4341

S/N 11543

MI

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VOL 18

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```

Notes:
- Selections with broken lines indicate a non-displayable function.
- Selections with asterisks (*) not available at all microcode levels.

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Model Group 2

CONTENTS

INTRODUCTION

This manual provides information required by the operator for:

- Normal system operations.
- Procedures that can be carried out by service representatives.

The 4341 system consists of one 3278 Display Console Model 2A (standard) or the 3279 Color Display Console Model 2C (optional). Optional features allow three additional devices (3278-2A, 3279-2C Display Consoles or 3287 Model 1, 2, 1C, and 2C Printers) in any arrangement. Optional display consoles can be assigned used as alternate operator display consoles.

OPERATOR CONSOLE

The operator console for the 4341 consists of:

- A control panel
- A display screen
- A display keyboard.

Messages and status information appear on the display screen in clear text. Most of the operator functions are performed at the keyboard.

Manual operations (such as displaying and altering data, loading programs, and running the system in instruction-step or address-compare mode) are performed by keying characters from the keyboard into displays on the video screen. The screen is used to display all actions. No indicator lights are to be decoded. All information is displayed on the screen, either in clear text, hexadecimal notation, or binary zeros and ones.

A permanent display of the 4341 status is at the lower part of the screen.

Operator Control Panel (OCP)

The operator control panel has switches for basic tasks (such as making the system operational) and lights to alert the operator of system status.

Display Console/Keyboard

The Display Console is the principal device for the operator to communicate with the system. The keyboard and the display can control system operations as well as display the status of the system. The display keyboard has alphameric, control, and function keys. All keys, except the Copy key and those keys designated for CE use only, operate when the console is in display mode.

3287 Printer

The 3287 Printer provides a printed copy of information that is displayed at a display console, or of information written from the program. Printed data appears in the same alphameric characters and symbols that appear on a display image. Printouts can be formatted in the same manner as a display image. The cursor indication is not shown on the printer output.

Hardware Configuration

The 4341 Processor consists of one 3278-2A (standard) or 3279-2C (optional) Display Console. Optional features allow three additional 3278-2A, 3279-2C or 3287 devices to be attached to the support processor and configured as needed. The 3278-2A and 3279-2C operator console keyboard has 75 keys including 12 Program Function keys. All alphameric, graphic, and cursor control keys are typamatic. When held pressed, typamatic keys automatically repeat at approximately ten operations a second.

The following figure indicates the 4341 hardware configuration.

```
          ┌─────────────────────────┐
          │          P U            │
          ├─────────────────────────┤
          │     BYTE CHANNEL 0       │
          └─────────────┬───────────┘
                        │
                ┌───────┴───────┐
                │     L C A     │
                └───────┬───────┘
                        │
          ┌─────────────┴───────────┐
          │  SUPPORT    PROCESSOR   │
          └─────────────┬───────────┘
                        │
                ┌───────┴───────┐
                │     D C A     │
                └───┬───────┬───┘
         ┌──────────┘       └──────────┐
   ┌─────┴────┐  ┌──────┐  ┌─────┴────┐  ┌──────┐
   │ 3278 2A  │==│ 3287 │  │ 3278 2A  │==│ 3287 │
   ├──────────┤  └──────┘  ├──────────┤  └──────┘
   │ 3279 2C  │            │ 3279 2C  │
   └──────────┘            └──────────┘
```
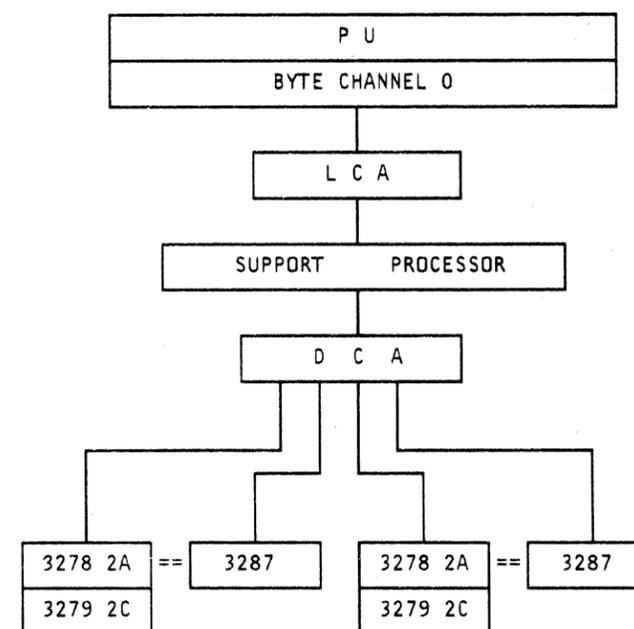
Modes of Operation

The 3278-2A and 3279-2C Display Consoles have three modes of operation that affect screen format: Display mode, Printer/Keyboard mode, and Manual mode. The Display and Printer/Keyboard modes are used under the control of the operating system. Manual mode, which can be entered at any time, provides control of basic system functions.

Display Mode

In display mode, the 3278-2A or 3279-2C Display Console and the optional 3287 Printer are separately addressable devices operating as a 3270-type of operator console. Data may be entered or displayed on the display console and separately printed on the hard-copy printer.

Printer/Keyboard Mode

In printer/keyboard mode, the 3278-2A or 3279-2C Display Console and the optional 3287 Printer share a single address. This mode is used to emulate a 1052 for those operating systems and programs designed for that type of operator console. Operating messages to and from the system are displayed on the display console and also printed on the coupled printer.

Manual Mode

When the system is in manual mode, the display console is under control of support processor microcode. The system uses the display console to display or alter data, control a function, or display the results of a function. The support processor manual functions are: to alter/display storage, registers, PSW, UCWs, etc., or to compare stop on addresses or data. All manual function facilities are displayed on the General Selection screen (Q).
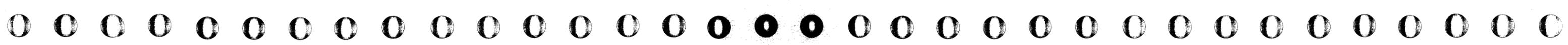
OPERATOR CONTROL PANEL (OCP)

The operator control panel (OCP) is on both the 3278-2A and 3279-2C keyboards. The OCP provides the facilities to control the system power and the associated initial microcode load and to monitor the system operating states.

OCP SWITCHES

Power On/IML Switch

This switch has a dual function. Powering on the system by pressing this switch:

- Applies power to the processor.

- IMLs the support processor. (A subsequent, nonrelated IML of the processing unit occurs at the conclusion of the power-on cycle).

- Powers on all I/O devices that are switched to power on/off with the processor.

- IMLs the instruction processor if IML at power-on is specified on the Program Load screen.

If system problems later occur during operational processing, pressing Power On re-IMLs the support processor without powering down the system. Note, that a re-IML does not reset any PU errors.

Notes:

- *The 4341 requires 15 seconds of warmup time after the main power is applied before the operator control panel can power up the system.*

- *The Power On/IML switch must not be pressed within approximately 30 seconds following a power-off or a BASIC CHECK results. The cooling fans must have time to stop.*

- *After initiating power-on or re-IML, do not perform any other functions or press any key, until the power-on or re-IML is complete. These functions cannot be aborted as microcode is involved in a very complex sequence. Even if you make an error, you must wait for the sequence to be completed.*
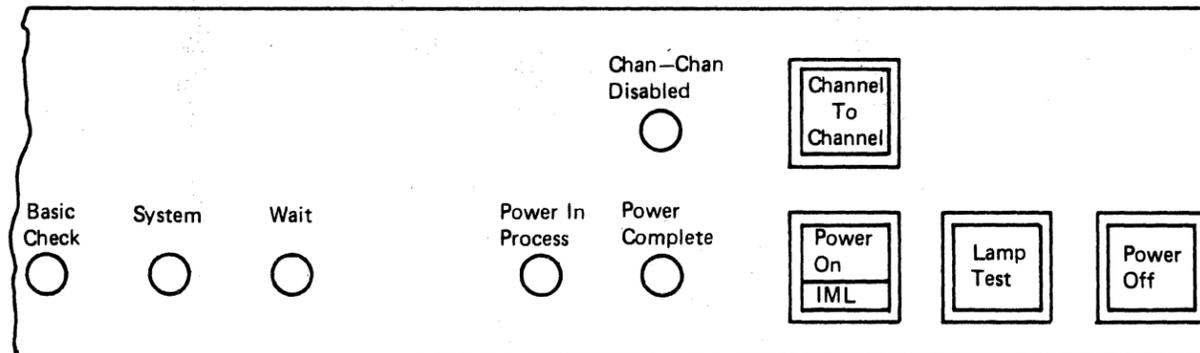
Logic Reset Key

Note: *This key is inside the machine near the diskette drive.*

This key invokes a process which attempts to restore proper operation to the SP without reloading any code. However, to do this, a small module is read from the diskette. Therefore, the diskette must be operational. All adapters and certain control blocks are reset; then the General Selection screen appears.

Power Off Switch

This switch removes power from the system under control of the power sequencing program resident in the support processor.

Note: *Observe the notes for Power On/IML switch above; they apply to this switch also.*

Channel-to-Channel Switch

The channel-to-channel switch is required for systems having a channel-to-channel adapter feature. This switch is activated to make a logical interface connection of one processor to another processor for data sharing purposes. Normally, it is activated only two times during the workday:

1. After power-up completion. Activation places the interface in the enabled mode and causes the Disable indicator to go out.

2. Prior to powering off. Power Off should *not* be pressed until the Chan-Chan Disabled indicator comes on.

Lamp Test Switch

This switch is used by the operator to check whether or not all indicators are working.

OCP INDICATORS

Power In Process

This indicator turns on as soon as the Power On switch is pressed. It remains on through the power-on sequence of hardware initialization of the support processor, IML, processor power sequence, and control unit power. At this point it goes out, and the Power Complete light turns on.

Power Complete

This indicator turns on at the end of the power-on sequence.

Chan-Chan Disabled

This indicator is associated with the Channel-to-Channel switch and comes on when the processor logical interface is not connected. When lit, the operator can power down the system and not lose data or hang up the other processor.

Basic Check

This indicator turns on when a hardware malfunction exists in the basic power (hardwire sequence), the display console, or when the CE switch is in the CE Mode.

If the Operator Console has a control panel, a power-off, a Test Mode condition, an open coax cable or a console and/or DCA hardware failure, the Basic Check indicator turns on. When power is restored and the console is returned from Test mode, the Basic Check indicator is reset.

System

This indicator is on when PU operations are active; for example, during instruction processing.

Wait Indicator

This indicator is on when the processor is idle (processing clock is running, but no instruction processing is taking place).
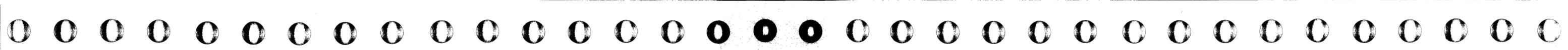
3278 DISPLAY CONSOLE MODEL 2A

CONSOLE CHARACTERISTICS

The 3278 Display Console Model 2A has a screen size of 1920 characters, 24 lines at 80 characters per line. The bottom four (21-24) lines are reserved for system status information. Both uppercase and lowercase characters can be displayed.

Display Image

The display image format is divided into three functional areas.
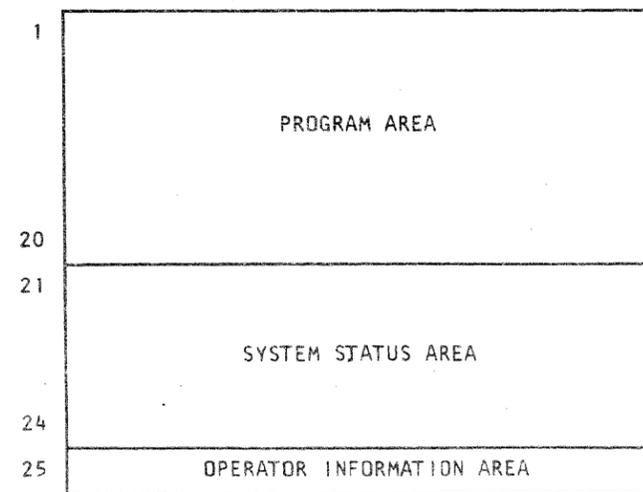
```
 1 ┌───────────────────────────────┐
   │                               │
   │                               │
   │         PROGRAM AREA          │
   │                               │
   │                               │
20 │                               │
21 ├───────────────────────────────┤
   │                               │
   │        SYSTEM STATUS AREA     │
24 │                               │
25 ├───────────────────────────────┤
   │       OPERATOR INFORMATION AREA │
   └───────────────────────────────┘
```

Program Area

Lines 1-20 display the operator input and host program output messages.

System Status Area

Lines 21-24 display system status. for the layout for these four lines, see "System Status."

Operator Information Area

Line 25 for displays console and keyboard status.

3278 MODEL 2A OPERATOR CONTROLS
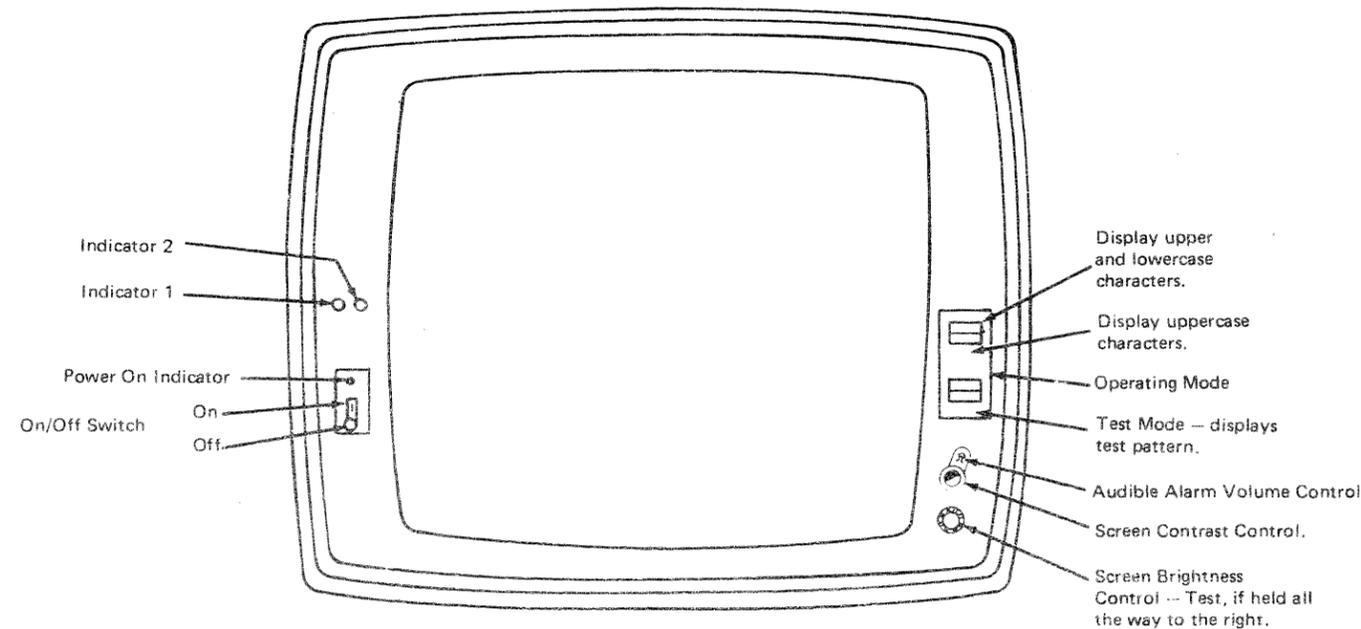
Indicator 2
Indicator 1
Power On Indicator
On/Off Switch — On — Off
Display upper and lowercase characters.
Display uppercase characters.
Operating Mode
Test Mode — displays test pattern.
Audible Alarm Volume Control
Screen Contrast Control.
Screen Brightness Control — Test, if held all the way to the right.

Power On/Off Switch

Push in on the top portion of the Power On/Off switch to apply power to your display. The red indicator is visible at the lower part of the switch when it is in the On (I) position. This is a reminder to turn power off (O) before leaving your display. The On indicator and Indicator 1 turn on when you turn on the Power switch. A delay of a few seconds allows the machine to warm up. After this delay, Indicator 2 turns on, and the cursor appears in the first character position on line one.

To turn off the display console, push in on the bottom portion of the Power On/Off switch.

The Power On/Off switch is used together with the Normal/Test switch to make the device ready or not-ready. On and Normal create a ready condition; Off or Test create a not-ready condition. In the not-ready case, intervention required sense is set, and Start I/O instructions to the device are rejected. When a not-ready-to-ready transition occurs, device-end status is presented. Whenever the device is made ready in this manner, a blank program area screen appears.

Brightness Control

You can adjust the brightness of the characters displayed on the screen by turning the brightness control knob to the left or to the right. Turning it to the right makes the display image brighter; to the left, dimmer. Find the setting most convenient and comfortable for your viewing. If held all the way to the right, a raster pattern is displayed for test purposes. This raster pattern can vary between consoles.

Contrast Control

The contrast control can aid in adjusting the display for comfortable viewing. Two intensity levels are used to display characters, the contrast control varies the difference between these two levels. Experiment to find the contrast level that is prefered.

Audible Alarm Volume Control

If the display console has the Audible Alarm feature, the volume control for the audible alarm is at the outside of the screen contrast control. Turning this control clockwise increases the sound level; turning the control counterclockwise decreases the sound level. To test or adjust the audible alarm, refer to "Audible Alarm Feature."

Normal/Test Switch

When you are operating the display station, have this switch in the Normal position.

Use the Test position of this switch when you have a problem with the display console and you perform the Problem Determination Procedures. When you place the switch in the Test position, the operator can perform tests that help diagnose the cause of the problem.

The Normal/Test switch is used together with the Power On/Off switch to create ready and not ready conditions. See "Power On/Off Switch" above.

Dual Case/Mono Case Switch (Aa/A)

When this switch is set to dual case (Aa), both uppercase and lowercase alphabetic characters are displayed on the screen.

When the switch is set to monocase (A), both lowercase and uppercase alphabetic characters are displayed in uppercase.

Regardless of how the switch is set, lowercase characters are transmitted if you do not switch to uppercase and they may be received as data on a Write command.

3278 MODEL 2A INDICATORS

The 3278 Console Display Model 2A has both off-screen and
on-screen indicators. The off-screen indicators are on the
left front of the display. The on-screen indicators are
displayed on the bottom line of the display.

Off-Screen Indicators

Power On Indicator

The Power On indicator, when lit, indicates that power is on
in the display console. It turns on when you turn the Power
On/Off switch to the On position.

Indicator 1

Indicator 1, when lit, indicates that the internal console
circuits for the display image are ready. It turns on when you
turn the Power On/Off switch to the On position.

Indicator 2

Indicator 2, when lit, indicates that the high-voltage circuits in
the display console are on. It turns on a few seconds after
you place the Power On/Off switch in the On position.

On-Screen Indicators

The On-Screen indicators are messages that appear on line
25 in the Operator Display Area. For messages, refer to
"Messages."

3279 COLOR DISPLAY CONSOLE MODEL 2C

CONSOLE CHARACTERISTICS

The 3279 Color Display Console Model 2C is a tabletop display using a high-resolution color cathode ray tube (CRT) display. The 3279-2C Base Color Mode provides four different colors, which can be produced by existing 3270 application programs with little or no reprogramming. Fields can be displayed in red, blue, green, or white. Field colors are determined by the four combinations of the field protection and intensity attributes.

The 3279-2C Display Console has a screen size of 1920 characters, 24 lines at 80 characters per line. The bottom four (21-24) lines are reserved for system status information. Both uppercase and lowercase characters can be displayed.

FIELD ATTRIBUTES

COLOR DISPLAY

3279 MODEL 2C

PROTECTED	INTENSITY	COLOR	MONO MODE
NO	NORMAL	GREEN	GREEN
NO	HIGH	RED	WHITE
YES	NORMAL	BLUE	GREEN
YES	HIGH	WHITE	WHITE

Display Image

The display image format is divided into three functional areas.

Program Area

Lines 1-20 display the operator input and host program output messages.

System Status Area

Lines 21-24 display system status. For the layout for these four lines, see "System Status."

Console Indicator Area

Line 25 for displays console and keyboard status. Line 25 is displayed in the color blue.

3279 MODEL 2C OPERATOR CONTROLS
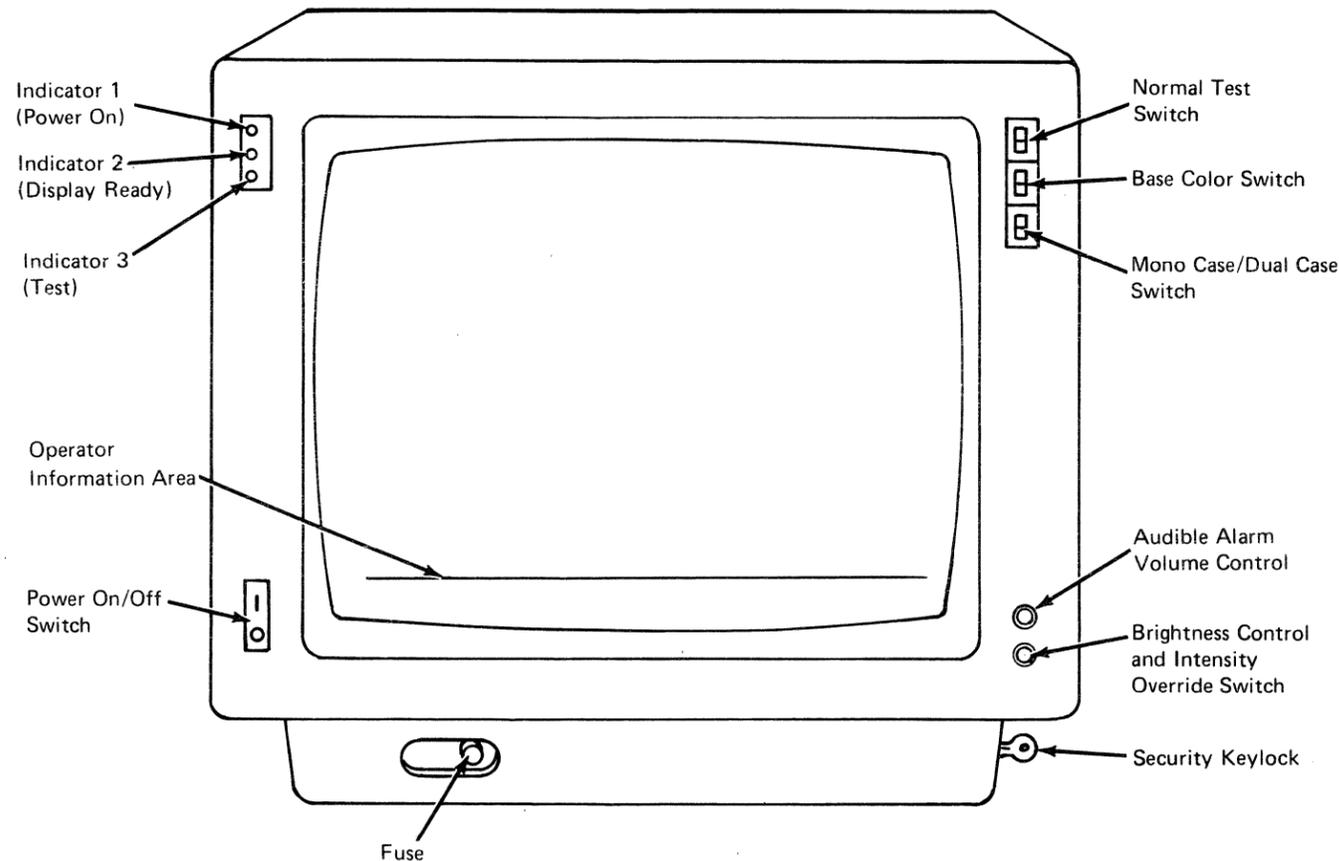
Power On/Off Switch

Push in on the top portion of the Power On/Off switch to apply power to your display. The On indicator and Indicator 1 turn on when you turn on the Power switch. A delay of a few seconds allows the machine to warm up. After this delay, Indicator 2 turns on, and the cursor appears in the first character position on line one.

To turn off the display station, push in on the bottom portion of the Power On/Off switch.

The Power On/Off switch is used together with the Normal/Test switch to make the device ready or not-ready. On and Normal create a ready condition; Off or Test create a not-ready condition. In the not-ready case, intervention required sense is set, and Start I/O instructions to the device are rejected. When a not-ready-to-ready transition occurs, device-end status is presented. Whenever the device is made ready in this manner, a blank program area screen appears.

Brightness Control

You can adjust the brightness of the characters displayed on the screen by turning the brightness control knob to the left or to the right. Turning it to the right makes the display image brighter; to the left, dimmer. Find the setting most convenient and comfortable for viewing. If held all the way to the right, a raster pattern is displayed for test purposes.

Intensity Override Switch

Operates when the brightness control is turned fully counterclockwise. This position sets the brightness circuits to maximum and the screen shows full rasters of red, blue and green. These are converged if the Test/ Normal switch is set to NORMAL on the 3279 and unconverged when set to the TEST position.

Base Color Switch

In the base color position (0000), the base colors red, blue, green and white are displayed. In the monochrome position (00), the base colors blue and red are replaced by green and white. Green and white fields are not affected.

Audible Alarm Volume Control

Turning this control clockwise increases the sound level; turning the control counterclockwise decreases the sound level. To test or adjust the audible alarm, refer to "Audible Alarm Feature."

Normal/Test Switch

When you are operating the display station, have this switch in the Normal position.

Use the Test position of this switch when you have a problem with the display console and you perform the Problem Determination Procedures. When you place the switch in the Test position, the operator can perform tests that help diagnose the cause of the problem.

The Normal/Test switch is used together with the Power On/Off switch to create ready and not-ready conditions. See "Power On/Off Switch" above.

Dual Case/Mono Case Switch (Aa/A)

When this switch is set to dual case (Aa), both uppercase and lowercase alphabetic characters are displayed on the screen.

When the switch is set to monocase (A), both lowercase and uppercase alphabetic characters are displayed in uppercase.

Regardless of how the switch is set, lowercase characters are transmitted if you do not shift to uppercase and they may be received as data on a Write command.

3279 MODEL 2C INDICATORS

The 3279 Console Display Model 2C has two types of
indicators: off-screen indicators and on-screen indicators.
The off-screen indicators are on the left front of the display.
The on-screen indicators are displayed on the bottom line of
the display screen.

Off-Screen Indicators

Power On Indicator

The Power On indicator, when lit, indicates that power is on
in the display console. It turns on when you turn the Power
On/Off switch to the On position.

Indicator 1

Indicator 1, when lit, indicates line supply and +5 volts are
available. This does not confirm the availability of other
voltages throughout the machine, but it does turn on when
the Power On/Off switch is in the On postion.

Indicator 2

Indicator 2, when lit, indicates that the high-voltage circuits in
the display console are operating. It turns on about 40
seconds after you place the Power On/Off switch in the On
position. This allows for warmup.

Indicator 3

Indicator 3, when lit, indicates Normal/Test switch is in the
Test position.

On-Screen Indicators

The On-Screen Indicators are messages that appear on line
25 in the operator display area. For messages, refer to
"Messages."

DISPLAY/KEYBOARD

KEYBOARD CHARACTERISTICS

The 3278-2A and 3279-2C keyboards enable the operator to communicate with the system. Most functions are available in the stopped and running states of the system.

The characters that can be displayed consist of 26 uppercase and 26 lowercase alphabetic characters, 10 numeric characters, and 32 symbols and punctuation marks. The keyboard also contains input control keys, cursor control keys, program function keys, and system function keys.

Keys that have two characters on the key tops can display either of them depending upon the position of the shift key. The lower character displays when the keyboard is in the unshifted mode (the shift key not pressed). To display the upper character, hold the shift key down or press the shift lock key before pressing the character key.

Those keys that appear on the front face of indicated keys on the keyboard are program function keys and system function keys. To select one of these functions, hold the ALT key down while pressing the key that indicates the specific function you want.

Typamatic Keys

A majority of the keys have the typamatic feature. For example, if you hold the key down, the character or function automatically repeats at a rate of approximately ten operations per second until you release the key. The keys that have this capability are:

- Character keys (alphabetic, numeric, and special characters).
- Cursor moving keys
- Program Function (PF) and Enter keys

Alphameric and Special Character Keys

These keys can only be used when an unprotected field is present. At that time, pressing the key causes the character indicated to appear and the cursor to advance. At other times, or if the cursor is not in an unprotected field, pressing these keys causes the INHIBITED message to appear on line 25 of the display. The INHIBITED condition is cleared with the RESET key.

Data displayed is not effective until ENTER is pressed. This greatly reduces the possibility of entering erroneous or incorrectly formatted data.

When operated with the ALT key held down, the numeric keys become PF1 through PF10.

Key Symbols

Instead of language, the following symbols appear on the display keyboard:

Key Function	Symbol
Backspace	←
Tab	→|
Backtab	|←
Home	� symbol
Cursor Up	↑
Cursor Down	▼
Cursor Left	←
Cursor Right	→
New Line	←↵
Shift	⇧
Shift Lock	shift lock symbol
Insert	^a
Delete	delete symbol
Page Up	Page ↑
Page Down	Page ↓
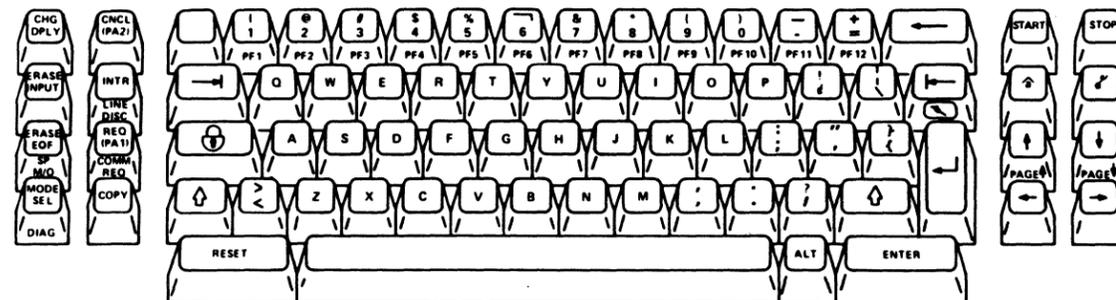
Symbols and Punctuation Marks

These characters are in two groups because of their physical locations. The first group contains the symbols that are on the upper part of the key top that have numerals 1 through 0 on the lower half. The second group is on keys that have two special symbols on them. The display symbols that appear on the upper half of a key require pressing of the shift key. All the symbol and punctuation mark keys are typamatic when held down.

Numeric Key	Upper Half of Numeric Key	
1	I	(logical OR, vertical bar)
2	@	(at sign)
3	#	(number sign)
4	$	(dollar sign)
5	%	(percent sign)
6	¬	(logical NOT sign)
7	&	(ampersand)
8	*	(asterisk)
9	(	(left parenthesis)
0	)	(right parenthesis)

Lower Symbol		Upper Symbol	
`	(grave accent)	~	(equivalent, similar)
-	(minus sign)	__	(underscore)
=	(equal sign)	+	(plus sign)
¢	(cent sign)	!	(exclamation point)
\	(back slash)	¦	(broken vertical line)
;	(semicolon)	:	(colon)
'	(apostrophe)	"	(quotation mark)
{	(opening brace)	}	(closing brace)
<	(less than sign)	>	(greater than sign)
,	(comma)	,	(comma)
.	(period)	.	(period)
/	(slash)	?	(question mark)

Model Groups 1 and 2

Shift and Shift Lock

The SHIFT and SHIFT LOCK keys are the same as on a standard typewriter keyboard. When either the left or the right SHIFT key is pressed, the upper symbols shown on the key tops are displayed when their respective keys are pressed. If the character key has no upper symbol (such as the alphabetic keys), the uppercase characters appear on the screen. The SHIFT keys are nonlocking and must be held down.

Pressing the SHIFT LOCK key locks the keyboard in the shifted (uppercase) mode. When the SHIFT LOCK key is used, you need not hold the SHIFT key down. This frees both hands for typing. Pressing either SHIFT key resets the SHIFT LOCK to return the keyboard to the unshifted (lowercase) mode.

ALT

The ALT key selects the function that appears on the face of specific keys. To invoke the alternate function, hold the ALT key down and then press the desired function key.

Space Bar

A space is considered an actual character that occupies a position on the screen. When the space bar is pressed, a space is entered on the screen and replaces whatever character is presently in that position. For this reason, the space bar should not be used to position the cursor. The space bar is typamatic.

Cursor Control Keys

The cursor keys control the vertical and horizontal movement of the cursor. These keys position the cursor without affecting the information on the screen.

The two types of cursor control keys are:

1. Those that move the cursor to the first character location in an unprotected field.

2. Those that move the cursor one character position at a time.

Moving Cursor to Beginning of Field

New Line Key

The New Line key moves the cursor to the first unprotected character location of the next line. If all character positions of the next line or lines are protected, the cursor continues as many lines as necessary to the first unprotected field. If all character positions on the display screen are protected, the cursor is repositioned to the first character location on the first line. The New Line key is typamatic and moves the cursor quickly from line to line.

Tab Key

Pressing the Tab key moves the cursor to the right to the first character location of the next unprotected data field.

Pressing the Tab key moves the cursor to the first character location on line 1 if the screen is not formatted or if there are no unprotected data fields. Tab key is typamatic and moves the cursor quickly from field to field.

Back Tab Key

The Back Tab key moves the cursor back to the first character position in an input field.

If the cursor is already in the first character position of an input field, pressing the Back Tab key moves the cursor back to the first character position of the preceding input field.

Pressing the Back Tab key moves the cursor to the first character position on line 1 if the screen is not formatted or if there are no unprotected data fields.

Home Key

Pressing the Home key repositions the cursor to the first unprotected character position on the screen. If there are no unprotected character positions on the screen, the cursor is placed at the first character position on line 1.

Moving Cursor One Character Space

Horizontal Positioning

Pressing either of the two horizontal keys (right or left) moves the cursor in the direction of the arrow, one character position at a time, including unprotected and protected alphameric character and attribute character locations. These keys can cause the cursor to wrap and reposition the cursor to the next or preceding line of characters. These keys are typamatic. If the cursor is positioned in a protected field or attribute position, no data can be entered at that location.

Vertical Positioning Keys

Operating either of two vertical cursor positioning keys (cursor up, cursor down) moves the cursor in the direction of the arrow, one line at a time. These keys can cause the cursor to wrap vertically. The cursor stays in the same character column. These keys are typamatic.

Backspace Key

Pressing the Backspace key moves the cursor one character space to the left for each pressing of the key. This key operates exactly like the horizontal (left) positioning key and is also typamatic.

Input Control Keys

Insert

Pressing the Insert key allows the insertion of a character, or a string of characters, into the middle of a field without disturbing the information already displayed there. Pressing the Insert key places the keyboard in the insert mode of operation. The word Insert is displayed on line 25 to remind you that your keyboard is in the insert mode.

All the keyboard control keys perform normally when in insert mode.

Delete

Pressing the Delete key when the cursor is located in an unprotected field deletes the character at the cursor position. All characters in the field to the right of that position and on the same line are then shifted left one position and a null character is added to the end.

The Delete key is active for the display, printer/keyboard, or manual mode.

Erase Input

Pressing the ERASE INPUT key erases all input fields on the screen. On a permanently displayed document with blanks to fill in, only those areas in which you can enter data are erased. The cursor moves to the first character position in the first field in which you can begin keying input data.

Pressing the ERASE INPUT key for a screen with no input fields erases nothing. The cursor moves to the first character position on line 1.

Pressing the ERASE INPUT key for an unformatted screen erases all character positions. The cursor moves to the first character position on line 1.

Erase EOF

Pressing the ERASE EOF (Erase to End of Field) key erases (blanks) character positions in that input field from the cursor location to the end of the field. The cursor, however, does not move. If the screen is unformatted, all character positions from the cursor to the last character position of the bottom line are erased.

For example, if incorrect information has been keyed in a field, press the Back Tab key to return the cursor to the beginning of the field, press the ERASE EOF key to erase the incorrect information, and then key in the correct information.

Reset

Pressing the RESET key restores the keyboard to its normal mode of operation. The keyboard is inhibited whenever an attempt is made to enter a character into a protected location. This can occur when the cursor is moved (via the cursor keys) to a protected field. When the keyboard is inhibited, the alphameric and symbol keys can be pressed, but no action results. The message INHIBITED appears on line 25 on the display. To remove the inhibit, press the RESET key.

To find the next unprotected field (and avoid inhibiting the keyboard again), press the Tab or Back Tab key.

Enter (Display Mode)

In display mode, the ENTER key causes an attention status and sets an attention identifier (AID). The software performs a subsequent Read command to obtain the AID and any entered data.

Note: *Before the ENTER key is pressed, the keyed in data is displayed on the screen and can be changed or corrected.*

Enter (Printer/Keyboard Mode)

During a read operation, pressing the ENTER key signals that data entry is complete and transfers the input data to the channel. The data is read, and the input area is cleared and protected. If no Read is in progress, the ALARM indicator is cleared and the keyboard unlocked.

Note: *Before the ENTER key is pressed, the keyed in data is displayed on the screen and can be changed or corrected.*

Enter (Manual Mode)

When the screen is being used as the machine panel for manual operations, pressing the ENTER key causes the specified operation to be performed.

Note: *Before the ENTER key is pressed, the keyed in data is displayed on the screen and can be changed or corrected.*

Cncl (Display Mode)

Pressing the CNCL (cancel) key generates an attention interrupt to the operating system in display mode.

Cncl (Printer/Keyboard Mode)

During a read operation, the CNCL key initiates a cancel response to the channel. The cancel response is a channel end with exception. The input area is cleared and protected and an asterisk (*) is written in the display area. No data is transferred across the channel. If no Read is in progress, the ALARM indicator is cleared and the keyboard is unlocked.

Cncl (Manual Mode)

The message FUNCTION KEY IGNORED is displayed if the CNCL key is pressed while in manual mode.

Req (Display Mode)

Pressing the REQ key generates an attention interrupt to the operating system in display mode.

Req (Printer/Keyboard Mode)

The REQUEST key initiates communication with the operating system by sending an attention status (X'80'). If the request status cannot be sent immediately because of a busy condition, the REQUEST indicator appears, and the attention is stacked. When the device becomes not busy, the attention is sent and the REQUEST indicator is cleared.

Req (Manual Mode)

The message FUNCTION KEY IGNORED is displayed if the REQUEST key is pressed while in manual mode.

Note: *Do not confuse the REQ and INTR keys. The red INTR key is used to cause an EXTERNAL INTERRUPT.*

Program Function Keys

PF1 — PF12 (Display Mode)

In addition to the functions permanently assigned to system function keys, application programs can define the action that occurs with any one of the PF (program function) keys. Program function keys allow the operator to tailor the keyboard to fit some specific need.

To activate a programmable function, hold the ALT key pressed, and then press the appropriate PF key.

The PF keys generate attention interrupt with the appropriate AID value when in display mode.

PF1 — PF12 (Printer/Keyboard Mode)

These keys clear the ALARM indicator and unlock the keyboard when in printer/keyboard mode.

PF1 — PF12 (Manual Mode)

These keys are reserved for power screen function.

System Function Keys

Chg Dply

Pressing the CHG DPLY key causes the display screen program area to switch from the operating system buffer to the manual operations buffer (manual mode), and vice versa.

The keyboard becomes inhibited when another console has been placed in manual functions mode through a MODE SEL or a CHG DPLY.

CHG DPLY Restrictions:

- *Pressing the CHG DPLY key while displaying one of the following screens causes the INHIBIT indicator to be set:*

QMW	*QMP*	*QEB*
QMA	*QMV*	*QEE*
QMD	*QEL*	

  Press RESET to clear.

- *When the momentary or error status screens are displayed, pressing the CHG DPLY key causes the system to exit to the Partly Power Up and Down screen (QMW).*

Mode Sel

Pressing MODE SEL invokes the manual function and brings the General Selection screen to the display. The state of the machine is not changed when the MODE SEL key is pressed. The only difference is that the screen cannot be used by the operating system.

The last screen of the operating system (that was on the screen before the MODE SEL key was pressed) is stored by the machine for later use. If the MODE SEL key was pressed accidentally, key Z and press ENTER. This releases the screen to the operating system and restores the previous screen.

The MODE SEL key performs the same function in display, printer/keyboard, or manual mode.

The keyboard becomes inhibited when you press MODE SEL and another console has already been selected.

Diag

This key is a CE diagnostic function.

Whenever the Diagnostic key is pressed, a copy of the Testcase Monitor is read into the support processor storage, and execution of the Testcase Monitor begins.

The key can be used when in manual console functions mode, or while running Testcase Monitor to start it.

Note: *If the DIAG key and the ALT key are accidently pressed: To exit the diagnostic function, either press the MODE SEL key or, Enter E next to SELECTION and press ENTER.*

SPM/O

Note: *This function is to be used only under the guidance of the field support center.*

The SPM/O (support processor manual operations) key is reserved for CE use only, and can be invoked only after the CE key is activated. Pressing this key while the ALT key is held down, invokes the SPIL manual operations.

You must be in manual functions mode to use this key.

Note: *To exit from this function:*

1. *Enter 7 following the MANUAL OPS FOR LEVEL MESSAGE, and press ENTER.*

2. *In field 3, enter G following the F, and press ENTER.*

   This clears the message and returns you to normal operation.

Intr

Pressing the INTR key requests an external interruption. This key is active from any display console when you are in normal operation.

If you are in manual mode, this key is only operative on the display console that is in manual mode.

Start

Pressing the START key on any console when all consoles are in normal operation causes the system to execute instructions at the current operation rate.

Operating Restrictions:

- When the operation rate control is other than NORMAL, only one instruction is processed each time the START key is pressed.

- When the START key is pressed after a normal stop, the system carries on instruction processing as if no stop has occurred, provided the operation rate function is at NORMAL.

- The START key has no effect when instruction processing is in progress, with the system in wait state, or with the system in the check-stop state.

- The START key is inactive if a maintenance or log display program is running.

- The START key is active only on that console which is in manual mode. The START key on any other console is inoperative.

Stop

Pressing STOP places the system in manual mode after the current instruction has been processed, and any pending interruptions have been serviced. This key is active on any display console when in normal mode.

Operating Restrictions:

- If the STOP key is pressed while the console printer is printing, the printer completes the operation even after MAN appears in line 21.

- The STOP key is inactive if a maintenance or log display program is running.

- When PSW looping occurs, the STOP key has no effect, and only a system reset or an IPL can cause a normal stop.

- The STOP key is active only on that console which is in manual mode. The STOP key on any other console is inoperative.

- Normally when STOP is pressed, the ADDR and DATA fields on line 21 are updated. However, sometimes they may not be updated if the message CHANNEL 0 UNAVAILABLE appears on line 23 position 1.

- Normally, when STOP is pressed, within a few seconds the words INSTR STOP appear on line 21.

Page

The page function (manual mode only) allows you to increase or decrease storage addresses. This allows you to display new blocks of storage. The amount the address increases or decreases depends upon the manual function being executed.

You must be in manual mode to use this key.

To increase the address, hold the ALT key pressed and press the PAGE UP key.

To decrease the address, hold the ALT key pressed and press the PAGE DOWN key.

A message PAGING KEY IGNORED appears on line 20 when the paging keys have no significance to the function being performed, or if the address that would be generated by paging is either too high or too low for the function, or the previous command had a nonpaging error.

Note: *Pressing the paging key, while using the Copy-to-Diskette (KD) or the Copy-to-Channel Printer (KC) options, may require you to press the key twice after using the copy key function.*

Remote Facility Keys

Comm Req

The Communications Request (COMM REQ) key initiates voice or terminal communication between an on-site service representative and a remote specialist. The initiation of COMM REQ can be done by either the on-site service representative or the remote specialist.

Line Disc

The Line Disconnect (LINE DISC) key disconnects the data link and can also be used to abort the RSF. Use this key if an RSF fails to initialize and the SP appears to be hung up.

Note: *These keys are for service personnel only.*

Copy

The COPY key is used to make a copy of the information displayed on the screen.

The COPY key can be assigned to make a copy in three different ways:

- By a console attached printer
- To the diskette
- By a channel-attached printer.

The COPY Key is operative when in manual operations and with proper assignment. For more information about Copy Key, see "Program Load Copy Key (Kx)."

FEATURES

SECURITY KEYLOCK (Optional Feature)

The Security Keylock feature is an optional feature and may not be installed on all systems. On the 4341, it has the following characteristics:

- A hardware feature on the display console.

- Security keylock microcode is installed on all systems, but is only activated when the Security Keylock feature is installed.

- All functions are normal when:
  - Security Keylock feature is not installed
  - Security Keylock feature is ON.

- When Security Keylock is OFF:
  - Keyboard is locked
  - Console is blank
  - INHIBITED indicator on line 25 is on
  - Intervention required is the response to application programs
  - No power-on/IML can be done.

Note: *If the main display console is off and the Power-On/IML key is pressed, a message appears on the screen of all unlocked and operational display consoles on the system. This indicates that the CHG DPLY key should be pressed on the console from which the power-on/IML is to continue. The key is ignored if it is pressed on a console with the security lock in the OFF position. However, if the lock is turned to the ON position and the CHG DPLY key is pressed, the power-on/IML continues from that console.*

AUDIBLE ALARM FEATURE

A high-pitched tone sounds for about one second when the audible alarm is activated on the display console.

The audible alarm always sounds when you enter a character into the next to last character position on your screen. The cursor wraps from the last character position on the screen after a character is keyed into that last position. This is normal operation. The alarm warns that to key another character after the cursor has wrapped, enters it into the first character position on line 1 of your screen and destroys the data already displayed there.

The computer program can also activate the alarm. To do so, the program sends a signal to your display. The *User's Guide* for that program indicates if the audible alarm will sound and, if so, the different reasons for sounding it.

The volume of the audible alarm is adjustable. The adjustment control is located at the outside of the screen. Generally, it has been set for a normal operating environment. To test the volume level, the next-to-last character position must be in an unprotected input field. If your display station does not have have an unprotected input field in this area of the screen, check the application program *User's Guide* or ask your supervisor for instructions to obtain one. When you have an unprotected input field in this area of this area of the screen, move the cursor and key in a character in the next-to-last position on the screen. Then, listen to the level of the alarm. To check the sound level again, press the backspace key and then a character key. If the sound is not at the desired volume, adjust the alarm control and test the sound level again. When the volume is adjusted for your environment, press the ERASE INPUT key.
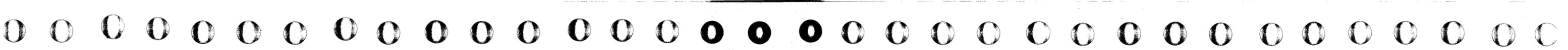
3287 PRINTER

PRINTER CHARACTERISTICS

The 3287 Printer Model 1 or 2 is a compact, desk-top, matrix printer with a nominal print rate of 80 characters per second (cps) for Model 1 and 120 characters per second for Model 2.

The 3287 Printer Models 1C and 2C print in four colors: red, blue, green, and black. The basic printer prints fields in one of four colors as determined by the existing field protection and intensity attributes.

The 3287 Model 1C rate is 80 cps and the 2C is 120 cps at maximum print rate for each color on a line. Print positions 1-120 can be printed in any of the four colors. Print positions 121-132 can only be printed in black.

A maximum of three hard-copy printers (3287s) can be on each system, but none is standard. If a hard-copy printer is installed, it must be configured on the System Configuration screen (QFS). When a 3287 is optionally coupled as a hard-copy device in printer/keyboard mode, it prints all data transferred across the channel interface. The data is arranged in lines of 126 or less characters as they would appear on a printer/keyboard printer. Each line is printed as soon as it is completed. A line is complete when one of the following conditions occurs:

- 126 bytes of data are received.

- A new-line character (X'15') is found in a Write or Write-ACR command data stream.

- All data is received on a Write-ACR command.

- After a Read command is executed.

- A system or selective reset occurs.

Note that, after a Write command (X'01') is executed, if a complete line has not been accumulated, the last partial line is not printed. The data is accumulated in the 3287 buffer and is printed when the line is completed by succeeding commands. The printer appears busy to a COPY key request at this time.

A system or selective reset causes a line feed if no data is present in the buffer.

The 3287 Printer provides an automatic printout when attached to the system in printer/keyboard mode, or it can be separately addressed by the system and it responds with the equivalent 3270 status and sense information, when the hard-copy printer is in display mode.

Copy Mode

The 3287 can be used to obtain local copies from the Display Console that is in manual mode, when the following conditions are met:

- A copy key device has been configured. The 3287 to be used for local copy must be specified on the Program Load screen (QL) or by using the K-selection. This makes the 3287 available for shared use with the operating system.

- The 3287 is not busy. The 3287 can be busy because of the following conditions:

  - In display mode, the 3287 is executing a 3270 CCW command, or the last write command does not specify Start Print in the WCC. In this condition, the printer is considered to have accepted data in preparation for a later print operation.

  - In printer/keyboard mode, an incomplete line is being saved in the 3287 buffer for later printing.

  - A previous COPY key request is not complete.

- The 3287 is operational.

The copy operation overwrites the 3287 buffer with the console display buffer. After printing is completed, the 3287 buffer is cleared. The printer output is formatted in 80 lines with NL, EM, and CR characters printed as spaces. Null lines are suppressed.

If a CCW command is received while a local copy is in progress, the command is queued until copy is complete. The command is then executed normally.

Audible Alarm

An audible alarm sounds a continuous, one-second beep when the 3287 printer enters the end-of-form condition or when a host-initiated request is received. The audible alarm is also operational in offline mode. The audible alarm knob, located under the left platen access cover, controls the alarm volume.

To reset the alarm, press HOLD PRINT, and then press ENABLE PRINT.

MODES OF OPERATION

PRINTER/KEYBOARD MODE

The printer/keyboard emulation mode allows the system to run operating systems and programs designed for that type of operator console.

In printer/keyboard mode, the display console shares the same address with a 3287 Printer. The 3287 Printer prints all data read from or written to the main console display. The main console displays 18 lines instead of the normal 20 lines. A maximum of 126 characters can be entered at one time from the console display keyboard. Line 19 and columns 1-46 of line 20 are reserved for data input. Columns 48-79 of line 20 are for indicators when in printer/keyboard mode. During printer/keyboard mode, hard-copy cannot be obtained, if a printer is not coupled or the system does not have a printer attached. The addresses are assigned and the coupling assigned from the Program Load screen. For more detail about assignments, see "Program Load Screen." The main display console and printer responds to printer/keyboard commands and send status and sense information back to the system. The following sections provide detailed information on using the display console and 3287 Printer in printer/keyboard mode.

The printer/keyboard mode is called *emulation mode* in some of the 4341 documents. In this manual, printer/keyboard operations are referred to as *printer/keyboard mode* or *Ptr/Kybd mode*. The Display Consoles and 3287 Printers are attached to the 4341 Processor via the support processor and are addressed via I/O instructions to channel 0 addresses. The device addresses used on channel 0 and the coupling assignment are selected by the operator and can be modified at any time. A maximum of two printer/keyboard devices can be configured at one time. The standard configuration of the 4341 system has one 3278-2A Display Console or 3279-2C which is the optional Display Console. Optional features allow three additional 3278-2A/3279-2C/3287 devices to be attached. These are configured from the Program Load screen. The 3278-2A and 3279-2C keyboard has 75 keys including 12 program function keys. All alphameric, graphic, and cursor control keys are typamatic.

```
column: 1                                                      80
line: 1  +------------------//---------------------------------+
         |                                                     |
         |                                                     |
         |               D I S P L A Y   A R E A               |
         |                                                     |
         |                                                     |
         |-----------------//----------------------------------|
  19     |                                                     |
  20     |    INPUT  AREA          |    INDICATOR  AREA        |
         |-----------------//----------------------------------|
  21     |                                                     |
         |             SYSTEM  STATUS  AREA                    |
  24     |                                                     |
         |-----------------//----------------------------------|
  25     |             OPERATOR  INFORMATION  AREA             |
         +-----------------//----------------------------------+
```
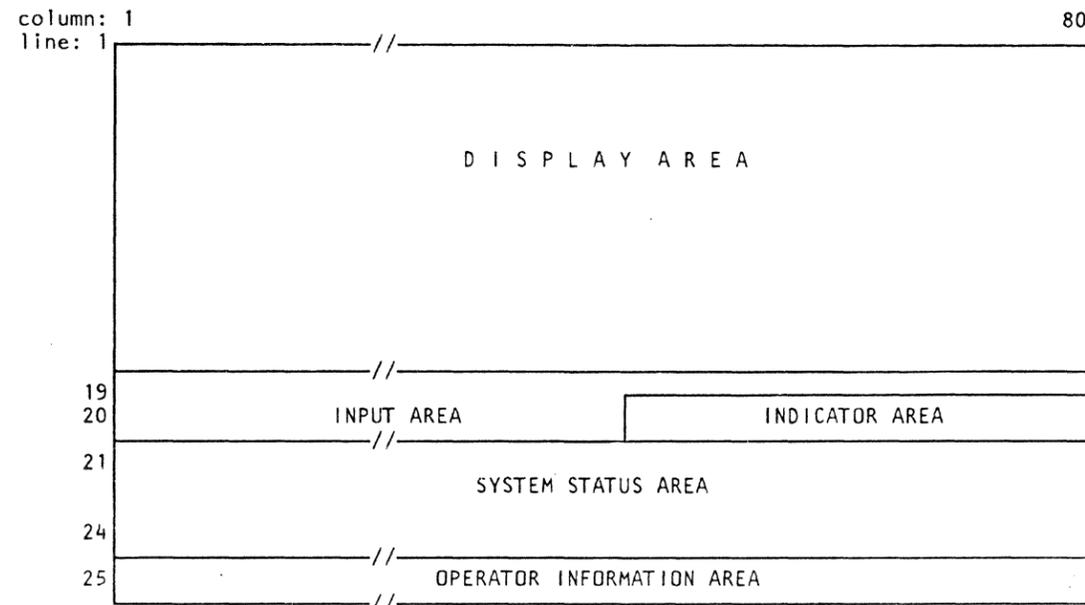
Display Console

In printer/keyboard mode, the entire 20-line system mode screen is controlled by the emulation module. After the screen is in printer/keyboard mode and made ready, the operator is only able to enter data on the screen when a Read command is issued. At other times, the entire display is protected from operator alteration.

Display Area

The display area starts in line 1 column 1 and ends on line 18 column 79. Lines 1-18 display the last 18 lines written or read to the device (3278-2A/3279-2C). Lines 19 and 20 are a 126-character input area with line 20 columns 48-79 used for emulate indicators. The data is organized into lines corresponding to lines of printer/keyboard printer output. Each new line begins in column 1 of a display area line. A line longer than 80 characters (the display area line length), wraps to the next line in the display area, to a maximum of 126 characters (the printer line length). When the 18-line display area is filled, the next new line causes the display area to be scrolled by 6 lines. Lines 7-18 move to the top of of the screen, and lines 13-18 are cleared and ready for additional input.

In order to allow the maximum amount of data to be displayed at all times in the display area, multiple New Line characters (NL=X'15') in a write data stream result in only one blank line on the display. Multiple blank lines caused by NL characters are displayed as only one blank line. This prevents data from being scrolled off the screen in cases where New Line characters are added to space the printer output.

Note: *Line 25 of the display console is used exclusively for indication of console and keyboard status.*

Input Area

The input area is defined by an attribute at line 18 column 80 and contains 126 characters on lines 19 and 20. This area is unprotected only when a Read command is in progress (PROCEED displayed). At other times, it is protected from operator alteration. The operator may enter and modify data for the Read, up to 126 characters, in this area. When the ENTER or CNCL key is pressed, the data in the input area is transferred across the channel. Data accepted by the channel for a Read command is moved to the display area and printed. If the channel stopped data transfer before all data entered by the operator is sent, only that data accepted appears in the display area.

The field initially contains all nulls. These are compressed out of the Read data and not transferred to the channel. The SPACE BAR must be used to enter spaces. Cursor movement keys leave nulls in the input area which are compressed from the data.

Indicator Area

The indicator area is a brightened field on line 20 columns 48-79 and is 32 characters in length. Columns 47 and 80 are attribute characters. This area is used to contain visual indicators signaling the state of the printer/keyboard device being emulated.

The indicators displayed on line 20 are PROCEED, REQUEST, ALARM, and INTV-REQD. They are used in printer/keyboard mode. This brightened field highlights the indicators above that of data.

Proceed

This indicator appears whenever there is a Read command in progress. Only at this time may the operator enter data in the input area. PROCEED is cleared when the READ command is ended, by one of the following conditions:

- Normal ending caused by ENTER or CNCL key.
- A system or selective reset.
- A Halt Device or Halt I/O instruction issued to the device.

Request

This indicates that a REQ (Request) key attention status has been stacked because the device is busy executing a command. When the current operation is completed, the attention status is presented to the channel and the REQUEST indicator is cleared. A system or selective reset also clears the REQUEST indicator.

Alarm

This indicator appears and the audible alarm sounds whenever an Alarm command is received. The indicator is cleared by one of the following:

- Pressing a Program Function (PF) key at any time.
- Pressing the ENTER or CNCL key when PROCEED is not displayed.
- System or selective reset condition.

Intv-Reqd

The Intervention-Required indicator appears if the 3287 Printer coupled as a hard-copy device becomes not ready. This condition can occur when end-of-form, power off, or other check conditions are present. At this time, a Start I/O is not accepted. When the check condition is cleared, the indicator is cleared, and device-end status is presented to the channel.

Printer/Keyboard Mode Commands

The printer/keyboard mode accepts and executes all commands valid for a printer/keyboard type device. The valid commands and the normal status response received are:

Command	Hex Value	Initial Status	Ending Status	Async. Status
Write	01	00	CE	DE
Write-ACR	09	00	CE	DE
Read-Inquiry	0A	00	CE	DE
Sense	04	00	CE+DE	---
Sense I/O	E4	00	CE+DE	---
NOP	03	CE+DE	---	---
Alarm	0B	CE+DE	---	---

A brief description of each command is summarized in the following section. In the descriptions, a 3287 Printer is assumed to be coupled as a hard-copy device. If no printer is coupled, ending status for a command is presented to the channel after the data has been placed in the 3278-2A/3279-2C display area.

Command Definitions (Printer/Keyboard Mode)

Alarm

This control command causes the audible alarm on the display console to be sounded and the ALARM indicator to be displayed. If the display is NOT READY, the command functions as a NOP. Immediate channel end and device end are presented as initial status for this command. The command is accepted even if an intervention-required condition exists.

NOP

This control command results in an immediate channel end and device end. No action is performed in the device. This command may be used to cause a command chain to end with a combined channel end and device end.

Read-Inquiry

When the Read-Inquiry command is received, the input area is unprotected and the PROCEED indicator is displayed. The command then waits until the operator signals that data entry is completed by pressing the ENTER or CNCL key. If the ENTER key is pressed, the data is read from the input area and transferred to the channel. A channel end is presented after data transfer; then any data the channel accepted is written to the display area and printed on the printer. If the CNCL key is pressed, a channel end with unit exception status is presented to the channel, and an asterisk (*) is written to the display area and printed. After printing is completed, in either of the above cases, device end is sent to terminate the command.

Sense

One byte of sense information is transferred in response to a Sense command. After the sense byte is accepted, channel-end and device-end status are presented as ending status. The sense byte is reset at the initiation of any command except a NOP. The sense byte is reset after the Sense command is executed. The sense byte is defined below:

Bit No.	Code	Explanation
0	CR	Command Reject
1	IR	Intervention Required
2	BOC	Bus-Out Check
3	EC	Equipment Check
4	---	Unused; always 0
5	---	Unused; always 0
6	---	Unused; always 0
7	---	Unused; always 0

Sense I/O

The Sense I/O command facilitates device type identification. If the device is not busy the data transferred (in printer/keyboard mode) is a constant seven bytes: X'FF43410010 5200'. This command is executed even when the device is not ready.

Write

Upon receipt of the Write command, the data is transferred from the channel to an internal buffer and then processed, a line at a time, to the display area on the display console and printed on the 3287 Printer. When all of the data has been received, channel-end status is returned, and the last line is processed. If the last line is not complete (ended with new-line character or 126 bytes), device-end status is sent after the data has been placed in the display area and saved in the printer buffer without printing. If the command ends with a complete line, device-end status is sent when printing is finished.

The Write command continues requesting data from the channel until the channel stops data transfer. This occurs when the CCW count reaches zero. Therefore, incorrect length channel status is always indicated with a zero residual count unless the Suppress Incorrect Length Indicator (SILI) flag is on in the CCW.

Write-ACR (Automatic Carriage Return)

This command is executed identically to the Write command except at the end of data processing. The printer performs the automatic carriage return. and perform the automatic carriage return.

Restrictions and Deviations (Printer/Keyboard Mode)

Timing (Printer/Keyboard Mode)

In printer/keyboard mode, the time taken to execute a command differs from all other printer/keyboard devices. Typically, the time from SIO to channel end is much shorter, and the time from channel end to device end is longer. This is because buffering takes place, and printing is not started until a complete line is received. When running in uncoupled mode (3278-2A or 3279-2C without 3287 Printer), a timing delay of 0.5 seconds per line is added to keep the display area from changing faster than it can be read.

Keyboard Deviations (Printer/Keyboard Mode)

The 3278-2A and 3279-2C keyboard differs in both the number of keys and the keyboard layout. All of the keys on the 3278-2A and 3279-2C can be used even if the printer has no corresponding key. It is, therefore, possible to read and write characters which are not implemented on a printer/keyboard device. The CARRIAGE RETURN key on a printer/keyboard is not implemented either physically on the 3278-2A/3279-2C or logically in the printer/keyboard emulation module. Programs which require the use of the RETURN key do not operate in 4341 printer/keyboard mode.

DISPLAY MODE

The display mode of operation enables the 4341 to run operating systems and programs designed for cathode-ray tube (CRT) type console with IBM 3270 support. For detailed information on IBM 3270 support, refer to *IBM 3270 Information Display System Component Description*, GA27-2749.

The console devices appear to the software as local channel attached devices that support the 3272 command set. Each console device appears as a separate address to the operating system. A maximum of four console devices is supported: the standard 3278-2A or the optional 3279-2C and up to three optional 3278-2A/3279-2C/3287 devices in any combination.

The display console provides a 20-line (1600-byte) user accessible buffer. The last four lines on the display are reserved for displaying 4341 Processor status and are not available to the user for either reading or writing. The 3287 Printers has a 24-line (1920-byte) user accessible buffer. The device addresses to be used in display mode are selectable by the operator by using the Console Functions Program Load screen (QL).

Display Console

When the display console is in display mode, the entire 20-line user buffer is controlled by software. The user buffer may be accessed by 3270 Read, Write, and Control commands. Lines 21 through 24 are reserved to display 4341 Processor status. Any attempt to access lines 21 through 24 by the user is rejected as invalid buffer addresses and causes an operation check sense byte to be set. A 25th line, separated from the other lines by a solid line, displays console status indicators. Line 25 is also unavailable to the user. The 3278-2A and 3279-2C keyboard is for communicating with system. In display mode, the display contains an operating system or user-defined screen that may be either formatted or unformatted. Formatted screens contain fields that can be protected or unprotected from keyboard alteration, brightened for highlighting purposes, or nondisplayable for security reasons.

---

column: 1   80
line: 1

```
┌─────────────────────────────────────────────────────────┐
│                                                         │
│                                                         │
│                    D I S P L A Y   A R E A              │
│                                                         │
│                                                         │
20│                                                         │
21├─────────────────────────────────────────────────────────┤
│                 PROCESSOR STATUS AREA                   │
│                                                         │
24├─────────────────────────────────────────────────────────┤
25│                 OPERATOR INFORMATION AREA               │
└─────────────────────────────────────────────────────────┘
```
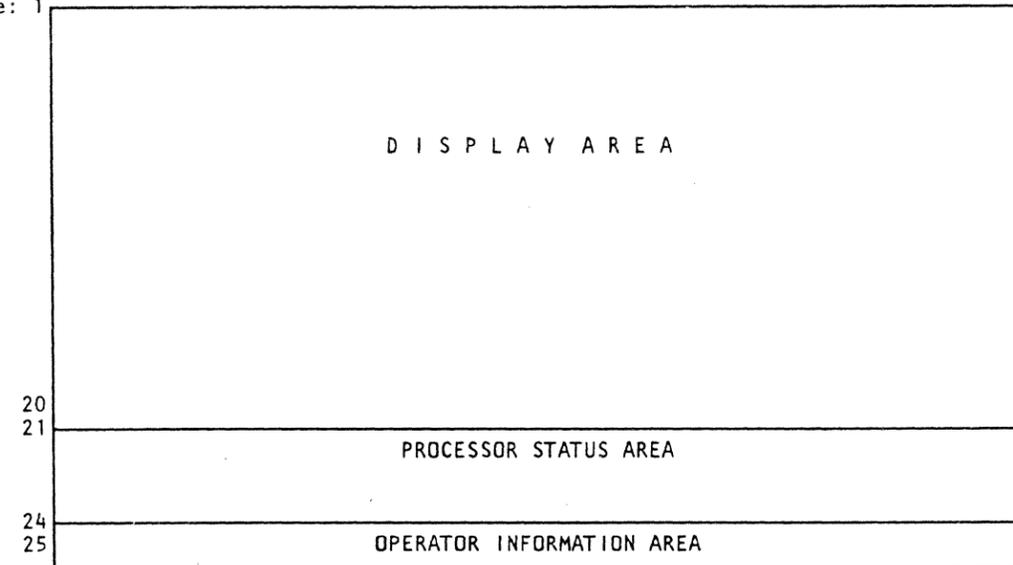
Display Area

Lines 1 through 20 on the display are system input and output areas. This area is organized and used as defined by the operation of the system.

Display Mode Commands

In display mode, the display console and 3287 Printer accept and execute all commands valid for a 3272 Control Unit. The valid commands and the normal status responses received are:

Command	Hex Value	Initial Status	Ending Status	Async. Status
Write	01	00	CE	DE
Erase/Write	05	00	CE	DE
Read Buffer	02	00	CE+DE	---
Read Modified	06	00	CE+DE	---
Sense	04	00	CE+DE	---
Sense I/O	E4	00	CE+DE	---
NOP	03	CE+DE	---	---
Select	0B	CE	---	DE
EAU	0F	CE	---	DE

A brief description of each command is summarized in the following section. In the descriptions, the 3278-2A/3279-2C or 3287 is assumed to be ready and no programming or device errors occur. References to a device refer to either a 3278-2A or 3279-2C Display Console or a 3287 Printer.

Command Definitions (Display Mode)

EAU (Erase All Unprotected)

This command causes all unprotected fields in the device buffer to be cleared to nulls. The Modified Data Tags (MDT) are reset to zero for each unprotected field, and the cursor is positioned to the first unprotected character location on the screen. Channel-end status is presented as initial status to the SIO, and device-end status is sent when the erase is completed.

Erase/Write

This command performs two functions: a buffer erase operation, then a write operation. The erase operation clears the device buffer to nulls and sets the cursor and current buffer address to location 0. The write operation is performed exactly as the Write command.

NOP

This control command results in an immediate channel end and device end. No action is performed in the device. This command can be used to cause a command chain to end with a combined channel end and device end or to modify the initial buffer address position for a subsequent command in a chain.

Read Buffer

This command causes all data in the device buffer to be transferred to main storage. The data stream consists of a read heading followed by the device buffer data. The read heading is three bytes: a 1-byte AID character followed by a 2-byte cursor address. The buffer data has a Start Field (SF) character inserted before each attribute byte to identify the beginning of each field.

Read Modified

The Read Modified command performs one of two functions based on the value of the current AID character. A Short Read is performed if the AID character is from a REQ (PA1) or CNCL (PA2) key. The Short Read only transfers the AID byte to identify which key was pressed (no data is included). The read modified data function is performed for all other AID characters. The data stream consists of a read heading and the data from modified fields. The read heading consists of the AID character and the two-byte cursor address. The data for each modified field is preceded by a Set Buffer Address order code with a two-byte buffer address of the first character position in the field (the attribute address + 1). An unformatted screen results in a read modified data stream consisting of the read heading and all data in the buffer because modification of data cannot be determined. All null characters are suppressed from the data transferred.

Select

This control command is implemented for 3270 compatibility, and no function is performed internally. Channel-end status is presented as initial status to the SIO, and device-end status is generated immediately after.

Sense

One byte of sense information is transferred in response to a Sense command. After the sense byte is accepted, channel-end and device-end status are presented as ending status. The sense byte is reset at the initiation of any command except a NOP. The sense byte is reset after the Sense command is executed. The sense byte is defined below:

Bit No.	Code	Explanation
0	CR	Command Reject
1	IR	Intervention Required
2	BOC	Bus-Out Check
3	EC	Equipment Check
4	DC	Data Check
5	US	Unit Specify
6	CC	Control Check
7	OC	Operation Check

Model Groups 1 and 2

EC 379605 06Mar81	PN 5666356	44 095
EC 379814 02Oct81	3 of 4	

Sense I/O

The Sense I/O command facilitates device-type identification. If the device is not busy, the data transferred (in display mode) is a constant seven bytes: X'FF43410032782A' for 3278-2A Display Console , 3279-2C FF43410032792C and X'FF43410032870O' for a 3287 or 3268 Printer. This command is executed even when the device is not ready.

Write

Upon receipt of the Write command, the data is transferred from the channel to an internal buffer and then processed to the device. When all of the data has been received, channel-end status is returned, and the last buffer is processed. Device-end status is sent after the last buffer has been processed.

The Write command continues requesting data from the channel until the channel stops data transfer when the CCW count reaches zero. Therefore, incorrect length channel status is always indicated by a zero residual count unless the Suppress Incorrect Length Indicator (SILI) flag is on in the CCW.

Restrictions and Deviations (Display Mode)

Timing

The time taken to execute a command may differ from other 3270 control units/devices. Programs depending on the time to execute a command cannot be assumed to operate correctly in display mode.

Keyboard Deviations

The 3278-2A and 3279-2C keyboard differs from a standard 3277 or 3278 keyboard layout. Several keys are either not in the standard position or not implemented. Programs requiring the keys that have not been implemented may not be able to use the 3278-2A and 3279-2C for a input device. For the following keys a difference exists between the 3278-2A /3279-2C and other 3270 display units.

- CNCL (PA2) key — Moved to a different position
- REQ (PA1) key — Moved to a different position
- CLEAR key — Not implemented
- TEST REQ key — Not implemented
- DUP key — Not implemented
- FIELD MARK key — Not implemented

Several 3278/3279-only functions involving 3274/3276 Control Units also differ on the 3278-2A and 3279-2C from a standard 3278-2.

- Cursor blinking and reverse functions not available.
- Keyboard clicker selection function not alterable. The clicker is set to click when keyboard unlocks and cannot be changed.
- Local print function keys and matrix not available.
- Insert mode reset 3277-compatible, instead of 3278, 3279-compatible.
- Line 25 indicators patterned after 3277 indicators, not 3278 symbols.
- Keys used for SNA/SDLC functions (SYS REQ and ATTN) not implemented.

3278-2A and 3279-2C Buffer

The 3278-2A and 3279-2C buffer is not completely available for use by the Operating System or user program. Lines 21 through 24 are reserved for 4341 Processor use and are unavailable for programmed use. Therefore, programs written for a 24 line 3270 terminal do not execute correctly without some alterations. Generally, an attempt to use such a program results in an error when access lines 21 through 24 is attempted. The error causes unit-check status to be presented and operation-check sense to be set.

Operation Check Error Handling

Write command data is internally buffered before it is processed and written to the device. Therefore, an operation check as the result of an invalid buffer address is not detected when the invalid data byte is received from the channel but at some later time. It is likely that more data has been received from the channel and possibly that channel end may have been sent before the operation check occurred. The residual count field is unpredictable in this case and cannot be used to determine precisely the location of the error in the write data stream.

MANUAL MODE

In manual mode, the following functions are provided:

- Processor IML, IPL, and resetting of the system
- Display/alter functions
- CE functions
- TOD and timer control
- START, STOP, and INTR keys.

All of the manual function facilities are displayed on the General Selection screen (Q). For detailed information, refer to "Manual Functions."

Display Console

In manual mode, the screen configuration depends upon the function that is being used. For detailed information, refer to Manual Functions.

Console/Printer Sensing Conditions

The following sensing conditions can occur while operating the system.

Not Ready

When the device is not ready, all commands except Sense are rejected.

Power Off

When the device is not powered on, an intervention-required condition exists and is reported to a Sense command.

Test Mode

When the device is in test mode (TEST/NORMAL switch in TEST position), an intervention-required condition exists and is reported to a Sense command.

Device Not Functional

If the device hardware is failing, or the device is not connected or configured correctly, an intervention-required or equipment-check condition exists and is reported to a Sense command.

End-of-Forms (3287 Only)

When the end-of-forms switch indicates no paper is in the printer, and a one-minute timeout condition occurs, an intervention-required condition exists and is reported to a Sense command. This delay is incorporated in the 3287 to allow the operator to correct the end-of-forms condition and have the 3287 automatically continue printing with no errors reported or software retry required. The end-of-forms condition causes the audible alarm to sound until the HOLD PRINT switch is pressed. The end-of-forms should be cleared by pressing the HOLD PRINT switch, replacing the forms, then pressing the ENABLE PRINT switch to allow printing to continue.

Hold-Print Timeout (3287 Only)

When the hold-print condition has lasted more than ten minutes, an intervention-required condition exists and is reported to a Sense command.

Operation Check (Display Mode)

An operation-check occurs when invalid data is received in the data for a Write or Erase/Write command. This error is a programming error which cannot be recovered from by software retry. A programmer must inspect the data to locate the invalid condition. The following conditions may cause an operation check:

- Invalid buffer address specified in a SBA, RA, or EUA order. A buffer address is invalid when it references a location past the end of the user buffer area (20 lines on a 3278-2A/3279-2C or 24 lines on a 3287).

- Incomplete order sequence for SBA, RA, EUA, or SF order. An order requiring multiple data bytes was not complete at the end of the data stream.

- The start print bit was set in the WCC for a Write or Erase/Write command and chaining is indicated. Printing is suppressed and command chaining is canceled.

An operation check sets unit-check and device-end status to be sent, combined with channel end, if it has not already been sent. The residual count in the channel status word is unpredictable and cannot be used to determine the location of the invalid order. The device buffer is modified with all data processed before the invalid order.

ADDITIONAL FEATURES

SECURITY KEYLOCK (Optional Feature)

The Security Keylock Feature is an optional feature and may not be installed on all systems. On the 4341, it has the following characteristics:

- A hardware feature on the 3278 Display Console 2A.

- Security Keylock microcode is installed on all systems, but it is only activated when the Security Keylock Feature is installed.

- All functions are normal when:
  - Security Keylock Feature is not installed
  - Security Keylock Feature is ON.

- When Security Keylock is OFF:
  - Keyboard is locked
  - Console is blank
  - INHIBITED indicator on line 25
  - INTERVENTION REQUIRED response to application programs
  - All functions NORMAL when switched from OFF to ON
  - No Power-On/IML.

Note: *If the main console is in the OFF state, and the Power-On/IML key is pressed, a message appears on the screen of all unlocked and operational 3278-2A consoles on the system indicating that the CHG DPLY key should be pressed on the console from which the Power-On/IML is to continue. The key is ignored if it is pressed on a console with the security lock in the OFF position. However, if the lock is turned to the ON position and the CHG DPLY key is pressed, the Power-On/IML will continue from that console.*

AUDIBLE ALARM FEATURE

The 3278 display can be equipped with an audible alarm. This is a feature of your display that can't be seen but that you should be aware of.

A high-pitched tone sounds for about one second everytime the audible alarm is activated.

The audible alarm always sounds when you enter a character into the next to last character position on your screen. The cursor wraps from the last character position on the screen after a character is keyed into that last position. This is normal operation. If you key another character after the cursor has wrapped, it will be entered into the first character position on line 1 of your screen. In this situation, you wouldn't want to key on line 1 because doing so would destroy the data already displayed there. In this case, the alarm is warning you.

The computer program that you are working with also can activate the alarm. To do so, it sends a signal to your display. The user's guide for that program will tell you if the audible alarm will sound and, if so, the different reasons for sounding it.

The volume of the audible alarm is adjustable. The adjustment control is located at the outside of the screen contrast control. Generally, it has been set for your operating environment. To test the volume level, the next-to-last character position must be in an unprotected input field. If your display station does not have have an unprotected input field in this area of the screen, check the application program User's Guide or ask your supervisor for instructions to obtain one. When you have an unprotected input field in this area of this area of the screen, move the cursor and key in a character in the next-to-last position on the screen: then, listen to the level of the alarm. To check the sound level again, press the backspace key and, then, a character key. If the sound is not at the desired volume, adjust the alarm control and test the sound level again. When the volume setting is correct, press the ERASE INPUT key.

SYSTEM STATUS

The system status information is applicable to each mode of screen operation. Lines 21-24 of the display contain information concerning the state of the system.

Line 21

Field 1
Unused.

Field 2
MAN
Displayed when the processor is in stop state.

Field 3
WAIT
Displayed when the processor is in wait state.

Field 4
TEST
Displayed when :
1. A control (Compare/Trace (QA), Check (QK), Operation Rate (QO), or Display/Alter PSW and I/O (QDTC)) is not in its normal state.
2. The CE switch is on for maintenance or service.

Field 5
LOAD
Displayed during program load. This field becomes blank when the new PSW is successfully loaded.
SAVE
Displayed after a completion of a successful machine save/store status. It becomes blank on the next system reset (including an IPL).

Field 6
Unused.

```
 1 ─┐
 2  │
 3  │
 4  │
 -  ├──Message Area (20 lines)
 -  │
 -  │
 -  │
19  │
20 ─┘

21  -1- -2- --3- --4- --5- -6-   -7-  ----8---- ---9/10---  ----11----  12--13-  --14--
        MAN WAIT TEST LOAD        370  TIMER:ON  OPERATING   DATA: XXXX    ADDR: XXXXXX
                      SAVE        VSE       OFF  INSTR STOP              V-ADDR:
                                                MATCH STOP              R-ADDR:
                                                CLOCK STOP                 CSAR:
                                                CHECK STOP
                                                MACH CHECK

22  ------15----- -------16----- ---17---- ------------------18-----------------------
    RATE: I-STEP CHK: NORM-C   TOD: ENBL ADDR-COMP: STOP TYPE: ANYREF V-ADDR: XXXXXX
                      NRTY-C                          TRWR  IO-REF R-ADDR:
                      HDST-C                          TRST  D-STOR V-DATA: XXXXEQ/NE
                      DSBL-C                                I-CNTR R-DATA:    AE/AN

        --------   ------                             --------  --------    --------
        M-STEP     NORM CH /-C /- H            SYNC     MICWRD
        P-STEP     NRTY CH /-C /- H            H-ST     LS-SRC
        C-STEP     H-ST CH /-C /- H            MWTR     LS-DES
        F-REPM     DSBL CH / C /- H            MBTR     CH-SEQ
                                                        CH-DAT
                                                        CSW
                                                        pppPSW
                                                        iiiIOP

23  ------------19----------- --------20------------ -21a- -21b- -------21c----------
    <Control Prog Messages > SYSTEM MESSAGE WAITING BLOCK  4341 RC=XXXXXXXX Ext Code
    C< Message Area    >
    LOG FAILURE IGNORED
    RETRY PENDING
    block message area

24  -22- 23-24- --------------------------25---------------------- -------26---------
    XXXX   XXXX                       (CE Use Only)                   (CE Use Only)
           idid F:a A:xxxx D:hhhh hhhh hhhh hhhh I:iiii=hhhh E:dd  ----SP trace----

25  Display Console Status Information
    DISPLAY MODE     INSERT MODE      INHIBITED
    PTR/KYBD MODE                     USAGE CONFLICT
    MANUAL CONTROL                    PTR-BUSY
    DISCONNECTED                      PTR-INTV REQD
                                      PTR-CHECK
```

Field 7
370
Displayed when the processor is in 370 mode.

VSE
Displayed when the processor is in virtual storage extended mode.

Field 8
TIMER: ON/OFF
ON is displayed when the timer is on; OFF is displayed when the timer is off.

Field 9/10
OPERATING
Displayed when processor is in operating state.

STOP
Indicators INSTR, MATCH, CLOCK, and CHECK display condition when the machine stops. INSTR STOP can be caused by pressing the STOP key.

MACH CHECK
Displayed when the processor fails to operate or when error retry is in progress.

Field 11
DATA:
Displays contents at the related address (field 14) when the processor is in instruction-stop or match-stop state. The field is blank if processor is operating.

Fields 12-14
ADDR:
Indicates that the processor is in VSE mode. The address displayed on a stop is the location of the next instruction.

V-ADDR:
Indicates that the processor is in 370 mode and that it is operating with virtual addresses.

R-ADDR:
Indicates that the processor is in 370 mode and is operating with real addresses.

CSAR:
Indicates that the processor is totally stopped (clock stopped). This occurs only in CE mode or momentarily during some manual functions. The value displayed is the address of the current control storage address placed in the CSARBU register.

Line 22

Field 15

RATE:
Displays setting of the RATE control.

I-STEP = Instruction Step
P-STEP = Pulse step (CE display)
M-STEP = Microword step (CE display)
C-STEP = Clock step (CE display)

When the repeat microword function (CE only) is on, RATE: f-REPM appears on line 22: where "f" represents the rate function (I, P, W, or C). A blank indicates a normal setting.

Field 16

CHK:
Displays the setting of the check control.

NORM-XX
NRTY-XX
HDST-XX
DSBL-XX

where:

XX = C   Stop after Log is set.
XX = H   if Channel Check is set.
XX = CH if both Stop after Log and Channel Check are set.
XX = Blank, if neither Stop after Log nor Channel Check is set.

Field 17

TOD:ENBL
Indicates that the Set Clock instruction is enabled. A blank indicates a normal setting where a Set Clock is inhibited (TOD is secured).

Field 18

ADDR-COMP:
Displays the setting of the compare/trace control action selection.

STOP = Softstop
TRWR = Trace wrap
TRST = Trace stop
SYNC = Sync (CE use only)
H-ST = Hardstop (CE use only)
MWTR = Trace microword (CE use only)
MBTR = Trace microbranch (CE use only)

TYPE:
Displays the type of compare made.

ANYREF = Any reference
IO-REF = I/O reference
D-STOR = Data store
I-CNTR = Instruction counter
MICWRD = Microword (CE use only)
LS-SRC = Local store source (CE use only)
LS-DES = Local store destination (CE use only)
CH-SEQ = CHANNEL-SEQ CNT
CH-DAT = CHANNEL-DATA
CSW = CSWs
pppPSW = PSW SWAPS (ppp = MCK, PCK, etc.)
oooIOP = I/O operations (ooo = SIO, TIO, etc.)

ADDRESS/DATA
Displays the address for the compare or the data contents of that address if the compare is on data.

V-ADDR: = Virtual address
R-ADDR: = Real address
V-DATA: = Virtual data
R-DATA: = Real data
EQ = Equal
NE = Not equal
AE = And equal
AN = And not equal

If a data compare is chosen, the selected data and the characters EQ or NE are shown for the chosen address. If the address compare screen is reselected, the address reappears next to the SELECTION label.

Line 23

Field 19

SUPPORT PROCESSOR
For detailed information, see "Messages, Support Processor" in the "Messages" section.
   This field is also used for block messages or errors.

Field 20

SYSTEM MESSAGE WAITING
Displayed when the screen is in manual mode and a I/O operation is performed to that address by the program in the processor. To leave manual mode, use the Z selection or the CHG DPLY key to allow the screen/keyboard to be used by the program.

Note: *In printer/keyboard mode, if SYSTEM MESSAGE WAITING appears immediately after changing the device address or console mode and if the I/O operation is an immediate command (for example, alarm), instruction processing may stop until the operator returns to the Program screen.*

Field 21a

BLOCK
Displayed when a block or patch is invoked and stays displayed until it ends or is halted.

Field 21b

This field is for system ID; for example: 4341.

Field 21c

RC (Reference Code)
The eight-digit reference code is an error message from the operational code, diagnostics, or logout analysis routines. The reference code is used as an entry to the maintenance documentation and as a search argument for a symptom/fix file (RETAIN). The reference code appears brighter than the normal intensity.

   Once the ENTER Key is used, the reference code returns to normal intensity. When a new reference code (error message) occurs, it appears intensified . The code is cleared on a system reset.

   In addition to the reference code, an extension (also eight digits) can be provided as required by the application using the reference code. The reference code extension has no fixed format.

Line 24

Field 22

YYYY
Identifies the last program loaded in the support processor (module ID).

Field 23

Unused.

Field 24

idid
Same as YYYY if program is loaded.

   If data module is read, idid identifies the data module read.

   If an error occurs on read, idid identifies the module that was about to be read.

Field 25

Field 25 is blank with CE switch inactivated.

F
Interprets manual ops function selected.

A
Displays address (SP storage).

D
Displays data at the related address.

I: iiii = hhhh
Interprets instruction counter address and the data at the related address.

E:dd
Interprets error code:

AM = Address match
AC = Boundary
DE = Data error
FK = Function key
OC = Operation code
PC = Program check
BC = Bus operation error

Field 26

SP TRACE
Displays SP trace information. It is blank unless activated from the CE panel by pressing keys A, B, and C.

Line 25

Contains the display console status information. For
messages, refer to "Messages."

Column 2

DISPLAY MODE
PTR/KYBD MODE
MANUAL CONTROL
DISCONNECTED

Column 20

INSERT MODE

Column 35

INHIBITED
USAGE CONFLICT
PTR-BUSY
PTR-INTV REQD
PTR-CHK
CONV-CHECK

Notes:

- *The indicator pointer is displayed on line 25, position 1,
  as soon as power-on response is accepted by the system.
  This indicator is not displayed if the display device Test
  switch is on.*

- *For more detailed information about these indicators, see
  "On-Screen Indicators."*
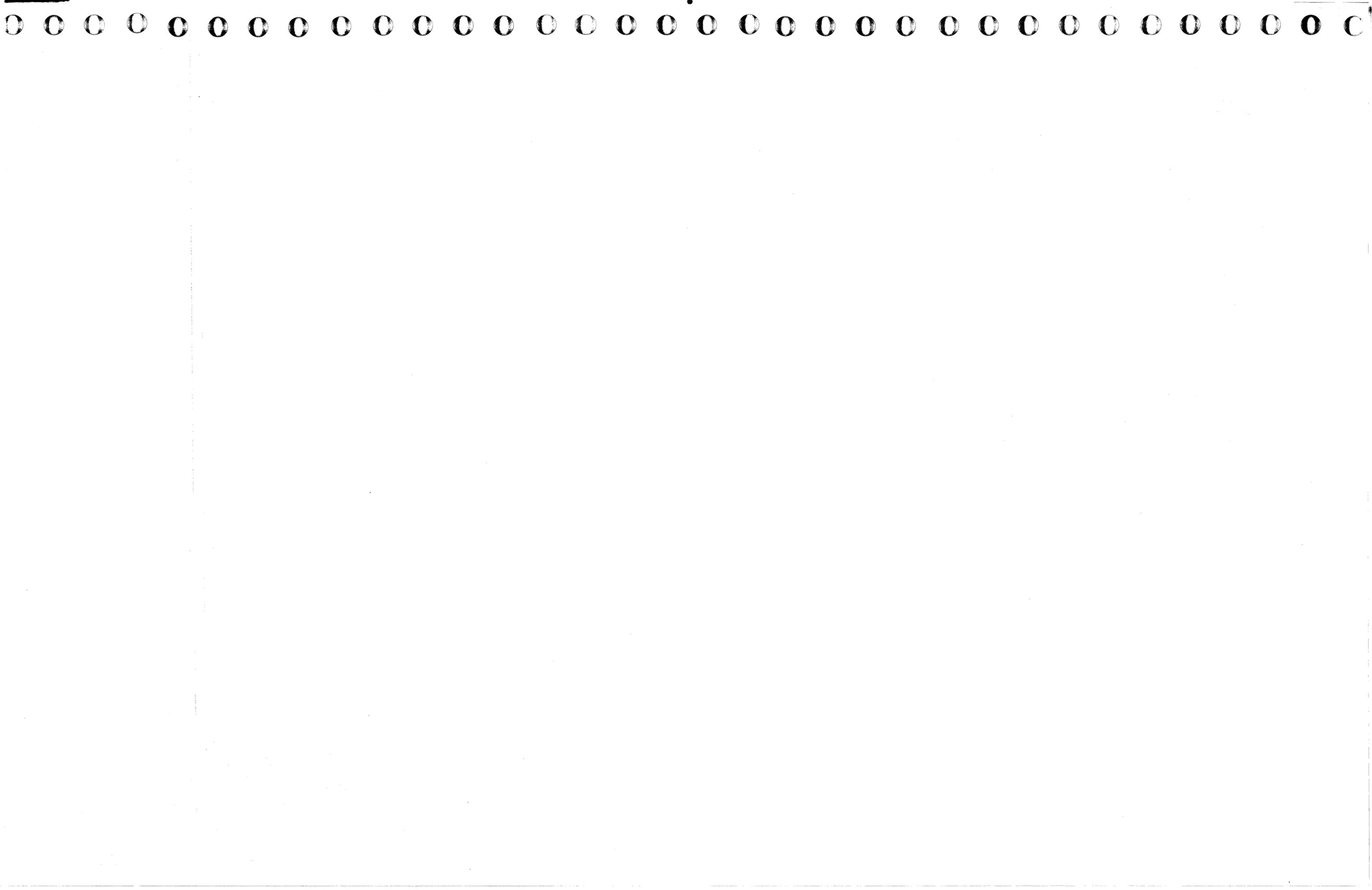
MESSAGES

This section defines the following messages:

- System Messages
- Support Processor Messages
- UCW Messages
- Program Load Messages
- Diskette Build Messages
- On-Screen Indicator Messages
- Printer/Keyboard Indicator Messages

These messages are displayed on lines 20 through 25 of the display console. To determine the line numbers refer to "Display Console." These messages indicate:

- Hardware Failures
- Operator Errors
- System Errors
- System States
- I/O Errors

ACB VALUE CHANGED BY XXK: Assigned UCWs take a reserved storage area of 128 UCWs. After this boundary is passed, each block of 32 UCWs takes an extra 2K of user storage. This change is reflected in the Address Check Boundary generated at the next IML.

ADDR COMP REMAINS: An address-compare match is still waiting to occur even though you issued the QBH command.

Recovery: To set the address compare to normal, enter QAN.

ADDR CUU ALREADY ASSIGNED: The address assigned in the Tn or Hn command was assigned to a non-native device via the UCW assignment screen.

Recovery: Assign the device (Tn or Hn) to an unused address.

ADDRESS ALREADY USED: The address you are trying to assign was previously assigned.

Recovery: Ensure that proper diskette is installed and the perform a SP-IML.

ADDRESS OUT OF RANGE: Address of the function selected for the screen (byte offsets, and so forth) is too high or too low; or the address is larger than the physical storage size.

Recovery: Enter the correct address parameter.

ADDRESS TOO LARGE: Address specified is beyond what is allowed.

Recovery: Correct the ADDR parameter and re-enter the function.

ALARM: Alarm was received and the audible alarm sounded. Indicator is cleared by any of the following:

Recovery:

- Pressing a Program Function (PF) key at any time.
- Pressing the ENTER or CNCL key when PROCEED is not displayed.
- System or selective reset condition.

ALTER IGNORED: An alter attempt was made, but the machine is in a state (not a softstop, and so forth) that does not permit the alter to occur, or you have changed the SELECTION line on a full-screen alter.

Recovery: Press the STOP key to softstop the machine and repeat the desired alter function.

ALTER WILL BE IGNORED: An attempt to alter data on the current screen was ignored. because the current screen remains displayed after a successful fast-selection operation on another screen.

Recovery: Pressing the ENTER key restores normal operation back to the displayed screen.

BLOCK IS AT MATCH-WAIT: A block is running and is at a Match command waiting for an address compare. Another block or patch must not be activated at this time.

Recovery: To halt the block enter QBH.

CE LOG MUST HAVE A TITLE: A title must be entered to have the log displayed in the index.

Recovery: Enter a title name in Log Title (Log 1/).

CHANGES REQUIRE IML: A change to console mode or console address was made, but could not be communicated to the processor.
This message also appears on the Mode Assist screen (QLI) if any changes to the fields are made.

Recovery: To put the changes into effect, re-IML.

CHANNEL 0 UNAVAILABLE: A function requires the local channel path (channel 0) between the SP and the PU, and that path is busy with a PU operation.

Recovery: Retry the function. If the message continues to display, press the STOP key. A SP re-IML may be needed to clear a channel program loop to the operator's console, or a program reset may be required to clear a channel program loop to channel 0. A program reset under these circumstances takes longer to complete than normal.

COMPARE/TRACE NOT RESET: The processor unit has stopped and the Compare/Trace function is still in effect.

Recovery: Start instruction processing (press START key) to continue with compare/trace function active; or reset Compare/Trace function if desired (see "Compare/Trace.")

CONFG DATA ERR: CONSOLES: The configuration of the console defined on the diskette is not the same as in SP storage.

Recovery: Ensure that proper diskette is installed and then perform a SP-IML.

CONFG DATA ERR: UCWS: The number of UCWs defined on the diskette is not the same as in SP storage.

Recovery: Ensure that proper diskette is installed and then perform a SP-IML.

CONS PTR NOT CONFIGURED The console printer is not configured at the Program Load (QL) screen.

Recovery: Configure the Copy key to a console printer on the Program Load screen. Typically the console printer is set to K0. A K1, K2, or K3 must be entered depending on which native device is the printer. The command must then be repeated.

CONSOLE DISK FAILURE: Ten errors occurred on the same record on the disk during IML. This error may be accompanied by a reference code.

Recovery: If failure persists or is accompanied by a reference code, go to Start MAPs.

CONSOLE DISK I/O ERROR: An error occurred during an attempt to read a program from the disk. This error may be accompanied by a reference code.

Recovery: Go to the Start MAPs.

CONTROL STORAGE FAILURE:

- The control storage failed during IML.
- An error in control storage was detected while running the Verification test (V1) of the Program Load screen. This error may be accompanied with a reference code.

Recovery: Retry IML. If it fails again, IML the backup diskette. If the failure persists, or a reference code is displayed go to the Start MAPs.

CONV-CHECK: The color convergence of the console display is out of tolerance.

Recovery: Press the RESET key. If the keyboard can be reset, the battery has failed, or the color convergence hardware has failed. (Refer to "3279 Display Terminal Maintenance Analysis Procedures [MAPs].")

DATA BANK MODE ACTIVE: Remote Data Bank mode initiated. All PU operations are terminated and the SP acts like a 3275. When Data Bank mode is terminated, power off and then on.

DATA LINK DISCONNECTED: The DISC key was pressed, and all remote service was terminated.

DATA NOT ACCESSIBLE: The virtual storage address is not available to the display/alter function or the UCW data could not be accessed at this time because the processor is busy.

Recovery: This virtual address cannot be used in the display/alter function at this time. Change the address, retry later, or discontinue the attempt to display/alter. If UCW data cannot be accessed now, retry later.

DATA NOT ON TAPE: The diskette image is not found on the tape.

Recovery: Verify that the correct tape is being used and the correct drive number and part number have been entered.

DEVICE BUSY: A function cannot be performed.

Recovery: Try the function again.

DEVICE CUU IS BUSY: PROCEED (keyboard is unlocked and waiting for a reply from the device that has the same address) status is present on a device pair in printer/keyboard mode when one of the addresses is changed.

Recovery: Press the ENTER key on the display while in operating system mode, with the PROCEED indicator on, and then rekey the changes.

DEVICE Nx CONFIG ERROR: A device is not installed or not configured correctly (for example: a console installed as a hard-copy device) on the System Configuration (QFS) screen.

Recovery: Ensure that the device is installed or configured properly.

DISCONNECTED: The display console is not logically connected to the 4341 Processor. The console is not available to the operating system nor for manual functions. This condition exists on the display console when no unit address is assigned (via the Program Load screen) to the display console.

Recovery: Ensure that the device is configured at the Program Load screen.

DISKETTE CHECK: A diskette or diskette drive failure occurred. This error may be accompanied by a reference code.

Recovery: Check that the diskette drive is operational, and that the diskette is not damaged. If the error persists, or a reference code is displayed, go to the Start MAPs.

DISKETTE NOT READY: The diskette drive latch is not closed. The diskette drive is not ready. The diskette is not inserted properly. This error may be accompanied with a reference code.

Recovery: Ensure that the diskette drive door is closed and that the diskette is inserted properly. If the error persists, or a reference code is displayed, go to the Start MAPs.

DISPLAY CONSOLE FAILURE: A display to the screen failed during IML. An error was detected from the console display. This error may be accompanied with a reference code.

Recovery: Retry the IML; if error persists or a reference code is displayed, go to the Start MAPs.

DISPLAY MODE: The display console is in the display mode as indicated on the Program Load screen.

DONE - PUT IN ORIGINAL DISK: The data has been transferred. Insert the original diskette (the diskette that was present when you first entered the transfer function).

Recovery: Press the ENTER key to continue.

DUPLICATE DEVICE ADDRESS: A duplicate address exists and coupling is improper. The only duplicate address permitted is a console and printer in printer/keyboard mode. The cursor moves to the end of the SELECTION line.

Recovery: Rekey the correct parameter after the last command entered on the SELECTION line. When there are several duplicate commands, only the last is recognized.

EDIT COMMAND ERROR: An invalid entry was placed in the editing input area.

Recovery: Select the correct function (or blank) and retry.

ENGINEERING DATA ERROR: The engineering level of the hardware is not compatible with the microcode. This error may be accompanied by a reference code.

Recovery: Ensure that you have the proper EC level cards to match the diskettes.

ENGINEERING DATA FAILURE: An error occurred while resetting the PU hardware with defined values.

Recovery: Retry, or switch to the backup diskette.

ERASE?title: A saved screen is about to be overlayed when attempting to copy a screen on to the diskette. A second attempt to copy the screen on to the diskette overlays the oldest saved screen on the diskette.

Recovery: If oldest copy is to be saved, exit from this procedure by entering a different command or press the MODE SELECT key.

ERR - PUT IN ORIGINAL DISK: An error occurred during the transfer of data. Insert the original diskette (the diskette that was present when you first entered the transfer function).

Recovery: To get more information about the error, press the ENTER key.

ERR - BLOCK AT MATCH-WAIT: The patch being transferred cannot be activated because a block is running and a match command is waiting for an address compare.

Recovery: To halt the block, enter QBH.

ERR - DISK ERROR: A diskette error occurred.

ERR - NO SPACE IN LIST: The patch or block list space on the TO diskette is full.

ERR - NOT FOUND IN LIST: A block or patch to be transferred is not on the FROM diskette.

ERR - PATCH EC NAME WRONG: The patch name does not follow the naming convention.

Recovery: Ensure that the TO diskette is the correct one.

ERR - PATCH IS ACTIVE: The patch being transferred is already active on the TO diskette.

Recovery: Ensure that you want to transfer this patch and, if you do, deactivate the patch on the TO diskette and repeat the operation.

ERR :CSW=XXXXXXXXXXXXXXXXX: An error occurred while the PU was transferring data from the tape unit.

Recovery: Check the unit status and the channel status to determine if the problem is with the tape drive, tape control unit, or the channel.

ERROR BUILDING DISKETTE: An error occurred while trying to write onto the diskette.

Recovery: Ensure that the diskette drive is operational and verify that the diskette is good by running the Diskette Readability Test (QED).

ERROR DURING DATA XFER: An error occurred while transferring data from the PU to the SP. Verify that the PU is operational.

Recovery: Go to Start MAPs.

ERROR OR SLOW PRINTER: A printer error occurred, or the SP is waiting for a complete signal.

Recovery: Press the MODE SEL key to clear this condition; then retry the function and check the printer's operation.

ERROR WHEN STARTING PU: An error occurred when starting the processing unit.

Recovery: Go to Start MAPs.

ERROR WHEN STOPPING PU: An error occurred when trying to softstop the PU.

Recovery: Run the SBA diagnostics to locate the problem.

EXECUTION TIME XX MINUTES: This is an informative message about the approximate run time for the selected diagnostics.

FUNCTION KEY IGNORED: A function key other than PAGE UP or PAGE DOWN was pressed.

I INVALID WITH M OR P: An attempt occurred to IML (M) or IPL (P) and at the same time to go to the Assist screen (I).

Recovery: Select the correct function desired and rekey the correct command.

IML COMPLETE: IML execution is complete.

IML ERROR: An error was detected while performing an IML.

Recovery: Re-IML.

IML IN PROG: Displayed during the execution phase of IML.

IML REQUIRED: A function was requested that requires an IML of the processor.

Recovery: Perform an IML and retry function.

INCOMPATIBLE SELECTIONS: The combination of Mode and Assists selected is not permitted. Assists must be reset before setting VSE mode. Only one Assist can be specified at a time with 370 mode. A specific Assist cannot be individually reset. All must be reset; then the new Assist combination must be entered.

Recovery: Erase the entry and rekey the correct commands following the I on the SELECTION line.

INCOMPLETE COMMAND: The required fields for a function have not been fully specified. The cursor is placed ready for the missing input.

Recovery: Enter the missing fields.

INCOMPLETE INPUT: The required fields for a function have not been fully specified. The cursor is placed ready for the missing input.

Recovery: Enter the missing fields.

INHIBITED: All keys except the RESET, START, STOP, and INTR keys are inhibited.

No mechanical keyboard lock prevents the use of the keyboard. That is, when input is inhibited, the keys are not physically locked. You can still press them normally, but there is no click when a key is pressed. The INHIBITED indicator appears if you:

- Attempt to change protected data.
- Attempt to press two keys at the same time.
- Cause an overrun condition by pressing keys faster than they can be processed.
- Insert a character into an input field that is full (no null characters).
- Press one of the function keys (PF keys, ENTER, CNCL or PA2, REQ or PA1, MODE SEL, CHG DPLY or the DIAG key).

Recovery:

- Press the RESET key.
- The application program issues a Write command that specifies keyboard restore. (This also resets the PTR-BUSY, PTR-INTV REQD, or PTR-CHK indicator.)

INSERT MODE: The INSERT key was pressed to insert characters between existing characters.

Recovery: Press the RESET key.

INTERNAL CONFG DATA ERROR: The modules on the diskette contain redundant configuration information that does not agree. The fields in conflict are marked with asterisks.

Recovery: Key in a valid argument for the field.

INTV-REQD: The 3287 Printer coupled as a hard-copy device has become not-ready (end-of-form, power-off, or other check conditions are present).

Recovery: Clear the check condition, and make printer ready.

INVALID ADDRESS: The address field contains an invalid character, or the address specified is out of the valid range for this screen. The cursor is positioned under the address.

Recovery: Enter a valid address and retry the command.

INVALID BLOCK NAME: The block name must not begin with a P or be longer than eight characters.

Recovery: Respecify the block name.

INVALID CHAR.CODE: Invalid character or an invalid combination of characters was used in the CHAR.CODE field.

Recovery: Enter correct characters.

INVALID INPUT: A function letter, an address, or data has an invalid character entered next to the SELECTION label. The cursor is under the first character in the error field. This message also appears if you enter more than the allowed number of characters on the SELECTION line.

Recovery: Enter the parameter for the function desired and press ENTER.

INVALID INPUT, CE ONLY: The function letter requires the CE MODE switch to be in the CE MODE position.

Recovery: Select the correct function letter, or set the CE switch to CE MODE and reselect the letter.

INVALID NAME: The name is invalid; it has too many characters or no name was specified.

Recovery: Specify a valid name.

INVALID OPERATION: The operation specified is not valid for the screen. The cursor is positioned under the operation character.

Recovery: Enter a valid op code and retry the command.

INVALID PROCESSOR ID: The machine serial number on the diskette does not match the serial number hardwired in the machine. The requested function is disabled.

Recovery: Load the correct diskette and re-IML. If the error persists go to Start MAPs.

IPL COMPLETE: The IPL execution is complete.

IPL DEVICE UNAVAIL-SELIN: For a valid UCW, the device is not attached, or the METER switch is off.
It also appears when a QCM (machine reset) is selected, but the system is not hardstopped.

Recovery: Check that the IPL UNIT ADDR is correct on the Program Load screen. Check any switching devices to ensure that the device is attached to the system. Check that the device control unit power is on, and that the METER switch is on.

IPL ERROR: An error occurred while performing an IPL.

Recovery: Re-IPL.

IPL I/O ERROR. US/CS=XXXX: An I/O error has occurred. The unit status/channel status is shown.

Recovery: If US/CS=x2xx, xAxx, or xExx, check that the IPL device is powered on, ready, and physically attached. Retry the IPL. If the error persists, go to Start MAPs.

IPL I/O ERROR: No UCW exists for the devices or no valid IPL record is on tape (for example, the drive is not at load point).

Recovery 1: Check that the IPL UNIT ADDR is correct on the Program Load screen. Check that the IPL device contains the correct disk or tape. Then retry an IPL.

Recovery 2: Ensure that the tape is in a ready state and at load point. Then retry an IPL.

IPL IN PROG: The execution phase of IPL is in progress.

IPL PSW FORMAT ERROR: The PSW loaded during an IPL is invalid; for example, the instruction address in the current PSW is not an address in main storage.

Recovery: Check that the IPL UNIT ADDR is correct on the Program Load screen. Check that the IPL device contains the correct disk or tape.

KC INVALID WITH M OR P: An IML (M) or IPL (P) was attempted when the channel printer (KC) option was selected.

Recovery: Change the Copy key configuration to a null value by entering K0 on the Program Load screen, or configure channel printer from a hard-copy device to the system diskette.

KEY IGNORED: The SP is busy processing the previous function.

Recovery: Try the function again.

LINES OR SIZE OVER MAX: The number of characters exceeds the available space or more than the allowed number of editing lines is requested.

Recovery: Delete excessive characters or lines.

LOG AREA FULL: Log area is full.

Recovery: Erase the screen and retry the save function.

LONG IPL PROCEEDING: The IPL has taken about twelve seconds to IPL and the IPL is still in process.

Recovery: If this condition is abnormal, press the MODE SEL key to exit the IPL. The user cannot IPL with polling off. Check the Check Control (QK) screen to determine if the 'P' selection (polling) is set to NO. If so, it must be set to YES.

MACHINE NOT HARDSTOPPED: A function is selected that requires the machine to be in CLOCK STOP state, and it is not.

Recovery: Enter QOM or QOC to hardstop the machine. For additional information, refer to QO screens.

MAIN CONSOLE NOT READY DURING POWER UP SEQUENCE: The main (primary) console failed to operate on power-on.

Recovery: Press the CHG DPLY key on the console displaying this message.

MAIN STG DATA CMP ERROR:

- An addressing error or a data content (pattern) error was detected during IML of the Main Storage test.

- An error in main storage was detected while running the Verification test (V2) of the Program Load screen. This error may be accompany by a reference code.

Recovery: Press the PF9 key.

MAIN STG ADDRESS ERROR:

- An addressing error or a data content (pattern) error was detected during IML of the Main Storage test.

- An error in main storage was detected while running the Verification test (V3) of the Program Load screen. This error may be accompanied by a reference code.

Recovery: Press the PF9 key.

MANUAL CONTROL: The system is under control of the support processor microcode.
In this mode, an SIO to the display console is accepted but held pending until the display console is available to the operating system. If an SIO is queued, the audible alarm is sounded, and SYSTEM MESSAGE WAITING is displayed on line 23.

Recovery: Press the CHG DPLY key to return to the operating system.

MODULE NOT FOUND: The requested display of a module does not exist on the diskette.

Recovery: Enter the correct ID, or mount the desired diskette.

MORE: More Saved Screens are on the next page.

Recovery: To display the next page of Saved Screen area, press the Page Up key.

MORE, PRESS ENTER: The data does not fit on the screen.

Recovery: Press ENTER to continue the display on the next page.

NAME2 LONGER THAN NAME1: NAME2 is longer than NAME1.

Recovery: Make NAME2 equal to or shorter than NAME1.

NATIVE DEVICE ADDR USED: The wrong screen was used to assign or unassign a native device.

Recovery: Use the Program Load screen to change any native device address.

NO BLOCK AT MATCH-WAIT: No block is active (available to be halted).

Recovery: No action is required.

NO IML: No IML was performed.

Recovery: Press the POWER ON/IML key.

NO SAVED SCREENS: The CE log or Saved Screens area is empty.

Recovery: No action is required.

NO SPACE IN LIST: The list area is full.

Recovery: No action required.

NOT A COLOR CONSOLE: A color display function was requested from a noncolor display unit.

NOT AVAILABLE: The requested function is not available for use, or no room is on the diskette currently mounted. The function cannot be performed.

NOT FOUND IN LIST: The Block or Patch name was not found in the Index.

Recovery: No action required.

NOT IMLED: (This is a dependent error; other commands must have certain parameters.) An IPL was attempted without a prior IML. The cursor is positioned at the end of the SELECTION line.

Recovery: IML the Support Processor, and rekey the correct command and parameter.

OPERATION RATE NOT NORMAL: The Operation Rate switch is not set to NORMAL.

Recovery: Set the Rate switch to NORMAL (QON).

PAGING KEY IGNORED:
- A paging operation (not required for this screen) was attempted, or
- The address to be generated by paging is either too high or too low for the function selected, or
- The previous command had a nonpaging error.

PATCH IS ACTIVE: The patch is active and cannot be edited.

Recovery: Press ENTER to return to the patch list screen.

PATCH ERROR: An error occurred while running a patch that was invoked after an IML.

POWER COMPLETE: A power-up of the processor or a re-IML of the Support Processor was successful.

POWER INCOMPLETE: A function was selected before the power-on sequence of the processor was complete.

Recovery: Press the POWER OFF key and then the POWER ON key.

POWER NOT UP: A function was selected, but no power is on the processor.

Recovery: Press the POWER ON key, wait for POWER COMPLETE, and then retry the command.

PRESS ENTER TO SAVE: Pressing ENTER saves the screen.

Recovery: Informative message; no action required.

PRINTER HALTED: An informative message that the printer was stopped from copying.

Recovery: No action required.

PROCEED: A Read command is in progress. Only now can the operator enter data in the input area. Proceed is cleared when the Read command is ended by one of the following conditions:
- Normal ending caused by ENTER or CNCL key.
- A system or selective reset.
- A Halt Device or Halt I/O instruction issued to the device.

PRT/KYBD MODE: The display console was assigned a common address with a hard-copy printer (via the Program Load screen).

PSW UNPREDICTABLE: A program reset made the PSW unpredictable. The PSW is set to zeros.

Recovery: Display the current PSW to determine whether program execution should continue. If necessary, re-IPL.

PTR-BUSY: The printer is in manual mode and busy from a previous Copy key request or a SIO from the operating system. The Copy key request is ignored.

Recovery:
- Press the RESET key and retry Copy key request.
- Press the RESET key, and then press the STOP and START key at the PU. Retry the Copy key request.
- Power the printer off and on; then retry the Copy key request.

PTR-CHK: The printer in manual mode has an unrecoverable error.

Recovery: Press the RESET key.

PTR-INTV REQD: In manual mode, operator intervention is required to restore the printer to the ready condition.
- Printer power is off.
- Printer is in Test mode.
- A Copy key request was performed, and no Copy key device was configured. The Copy request is ignored.

Recovery: Press the RESET key.

PTR/KYBD CONS ADDR ERROR: The address restrictions of printer/keyboard mode were not met. The cursor is positioned at the end of the SELECTION line.

Recovery: Rekey the correct command and parameter after the last command entered along the SELECTION line. Only the latter command is recognized.

PU ALREADY INTIALIZED: An attempt was made to use the Copy function to a channel printer while the system was in an active IPL. This Copy function overlays the existing program within the system.

Recovery: If a copy is desired, enter a QCLEAR on the selection line and retry the Copy function.

Warning: If the machine has been IPLed, a QCLEAR is required. However, a loss of customer data can result with this selection.

PU HARDSTOPPED: A function was requested, but the machine was hardstopped.

Recovery: Remove the machine from the hardstopped state and retry the function.

PU IS NOT SOFTSTOPPED: A function requiring the processor to be softstopped was invoked while the machine was running, and the attempt to softstop the processor was unsuccessful.

Recovery: Press the STOP key and perform the desired function.

PU NOT INITIALIZED: The selected function was not possible because no PU IML was performed.

Recovery: IML the PU and try the function again.

PUT IN FROM DISK, ENTER: Insert the diskette which contains the data to be transferred and press the ENTER key.

PUT IN TO DISK, ENTER: Insert the diskette which is to receive the data to be transferred and press the ENTER key.

'QCLEAR' RESET REQUIRED:
- A requested function requires that the machine not be IPLed.
- The channel printer (KC) or (QEWC) option was selected when the machine was IPLed.

Recovery: To protect the operator from accidentally overlaying storage, the Copy-to-line-printer function requires a specific clear reset. If a customer job is running, a clear reset aborts the job. A re-IPL is required after a clear reset if more programs are to be run.

RE-IML REQUIRED: Changes were made to the System Configuration (QFS) or Module Transfer (QFM) screen.

Recovery: To effect the changes, press POWER ON/IML key and select option 'M' when the Program Load (QL) screen appears.

READY THE PRINTER: A print operation was attempted, but the printer (channel) was not ready.

Recovery: Ready the printer and retry the function.

REFCODE LOGGED: A reference code was displayed and logged.

Recovery: Go to the Start MAPs.

REJECTED-BLOCK INVOKED: An inactive block was invoked, and an Address Compare command was issued.

Recovery: Halt the block (QBH) before issuing an Address Compare command.

REMOVE PART OF SHARED UCW: Entire address range of shared devices was not removed.

Recovery: Remove entire address range.

REQUEST: A REQ (Request) key attention status was stacked because the device was busy executing a command. When the current operation is completed, the attention status is presented to the channel, and the REQUEST indicator is cleared. A system or selective reset also clears the REQUEST indicator.

ROCF ACTIVE: The host system has an active session in process with the 4341 via the RSF link.

ROCF MONITOR ACTIVE: The Remote Operator Console Facility is enabled and waiting for incoming calls from the host system.

SAVED-title: A screen was successfully saved on the diskette.

SEE ERROR MESSAGE: See the error message on line 20.

SELECTION COMPLETE: The UCW directory was changed, and the device address was assigned.

SERIAL NOS. DO NOT MATCH: The diskette image machine serial number does not match the processor serial number.

SERIAL NUMB READY TO LOCK: The machine serial number entered does not have a syntax error.

Recovery: Use LOCKSERNUM to secure the serial number.

SOFTSTOP REQUIRED: The processor is in a hardstop or running state, and an attempt was made to change a device address within the processor. The cursor is positioned at the end of the SELECTION line.

Recovery: Press the STOP key. With the correct command still on the SELECTION line, press the ENTER key.

SP/PU COMMUNICATION ERR: A communication error occurred between the SP and PU. This error may be accompanied by a reference code.

Recovery: Go to the Start MAPs.

SP/PU COMMUNICATIONS FAILURE: An IML failed because data was not transferred between the SP and the PU.

Recovery: Retry an IML. If the failure persists, go to the Start MAPs.

SP/PU DATA MISCOMPARE: Data in the SP does not compare with the data sent back from the PU. This error may be accompanied by a reference code.

Recovery: Go to the Start MAPs.

SP/PU TRANSFER ERROR:

- An error occurred during transfer of data from the SP to the PU while executing the Main Storage Address Verification test.

- An error occurred while transferring data from the SP to the PU. This error may by accompanied by a reference code.

Recovery: Retry the test. If the test fails again or a reference code appears, go to the Start MAPs.

STARTL NOT AVAILABLE: The test before a STARTL transfer begins showed that the support processor or processing unit interfaces were not operational.

Recovery: Re-IML the processor, and then restart the STARTL command function.

SUPPORT BUS FAILURE: The PU logic reset failed during IML or a Support Bus error was detected.

Recovery: Re-IML. If the failure persists, go to the Start MAPs.

SYNTAX ERROR: An error occurred in the editing fields. The cursor is positioned beneath the data in error.

Recovery: Key in the correct data and press ENTER.

SYSTEM ERROR: An internal error occurred in the processor. A reference code indicates the source:

EC900060 =	Coding error (Ref. Code)
EC90EC60 =	Start or stop attempt failed (Ext. Code)
F4900060 =	Diskette I/O error (Ext. Code)
F8900060 =	Console Display error (Ext. Code)
FD900060 =	Scan ring failed to cycle properly (Ext. Code)
ED900060 =	Path from the SP to the PU failed (Ext. Code)

Recovery: Retry the command function. If the error persists, go to the Start MAPs.

SYSTEM IS IMLED: The satelite system is IMLed a re-IML changes the status. CURRENT PSW IS XXXXXXXX XXXXXXXX, MACHINE IS CLOCKED STOP STATE, or MACHINE IS ERROR STOPPED STATE is also displayed with this message. Their status changes with a re-IML also.

SYSTEM IS IPLED: The satelite system is IPLed a re-IPL changes the status. CURRENT PSW IS XXXXXXXX XXXXXXXX, MACHINE IS CLOCKED STOP STATE, or MACHINE IS ERROR STOPPED STATE is also displayed with this message. Their status changes with a re-IPL also.

SYSTEM RESET REQD: An attempt was made to use the MODE SEL or CHG DPLY key while the system was in a hardstop state and the console was busy with an Operating System operation.

Recovery: Perform a Program Reset (PROGR), Clear Reset (CLEAR) or an IPL.

TAPE NOT OPERATIONAL: The specified tape drive is not operational.

Recovery: Verify that the correct tape drive is being used, and that the tape unit and tape control unit are operational.

TRACE/DATA COMP NOT RESET: The entered command required a Trace or Data Compare to be reset, but the PU was in hardstop. The command is accepted, but the system continues to run the Trace or Data compare function.

Recovery: Perform a system reset, or place the system in Instruction Step mode. Reenter the Normal Address Compare function.

TRANSFER HALTED: A support processor-common adapter code interface failed during a transfer.

Recovery: Return to the Module Transfer screen, and rerun the Module Transfer function.

UPDATE OVER 1024 UCWs: More than 1024 UCWs were assigned.

USAGE CONFLICT: A previous request was not completed, or the START, STOP, INTR, MODE SEL, CHG DPLY, SPM/O, or DIAG key was pressed while another display console was already in manual control mode.

Recovery: Press the RESET key to clear messages. To activate function keys for the display, locate the console that is in manual control mode, and press the CHG DPLY key. Now the function keys can be activated.

WNG: CHECK ERROR: A CRC (CHECKSUM) error occurred.

Recovery: Enter the correct CRC value.

WNG: CHECK ERROR (XXXX): A CRC (CHECKSUM) error occurred.

Recovery: Enter the CRC value (XXXX) that is provided in the message.

X OF PART OF SHARED RANGE: Unassigning a shared device did not unassign the entire range.

Recovery: Unassign the entire range.

MANUAL FUNCTIONS

GENERAL SELECTION (Q)

The General Selection screen is the first screen to appear when you initially enter manual functions. The General Selection (Q) screen is the main screen in the manual function. The Q-screen has two sections. The selections on the left half of the screen are immediate operations and, with the exception of the Problem Analysis and SP Storage Displays, do not produce another manual control mode screen. They execute their particular function and display the Q-screen. The selections on the right half of the screen have additional screens to complete their function.

Selecting the General Selection Screen (Q)

The General Selection screen appears:

- When MODE SEL is pressed
- When you enter Q in the SELECTION area (manual mode)
- When CHG DPLY is pressed (if last screen displayed in manual mode).

Selecting a Manual Function

The cursor is next to SELECTION: and ready for input. To select one of the functions:

1. Key in the selector character shown on the left of the required operation.
2. Press ENTER.

Another display appears on the screen if you made a selection that appears to the right of the screen. This new display usually requires the same action as above, that is, selection of a displayed character, and then pressing ENTER.

Note: *The appropriate action is carried out as soon as ENTER is pressed for characters Y, J, PROGR, CLEAR, CM, RES, SAVE and Z.*

For the description of the error messages that can occur during the selection of a manual function, see Error Messages.

```
                    *GENERAL SELECTION*

       Y   TIME OF DAY-ENABLE              F   CONFIGURATION
                                           L   PROGRAM LOAD
       J   INTERVAL TIMER-SWITCH           B   BLOCK/PATCH

      PA   PROBLEM ANALYSIS                A   COMPARE/TRACE
    PROGR  SYSTEM RESET-PROGRAM            K   CHECK CONTROL
    CLEAR  SYSTEM RESET-CLEAR              O   OPERATION RATE
      CM   MACHINE RESET

      RES  RESTART                         D   DISPLAY/ALTER
                                           V   INSERT/EXTRACT
     SAVE  STORE STATUS


       Z   RETURN TO PROG SYS             E   ERROR LOGOUTS
       X   SP STORAGE DISPLAY             M   POWER/TEMPERAT
                                          I   DISKETTE IPL

    SELECTION:                                ==>

                                           4341
```

Fast Selection

Once you are familiar with the manual selections, selector characters, subsequent displays and their associated parameters, you can execute a function in one step. This feature can be implemented from most manual selection screens. One fast-select method is the execution of a manual function directly from the General Selection screen. A second way is to switch between manual functions, and directly execute the function just selected. To initiate fast selection, the letter Q must always proceed the function being implemented.

To perform fast selection:

1. Press MODE SEL (if system screen is present).
2. Press Q.
3. Key in character that represents manual function you want to perform.
4. Key in parameters for the manual function you have just selected.
5. Press ENTER.

Note: *Do not insert commas between characters. If the system finds a syntax error, the screen that represents the last correct letter is displayed. The manual functions compress the selection line input and ignore blanks entered into the system.*

Time of Day Enable (Y)

TIME OF DAY ENABLE switch has no additional menu.

1. Key in Y following the SELECTION label.
2. Press ENTER.

The clock can be altered by the Set Clock instruction. After pressing the ENTER key, screen control is immediately switched to the Operating System screen.
   TOD: ENBL is indicated on line 22 of the display console for approximately six seconds, and then the TOD is automatically disabled.

Interval Timer Switch (J)

Interval Timer switch has no additional display.

1. Key in J next to the SELECTION label.
2. Press ENTER.

The interval timer function is available when the system is operating in 370 or VSE mode. The Interval Timer switch is automatically set on when the system is IMLed. The timer can be turned off by entering a J following the SELECTION label and pressing ENTER on the keyboard. Whenever the switch is on, TIMER: ON is indicated on line 21 of the display console. Whenever the switch is off, TIMER: OFF is indicated on line 21.

The interval timer is alternately turned on or off each time that a J is entered.

When the timer is activated, real main storage location 80 is decremented approximately every 30 ms. When the location goes negative, an interrupt is generated. If the timer is off, location 80 is available for use.

Problem Analysis (PA)

For information about Problem Analysis see: Volume 13/16, Section 14, "Problem Analysis (PA)."

System Resets

Program Reset (PROGR)
Clear Reset (CLEAR)

Note: *If a Clear Reset is performed while a trace or stop-on-main-storage-data-compare (nonzero) function is in effect, a false match stop occurs.*

There is no display for Program Reset or Clear Reset.

1. Key in either PROGR (Reset-Program) or CLEAR (Reset-Clear) following the SELECTION label.

2. Press ENTER.

Keying in either PROGR OR CLEAR and then pressing ENTER:

- Clears pending interrupts or machine check conditions.

- Causes the following to stop:
  Execution of the present PU instruction (if any)
  All channels and their control units
  All adapters
  All I/O devices (channel and natively attached)

- Resets manual functions
  Time-of-Day Enable
  Save Indicator
  Operation Control Rate (except I-step)

A Program Reset does not affect the values of:

- PU timer
- Clock comparator
- General registers
- Floating-point registers
- Control registers
- Main storage

A Clear Reset initializes the control registers and clears to zero the values of any storage or registers whose contents can be modified by the system program. These include:

- Current PSW
- Processor timer
- Clock comparator
- General registers
- Floating-point registers
- Main storage
- Translate tables (VSE mode)
- Page management pointer (VSE mode)

Note: *Pressing the POWER ON/IML switch (with power up) does not reset the processor. Only the SP code is reloaded and normal processor operation can be continued. This switch clears up Channel 0 if it has failed due to an intermittent problem. The Reset button (logic reset) on the main frame near the diskette drive is similar to the SP re-IML, but no SP code is reloaded.*

Check Reset (Re-IML)

The only reliable way of clearing an intermittent check is to re-IML the processing unit. This command is QLM. If another checkstop occurs, the error is probably not intermittent. However, most checks can be cleared either by the Program Reset (QPROGR) or Clear Reset (QCLEAR).

Machine Reset (CM) (Normal)

The Machine Reset is a CE-only function to be used when directed by your FSC or Product Engineer.

To invoke the Machine Reset function from the General Selection screen:

1. Key CM next to SELECTION.

2. Press ENTER.

Note: *The following happens:*

- *All scan rings are reset including those related to the clocks.*

- *The refresh clock is turned on at the end of the routine.*

CAUTION Because the Refresh Clock is stopped, double-bit errors occur in main storage.

Note: *It does not:*

- *Use the PU microcode.*

- *Clear or reset any arrays.*

- *Save any Manual Control settings.*

Two optional variations to the machine reset are QCMrr and QCMLxxxx.

Machine Reset (CMrr) — One Ring

QCMrr resets specified scan rings. rr is the specified ring to be reset. In general, operational results are unpredictable.

Machine Reset (CMLxxxx) — With Log

QCMLxxxx resets machine latches from a specified machine check logout. xxxx is the same four digits as those specified to display the detailed error logout (QECDxxxx). The machine is placed in CK-CTRL=HARDSTOP automatically. All nonarray Insert/Extract screens may now be used.

Restart (RES)

RESTART has no additional display.

1. Key in RES following the SELECTION label.

2. Press ENTER.

If the machine is in stopped state, it starts with the program restart PSW. If the machine is in the operating state, the PSW exchange occurs at the end of the current instruction after all interrupts for which the PU is enabled are handled.

To return the console to the operating system:

- Press CHG DPLY or,

- Key Z next to SELECTION and press ENTER.

Store Status (SAVE) (370 Mode Only)

This function stores in hex and is allowed when running with Virtual Storage Control. STORE STATUS has no additional display.

1. Key in SAVE following the SELECTION label.

2. Press ENTER.

The following are stored in main (real) storage:

- Processor timer — 8 bytes at 'D8' (216 dec.)
- Clock Comparator — 8 bytes at 'E0' (224 dec.)
- The current PSW — 8 bytes at '100' (256 dec.)
- Floating-point registers — 32 bytes at '160' (352 dec.)
- General registers — 64 bytes at '180' (384 dec.)
- Control registers — 64 bytes at '1C0' (448 dec.)

Machine Save (SAVE) (VSE Mode only)

In VSE mode, the Save function is called *Machine Save*. This function saves the above data as well as page 0 (virtual address 0 to 2048) in auxiliary storage for subsequent retrieval by a Retrieve Status and Page software instruction (D8).

When Store Status or Machine Save is complete, SAVE is indicated on line 21 of the display console, and the system goes into a stopped state.

Return to Prog Sys (Z)

RETURN TO PROG SYS has no additional display.

1. Key in Z following the SELECTION label.

2. Press ENTER

The screen is under control of the operating system.

Note: *The support processor transient area is released and the contents of the system mode (usually operating system messages) buffer is displayed.*

SP STORAGE (QX)

Microcode Level 154322 (856091) and Above

To select the SP Storage function from the Q-screen:

1. Key X next to SELECTION.
2. Press ENTER.

Notes:

- *The next higher/lower 512 bytes of storage can be displayed by using the paging keys.*
- *The address can be defaulted.*
- *The display can be fast-selected by keying QX and the desired address (does not have to be 4 digits) from any screen.*
- *To obtain a display of the dump of SP storage when using the SP stand-alone dump support option (QID), key DUMP next to SELECTION instead of a hex address.*
- *To return to SP STORAGE when in SP DUMP mode:*
  1. *Key STOR next to SELECTION.*
  2. *Press ENTER*

Return to General Selection (Q)

1. Key Q next to SELECTION.
2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.
2. Press ENTER.

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```
                              *SP STORAGE*
ADRS   +0        +4        +08       +0C       +10       +14       +18       +1C
2000   0814000F  70613600  80007061  20323600  40007061  20263600  10007061  2026090C
2020   243E04F0  21CE1FC4  707121B8  0804007B  70610D08  22CC3600  800070C1  207C3800
2040   800022CC  20742808  20580201  0020FFE0  22F422CD  3C0000FF  22F6FFFF  22F422CD
2060   206604F0  20740212  002022F4  000022F4  04F421BB  0982243E  04F021CE  36002000
2080   706120C6  A08040DF  70610814  00807000  080400BF  70CC0804  00BF7070  08340080
20A0   70CB0884  706270CB  083400E9  70711526  22CD22CD  09D822CD  3A002680  228604F0
20C0   265604F0  21FA09D3  243E3600  800070CC  21CE3600  40007070  20FA3600  400070CC
20E0   21CE3600  80007072  21CE3800  80007072  21CE0982  243E04F0  21CE8000  400070CC

2100   0814000F  70613600  80007061  20323600  40007061  20263600  10007061  2026090C
2120   243E04F0  21CE1FC4  707121B8  0804007B  70610D08  22CC3600  800070C1  207C3800
2140   800022CC  20742808  20580201  0020FFE0  22F422CD  3C0000FF  22F6FFFF  22F422CD
2160   206604F0  20740212  002022F4  000022F4  04F421BB  0982243E  04F021CE  36002000
2180   706120C6  A08040DF  70610814  00807000  080400BF  70CC0804  00BF7070  08340080
21A0   70CB0884  706270CB  083400E9  70711526  22CD22CD  09D822CD  3A002680  228604F0
21C0   265604F0  21FA09D3  243E3600  800070CC  21CE3600  40007070  20FA3600  400070CC
20E0   21CE3600  80007072  21CE3800  80007072  21CE0982  243E04F0  21CE8000  400070CC
SELECTION:  2000

                                         ==>
                                           4341
```

MICROCODE 154322 (856091) AND ABOVE

```
                            *SP STORAGE DISPLAY*
BYTE   +00       +04       +08       +0C       +10       +14       +18       +1C
2000   0814000F  70613600  80007061  20323600  40007061  20263600  10007061  2026090C
2020   243E04F0  21CE1FC4  707121B8  0804007B  70610D08  22CC3600  800070C1  207C3800
2040   800022CC  20742808  20580201  0020FFE0  22F422CD  3C0000FF  22F6FFFF  22F422CD
2060   206604F0  20740212  002022F4  000022F4  04F421BB  0982243E  04F021CE  36002000
2080   706120C6  A08040DF  70610814  00807000  080400BF  70CC0804  00BF7070  08340080
20A0   70CB0884  706270CB  083400E9  70711526  22CD22CD  09D822CD  3A002680  228604F0
20C0   265604F0  21FA09D3  243E3600  800070CC  21CE3600  40007070  20FA3600  400070CC
20E0   21CE3600  80007072  21CE3800  80007072  21CE0982  243E04F0  21CE8000  400070CC

2100   0814000F  70613600  80007061  20323600  40007061  20263600  10007061  2026090C
2120   243E04F0  21CE1FC4  707121B8  0804007B  70610D08  22CC3600  800070C1  207C3800
2140   800022CC  20742808  20580201  0020FFE0  22F422CD  3C0000FF  22F6FFFF  22F422CD
2160   206604F0  20740212  002022F4  000022F4  04F421BB  0982243E  04F021CE  36002000
2180   706120C6  A08040DF  70610814  00807000  080400BF  70CC0804  00BF7070  08340080
21A0   70CB0884  706270CB  083400E9  70711526  22CD22CD  09D822CD  3A002680  228604F0
21C0   265604F0  21FA09D3  243E3600  800070CC  21CE3600  40007070  20FA3600  400070CC
20E0   21CE3600  80007072  21CE3800  80007072  21CE0982  243E04F0  21CE8000  400070CC

ADDRESS:  2000                                        4341
```

MICROCODE 154321 AND BELOW

SP STORAGE DISPLAY (QX)

Microcode Level 154321 and Below

To invoke the SP Storage Display from the General Selection screen:

1. Place the CE MODE switch ON.
2. Key X next to SELECTION.
3. Key a four-digit hex address next to X.

Notes:

- *To obtain a display of the dump of SP storage when using the SP stand-alone dump support option, key DUMP next to X instead of a four-digit hex address.*
- *This address can be defaulted.*

4. Press ENTER.
5. Press ALT and use the PAGE keys to find desired address.
6. Press MODE SEL to exit the SP Storage Display screen.

Notes:

- *Each page contains 512 bytes of storage.*
- *Any address entered must contain four hex digits.*

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CONFIGURATION (QF)

The F-selection from the General Selection screen displays the Configuration screen menu. The menu shows the facilities available as subscreens from the Configuration screen. A subscreen is selected from the Configuration screen by first keying QF, or just F if you currently have the General Selection screen.

Nine selection characters are on the Configuration screen, but only seven are major facilities: the System Configuration screen, Console Color Convergence screen, Console Test Pattern screen, Module Transfer screen, Remote Support Facility screen, Remote Operator Console Facility screen and the Tape-to-Diskette Build screen. The Remote Support Facility consists of selections: R, C, and D. For more information, refer to "Remote Support Facility."

To select the Configuration screen from the General Selection screen:

1. Place the CE MODE switch ON.

2. Key F next to SELECTION.

3. Press ENTER. Configuration screen is displayed.

```
               *CONFIGURATION*

        S   SYSTEM CONFIGURATION

        A   CONSOLE COLOR CONVERGENCE
        P   CONSOLE TEST PATTERN

        M   MODULE TRANSFER

        R   REMOTE CONSOLE INITIALIZATION
        C   REMOTE CONSOLE COMMUNICATIONS
        D   DATA BANK INITIALIZATION

        B   REMOTE OPERATOR CONSOLE FACILITY

        T   TAPE TO DISKETTE BUILD (IBM AFE ONLY)

        Q   GENERAL SELECTION
        Z   RETURN TO PROG SYS
SELECTION:                              ==>

                        4341
```

SYSTEM CONFIGURATION (QFS)

The System Configuration screen is a CE-only function. To invoke this screen, the 4341 must be in CE mode. This screen can be selected from the Configuration screen or fast-selected from the General Selection screen.

Changes are made by entering the required data, or by using the cursor. The use requirements are restrictive to prevent errors. Be careful when updating the configuration record. Fields displaying a colon (:) on the screen are alterable.

The configuration record is stored on the system diskette and is updated each time a change is made. A support processor re-IML must be performed any time a change is made to the configuration record or if the diskette is changed.

To select the System Configuration screen from the Configuration screen:

1. Place the CE MODE switch ON.

2. Key S next to F on the SELECTION line.

3. Press ENTER. System Configuration screen is displayed.

To update the configuration record:

Note: *The following sections apply to the areas which can be altered.*

Serial No.: Move the cursor to the value displayed on the screen for SERIAL NO. and key in the machine serial number. When the entered serial number is verified, key in next to SELECTION:SLOCKSERNUM
Press ENTER.

The serial number is now locked, and the lock serial number message is no longer displayed on the screen.

Note: *The serial number update is a one-time occurrence. When entered, it becomes an unalterable field. It is important that the entered serial number be verified.*

Power Logic: Move the cursor to the value displayed on the screen for POWER LOGIC, and key in the EC number of the power EC just installed.
Press ENTER.

Main Store Size: Move the cursor to the value displayed on the screen for MAIN STORE SIZE, and key in the two-digit number representing the size of main storage.
Press ENTER.

Control Store Size: Move the cursor to the value displayed on the screen for CONTROL STORE SIZE, and key in the two-digit number representing the size of control storage.
Press ENTER.

```
                 *SYSTEM CONFIGURATION*

MODEL  4341                           CONSOLE DEVICES
SERIAL NO.:   000000                     N0 N1 N2 N3
DISKETTE PART NO. 0000000    INSTALLED:    X  X  X  X
          EC  000000         OPERATIONAL   X  X  _  X
          REA 0000000        HARDCOPY:     _  _     X

                             CONSOLE LANGUAGE CODE: 00
POWER LOGIC:  000000         ROCF AUTO-ANSWER MODEM: _

MAIN STORE SIZE:    04 MEG    NUMBER OF CHANNELS: 06
CONTROL STORE SIZE: 64 KB     CHANNEL 4 IN BYTE MODE: _

    LOCKSERNUM - LOCK SERIAL NUMBER   CHANNEL TO CHANNEL:
                                      I/O POWER-UP TIME-OUT: 02 MINS
    Q  GENERAL SELECTION              POWER GROUP: 00
    Z  RETURN TO PROG SYS

SELECTION: S                          ==>


                                      4341
```

Console Devices Installed: Move the cursor to the location on the screen for CONSOLE DEVICES INSTALLED, and key in an X if installed or an __ if not installed. No device should be assigned unless it is installed.

Operational field is for information only; it is not alterable.

Hardcopy: Move the cursor to the location on the screen for HARDCOPY, and key in an X if a printer is installed and is to be flagged as a hard-copy device, or an __ if it is not installed. A hard-copy device can be console device one through three.
Press ENTER.

Console Language Code: Move the cursor to the value displayed on the screen for CONSOLE LANGUAGE CODE, and key in one of the following values:

00	U.S. English
00	Canadian/French (See Note)
01	Austria/German
02	Belgium
03	Brazil/Portuguese
04	Denmark
05	Finland
06	France/Azerty
07	France/Qwerty
08	International
09	Italy
0A	Japan/English
0B	Norway
0C	Portugal
0D	Spain
0E	Spanish Speaking
0F	United Kingdom
10	Sweden
11	EBCDIC/World Trade

Press ENTER.

Note: *The Canadian/French keyboard has the same character set and keyboard layout as the U.S. English, but with French nomenclature on the keys.*

ROCF Auto-Ans Modem: Move the cursor to the location on the screen displaying ROCF AUTO-ANS MODEM: and key in an X when an ROCF Auto-Ans modem is installed, or an __ if it is not installed.
Press ENTER.

Number of Channels: Move the cursor to the location on the screen displaying NUMBER OF CHANNELS: and key in the two-digit number representing the number of channels.
Press ENTER.

Channel 4 in Byte Mode: Move the cursor to the location on the screen displaying CHANNEL 4 IN BYTE MODE: and key in an X if channel 4 is to be used as a byte-multiplexer channel, or an __ if it is to be used as a block-multiplexer channel. This selection is valid only when the processor has been configured for six channels.
Press ENTER.

Note: *Always check the Display/Alter UCW Directory (QDU) to verify the assignment.*

Channel to Channel: Move the cursor to the value displayed on the screen for CHANNEL TO CHANNEL, and key an X next to it for desired assignment, or an __ if the existing value is to be deleted.
Press ENTER.

I/O Power-Up Time-Out: Move the cursor to the value on the screen for I/O POWER-UP TIME-OUT, and key in the number of minutes (in decimal) that the power code waits for the channel I/O devices attached to the power sequencing relays to power up. (If I/O stepping is not complete in the specified time, the machine posts a reference code.)
Press ENTER.

Power Group:

Note: *Using the Feature BM machine history, determine what Documentation BM is associated with the 4341. The charts on the following page indicate which Power Group Code matches the machine configuration.*

Move the cursor to the value displayed on the screen for POWER GROUP code, and key in the correct code.

Press ENTER.

Return to General Selection (Q)

1. Key Q next to SELECTION.

2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.

2. Press ENTER.

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BM	Feature Title	Power Group Code
4154511 and one of the following: 5896667 or 4124111 or 4124101	First Source Storage with Ferro Power Supplies: First Source 2 Meg (.5 Meg Card) Storage Group First Source 4 Meg (.5 Meg Card) Storage Group First Source 8 Meg (.5 Meg Card) Storage Group	21
4154512 and one of the following: 5896667 or 4124111 or 4124101	First Source Storage with Switching Regulators: First Source 2 Meg (.5 Meg Card) Storage Group First Source 4 Meg (.5 Meg Card) Storage Group First Source 8 Meg (.5 Meg Card) Storage Group	22
4154511 and one of the following: 4154406 or 4154407 or 4154408 or 4154409	First Source Storage with Ferro Power Supplies: First Source 4 Meg (1.0 Meg Card) Storage Group First Source 8 Meg (1.0 Meg Card) Storage Group First Source 12 Meg (1.0 Meg Card) Storage Group First Source 16 Meg (1.0 Meg Card) Storage Group	23
4154512 and one of the following: 4154406 or 4154407 or 4154408 or 4154409	First Source Storage with Switching Regulators: First Source 4 Meg (1.0 Meg Card) Storage Group First Source 8 Meg (1.0 Meg Card) Storage Group First Source 12 Meg (1.0 Meg Card) Storage Group First Source 16 Meg (1.0 Meg Card) Storage Group	24

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Model Group 2

CONSOLE COLOR CONVERGENCE (QFA)

The Console Color Convergence screen is used to align the color on a color display console. The initial display when making this selection is a description of the operation of the convergence procedure.

Pressing the ENTER key advances the screen to the pattern display to start the adjustment. The ENTER key may be pressed at any time to restart the adjustment.

To return to the General Selection (Q) screen, press the MODE SEL key. However, because of interaction of some of the convergence positions, check all positions after the procedure is started. It is not necessary to adjust each position; advancing through each pattern position with the SPACE BAR performs the necessary action.

Notes:

- If INHIBITED or any other symbol appears in the operator information area, press RESET and retry the action.
- After all thirteen positions have been adjusted, the pattern displays white in all positions (see test pattern diagram). This is the final check for convergence.
- The convergence procedure cannot be directed to another console. You must be physically at that console and in manual mode to perform the procedure.

To select the Console Color Convergence screen from the Configuration screen:

1. Key A next to F on the SELECTION line.

2. Press ENTER.

```
                  CONVERGENCE UTILITY


THIS UTILITY IS USED TO CONVERGE RED, GREEN, AND BLUE
DISPLAYS INTO CORRECT ALIGNMENT.   PATTERNS ARE SHOWN
TWICE AT 13 POSITIONS ON THE SCREEN, IN RED/GREEN AND
THEN RED/BLUE. THE 4 CURSOR KEYS ARE USED TO MOVE THE
2 COLOR PATTERNS TOGETHER INTO 1 COLOR, THE RED/GREEN
MERGES INTO YELLOW AND RED/BLUE MERGES INTO PINK.

     ENTER INITIALIZES UTILITY (MUST BE PRESSED 1ST)


     CURSOR UP, DOWN, LEFT, OR RIGHT MOVES THE PATTERN


     SPACE BAR SELECTS NEXT POSITION OR COLOR


     R KEY CHANGES PATTERN COLOR (RED/GREEN(-)REDBLUE)


     MODE SEL KEY EXITS UTILITY
```
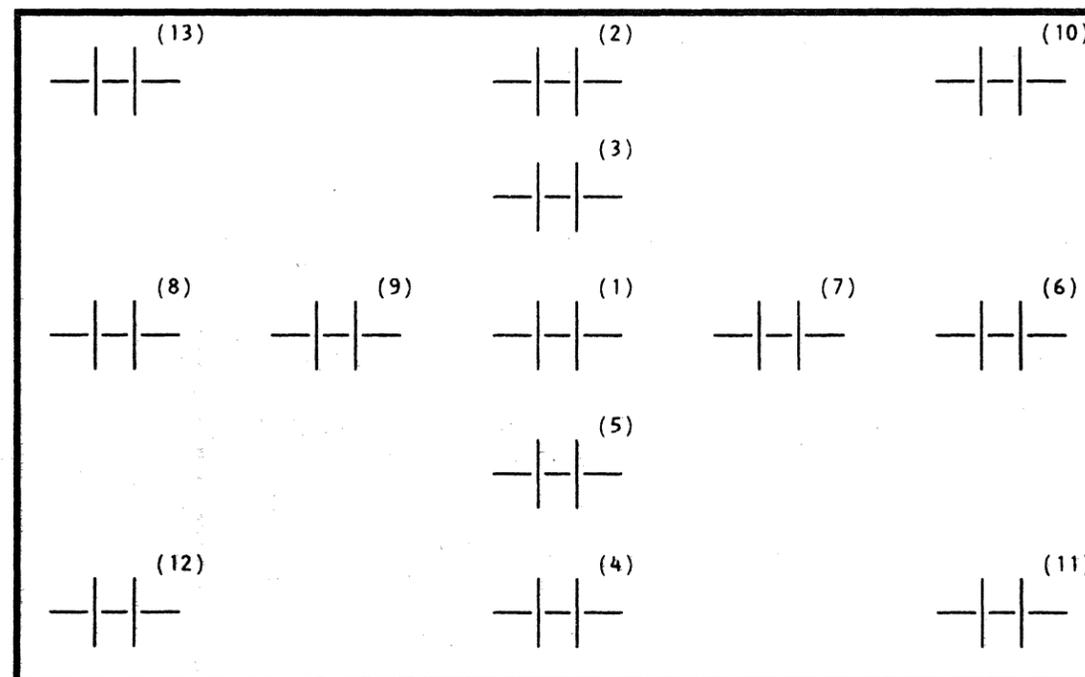

Note: *Numbers in parenthesis indicate order of adjustment.*

Convergence Procedure

The convergence procedure is used to optimize the 3279-2C color console primary color settings (red, green, and blue) to produce a pure compound color (white). If convergence is wrong, traces of each color are displayed at the edges of the white character.

Use the convergence procedure when setting up a color console, when the console has been moved to another area, or when color definition is in question.

Convergence can be adjusted by using the keyboard to manually align a pattern. By using two colors (red/green or red/blue), a pattern (- | - | -) is displayed at a location on the screen, any misconvergence can be easily seen. In a correctly converged screen, the two colors combine to show one pattern, in the color obtained by mixing the two primary colors (red/green combine into yellow, and red/blue combine into pink). A misconverged screen shows traces of the primary colors at the edge of the pattern or, if the convergence is bad, two separate patterns. The pattern is displayed at thirteen positions on the screen to allow all areas to be converged. At each of the thirteen positions, the pattern is first displayed in red/green, and then in red/blue.

The cursor positioning keys move the green (or blue) pattern towards the red until they coincide and a yellow (or pink) pattern is displayed. These keys are typematic and can be held down until the pattern is in the correct position.

The "R" key is used to reverse the color setting of the displayed pattern (red/green to or from red/blue). This allows the pattern to checked and adjusted at one position.

Use he SPACE BAR to advance to the next adjustment position in the convergence procedure. The initial pattern at each position is displayed with the red/green colors. Pressing the SPACE BAR at this time changes the pattern to red/blue (the same as the "R" key). Pressing the SPACE BAR when the red/blue pattern is displayed advances the procedure to the next adjustment position, and displays the pattern in red/green. After the last position has been adjusted, pressing the SPACE BAR displays the pattern in white at all positions. If the SPACE BAR is pressed again, the procedure restarts at position one.

CONSOLE TEST PATTERN (QFP)

The Console Test Pattern screen provides a visual check for the display console colors, intensity, fields, and characters.

To select the Console Test Pattern screen from the Configuration screen:

1. Key P next to F on the SELECTION line.

2. Press ENTER.

3. Visually check all fields for correct characteristics.

4. Move cursor under the CK field.

5. Press INSERT key. INSERT MODE displays in operator information area.

6. Press keys A, B, and C. DISPLAY INSERT abck displays on line 4. INHIBITED appears in operator information area.

7. Press RESET.

   Note: *Any character key may be entered on lines 5 through 20 to check proper operation.*

8. Press MODE SEL to exit from the Console Test Pattern screen.

Note: *The console test pattern cannot be directed to another console. You must be physically at the console and in manual mode to perform the test.*

```
TEST: 4341;AA
PROTECTED AND NOT INTENSIFIED          PROTECTED AND INTENSIFIED
NOT PROTECTED AND NOT INTENSIFIED      NOT  PROTECTED AND INTENSIFIED
     DISPLAY  INSERT  CK    __




                                               ·


SELECTION:                                 ==>

                                    4341
```
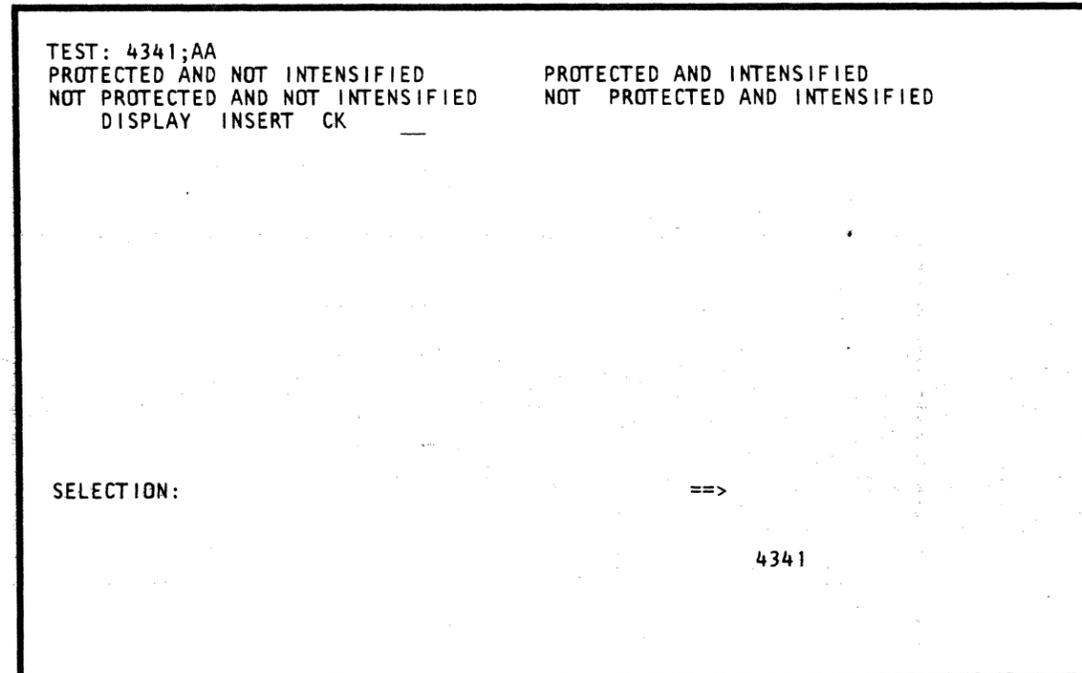
	field 1	field 2
line 1	TEST: 4341 AA	
line 2	PROTECTED AND NOT INTENSIFIED	PROTECTED AND INTENSIFIED
line 3	NOT PROTECTED AND NOT INTENSIFIED	NOT PROTECTED AND INTENSIFIED
line 4	DISPLAY INSERT	CK __

line	field	3278-2A	3279-2C 4 Color	3279-2C Monochrome
1	1	g	b	g
1	2			
2	1	g	b	g
2	2	bg	w	w
3	1	g	g	g
3	2	bg	r	w
4	1	g	b	b
4	2	g	g	g

```
g  - green
bg - bright green
b  - blue
r  - red
w  - white
```

Line Identification

Line 1

4341;aa identifies the controller to which a display console is attached; aa a port number (00 through 03).

Line 2

Protected and not Intensified
  No data can be entered; the field is not intensified (blue on a 3279-2C, normal green on a 3278-2A).

Protected and Intensified
  No data can be entered; the field is intensified (white on a 3279-2C, high intensity on a 3278-2A).

Line 3

Not Protected and not Intensified
  Data can be entered; the field is not intensified (green on a 3279-2C, normal green on a 3278-2A).

Not Protected and Intensified
  Data can be entered; the field is intensified. (red on a 3279-2C, high intensity on a 3278-2A).

Line 4

Display Insert CK
  Display and Insert fields are protected fields. CK is an unprotected field.

Note: *If the blanking circuit fails, a nondisplayable field (NON) appears preceding the DISPLAY field.*

Lines 5 to 20

Lines 5 to 20 are used to check all keyboard characters for proper operation. These lines are unprotected and not intensified.

Model Groups 1 and 2

MODULE TRANSFER (QFM)

The Module Transfer screen moves the machine-dependent data module from one support processor diskette to another. When the EC is ready to be installed, take a stock EC disk to be updated with the data from the disk already there. The new disk then is unique for this particular system. Patches and Assists can not be transferred by the Module Transfer screen.

The Module Transfer screen has two different input areas: the first is the area to the left of the module of MACHINE SENSITIVE DATA, and the other is for entering instruction type on the SELECTION line. The first area of input is on the full-screen area. The only inputs that are valid are "X" or "_" (or blanks). For any other input, an INVALID message appears. The second area of input is through the normal manual function input that is on the SELECTION line. These commands are displayed on the screen.

The module IDs are shown for each line and are taken from the disk that contains the Module Transfer CODE. If the two disks do not have the same module IDs, the transfer does not occur.

The first selection is special in that only part of the total module shown is transferred. For the configuration data, the information unique to a disk (such as part number and EC number) is not transferred. For the reset data, only those bits that are machine sensitive are transferred to the reset data module.

The Status Area of the Module Transfer screen shows the current status of the transfer taking place. The status area has four positions. The first shows the state of the transfer: S - selected for transfer; R - read from the disk and store either in main storage or in the support processor buffer; W - write on the disk from the storage area; T - the module has been transferred completely. The second through fourth positions show any error that has occurred during a read or write portion of the transfer. The "D" is followed by an error indication.

```
*MODULE TRANSFER SCREEN*
   STATUS   MACHINE SENSITIVE DATA (MODULE)
            X CLOCKS,IPU,STORE,CS .(8001-8004)
              CONFIGURATION,UCWS .(0001,20A0)
            X POWER/TEMP LOGS . . .(1024,1026)
            X PU LOG CONTROL 1,2. .(3050,3501)
            X PU LOGS 1-9 . . . . .(3061-3069)
            X SP LOGS . . . . . . .(3800)
            X REFERENCE CODES . . .(3900)
            X PROBLEM ANALYSIS DATA(2806-2808)
            X SAVED SCREENS/CE LOGS(9BXX)
ERR MODS:

STATUS INFO:  S=SELECT  R=READ & SAVE  W=RETRIEVE & WRITE  T=TRANSFER COMPLETE
              DSZ=SIZE DIFFERENT  DLA=LOAD ADDRESS DIFFERENT  D41=NOT FOUND
              INVP=INVALID INPUT

   COMMANDS:  MSTARTL  START DISK-PU-DISK TRANSFER    Q  GENERAL SELECTION
              MSTARTD  START DISK-SP-DISK TRANSFER    Z  RETURN TO PROG SYS
   SELECTION: M                                       ==> ALL LINES SELECTED


                                         4341
```

To invoke the Module Transfer screen:

Warning: Do not press the Copy key during a Module Transfer; the transfer is not completed. If a transfer is desired, rekey the previous command.

1. Place the CE MODE switch ON if you have not already done so. If you have not, you must select the Configuration screen first.

2. Key M on the SELECTION line.

3. Press ENTER.

4. After the Module Transfer screen is displayed, move the cursor to the module(s) that you do not want to transfer and place an _ next to that module. Ensure that an X is next to the module(s) that you do want transferred.

5. Press ENTER. The status area displays an S beside those modules which you have selected.

   Note: *If an error occurs, INVP is displayed instead of S.*

6. Key STARTL or STARTD next to the M on the SELECTION line, depending upon the type of transfer you wish to do.

   STARTL requires the processing unit to have been IMLed but not IPLed.

   Warning: If the machine has been IPLed, a QCLEAR is required. However, a loss of customer data can result with this selection.

   If no error occurs, the code transfers modules from the disk to the processor main storage, and asks you to swap disks. After the disk has been swapped, the modules from the processor storage are transferred to the new disk. One disk swap transfers all modules. The request for the ORIGINAL disk indicates that the transfer is complete. If a support processor-processing unit interface error occurs, the process stops, and the transfer must be restarted.

STARTD only requires the support processor and uses a buffer of about 4K. If no selection errors occur, the code transfers modules from the disk to the buffer. You are then asked to swap the disks. The modules are then transferred from the buffer to the new disk. You are then asked to swap back to the old disk. The transfer then continues until all of the modules selected are transferred.

The transfer is completed regardless of the command used, size errors, or load address errors. However, the module in error is flagged as an error module and is not used again.

Once the transfer is started, the microcode asks for the FROM disk. This allows you to use a different disk for the FROM modules.

At the end of the transfer, you are asked to replace the ORIGINAL disk because the transfer routine is reloaded to set up for another pass (if one is required). This message indicates the end of the transfer. However, you can continue and use a different disk (either another FROM or another TO).

7. Press ENTER.

Note: *Always check the System Configuration (QFS), Program Load (QL), and the Display/Alter UCW (QDU) assignment to verify the transfer.*

Status Area Codes

SZ	=	From/to modules a different size
LA	=	From/to modules have a different load address
01	=	Zero length
02	=	Error during transfer of engineering data
0F	=	Diskette not ready
21	=	Past end-of-file
31	=	Address length, memory protect error
41	=	Module ID not found
4F	=	Write protect error
81	=	Read error
82	=	Adapter machine check
83	=	UC machine check
8F	=	Cylinder index and master index different
9F	=	No current seek issued

Notes:

- *The status shows the last error encountered.*

- *When the ERR MODS area indicates 0001 (the status area displays WDSZ, and line 21 displays the message TRANSFER HALTED), a machine serial number mismatch exists between the FROM and the TO diskettes.*

Model Group 2

PROGRAM LOAD (QL)

The Program Load screen is the console function which controls the processing unit (PU) initial microcode load (IML) and the system initial program load (IPL). This screen can be invoked automatically from initial power-up or selected from the General Selection screen (Q).

The System operates in two modes. One is the System/370 (S/370) emulate mode. The other is the Virtual Storage Extended (VSE) mode and is the normal 4300 mode. The parameters that have been set determine the mode that is invoked automatically at power-up.

A function of the Program Load screen is to display the optional parameters. This function is similar to a configuration function because the parameters are changed and the configuration record is updated. The selected parameters are intensified on the screen.

From the Program Load screen you can go to the Mode Assist (I) screen, the General Selection (Q) screen, or Return to Programming Systems (Z) screen.

To display the Program Load screen from the General Selection screen:

1. Key L next to SELECTION.

2. Press ENTER.

Notes:

- *The Program Load screen displays the state of the last successful IML.*

- *For more information about program load, see "Program Load (QL)-Parameter Details."*

```
                      *PROGRAM LOAD*

PERFORM IML: M        V1  CS  TEST        PERFORM IPL: P
                      V2  MS  DATA
MODE-ASSIST MENU: I   V3  MS  ADDR        IPL UNIT ADDR: U 191
                      V4  SCOPE LP
  *MODE*              S   SAVE STG        RESET TYPE: R1 LOAD CLEAR
  S/370               Y   NO CS LD                    R2 LOAD NORMAL
  *ASSISTS*
  (NONE)                                  CONSOLE MODE: N1 PTR/KYBD
                                                        N2 DISPLAY

                                          CONSOLE ADDR: T0 01F  T2 012
IML AT POWER-ON: X1 YES                                 T1 011  H3 DSC
                 X2 NO
                                          COPY KEY: K3 CONSOLE
STATUS  NO IML                                      KD DISKETTE
Q GENERAL SELECTION                                 KC 00E CHNL PTR
Z RETURN TO PROG SYS

SELECTION:                        ==>

                                     4341
```

```
*PROGRAM LOAD*        *MODE-ASSIST SELECTION*

        SYSTEM MODE: W1 S/370       ASSISTS: 01 VMA
                     W2 VSE                  02 VS1
                                             03 MVS


        NO  ASSISTS: R
        LOAD SCREEN: L
        PERFORM IML: M




        Q GENERAL SELECTION
        Z RETURN TO PROG SYS

SELECTION: I                          ==>

                                         4341
```

MODE/ASSIST (QLI)

This screen is used to change the IML MODE and ASSISTS fields on the Program Load screen. The Mode and Assists (if any) that are selected (intensified) are loaded into the processor from the Program Load screen when the PERFORM IML: M function is invoked.

System Mode (Wn)

The SYSTEM MODE (S/370 or VSE) that is currently selected is intensified on the screen. To change the SYSTEM MODE, key in the corresponding code (W1 or W2) on the SELECTION line after the I, and press ENTER. Certain assists apply to only one system mode. Some assists are not selectable with others. If you attempt to select such mutually exclusive assists, the message INCOMPATIBLE SELECTION appears on the screen.

Assists (On)

Any assist currently selected is intensified on the screen. To change the current assist selection, first reset all assists (see "No Assists (R)" description). Then select an Assist by keying the corresponding two digits and pressing ENTER. The assist selected is intensified on the screen.

The mode and assist when none is currently specified can be selected in one operation by keying W1 and the two-digit assist code.

Notes:

- *The Program Load screen displays the state of the last successful IML.*

- *You must perform an IML to carry over the new Mode and Assist selected for IML.*

- *Assists can not be transferred by the Module Transfer (QFM) screen.*

- *Assists are valid in S/370 mode only.*

- *VMA (01) and MVS (03) Assists combination is valid only when configured with 80K Control storage (Control Store Increment option, Model Group 2 only).*

No Assists (R)

This function resets the assists that are currently in effect (intensified). Any assist *must* be reset before another assist or mode can be selected.

To clear an assist, key in R after the I on the SELECTION line and press ENTER.

Load Screen (L)

Entering L on the SELECTION line returns the display to the Program Load screen. If another screen is displayed from the Mode/Assist Selection screen, any changes made to the mode and assist fields are lost and the previous settings are loaded when the processor is IMLed.

Perform IML (M)

Entering M on the SELECTION line returns the display to the Program Load screen and initiates the microcode load that was last specified on the Mode/Assist Selection screen.

General Selection (Q)

Entering a Q on the SELECTION line changes the display to the General Selection screen. If this screen is displayed from the Mode/Assist Selection screen, any changes to the mode and assist fields are lost. You must perform an IML to carry over the new mode and assist selected for IML.

Return to Prog Sys (Z)

Entering a Z on the SELECTION line returns the display to the Operating System (Display or Ptr/Kybd mode) screen. If this screen is displayed from the Mode/Assist Selection screen, any changes to the mode and assist fields are lost. You must perform an IML to carry over the new mode and assist selected for IML.

Program Load (QL)-Parameter Details

A function of the Program Load screen is displaying the optional parameters. This function is similar to a configuration function because the parameters are changed and the configuration record is updated. The selected parameters are intensified on the screen. Any one or all of the commands with parameters can occur in any order on the SELECTION line.

The following describes the Program Load screen parameters:

Perform IML (M)

Keying M next to SELECTION and pressing ENTER IMLs the processor and loads the microcode for the mode selected on the Mode/Assist screen.

IML at Power-On (Xn)

Power-on IML can occur only when the support processor is IMLed from a power-off condition, the CE/NORMAL switch is in NORMAL, and X1 has been previously selected. If the first screen is other than the Program Load screen, no automatic IML is performed regardless of the parameter setting. For an automatic power-on IML, key in X1 next to SELECTION. For no automatic Power-On IML, key in X2.

Notes:

- If you select IML at power-on, do not perform any other function or press any key until the power-on and IML functions are complete. These functions cannot be aborted because microcode is involved in a very complex sequence.

- The setting of this control is effective only when one of the Power On keys has been used. It is not effective if a power-up is selected from the QM screen.

Perform IPL (P)

Entering P after SELECTION and pressing ENTER perform the initial program load.

IPL Unit Address (Ucuu)

The address must include a hex-digit channel number and a two-digit hex-character device number from which the program is loaded when the perform IPL (P) function is initiated. An example of an entry on the SELECTION line for the IPL device is: U191.

Reset Type (Rn)

This parameter specifies the type of system reset taken. The reset is the one currently intensified on the screen. The reset type can be changed by entering the appropriate code (R1 or R2) following the SELECTION label and pressing ENTER.

Once selected, the load clear (R1) reset function remains active (intensified) only until a successful IPL is accomplished.

A successful IPL or power-off changes the selection back to load normal (R2) reset function.

At IPL time, a basic processor and an I/O system reset in the configured channels is performed. As part of the I/O system reset, pending interrupts are cleared, and a system reset is signaled to the I/O control units and devices configured to the channel.

The first IML from power-off resets the entire processor. Subsequent IMLs reset everything except the TOD clock.

When in VSE mode, and a re-IPL is being done with the RESET-NORMAL selected, there must be enough addressable virtual storage to load and initialize the program/system. If not, the program can be designed to detect the program check and issue VSE instructions to obtain more addressable virtual storage. This is required for a stand-alone dump when RESET-NORMAL is selected.

If neither of these two options is available, the IPL must be performed with RESET-CLEAR selected.

The following shows the effect for an IML function.

PSW	C
PU Timer	C
Clock Comparator	C
Control Registers	I
General Registers	C
Floating-Point Regs	C
Storage Keys	C
Main Storage	C
TOD Clock (See Note)	C
Channel DLAT	C
Retry Local Store	C
Trap/BAL	C
Local Store	I
Channel Data Buffer	C
Channel Control	C
Trace	C
Control Store	I
Swap Buffer	C
Cache Retry	C
PU DLAT	C
Key Reset	I
Directories	I
Cache	C

C = cleared
I = set to initial values

Note: An IML, other than a power-on IML, resets everything except the TOD clock.

The following shows the effect of reset for an IPL function.

	Clear (Note 1)	Program (Note 1)
PSW		
PU Timer	C	C
Clock Comparator	C	U
Control Registers	I	U
General Registers	C	U
Floating-Point Regs	C	U
Storage Keys	C	U
Main Storage	C	U(Note 2)
TOD Clock	U	U

U = unchanged
C = cleared
I = set to initial values

Notes:

1. A PSW is loaded from the program, and the machine is left in a running state.

2. The virtual addressing tables (VSE mode) are not affected.

Console Mode (Nn)

Note: *You must softstop the machine (press the STOP key) before changing this parameter.*

The N command allows the assignment of consoles to either printer/keyboard or display mode. If an N1 command is assigned, all consoles are assigned to the printer/keyboard mode, which provides the channel interface for 1052/3210 type of devices. This mode permits the optional coupling of a display console with a printer as a one-device address. To couple, assign the devices (display and printer) the same console address. Data that is on the display console is automatically printed on the printer when these devices are coupled together.

When in printer/keyboard mode (N1), a maximum of two addresses can be assigned regardless of the number of terminals attached. The maximum configuration in printer/keyboard mode is two display consoles coupled with two printers. Any over two display consoles attached to the system must be disconnected (DSC). A printer cannot be assigned a console address without being coupled to a display console. An error message occurs if these restrictions are not observed.

If an N2 command is assigned, all consoles are assigned to the display mode, which enables the channel interface for 3270-type of devices. This mode requires each device to have a unique device address - no sharing of addresses. This address has either a T or H device assignment with its accompanying unit number.

Note: *When changing between Display and Printer/Keyboard modes, key both console mode and address changes as one entry (for example: N1T0010H3010).*

Console Address (Tn/Hn)

Note: *You must softstop the machine (press the STOP key) before making a change to this parameter.*

A terminal that is attached to the system causes a Tn or Hn to be displayed on the Program Load screen. The "T" designation indicates a display console; an "H" indicates a printer. The number "n" following the T or the H indicates the port to which the device is attached. Each attached terminal may be assigned a unit address if it is to be accessed by the programming system. The unit address must indicate channel zero (first digit is 0), and the unit portion must be an unassigned address on this channel.

Notes:

- *Console addresses cannot be assigned with the UCU/Device Directory Update function (QDUU).*

- *Any terminal may be assigned an address of "DSC" (for disconnected). A terminal that is disconnected has no address and is not available to the programming system.*

- *Assignment of terminal addresses depends upon the console mode (display or printer/keyboard).*

Copy Key (Kx)

The COPY KEY is displayed on the screen to indicate the assignment of the COPY key. The three modes of assignment are:

- Console Printer (Kn)

- Diskette (KD)

- Channel Printer (KC cuu)

The Program Load screen highlights the current selection. It displays only those devices physically attached and selected as installed on the System Configuration screen (QFS) or, if a channel-attached device, on the UCW Assignment (QDU) screen.

Console Printer (Kn): When the COPY KEY DEVICE is configured for console printer mode (Kn), the screen indicates which console unit (not console address) has been assigned to print the hard copy when the COPY key is pressed. If you choose to remove the hard-copy device, key K0 on the SELECTION line and, if no other changes, press ENTER. For example, if you want to assign a hard-copy device, key in K3 on the SELECTION line and press ENTER.

Warning: For the Diskette (KD) and Channel Printer (KC cuu) options:

Before pressing the COPY key, wait until the input data is saved. Input data is saved by pressing the ENTER key after you have altered a screen. If you press the COPY key before the input data is saved, the input data can be lost.

For the Channel Printer (KC cuu) option:

If the machine has been IPLed, a QCLEAR is required. However, a loss of customer data can result with this selection.

Diskette (KD): When the COPY KEY DEVICE is configured for Diskette mode (KD), the current screen is copied onto the diskette when the COPY key is pressed.

The existing status of that screen can be later viewed by using the Saved Screens (QEW) function.

Channel Printer (KC cuu): When the COPY KEY DEVICE is configured for channel printer mode (KC cuu), the current screen is printed by the assigned channel printer when the COPY key is pressed.

Notes:

- *The Channel Printer (KC cuu) selection is operative when the machine has been IMLed but not IPLed.*

- *Pressing the Paging key while using the Diskette (KD) or Channel Printer (KC cuu) options may require you to press the key twice after using the Copy key function.*

Invoking Procedures

IML Invoke Procedure (M)

To invoke IML from the Program Load screen:

1. Key the parameters sequentially (any order) next to SELECTION. Only those which require a change need to be entered.

2. Key M next to SELECTION.

   Note: *This is necessary, to initiate the IML sequence, even if the parameters have not been changed.*

3. Press ENTER.

   Note: *If there are no errors, all command parameters are examined and executed, followed by an IML of the mode determined by the parameters.*

IML Invoke Procedure (Automatic)

To invoke IML from a power-off condition:

1. Place CE MODE switch in NORMAL.

2. Press POWER ON/IML.

Notes:

- *The parameters must have been set during some previous power-up.*

- *Support processor powers up.*

- *Support processor does an SP-IML.*

- *Processing unit powers up.*

- *Processing unit does an IML.*

- *Message NO IML, IML IN PROGRESS, IML ERROR, or IML COMPLETE is displayed.*

IPL Invoke Procedure (P)

To invoke IPL from the Program Load screen:

1. Key the parameters sequentially (any order) next to SELECTION.

   Note: *Only those parameters that require a change need to be entered.*

2. Key P next to SELECTION.

   Note: *Examine the IPL Unit and IPL Reset type and key in any corrections that may be required.*

3. Press ENTER.

Notes:

- *Processing unit executes IPL and displays the message IPL COMPLETE.*

- *If P is keyed alone without a prior IML, an error occurs.*

Fast-Select IML/IPL (MP)

To invoke IML and IPL from the Program Load screen:

1. Key MP next to SELECTION.

2. Press ENTER.

Notes:

- *Either M or P may be entered first, but IML always executes before IPL.*

- *If P is keyed alone without a prior IML, an error occurs.*

- *IML executes with the existing parameter setting.*

Fast-Select IML/IPL (Alternate) (QLM)

To invoke IML or IPL from any screen:

1. Key QL next to SELECTION followed by any commands and parameters that may be required.

2. Key M or MP next to QL on the SELECTION line.

3. Press ENTER.

Notes:

- *All syntax and dependent error conditions are verified and then executed.*

- *When the commands are complete, the system returns to the Program Load screen and awaits further commands.*

Invoking Conditions

- Commands are examined for syntax errors (correct parameters) first. Dependent commands are examined next. An error in either place returns control of the Program Load screen to the user. Only after all errors have been corrected are the commands executed.

- An IML is performed any time M appears on the SELECTION line and there are no errors.

- Screen data can be changed only by way of the SELECTION line.

- Internal errors (logic or hardware) are indicated by reference codes.

- If IML or IPL detects an error, a message is displayed, control returns to the program load screen, and more commands can be entered.

- A SIGP instruction is used to change the console mode or device address in the processing unit, provided the processor is in a softstop state, not running or hardstopped.

Model Group 2

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Patches at IML

Coreloads in the processing unit can be Patched after every IML. The patch is accomplished by invoking a Block. This is a feature of the Block screen (QB). For procedures, see "Block Facility."

To set up a patch, enter a block into the system with the Block editing commands. (The Block must not contain 'QDD...' commands that permanently alter the machine.) Next, place the name beside the coreload to be patched in the IML Patches screen (QBM). From now until the name is removed from the QBM screen for the coreload IMLed, the user is prompted with the question RUN PATCHES (Y/N)? after every successful IML. The status of the invoked block is displayed in the message area on line 20. If an error occurs, control is returned to the Program Load screen, and the status display is changed to PATCH ERROR.

Note: *Errors occurring during IML cannot be patched with this method because a patch depends upon a successful IML.*

Status Messages

For information about program load status messages, see "Messages."

Verification Tests (Vn)

Verification Tests are used only when directed by your Support Structure. At IML time, four tests can be run that ensure the proper operation of the component selected.

The following commands are available and displayed only when the CE MODE switch is ON.

Valid Arguments/Commands

V 1 - Control store test
V 2 - Data test of main store
V 3 - Address test of main store
V 4 - Scope loop test

To exit from any of these commands, press Program Function key 9.

Save Storage (S)

This selection reduces the resets done during a re-IML if the coreload has not changed. Some of the arrays are not reset and main storage is not cleared.

The following shows the effect for the Save Storage function:

PSW	C
CPU Timer	C
Clock Comparator	C
Control Registers	I
General Registers	C
Floating-Point Regs	C
Storage Keys	C
Main Storage	U
TOD Clock	U
Channel DLAT	C
Retry Local Store	C
Trap/BAL	C
Local Store	I
Channel Data Buffer	C
Channel Control	C
Trace	C
Control Store	I
Swap Buffer	U
Cache Retry	U
PU DLAT	U
Key Reset	U
Directories	U
Cache	U

U = unchanged
C = cleared
I = set to initial values

No Control Store Load (Y)

This command causes the IML routine to skip the actual loading of control storage.

The following shows the effect for the No Control Store load function:

PSW	C
CPU Timer	C
Clock Comparator	C
Control Registers	I
General Registers	C
Floating-Point Regs	C
Storage Keys	C
Main Storage	C
TOD Clock	U
Channel DLAT	C
Retry Local Store	C
Trap/BAL	C
Local Store	I
Channel Data Buffer	C
Channel Control	C
Trace	C
Control Store	U
Swap Buffer	C
Cache Retry	C
PU DLAT	C
Key Reset	I
Directories	I
Cache	C

U = unchanged
C = cleared
I = set to initial values

Return to General Selection Screen (Q)

To return to the General Selection screen from the Program Load screen:

1. Key Q next to SELECTION.

2. Press ENTER.

Return to Prog Sys (Z)

To return to Prog Sys from the Program Load screen:

1. Key Z next to SELECTION.

2. Press ENTER.

COMPARE/TRACE (QA)

The Compare/Trace screen is obtained from any other manual mode screen by entering QA following the SELECTION label and pressing ENTER. The Compare/Trace function provides the capability to:

- Stop when certain specified parameters are met.

- Trace selected addresses and I/O operations and place them in an accessible area for later use.

- Obtain sync pulses when specified operating conditions are encountered.

The format of the Compare/Trace screen is different for the 370 and VSE modes in that the screen for 370 provides for specification of virtual or real addresses.

The Compare/Trace screen is used by specifying one parameter from each field that can be required to perform the function desired. To invoke the function, enter the parameters on the SELECTION and press ENTER.

To fast-select compare/trace functions from other manual mode screens, key QA followed by the desired compare/trace parameters. If the selection is accepted, the current screen remains displayed and the compare/trace parameters are displayed on line 22. However, if the selection is not accepted (such as entry error), the Compare/Trace screen is displayed.

Warning: *An error may occur if a compare/trace function is selected and an I/O program with long CCW strings or large data counts is in progress. If this I/O error condition (overruns, interface control checks) occurs, status data in the CSW and so forth are unpredictable.*

To avoid this situation, before using the compare/trace function, press the STOP key. When the WAIT indicator is displayed, wait approximately 30 seconds, and then select the desired compare/trace function.

To select the Compare/Trace screen from the General Selection screen:

1. Key A next to SELECTION.

2. Press ENTER.

To select a Compare/Trace function:

1. Key in the appropriate functions (for address compare, data compare, or trace) following the SELECTION label.

2. Press ENTER.

Notes:

- *Six fields are associated with this display: Action, Type, Addr, Op, Data, and V/R. The function selection under the Action field determines what parameters within the remaining five fields can be selected.*

- *To exit the A-screen, key Q next to SELECTION, and press ENTER.*

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```
                         *COMPARE/TRACE*

      *ACTION*           *TYPE*           *ADDR*  *OP*  *DATA*  *V/R*

      N NORMAL           A ANY REFERENCE
      S STOP             D DATA STORE      0-       =    0000-   V VIRTUAL
      T TRACE-STOP       I I/O REFERENCE   FFFFFF   &    FFFF    R REAL
      W TRACE-WRAP       C INSTR COUNTER            %
                         O I/O INSTRUCTIONS
                         W CSW'S
      H HARD STOP        P PSW SWAPS                     *V/R*
      Y SYNC PULSE       M MICROWORD                     V VIRTUAL
      M MICWD-TRACE      L LOCAL STORE-DST               R REAL    (DEFAULT)
      B MICBR-TRACE      S LOCAL STORE-SRC
      + ACCUMULATION SW  H CHANNEL-SEQ CNT
                         X CHANNEL-DATA

      Q GENERAL SELECTION                  NOTE:  SOME TYPES ACCUMULATE.
      Z RETURN TO PROG SYS                        QAN = RESET.

      SELECTION:                                  ==>
        MAN      TEST                        INSTR STOP

                                             4341
```

Address Parameters

The following address parameters are required after the appropriate Action and Type parameters have been selected.

n   Normal — No extra parameters required.

s   Storage Address (Data compare not allowed) — Requires a zero to six-digit address within the range of real or virtual storage.

d   Storage Address (Data compare - optional) — Requires a zero to six-digit address within the range of real or virtual storage.

t   No Address — No address required. Allows a full Instruction Counter trace and an address/data compare. This provides the ability to stop a trace at a certain point.

l   Local Storage Address (Data compare not allowed) — Requires a three-digit address where:

     Digit 1 = Local storage section number (0-7)
     Digit 2 = An eight-byte area within the section (0-F)
     Digit 3 = Always zero.

m   Control Storage Address (Data compare not allowed) — Requires a zero to six-digit address within the range of control storage on a fullword boundary.

o   I/O Instruction Trace Address and Op Code — See section "O I/O Instructions."

w   CSW Trace Address — See "W CSWs."

p   PSW Trace Type — See "P PSW Swaps."

h   Channel Sequence Count Address and Count — See "H Channel-Seq Cnt."

x   Channel Data Address and Data — See "X Channel-Data."

b   Microword/Microbranch Trace — No extra parameters.

+   Accumulation Switch — No extra parameters.

Action Parameters

Note: *Each of the following action parameters show what applicable selections can be made and what address parameter is required to make the selection valid.*

N NORMAL

When this function is selected, the Compare/Trace area is cleared on line 22.

This action parameter is used alone to reset any previously selected compare/trace functions. Keying N when on the Compare/Trace screen or QAN from any other manual mode screen terminates any compare/trace function, and normal processing continues.

```
   NORMAL
   ┌─────────────────────────────────────┐
   │  QAN─┤   ├──No Extra Parameters      │
   └─────────────────────────────────────┘
```
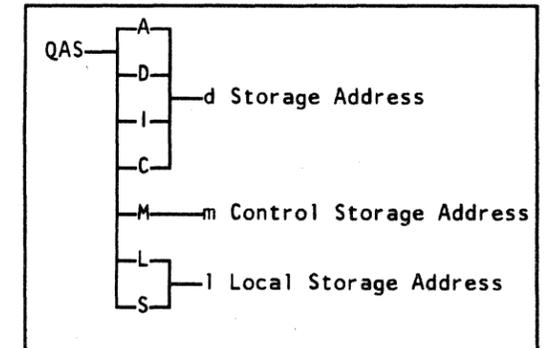

S STOP

When this function is selected, ADDR-COMP: STOP appears on line 22.

This action parameter compares the address or data compare conditions as specified by the remaining parameter fields. Following a successful compare, the system executes the current instruction, accepts all pending allowed interrupts, and enters the soft-stop state.

When the machine is stopped because of the stop function, MATCH STOP is displayed on line 21.

```
   STOP
   ┌─────────────────────────────────────┐
   │            ┌─A─                      │
   │  QAS───┬─D─┼──d Storage Address      │
   │        ├─I─┘                         │
   │        ├─C─                          │
   │        ├─M──────m Control Storage Address │
   │        ├─L──┐                        │
   │        └─S──┴──l Local Storage Address │
   └─────────────────────────────────────┘
```

T TRACE-STOP

When this function is selected, ADDR-COMP: TRST appears on line 22.

On a Type C (Instr Counter) operation, this action causes the instruction counter addresses to be stored in a trace area until the trace area becomes full (128 addresses). When the machine is stopped because the trace area is full, MATCH STOP (INSTRUCTION STOP if tracing a instruction) is displayed on line 21. Pressing the START key repeats the process.

On Type A, D, and I operations, the instruction counter address is stored only when the compare conditions specified by the remaining parameter fields are met. Processing continues following each compare until the trace area is full.

```
   TRACE-STOP
   ┌─────────────────────────────────────┐
   │            ┌─A─                      │
   │  QAT───┬─D─┼──d Storage Address      │
   │        ├─I─┘                         │
   │        ├─C──────t No Address         │
   │        ├─L──┐                        │
   │        └─S──┴──l Local Storage Address │
   └─────────────────────────────────────┘
```
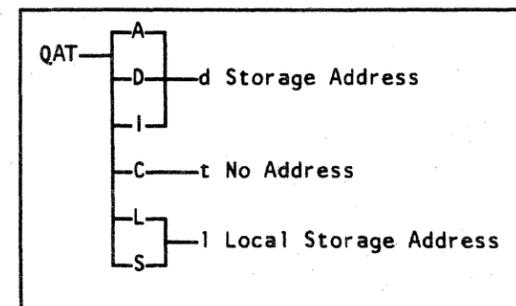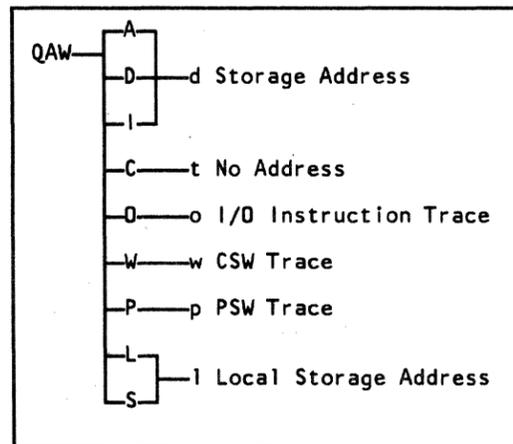
Model Group 2

W TRACE-WRAP

When this function is selected, ADDR-COMP: TRWR appears on line 22.

On a Type C (Instr Counter) operation, this action causes the instruction counter addresses to be stored into the trace area. When the trace area becomes full, additional addresses are stored, and the oldest are dropped so that the trace area always contains the 128 most recent addresses.

On Type A, D, and I operations, the instruction counter address is stored in the trace area only when the compare conditions specified by the remaining parameter fields are met. Processing continues following each compare.

TRACE-WRAP

```
QAW───A
      ├─D───d Storage Address
      └─I
      ├─C───t No Address
      ├─O───o I/O Instruction Trace
      ├─W───w CSW Trace
      ├─P───p PSW Trace
      ├─L
      │    ├─l Local Storage Address
      └─S
```
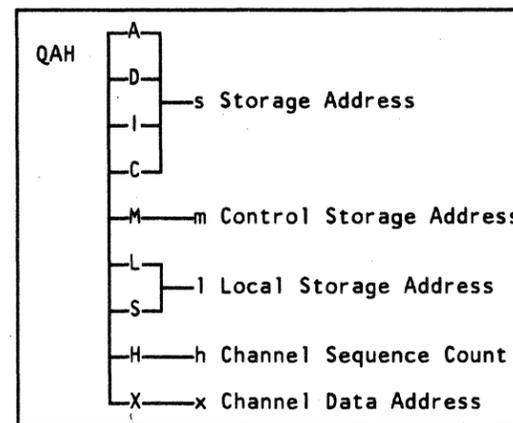
H HARD STOP

The hard-stop function can only be selected when the CE MODE is on. When selected, ADDR-COMP: H-ST is displayed on line 22.

Following a successful compare, the current microword is completed, and no additional microwords are executed. (Refresh clocks continue to run.) MATCH-STOP appears on line 21. Hard stop is implied when CSAR is displayed on line 21.

The microword that caused the match is at the control storage address last entered into the trace array (QVAB). This address is the one logically preceding the address displayed in line 21.

For an I-counter type match, a hard stop occurs before the instruction is executed.

HARD STOP

```
QAH───A
      ├─D
      ├─I
      ├─C
      ├──────s Storage Address
      ├─M───m Control Storage Address
      ├─L
      │    ├─l Local Storage Address
      ├─S
      ├─H───h Channel Sequence Count
      └─X───x Channel Data Address
```

Warning: *Some problems may occur when stopping on a MICROWORD. They occur when the MATCH-STOP interrupts communications between the SP and PU via the LCA. This can be recognized by the error message SP/PU COMMUNICATION FAILURE or CHANNEL 0 UNAVAILABLE.*

To recover:

•If the screen displays MATCH-STOP:

   1. Enter QAN to clear the address compare condition.
   2. Press START to leave the CLOCK-STOP state.
   3. Press the SP reset button.

•If the screen displays INSTR-STOP:

   1. Enter QOM to stop the PU.
   2. Enter QAN to clear the address compare condition.
   3. Enter QON.
   4. Press START to leave the CLOCK-STOP state.
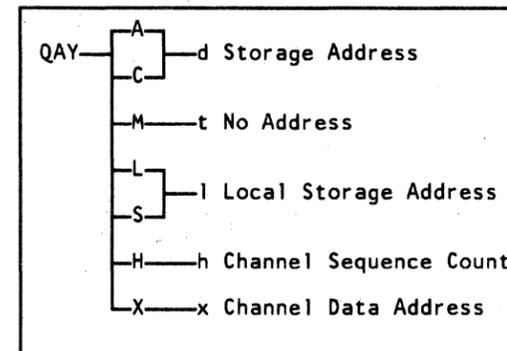   *5. Press the SP reset button.*

If control is regained you can continue; however, avoid selecting a stop address that is in the I/O Input Set-up Trap. If the above procedures do not allow you to regain control, power down and then back up.

Y SYNC PULSE

The sync pulse function can only be selected when the CE MODE switch is on. When selected, ADDR-COMP: SYNC is displayed on line 22.

Following a successful compare, the system generates a sync signal. This sync signal can be monitored at A2J4G03. The system does not stop.

SYNC PULSE

```
QAY───A
      ├─C───d Storage Address
      ├─M───t No Address
      ├─L
      │    ├─l Local Storage Address
      ├─S
      ├─H───h Channel Sequence Count
      └─X───x Channel Data Address
```
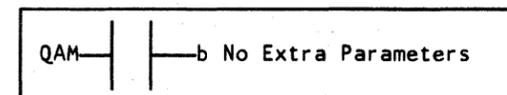
M MICWD-TRACE

The microword-trace function can only be selected when the CE MODE switch is on. When selected, ADDR-COMP: MWTR appears on line 22.

For each microword execution, the address, derived from the CSAR and the CSARBU, is stored into the CSARBU trace array after the array index has been incremented by 1. In this mode, the array contains the addresses of the last 32 microwords executed.

The microword addresses can be monitored by displaying this array by the Insert/Extract function QVAB.

The MICWD-trace function is the normal reset condition. That is, when the N-Normal action is selected, the MICWD-trace action is highlighted and is in effect although not displayed on line 22.

MICWD-TRACE

```
QAM───┤ ├───b No Extra Parameters
```

B MICBR-TRACE

The microbranch trace function can only be selected when the CE MODE switch is on. When selected, ADDR-COMP: MBTR appears on line 22.

In this mode, the CSARBU trace array contains the address of the last 32 targets of microwords that caused a modular switch. The addresses can be monitored by displaying this array by the Insert/Extract function QVAB.

MICBR-TRACE

```
QAB───┤ ├───b No Extra Parameters
```
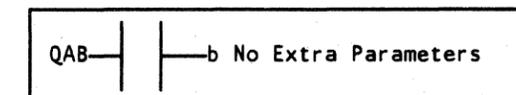
+ ACCUMULATION SW

This selection acts as a switch. When selected and ACCUMULATION is on, the message *SOME TYPES ACCUMULATE. QAN RESET ALL.* appears on the screen. The next time it is selected, the message is erased. Once on, the mode is remembered even if the compare/trace screen is not being used.

The mode applies to two basic areas of the Compare/Trace function: (1) type field selections for normal matches (storage, local storage, control storage, channel), and (2) the IO/CSW/PSW traces. Selections within these areas are accumulative.

ACCUMULATION SW
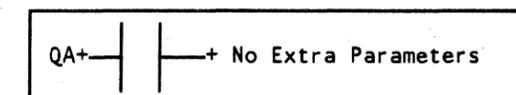
```
QA+───┤ ├───+ No Extra Parameters
```

Accumulate Mode

The following matrix shows which ACTION/TYPE combinations are reset or kept when a new ADDRESS/COMPARE selection is made. The letters (lowercase) are the address letters described in the section "Address Parameters".

Storage addresses of the same type cause a reset. I/O addresses of the same type do not cause a reset. Action and Type fields may or may not reset depending on the restrictions listed below.

Note: *The following restrictions prevent the associated selections from accumulating. You are limited to:*

- *A control storage address and a local storage address along with one real storage address or virtual storage address.*
- *One data compare value.*
- *A Trace-Stop or Trace-Wrap value, not both.*
- *One C.. or CUU selection for each I/O Instruction Trace or CSW Trace channel.*
- *One I/O (or ALL) mnemonics for each I/O Instruction Trace channel.*
- *A Microword-Trace or Microbranch Trace, not both.*
- *A Channel Sequence Count or Channel Data selection, not both.*

```
                ACCUMULATE MODE
                  OLD Setting

        n   s   d   t   l   m   o   w   p   h   x   b   +
    n | R | R | R | R | R | R | R | R | R | R | R | M | R |
    s | R | K | K | K | K | K | K | K | K | K | K | K | K |
    d | R | K | K | K | K | K | K | K | K | K | K | K | K |
N   t | R | K | K | R | K | R | K | K | K | K | K | K | K |
E   l | R | R | R | R | K | R | R | K | K | R | R | K | K |
W   m | R | R | K | R | K | K | K | K | K | K | K | K | K |
S   o | R | K | K | K | K | K | K | K | K | K | K | K | K |
e   w | R | K | K | K | K | K | K | K | K | K | K | K | K |
t   p | R | K | K | K | K | K | K | K | K | K | K | K | K |
t   h | R | K | K | K | K | K | K | K | K | R | R | K | K |
i   x | R | K | K | K | K | K | K | K | K | R | R | K | K |
n   b | R | K | K | K | K | K | K | K | K | K | K | R | K |
g   + | R | K | K | K | K | K | K | K | K | K | K | K | R |

        R = Reset
        K = Keep
        M = Microword Trace
```

Nonaccumulate Mode

The following matrix shows which ACTION/TYPE combinations are reset or kept when a new ADDRESS/COMPARE selection is made. The letters (lowercase) are the address letters described in the section "Address Parameters."

Note: *Even in nonaccumulate mode, four areas of compare/trace function may be accumulative; that is, selections made in one area do not cause resets of the other areas. They are:*

- *Instruction trace (wrap or stop)*
- *I/O, CSW, or PSW trace*
- *Normal matching or data comparing.*
- *Microword or branch tracing (CE only).*

```
                NONACCUMULATE MODE
                    OLD Setting

        n   s   d   t   l   m   o   w   p   h   x   b   +
    n | R | R | R | R | R | R | R | R | R | R | R | M | R |
    s | R | R | R | K | R | K | R | K | K | R | R | K | K |
    d | R | R | R | K | R | K | R | K | K | R | R | K | K |
N   t | R | R | K | K | R | K | R | K | K | K | K | K | K |
E   l | R | R | R | K | R | R | R | K | K | R | R | K | K |
W   m | R | R | R | K | R | R | R | K | K | R | R | K | K |
S   o | R | K | K | K | K | K | K | K | K | K | K | K | K |
e   w | R | R | R | K | R | R | R | K | K | R | R | K | K |
t   p | R | K | K | K | K | K | K | K | K | R | R | K | K |
t   h | R | R | R | K | R | R | R | K | K | R | R | K | K |
i   x | R | R | R | K | R | R | R | K | K | R | R | K | K |
n   b | R | K | K | K | K | K | K | K | K | K | K | R | K |
g   + | R | K | K | K | K | K | K | K | K | K | K | K | R |

        R = Reset
        K = Keep
        M = Microword Trace
```

Type Parameters

A ANY REFERENCE

When this function is selected, TYPE: ANYREF appears on line 22.

This parameter causes the address, or both address and data, specified by the remaining parameter fields to be compared to the storage address or address and data whenever storage is accessed by the machine.

D DATA STORE

When this function is selected, TYPE: D-STORE appears on line 22.

This parameter causes the address, or both address and data, specified by the remaining parameter fields (Op, Data) to be compared to the storage address or address and data whenever a machine store (write) function occurs.

I I/O REFERENCE

When this function is selected, TYPE: IO-REF appears on line 22.

This parameter causes the transfer of data to and from I/O devices to be compared to the address and data specified by the remaining parameter fields.

Note: *For parameters A, D, and I.*
The address specified in the command is always converted to the next lowest doubleword (8 byte) boundary because the machine accesses eight bytes of storage simultaneouly. A compare occurs, if the address specified in a storage operation is anywhere within this doubleword.

C INSTR COUNTER

When this function is selected, TYPE: I-CNTR appears on line 22.

When used in conjunction with the S (Stop) function, this parameter compares the instruction counter with the address entered in the address field. When used with either trace function (T or W), the address cannot be specified.

The result of a QATC or QAWC operation is displayed with the QDTI function.

O I/O INSTRUCTIONS

The O-type function is used with the Trace-Wrap action (W). The I/O instruction trace address and op code is placed in a 4Kb block of auxiliary storage that can be displayed with the QDTP function.

The selection format for this function is:

Address	Condition
bbb bbb	All channels, all devices, all operations
c.. bbb	Specific channel, all devices, all operations
c.. iii	Specific channel, all device, specific operation
cuu bbb	Specific device, all operations
cuu iii	Specific device, specific operation

where:

b	=	Blank
.	=	Don't care character
cuu	=	Channel and unit address
iii	=	Valid I/O operation mnemonic
	CIO	= Clear I/O
	HDV	= Halt Device
	SIO	= Start I/O
	TIO	= Test I/O
	HIO	= Halt I/O
	TCH	= Test channel

Note: *If the same I/O operation is wanted on all or some of the channels, the selection must be made in accumulate mode the appropriate amount of times.*

P PSW SWAPS

The P-type function is used with the Trace-Wrap action (W). The PSW trace type is placed in a 4Kb block of auxiliary storage that can be displayed with the QDTP function.

The selection format for this function is:

Type	Condition
b	All interrupts
I	I/O PSW swaps
M	Machine check
P	Program check
S	Supervisor call
E	External interrupt
L	Load PSW
V	VM-assisted load PSW, SVC, or program checks

where:

b = Blank

W CSWs

The W-type function is used with the Trace-Wrap action (W). The CSW trace is placed in a 4Kb block of auxiliary storage that can be displayed with the QDTP function.

The selection format for this function is:

Address	Condition
bbb	All channels, all devices
c..	Specific channel, all devices
cuu	Specific device

where:

b	=	Blank
.	=	Don't care character
cuu	=	Channel and unit address

Note: *Only CSWs stored as a result of an I/O interrupt are traced with this option. CSWs stored from an I/O instruction are only traced if the I/O instruction trace is active.*

M MICROWORD

The microword-type function can be selected only when the CE MODE switch is on. When selected, TYPE: MICWRD appears on line 22.

The control storage address backup (CSARBU) contains the address of the microword currently being executed. The address specified in the ADDR field is loaded into the control storage address match register. When the CSARBU register and the CS address match register compare, a signal indicates a control storage match.

If a hard-stop action is selected and a match occurs, MATCH STOP appears on line 21. The match address appears in line 21 opposite the CSAR label. The S (Stop) selection is also allowed.

L LOCAL STORE-DST

The local store-destination function can be selected only when the CE MODE switch is on. When selected, TYPE: LS-DES appears on line 22.

The destination address specified in the ADDR field is loaded into the local storage address match register. When this register compares with the local storage address register, and data is written in that local storage element, a signal indicates a local store-destination address match.

If a stop action is selected and a match occurs, MATCH STOP appears on line 21. The match address appears on line 22.

S LOCAL STORE-SRC

The local store-source function can be selected only when the CE MODE switch is on. When selected, TYPE: LS-SRC appears on line 22.

The source address specified in the ADDR field is loaded into the local storage address match register. When this register compares with the local storage address register and data is read in that local storage element, a signal indicates a local storage source address match.

If a stop action is selected and a match occurs, MATCH STOP appears on line 21. The match address appears on line 22.

H CHANNEL-SEQ CNT

The channel sequence count function can be selected only when the CE MODE switch is on. When selected, TYPE: CH-SEQ appears on line 22.

This function provides a hard stop or a sync pulse when the channel reaches a given point of operation by specifying a channel number and a two-digit sequence count code. The type must follow the format:

cnn

where:
c = Channel number
nn = Sequence count

X CHANNEL-DATA

The channel data function can be selected only when the CE MODE switch is on. When selected, TYPE: CH-DAT appears on line 22.

This function provides a hard stop or a sync pulse on a specific byte of channel data by specifying the channel number and byte of data. The type must follow the format:

cdd

where:
c = Channel number
dd = One byte of hex data

ADDR Field

0-FFFFFF

The address field is displayed on line 22 provided a data compare operation is not in process. This field is used to enter the search address for all compare/trace functions. The characteristics for the address specified are:

- The search address can be up to a six-digit hexadecimal number.

- The maximum address value must be less than the machine capability. Five maximum values are checked: physical real main storage, customer accessible real main storage, virtual main storage, control storage, and local storage.

- The address specified in the command is always converted to the next lowest doubleword (8 byte) boundary because the machine accesses eight bytes of storage simultaneouly. A compare occurs, if the address specified in a storage operation is anywhere within this doubleword.

Example:

Main storage must be 2080 not 208 for 2080-7.
Local storage must be 3F0 not 3F for 3F0-7.

Addr Entered	Line 22 Display	Contents of Match Regs	Max Addr
ASA4	000000	000000	FFFFFF*
ASA403E	000400	000400	FFFFFF*
ASA2545E	025458	025458	FFFFFF*
ASAF8FF=FFFF	FFFFE0	00F8F8**	FFFFFF*
ASM4224	004224	004224	00FFFF*
ASM000913	000910	000910	00FFFF*
ASL224	000220	000220	007F8

* For real addresses, this address must be what is physically installed.

** In addition to the hardware match register, microcode compares the two bytes starting at address F8FF.

OP Field

This field is used for address type or data compare operations.

In VSE or 370 mode, this field is used when compare data is to be specified in addition to an address. The options are to compare the data specified in the DATA field for an equal or not-equal condition on any Type A, D, and I operations. On Type C operations, data can be compared only when using the STOP function. Data compare is not allowed on a Type C operation for trace-stop (T) and trace-wrap (W) functions.

In VSE (NORM only) mode, if data is not to be specified in the DATA field, the OP field is not used.

In 370 and VSE (CE only) mode, if data is not to be specified in the DATA field, enter a V or R in the OP field to indicate whether the previous address specified in the ADDR field is a virtual or real storage address. If V or R is not specified, a default is assumed based on the mode selected.

The field equal (=) option compares up to four hexadecimal digits (two bytes) of data specified in the DATA field for an equal condition.

The field not-equal (/) option compares up to four hexadecimal digits (two bytes) of data specified in the DATA field for a not-equal condition.

The bit equal (&) option compares all of the bits of the data specified in the DATA field for an equal (on) condition.

The bit not-equal (%) option compares any of the bits of the data specified in the DATA field for a not-equal (off) condition.

DATA Field

This field specifies up to two bytes of data to be compared at the address specified in the ADDR field. Any hexadecimal digit or digits comprising the two-byte data compare field can be ignored by entering a period (.) as a "don't care" character.

For bit compare operations (& or % in OP field), only the bits that are on to comprise each hexadecimal digit are tested for an equal (on) or not-equal (off) condition. For example, if the data compare field contained the digit "3" (bits = 0011), all digits containing the last two bits equal to "1" (such as 7, bits = 0111) compare equal. All other digits compare on a not-equal operation.

Note: *The following restrictions apply to data compare operations.*

- *Data compare operations beginning on the last byte of a 2K page are not allowed.*

- *On Type A, D, and I operations, missing a data compare is possible if sequential instructions change the same two bytes of storage.*

- *If a Clear Reset (see General Selection Screen) is performed while a trace or a stop-on-main-storage data compare (nonzero) function is in effect, a false match stop occurs.*

- *Data Contents Compare is performed by microcode and allows compares down to the halfword or bit. However, because the basic match hardware stops if a reference is made to a doubleword, the data in the target address may not actually have been referenced.*

V/R Field (370 Mode only)

This field is used only in 370 or CE mode when the DATA field is specified to indicate whether the address contained in the ADDR field is a virtual (V) or real (R) address.

CHECK CONTROL (QK)

The Check Control screen enables selecting the action to be taken by the PU when an interrupt occurs because of a machine check. MACHINE CHECK is indicated on line 21. Functions N, S, R, and D are mutually exclusive; functions C and H are independent. In CE mode, an additional selection list allows the service representative to halt SP functions that may interfere with testing and debugging. If one of the functions has been fast-selected, the current screen remains displayed with the last command entered redisplayed on the SELECTION line in a fast-select format.

If any of the high-level checkers are turned on by a malfunction, an error latch is set, and the processor clock is stopped. The support processor continually monitors the status of the processor. Whenever the clock is stopped, the support processor posts a machine check and examines the check latches and other facilities to determine if the instruction is retriable. If the instruction is retriable, the support processor retries and then logs the machine check to the disk. If the retry is successful, the log counters are updated and processing continues. If the retry is unsuccessful or the instruction is unretriable, the support processor posts check stop on the screen. After the analysis is completed, the support processor invokes the proper routines to generate a reference code, and the system remains in the check-stop state. At this time, the reference code is posted both on the disk and on the screen.

The Check Control screen remains displayed if you enter a command on the SELECTION line and it has a successful completion. If you are on a screen other than Check Control, and you enter a Check Control command on the SELECTION line and it has a successful completion, a new screen is not displayed. The Check Control screen is displayed if the command is unsuccessful.

Warning: *An error may occur if a Check Control function is selected and an I/O program with long CCW strings or large data counts is in progress. If this I/O error condition (overuns, interface control checks) occurs, status data in the CSW and so forth are unpredictable.*

To avoid this situation, before using the Check Control function, press the STOP key. When the WAIT indicator is displayed, wait approximately 30 seconds, and then select the desired compare/trace function.

To select the Check Control screen from the General Selection screen:

1. Key K next to SELECTION.

2. Press ENTER. Check Control screen is displayed.

To select a Check Control function:

1. Key in the desired function next to SELECTION.

2. Press ENTER. Check Control screen is displayed.

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```
    *SP CONTROLS*                    *CHECK CONTROL*

    P ALL POLLING     YES  NO        N NORMAL

    I ICNTR POLLING   YES  NO        S HARDSTOP

    L SP LOGS         YES  NO        R NO RETRY
    F REF CODES       YES  NO
    U PU LOGS         YES  NO        D DISABLE

    E STOP WORD CKS   YES  NO        C STOP AFTER LOG-SWITCH
    M ELA-UNRECV MC   YES  NO
    O ELA-LOG DISPL   YES  NO        H CHANNEL CHECKS-SWITCH

    V EMC A B C LOGS  YES  NO
    W EMC D LOGS      YES  NO

                                     Q GENERAL SELECTION
                                     Z RETURN TO PROG SYS

    SELECTION:                            ==>
                                     INSTR STOP

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```

Check Control -- Fast-Selection

To fast-select a check-control function:

1. Key in letters in sequential order for the function desired following the SELECTION label.

Function	Entry Sequence
N (Normal)	QKN
S (Hardstop)	QKS
R (No Retry)	QKR
D (Disable)	QKD
C (Stop After Log Switch)	QKC
H (Channel Checks Switch)	QKH

SP Controls

Function	Entry Sequence
P (All Polling)	QKP
I (ICNTR Polling)	QKI
L (SP Logs)	QKL
F (Ref Codes)	QKF
U (PU Logs)	QKU
E (Stop Word Cks)	QKE
M (ELA Unrecv MC)	QKM
O (ELA-Log Displ)	QKO
V (EMC A B C Logs)	QKV
W (EMC D Log)	QKW

2. Press ENTER.

SP Controls

Note: *These switches (states) must be set back to the YES state after using (debugging).*

P ALL POLLING

This CE-only function enables or disables all polling by the SP control program. This includes rings 20 and 23, CSAR polling, I-counter polling, and all other line 21 activity. Other SP programs that required polling for information on the state of the PU may not run normally if the PU is halted.

I ICNTR POLLING

This CE-only function enables or disables the I-counter polling which uses the SIGP (LCA interface) instruction.

L SP LOGS

This CE-only function enables or disables storing of SP logs on the disk.

F REF CODES

This CE-only function enables or disables storing of reference codes on the disk.

U PU LOGS

This CE-only function enables or disables storing of PU logs on the disk.

E STOP WORD CKS

This CE-only function enables or disables the SP from going into a check-stop state when a PU stop word is executed. YES allows the check stop; NO does not allow a check stop.

M ELA-UNRECV MC

This CE-only function enables or disables ELA execution whenever you have an unrecoverable machine check.

O ELA-LOG DISPL

This CE-only function enables or disables an attempt to update the PU error logging if you had a disk error.

V EMC A B C LOGS

This CE-only function enables or disables Electromagnetic Charge (EMC) logging for the A, B, and C latches.

W EMC D LOGS

This CE-only function enables or disables Electromagnetic Charge (EMC) logging for the D latch.

Check Controls

N NORMAL

The system determines the handling of machine checks.

The N (normal) function clears the check control area on line 22 of the display; or displays CHK: NORM-H if channel-checks hardware error stop is selected.

This function does not alter the C (Stop after Log) or H (Channel Checks) switch setting.

S HARDSTOP

The system enters the check-stop state when a machine-check condition appears. When this option (QKS) is selected, the processor enters the stop state immediately when an error latch is set. No retry is permitted, and no reference code is generated. CHK: HDST is indicated on line 22 of the system console.

After a QKS stop, a reset (QKN) and a pressing of the START key resume normal operations. The machine-check condition is logged.

R NO RETRY

PU retry is inhibited when a machine check appears. CHKC: NRTY appears on line 22. Logging occurs normally.

D DISABLE

This option prevents the system from entering the check-stop state by inhibiting the error handling function. It also inhibits clock stop. The PU ignores all conditions that normally cause machine checks and attempts to continue processing without a retry. CHK:DSBL appears on line 22 of the system console. The clock/timer checks are not set because they affect the TOD clock. An invalid TOD setting would have to be corrected by the Extract function.

Note: *For a stop caused by a unrecoverable error, the system appears as though it had a QKS hardstop.*

C STOP AFTER LOG-SWITCH

If programs written for the System/360 are used on the 4341, an error log can overlay either instructions or data. The Stop After Log switch is used to avoid this by stopping the system after logging takes place. In this mode, the retry mechanism to correct errors is still available, but erroneous program execution because of logging is avoided.

The Stop After Log switch is alternately set and reset each time that the C-option is entered on the SELECTION line and the ENTER key is pressed. When the switch is on, a -C is displayed following the Check Control indicator on line 22. When on, the Stop After Log switch is active in all modes.

H CHANNEL CHECKS-SWITCH

With this switch on, an error detected in the channel hardware causes a machine check. Based on the retry setting, a machine check is posted.

The Channel Checks switch is alternately set and reset each time that the H-option is entered on the SELECTION line and the ENTER key is pressed. When the switch is on, a -H is displayed following the Check Control indicator on a line 22. When on, the Channel Checks switch is active in all modes.

The following conditions cause a machine check if QKH is active.

- A program check that is detected by the hardware while the hardware is processing data after the CCW has been determined to be correct.
- A protect check that is detected by the hardware while the hardware is processing data after the CCW has been determined to be correct.
- A chaining check that is detected when the hardware accepts more data than has been requested during data chaining.
- Bad parity during output that is detected in the eight-byte channel data register after the move from storage.
- Bad parity during output that is detected in the two-byte channel-out register after the move from the channel data buffer.
- Bad parity during output that is put on the data-out lines after the move from the channel-out register.

Q GENERAL SELECTION

The General Selection screen reappears on the system console.

Z RETURN TO PROG SYS

Releases manual operation controls within the support processor and returns the display console to the operating system.

OPERATION RATE CONTROL (QO)

The Operation Rate Control screen allows you to control the rate the PU executes an instruction. The selected operation rate is displayed on line 22. If one of the functions has been fast-selected, the current screen remains and the last command entered is redisplayed on the SELECTION line in a fast-select format. Functions N, I, M, C, and P are mutually exclusive.

Warning: Main storage is unpredictable with the use of Clock Cycle or Clock Pulse Step. However; a loss of customer data can result with these selections.

To select the Operation Rate Control screen from the General Selection screen:

1. Key O next to SELECTION.

2. Press ENTER.

To select an operation rate control function from the O-screen:

1. Key in the desired function following the SELECTION label.

2. Press ENTER.

The function is now set, and an instruction is executed at the rate selected each time the START key is pressed.

```
                    *OPERATION RATE CONTROL*

            N  NORMAL

            I  INSTRUCTION STEP

            M  MICROWORD STEP

            C  CLOCK CYCLE STEP

            P  CLOCK PULSE STEP


            R  REPEAT MICROWORD-SWITCH


            Q  GENERAL SELECTION
            Z  RETURN TO PROG SYS

SELECTION:                              ==>
                                     INSTR STOP

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```

Operation Rate -- Fast-Selection

To fast-select an operation rate function:

1. Key in letters in sequential order for the function desired.

2. Press ENTER.

Function	Entry Sequence
N (Normal)	QON
I (Instruction Step)	QOI
M (Microword Step)	QOM
C (Clock Cycle Step)	QOC
P (Clock Pulse Step)	QOP
R (Repeat Microword-Switch)	QOR

Operation Rate Controls

N NORMAL

After START has been pressed, the PU executes instructions at the normal machine speed. This function also clears the I, M, P, or C rate selection on line 22.

This function does not alter the R (Repeat Microword-Switch) selection. RATE: N-REPM appears on line 22 if the R function has not been reset.

I INSTRUCTION STEP

The PU executes one instruction each time the START key is pressed. The system accepts all pending allowed interrupts, and then returns to the stopped state. The STOP key and the I-function soft stop the system (no I-step, but the PU clock continues to run). If another function is selected, such as display/alter, it is accepted, and instruction step remains in effect.

Changes in data can be seen on the display console as each instruction step is completed. Line 21 shows the address and the data at this address. RATE: I-STEP appears on line 22.

M MICROWORD STEP

The CE MODE switch must be on to perform this function.

The PU executes one microword each time the START key is pressed, and then enters the hard-stop state. If the microword function is selected while the system is operating at normal speed, the system executes the current microword (PU clock stopped), and then goes into the hard-stop state. RATE: M-STEP appears on line 22.

You can monitor your activity via Insert/Extract function.

C CLOCK CYCLE STEP

The CE MODE switch must be on to perform this function.

The PU executes one clock cycle each time the START key is pressed, then enters the hard-stop state. If the function is selected while the system is operating at normal speed, the system executes the current clock cycle, and then goes into the hard-stop state. RATE: C-STEP appears on line 22.

You can monitor your activity via Insert/Extract function.

Restriction:
The clock-cycle step function does not operate on a storage word.

P CLOCK PULSE STEP

The CE MODE switch must be on to perform this function.

The PU executes on clock pulse each time the START key is pressed, and then enters the hard-stop state. If the function is selected while the system is operating at normal speed, the system clock-cycle stops and then goes into clock pulse step. RATE: P-STEP appears on line 22.

You can monitor your activity via Insert/Extract function.

Restriction:
The clock-pulse step function does not operate on a storage word.

R REPEAT MICROWORD-SWITCH

The CE MODE switch must be on to perform this function.

The PU must be placed in a hard-stop state before invoking this function. Stop the PU clock with the QOM function, for example.

The PU executes the selected microword repeatedly after the START key is pressed. When the repeat microword function is on, RATE: f-REPM appears on line 22 (where "f" represents the rate function). When the function is off, RATE: f-STEP appears on line 22, except when the rate is normal.

A desired microword loop can be selected two ways:

1. Hardstop on the word before the desired loop word by keying QOR. Set the desired operation rate and continue, or

2. Key in QVGxxxxx with the address of the desired loop word, and then key QOR. Set the desired operation rate and continue.

You can monitor your activity via Insert/Extract function.

To reset this function:

1. Key in R.

2. Press ENTER.

Q GENERAL SELECTION

The General Selection screen reappears on the display console.

Z RETURN TO PROG SYS

This function releases manual operation controls within the processor and returns the display console to the operating system.

DISPLAY/ALTER SCREENS

DISPLAY/ALTER (D-SCREEN)

The display/alter function lists a menu that can be invoked by selecting the D-screen. Most display/alter functions use the local channel adapter to transfer data to and from the hardware. Because most display/alter functions use the LCA, the machine must not be hard-stopped for most of the display/alter code to run. The function list is redisplayed each time a new function is selected. As a result, the output area is cleared for the next function.

Selections S, A, U, L, X, W, and D are not selectable on the customer screen.

The two ways to select a screen are: key a character next to the character on the SELECTION line (a subscreen is called up), or key Q and the facility or facility with its subscreen. For example, QDL bypasses the General Selection and bypasses the Display/Alter screen and displays the Local Storage subscreen.

The alter function and the display screens are much the same. The full-screen data can be changed by using the cursor and rekeying data, but the characters on the SELECTION line must be unchanged. In full-screen altering, blanks, hex zeroes, and periods are "don't care" characters. For Fast Select Alter, the period is a "don't care" character. The hex zeroes and blanks are compressed out (deleted) from the SELECTION line when fast altering. On a full-screen alter, the cursor moves to the first data position if an invalid character is entered. On Fast Alter, the cursor moves to the right of the op code if an invalid character is entered. Any invalid character prevents an alter operation (full screen or Fast Select).

DISPLAY/ALTER D-SCREEN (QD)

Most displays and alters can be performed by two means: screen select and fast-screen select.

To select the Display/Alter screen from the General Selection screen:

1. Key in D following the SELECTION label.

2. Press ENTER.

The display/alter image appears on the screen and the program stops. The items listed on the screen show those areas of the system that can be displayed and altered. You can now select one of the set. After you have chosen a display/alter function, the display/alter image remains on the left portion of the screen, and the selected facility appears on the right portion.

```
*DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY
V VIRTUAL STORAGE
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION:                        ==>
                         INSTR STOP

                            4341
```

TRANSLATION

The translate function is applicable to many of the display/alter functions. If you select the translate option, all full-screen input areas are eliminated (alter is inhibited), and the function is in translate mode. You may now page the data and it stays in translate mode. A command from the SELECTION line without the translate op code restores the screen input areas and allows full-screen alters.

To use the Translate op code, which converts hexadecimal to EBCDIC character format:

1. Key the D/A function and parameters (if any) plus T.

2. Press ENTER.

```
*DISPLAY/ALTER*                          LOCAL STORAGE
G GENERAL REGISTERS            0   2   4   6        0   2   4   6
C CONTROL REGISTERS         *10 F5F9 F2F0 F0F1 F5F4  *11 F0F3 F8F1 F5F5 F5F3
F FLOATING POINT REGISTERS       59  20  01  54       03  81  55  53
P CURRENT PSW               *12 F0F0 F0F4 F1F7 F7F9  *13 F5F7 F1F1 F9F1 F0F6
K STORAGE KEY                    00  04  17  79       57  11  91  06
V VIRTUAL STORAGE           *14 FAF0 F3F4 F4F0 F9F5  *15 F2F5 F7F0 F0F0 F0F0
M REAL STORAGE                    0  34  40  95       25  00  00  00
T TRACE AREA                *16 F0F3 F4F4 F0F4 F1F7  *17 F3F0 F0F6 F0F0 F1F0
S BLOCK SAVE AREA                03  44  04  17       30  06  00  10
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY       *18 F1F0 F0F0 F0F0 F0F0  *19 F0F0 F0F0 F0F0 F0F0
L LOCAL STORAGE                  10  00  00  00       00  00  00  00
X EXTERNAL REGISTERS        *1A F0F0 F0F0 F0F0 F0F0  *1B F0F0 F0F0 F0F0 F0F0
W SP STORAGE                     00  00  00  00       00  00  00  00
D CONSOLE DISK FILE         *1C 4040 4040 4040 4040  *1D 4040 4040 4040 4040
= HEX CALCULATOR
Q GENERAL SELECTION         *1E F3F3 F2F3 F4F3 F5F3  *1F F6F3 F7F3 F9F3 F3F3
Z RETURN TO PROG SYS             33  23  43  53       63  73  93  33
SELECTION:  L100T                              ==>
                                  INSTR STOP

                                     4341
```

DISPLAY/ALTER HEX CALCULATOR (QD=)

The hex calculator function converts two hex addresses arithmetically to one hex address. One address can be added or subtracted with another. This function uses two operands (0-6 digits) and can be defaulted to 000000. Both operands remain a constant unless a new operand is rekeyed. The only op codes are (+) and (-). Plus (+) adds the second operand to the first operand. Minus (-) subtracts the second from the first. An example is shown on the hex calculator function. The result is displayed next to the message indicator.

Display Hex Calculator

To display the hex calculator function from any D-screen:

1. Key QD= next to SELECTION followed by:
   (a) operand one (if any)
   (b) op code (if any)
   (c) operand two (if any)

2. Press ENTER.

Notes:

- *The operands and result are displayed next to the message indicator.*

- *The hex calculator function can be fast-selected from any screen and that screen remains.*

- *By keying QD=, the last calculation is restored on the SELECTION line.*

- *Each operand is retained until it is replaced; thus, either can be used as a constant.*

```
*DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY
V VIRTUAL STORAGE
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: = 777342 + 2BCE        ==> 779F10 = 777342 + 002BCE

                                     4341
```

Fast-Selection Hexadecimal Calculations

The hexadecimal calculator is a normal function of the Display/Alter (D) screen. However, hexadecimal calculations may be made from any other manual mode screen by keying QD= followed by the problem (no spaces between characters) and pressing ENTER. The same screen remains displayed and the calculation result is shown to the right of the SELECTION entry. If an entry error is made, INVALID INPUT is displayed and the cursor is positioned under the first invalid character encountered. The same screen remains displayed.

DISPLAY/ALTER GENERAL REGISTERS (QDG)

Display General Registers

To select the general register function from the D-screen:

1. Key G plus the register number and register byte number next to SELECTION. The register values are 0-F (hex); the byte values are 0-3 (hex). Both may be defaulted to zero.

2. Press ENTER. Sixteen general registers of four bytes each are displayed.

Alter General Registers

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*
- *An invalid character prevents the alter function.*
- *The Translate option is applicable to the General Register display.*
- *The paging keys are not applicable to this screen.*

Fast Alter General Registers

QDG rb op data.

Key next to SELECTION as follows:

1. QDG selects the General Register screen.

2. Key the register number (r) plus byte number (b) in hexadecimal.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data.

5. Press ENTER.

Save General Registers

All data in the general registers can be saved by the Block function. The byte character is ignored for a save function. An example of how you can save the general register data is QDGrb?.

DISPLAY/ALTER CONTROL REGISTER (QDC)

Display Control Registers

To select the control register function from the D-screen:

1. Key C plus the register number and register byte number next to SELECTION. The register values are 0-F (hex); the byte values are 0-3 (hex). Both may be defaulted to zero.

2. Press ENTER. Sixteen control registers of four bytes each are displayed.

Alter Control Registers

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*
- *An invalid character prevents the alter function.*
- *The Translate option is applicable to the Control Register display.*
- *The paging keys are not applicable to this screen.*

Fast Alter Control Registers

QDC rb op data.

Key next to SELECTION as follows:

1. QDC selects the Control Register screen.

2. Key the register number (r) plus byte number (b) in hexadecimal.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data.

5. Press ENTER.

Save Control Registers

All data in the control registers can be saved by the Block function. The byte character is ignored for a save function. An example of how you can save the control register data is QDCrb?.

```
  *DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS              GENERAL REGISTERS
F FLOATING POINT REGISTERS
P CURRENT PSW              0          1          2          3
K STORAGE KEY              0002 70B0  3BCE 5A40  0035 3A04  5A40 002D
V VIRTUAL STORAGE
M REAL STORAGE             4          5          6          7
T TRACE AREA               2CEA 5A40  002E 2CEA  6200 0040  5A01 0800
S BLOCK SAVE AREA
A AUXILIARY STORAGE        8          9          A          B
U UCW/DEVICE DIRECTORY     0000 70D6  2CEA A800  2EBE 3AB0  3AB5 0000
L LOCAL STORAGE
X EXTERNAL REGISTERS       C          D          E          F
W SP STORAGE               0002 3BD4  5A01 0100  0000 70D6  2CEA A800
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: G00                        ==>
                                 INSTR STOP

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```

```
  *DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS              CONTROL REGISTERS
F FLOATING POINT REGISTERS
P CURRENT PSW              0          1          2          3
K STORAGE KEY              0002 70B0  3BCE 5A40  0035 3A04  5A40 002D
V VIRTUAL STORAGE
M REAL STORAGE             4          5          6          7
T TRACE AREA               2CEA 5A40  002E 2CEA  6200 0040  5A01 0800
S BLOCK SAVE AREA
A AUXILIARY STORAGE        8          9          A          B
U UCW/DEVICE DIRECTORY     0000 70D6  2CEA A800  2EBE 3AB0  3AB5 0000
L LOCAL STORAGE
X EXTERNAL REGISTERS       C          D          E          F
W SP STORAGE               0002 3BD4  5A01 0100  0000 70D6  2CEA A800
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: C00                        ==>
                                 INSTR STOP

                                      4341
```

DISPLAY/ALTER FLOATING-POINT REGISTERS (QDF)

Display Floating-Point Registers

To select the floating-point register function from the D-screen:

1. Key F plus the register number and register byte number next to SELECTION. The register values are 0, 2, 4, or 6; the byte values are 0-7 (hex). Both may be defaulted to zero.

2. Press ENTER. Four eight-byte registers are displayed.

Alter Floating-Point Registers

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*
- *An invalid character prevents the alter function.*
- *The Translate option is applicable to the Floating-Point Register display.*
- *The paging keys are not applicable to this screen.*

```
   *DISPLAY/ALTER*
 G GENERAL REGISTERS
 C CONTROL REGISTERS          FLOATING POINT REGISTERS
 F FLOATING POINT REGISTERS
 P CURRENT PSW                0
 K STORAGE KEY                0002  70B0  3BCE  5A40
 V VIRTUAL STORAGE
 M REAL STORAGE               2
 T TRACE AREA                 0035  3A04  5A04  002D
 S BLOCK SAVE AREA
 A AUXILIARY STORAGE          4
 U UCW/DEVICE DIRECTORY       2CEA  5A40  002E  2CEA
 L LOCAL STORAGE
 X EXTERNAL REGISTERS         6
 W SP STORAGE                 6200  0040  5A01  0800
 D CONSOLE DISK FILE
 = HEX CALCULATOR
 Q GENERAL SELECTION
 Z RETURN TO PROG SYS
 SELECTION: F00                    ==>
                              INSTR STOP

                                  4341
```

Fast Alter Floating-Point Registers

QDF rb op data.

Key next to SELECTION as follows:

1. QDF selects the Floating-Point Register screen.

2. Key the register number (r) plus the byte number (b) in hexadecimal. The register number is 0, 2, 4, or 6; the byte number has a value of 0-7 (hex). Both may be defaulted to zero.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data.

5. Press ENTER.

Save Floating-Point Registers

All data in the floating-point register can be saved by the Block function. The byte character is ignored for a save function. An example of how you can save the floating-point register data is QDFrb?.

DISPLAY/ALTER CURRENT PSW (QDP)

Display Current PSW

To select the PSW function from the D-screen:

1. Key P and a PSW byte number in hexadecimal next to SELECTION. The byte number may be 0-7 (hex) or defaulted to zero.

2. Press ENTER. The eight-byte PSW is shown in binary except for the hexadecimal address.

Alter Current PSW

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- Data is binary; address is hexadecimal.

- An invalid character prevents the alter function.

- Fast-alter data is hexadecimal up to a maximum of eight bytes (16 characters).

- The paging keys are not applicable to this screen.

- Two screens are displayed to illustrate the differences between BC and EC PSWs.

Fast-Alter Current PSW

QDP b op data.

Key next to SELECTION as follows:

1. QDP selects the PSW screen.

2. Key the byte number (b) whose values are 0-7 (hex). The byte number may be defaulted to zero.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

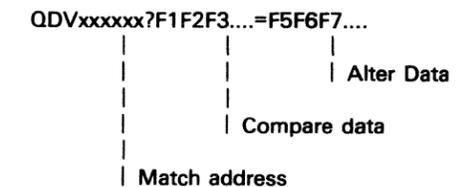   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data to the maximum of eight bytes (16 characters).

5. Press ENTER.

Save Current PSW

All data in the PSW can be saved by the Block function. The byte character is ignored for a save function. An example of how you can save the current PSW data is QDP?.

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```
*DISPLAY/ALTER*                    CURRENT PSW
G GENERAL REGISTERS
C CONTROL REGISTERS                47C9 2300 0017 C123
F FLOATING POINT REGISTERS
P CURRENT PSW
K PAGE DESCRIPTION        BC: CHNLMSK.E
V VIRTUAL STORAGE         EC:  R   TIE     PSW.KEY CMWP  S  CC  PROG.MASK
M REAL STORAGE               0100 0111     1100    1000  0  10   0011
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY        INSTRUCTION ADDRESS: 17C123
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE          ADDRESS IN HEXADECIMAL
= HEX CALCULATOR             OTHER DATA IN BINARY
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: P0                         ==>
    MAN            370            INSTR STOP

                                          4341
```

(Extended Control Mode)

```
*DISPLAY/ALTER*                    CURRENT PSW
G GENERAL REGISTERS
C CONTROL REGISTERS                D7C1 0000 2317 C123
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY             BC: CHNLMSK.E
V VIRTUAL STORAGE         EC:  R   TIE     PSW.KEY CMWP  ILC CC  PROG.MASK
M REAL STORAGE               1101 0111     1100    0001  00  10    0011
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY        INSTRUCTION ADDRESS: 17C123
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE          ADDRESS IN HEXADECIMAL
= HEX CALCULATOR             OTHER DATA IN BINARY
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: P1                         ==>
                  370            INSTR STOP

                                          4341
```

(Basic Control Mode)

PSW Screen Label (EC Mode)

BYTE 0	BYTE 1
Bit	*Bit*
0 Unassigned	0 Storage protect key
1 Per (R)	1 Storage protect key
2 Unassigned	2 Storage protect key
3 Unassigned	3 Storage protect key
4 Unassigned	4 EC mode (D)(=1)
5 DAT (370 mode only)	5 MC mask (M)
6 I/O mask	6 Wait (W)
7 External mask	7 Problem state (P)

BYTE 2

Bit
- 0 Address Space Control (S)
- 1 Unassigned
- 2 Condition code
- 3 condition code
- 4 Program mask
- 5 Program mask
- 6 Program mask
- 7 Program mask

PSW Screen Label (BC Mode)

BYTE 0	BYTE 1
Bit	*Bit*
0 Channel mask	0 Protection key
1 Channel mask	1 Protection key
2 Channel mask	2 Protection key
3 channel mask	3 Protection key
4 Channel mask	4 BC mode (=0)
5 Channel mask	5 MC mask (M)
6 Channel mask	6 Wait (W)
7 External mask	7 Problem state (P)

BYTE 2	BYTE 3
Bit	*Bit*
0 Interruption Code	0 Interruption Code
1 Interruption Code	1 Interruption Code
2 Interruption Code	2 Interruption Code
3 Interruption Code	3 Interruption Code
4 Interruption Code	4 Interruption Code
5 Interruption Code	5 Interruption Code
6 Interruption Code	6 Interruption Code
7 Interruption Code	7 Interruption Code

BYTE 4

Bit
- 0 Inst length code
- 1 Inst length code
- 2 Condition code
- 3 Condition code
- 4 Fixed-point overflow mask
- 5 Decimal overflow mask
- 6 Exponent overflow mask
- 7 Significance mask

Model Group 2

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DISPLAY/ALTER STORAGE KEY (QDK)

Note: *In 370 mode, QDK is labeled* Storage Key; *in VSE mode, it is labeled* Page Description.

Display Storage Key

To select the storage key function from the D-screen:

1. Key K and the six-digit address next to SELECTION. The VSE address values are 0-FFFFFF (hex). The 370 address is 0 to one less than the address check boundary. The address may be defaulted to zero.

2. Press ENTER.

Alter Storage Key

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) of bit data and key in new data This data is bits 0 or 1. Leave the selection unchanged and press ENTER.

Notes:

- *The key data is in bit format. The address and frame are in hex.*

- *Other than bit data prevents the alter function.*

- *The next higher/lower 2K boundary can be displayed/ altered by using the paging keys.*

- *Two screens are displayed to illustrate the differences between 370 and VSE mode.*

```
*DISPLAY/ALTER*                      PAGE DESCRIPTION
G GENERAL REGISTERS
C CONTROL REGISTERS
F FLOATING POINT REGISTERS        STOR.KEY    FRC    PROG.BITS    CA
P CURRENT PSW                       0000      100      000       11
K PAGE DESCRIPTION
V VIRTUAL STORAGE
M REAL STORAGE                    ADDRESS:000000      FRAME INDEX:0000
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE               PAGE-CAPACITY-COUNT (PCC)          :2000
U UCW/DEVICE DIRECTORY            EXISTING-FRAME-CAPACITY-COUNT (EFCC) :03E7
L LOCAL STORAGE                   AVAILABLE-FRAME-CAPACITY-COUNT (AFCC) :03E7
X EXTERNAL REGISTERS              FREE-FRAME-CAPACITY-COUNT (FFCC)    :0000
W SP STORAGE
D CONSOLE DISK FILE                  ADDRESS, FRAME INDEX, AND CAPACITY COUNTS
= HEX CALCULATOR                             IN HEX, OTHER DATA IN BINARY
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION:  K000000                          ==>
                             VSE      INSTR STOP

                                             4341
```

(VSE Mode)

```
*DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS                      STORAGE KEY
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY
V VIRTUAL STORAGE                HEX          BIN          BIN
M REAL STORAGE         ADDRESS:000000    KEY:1101     FRC:000
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION:  K000000                   ==>
                              INSTR STOP

                                      4341
```

(370 Mode)

Fast-Alter Storage Key

QDK address op data (bit)

Key data next to SELECTION as follows:

1. QDK selects the Storage Key screen.

2. Key in the address whose values are 0-FFFFFF (hex). The address may be defaulted to zero.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data whose digit values are in bit mode.

   Bits (370 and VSE)

   0-3 = (Key field) 0-F
    4 = Fetch protection bit
    5 = Reference bit
    6 = Change bit

   Bits (VSE only)

   7-9 = Program bits

   Note: *Connected and Addressable bits (CA) are non-alterable.*

5. Press ENTER.

Save Storage Key

The data of Key In Storage can be saved by the Block function. An example of how you can save the key in storage data is QDKxxxxxx?.

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DISPLAY/ALTER VIRTUAL STORAGE 370/VSE (QDV)

Display Virtual Storage 370/VSE

To select the virtual storage function from the D-screen:

1. Key V and the six-digit address next to SELECTION. The address values are 0-FFFFFF (hex). The address may be defaulted to zero.

2. Press ENTER. A 128-byte block of data containing the selected address is displayed.

Note: *The virtual storage address can be modified by placing a (+) to add or a (−) to subtract from the address keyed next to SELECTION. An example is shown on both screens. When the Adjust Value has been entered, it remains until a new value has been entered or you select another screen that is not a Display/Alter screen.*
You can key in the Adjust Value alone or with an address. No address entered defaults to zero. The data appears in the normal area as though it were at the selected address, but the data is actually that data located at the adjusted address, even though the address under label ADRS is that from the address on the SELECTION line. You can key a new address or use the PAGE key, and you still get the data from the adjusted address. The address plus the Adjusted Value might cause the screen to have a twos-complement negative number.

Alter Virtual Storage 370/VSE

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*

- *An invalid character prevents the alter function.*

- *The next higher/lower 128-byte boundary can be displayed by using the paging keys.*

- *The Translate option is applicable to the Virtual Storage display.*

- *Error message DATA NOT ACCESSIBLE is displayed when the selected virtual address does not exist in real storage.*

```
*DISPLAY/ALTER*              VIRTUAL STORAGE ADJUST=+0003A0    REAL=000000
G GENERAL REGISTERS          ADRS  +0   +2   +4   +6   +8   +A   +C   +E
C CONTROL REGISTERS          FFFFE0 8012 3465 0000 0000 0831 2040 0000 0340
F FLOATING POINT REGISTERS
P CURRENT PSW                FFFFF0 0000 0000 000C 0000 0000 0550 0DA0 0000
K PAGE DESCRIPTION
V VIRTUAL STORAGE            000000 0450 0270 0380 0000 0000 0000 0000 0000
M REAL STORAGE
T TRACE AREA                 000010 0000 0000 0020 0000 0000 0A67 F000 0000
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY       000020 0000 0000 0220 0000 0000 0000 0000 0000
L LOCAL STORAGE
X EXTERNAL REGISTERS         000030 0000 0000 000A 00B5 4346 0000 0000 0000
W SP STORAGE
D CONSOLE DISK FILE          000040 0000 0000 0400 0000 0000 0000 0000 0000
= HEX CALCULATOR
Q GENERAL SELECTION          000050 0000 A4E4 0360 0000 0000 0000 0330 0000
Z RETURN TO PROG SYS
SELECTION: V000000+3A0                        ==>
                        VSE           INSTR STOP

                                      4341
```

Fast Alter Virtual Storage 370/VSE

QDV address op data.

Key data next to SELECTION as follows:

1. QDV selects the Virtual Storage screen.

2. Key in address 0-FFFFFF (hex). The address may be defaulted to zero.

3. Key in the op code:

   where:
   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data in hexadecimal.

5. Press ENTER.

Save Virtual Storage 370/VSE

Eight bytes of data in virtual storage, starting with the address in the save area, can be saved by the Block function. An example of how you can save the virtual storage data is QDVxxxxxx?.

Note: *You can use the ? op code to verify if data exists at the address before altering that data. This feature is very helpful while running a block, but it can be used at any time. After the ?, enter any number of digits for the data that would be at that address. You can alter any number of digits by also using an alter op code, such as (=). If the data at that address does not match, no alter occurs. If you have no match, and the data you are matching and the data which you wish to alter match each other, no alter occurs, nor does an error occur.*

An example of how this command is used is:

```
QDVxxxxxx?F1F2F3....=F5F6F7....
        |       |     |
        |       |     | Alter Data
        |       |
        |       | Compare data
        |
        | Match address
```

DISPLAY/ALTER REAL STORAGE 370 (QDM)

Display Real Storage 370

To select the real storage function from the D-screen:

1. Key M and the six-digit address next to SELECTION. The address values are zero to one less than the address check boundry. In CE mode, the address range is all of real storage. The address may be defaulted to zero.

2. Press ENTER. A 128-byte block of data containing the selected address is displayed.

Note: *The real storage address can be modified by placing a (+) to add or a (−) to subtract from the address keyed next to SELECTION. An example is shown on the QDV screens. When the Adjust Value has been entered, it remains until a new value has been entered or you select another screen that is not a Display/Alter screen.*

You can key in the Adjust Value alone or with an address. No address entered defaults to zero. The data appears in the normal area as though it were at the selected address, but the data is actually that data located at the adjusted address, even though the address under label ADRS is that from the address on the SELECTION line. You can key a new address or use the PAGE key, and you still get the data from the adjusted address. The address plus the Adjusted Value might cause the screen to have a twos-complement negative number.

Alter Real Storage 370

1. Perform steps 1 and 2 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*
- *An invalid character prevents the alter function.*
- *The next higher/lower 128-byte boundary can be displayed by using the paging keys.*
- *The maximum selected address must be 1 less than the ACB (Address Check Boundary).*
- *The Translate option is applicable to the Real Storage display.*

```
  *DISPLAY/ALTER*              REAL STORAGE  ADJUST=+0003A0   ACB=1C0000
G GENERAL REGISTERS       ADRS  +0   +2   +4   +6   +8   +A   +C   +E
C CONTROL REGISTERS       000010 8012 3465 0000 0000 0831 2040 0000 0340
F FLOATING POINT REGISTERS
P CURRENT PSW             000020 0000 0000 000C 0000 0000 0550 0DA0 0000
K STORAGE KEY
V VIRTUAL STORAGE         000030 0450 0270 0380 0000 0000 0000 0000 0000
M REAL STORAGE
T TRACE AREA              000040 0000 0000 0020 0000 0000 0A67 F000 0000
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY    000050 0000 0000 0220 0000 0000 0000 0000 0000
L LOCAL STORAGE
X EXTERNAL REGISTERS      000060 0000 0000 000A 00B5 4346 0000 0000 0000
W SP STORAGE
D CONSOLE DISK FILE       000070 0000 0000 0400 0000 0000 0000 0000 0000
= HEX CALCULATOR
Q GENERAL SELECTION       000080 0000 A4E4 0360 0000 0000 0000 0330 0000
Z RETURN TO PROG SYS
SELECTION: M000020-10                ==>
                                  INSTR STOP

                                     4341
```

Fast Alter Real Storage 370

QDM address op data.

Key data next to SELECTION as follows:

1. QDM selects the main storage screen.

2. Key in address 0-FFFFFF (hex). The address may be defaulted to zero.

3. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

4. Key data in hexadecimal.

5. Press ENTER.

Save Real Storage 370

Eight bytes of data in real storage, starting with the address in the save area, can be saved by the Block function. An example of how you can save the real storage data is QDMxxxxxx?.

Note: *You can use the ? op code to verify if data exists at the address before altering that data. This feature is very helpful while running a block, but it can be used at any time. After the ?, enter any number of digits for the data that would be at that address. You can alter any number of digits by also using an alter op code, such as (=). If the data at that address does not match, no alter occurs. If you have no match, and the data you are matching and the data which you wish to alter match each other, no alter occurs, nor does an error occur.*

An example of how this command is used is:

```
QDMxxxxxx?F1F2F3....=F5F6F7....
         |    |     |
         |    |     | Alter data
         |    |
         |    | Compare data
         |
         | Match address
```

DISPLAY/ALTER TRACE AREA (QDT)

The T-selection from the Display/Alter screen causes the trace area menu to be displayed. The menu shows the selections available for the Trace function.

Display Trace Area (T)

To select the Trace function from the D-screen:

1. Key T next to SELECTION.

2. Press ENTER. Trace screen menu is displayed.

```
      *DISPLAY/ALTER*                      *TRACE AREA*
G GENERAL REGISTERS
C CONTROL REGISTERS              *INSTRUCTION COUNTER TRACE*
F FLOATING POINT REGISTERS         TI  DISPLAY
P CURRENT PSW                      TIX CLEAR
K STORAGE KEY
V VIRTUAL STORAGE               *PSW AND I/O TRACE*
M REAL STORAGE                     TC  TRACE CONTROLS
T TRACE AREA
S BLOCK SAVE AREA                  TP  DISPLAY
A AUXILIARY STORAGE                TPX CLEAR
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE                    TS  SAVE IFCC
X EXTERNAL REGISTERS               TSX CLEAR SAVED IFCC
W SP STORAGE                       TF  DISPLAY SAVED IFCC
D CONSOLE DISK FILE
= HEX CALCULATOR                *I/O DEVICE STATUS*
Q GENERAL SELECTION                TM  DISPLAY
Z RETURN TO PROG SYS               TMX RESET SAMPLE COUNT
SELECTION: T                               ==>
                                   INSTR STOP

                                        4341
```

Display Instruction Counter Trace (TI)

To select the Instruction Counter Trace from the T-screen:

1. Key TI next to SELECTION.

2. Press ENTER. Instruction Counter Trace screen is displayed.

The Instruction Counter Trace area (TI) contains up to 128 instruction addresses resulting from using the Trace-Stop (QAT), Trace-Wrap (QAW), or the Instruction Step (QOI) functions. The total 128-address trace area is divided into two 64-address pages.

The addresses are arranged from left to right, top to bottom. The newest address is displayed at the beginning of page 0 with the oldest at the end of page 1. The trace area always contains the most recent addresses up to a maximum of 128 addresses. When the list becomes full, each new address is inserted into the first position of page 0, all addresses are advanced, and the oldest is dropped from the bottom of page 1.

The current page containing the first 64 addresses (CURRENT) is always displayed first. Addresses over a count of 64 are displayed on the second page (PREVIOUS) of this screen. Selecting TI0 at the SELECTION line displays the current page (page 0). Selecting TI1 at the SELECTION line displays the previous page (page 1). The Page-Up and Page-Down function keys can also be used to go from page to page.

Addresses displayed followed by a V denote a virtual address. An address followed by an R denotes a real address. An address that cannot be determined to be either virtual or real is denoted by an X. An address resulting from a Branch instruction is followed by a B.

Clear Instruction Counter Trace (TIX)

To clear the Instruction Counter Trace Screen:

1. Key TIX next to SELECTION.

2. Press ENTER. Instruction Counter Trace screen is cleared.

```
      *DISPLAY/ALTER*          CURRENT    I-COUNTER TRACE     ADJUST=+000000
G GENERAL REGISTERS           007854 VB  007850 V   00784C V   00784A VB
C CONTROL REGISTERS           005982 V   005980 V   00597C V   005978 V
F FLOATING POINT REGISTERS    005974 V   005970 VB  001444 V   001440 V
P CURRENT PSW                 00143E V   00142A V   001436 X   066666 X
K STORAGE KEY                 066662 V   06665E V   06665C VB  06665A V
V VIRTUAL STORAGE             06665C V   06665A V   06665C V   06665A VB
M REAL STORAGE                0044AE VB  0044A8 RB  0044A6 V   0044A0 V
T TRACE AREA                  00449E V   00449A R   004496 V   004490 V
S BLOCK SAVE AREA
A AUXILIARY STORAGE           00498C X   012344 R
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS          B=RESULT OF BC OR BCR R=REAL V=VIRT X=UNKNOWN
SELECTION: TI-1220                          ==>
                                   INSTR STOP

                                        4341
```

Model Group 2

Display PSW and I/O Trace Controls (TC)

To select the PSW and I/O Trace Controls function from the T-screen:

1. Key TC next to SELECTION.

2. Press ENTER. PSW and I/O Trace Controls screen is displayed.

The PSW and I/O Controls (TC) screen provides the capability to set controls for the PSW and I/O trace. The results of the traces are displayed on the PSW and I/O Trace Display (TP) screen. The PSW and I/O Trace Controls screen provides the same capability as the I/O instructions (O), PSW swaps (P), and the CSWs (W) trace options as on the Compare/Trace (QA) screen.

To set a selection in the PSW trace control area, key a **Y** for YES, or **N** for NO, over the existing setting. To set all the selections to YES or NO, key the appropriate letter under the selection **ALL:**.

To set a selection in the I/O trace control area, key in the appropriate selections where:

UNIT column: a two-character unit address, **Y** for all or **N** for none.
CSW column: Y activates CSW store trace because of device activity rather than I/O instructions; **N** deactivates CSW store trace.
OPS column: A specific I/O op code mnemonic, **Y** for all I/O operations or **N** for none.

All selectable fields are highlighted. To make a change to a field, key in the desired setting in place of the existing one.

To return Trace functions to their normal (reset) state, an **N** under the selection **ALL** resets PSW traces. An **N** in the Unit column resets Channel I/O Trace. Or, the QAN function can be used to reset the trace functions.

Note: *Using the QAN function resets any previously selected Trace function, whether it was selected from the Compare/Trace (QA) or the Trace Controls (QDTC) screen.*

```
*DISPLAY/ALTER*                        * PSW TRACE CONTROLS *
G GENERAL REGISTERS          ALL:  LOAD I/O  MCK  PCK  SVC  EXT  VM
C CONTROL REGISTERS            -    Y    N    N    Y    Y    N    N
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY                          * I/O TRACE CONTROLS *
V VIRTUAL STORAGE               CHANNEL    UNIT    CSW    OPS
M REAL STORAGE                     0        1F      N     SIO
T TRACE AREA          Y = YES/ALL
S BLOCK SAVE AREA     N = NO/NONE   1        91      N     SIO
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY  OPS = CIO   2        Y       Y     Y
L LOCAL STORAGE              HDV
X EXTERNAL REGISTERS         SIO    3        80      N     HIO
W SP STORAGE                 TIO
D CONSOLE DISK FILE          HIO    4        N       N     N
= HEX CALCULATOR             TCH
Q GENERAL SELECTION                 5        N       N     N
Z RETURN TO PROG SYS
SELECTION: TC                      ==>
                                INSTR STOP

                                    4341
```

```
*DISPLAY/ALTER*                  PSW & I/O TRACE
G GENERAL REGISTERS      PSW LOAD    ADR=0000 0000    OLD=0000 0000 0000 0000
C CONTROL REGISTERS                                  NEW=0000 0000 0000 0000
F FLOATING POINT REGISTERS  PSW I/O         DEV=10C  OLD=FE00 010C 0007 7622
P CURRENT PSW                                        NEW=0000 0000 0000 3466
K STORAGE KEY            PSW MCHK   INT=0000 0101    OLD=070C 0000 0004 4444
V VIRTUAL STORAGE                                    NEW=0008 0000 000E 3922
M REAL STORAGE           OPS SIO    CC=0   DEV=2B4   CCW=0202 334C 0000 0050
T TRACE AREA                                         CAW=0006 304C
S BLOCK SAVE AREA        OPS HIO    CC=1   DEV=119   CSW=.... .... 0100 ....
A AUXILIARY STORAGE                                  CNT=0000 0002
U UCW/DEVICE DIRECTORY   OPS CLRIO  CC=3   DEV=111
L LOCAL STORAGE          OPS TCH    CC=2   DEV=3AD
X EXTERNAL REGISTERS     CSW        IFCC   DEV=323   CSW=3000 0200 0002 0029
W SP STORAGE                   BUSIN=21 BUSOUT=11  CN=0C  ENG=35 33 06 5F 47
D CONSOLE DISK FILE            TAGIN=  REQ OPL DIS ADR SEL STA SRV/DAT
= HEX CALCULATOR               TAGOUT= ADR CMD DAT SRV SUP OPL SEL
Q GENERAL SELECTION            INTERFACE CLEANUP TIMEOUT
Z RETURN TO PROG SYS
SELECTION: TP                      ==>
                                INSTR STOP

                                    4341
```

Display PSW and I/O Trace (TP)

To select the PSW and I/O Trace screen from the T-screen:

1. Key TP next to SELECTION.

2. Press ENTER. PSW and I/O Trace screen is displayed.

The PSW and I/O Trace screen displays the traces made with the selections on either the PSW and I/O Trace Controls screen (TC) or the Compare/Trace (QA) screen. The PSW and I/O operations selected are traced and recorded on this screen.

This screen also displays the current Interface Control Checks (IFCC). The interface control checks trace is always active and is not affected by any selections made from the Compare/Trace (QA) screen or the PSW and I/O Trace Controls (TC) screen.

The Page-Up and Page-Down function keys can be used to increase or decrease page numbers.

Clear PSW & I/O Trace (TPX)

To clear the PSW and I/O Trace screen:

1. Key TPX next to SELECTION.

2. Press ENTER. PSW and I/O Trace screen is cleared.

Display Saved IFCC (TF)

To select the Saved IFCC screen from the T-screen:

1. Key TF next to SELECTION.

2. Press ENTER. Saved IFCC save area is displayed.

The Saved IFCC screen displays the saved interface control checks that have been saved to the diskette by using the Save IFCC (TS) function.

The Page-Up and Page-Down function keys can be used to increase or decrease page numbers.

Save IFCC (TS)

When the Save IFCC (TS) function is invoked, the IFCC save area is cleared, and the current interface control checks in the trace area are transferred to the IFCC area on the diskette. This function invoked from inside a Block saves the latest interface control check in the trace area without clearing the diskette area.

Clear Saved IFCC (TSX)

To clear the Saved IFCC save area:

1. Key TSX next to SELECTION.

2. Press ENTER. IFCC screen is cleared.

```
 *DISPLAY/ALTER*              SAVED IFCC                   PAGE 00
G GENERAL REGISTERS     CSW      IFCC DEV=341   CSW=3000 0200 0002 0029
C CONTROL REGISTERS              BUSIN=21 BUSOUT=11  CN=0C  ENG=35 33 06 5F 47
F FLOATING POINT REGISTERS       TAGIN=  REQ OPL DIS ADR SEL STA SRV/DAT
P CURRENT PSW                    TAGOUT= ADR CMD DAT SRV SUP OPL SEL
K STORAGE KEY                    INTERFACE CLEANUP TIMEOUT
V VIRTUAL STORAGE        OPS SIO   IFCC DEV=311   CSW=0202 0000 000E 3922
M REAL STORAGE                   BUSIN=21 BUSOUT=11  CN=0C  ENG=35 33 06 5F 47
T TRACE AREA                     TAGIN=  REQ OPL DIS ADR SEL STA SRV/DAT
S BLOCK SAVE AREA                TAGOUT= ADR CMD DAT SRV SUP OPL SEL
A AUXILIARY STORAGE              INTERFACE CLEANUP TIMEOUT
U UCW/DEVICE DIRECTORY   OPS TIO   IFCC DEV=323   CSW=3000 0200 0002 0029
L LOCAL STORAGE                  BUSIN=21 BUSOUT=11  CN=0C  ENG=35 33 06 5F 47
X EXTERNAL REGISTERS             TAGIN=  REQ OPL DIS ADR SEL STA SRV/DAT
W SP STORAGE                     TAGOUT= ADR CMD DAT SRV SUP OPL SEL
D CONSOLE DISK FILE              INTERFACE CLEANUP TIMEOUT
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: TF                          ==>
                                  INSTR STOP

                                     4341
```

```
 *DISPLAY/ALTER*      *I/O DEVICE STATUS*            SAMPLES=03
G GENERAL REGISTERS      CUU STATUS   CUU STATUS   CUU STATUS   CUU STATUS
C CONTROL REGISTERS      033 CE/DE    150    DE    18E CE/DE    230 CE/DE
F FLOATING POINT REGISTERS 33C    DE    344 CE/DE    4E1 CE/DE
P CURRENT PSW
K STORAGE KEY
V VIRTUAL STORAGE
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION      CE - DEVICE OWES CHANNEL END FOR FINAL OPERATION
Z RETURN TO PROG SYS     DE - DEVICE OWES DEVICE END
SELECTION: TM                          ==>
                                  INSTR STOP

                                     4341
```

Display I/O Device Status (TM)

To select the I/O Device Status screen from the T-screen:

. 1. Key TM next to SELECTION.

2. Press ENTER. I/O Device Status screen is displayed.

The I/O Device Status screen displays the status of devices that have not completed their final operation when a sample (examination of UCWs) is taken. Each time the ENTER key is pressed, another sample (examination of UCWs) is taken. The results, any outstanding devices, are displayed. If a device has had outstanding status since the last sample count reset, that device is intensified on the screen.

Use the I/O Device Status screen to identify suspected device(s) that may be having device or system problems. A number of samples is required to determine this. Once the suspected device(s) are identified, perform a full I/O Trace on that particular device(s) to ensure more reliable diagnostic results.

Notes:

- *During command-chained operations, channel-end (CE) is outstanding until channel-end is received for the last command in the chain.*

- *Device-End (DE) status for devices with shared subchannels cannot be determined.*

- *During Halt and Clear instructions, the indications CE and DE are unpredictable.*

- *Any status accepted into the UCW, but not yet presented to the operating system, is reflected as completed.*

Reset Sample Count (TMX)

To reset the I/O Device Status sample count:

1. Key TMX next to SELECTION.

2. Press ENTER. I/O Device Status count is reset and a new sample is performed.

Definition of Terms

The fields are defined by:

ADR	Address of the Load PSW instruction
BUSIN	Data input bus
BUSOUT	Data output bus
CAW	Channel address word
CC	I/O instruction condition code
CCW	Channel command word
CE	Channel-end
CN	Catalog number
CIO	Clear I/O instruction trace control
CLRIO	Clear I/O instruction
CNT	Number of times this entry has been repeated without any intervening entry (CNT 0=1, ... CNT 1=2)
CSW	Channel status word. Entries with '....' are showing the changed part of the CSW.
DE	Device-end
DEV	I/O device address
ENG	For engineering use: byte 0 - catalog number byte 1 - CHCMDR byte 2 - CHSYNC0 byte 3 - CHDATA0 byte 4 - CHSYNC1 byte 5 - CHDATA2
EXT	External PSW
HIO	Halt I/O instruction
I/O	Input/output
IFCC	Interface control check
INT	Interruption code (EC mode only). In BC mode, the interruption code is in the old PSW.
MCK	Machine check PSW trace control
MCHK	Machine check
NEW	PSW after the PSW swap
OLD	PSW before the PSW swap
PCK	Program check
PSW	Program status word

SIO	Start I/O
SVC	Supervisor call
TAGIN	Interface adapter tags in, where: REQ = Request in OPL = Operational in DIS = Disconnect in ADR = Address in SEL = Select in STA = Status in SRV = Service in DAT = Data in
TAGOUT	Interface adapter tags out, where: ADR = Address out CMD = Command out DAT = Data out SRV = Service out SUP = Suppress out OPL = Operational out SEL = Select out
TCH	Test channel
TIO	Test I/O instruction
VM	Virtual machine assist

Condition Codes:

Condition Code Setting	0	1	2	3
Mask Bit Value	8	4	2	1

Input/Output Instructions:

Clear I/O	No oper in progress	CSW stored	Channel busy	Not operating
Halt Device	Interruption pending	CSW stored	Channel working	Not operating
Halt I/O	Interruption pending	CSW stored	Burst op stopped	Not operating
Start I/O	Successful	CSW stored	Channel busy	Not operating
Channel ID	ID stored	CSW stored	Channel busy	Not operating
Test Channel	Available	Interruption pending	Burst mode	Not operating
Test I/O	Available	CSW stored	Channel busy	Not operating

DISPLAY/ALTER BLOCK SAVE AREA (QDS)

Display Block Save Area

To select the block save function from the D-screen:

1. Place the CE MODE switch ON.

2. Key S with a one-digit address next to SELECTION. This is the number of a page of the save area. The address may be defaulted to zero.

3. Press ENTER. A 16-item section of Block Save is displayed.

Notes:

- *The next higher/lower 16 entries can be displayed by using the paging keys.*

- *SAVE AREA EMPTY message indicates the save area was not used during the last Block activity.*

Alter Block Save Area

Note: *The block save area cannot be full-screen altered.*

Fast-Alter Block Save Area

Note: *The block save area cannot be fast-altered.*

```
         *DISPLAY/ALTER*              SAVE AREA    DATE: 00/000 00:00  PAGE 0
       G GENERAL REGISTERS           TYPE ADDRESS  DATA
       C CONTROL REGISTERS           QDG  04        A5A5 A5A5
       F FLOATING POINT REGISTERS    QDP            FF00 0000 4000 2222
       P CURRENT PSW                 QDM  004672    3A00 2680 2B90 04F0
       K STORAGE KEY                 QDK  004672    0007 0000
       V VIRTUAL STORAGE             TOD            00/000  00:00:00
       M REAL STORAGE
       T TRACE AREA
       S BLOCK SAVE AREA
       A AUXILIARY STORAGE
       U UCW/DEVICE DIRECTORY
       L LOCAL STORAGE
       X EXTERNAL REGISTERS
       W SP STORAGE
       D CONSOLE DISK FILE
       = HEX CALCULATOR
       Q GENERAL SELECTION
       Z RETURN TO PROG SYS
       SELECTION: S0                          ==>
                                        INSTR STOP

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```

Save Screen Label

Type	Description
Type	Type of information saved
Address	Address of stored data
Data	Hexadecimal data.

Save Area Type Field Description

Type	Description
S	BLOCK VARIABLE SAVE
QDA	AUXILIARY STORAGE
QDC	CONTROL REGISTERS
QDD	CONSOLE DISK FILE
QDF	FLOATING-POINT REGISTERS
QDG	GENERAL REGISTERS
QDK	STORAGE KEY
QDL	LOCAL STORAGE
QDM	REAL STORAGE
QDP	CURRENT PSW
QDW	SP STORAGE
QDV	VIRTUAL STORAGE
QVAB	CSAR BACKUP TRACE
QVAC	CONTROL STORE
QVAD	CHANNEL DATA BUFFER
QVAF	L1 DIRECTORY
QVAG	L1 CACHE DATA
QVAH	CHANNEL DLAT
QVAL	LOCAL STORAGE
QVAN	CHANNEL CONTROL
QVAP	LOCAL STORE RETRY
QVAR	CACHE RETRY DATA
QVAS	SWAP BUFFER
QVAT	TRAP/BAL STACK
QVAU	PU DLAT
QVAY	KEYSTACK ARRAY
QVB	CONTROL STORAGE HARDWARE
QVC	CHANNEL INTERFACE
QVH	CHANNEL HARDWARE
QVI	PU HARDWARE
QVK	CHECK LATCHES
QVM	MAIN STORAGE HARDWARE
QVR	SCAN RINGS
QVX	EXTERNAL REGISTERS

Model Group 2

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DISPLAY/ALTER AUXILIARY STORAGE (QDA)

Display Auxiliary Storage

To select the auxiliary storage function from the D-screen:

1. Place the CE MODE switch ON.

2. Key A and a six-digit address next to SELECTION. The address is a value of zero to one less than the main storage size minus the address check boundry size. The address may be defaulted to zero.

3. Press ENTER. A 128-byte block of data containing the selected address is displayed.

Alter Auxiliary Storage

1. Perform steps 1 through 3 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*

- *An invalid character prevents the Alter function.*

- *The next higher/lower 128-byte boundary can be displayed by using the paging keys.*

- *The Translate option is applicable to the Auxiliary Storage display.*

- *The auxiliary storage address can be modified by placing a (+) to add or a (−) to subtract from the address keyed next to SELECTION. An example is shown on the QDV screen. When the Adjust Value has been entered, it remains until a new value has been entered or you select another screen that is not a Display/Alter screen. You can key in the Adjust Value alone or with an address. No address entered defaults to zero.*

  The data appears in the normal area as though it were at the selected address, but the data is actually that data located at the adjusted address, even though the address under label ADRS is that from the address on the SELECTION line. You can key a new address or use the PAGE key, and you still get the data from the adjusted address. The address plus the Adjusted Value might cause the screen to have a twos-complement negative number.

```
 *DISPLAY/ALTER*           AUXILIARY STORAGE  ADJUST=+0003A0   ACB=1C0000
G GENERAL REGISTERS        ADRS  +0   +2   +4   +6   +8   +A   +C   +E
C CONTROL REGISTERS        000010 8012 3465 0000 0000 0831 2040 0000 0340
F FLOATING POINT REGISTERS
P CURRENT PSW              000020 0000 0000 000C 0000 0000 0550 0DA0 0000
K STORAGE KEY
V VIRTUAL STORAGE          000030 0450 0270 0380 0000 0000 0000 0000 0000
M REAL STORAGE
T TRACE AREA               000040 0000 0000 0020 0000 0000 0A67 F000 0000
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY     000050 0000 0000 0220 0000 0000 0000 0000 0000
L LOCAL STORAGE
X EXTERNAL REGISTERS       000060 0000 0000 000A 00B5 4346 0000 0000 0000
W SP STORAGE
D CONSOLE DISK FILE        000070 0000 0000 0400 0000 0000 0000 0000 0000
= HEX CALCULATOR
Q GENERAL SELECTION        000080 0000 A4E4 0360 0000 0000 0000 0330 0000
Z RETURN TO PROG SYS
SELECTION: A000000                        ==>
                                      INSTR STOP

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```

Fast-Alter Auxiliary Storage

QDA address op data.

Key data next to selection as follows:

1. Place the CE MODE switch ON.

2. QDA selects the Auxiliary Storage screen.

3. Key in the address. The address may be defaulted to zero.

4. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

5. Key in data in hexadecimal.

6. Press ENTER.

Note: *You can enter as much data as can fit the SELECTION line, provided you do not cross the 128-byte boundry.*

Save Auxiliary Storage

Eight bytes of data in auxiliary storage can be saved by the block function. An example of how you can save the auxiliary storage data is QDAxxxxxx?.

Note: *You can use the ? op code to verify if data exists at the address before altering that data. This feature is very helpful while running a block, but it can be used at any time. After the ?, enter any number of digits for the data that would be at that address. You can alter any number of digits by also using an alter op code, such as (=). If the data at that address does not match, no alter occurs. If you have no match, and the data you are matching and the data which you wish to alter match each other, no alter occurs, nor does an error occur.*

An example of how this command is used is:

```
QDAxxxxxx?F1F2F3....=F5F6F7....
   |        |       |
   |        |       | Alter data
   |        |
   |        | Compare data
   |
   | Match address
```

DISPLAY/ALTER UCW/DEVICE DIRECTORY
(QDU) (GRP 2)

Display UCW/Device Directory Facilities

To select the UCW/Device Directory Facilities from the
D-screen:

1. Place the CE MODE switch ON.

2. Key U next to SELECTION.

3. Press ENTER.

Alter UCW/Device Directory

Note: *The UCW/Device Directory Facilities cannot be
altered.*

```
   *DISPLAY/ALTER*
G  GENERAL REGISTERS
C  CONTROL REGISTERS              *UCW/DEVICE DIRECTORY*
F  FLOATING POINT REGISTERS
P  CURRENT PSW
K  STORAGE KEY              UU  UPDATE DIRECTORY
V  VIRTUAL STORAGE
M  REAL STORAGE             UC  COMPRESSED DIRECTORIES DISPLAY
T  TRACE AREA
S  BLOCK SAVE AREA          UE  EXPANDED DIRECTORIES DISPLAY
A  AUXILIARY STORAGE
U  UCW/DEVICE DIRECTORY
L  LOCAL STORAGE
X  EXTERNAL REGISTERS
W  SP STORAGE
D  CONSOLE DISK FILE
=  HEX CALCULATOR
Q  GENERAL SELECTION
Z  RETURN TO PROG SYS
SELECTION: U                           ==>
                                    INSTR STOP

                                        4341
```

DISPLAY UCW/DEVICE DIRECTORY UPDATE
(QDUU)

To select the UCW/Device Directory Update screen from the
D-screen:

1. Place the CE MODE switch ON.

2. Key UU next to SELECTION.

3. Press ENTER.

Alter UCW/Device Directory Update

Note: *To alter the UCW/Device Directory Update screen,
refer to UCW Assignment Procedure.*

```
   *DISPLAY/ALTER*                    *UCW DIRECTORY UPDATES*
G  GENERAL REGISTERS                     LASTREF=00F
C  CONTROL REGISTERS          CHANNEL: 0-BYTE     1-BLOCK     2-BLOCK
F  FLOATING POINT REGISTERS            3-BLOCK     4-BLOCK     5-BLOCK
P  CURRENT PSW
K  STORAGE KEY                FORMAT:  UU XXX -YYY CHARACTERISTICS
V  VIRTUAL STORAGE                     XXX STARTING DEVICE ADDR
M  REAL STORAGE                        -YYY ENDING DEVICE ADDR (OPTIONAL)
T  TRACE AREA
S  BLOCK SAVE AREA            CHARACTERISTICS (OPTIONAL, ANY ORDER)
A  AUXILIARY STORAGE                    S SHARED UCW
U  UCW/DEVICE DIRECTORY                 L SELECTOR MODE       -BLOCK ONLY
L  LOCAL STORAGE                        D DATA STREAMING MODE -BLOCK ONLY
X  EXTERNAL REGISTERS
W  SP STORAGE
D  CONSOLE DISK FILE                    X UNASSIGN DIRECTORY
=  HEX CALCULATOR
Q  GENERAL SELECTION          PU-IML REQUIRED AFTER UPDATES
Z  RETURN TO PROG SYS
SELECTION: UU 380-387 SL               ==>
                                    INSTR STOP

                                        4341
```

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Use with microcode EC 856091 and above

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UCW COMPRESSED DIRECTORIES (QDUC)

This screen is used to verify any changes made while using the update screen (QDUU) in the assignment procedure.

Display UCW/Device Directory-Compressed Directories Display

To display the UCW/Device Directory-Compressed Directories Display from the D-screen:

1. Place the CE MODE switch ON.

2. Key UC and a three-digit device address (000-5FF) next to SELECTION.

   Note: *The three-digit device address may be defaulted to 000.*

3. Press Enter.

Note: *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*

Alter UCW/Device Directory-Compressed Directories Display

Note: *The Compressed Directories Display screen cannot be altered. If you need to alter, it must be done by way of the Update screen (QDUU).*

```
*DISPLAY/ALTER*                    *UCW DIRECTORIES DISPLAY*
G GENERAL REGISTERS         CUU       REF       CHARACTERISTICS
C CONTROL REGISTERS         003-006   010-013   BYT
F FLOATING POINT REGISTERS  010       003       BYT
P CURRENT PSW               060-067   014       BYT,SHR
K STORAGE KEY               150-15F   015-024   BLK
V VIRTUAL STORAGE           240-243   025-028   SEL
M REAL STORAGE              280       029       BLK,DST
T TRACE AREA                380-387   02A       SEL,SHR
S BLOCK SAVE AREA           388-38F   02B       SEL,SHR
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY      4B8       02C       INV
L LOCAL STORAGE             4C0-4C5   02D-032   BLK,DST
X EXTERNAL REGISTERS        503-506   033-036   BLK
W SP STORAGE                51A       037       SEL
D CONSOLE DISK FILE         520-527   038-03F   BLK
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: UC                          ==>
                               INSTR STOP

                                  4341
```

UCW EXPANDED DIRECTORIES (QDUE)

This screen is used to verify any changes made while using the update screen (QDUU) in the assignment procedure.

Display UCW/Device Directory-Expanded Directories Display

To display the UCW/Device Directory-Expanded Directories Display from the D-screen:

1. Place the CE MODE switch ON.

2. Key UE and a three-digit device address (000-5FF) next to SELECTION.

   Note: *The three-digit device device address may be defaulted to 000.*

3. Press ENTER.

Note: *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*

Alter UCW/Device Directory-Expanded Directories Display

Note: *The Expanded Directories Display screen cannot be altered. If you need to alter, it must be done by way of the Update screen (QDUU).*

```
*DISPLAY/ALTER*              *UCW DIRECTORIES DISPLAY*
G GENERAL REGISTERS         CUU    REF    CHARACTERISTICS   HEX
C CONTROL REGISTERS         0F0    007    INV               01C0
F FLOATING POINT REGISTERS  0F1    008    INV               0200
P CURRENT PSW               0F2    003    BYT               00E0
K STORAGE KEY               0F3    004    INV               0100
V VIRTUAL STORAGE           0F4    005    INV               0140
M REAL STORAGE              0F5    006    INV               0180
T TRACE AREA                0F6    001    BYT               0060
S BLOCK SAVE AREA           0F7    002    BYT               00A0
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY      0F8    00F    UNA               03D0
L LOCAL STORAGE             0F9    00F    UNA               03D0
X EXTERNAL REGISTERS        0FA    00F    UNA               03D0
W SP STPRAGE               0FB    00F    UNA               03D0
D CONSOLE DISK FILE        0FC    00F    UNA               03D0
= HEX CALCULATOR           0FD    00F    UNA               03D0
Q GENERAL SELECTION        0FE    00F    INV               03C0
Z RETURN TO PROG SYS       0FF    009    BYT               0260
SELECTION: UE0F0                     ==>
                               INSTR STOP

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```

Display/Alter UCW/Device Directory Tasks (QDU)

Display UCW/Device Directory Tasks

The U-selection from the Display/Alter screen (QD) displays the UCW/Device Directory Tasks screen. This directory provides you with selections available for the UCW Assignment procedure.

To select the UCW/Device Directory Tasks screen from the Display/Alter (QD) screen:

1. Key U next to SELECTION.

2. Press ENTER. UCW/Device Directory Tasks screen is displayed.

Note: *This screen cannot be altered.*

```
*DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS                    *UCW/DEVICE DIRECTORY TASKS*
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY                      U CHANGE UCW DIRECTORY
V VIRTUAL STORAGE
M REAL STORAGE                     C DISPLAY UCW DIRECTORY
T TRACE AREA
S BLOCK SAVE AREA                  E DISPLAY EXPANDED UCW DIRECTORY
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: U                             ==>


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```

Display/Alter UCW/Device Directory Tasks (QDU) Screen

```
   *DISPLAY/ALTER*                    *CHANGE UCW DIRECTORY*
G GENERAL REGISTERS
C CONTROL REGISTERS        FORMAT: CXX -CYY CHAR.CODES
F FLOATING POINT REGISTERS        CXX = STARTING DEVICE ADDRESS
P CURRENT PSW                    -CYY = ENDING DEVICE ADDRESS (OPTIONAL)
K STORAGE KEY
V VIRTUAL STORAGE                CHANNEL: 0-BYTE   1-BLOCK    2-BLOCK
M REAL STORAGE                            3-BLOCK  4-BLOCK    5-BLOCK
T TRACE AREA
S BLOCK SAVE AREA                CHAR.CODES (OPTIONAL, ANY ORDER)
A AUXILIARY STORAGE                S SHARED UCW
U UCW/DEVICE DIRECTORY             L SELECTOR MODE -BLOCK ONLY
L LOCAL STORAGE                    D DATA STREAMING MODE -BLOCK ONLY
X EXTERNAL REGISTERS
W SP STORAGE                       X REMOVE DEVICES
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION        .ONE ENTRY MUST COVER ALL ADDRS FOR ANY CTL UNIT
Z RETURN TO PROG SYS       .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UU 380-387 SL               ==>


                                           4341
```

Display/Alter Change UCW Directory (QDUU) Screen

Display/Alter Change UCW Directory (QDUU)

Display Change UCW Directory

The Change UCW Directory screen is used to modify the UCW Directory by adding or deleting UCW addresses, or to modify the type of UCW address in the directory.

To select the Change UCW Directory screen from the UCW/Device Directory Tasks screen:

1. Key U next to SELECTION: U.

2. Press ENTER. Change UCW Directory screen is displayed.

Notes:

- *To Change the UCW Directory, refer to Volume 13/16, Section 14, "UCW Assignment."*

- *The paging keys are not applicable for this function.*

Model Group 2

Display/Alter Display UCW Directory (QDUC)

Display UCW Directory

This screen is used to verify any changes made while using the Change UCW Directory screen (QDUU) in the UCW Assignment procedure.

To select the UCW Directory from the UCW/Device Directory Tasks screen:

1. Key C and a three-digit device address (000-5FF) next to SELECTION: U.

   Note: *The default address is zero.*

2. Press ENTER. The UCW Directory screen is displayed.

Notes:

- *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*

- *This screen cannot be altered.*

```
  *DISPLAY/ALTER*                  *DISPLAY UCW DIRECTORY*
G GENERAL REGISTERS        CXX-CYY  REF      CHARACTERISTICS
C CONTROL REGISTERS        000      010      BYT,SHR
F FLOATING POINT REGISTERS 301-305  011      BLK,SHR
P CURRENT PSW              306-30F  012      BLK,SHR
K STORAGE KEY              310-31F  013-022  SEL,DST
V VIRTUAL STORAGE
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS       .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UC                            ==>

                                                    4341
```

Display/Alter UCW Directory (QDUC) Screen

```
  *DISPLAY/ALTER*                  *DISPLAY UCW DIRECTORY*
G GENERAL REGISTERS        CXX-CYY  REF    CHARACTERISTICS  HEX
C CONTROL REGISTERS        300      00C    UNA              0310
F FLOATING POINT REGISTERS 301      011    BLK,SHR          0472
P CURRENT PSW              302      011    BLK,SHR          0472
K STORAGE KEY              303      011    BLK,SHR          0472
V VIRTUAL STORAGE          304      011    BLK,SHR          0472
M REAL STORAGE             305      011    BLK,SHR          0472
T TRACE AREA               306      012    BLK,SHR          04B2
S BLOCK SAVE AREA          307      012    BLK,SHR          04B2
A AUXILIARY STORAGE        308      012    BLK,SHR          04B2
U UCW/DEVICE DIRECTORY     309      012    BLK,SHR          04B2
L LOCAL STORAGE            30A      012    BLK,SHR          04B2
X EXTERNAL REGISTERS       30B      012    BLK,SHR          04B2
W SP STORAGE               30C      012    BLK,SHR          04B2
D CONSOLE DISK FILE        30D      012    BLK,SHR          04B2
= HEX CALCULATOR           30E      012    BLK,SHR          04B2
Q GENERAL SELECTION        30F      012    BLK,SHR          04B2
Z RETURN TO PROG SYS       .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UE300                         ==> MORE, PRESS ENTER

                                                    4341
```

Display/Alter Expanded UCW Directory (QDUE) Screen

Display/Alter Display Expanded UCW Directory (QDUE)

Display Expanded UCW Directory

This screen is used to verify any changes made while using the Change UCW Directory screen (QDUU) in the UCW Assignment procedure.

To select the Expanded UCW Directory from the UCW/Device Directory Tasks screen:

1. Place CE MODE switch on.

2. Key E and a three-digit device address (000-5FF) next to SELECTION: U.

   Note: *The default address is zero.*

3. Press ENTER. The Expanded UCW Directory screen is displayed.

Notes:

- *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*

- *This screen cannot be altered.*

Return to General Selection (Q)

To return to the General Selection (Q) screen:

1. Key Q next to SELECTION.

2. Press ENTER. General Selection (Q) screen is displayed.

Return to Prog Sys (Z)

To return to the Prog Sys (Z) screen:

1. Key Z next to SELECTION.

2. Press ENTER. Prog Sys (Z) screen is displayed.

DISPLAY/ALTER LOCAL STORAGE (QDL)

Display Local Storage

To select the local storage function from the D-screen:

1. Place the CE MODE switch ON.

2. Key L and a three-digit device address next to SELECTION. The first digit is the number of a local storage section with values of 0-7 (hex). The second digit is a row within local storage with a value of 0-F (hex), and digit three is a byte offset with a value of 0-7 (hex). The address may be defaulted to zero. If a single digit is entered, it is a section number.

3. Press ENTER. A 128-byte block of local storage is displayed which contains the selected address.

Alter Local Storage

1. Perform steps 1 through 3 of display above.

2. Move the cursor to the location(s) to be altered and key in the new data. Leave the selection line unchanged and press ENTER.

Notes:

- *Data is shown and entered in hexadecimal.*
- *An invalid character prevents the alter function.*
- *The next higher/lower 128-byte boundary can be displayed by using the paging keys.*
- *Care should be taken as data is changing in local storage while this function operates.*
- *The Translate option is applicable to the Local Storage display.*

```
 *DISPLAY/ALTER*                           LOCAL STORAGE
G  GENERAL REGISTERS              0    2    4    6         0    2    4    6
C  CONTROL REGISTERS        *10 C5D9 E240 40C1 D5C4  *11 40C3 C8C1 D5D5 C5D3
F  FLOATING POINT REGISTERS
P  CURRENT PSW              *12 40F0 40D4 C1D7 D7C9  *13 D5C7 11C1 F9F1 60F6
K  STORAGE KEY
V  VIRTUAL STORAGE          *14 7A40 C3E4 E460 D9C5  *15 C640 4040 4040 F07A
M  REAL STORAGE
T  TRACE AREA               *16 40C3 E4E4 60D4 C1D7  *17 0300 0036 1040 1100
S  BLOCK SAVE AREA
A  AUXILIARY STORAGE
U  UCW/DEVICE DIRECTORY     *18 0140 4040 4040 4040  *19 4040 4040 4040 4040
L  LOCAL STORAGE
X  EXTERNAL REGISTERS       *1A 4040 4040 4040 4040  *1B 4040 4040 4040 4040
W  SP STORAGE
D  CONSOLE DISK FILE        *1C 4040 4040 4040 4040  *1D 4040 4040 4040 4040
=  HEX CALCULATOR
Q  GENERAL SELECTION        *1E 4003 C27F C44F C55F  *1F C66F C77F C94F 4A5F
Z  RETURN TO PROG SYS
SELECTION: L100                              =>
                                          INSTR STOP

                                             4341
```

Fast Alter Local Storage

QDL XYZ op data.

Key data next to selection as follows:

1. Place the CE MODE switch ON.

2. QDL selects the Local Storage screen.

3. Key in the address XYZ:

   where:

   X is a hex digit of local storage section with a value of 0-7 (hex).

   Y is a hex digit representing a row of local storage with a value of 0-F (hex).

   Z represents a byte offset digit with a value of 0-7 (hex).

   The address may be defaulted to zero.

4. Key in the op code:

   where:

   = Means MOVE the data opposite the SELECTION line into the address location.

   & Means AND the data opposite the SELECTION line with the data in the address location.

   / Means OR the data opposite the SELECTION line with the data in the address location.

5. Key in data in hexadecimal.

6. Press ENTER.

Save Local Storage

Eight bytes of data in local storage can be saved by the Block function. An example of how you can save the local storage data is QDLxxx?.

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DISPLAY/ALTER EXTERNAL REGISTERS (QDX 0-5) (GRP 2)

Display External Registers

To select the external register function from the D-screen:

1. Place the CE MODE switch ON.

2. Key X and a one-digit address next to SELECTION.

   Note: *Use 0-5 for particular channel desired; the address may be defaulted to zero.*

3. Press ENTER. A 64-byte section of the external registers is shown of which the data at the selected address is included.

Alter External Registers

Notes:

- *The External Register screen cannot be altered.*
- *Data is displayed in hexadecimal.*
- *The next higher/lower 64-byte section can be displayed by using the paging keys.*

Fast Alter External Registers

Note: *The External Register screen cannot be fast altered.*

Save External Registers

Note: *The External Registers screen cannot be saved.*

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```
        *DISPLAY/ALTER*              CHANNEL        PU        *EXTERNAL REGISTERS*
    G  GENERAL REGISTERS          0          1     0    1     2    4     5 6 7
    C  CONTROL REGISTERS          CHDLR            SIR  INT5   INDIR0 CHKEY ---CHSAR---
    F  FLOATING POINT REGISTERS   40               40   00    F0*    00    1FE040
    P  CURRENT PSW                CHSYNC0 CHDATA0   W1   MNTR   STAT1        ----L1BU---
    K  STORAGE KEY                5D       0C       00   00    80           1FDF00*
    V  VIRTUAL STORAGE            CHCOMONR CHSTAT   W2   INT4   STAT2  CTRL0 ----SAR2---
    M  REAL STORAGE               80       00       08*  C0    02     00    000090*
    T  TRACE AREA                 CHACMDR  CHIMODE  PSW0 PSW1   PSW2         ----SAR1---
    S  BLOCK SAVE AREA            E0       40       00   00    00           000200
    A  AUXILIARY STORAGE          CHSYNC1  CHDATA2       INT3   STAT0        ----ICTR---
    U  UCW/DEVICE DIRECTORY       15       AF            00     02           000200
    L  LOCAL STORAGE              CHCMDR   CHDRSTA  ICYC INT2   INDIR1 --DCRMNT--   NIB
    X  EXTERNAL REGISTERS         00       00       94   10     1E     FFFFF0       F0
    W  SP STORAGE                 CHSDBAR  CHMISC   OP   INT1   RETRY  --TODHI--    NIB1BF
    D  CONSOLE DISK FILE          02       00       47   00     42            000010     F0
    =  HEX CALCULATOR                               HREG INT0         --TODLO--------
    Q  GENERAL SELECTION                            00   88         D2FB8824
    Z  RETURN TO PROG SYS       CHANNEL 0 AND (*) FIELDS USED TO DISPLAY SCREEN
    SELECTION: X0                                   ==>
                                              INSTR STOP

                                              4341
```

Label Identification

1. **CHDLR:** Contains the count value of the channel data length register. The channel external address is 0,0.

2. **SIR:** This byte contains data which determines the number of bits or bytes that are to be shifted. The PU external address is 0,0.

3. **INT5:** This byte contains eight bits used in channel mode. The external address is 0,1.

   Bit 0   Channel 0 interrupt request
   1   Channel 1 interrupt request
   2   Channel 2 interrupt request
   3   Channel 3 interrupt request
   4   Channel 4 interrupt request
   5   Channel 5 interrupt request
   6   Unused
   7   Reset ADDRMATCH

4. **INDIR0:** This byte contains the address that is the R1 field of the current instruction. The external address is 0,2.

5. **CHKEY:** Bits 0-3 are key bits; 4-7 are unimplemented bits, sourced as zero. The external address is 0,4.

6. **CHSAR:** Three-byte address invoked when the channel is used. The external address is 0, 5-7.

7. **CHSYNC0:** Contains a value in the channel sync 0 register. The Channel external address is 1,0.

8. **CHDATA0:** This byte is the first byte of the channel data register. It is assigned to contain the channel address protect key. It is assigned to obtain device address, device status, interface status and other information from the interface adapter. The channel external address is 1,1.

9. **W1:** This byte contains the shift length value when W1 register is specified as a length parameter. The PU external address is 1, 0.

10. **MNTR:** Monitor external senses certain system status information. The external address is 1,1.

    Bit 0   Start I/O count
    1   SVC interrupt
    2   I/O interrupt
    3   Page fault interrupt
    4   Unassigned
    5   Unassigned
    6   Unassigned
    7   Unassigned

11. **STAT1:** This byte contains conditions (status) relative to ALU. The external address is 1,2.

    Bit 0   W1 (4) = 0
    1   W2 (0-4) = 0
    2   Invalid decimal format (cumulative)
    3   True/complement decimal
    4   Unassigned
    5   Unassigned
    6   Unassigned
    7   ACB check enable

12. **L1BU:** Three bytes contain the cache backup address. The external address is 1, 5-7.

13. **CHCOMONR:** This byte contains the channel control bits in the common register. The channel external address is 2,0.

    Bit 0   370 mode
    1   Can source other externals
    2   LCA meter in
    3   Microword channel control check
    4   Storage busy
    5   Valid transfer-in-channel (TIC)
    6   Valid command chain CCW
    7   Valid chain data CCW

14. **CHSTAT:** This byte contains hardware set channel status indicators. The channel external address is 6,0.

    Bit 0   Spare = 0
    1   Incorrect length latch
    2   Prog or Prot check latch
    3   Spare = 0
    4   Channel data length latch
    5   Channel control check latch
    6   Spare = 0
    7   Chaining check latch

15. **W2:** This byte contains the shift length value when W2 register is specified as a length parameter. It may also serve as a loop counter. The PU external address is 2,0.

16. **INT4:** This byte contains eight bits used in channel mode. The PU external address is 2,1.

    Bit 0   CPUTIA
    1   CCOMPIA
    2   ITIMIA
    3   Pending machine check interrupt
    4   Retry interrupt force
    5   Execute transaction in process
    6   Restart request
    7   Full I-counter trace active

17. **STAT2:** This byte contains status conditions relative to arithmetic, branch, shift, etc. of ALU. The external address is 2,2.

    Bit 0   Working stat 0
    1   Working stat 1
    2   Working stat 2
    3   Working stat 3
    4   Channel working stat 0
    5   Channel working stat 1
    6   Instruction length counter
    7   Instruction length counter

18. **CTRL0:** System control register 0

19. **SAR2:** Three bytes contain the address of operand 2 of an instruction. The external address is 3, 5-7.

Use with microcode EC 856091 and above

20. **CHACMDR**: One-byte command from the channel asynchronous command register to the channel. The external address is 3,0.

21. **CHIMODE**: This byte contains gating controls for ACB checking and hardware set latches for PCI and CDA controlling. The Channel external address is 3,1.

   Bit 0 Block-multiplexer mode latch
   1 Byte-multiplexer mode latch
   2 Enable ACB check latch
   3 Hi-speed mode latch
   4 Internal interrupt request latch
   5 Implement spare latch
   6 PCI latch
   7 CD prefetch latch

22. **PSW0**: Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The PU external address is 3,0.

23. **PSW1**: Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The PU external address is 3,1.

24. **PSW2**: Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The external address is 3,2.

25. **SAR1**: Three bytes contain the address of operand 1 of an instruction. The external address is 3, 5-7.

26. **CHSYNC1**: This byte contains conditions as trap addresses, flags, timeout values, etc. The channel external address is 4,0.

27. **CHDATA2**: This byte contains the sequence count from the channel. The channel external address is 4,1.

28. **INT3**: This byte contains eight bits used in channel mode. The PU external address is 4,1.

   Bit 0 ITIMIB
   1 Interrupt key
   2 External signal 2
   3 External signal 3
   4 External signal 4
   5 External signal 5
   6 External signal 6
   7 External signal 7

29. **STAT0**: This byte contains status conditions of various conditions in ALU. The external address is 4,2.

   Bit 0 ALU overflow
   1 Negative result
   2 Recomplement
   3 Destination = 0
   4 ALU carry
   5 1-bit carry
   6 Z /*= 0
   7 ALU size exception

30. **ICTR**: Three bytes contain the starting address of the next instruction. The external address is 4, 5-7.

31. **CHCMDR**: Command register content for this channel. The external address is 5,0.

   Bit 0 Data transfer
   1 Sequence count
   2 I/O instruction load
   3 UCW load
   4 Misc
   5 CCW fetched
   6 Interface adapter
   7 Interface controller

32. **CHDRSTA**: Channel data register status.

   Bit 0 Unused
   1 Unused
   2 Unused
   3 Unused
   4 Last character mark, valid data in data register
   5 Number of bytes ready to transfer across channel
   6 Number of bytes ready to transfer across channel
   7 Number of bytes ready to transfer across channel

33. **ICYC**: Byte (I-cycle control register) contains status information of I-cycles. It contains I-cycle function and flags. The PU external address is 5,0.

   Bit 0 370 mode
   1 Unconditional I-cycle store error
   2 Conditional I-cycle store error
   3 Successful branch
   4 Execute
   5 PU retry mask
   6 IB empty
   7 Operate latch

34. **INT2**: This byte contains eight bits used in channel mode. The PU external address is 5,1.

   Bit 0 Signal DIAGM
   1 ITIMWRPA
   2 ADRMATCH
   3 ISTRSTEP
   4 Pending machine check interrupt
   5 Decrementer adjustment
   6 CCOMPIB
   7 CPUTIB

35. **INDIR1**: This byte contains the address which is the R2 or X2 field of the current instruction. The external address is 5,2.

36. **DCRMNT**: This byte contains the decrementer count. Counts down at a rate of one per microsecond. Used to implement system clocks.

37. **NIB**: This byte is the second byte of the NIB. The external address is 5,7.

38. **CHSDBAR**: Used to address the channel data bus when transferring and receiving data from storage. The channel external address is 6, 0.

39. **CHMISC**: Uses only the first 4 bits 0-3 to identify data in parity, output, ISB and first character transferred. The external address is 6,1.

   Bit 0 DI parity check
   1 Output
   2 ISB
   3 First character transferred
   4 Spare
   5 Spare
   6 Spare
   7 Spare

40. **OP**: Contains the first byte (byte 0) of the current instruction. It implies 256 op code possibilties. It is driven by the NIB. The PU external address is 6,0.

41. **INT1**: This byte contains eight bits used in channel mode. The PU external address is 6,1.

   Bit 0 Channel 0 interrupt
   1 Channel 1 interrupt
   2 Channel 2 interrupt
   3 Channel 3 interrupt
   4 Channel 4 interrupt
   5 Channel 5 interrupt
   6 Unused
   7 Channel external interrupt

42. **RETRY**: This byte contains eight bits that indicate the status conditions relative to a retry operation. The external address is 6,2.

   Bit 0 Hardstop
   1 Sequential processing
   2 Instruction processing
   3 SS operation
   4 Refresh in progress
   5 Retry in progress
   6 Unretriable section of code
   7 System operation

43. **TODHI**: This byte contains the high six digits of the time-of-day clock and is set by the Store Clock instruction.

44. **NIBIBF**: This byte is the second byte of the NIB buffer. The external address is 6,7.

45. **HREG**: This byte contains eight bits that act as status conditions for taking traps. The external address is 7,0.

   Bit 0 Spare
   1 Odd branch address - trap level 0
   2 L1 miss - trap level 0
   3 ACB check - trap level 0
   4 DLAT miss - trap level 1
   5 Storage protect check - trap level 1
   6 Block channel traps
   7 Channel trap - trap level 2

46. **INT0**: This byte contains eight bits used in channel mode. The external address is 0,3.

   Bit 0 Interrupt pending
   1 PER
   2 Pending channel interrupt
   3 Pending external interrupt
   4 MSVP request
   5 Execute interrupt
   6 Decrementer = 0
   7 ITIMWRP

47. **TODLO**: This byte contains the low seven digits of the time-of-day clock and is set by the Store Clock instruction.

DISPLAY/ALTER EXTERNAL REGISTERS (QDX 0-5) (GRP 2)

Display External Registers

To select the external register function from the D-screen:

1. Place the CE MODE switch ON.

2. Key X and a one-digit address next to SELECTION.

   Note: *Use 0-5 for particular channel desired; the address may be defaulted to zero.*

3. Press ENTER. A 64-byte section of the external registers is shown of which the data at the selected address is included.

Alter External Registers

Notes:

- *The External Register screen cannot be altered.*
- *Data is displayed in hexadecimal.*
- *The next higher/lower 64-byte section can be displayed by using the paging keys.*

Fast-Alter External Registers

Note: *The External Register screen cannot be fast-altered.*

Save External Registers

Note: *The External Registers screen cannot be saved.*

```
*DISPLAY/ALTER*          CHANNEL       PU       *EXTERNAL REGISTERS*
G GENERAL REGISTERS       0       1       0   1     2    4      5 6 7
C CONTROL REGISTERS      CHDLR          SIR INT5  INDIRO CHKEY --CHSAR---
F FLOATING POINT REGISTERS 40           40  00    FO*   00     1FE040
P CURRENT PSW            CHSYNCO CHDATAO W1   MNTR STAT1       ----L1BU---
K STORAGE KEY            5D      OC      00   00   80          1FDF00*
V VIRTUAL STORAGE        CHCOMONR CHSTAT W2   INT4 STAT2 CTRLO ----SAR2---
M REAL STORAGE           80      00      08*  CO   02    00    000090*
T TRACE AREA             CHACMDR CHIMODE PSWO PSW1 PSW2        ----SAR1---
S BLOCK SAVE AREA        EO      40      00   00   00          000200
A AUXILIARY STORAGE      CHSYNC1 CHDATA2 INT3 STATO           ----ICTR---
U UCW/DEVICE DIRECTORY   15      AF      00   02          000200
L LOCAL STORAGE          CHCMDR  CHDRSTA ICYC INT2 INDIR1 --DCRMNT--  NIB
X EXTERNAL REGISTERS     00      00      94   10   1E    FFFFFO      FO
W SP STORAGE             CHSDBAR CHMISC  OP   INT1 RETRY --TODHI--  NIB1BF
D CONSOLE DISK FILE      02      00      47   00   42    000010     FO
= HEX CALCULATOR                         HREG INTO       --TODLO--------
Q GENERAL SELECTION              00      88        D2FB824
Z RETURN TO PROG SYS  CHANNEL 0 AND (*) FIELDS USED TO DISPLAY SCREEN
SELECTION: XO                            ==>
                                      INSTR STOP

                            4341
```

Label Identification

1. **CHDLR**: Contains the count value of the channel data length register. The channel external address is 0,0.

2. **SIR**: This byte contains data which determines the number of bits or bytes that are to be shifted. The PU external address is 0,0.

3. **INT5**: This byte contains eight bits used in channel mode. The external address is 0,1.

   Bit 0 Channel 0 interrupt request
      1 Channel 1 interrupt request
      2 Channel 2 interrupt request
      3 Channel 3 interrupt request
      4 Channel 4 interrupt request
      5 Channel 5 interrupt request
      6 Unused
      7 Reset ADDRMATCH

4. **INDIR0**: This byte contains the address that is the R1 field of the current instruction. The external address is 0,2.

5. **CHKEY**: Bits 0-3 are key bits; 4-7 are unimplemented bits, sourced as zero. The external address is 0,4.

6. **CHSAR**: Three-byte address invoked when the channel is used. The external address is 0, 5-7.

7. **CHSYNC0**: Contains a value in the channel sync 0 register. The Channel external address is 1,0.

8. **CHDATA0**: This byte is the first byte of the channel data register. It is assigned to obtain device address, device status, interface status and other information from the interface adapter. The channel external address is 1,1.

9. **W1**: This byte contains the shift length value when W1 register is specified as a length parameter. The PU external address is 1, 0.

10. **MNTR**: Monitor external senses certain system status information. The external address is 1,1.

    Bit 0 Start I/O count
       1 SVC interrupt
       2 I/O interrupt
       3 Page fault interrupt
       4 Unassigned
       5 Unassigned
       6 Unassigned
       7 Unassigned

11. **STAT1**: This byte contains conditions (status) relative to ALU. The external address is 1,2.

    Bit 0 W1 (4) = 0
       1 W2 (0-4) = 0
       2 Invalid decimal format (cumulative)
       3 True/complement decimal
       4 Unassigned
       5 Unassigned
       6 Unassigned
       7 ACB check enable

12. **L1BU**: Three bytes contain the cache backup address. The external address is 1, 5-7.

13. **CHCOMONR**: This byte contains the channel control bits in the common register. The channel external address is 2,0.

    Bit 0 370 mode
       1 Can source other externals
       2 LCA meter in
       3 Microword channel control check
       4 Storage busy
       5 Valid transfer-in-channel (TIC)
       6 Valid command chain CCW
       7 Valid chain data CCW

14. **CHSTAT**: This byte contains hardware set channel status indicators. The channel external address is 6,0.

    Bit 0 Spare = 0
       1 Incorrect length latch
       2 Prog or Prot check latch
       3 Spare = 0
       4 Channel data check latch
       5 Channel control check latch
       6 Spare = 0
       7 Chaining check latch

15. **W2**: This byte contains the shift length value when W2 register is specified as a length parameter. It may also serve as a loop counter. The PU external address is 2,0.

16. **INT4**: This byte contains eight bits used in channel mode. The PU external address is 2,1.

    Bit 0 CPUTIA
       1 CCOMPIA
       2 ITIMIA
       3 Pending machine check interrupt
       4 Retry interrupt force
       5 Execute transaction in process
       6 Restart request
       7 Full I-counter trace active

17. **STAT2**: This byte contains status conditions relative to arithmetic, branch, shift, etc. of ALU. The external address is 2,2.

    Bit 0 Working stat 0
       1 Working stat 1
       2 Working stat 2
       3 Working stat 3
       4 Channel working stat 0
       5 Channel working stat 1
       6 Instruction length counter
       7 Instruction length counter

18. **CTRL0**: System control register 0

19. **SAR2**: Three bytes contain the address of operand 2 of an instruction. The external address is 3, 5-7.

---

20. **CHACMDR**: One-byte command from the channel asynchronous command register to the channel. The external address is 3,0.

21. **CHIMODE**: This byte contains gating controls for ACB checking and hardware set latches for PCI and CDA controlling. The Channel external address is 3,1.

Bit 0 Block-multiplexer mode latch
 1 Byte-multiplexer mode latch
 2 Enable ACB check latch
 3 Data stream mode latch
 4 Internal interrupt request latch
 5 Implement spare latch
 6 PCI latch
 7 CD prefetch latch

22. **PSW0**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The PU external address is 3,0.

23. **PSW1**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The PU external address is 3,1.

24. **PSW2**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The external address is 3,2.

25. **SAR1**: Three bytes contain the address of operand 1 of an instruction. The external address is 3, 5-7.

26. **CHSYNC1**: This byte contains conditions as trap addresses, flags, timeout values, etc. The channel external address is 4,0.

27. **CHDATA2**: This byte contains the sequence count from the channel. The channel external address is 4,1.

28. **INT3**: This byte contains eight bits used in channel mode. The PU external address is 4,1.

Bit 0 ITIMIB
 1 Interrupt key
 2 External signal 2
 3 External signal 3
 4 External signal 4
 5 External signal 5
 6 External signal 6
 7 External signal 7

29. **STAT0**: This byte contains status conditions of various conditions in ALU. The external address is 4,2.

Bit 0 ALU overflow
 1 Negative result
 2 Recomplement
 3 Destination = 0
 4 ALU carry
 5 1-bit carry
 6 Z /*= 0
 7 ALU size exception

30. **ICTR**: Three bytes contain the starting address of the next instruction. The external address is 4, 5-7.

31. **CHCMDR**: Command register content for this channel. The external address is 5,0. The types of commands are:

Data transfer
Sequence count
I/O instruction load
UCW load
Misc
CCW fetched
Interface adapter
Interface controller

32. **CHDRSTA**: Channel data register status.

Bit 0 Unused
 1 Unused
 2 Unused
 3 Unused
 4 Last character mark, valid data in data register
 5 Number of bytes ready to transfer across channel
 6 Number of bytes ready to transfer across channel
 7 Number of bytes ready to transfer across channel

33. **ICYC**: Byte (I-cycle control register) contains status information of I-cycles. It contains I-cycle function and flags. The PU external address is 5,0.

Bit 0 370 mode
 1 Unconditional I-cycle store error
 2 Conditional I-cycle store error
 3 Successful branch
 4 Execute
 5 PU retry mask
 6 IB empty
 7 Operate latch

34. **INT2**: This byte contains eight bits used in channel mode. The PU external address is 5,1.

Bit 0 Signal DIAGM
 1 ITIMWRPA
 2 ADRMATCH
 3 ISTRSTEP
 4 Pending machine check interrupt
 5 Decrementer adjustment
 6 CCOMPIB
 7 CPUTIB

35. **INDIR1**: This byte contains the address which is the R2 or X2 field of the current instruction. The external address is 5,2.

36. **DCRMNT**: This byte contains the decrementer count. Counts down at a rate of one per microsecond. Used to implement system clocks.

37. **NIB**: This byte is the second byte of the NIB. The external address is 5,7.

38. **CHSDBAR**: Used to address the channel data buffer when transferring and receiving data from storage. The channel external address is 6, 0.

39. **CHMISC**: Uses only the first 4 bits 0-3 to identify data in parity, output, ISB and first character transferred. The external address is 6,1.

Bit 0 DI parity check
 1 Output
 2 ISB
 3 First character transferred
 4 Spare
 5 Spare
 6 Spare
 7 Spare

40. **OP**: Contains the first byte (byte 0) of the current instruction. It implies 256 op code possibilities. It is driven by the NIB. The PU external address is 6,0.

41. **INT1**: This byte contains eight bits used in channel mode. The PU external address is 6,1.

Bit 0 Channel 0 interrupt
 1 Channel 1 interrupt
 2 Channel 2 interrupt
 3 Channel 3 interrupt
 4 Channel 4 interrupt
 5 Channel 5 interrupt
 6 Unused
 7 Channel external interrupt

42. **RETRY**: This byte contains eight bits that indicate the status conditions relative to a retry operation. The external address is 6,2.

Bit 0 Hardstop
 1 Sequential processing
 2 Instruction processing
 3 SS operation
 4 Refresh in progress
 5 Retry in progress
 6 Unretriable section of code
 7 System operation

43. **TODHI**: This byte contains the high six digits of the time-of-day clock and is set by the Store Clock instruction.

44. **NIBIBF**: This byte is the second byte of the NIB buffer. The external address is 6,7.

45. **HREG**: This byte contains eight bits that act as status conditions for taking traps. The external address is 7,0.

Bit 0 Spare
 1 Odd branch address - trap level 0
 2 L1 miss - trap level 0
 3 ACB check - trap level 0
 4 DLAT miss - trap level 1
 5 Storage protect check - trap level 1
 6 Block channel traps
 7 Channel trap - trap level 2

46. **INT0**: This byte contains eight bits used in channel mode. The external address is 0,3.

Bit 0 Interrupt pending
 1 PER
 2 Pending channel interrupt
 3 Pending external interrupt
 4 MSVP request
 5 Execute interrupt
 6 Decrementer = 0
 7 ITIMWRP

47. **TODLO**: This byte contains the low seven digits of the time-of-day clock and is set by the Store Clock instruction.

Model Group 2

DISPLAY/ALTER SP STORAGE (QDW)

Display SP Storage

To select the SP Storage function from the D-screen:

1. Place the CE MODE switch ON.

2. Key W and a four-digit address next to SELECTION. The four digits represent an SP address and range from 0 to FFFF. The address is defaulted to zero if no address is entered.

3. Press ENTER. A 128-byte block of SP storage containing the selected address is displayed.

Alter SP Storage

Notes:

• *There is no full-screen alter for SP Storage.*

• *Data is shown and entered in hexadecimal.*

• *The next higher/lower 128-byte boundary can be displayed by using the paging keys.*

• *The Translate option is applicable to the SP Storage display.*

• *The SP storage address can be modified by placing a (+) to add or (–) to subtract from the address keyed next to SELECTION. An example is shown on the QDV screen. When the Adjust Value has been entered, it remains until a new value is entered or you select another screen that is not a Display/Alter screen.*
   You can key in the Adjust Value alone or with an address. No address entered defaults to zero. The data appears in the normal area as though it were at the selected address, but the data is actually that data located at the adjusted address, even though the address under label ADRS is that from the address on the SELECTION line. You can key a new address or use the PAGE key, and you still get the data from the adjusted address. The address plus the Adjusted Value might cause the screen to have a twos-complement negative number.

• *The SP Storage function can be altered only by the Block function.*

```
  *DISPLAY/ALTER*      SP STORAGE        ADJUST=+0000
G GENERAL REGISTERS    ADRS   +0   +2   +4   +6   +8   +A   +C   +E
C CONTROL REGISTERS    D000  1234 5678 9000 0010 0001 0380 0191 0000
F FLOATING POINT REGISTERS
P CURRENT PSW          D010  0000 0000 0000 0000 0000 0000 0000 0000
K STORAGE KEY
V VIRTUAL STORAGE      D020  4004 1C00 0001 0000 0000 0000 0000 0000
M REAL STORAGE
T TRACE AREA           D030  FE82 0000 0000 0000 0000 0000 0000 0000
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY D040  0000 0000 A800 0000 0000 0000 0000 0E0F
L LOCAL STORAGE
X EXTERNAL REGISTERS   D050  1011 1213 F6F7 F800 0000 0000 0000 0000
W SP STORAGE
D CONSOLE DISK FILE    D060  800F 8000 0000 0000 9999 9999 9999 0000
= HEX CALCULATOR
Q GENERAL SELECTION    D070  A0C4 0000 0000 0000 0000 0000 0000 0000
Z RETURN TO PROG SYS
SELECTION: WD000                       ==>
                                    INSTR STOP

                                       4341
```

Fast Alter SP Storage

Note: *There is no fast alter for SP storage.*

Save SP Storage

Eight bytes of SP storage can be saved by the Block function. An example of how you can save SP storage data is QDWxxxxxxxx?.

Note: *You can use the ? op code to verify if data exists at the address before altering that data. This feature is very helpful while running a block. After the ?, enter any number of digits for the data that should be at that address. You can alter any number of digits by also using an alter op code, such as (=). If the data at that address does not match, no alter occurs. If you have no match, and the data you are matching and the data which you wish to alter match each other, no alter occurs, nor does an error occur.*

An example of how this command is used is:

```
QDWxxxxxxxxxF1F2F3....=F5F6F7....
           |       |    |
           |       |    | Alter data
           |       |
           |       | Compare data
           |
           | Match address
```

DISPLAY/ALTER CONSOLE DISK FILE (QDD)

Display Console Disk File

To select the Console Disk File function from the D-screen:

1. Place the CE MODE switch ON.

2. Key D and a four-digit module ID and four-digit byte offset next to SELECTION. The console module ID has values of 0001-FFFE (hex). The byte offset is defaulted to zero.

3. Press ENTER. A 128-byte section of data is shown based on the selected module ID.

Alter Console Disk File

Notes:

- There is no full screen alter for the Console Disk File.

- Data is displayed in hexadecimal.

- The next higher/lower 128-byte boundary of a disk file can be displayed by using the paging keys.

- The Translate option is applicable to the Console Disk File display.

- The Console Disk File address may be modified by placing a (+) to add or a (−) to subtract from the address keyed next to SELECTION. An example is shown on the QDV screens. When the Adjust Value has been entered, it remains until a new value is entered or you select another screen that is not a Display/Alter screen. The Adjust Value also is reset if new Module IDs are selected.
  You can key in the Adjust Value alone or with an address. No address entered defaults to zero. The data appears in the normal area as though it were at the selected address, but the data is actually that data located at the adjusted address, even though the address under label ADRS is that from the address on the SELECTION line. You can key a new address or use the PAGE key, and you still get the data from the adjusted address. The address plus the Adjusted Value might cause the screen to have a twos-complement negative number.

- The Console Disk File function can be altered only by the Block function.

Console Disk File Labels

Type	Description
ID	Module ID of the file
ADJUST	Address adjust value
LADDR	Load address of the module
FLSIZE	Linked file size of the module

```
*DISPLAY/ALTER*          ID=9000 ADJUST=+0000      LADDR=2000   FLSIZE=07D2
G GENERAL REGISTERS     BYTES  +0    +2    +4    +6    +8    +A    +C    +E
C CONTROL REGISTERS     0000   8012  3465  0000  0000  0831  2040  0000  0340
F FLOATING POINT REGISTERS
P CURRENT PSW           0010   0000  0000  000C  0000  0000  0550  0DA0  0000
K STORAGE KEY
V VIRTUAL STORAGE       0020   0450  0270  0380  0000  0000  0000  0000  0000
M REAL STORAGE
T TRACE AREA            0030   0000  0000  0020  0000  0000  0A67  F000  0000
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY  0040   0000  0000  0220  0000  0000  0000  0000  0000
L LOCAL STORAGE
X EXTERNAL REGISTERS    0050   0000  0000  000A  00B5  4346  0000  0000  0000
W SP STORAGE
D CONSOLE DISK FILE     0060   0000  0000  0400  0000  0000  0000  0000  0000
= HEX CALCULATOR
Q GENERAL SELECTION     0070   0000  A4E4  0360  0000  0000  0000  0330  0000
Z RETURN TO PROG SYS
SELECTION: D900000047                    ==>
                                    INSTR STOP

                                       4341
```

Fast Alter Console Disk File

Note: There is no fast alter for Console Disk File.

Save Console Disk File

Eight bytes of data of the Console Disk File can be saved by the Block function, beginning with the starting address. An example of how you can save the console disk file data is QDDxxxxxxxx?.

Note: You can use the ? op code to verify if data exists at the address before altering that data. This feature is helpful while running a block. After the ?, enter any number of digits for the data that should be at that address. You can alter any number of digits by also using an alter op code, such as (=). If the data at that address does not match, no alter occurs. If you have no match, and the data you are matching and the data which you wish to alter match each other, no alter occurs, nor does an error occur.

An example of how this command is used is:

```
QDDxxxxxxxxF1F2F3....=F5F6F7....
   |        |       |
   |        |       | Alter data
   |        |
   |        | Compare data
   |
   | Match address
```

INSERT/EXTRACT SCREENS

INSERT/EXTRACT

The insert/extract function is a form of the display/alter function, except that it uses scan rings. Therefore, insert/extract is slower than display/alter. The insert/extract function is used in CE mode only.

Each screen can have up to six functions:

Display
Alter
Fast-Alter
Paging
Save from a Block
Alter from a Block

For many screens, entering the Fast-Alter command with nothing after the op code (for example, QVI22=) causes the data at the specified address to be shown on the SELECTION line after the op code. This is useful as a check when performing fast-alter using screens without full-screen alter.

The insert/extract function must be executed when the PU is in the hardstop state with the exception of the Status Scan Ring (QVS) screen and the W-command (QVW). These can be executed in any state. Use the Operation Rate screen functions (QOM or QOC) to hardstop the PU, or if necessary use the W-command (2D or 2E). The CLOCK STOP message is displayed in the system status area to indicate this state.

To return the processor back to its normal state:
If QOM or QOC was used, enter QON next to SELECTION and press ENTER. This resets any previously selected state and the processor remains in the hardstop state. Pressing the START key resumes normal operation.

If W2D or W2E was used, enter W2F next to SELECTION and press ENTER. This resets any previously selected state and the processor remains in the hardstop state. Entering W30 and pressing ENTER resumes normal operation. Be careful when using the W-command. Although it can be issued in any state, the PU may have to be set to a particular state for this command to function properly.

The START key is disabled during the insert/extract function, except after the ENTER key has been pressed. If the scan data has been altered and the START key is pressed instead of ENTER, the alter is voided, and the screen data is redisplayed along with an error message. However, the alter occurs if the fast-alter function is performed.

```
*INSERT/EXTRACT*

A  ARRAYS
S  STATUS SCAN RING
K  CHECKS IN SYSTEM
I  PU HARDWARE
B  CS HARDWARE
M  MS HARDWARE
H  CHANNEL HARDWARE
C  CHANNEL INTRFACE
X  EXTERNAL REGS
R  SCAN RING
Y  CLOCK SCAN RING
W  COMMAND SBA-CAC
T  ADDRESS TRANSLAT
G  SET CSAR ADDRESS

Q  GENERAL SELECT
Z  RTRN TO PROG SYS
SELECTION:                          ==>
                              CLOCK STOP
                                      4341
```

The screen can be displayed regardless of parity errors. The facilities are always parity corrected, when any of them is altered (updated), except in hardware fault conditions. Bad parity fields are intensified on the screen.

The Insert/Extract screens can also be displayed by selecting Q% (for example Q%Bxx instead of QVBxx). This eliminates all clock status checking. Any insert/extract selection can then be made regardless of the state of the three clocks in the processing unit.

Note: *This feature should be used only if the state of the clocks is known. The scanning process alters a ring if the clocks are running.*

INSERT/EXTRACT (QV)

The Insert/Extract Facilities screen (QV) lists facilities on the left portion of the screen.

To select the QV screen:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QV next to SELECTION.
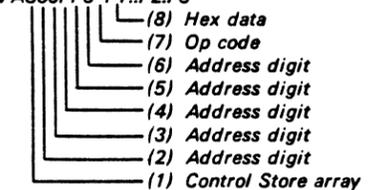5. Press ENTER.

Notes:

- *The PU clock can be stopped by the W-command.*
- *The clock can be stopped after invoking the QV facilities screen, but must be stopped prior to invoking any facility screen other than QVS or QVW.*

INSERT/EXTRACT ARRAYS (QVA)

Display Arrays Facilities

To select the Arrays facility from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key A next to SELECTION.
4. Press ENTER.

Notes:

- *Fourteen arrays are displayed on the right portion of the screen.*
- *This screen does not appear if the Fast Alter function is executed.*

```
*INSERT/EXTRACT*            ARRAYS

A  ARRAYS
S  STATUS SCAN RING        AL PU LS
K  CHECKS IN SYSTEM        AP PU RETRY LS
I  PU HARDWARE             AD CHNL DATA BUFFER
B  CS HARDWARE             AN CHNL CONTROL
M  MS HARDWARE
H  CHANNEL HARDWARE        AS SWAP BUFFER
C  CHANNEL INTRFACE        AC CONTROL STORAGE
X  EXTERNAL REGS           AT TRAP/BAL STACK
R  SCAN RING               AB CSAR BACKUP
Y  CLOCK SCAN RING         AU PU DLAT
W  COMMAND SBA-CAC         AH CHNL DLAT
T  ADDRESS TRANSLAT        AY KEY
G  SET CSAR ADDRESS        AF L1 DIR
                           AG L1 CACHE DATA
Q  GENERAL SELECT          AR CACHE RETRY DATA
Z  RTRN TO PROG SYS
SELECTION: A
                                    ==>
                           CLOCK STOP
                                4341
```

Array Addressing

An Array screen contains addresses and data. Each address is associated with a group of data called an *element*. A element is the logical unit of an array. The address of the element appears on the screen directly to the left of it. This address is in hexadecimal with a zero origin.

Arrays can also be addressed to the byte level by concatenating a digit to the right of the element address. This digit is the subscript or offset of the byte postion within the element. Byte subscripts are in hexadecimal and with a zero origin. These numbers appear on the top of the screen as a row of values.

Example:

```
                              ARRAY
                  _____
ELEMENT    BYTE BYTE BYTE BYTE BYTE BYTE BYTE BYTE
ADDRESS     0    1    2    3    4    5    6    7

 000       |    |    |    |    |    |    |    |    |
 001       |    |    |    |    |    |    |    |    |
 002       |    |    |    |    |    |    |    |    |
 003       |    |    |    |    |    |    |    |    |
 004       |    |    |    |    |    |    |    |    |
 005       |    |    |    |    |    |    |    |    |

 10A       |    |    |    |    |    |    |    |    |
 10B       |    |    |    |    |    |    |    |    |
 10C       |    |    |    |    |    |    |    |    |
 10D       |    |    |    |    |    |    |    |    |
 10E       |    |    |    |    |    |    |    |    |
 10F       |    |    |    |    |    |    |    | XX |
           |    |    |    |    |    |    |    |    |
```

To obtain address of byte XX:

1. Element address   = 10F
2. Byte subscript into element = 7
3. Address of byte XX   = 10F7

To display an Array screen that has more than one page, an address is required on the SELECTION line. This address consists of the minimum number of most significant (left side) digits of an element address sufficient to define a page of the array.

A specific element address can be specified. The address is truncated to the minimum information needed to display a page of the array. The displayed page contains the specific element address specified.

Notes:

- *To perform a Screen Alter (for example, to place data in the input fields), you must always leave the address on the SELECTION line. If the address is erased or changed, the alter is not successful.*
- *To perform a Fast-Alter (i.e. address and data on the SELECTION line), the full element address must be specified.*

INSERT/EXTRACT LOCAL STORE (QVAL)

Display Local Store

To display the Local Store array from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AL plus a block number (0 through 7 hex) next to SELECTION; the block number can be defaulted to zero.

4. Press ENTER.

Notes:

- Local store is displayed a block at a time.
- The data is displayed in hex.
- The full screen has a two-digit number to the left of the data. This is the block number and a line number.
- This array can be paged.

Alter Local Store

1. Display the selected block as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Save Local Store

Eight bytes (16 digits), an element, of local store can be saved by the Block function. The Local Store array has 128 elements. The format is: QVALxx?.

```
*INSERT/EXTRACT*  LOCAL STORE  (QVAL)
                     0    2    4    6         0    2    4    6
A ARRAYS          00 0000 0000 0000 0000  *01 0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 02 0000 0000 0000 0000 *03 0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE     04 0000 0000 0000 0000  *05 0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 06 0000 0000 0000 0000 *07 0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       08 0000 0000 0000 0000  *09 0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 0A 0000 0000 0000 0000  *0B 0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 0C 0000 0000 0000 0000 *0D 0000 0000 0000 0000

Q GENERAL SELECT  0E 0000 0000 0000 0000  *0F 0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: ALO                        ==>
                              CLOCK STOP
                                    4341
```

Fast Alter Local Store

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the array subscreens (QVA):
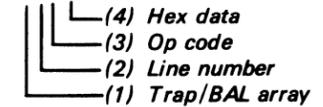
1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) L identifies the array as local store.
   (2) 0-7 represents a digit of a block number.
   (3) 0-F represents a digit of a line number within the block.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data

5. Press ENTER.

   Example: QVAL3A=F1..F2F.3
            │││└──(5) Hex data
            │││└───(4) Op code
            │││└────(3) Line number
            ││└─────(2) Block number
            │└──────(1) Local store
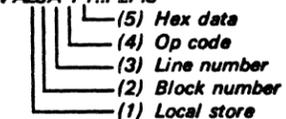
To fast alter from the Insert/Extract facilities screen or from one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Local Store.

Notes:

- Spaces between characters are deleted before the command is analyzed.
- Up to 16 digits can be altered. The entire screen, with changes, is written back into the array.
- The misplacement or absence of an op code produces an error, and altering does not occur.
- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).
- A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.
- A W-command also stops the PU clock.

INSERT/EXTRACT PU RETRY LOCAL STORE (QVAP)

Display PU Retry Local Store

To display PU Retry Local Store array from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTiON to stop the PU clock.

2. Press ENTER.

3. Key AP plus an array number (0 or 1) to select the first or second array, followed by a 0 or 1 to select the first or second half of the array. The array number and the first or second half of the array can be defaulted to zero.

4. Press ENTER.

Notes:

- PU Retry Local Store is made up of two arrays. Each array has 32 lines (00-1F), and each line is eight bytes long (0-7).

- Data is entered and displayed in hex.

- This array can be paged.

Alter PU Retry Local Store

1. Display the selected array of PU Retry Local Store as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Save PU Retry Local Store

Eight bytes (16 digits), an element, of PU Retry Local Store can be saved by the Block function. PU Retry Local Store has 64 elements. The format is QVAPxxx?.

Fast Alter PU Retry Local Store

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

```
*INSERT/EXTRACT*  LS RETRY (QVAP) 1 FFBIT 1 OTHERFF  18F8 FA18 7DC0 147F REFBIT
                  LIN  0    2    4    6       LIN  0    2    4    6
A ARRAYS          000  0000 0000 0000 01B8   *001 0000 0000 0000 01B8
S STATUS SCAN RING
K CHECKS IN SYSTEM 002 0000 0000 0000 01B8   *003 0000 0000 0000 01B8
I PU HARDWARE
B CS HARDWARE      004 0000 0000 0000 01B8   *005 0000 0000 0000 01B8
M MS HARDWARE
H CHANNEL HARDWARE 006 0000 0000 0000 01B8   *007 0000 0000 0000 01B8
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        008 0000 0000 0000 01B8   *009 0000 0000 0000 01B8
Y CLOCK SCAN RING
W COMMAND SBA-CAC  00A 0000 0000 0000 01B8   *00B 0000 0000 0000 01B8
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 00C 0000 0000 0000 01B8   *00D 0000 0000 0000 01B8

Q GENERAL SELECT   00E 0000 0000 0000 01B8   *00F 0000 0000 0000 01B8
Z RTRN TO PROG SYS
SELECTION: AP00                              ==>
                                                4341
```

4. Key QVA (Arrays screen) next to SELECTION followed by:

(1) P identifies the array as PU Retry Local Store.
(2) 0 for the first array, 1 for the second array.
(3) 0-1 represents a high-order digit of a line number.
(4) 0-F represents a low-order digit of a line number.
(5) Op code = (MOVE), & (AND), / (OR).
(6) Hex data.

5. Press ENTER.

Example: QVAP11F=F1..F2..F3

```
          |||||└─(6) Hex data
          ||||└──(5) Op code
          |||└───(4) Line number
          ||└────(3) Line number
          |└─────(2) Array
          └──────(1) PU Retry LS array
```
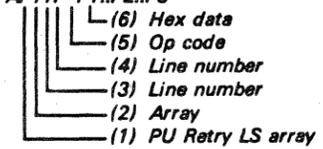
To fast alter from the Insert/Extract facilities screen or from one of the arrays subscreens:

1. Invoke steps 4 and 5 of "Fast Alter PU Retry Local Store."

Notes:

- *Spaces between characters are deleted before the command is analyzed. When the operation is executed, that digit is unaffected.*

- *Up to 16 digits, an element, can be altered. The entire screen, with changes, is written back into the array.*

- *The misplacement or absence of an op code produces an error and altering does not occur.*

- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*

- *A period (.) serves as a digit place holder in the data. When the operation is executed, this position is unaffected.*

- *A W-command also stops the PU clock.*

Label Identification

LIN: Identifies, left to right, displayed array of Local Storage Retry and a two-digit line number. Zero identifies the first array: one identifies the second array. These eight bytes are sometimes called *elements*.

FFBIT and OTHERFF: Addresses one of the two Local Store Retry arrays used to save Retry data. The first digit in the array defines the Local Store Retry array.

REFBIT: Addresses one element in the active Local Store Retry array where a doubleword is saved from the Local Store array. The second and third digits of the array element address define the element.

Example:

FFBIT	OTHERFF	Bit position of an 'ON' Bit in REFBIT	Element Address Currently Used to Save Retry Data
0	0	xx	0xx
0	1	x'20'+xx	1xx
1	0	x'20'+xx	1xx
1	1	xx	0xx

where 00 ≤ xx ≤ '1F'

INSERT/EXTRACT CHANNEL DATA BUFFER (QVAD)

Display Channel Data Buffer

To display the Channel Data Buffer from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AD plus a channel number (0-5) and a line number (0-F) next to SELECTION. The channel and line number can be defaulted to zero.
4. Press ENTER.

Alter Channel Data Buffer

Note: *Refer to the "Insert/Extract Control Store (QVAC)" and review the Warning before proceeding with this procedure.*

To alter the Channel Data Buffer from the Array (QVA) screen:

1. Display the selected channel data buffer as in the preceding steps.
2. Move the cursor below the location(s) to be altered, and key in the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Data is entered and displayed in hex.*
- *Sixteen lines of eight bytes are displayed by using an address value of 0 or 8. The first 16 lines are addressable by selecting the first line (00). The second 16 lines are addressable by selecting the 17th line (address 80). For Display/Alter, only one digit of the line number is required. For Save or Fast Select, both digits of the line number are required.*
- *This array can be paged.*

Save Channel Data Buffer

Eight bytes (16 digits) of the Channel Data Buffer can be saved by the Block function. The format is QVADcxx?.

```
*INSERT/EXTRACT* CHANNEL DATA BUFFER (QVAD)      CHANNEL 0
                 ADRS  0    2    4    6           8    A    C    E
A ARRAYS           0  0000 0000 0000 0000        0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 1  0000 0000 0000 0000        0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE      2  0000 0000 0000 0000        0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 3  0000 0000 0000 0000        0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        4  0000 0000 0000 0000        0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC  5  0000 0000 0000 0000        0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 6  0000 0000 0000 0000        0000 0000 0000 0000

Q GENERAL SELECT   7  0000 0000 0000 0000        0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: AD00                          ==>
                                            4341
```

Fast Alter Channel Data Buffer

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) D identifies the array as Channel Data Buffer.
   (2) 0-5 identifies which channel is selected.
   (3) 0-F represents a high-order digit of a line.
   (4) 0 or 8 represents a low-order digit of a line number.
   (5) Op code = (MOVE), & (AND), / (OR).
   (6) Hex data.

5. Press ENTER.

   Example: QVAD018=F1..F2F3
   - (6) Hex data
   - (5) Op code
   - (4) Line number
   - (3) Line number
   - (2) Channel number
   - (1) Channel Data Buffer array
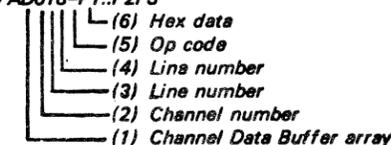
To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Channel Data Buffer."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *Up to 16 digits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error, and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *A period (.) is a digit place holder in the data. When the operation is executed, this digit is unaffected.*
- *A W-command also stops the PU clock.*
- *A doubleword on a doubleword boundary can be altered with a fast-alter command.*

Label Identification

CHANNEL: Identifies the channel is selected.

ADRS-vertical: Represents a high-order, addressable line number.

ADRS-horizontal: Represents a low-order, addressable line number.

INSERT/EXTRACT CHANNEL CONTROL (QVAN)

Display Channel Control

To display the Channel Control from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AN next to SELECTION.
4. Press ENTER.

Alter Channel Control

To alter the Channel Control from the Array (QVA) screen:

1. Display channel control as in the preceding steps.
2. Move the cursor below the location(s) to be altered, and key the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Data is entered and displayed in hex.*
- *Label CHANNEL identifies each of six channels and the first two lines of four bytes each.*
- *This array cannot be paged.*

Save Channel Control

Four bytes (eight digits) of channel control can be saved by the Block function. The format is QVANcx?.

```
*INSERT/EXTRACT*  CHANNEL CONTROL  (QVAN)

A ARRAYS
S STATUS SCAN RING                        0              1
K CHECKS IN SYSTEM CHANNEL 0:    0000 0000    0000 0000
I PU HARDWARE
B CS HARDWARE      CHANNEL 1:    0000 0000    0000 0000
M MS HARDWARE
H CHANNEL HARDWARE CHANNEL 2:    0000 0000    0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS    CHANNEL 3:    0000 0000    0000 0000
R SCAN RING
Y CLOCK SCAN RING  CHANNEL 4:    0000 0000    0000 0000
W COMMAND SBA-CAC
T ADDRESS TRANSLAT CHANNEL 5:    0000 0000    0000 0000
G SET CSAR ADDRESS

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: AN                             ==>
                                              4341
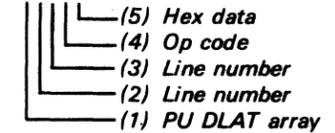```

### Fast Alter Channel Control

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) N identifies the array as channel control.
   (2) 0-5 identifies which channel is selected.
   (3) 0-1 represents a digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Four bytes of hex data (eight digits max).

5. Press ENTER.

   *Example:  QVAN01=F1..F2.F*
   - (5) Hex data
   - (4) Op code
   - (3) Line number
   - (2) Channel number
   - (1) Channel Control array
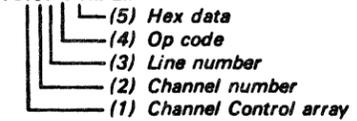
To fast alter from the Insert/Extract facilities screen or from one of the Array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Channel Control."

**Notes:**

- *Spaces between characters are deleted before the command is analyzed.*
- *Up to eight digits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error, and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *A period (.) is a digit place holder in the data. When the operation is executed, this digit is unaffected.*
- *A W-command also stops the PU clock.*

## INSERT/EXTRACT SWAP BUFFER (QVAS)

### Display Swap Buffer

To display the Swap Buffer from the array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AS and the line number (0-F) next to SELECTION. If the line number is not specified it defaults to zero.
4. Press ENTER.

### Alter Swap Buffer

To alter the Swap Buffer from the array (QVA) screen:

1. Display the Swap Buffer as in the preceding steps.
2. Move the cursor below the location(s) to be altered, and key in the new data.
3. Leave the selection line unchanged, and press ENTER.

**Notes:**

- Data is entered and displayed in hex.
- Only the first 16 lines (0-F) are addressable.
- Sixteen lines of the Swap Buffer are displayed.
- This array cannot be paged.

### Save Swap Buffer

Eight bytes (16 digits) of the swap buffer can be saved by the Block function. The format is QVASx?.

---

```
*INSERT/EXTRACT   SWAP BUFFER  (QVAS)
                         0    2    4    6        0    2    4    6
A ARRAYS           0   0000 0000 0000 0000  *1 0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 2   0000 0000 0000 0000  *3 0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE      4   0000 0000 0000 0000  *5 0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 6   0000 0000 0000 0000  *7 0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        8   0000 0000 0000 0000  *9 0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC  A   0000 0000 0000 0000  *B 0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS C   0000 0000 0000 0000  *D 0000 0000 0000 0000

Q GENERAL SELECT   E   0000 0000 0000 0000  *F 0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: AS                               ==>
                                               4341
```

Fast Alter Swap Buffer

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
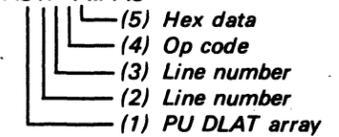2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) S identifies the array as Swap Buffer.
   (2) 0-F represents a line number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

   Example: QVASF=F1..F2F.3
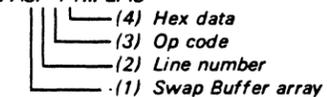
   ┌──────── (4) Hex data
   ├──────── (3) Op code
   ├──────── (2) Line number
   └──────── (1) Swap Buffer array

To fast alter from the Insert/Extract facilities screen or from one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Swap Buffer."

Notes:

- Spaces between characters are deleted before the command is analyzed.
- Up to 16 digits can be altered. The entire screen, with changes, is written back into the array.
- The misplacement or absence of an op code produces an error, and altering does not occur.
- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).
- A period (.) is a digit place holder in the hex data. When the operation is executed, this digit is unaffected.
- A W-command also stops the PU clock.

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INSERT/EXTRACT CONTROL STORE (QVAC)

Display Control Store

To display Control Store from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AC and a one-to-five-digit hex address next to SELECTION. The address can be defaulted to zero. See Notes.

4. Press ENTER.

Alter Control Store

To alter Control Store from the Array (QVA) screen:

1. Display the data at Control Store address as in the above steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Data is entered and displayed in hex.*

- *Control Store is displayed on a.quadword (16-byte) boundary with the selected address in the first line.*

- *Eight quadwords (16 bytes) are displayed per screen selection.*

- *The control store address must be no greater than the size specified in the Configuration screen.*

- *This array can be paged.*

Save Control Store

A doubleword (8 bytes) of data in Control Store can be saved by the Block function. The exception is a last word of a page, in which case eight digits can be saved and zero filled for the remaining eight digits. The format is QVACxxxxx?.

Note: *The save address must be on a word boundary.*

```
*INSERT/EXTRACT*  CONTROL STORE  (QVAC)
                  ADRS  0     2     4     6     8     A     C     E
A ARRAYS          0000  0000  0000  0000  0000  0000  0000  0000  0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 0001 0000  0000  0000  0000  0000  0000  0000  0000
I PU HARDWARE
B CS HARDWARE      0002 0000  0000  0000  0000  0000  0000  0000  0000
M MS HARDWARE
H CHANNEL HARDWARE 0003 0000  0000  0000  0000  0000  0000  0000  0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        0004 0000  0000  0000  0000  0000  0000  0000  0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC  0005 0000  0000  0000  0000  0000  0000  0000  0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 0006 0000  0000  0000  0000  0000  0000  0000  0000

Q GENERAL SELECT   0007 0000  0000  0000  0000  0000  0000  0000  0000
Z RTRN TO PROG SYS
SELECTION: AC00000                         ==>
                                             4341
```

Fast Alter Control Store

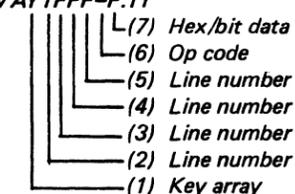To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

   Note: *Before continuing, read Control Store (QVAC) Warning.*

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) C identifies the array as control storage.
   (2) 0-F represents a digit of the address.
   (3) 0-F represents a digit of the address.
   (4) 0-F represents a digit of the address.
   (5) 0-F represents a digit of the address.
   (6) 0,4,8, or C represents a digit of the address.
   (7) Op code = (MOVE), & (AND), / (OR).
   (8) Hex data.

5. Press ENTER.

   Example: QVAC00FF8=F1..F2.F3
   ```
                    (8) Hex data
                    (7) Op code
                    (6) Address digit
                    (5) Address digit
                    (4) Address digit
                    (3) Address digit
                    (2) Address digit
                    (1) Control Store array
   ```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Control Store."

Label Identification

ADRS-vertical: Represents up to a four-digit addressable line number.

ADRS-horizontal: Represents a single-digit of an addressable line number.

Control Store (QVAC) Warning

Warning: If you have a screen filled with FFs or most of the screen filled with FFs, use the following steps to avoid entering invalid data into the control store array.

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Press the START key several times.

4. Press ENTER. The screen should be redisplayed correctly.

Notes:

- *If you have doubts about the validity of your control store data after you display, re-IML the processor.*

- *When the PU is forcing a trapword, control storage cannot be displayed because all positions may show up as Fs. The write operation still works; so be careful not to cause an alter that writes the Fs back into the array. By microword-stepping one or more times and redisplaying by pressing the ENTER key again, the screen can be corrected. However, this condition does not occur if the machine is first softstopped and then hardstopped by going into microword-step operation rate (QOM). Note that Control Store screen is not affected by microword-stepping, but the other arrays and facilities may be.*

- *This array can be fast selected by keying QVAC and 0, 4, 8, or C and = next to SELECTION and pressing ENTER. Read Warning above before attempting.*

- *Spaces between characters are deleted before the command is analyzed.*

- *Up to 16 digits can be altered. The addresses are variable such that the first four digits may be used or eliminated as needed. However, the fifth digit (0, 4, 8, or C) must always be used. The address is padded with zeroes and right justified if the full five-digit address is not used. Last word of a page address (for example, 7C or FC) alters only eight digits. The entire screen, with changes, is written back into the array.*

- *The misplacement or absence of an op code produces an error and altering does not occur.*

- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The address must be on a word boundary and not exceed the size specified in the Configuration screen.*

- *A period (.) is a digit place holder in the data. When the operation is executed, this digit is unaffected.*

- *A W-command also stops the PU clock.*

```
                    CONTROL STORE   (QVAC)
  *INSERT/EXTRACT*
                    ADRS  0     2     4     6        8     A     C     E
  A ARRAYS          09F8  FFFF  FFFF  FFFF  FFFF     FFFF  FFFF  FFFF  FFFF
  S STATUS SCAN RING
  K CHECKS IN SYSTEM 09F9  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  I PU HARDWARE
  B CS HARDWARE      09FA  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  M MS HARDWARE
  H CHANNEL HARDWARE 09FB  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  C CHANNEL INTRFACE
  X EXTERNAL REGS
  R SCAN RING        09FC  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  Y CLOCK SCAN RING
  W COMMAND SBA-CAC  09FD  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  T ADDRESS TRANSLAT
  G SET CSAR ADDRESS 09FE  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF

  Q GENERAL SELECT   09FF  FFFF  FFFF  FFFF  FFFF    FFFF  FFFF  FFFF  FFFF
  Z RTRN TO PROG SYS
  SELECTION: AC09F80                         ==>
                                        CLOCK STOP
                                                4341
```

Label Identification

ADRS-vertical: Represents up to a four-digit addressable line number.

ADRS-horizontal: Represents a single-digit of an addressable line number.
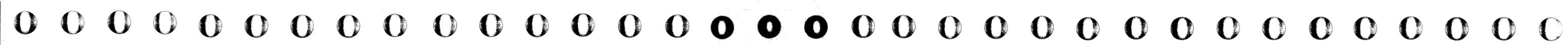
INSERT/EXTRACT TRAP/BAL STACK (QVAT)
(GRP 2)

Display Trap/BAL Stack

To display Trap/BAL Stack from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AT next to SELECTION.

4. Press ENTER.

Alter Trap/BAL Stack

To alter Trap/BAL Stack from the Array (QVA) screen:

1. Display the Trap/BAL Stack screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered and key the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Control store trap and BAL return addresses are displayed, as well as status 0, status 2, and I-reg 1 bytes.

- This array cannot be paged.

Save Trap/BAL Stack

Three bytes of the address and three bytes of the status information can be saved by the Block function. The format is QVATx?.

```
*INSERT/EXTRACT*  TRAP/BAL STACK  (QVAT)

A ARRAYS            LN       ADDR   STAT0  STAT2  INDIR1
S STATUS SCAN RING  0 TRAP0  000000  B4     BF     A9
K CHECKS IN SYSTEM
I PU HARDWARE       1 TRAP1  000000  B4     BF     A9
B CS HARDWARE
M MS HARDWARE       2 TRAP2  000000  B4     BF     A9
H CHANNEL HARDWARE
C CHANNEL INTRFACE  3 BAL    000000  B4     BF     A9
X EXTERNAL REGS
R SCAN RING         4 BAL0   000000
Y CLOCK SCAN RING
W COMMAND SBA-CAC   5 BAL1   000000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS  6 BAL2   000000

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: AT                          ==>
                              CLOCK STOP
                                        4341
```

Fast Alter Trap/BAL Stack

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:
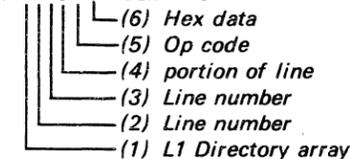
1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) T identifies the array as Trap-BAL.
   (2) A line number can have the value of 0-6. This range is dependent upon the machine's control store size.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

---

5. Press ENTER.

   Example: QVAT3=F1..F2F3
   - (4) Hex data
   - (3) Op code
   - (2) Line number
   - (1) Trap/BAL array

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter Trap/BAL Stack.

Notes:

- Spaces between characters are deleted before the command is analyzed.

- Up to 12 digits can be altered. The entire screen, with changes, is written back into the array.

- The misplacement or absence of an op code produces an error and altering does not occur.

- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).

- Data left to right: Trap Address (six digits), Status 0 (two digits), Status 2 (two digits) and I-reg 1 (two digits).

- A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.

- A W-command also stops the PU clock.

- BAL0-3 can be altered only on machines with Control Store Type 2.

Label Identification

LN: An addressable line number.

ADDR: Control store address used for returning from TRAP or BAL.

STAT0: Status register 0. Contains ALU information.

STAT2: Status register 2. Contains microword type information.

INDIR1: Indirect register 1. Contains information used for addressing local store.

INSERT/EXTRACT TRAP/BAL STACK (QVAT)

Display Trap/BAL Stack

To display Trap/BAL Stack from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AT next to SELECTION.
4. Press ENTER.

Alter Trap/BAL Stack

To alter Trap/BAL Stack from the Array (QVA) screen:

1. Display the Trap/BAL Stack screen as in the preceding steps.
2. Move the cursor below the location(s) to be altered and key the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Control store trap and BAL return addresses are displayed, as well as status 0, status 2, and I-reg 1 bytes.
- This array cannot be paged.

Save Trap/BAL Stack

Three bytes of the address and three bytes of the status information can be saved by the Block function. The format is QVATx?.

Fast-Alter Trap/BAL Stack

To fast-alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:
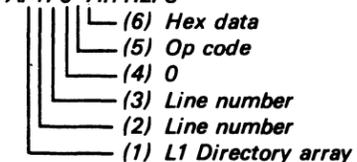
1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.

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```
*INSERT/EXTRACT*  TRAP/BAL STACK  (QVAT)

A ARRAYS            LN        ADDR    STAT0  STAT2  INDIR1
S STATUS SCAN RING  0  TRAP0  0028F8  B4     40     A9
K CHECKS IN SYSTEM
I PU HARDWARE       1  TRAP1  0028F8  B4     40     A9
B CS HARDWARE
M MS HARDWARE       2  TRAP2  0028F8  B4     40     A9
H CHANNEL HARDWARE
C CHANNEL INTRFACE  3  BAL    0028F8  B4     40     A9
X EXTERNAL REGS
R SCAN RING
Y CLOCK SCAN RING
W COMMAND SBA-CAC
T ADDRESS TRANSLAT
G SET CSAR ADDRESS

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: AT                              ==>
                                              4341
```

(56K Control Store Example)

```
*INSERT/EXTRACT*  TRAP/BAL STACK  (QVAT)

A ARRAYS            LN        ADDR    STAT0  STAT2  INDIR1
S STATUS SCAN RING  0  TRAP0  000000  B4     BF     A9
K CHECKS IN SYSTEM
I PU HARDWARE       1  TRAP1  000000  B4     BF     A9
B CS HARDWARE
M MS HARDWARE       2  TRAP2  000000  B4     BF     A9
H CHANNEL HARDWARE
C CHANNEL INTRFACE  3  BAL    000000  B4     BF     A9
X EXTERNAL REGS
R SCAN RING         4  BAL0   000000
Y CLOCK SCAN RING
W COMMAND SBA-CAC   5  BAL1   000000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS  6  BAL2   000000

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: AT                              ==>
                                      CLOCK STOP
                                              4341
```

(64K Control Store Example)

---

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) T identifies the array as Trap-BAL.
   (2) A line number can have the value of 0-6. This range depends upon the control storage size of the machine.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

   Example: QVAT3=F1..F2F3
   - (4) Hex data
   - (3) Op code
   - (2) Line number
   - (1) Trap/BAL array

To fast-alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast-Alter Trap/BAL Stack."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *Up to 12 digits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *Data left to right: Trap Address (six digits), Status 0 (two digits), Status 2 (two digits) and I-reg 1 (two digits).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*
- *BAL0-3 can be altered only on machines with 64K Control storage .*

Label Identification

LN: An addressable line number.

ADDR: Control store address used for returning from TRAP or BAL.

STAT0: Status register 0. Contains ALU information.

STAT2: Status register 2. Contains microword type information.

INDIR1: Indirect register 1. Contains information used for addressing local store.

INSERT/EXTRACT CSAR BACKUP (QVAB)

Display CSAR Backup

To display CSAR Backup from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AB next to SELECTION.
4. Press ENTER.

Alter CSAR Backup

To alter CSAR Backup from the Array (QVA) screen:
1. Display the CSAR Backup screen as in the above steps.
2. Move the cursor below the location(s) to be altered and key the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Neither the CSARBU Reg nor Trace Addr can be altered.*
- *All of the trace array is displayed on one screen.*
- *The addresses of the last 32 PU microwords executed are displayed.*
- *CSARBU label points to the most recent entry.*
- *The trace array contains the addresses of the last 32 microwords executed if QAM has been selected, or the addresses of the last 32 targets of microwords that caused a module switch if QAB has been selected.*

Save CSAR Backup

Three bytes (1 line) of the CSAR Backup array can be saved by the Block function. The format is: QVABxx?.

```
*INSERT/EXTRACT*  CSAR BACKUP TRACE (QVAB)
                  CSARBU REG:  000000   TRACE ADDR:  01
A ARRAYS          00 001CBC  *01 001CBC  *02 001CBC  *03 001CBC
S STATUS SCAN RING
K CHECKS IN SYSTEM 04 001CBC *05 001CBC  *06 001CBC  *07 001CBC
I PU HARDWARE
B CS HARDWARE     08 001CBC  *09 001CBC  *0A 001CBC  *0B 001CBC
M MS HARDWARE
H CHANNEL HARDWARE 0C 001CBC *0D 001CBC  *0E 001CBC  *0F 001CBC
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       10 001CBC  *11 001CBC  *12 001CBC  *13 001CBC
Y CLOCK SCAN RING
W COMMAND SBA-CAC 14 001CBC  *15 001CBC  *16 001CBC  *17 001CBC
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 18 001CBC *19 001CBC  *1A 001CBC  *1B 001CBC

Q GENERAL SELECT  1C 001CBC  *1D 001CBC  *1E 001CBC  *1F 001CBC
Z RTRN TO PROG SYS
SELECTION: AB                            ==>
                                            4341
```

Fast-Alter CSAR Backup

To fast-alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) B identifies the array as CSAR BACKUP.
   (2) 0-1 represents a high-order digit of a line number.
   (3) 0-F represents a low-order digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

   Example: QVAB1F=F..1
   - (5) Hex data
   - (4) Op code
   - (3) Line number
   - (2) Line number
   - (1) CSAR Backup array
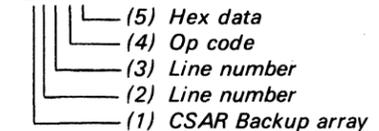
To fast-alter from the Insert/Extract facilities screen or one of the Array subscreens:

1. Invoke steps 4 and 5 of "Fast-Alter CSAR Backup."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *Only four digits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error, and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*

INSERT/EXTRACT PU DLAT (QVAU) (GRP 2)

Display PU DLAT

To display PU DLAT from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AU and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.

4. Press ENTER.

Alter PU DLAT

To alter PU DLAT from the Array (QVA) screen:

1. Display the PU DLAT screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered and key the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- One eight-line portion of the DLAT is displayed per screen.

- An alter updates a double entry (both sets of addresses) plus the LRU (least recently used).

- This array can be paged.

Save PU DLAT

One line (left adjusted) can be saved by the Block function. The format is: QVAUxx?.

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```
*INSERT/EXTRACT*  PU DLAT (QVAU)           -FF-FFF8-F-1-7-1-FF-FFF8-F-1-7-
                   LN  VA   RA  KEY FP S LRU  VA   RA  KEY FP S
A ARRAYS           00  00 0000   0  0  0  0   00 0000   0  0  0
S STATUS SCAN RING
K CHECKS IN SYSTEM 01  00 0000   0  0  0  0   00 0000   0  0  0
I PU HARDWARE
B CS HARDWARE      02  00 0000   0  0  0  0   00 0000   0  0  0
M MS HARDWARE
H CHANNEL HARDWARE 03  00 0000   0  0  0  0   00 0000   0  0  0
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        04  00 0000   0  0  0  0   00 0000   0  0  0
Y CLOCK SCAN RING
W COMMAND SBA-CAC  05  00 0000   0  0  0  0   00 0000   0  0  0
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 06  00 0000   0  0  0  0   00 0000   0  0  0

Q GENERAL SELECT   07  00 0000   0  0  0  0   00 0000   0  0  0
Z RTRN TO PROG SYS
SELECTION: AU00                           ==>
                                       CLOCK STOP
                                             4341
```

Fast Alter PU DLAT

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.
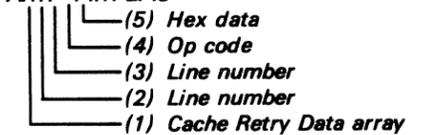
3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) U identifies the array as PU DLAT.
   (2) 0-1 represents a high-order digit of a line number.
   (3) 0-F represents a low-order digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

---

5. Press ENTER.

Example: QVAU1F=F..FF.3

```
        │││└──(5) Hex data
        │││└───(4) Op code
        ││└────(3) Line number
        │└─────(2) Line number
        └──────(1) PU DLAT array
```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter PU DLAT.

Notes:

- Spaces between characters are deleted before the command is analyzed.

- Up to 19 digits can be altered. The entire screen, with changes, is written back into the array.

- The misplacement or absence of an op code produces an error, and altering does not occur.

- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).

- The maximum value for each position is indicated on line 1 of the Display/Alter screen (QVAU).

- A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.

- A W-command also stops the PU clock.

Label Identification

VA: An eight-bit virtual address.

RA: An 11-bit real address.

KEY: Key in storage.

FP: A fetch protect bit.

S: Valid/invalid status.

LRU: The least recently used DLAT quadrant.

INSERT/EXTRACT PU DLAT (QVAU) (GRP 1)

Display PU DLAT

To display PU DLAT from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AU and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.
4. Press ENTER.

Alter PU DLAT

To alter PU DLAT from the Array (QVA) screen:

1. Display the PU DLAT screen as in the preceding steps.
2. Move the cursor below the location(s) to be altered and key the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- One eight-line portion of the DLAT is displayed per screen.
- An alter updates a double entry (both sets of addresses) plus the LRU (least recently used).
- This array can be paged.

Save PU DLAT

One line (left adjusted) can be saved by the Block function. The format is: QVAUxx?.

```
*INSERT/EXTRACT*   PU DLAT (QVAU)        -FF-3FF8-F-1-7-1-FF-3FF8-F-1-7-
                   LN  VA  RA    KEY FP S  LRU  VA  RA    KEY FP S
A ARRAYS           00  00  2D18   8  1  6   0   80  2D18   7  1  4
S STATUS SCAN RING
K CHECKS IN SYSTEM 01  00  2D18   8  1  6   0   80  2D18   7  1  4
I PU HARDWARE
B CS HARDWARE      02  00  2D18   8  1  6   0   80  2D18   7  1  4
M MS HARDWARE
H CHANNEL HARDWARE 03  00  2D18   8  1  6   0   80  2D18   7  1  4
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING        04  00  2D18   8  1  6   0   80  2D18   7  1  4
Y CLOCK SCAN RING
W COMMAND SBA-CAC  05  00  2D18   8  1  6   0   80  2D18   7  1  4
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 06  00  2D18   8  1  6   0   80  2D18   7  1  4

Q GENERAL SELECT   07  00  2D18   8  1  6   0   80  2D18   7  1  4
Z RTRN TO PROG SYS
SELECTION: AU00                          ==>
                                             4341
```

Fast Alter PU DLAT

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:
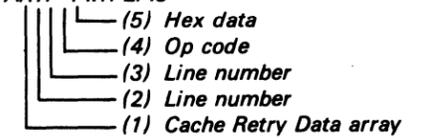
1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) U identifies the array as PU DLAT.
   (2) 0-1 represents a high-order digit of a line number.
   (3) 0-F represents a low-order digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

   Example: QVAU1F=F..FF.3
   ```
                 (5) Hex data
                 (4) Op code
                 (3) Line number
                 (2) Line number
                 (1) PU DLAT array
   ```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter PU DLAT."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *Up to 17 digits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error, and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *The maximum value for each position is indicated on line 1 of the Display/Alter screen (QVAU).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*

Label Identification

VA: An eight-bit virtual address.

RA: An 11-bit real address.

KEY: Key in storage.

FP: A fetch protect bit.

S: Valid/invalid status.

LRU: The least recently used DLAT quadrant.

INSERT/EXTRACT CHANNEL DLAT (QVAH) (GRP 2)

Display Channel DLAT

To display Channel DLAT from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AH next to SELECTION.
4. Press ENTER.

Alter Channel DLAT

To alter Channel DLAT from the Array (QVA) screen:

1. Display the Channel DLAT screen as in the preceding steps.
2. Move the cursor below the location(s) to be altered, and key in the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Each channel has two data entries and two CCW entries.*
- *The line 1 label identifies a mask for each entry.*
- *This array cannot be paged.*

Save Channel DLAT

One line (left adjusted) can be saved by the Block function. The format is QVAHcx?.

```
 *INSERT/EXTRACT*  CHANNEL DLAT (QVAH)         -FFF-FFF8-1-
                                        DATA                    CCW
 A ARRAYS                     EVEN(0)    ODD(1)     EVEN(2)    ODD(3)
 S STATUS SCAN RING           VA   RA  S VA   RA  S VA   RA  S VA   RA  S
 K CHECKS IN SYSTEM CHANNEL 0: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 I PU HARDWARE
 B CS HARDWARE      CHANNEL 1: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 M MS HARDWARE
 H CHANNEL HARDWARE CHANNEL 2: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 C CHANNEL INTRFACE
 X EXTERNAL REGS    CHANNEL 3: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 R SCAN RING
 Y CLOCK SCAN RING  CHANNEL 4: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 W COMMAND SBA-CAC
 T ADDRESS TRANSLAT CHANNEL 5: 000 0000 0 000 0000 0 000 0000 0 000 0000 0
 G SET CSAR ADDRESS

 Q GENERAL SELECT
 Z RTRN TO PROG SYS
 SELECTION: AH                              ==>
                                        CLOCK STOP
                                             4341
```

Fast Alter Channel DLAT

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) H identifies the array as Channel DLAT.
   (2) 0-5 identifies which channel is selected.
   (3) 0-3 represents which DLAT is selected.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

   Example: QVAH03=F1..F21

   ```
   ┃┃┃ └──(5) Hex data
   ┃┃└────(4) Op code
   ┃└─────(3) Line number
   ┃└──────(2) Channel
   └───────(1) Channel DLAT array
   ```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter Channel DLAT.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *One DLAT (8 digits) can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *The maximum value for each position is indicated on line 1 of the Display/Alter screen (QVAH).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*

Label Identification

VA: A 12-bit address.

RA: A 11-bit address.

S: A valid bit.

INSERT/EXTRACT CHANNEL DLAT (QVAH) (GRP 1)

Display Channel DLAT

To display Channel DLAT from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AH next to SELECTION.
4. Press ENTER.

Alter Channel DLAT

To alter Channel DLAT from the Array (QVA) screen:

1. Display the Channel DLAT screen as in the preceding steps.
2. Move the cursor below the location(s) to be altered, and key in the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Each channel has two data entries and two CCW entries.*
- *The line 1 label identifies the maximum value for each entry.*
- *This array cannot be paged.*

Save Channel DLAT

One element (left adjusted) can be saved by the Block function. The format is QVAHcx?.

```
*INSERT/EXTRACT* CHANNEL DLAT (QVAH)          -FFF-3FF8-1-
                                     DATA                    CCW
A ARRAYS                          EVEN(0)     ODD(1)      EVEN(2)     ODD(3)
S STATUS SCAN RING                VA   RA  S  VA   RA  S  VA   RA  S  VA   RA  S
K CHECKS IN SYSTEM CHANNEL 0:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
I PU HARDWARE
B CS HARDWARE      CHANNEL 1:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
M MS HARDWARE
H CHANNEL HARDWARE CHANNEL 2:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
C CHANNEL INTRFACE
X EXTERNAL REGS    CHANNEL 3:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
R SCAN RING
Y CLOCK SCAN RING  CHANNEL 4:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
W COMMAND SBA-CAC
T ADDRESS TRANSLAT CHANNEL 5:    000 0000 0  000 0000 0  000 0000 0  000 0000 0
G SET CSAR ADDRESS

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: AH                                ==>
                                             4341
```
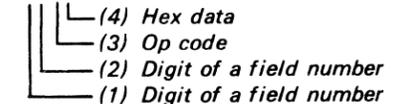

Fast Alter Channel DLAT

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

    (1) H identifies the array as Channel DLAT.
    (2) 0-5 identifies which channel is selected.
    (3) 0-3 represents which DLAT is selected.
    (4) Op code = (MOVE), & (AND), / (OR).
    (5) Hex data.

5. Press ENTER.

    Example: QVAH03=F1..F21

    (5) Hex data
    (4) Op code
    (3) Element number
    (2) Channel
    (1) Channel DLAT array

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Channel DLAT."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *One DLAT (7 digits) can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error and altering does not occur.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *The maximum value for each position is indicated on line 1 of the Display/Alter screen (QVAH).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*

Label Identification

VA: A 12-bit address.

RA: A 11-bit address.

S: A valid bit.

Use with microcode EC 154322 and above

EC 379807 22Sep80	PN 2676436	44 409
	1 of 1	

INSERT/EXTRACT KEY (QVAY) (GRP 2)

Display Key

To display Key from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AY and a three-digit line number (000-1FF) next to SELECTION. The line number can be defaulted to 000.

4. Press ENTER.

Alter Key

To alter Key from the Array (QVA) screen:

1. Display the Key screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Each array has 8192 entries, each with a four-bit key plus three status bits.
- The line one label identifies the maximum value of each entry.
- Each display contains 32 entries beginning with the one selected.
- This array can be paged.

Save Key

One line (left justified) can be saved by the Block function. The format is QVAYxxx?.

```
*INSERT/EXTRACT*  KEY  (QVAY)                        -F-111-
                  LIN  KY FRC    LIN  KY FRC    LIN  KY FRC    LIN  KY FRC
A ARRAYS          0000  0 000   *0001  0 000   *0002  0 000   *0003  0 000
S STATUS SCAN RING
K CHECKS IN SYSTEM 0004  0 000   *0005  0 000   *0006  0 000   *0007  0 000
I PU HARDWARE
B CS HARDWARE     0008  0 000   **009  0 000   *000A  0 000   *000B  0 000
M MS HARDWARE
H CHANNEL HARDWARE 000C  0 000  *000D  0 000   *000E  0 000   *000F  0 000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       0010  0 000   *0011  0 000   *0012  0 000   *0013  0 000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 0014  0 000   *0015  0 000   *0016  0 000   *0017  0 000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 0018  0 000  *0019  0 000   *001A  0 000   *001B  0 000

Q GENERAL SELECT  001C  0 000   *001D  0 000   *001E  0 000   *001F  0 000
Z RTRN TO PROG SYS
SELECTION: AY000                          ==>
                                           4341
```

Fast Alter Key

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the array subscreens (QVA):

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) Y identifies the array as key.
   (2) 0-1 identifies the first digit of a line number.
   (3) 0-F identifies the second digit of a line number.
   (4) 0-F identifies the third digit of a line number.
   (5) 0-F identifies the fourth digit of a line number.
   (6) Op code = (MOVE), & (AND), / (OR).
   (7) Hex data (1 digit); bit data (3 bits).

5. Press ENTER.

   Example: QVAY1FFF=F.11

```
          └(7) Hex/bit data
         └(6) Op code
        └(5) Line number
       └(4) Line number
      └(3) Line number
     └(2) Line number
    └(1) Key array
```

To Fast Alter from the Insert/Extract screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter Key.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *One hex digit and up to three binary bits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error and no altering occurs.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *The maximum value of each digit/bit position is indicated on line 1 of the Display/Alter screen (QVAY).*
- *A period (.) is a digit place holder. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*
- *This array can be paged.*

Label Identification

LIN: An addressable line number.

KEY: Key in storage.

F: Fetch protect.

R: A reference bit.

C: A change bit.

INSERT/EXTRACT KEY (QVAY) (GRP 1)

Display Key

To display Key from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AY and a three-digit line number (000-07F) next to SELECTION. The line number can be defaulted to 000.

4. Press ENTER.

Alter Key

To alter Key from the Array (QVA) screen:

1. Display the Key screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Each array has 2048 entries, each with a four-bit key plus three status bits.*
- *The line one label identifies the maximum value of each entry.*
- *Each display contains 32 entries beginning with the one selected.*
- *This array can be paged.*

Save Key

One line (left justified) can be saved by the Block function. The format is QVAYxxx?.

```
*INSERT/EXTRACT*  KEY  (QVAY)                        -F-111-
                  LIN   KY FRC    LIN   KY FRC    LIN   KY FRC    LIN   KY FRC
A ARRAYS          0000  0 000   *0001  0 000   *0002  0 000   *0003  0 000
S STATUS SCAN RING
K CHECKS IN SYSTEM 0004 0 000   *0005  0 000   *0006  0 000   *0007  0 000
I PU HARDWARE
B CS HARDWARE     0008  0 000   **009  0 000   *000A  0 000   *000B  0 000
M MS HARDWARE
H CHANNEL HARDWARE 000C 0 000   *000D  0 000   *000E  0 000   *000F  0 000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       0010  0 000   *0011  0 000   *0012  0 000   *0013  0 000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 0014  0 000   *0015  0 000   *0016  0 000   *0017  0 000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 0018 0 000   *0019  0 000   *001A  0 000   *001B  0 000

Q GENERAL SELECT  001C  0 000   *001D  0 000   *001E  0 000   *001F  0 000
Z RTRN TO PROG SYS
SELECTION: AY000                             ==>
                                                 4341
```
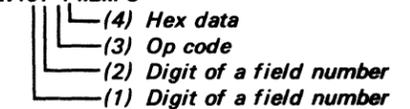

Fast Alter Key

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the array subscreens (QVA):

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) Y identifies the array as key.
   (2) 0 identifies the first digit of a line number.
   (3) 0-7 identifies the second digit of a line number.
   (4) 0-F identifies the third digit of a line number.
   (5) 0-F identifies the fourth digit of a line number.
   (6) Op code = (MOVE), & (AND), / (OR).
   (7) Hex data (1 digit); bit data (3 bits).

5. Press ENTER.

   Example: QVAY07FF=F.11

   - (7) *Hex/bit data*
   - (6) *Op code*
   - (5) *Line number*
   - (4) *Line number*
   - (3) *Line number*
   - (2) *Line number*
   - (1) *Key array*

To Fast Alter from the Insert/Extract screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Key."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *One hex digit and up to three binary bits can be altered. The entire screen, with changes, is written back into the array.*
- *The misplacement or absence of an op code produces an error and no altering occurs.*
- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*
- *The maximum value of each digit/bit position is indicated on line 1 of the Display/Alter screen (QVAY).*
- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*
- *This array can be paged.*

Label Identification

LIN: An addressable line number.

KEY: Key in storage.

F: Fetch protect.

R: A reference bit.

C: A change bit.

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INSERT/EXTRACT L1 DIRECTORY (QVAF) (GRP 2)

Display L1 Directory

To display L1 Directory from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key AF and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.
4. Press ENTER.

Alter L1 Directory

To alter L1 Directory from the Array (QVA) screen:

1. Display the L1 Directory screen as in the preceding steps.
2. Move the cursor below the location(s) to be altered and key in the new data.
3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Eight of the 32 entries are displayed on each screen.
- The addresses are line number 00, 08, 10, or 18.
- The line one label indicates the maximum value of each entry.
- Each line of four entries covers a 256-byte block of cache.
- This array can be paged.

Save L1 Directory

One line of nine bytes can be saved by the Block function. The format is QVAFxxx?.

```
*INSERT/EXTRACT*  L1 DIRECTORY (QVAF) B-FF,I-FF,M-FF,LRU-7F,RA-FFF8
                  LN 0 B  I  M  LRU RA0  RA1  RA2  RA3  1 RA4  RA5  RA6  RA7
A ARRAYS          00  00 00 00 40  0000 0000 0000 0000   0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 01 00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE     02  00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 03 00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       04  00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 05  00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 06 00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000

Q GENERAL SELECT  07  00 00 00 60  0000 0000 0000 0000   0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: AF00                         ==>
                               CLOCK STOP
                                   4341
```

Fast Alter L1 Directory

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) F identifies the array as L1 Directory.
   (2) 0-1 identifies the high-order digit of a line number.
   (3) 0-F identifies the low-order digit of a line number.
   (4) 0-1 identifies a portion of the line.
   (5) Op code = (MOVE), & (AND), / (OR).
   (6) Hex data

5. Press ENTER.

   Example: QVAF1F0=FF..22..7FF8
   ```
            └─(6) Hex data
           └──(5) Op code
          └───(4) portion of line
         └────(3) Line number
        └─────(2) Line number
       └──────(1) L1 Directory array
   ```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter L1 Directory.

Notes:

- Spaces between characters are deleted before the command is analyzed.
- Up to eight groups, each group consisting of four hex digits and three binary digits, plus two LRU digits can be altered. The entire screen, with changes, is written back into the array.
- The misplacement or absence of an op code produces an error and no altering occurs.
- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).
- The maximum value of each digit bit position is indicated on line 1 of the Display/Alter screen (QVAF).
- A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.
- A W-command also stops the PU clock.
- This array can be paged.
- The bit position in the B, I, and M fields determines with which real address fields that bit is associated.

Label Identification

LN: An addressable line number.

B: 64 bytes of the directory are flagged as bad.

I: An invalid status.

M: A modify status.

LRU: The least recently used quadrant of the directory.

RA0: A real address in the directory quadrant number zero.

RA1: Same as RA0, except quadrant one.

RA2: Same as RA0, except quadrant two.

RA3: Same as RA0, except quadrant three.

RA4: Same as RA0, except quadrant four.

RA5: Same as RA0, except quadrant five.

RA6: Same as RA0, except quadrant six.

RA7: Same as RA0, except quadrant seven.

INSERT/EXTRACT L1 DIRECTORY (QVAF)
(GRP 1)

Display L1 Directory

To display L1 Directory from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AF and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.

4. Press ENTER.

Alter L1 Directory

To alter L1 Directory from the Array (QVA) screen:

1. Display the L1 Directory screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Eight of the 32 entries are displayed on each screen.
- The addresses are line number 00, 08, 10, or 18.
- The line one label indicates the maximum value of each entry.
- Each line of four entries covers a 256-byte block of cache.
- This array can be paged.

Save L1 Directory

One line of nine bytes can be saved by the Block function. The format is QVAFxxx?.

```
*INSERT/EXTRACT*  L1 DIRECTORY (QVAF) B-F0,I-F0,M-F0,LRU-3F,RA-3FF8
                  LN O B  I  M  LRU RA0  RA1  RA2  RA3
A ARRAYS          00    00 00 00 00  0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 01   00 00 00 00  0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE     02    00 00 00 00  0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 03  00 00 00 00  0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       04    00 00 00 00  0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 05    00 00 00 00  0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 06  00 00 00 00  0000 0000 0000 0000

Q GENERAL SELECT  07    00 00 00 00  0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: AF00                         ==>
                                            4341
```

Fast Alter L1 Directory

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) F identifies the array as L1 Directory.
   (2) 0-1 identifies the high-order digit of a line number.
   (3) 0-F identifies the low-order digit of a line number.
   (4) 0 required to make address (three digits).
   (5) Op code = (MOVE), & (AND), / (OR).
   (6) Hex data

5. Press ENTER.

   Example: QVAF1F0=7..11.2F3

```
        ┌── (6) Hex data
      ┌─── (5) Op code
     ┌──── (4) 0
    ┌───── (3) Line number
   ┌────── (2) Line number
  └─────── (1) L1 Directory array
```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter L1 Directory."

Notes:

- Spaces between characters are deleted before the command is analyzed.
- Up to four groups, each group consisting of three hex digits and three binary digits, plus two LRU digits can be altered. The entire screen, with changes, is written back into the array.
- The misplacement or absence of an op code produces an error and no altering occurs.
- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).
- The maximum value of each digit bit position is indicated on line 1 of the Display/Alter screen (QVAF).
- A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.
- A W-command also stops the PU clock.
- This array can be paged.
- The bit position in the B, I, and M fields determines with which real address fields that bit is associated.
- The second digit of the B, I, and M fields is always zero.

Label Identification

LN: An addressable line number.

RA0: A real address in the directory quadrant number zero.

B: 64 bytes of the directory are flagged as bad.

I: An invalid status.

M: A modify status.

RA1: Same as RA0, except quadrant one.

RA2: Same as RA0, except quadrant two.

RA3: Same as RA0, except quadrant three.

LRU: The least recently used quadrant of the directory.

Use with microcode EC 154322 and above

EC 379807 22Sep80	PN 2676439	44 419
	1 of 1	

INSERT/EXTRACT L1 CACHE DATA (QVAG) (GRP 2)

Display L1 Cache Data

To display L1 Cache Data from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AG and a two-digit line number (00-7F) next to SELECTION. The line number can be defaulted to zero.

4. Press ENTER.

Alter L1 Cache Data

To alter L1 Cache Data from the Array (QVA) screen:

1. Display L1 Cache Data screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

• *2048 eight-byte entries are contained in the array. All can be displayed.*

• *Sixteen entries can be displayed beginning with the one addressed.*

• *This array can be paged.*

Save L1 Cache Data

One line of data (8 bytes) can be saved by the Block function. The format is QVAGxxx?.

```
*INSERT/EXTRACT*  L1 CACHE DATA (QVAG)
                  LN   0    2    4    6      LN   0    2    4    6
A ARRAYS          000 0000 0000 0000 0000   *001 0000 0000 0000 0000
S STATUS SCAN RING
K CHECKS IN SYSTEM 002 0000 0000 0000 0000  *003 0000 0000 0000 0000
I PU HARDWARE
B CS HARDWARE     004 0000 0000 0000 0000   *005 0000 0000 0000 0000
M MS HARDWARE
H CHANNEL HARDWARE 006 0000 0000 0000 0000  *007 0000 0000 0000 0000
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING       008 0000 0000 0000 0000   *009 0000 0000 0000 0000
Y CLOCK SCAN RING
W COMMAND SBA-CAC 00A 0000 0000 0000 0000   *00B 0000 0000 0000 0000
T ADDRESS TRANSLAT
G SET CSAR ADDRESS 00C 0000 0000 0000 0000  *00D 0000 0000 0000 0000

Q GENERAL SELECT  00E 0000 0000 0000 0000   *00F 0000 0000 0000 0000
Z RTRN TO PROG SYS
SELECTION: AG00                       ==>
                                          4341
```

Fast Alter L1 Cache Data

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

    (1) G identifies the array as L1 Cache Data.
    (2) 0-7 identifies the high-order digit of a line number.
    (3) 0-F identifies the middle digit of a line number.
    (4) 0-F identifies the low-order digit of a line number.
    (5) Op code = (MOVE), & (AND), / (OR).
    (6) Hex data.

5. Press ENTER.

    Example: QVAG7FF=F..1F2.F3
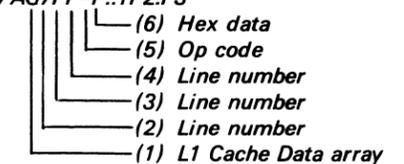
    ─(6) Hex data
    ─(5) Op code
    ─(4) Line number
    ─(3) Line number
    ─(2) Line number
    ─(1) L1 Cache Data array

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter L1 Cache Data."

Notes:

• *Spaces between characters are deleted before the command is analyzed.*

• *Up to 16 hex digits can be altered. The entire screen, with changes, is written back into the array.*

• *The misplacement or absence of an op code produces an error and no altering occurs.*

• *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*

• *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*

• *A W-command also stops the PU clock.*

Label Identification

LN: An addressable line number.

0, 2 etc.: A byte number.

Model Group 2

EC 379808 06Mar81	PN 2676410	
	1 of 1	44 425f

INSERT/EXTRACT CACHE RETRY DATA
(QVAR) (GRP 2)

Display Cache Retry Data

To display Cache Retry Data from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AR and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.

4. Press ENTER.

Alter Cache Retry Data

To alter Cache Retry Data from the Array (QVA) screen:

1. Display Cache Retry Data screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- *Eight lines of the 32 entries can be displayed on a screen.*

- *Addressing one-fourth of the array is address 00, 08, 10, or 18.*

- *This array can be paged.*

Save Cache Retry Data

One line of 13 bytes can be saved by the Block function. The format is QVARxx?.

Fast Alter Cache Retry Data

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

```
*INSERT/EXTRACT*   CACHE RETRY DATA (QVAR)      0 RTYACT    00 RTYCNT
                   LINE  0    2    4    6        FL  ADDRESS     CNT
A ARRAYS            00   0000 0000 0000 0000     8E  FA 0000     00
S STATUS SCAN RING
K CHECKS IN SYSTEM  01   0000 0000 0000 0000     82  FA 4000     00
I PU HARDWARE
B CS HARDWARE       02   0000 0000 0000 0000     82  FA 8000     00
M MS HARDWARE
H CHANNEL HARDWARE  03   0000 0000 0000 0000     82  FA C000     00
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING         04   0000 0000 0000 0000     82  FB 0000     00
Y CLOCK SCAN RING
W COMMAND SBA-CAC   05   0000 0000 0000 0000     82  FB 4000     00
T ADDRESS TRANSLAT
G SET CSAR ADDRESS  06   0000 0000 0000 0000     82  FB 8000     00

Q GENERAL SELECT    07   0000 0000 0000 0000     82  FB C000     00
Z RTRN TO PROG SYS
SELECTION: AR00                             ==>
                                         CLOCK STOP
                                                    4341
```

---

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) R identifies the array as Cache Retry Data.
   (2) 0-1 identifies the high-order digit of a line number.
   (3) 0-F identifies the low-order digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

   Example: QVAR1F=F..1F2F.3

       |||||└─(5) Hex data
       ||||└──(4) Op code
       |||└───(3) Line number
       ||└────(2) Line number
       |└─────(1) Cache Retry Data array

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of Fast Alter Cache Retry Data.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *Up to 24 hex digits can be altered. The entire screen, with changes, is written back into the array.*

- *The CNT field cannot be altered.*

- *The misplacement or absence of an op code produces an error and no altering.*

- *The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).*

- *A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

Label Identification

LINE: An addressable line in the array.

FL: If bit x is on, byte x of the doubleword was modified by the PU during the execution of the current instruction, where x is greater or equal to zero and less than or equal to seven.

ADDRESS: Real address of corresponding doubleword.

CNT: Value of RTYCNT when doubleword was saved.

RTYACT: 0 - No retry data was saved for the current instruction, and screen data is not valid.
1 - At least one doubleword was saved for the current instruction, and screen data is valid.

RTYCNT: Indicates which line in the Cache Retry Data array was the last valid line.

Use with microcode EC 856091 and above

EC 379822 22Sep80	PN 2676440	44 427
	1 of 1	

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INSERT/EXTRACT CACHE RETRY DATA (QVAR) (GRP 1)

Display Cache Retry Data

To display Cache Retry Data from the Array (QVA) screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key AR and a two-digit line number (00-1F) next to SELECTION. The line number can be defaulted to zero.

4. Press ENTER.

Alter Cache Retry Data

To alter Cache Retry Data from the Array (QVA) screen:

1. Display Cache Retry Data screen as in the preceding steps.

2. Move the cursor below the location(s) to be altered, and key in the new data.

3. Leave the SELECTION line unchanged, and press ENTER.

Notes:

- Eight lines of the 32 entries can be displayed on a screen.

- Addressing one-fourth of the array is address 00, 08, 10, or 18.

- This array can be paged.

Save Cache Retry Data

One line of 12 bytes can be saved by the Block function. The format is QVARxx?.

```
 *INSERT/EXTRACT*  CACHE  RETRY DATA (QVAR)      1 RTYACT   1E RTYCNT
                   LINE   0    2    4    6       FL    ADDRESS
 A ARRAYS          00     0000 0000 0000 0000    00    00 0000
 S STATUS SCAN RING
 K CHECKS IN SYSTEM 01    0000 0000 0000 0000    00    00 0000
 I PU HARDWARE
 B CS HARDWARE     02     0000 0000 0000 0000    00    00 0000
 M MS HARDWARE
 H CHANNEL HARDWARE 03    0000 0000 0000 0000    00    00 0000
 C CHANNEL INTRFACE
 X EXTERNAL REGS
 R SCAN RING       04     0000 0000 0000 0000    00    00 0000
 Y CLOCK SCAN RING
 W COMMAND SBA-CAC 05     0000 0000 0000 0000    00    00 0000
 T ADDRESS TRANSLAT
 G SET CSAR ADDRESS 06    0000 0000 0000 0000    00    00 0000

 Q GENERAL SELECT  07     0000 0000 0000 0000    00    00 0000
 Z RTRN TO PROG SYS
 SELECTION: AR00                              ==>
                                      CLOCK STOP
                                                 4341
```

Fast Alter Cache Retry Data

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array subscreens (QVA):

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVA (Arrays screen) next to SELECTION followed by:

   (1) R identifies the array as Cache Retry Data.
   (2) 0-1 identifies the high-order digit of a line number.
   (3) 0-F identifies the low-order digit of a line number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

   Example: QVAR1F=F..1F2F.3
   - (5) Hex data
   - (4) Op code
   - (3) Line number
   - (2) Line number
   - (1) Cache Retry Data array

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast Alter Cache Retry Data."

Notes:

- Spaces between characters are deleted before the command is analyzed.

- Up to 24 hex digits can be altered. The entire screen, with changes, is written back into the array.

- The misplacement or absence of an op code produces an error and no altering.

- The op code MOVES the data to, ANDs with, or ORs with the data in the selected location(s).

- A period (.) is a digit place holder in the data. When the operation is executed, that digit is unaffected.

- A W-command also stops the PU clock.

Label Identification

LINE: An addressable line in the array.

FL: If bit x is 'on', byte x of the doubleword was modified by the PU during the execution of the current instruction, where x is greater or equal to zero and less than or equal to seven.

ADDRESS: Real address of corresponding doubleword.

RTYACT: 0 - No retry data was saved for the current instruction and screen data is not valid.
1 - At least one doubleword was saved for the current instruction, and screen data is valid.

RTYCNT: Indicates which line in the Cache Retry Data array was the last valid line.

INSERT/EXTRACT STATUS SCAN RING (QVS)

Display Status Scan Ring

To display the Status Scan Ring screen from the QV screen:

1. Key S next to SELECTION.
2. Press ENTER.

Notes:

- *All status scan ring information can be displayed and formatted.*
- *The display consists of system status information.*
- *This screen is scan ring 23.*

Alter Status Scan Ring

Note: *This screen cannot be altered.*

Save Status Scan Ring

Note: *The data from this screen cannot be saved, except through the regular scan (QVR) screen.*

```
*INSERT/EXTRACT*  STATUS SCAN RING (QVS)

A ARRAYS           1 MTOPBIT    0 MTCHSEQM   1 MTIPURUN   0 MTANYDIS
S STATUS SCAN RING
K CHECKS IN SYSTEM 0 MTMWSTOP   0 MTCSARM    1 MTCHNLRN   0 MTANYCSE
I PU HARDWARE
B CS HARDWARE      1 MTS370     0 MTSTGRFM   1 MTREFRUN   0 MTANYLIE
M MS HARDWARE
H CHANNEL HARDWARE 1 MTMODE     0 MTLSREFM                0 MTANYCHE
C CHANNEL INTRFACE
X EXTERNAL REGS    0 MTDAT      0 MTIOBIT3   0 MTINSMDE   0 MTANYIPE
R SCAN RING
Y CLOCK SCAN RING  0 MTWAIT     0 MTIOBIT2   0 MTMWDSMD
W COMMAND SBA-CAC
T ADDRESS TRANSLAT             0 MTIOBIT1   0 MTCLKCMD
G SET CSAR ADDRESS
                              0 MTIOBITO   0 MTPULMDE

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: S                       ==>
                              CLOCK STOP

                                     4341
```

Label Identification

Screen label identification 0 represents the off condition; 1 represents the on condition.

1. **MTOPBIT**: Is the status of the I cycle op rate bit. 0 is a softstop.

2. **MTCHSEQM**: If on, channel sequence count match has occurred.

3. **MTIPURUN**: If on, PU clock is in run mode.

4. **MTANYDIS**: If on, one or more of the 18 error disable latches are set for the particular chip used at this time.

5. **MTMWSTOP**: The status of the CREG byte 3, bit 2.

6. **MTCSARM**: A CSAR address match.

7. **MTCHNLRN**: If on, channel clock is in run mode.

8. **MTANYCSE**: If on, an enabled error on one or more of the control storage cards.

9. **MTS370**: The status of I-cycle register bit 0.

10. **MTSTGRFM**: If on, storage reference (any reference, I/O reference, data store, instruction counter fetch) address match has occurred.

11. **MTREFRUN**: If on, refresh clock is in run mode.

12. **MTANYLIE**: If on, an enabled error on one or more of the five storage cards.

13. **MTMODE**: Status of PSW byte 1, bit 4.

14. **MTLSREFM**: If on, local store reference (source or destination) address match has occurred.

16. **MTANYCHE**: If on, an enabled error is on one or more of the four channel cards.

17. **MTDAT**: Status of PSW byte 0, bit 5.

18. **MTIOBIT3**: Status of the I/O register, bit 3.

19. **MTINSMDE**: If on, instruction step interrupt bit is set.

20. **MTANYIPE**: If on, an enabled error is on one or more of the eight PU or three clock cards.

21. **MTWAIT**: Status of PSW byte 1, bit 6.

22. **MTIOBIT2**: Status of the I/O register, bit 2.

23. **MTMWDSMD**: If on, clock is in single-microword cycle mode.

26. **MTIOBIT1**: Status of the I/O register, bit 1.

27. **MTCLKCMD**: If on, PU is in clock-cycle mode.

30. **MTIOBIT0**: Status of the I/O register, bit 0.

31. **MTPULMDE**: If on, PU is in pulse mode.

INSERT/EXTRACT CHECKS IN SYSTEM (QVK)
(GRP 2)

Display Checks in System

To display the Checks in System screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key K next to SELECTION.

4. Press ENTER.

Alter Checks in System

Note: *This screen cannot be full-screen altered.*

Save Checks in System

The data from the Checks in System screen can be saved by the Block function. The format is QVKxx? where xx is a line number on the screen. It is left-adjusted in the Save area. Only one line can be saved per selection.

Note: *The facilities (field number) are numbered (1-17) top to bottom of the screen.*

Check Reset

To reset all the detail latches:

1. Key QVKR next to SELECTION.

2. Press ENTER.

Fast Alter Checks in System

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVK next to SELECTION followed by:

   (1) A high-order decimal digit of a field number.
   (2) A low-order decimal digit of a field number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the the selected address.

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```
*INSERT/EXTRACT*  CHECK AND DISABLE (QVK)       FIELDS 1-17
                  SYSCKS    D  F  CARD/AREA      DETAIL LATCHES
A ARRAYS          0         0     CS  CONTROL    0000 0000 0
S STATUS SCAN RING 0000     0     CS  ARRAY      0000 0000 0000 0000 00
K CHECKS IN SYSTEM 00       0  0  CHN DATA BUFFER 0000 00
I PU HARDWARE     0         0  00 CHN CONTROL    0000 00
B CS HARDWARE     0         0     CHN INTERFACE  00
M MS HARDWARE     00000000  0     STG CACHE/DATA 0000 0000 0000 00
H CHANNEL HARDWARE 00       0     STG BSM        0000 0000
C CHANNEL INTRFACE 00       00    STG SAR/KEY    0000 00
X EXTERNAL REGS   00        00    STG DLAT/DIR   0000 0000 0000
R SCAN RING       00        0  00 PU  DATA FLOW  0000 0000 0000 0000 0000
Y CLOCK SCAN RING 0         0  0  PU  SAR        0000 0000 00
W COMMAND SBA-CAC 0         0  00 PU  DF CONTROL 0000 0000
T ADDRESS TRANSLAT 0        0  0  PU  SHIFTER    0000
G SET CSAR ADDRESS 0        0  0  PU  I-CYCLES   0000 0
                  0         0  0  PU  INTERRUPTS 000
Q GENERAL SELECT  0         0  00 PU  TIMER      000
Z RTRN TO PROG SYS 0        0     CLK CLOCK      000
SELECTION: K                                     ==>
                                         CLOCK STOP
                                                4341
```

---

7. Alter data as desired and press ENTER.

   Example: QVK15=1..F1F

   ```
   | └─(4) Hex data
   └──(3) Op code
   └───(2) Digit of a field number
   └────(1) Digit of a field number
   ```

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter Checks in System.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s)*

- *The check fields are numbered (1-17) top to bottom on the screen.*

- *A W-command also stops the PU clock.*

- *The last eight digits of Field 2 are unalterable and remain at zero.*

Label Identification

SYSCKS: A summary of the DETAIL LATCHES on the same line. Error conditions that occur on the DETAIL LATCHES are carried over to the appropriate SYSCKS latch. A 1 indicates an error condition. A 0 represents a normal condition.

D: Disables the SYSCKS latch. A 1 indicates SYSCKS is disabled. A 0 represents a normal condition.

F: Prevents a hardware portion from becoming inactive when an error condition is present.
A 1 keeps the hardware portion active if an error condition is present. A 0 causes the hardware portion to become inactive if an error condition occurs.

CARD/AREA: Identifies the name of the hardware portion for which the error indicators are in effect.

DETAIL LATCHES: Represent a low-level error. A 1 indicates an error condition. A 0 represents a normal condition.

INSERT/EXTRACT CHECKS IN SYSTEM (QVK) (GRP 1)

Display Checks in System

To display the Checks in System screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key K next to SELECTION.

4. Press ENTER.

Alter Checks in System

Note: *This screen cannot be full-screen altered.*

Save Checks in System

The data from the Checks in System screen can be saved by the Block function. The format is QVKxx? where xx is a line number on the screen. It is left-adjusted in the Save area. Only one line can be saved per selection.

Note: *The facilities (field number) are numbered (1-17) top to bottom of the screen.*

Check Reset

To reset all the detail latches:

1. Key QVKR next to SELECTION.

2. Press ENTER.

Fast Alter Checks in System

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVK next to SELECTION followed by:

   (1) A high-order decimal digit of a field number.
   (2) A low-order decimal digit of a field number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the the selected address.

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```
*INSERT/EXTRACT*  CHECK AND DISABLE (QVK)     FIELDS 1-17
                    SYSCKS  D  F  CARD/AREA       DETAIL LATCHES
A ARRAYS             0      0     CS  CONTROL     0000 0000 0
S STATUS SCAN RING   0000   0     CS  ARRAY       0000 0000 0000 0000 00
K CHECKS IN SYSTEM   00     0  C   CHN DATA BUFFER 0000 00
I PU HARDWARE        0      0  00  CHN CONTROL     0000 00
B CS HARDWARE        0      0     CHN INTERFACE    00
M MS HARDWARE        0000   0     STG CACHE/DATA   0000 0000 000
H CHANNEL HARDWARE   00     0     STG CONTROL      0000
C CHANNEL INTRFACE   00     00    STG SAR/KEY      000
X EXTERNAL REGS      00     00    STG DLAT/DIR     0000 00
R SCAN RING          00     0  FF PU DATA FLOW     0000 0000 0000 0000 0000
Y CLOCK SCAN RING    0      0  0  PU SAR           000
W COMMAND SBA-CAC    0      0  00 PU DF CONTROL    0000 0000
T ADDRESS TRANSLAT   0      0  0  PU SHIFTER       0000
G SET CSAR ADDRESS   0      0  8  PU I CYCLES      0000 0
          .          0      0  C  PU INTERRUPTS    000
Q GENERAL SELECT     0      0  00 PU TIMER         000
Z RTRN TO PROG SYS   0      0     CLK CLOCK        000
SELECTION: K                                     ==>
                                       CLOCK STOP
                                             4341
```

---

7. Alter data as desired and press ENTER.

   Example: QVK15=1..F1F
   - └─*(4) Hex data*
   - ├─*(3) Op code*
   - ├──*(2) Digit of a field number*
   - └───*(1) Digit of a field number*

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter Checks in System.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s)*

- *The check fields are numbered (1-17) top to bottom on the screen.*

- *A W-command also stops the PU clock.*

- *The last eight digits of Field 2 are unalterable and remain at zero.*

Label Identification

SYSCKS: A summary of the DETAIL LATCHES on the same line. Error conditions that occur on the DETAIL LATCHES are carried over to the appropriate SYSCKS latch. A 1 indicates an error condition. A 0 represents a normal condition.

D: Disables the SYSCKS latch. A 1 indicates SYSCKS is disabled. A 0 represents a normal condition.

F: Prevents a hardware portion from becoming inactive when an error condition is present.
A 1 keeps the hardware portion active if an error condition is present. A 0 causes the hardware portion to become inactive if an error condition occurs.

CARD/AREA: Identifies the name of the hardware portion for which the error indicators are in effect.

DETAIL LATCHES: Represent a low-level error. A 1 indicates an error condition. A 0 represents a normal condition.

Use with microcode EC 154322 and above

EC 379598 15Apr80	PN 5666387	44 445
EC 379807 22Sep80	1 of 1	

INSERT/EXTRACT PU HARDWARE (QVI) (GRP 2)

Display PU Hardware

To display the PU Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key I next to SELECTION.
4. Press ENTER.

Notes:

- *The PU Hardware control facilities (some are individual latches) are displayed on the screen.*
- *The display can be fast selected by keying QVI instead of I if selection from any other QV screen.*

Alter PU Hardware

Note: *This screen cannot be full-screen altered.*

Save PU Hardware

The data from the PU Hardware screen can be saved by the Block function. The format is QVIxx? where xx is a field number on the screen. Only one field can be saved per selection.

```
*INSERT/EXTRACT*  PU HARDWARE (QVI)
                                    *** PU REGS ***              FIELDS 1-19
A ARRAYS            FF FF FF FF FF FF FF FF A(AREG) 0000 0000 0000 0000 CREG
S STATUS SCAN RING  00 00 00 00 00 00 00 00 DFCAREG 0000 0000 0000 0000 SFIBB
K CHECKS IN SYSTEM  00 00 00 00 00 00 00 00 DFBREG  0000 0000 0000 0000 SFIB
I PU HARDWARE       FF FF FF FF FF FF FF FF DFDREG            0000 0000 NIB
B CS HARDWARE       00 00 00 00 00 00 00 00 MQREG   00 INDIR0        0 SFPDC
M MS HARDWARE       0000 DESTFLAG  00 00 00 GREG    00 INDIR1       00 PADFLG
H CHANNEL HARDWARE  8000 TRPOP        00 00 00 XLATSAR 00 RDWRFLG 00 0000 AUXSTBDY
C CHANNEL INTRFACE
X EXTERNAL REGS                     *** PU CONTROLS ***          FIELDS 20-26
R SCAN RING         E  D  C  B  J                           0 0000 ICYCTRL
Y CLOCK SCAN RING   80 80 80 80 80                            0000 TRPCTRL
W COMMAND SBA-CAC   00 00 00 00 00 EXTADR                 F 0000 0000 TPULSES
T ADDRESS TRANSLAT  00 00 00 00 00 RTYADR                          0 CCLKCTRL
G SET CSAR ADDRESS
                                    *** SYSTEM CHECKS ***      FIELD 27
Q GENERAL SELECT                    0000 0000 SYSCKS
Z RTRN TO PROG SYS
SELECTION: I                                 ==>
                                        CLOCK STOP
                                                 4341
```

Fast Alter PU Hardware

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVI next to SELECTION followed by:
   - (1) A high-order decimal digit of a field number.
   - (2) A low-order decimal digit of a field number.
   - (3) Op code = (MOVE), & (AND), / (OR).
   - (4) Hex data.
5. Press ENTER.
6. Verify that the data displayed after the OP code is from the selected address.
7. Alter data as desired and press ENTER.

   Example: QVI01=F..2..F3
   - *(4) Hex data*
   - *(3) Op code*
   - *(2) Digit of a field number*
   - *(1) Digit of a field number*

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter PU Hardware.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*
- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*
- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s)*
- *The facilities (field number) are numbered in decimal, left to right and top to bottom, on the screen.*
- *A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.*
- *A W-command also stops the PU clock.*

Label Identification

1. **A(AREG)**: Eight-byte PU register.

2. **CREG**: Contains two four-byte control words.

   Even word (byte 0-3) if CSAR bit 21 = 0.

   Odd word (byte 4-7) if CSAR bit 21 = 1.

3. **DFCAREG**: Same as the A-reg, except dedicated to channel operation only.

4. **SFIBB**: IB buffer. Bytes 2-7 are used.

5. **DFBREG**: B-register.

6. **SFIB**: Instruction buffer.

7. **DFDREG**: Data register in the PU.

8. **NIB**: Instruction buffer.

9. **MQREG**: Multiply and divide register.

10. **INDIR0**: Indirect register 0 (I0).

Bits 0-3	LS Section
1000	PU
0000/0001	PU
1010	Ch-1
1011	Ch-2
1100	Ch-3
1101	Ch-4
1110	Ch-5
1111	Ch-0

    Bit 0 = 0 for indirect addressing.

    Bit 0 = 1 for direct addressing.

11. **SFPDC**: One digit (four bits) called the *digit catcher.*

12. **DESTFLAG**: Two bytes containing a bit for each byte in the DREG. Byte 0 should be the same as byte 1. Byte 1 must duplicate byte 0. This flag controls the D-reg destination.

13. **GREG**: Register used for storage addressing (updating and displacement), parallel address update, I-cycle B and D and B+D+X, cache ACB, and calculating channel-end address.

14. **INDIR1**: Indirect register 1 (I1).

Bits 1-3	LS Section
000	PU
001	PU
010	Ch-1
011	Ch-2
100	Ch-3
101	Ch-4
110	Ch-5
111	Ch-0

15. **PADFLG**: Controls the shifter control.

16. **TRPOP**: Two-byte address forced into CSAR at the next Trap routine.

17. **XLATSAR**: Segment table entry address or page table entry address.

18. **RDWRFLG**: A bit for each byte to be gated through the shifter control where a 1 is for an active condition and a 0 for an inactive condition.

19. **AUXSTBDY**: The first real address not accessible to user programs. Bits 13-23 are unused.

20. **ICYCTRL**: Engineering data.

21. **LSADR**: Five bytes should always be equal and each byte consist of bits 0-2 for a control line and bits 3-7 for an address. If bit 0 is a 1, there is no local storage destination and thus no address.

22. **TRPCTRL**: Engineering data.

23. **EXTADR**: Five bytes should always be equal and each byte consist of bits 0-4 for a control line and bits 5-7 for an address. If bit 0 is a 1, there is no external destination, and thus no address.

24. **TPULSES**: A bit for each clock pulse (T0-T7) beginning with the second bit. The first bit represents the 'last pulse'.

25. **RTYADR**: Five bytes should always be equal and each byte consist of bits 0-2 for a control line and bits 3-7 for an address. If bit 0 is a 1, there is no retry and thus no address.

26. **CCLKCTRL**: Engineering data.

27. **SYSCKS**: Number of checks logged on the QVK screen.

INSERT/EXTRACT PU HARDWARE (QVI) (GRP 2)

Display PU Hardware

To display the PU Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key I next to SELECTION.

4. Press ENTER.

Notes:

- *The PU Hardware control facilities (some are individual latches) are displayed on the screen.*

- *The display can be fast selected by keying QVI instead of I if selection from any other QV screen.*

Alter PU Hardware

Note: *This screen cannot be full-screen altered.*

Save PU Hardware

The data from the PU Hardware screen can be saved by the Block function. The format is QVIxx? where xx is a field number on the screen. Only one field can be saved per selection.

```
*INSERT/EXTRACT*  PU HARDWARE (QVI)
                                    *** PU REGS ***              FIELDS 1-19
A ARRAYS           FF FF FF FF FF FF FF FF A(AREG) 0000 0000 0000 0000 CREG
S STATUS SCAN RING 00 00 00 00 00 00 00 00 DFCAREG 0000 0000 0000 0000 SFIBB
K CHECKS IN SYSTEM 00 00 00 00 00 00 00 00 DFBREG  0000 0000 0000 0000 SFIB
I PU HARDWARE      FF FF FF FF FF FF FF FF DFDREG            0000 0000 NIB
B CS HARDWARE      00 00 00 00 00 00 00 00 MQREG   00 INDIRO         0 SFPDC
M MS HARDWARE      0000 DESTFLAG 00 00 00 GREG     00 INDIR1        00 PADFLG
H CHANNEL HARDWARE 8000 TRPOP       00 00 00 XLATSAR 00 RDWRFLG  00 0000 AUXSTBDY
C CHANNEL INTRFACE
X EXTERNAL REGS                     *** PU CONTROLS ***          FIELDS 20-26
R SCAN RING        E  D  C  B  J                              0 0000 ICYCTRL
Y CLOCK SCAN RING  80 80 80 80 80 LSADR                         0000 TRPCTRL
W COMMAND SBA-CAC  00 00 00 00 00 EXTADR                   F 0000 0000 TPULSES
T ADDRESS TRANSLAT 00 00 00 00 00 RTYADR                             0 CCLKCTRL
G SET CSAR ADDRESS
                                   *** SYSTEM CHECKS ***       FIELD 27
Q GENERAL SELECT                       0000 0000 SYSCKS
Z RTRN TO PROG SYS
SELECTION: I                              ==>
                                       CLOCK STOP
                                              4341
```

Fast Alter PU Hardware

To fast alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVI next to SELECTION followed by:

   (1) A high-order decimal digit of a field number.
   (2) A low-order decimal digit of a field number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the selected address.

7. Alter data as desired and press ENTER.

   Example: QVI01=F..2..F3
   └─*(4) Hex data*
   └─*(3) Op code*
   └─*(2) Digit of a field number*
   └─*(1) Digit of a field number*

To fast alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter PU Hardware.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s)*

- *The facilities (field number) are numbered in decimal, left to right and top to bottom, on the screen.*

- *A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

Model Group 2

Label Identification

1. **A(AREG)**: Eight-byte PU register.

2. **CREG**: Contains two four-byte control words.

   Even word (byte 0-3) if CSAR bit 21 = 0.

   Odd word (byte 4-7) if CSAR bit 21 = 1.

3. **DFCAREG**: Same as the A-reg, except dedicated to channel operation only.

4. **SFIBB**: IB buffer. Bytes 2-7 are used.

5. **DFBREG**: B-register.

6. **SFIB**: Instruction buffer.

7. **DFDREG**: Data register in the PU.

8. **NIB**: Instruction buffer.

9. **MQREG**: Multiply and divide register.

10. **INDIR0**: Indirect register 0 (I0).

Bits 0-3	LS Section
1000	PU
0000/0001	PU
1010	Ch-1
1011	Ch-2
1100	Ch-3
1101	Ch-4
1110	Ch-5
1111	Ch-0

    Bit 0 = 0 for indirect addressing.

    Bit 0 = 1 for direct addressing.

11. **SFPDC**: One digit (four bits) called the *digit catcher*.

12. **DESTFLAG**: Two bytes containing a bit for each byte in the DREG. Byte 0 should be the same as byte 1. Byte 1 must duplicate byte 0. This flag controls the D-reg destination.

13. **GREG**: Register used for storage addressing (updating and displacement), parallel address update, I-cycle B and D and B+D+X, cache ACB, and calculating channel-end address.

14. **INDIR1**: Indirect register 1 (I1).

Bits 1-3	LS Section
000	PU
001	PU
010	Ch-1
011	Ch-2
100	Ch-3
101	Ch-4
110	Ch-5
111	Ch-0

15. **PADFLG**: Controls the shifter control.

16. **TRPOP**: Two-byte address forced into CSAR at the next Trap routine.

17. **XLATSAR**: Segment table entry address or page table entry address.

18. **RDWRFLG**: A bit for each byte to be gated through the shifter control where a 1 is for an active condition and a 0 for an inactive condition.

19. **AUXSTBDY**: The first real address not accessible to user programs. Bits 13-23 are unused.

20. **ICYCTRL**: Engineering data.

21. **LSADR**: Five bytes should always be equal and each byte consist of bits 0-2 for a control line and bits 3-7 for an address. If bit 0 is a 1, there is no local storage destination and thus no address.

22. **TRPCTRL**: Engineering data.

23. **EXTADR**: Five bytes should always be equal and each byte consist of bits 0-4 for a control line and bits 5-7 for an address. If bit 0 is a 1, there is no external destination, and thus no address.

24. **TPULSES**: The first bit represents the 'last pulse'. A bit for each clock pulse (T0-T7) beginning with the second bit.

25. **RTYADR**: Five bytes should always be equal and each byte consist of bits 0-2 for a control line and bits 3-7 for an address. If bit 0 is a 1, there is no retry and thus no address.

26. **CCLKCTRL**: Engineering data.

27. **SYSCKS**: Number of checks logged on the QVK screen.

INSERT/EXTRACT CONTROL STORAGE HARDWARE (QVB)

Display Control Storage Hardware

To display the Control Storage Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key B next to SELECTION.
4. Press ENTER.

Notes:

- *The Control Storage Hardware facilities (not shown on another screen) are displayed on this screen in hex or binary whichever is applicable for that particular facility.*

- *The display can be fast-selected by keying QVB instead of B if selection is from any other QV screen.*

Alter Control Storage Hardware

Note: *This screen cannot be full-screen altered.*

Save Control Storage Hardware

The data from the Storage Hardware screen can be saved by the Block function. The format is QVBxx?, where xx is a field number on the screen. Only one field can be saved per selection.

```
*INSERT/EXTRACT*  CS HARDWARE (QVB)                      FIELDS 01-12

                   0980 1B40 0940 1B40 CREG    00 2000 CSAR      0 CSARE
A ARRAYS           0000 0000 0000 0000 DATAIN  00 0040 CSARD     0 BLKCSAR
S STATUS SCAN RING      00 0000 0000 ODD       00 2000 CSARBU   00 BLKCREG
K CHECKS IN SYSTEM      FF FFFF FFFF EVEN      00 9830 SAVEREG  00 BLKOE
I PU HARDWARE                                          FIELDS 13-23
B CS HARDWARE                         0 CSAR21 00 0000 TRACEREG 14 TRADR
M MS HARDWARE      FF READ  000 0000 BLKERR    00 0000 MATCHREG 14 CNTR
H CHANNEL HARDWARE 3 TBADR      1800 CNTL      00 0000 CLKGATE  00 USE21
C CHANNEL INTRFACE
X EXTERNAL REGS
R SCAN RING
Y CLOCK SCAN RING
W COMMAND SBA-CAC
T ADDRESS TRANSLAT
G SET CSAR ADDRESS

Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: B                         ==>
                              CLOCK STOP
                                     4341
```
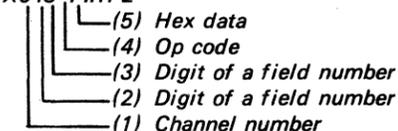
Fast-Alter Control Storage Hardware

To fast-alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOB next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVB next to SELECTION followed by:
   - (1) A high-order decimal digit of a field number.
   - (2) A low-order decimal digit of a field number.
   - (3) Op code = (MOVE), & (AND), / (OR).
   - (4) Hex data.
5. Press ENTER.
6. Verify that the data displayed after the OP code is from the selected address.
7. Alter data as desired and press ENTER.

   Example: QVB01=F..1F2.F3
   ```
                 └─(4) Hex data
               └──(3) Op code
            └─────(2) Digit of a field number
         └────────(1) Digit of a field number
   ```

To fast-alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of "Fast-Alter Control Storage Hardware."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered in decimal, left to right and top to bottom, on the screen.*

- *A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

Label Identification

1. **CREG:** Two four-byte control words. Even word (byte 0-3) used if the even latch is on. Odd word (byte 4-7) used if the odd latch is on.

2. **CSAR:** Along with CSARD and CSARE, make up the microword address.

3. **CSARE:** Along with CSAR and CSARD, make up the microword address.

4. **DATAIN:** Eight-byte scan-in register used to load the microcode into the control array.

5. **CSARD:** Along with CSAR and CSARE, make up the microword address.

6. **BLKCSAR:** Determines whether or not the CSAR is blocked.

7. **ODD:** All bits are set to 1 when the odd latch is on.

8. **CSARBU:** Contains the address of the microword currently being executed.

9. **BLKCREG:** Consists of eight bits and determines whether or not the C-register is blocked.

10. **EVEN:** All bits are set to 1 when the even latch is on.

11. **SAVEREG:** Data-in register for the Trace and Trap/BAL arrays. SAVEREG normally contains the address of the microword previously executed.

12. **BLKOE:** Indicates whether the odd or even latch is to be blocked.

13. **CSAR21:** Set when the CSAR address bit 21 is on and used with USE21 to set the odd latch.

14. **TRACEREG:** Contains the CSAR address in the trace register.

15. **TRADR:** Indicates the trace address.

16. **READ:** Byte set to ones in read mode.

17. **BLKERR:** Scan-only latches that may be used to block the setting of the error latches.

18. **MATCHREG:** Address to be matched for a stop condition.

19. **CNTR:** Trace array counter.

20. **TBADR:** Two-bit address of the Trap/BAL array with values for the trap levels of 0, 1, 2, or 3.

21. **CNTL:** Bit sensitive bytes: (56K control store)

BYTE 0

Bit	0	GATEOES	Bit	4	MODSW
	1	GATEOEM		5	STGWD
	2	GATEOEL		6	FINETRC
	3	TARGET		7	TRAPFLAG

BYTE 1

Bit	0	BALFLAG	Bit	4	BLKCSARH
	1	BLKSAVE		5	0
	2	IB		6	0
	3	BLKCSARL		7	0

CNTL: Bit sensitive bytes: (64/80K control store)

BYTE 0

Bit	0	0	Bit	4	MODSW
	1	0		5	STGWD
	2	0		6	FINETRC
	3	TARGET		7	TRAPFLAG

BYTE 1

Bit	0	BALFLAG	Bit	4	BLKCSAR(2)
	1	BLKSAVE		5	BLKCSAR(3)
	2	IB		6	0
	3	BLKCSAR(1)		7	0

22. **CLKGATE:** Control store clock gate.

23. **USE21:** Eight-bit control line that sets the odd or even latch.

INSERT/EXTRACT MAIN STORAGE HARDWARE (QVM) (GRP 2)

Display Main Storage Hardware

To display the Main Storage Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key M next to SELECTION.

4. Press ENTER.

Notes:

- *The Main Storage Hardware facilities (not shown on another screen) are displayed on this screen in hex or binary whichever is applicable for that particular facility.*

- *The display can be fast selected by keying QVM instead of M if selection is from any other QV screen.*

Alter Main Storage Hardware

Note: *This screen cannot be full-screen altered.*

Save Main Storage Hardware

The data from the Main Storage Hardware screen can be saved by the Block function. The format is QVMxx? where xx is a field number on the screen. Only one field can be saved per selection.

```
*INSERT/EXTRACT*   MS HARDWARE (QVM)                              FIELDS 01-14
                   FFFF FFFF FFFF FFFF A           FFFF FFFF FFFF FFFF DFDREG
A ARRAYS           0000 0000 0000 0000 DREG01      0000 0000 0000 0000 DREG10
S STATUS SCAN RING 0000 0000 0000 0000 DREG23      0000 0000 0000 0000 DREG32
K CHECKS IN SYSTEM 0000 0000 0000 0000 DREG45      0000 0000 0000 0000 DREG54
I PU HARDWARE      0000 0000 0000 0000 DREG67      0000 0000 0000 0000 DREG76
B CS HARDWARE      00 0000 0000 0000 0000 ECMDRE   00 0000 0000 0000 0000 ECMDRO
M MS HARDWARE      00 0000 0000 0000 0000 ECRE     00 0000 0000 0000 0000 ECRO
H CHANNEL HARDWARE                                              FIELDS 15-34
C CHANNEL INTRFACE 0000 0000 0000 0000 DIRRA03     0000 0000 0000 0000 DIRRA47
X EXTERNAL REGS    0000 0000 DIRRAHL 000 0000 0000 DLDIST   00 0000 BSMST
R SCAN RING             0000 DIRRADDR      0000 0000 DLTRAASM 00 0000 BSMADR
Y CLOCK SCAN RING  00 0000 SAR              00 0000 DLATVA   00 0000 BSMDXCYC
W COMMAND SBA-CAC  00 0000 VACMPR         0000 0000 KEYS        00 CMDREG
T ADDRESS TRANSLAT 00 0000 RACMPR           00 0000 RTYCTL     00 STRTADR
G SET CSAR ADDRESS 00 0000 ACBCMPR        0000 0000 SYSCKS     00 STOPADR
                                                               FIELDS 35-37
Q GENERAL SELECT   0000 0000 SLOTHIT          0 CYCRING        0 CHID
Z RTRN TO PROG SYS
SELECTION: M                                   ==>
                                        CLOCK STOP
                                               4341
```

Fast Alter Main Storage Hardware

To Fast Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVM next to SELECTION followed by:

   (1) A high-order decimal digit of a field number.
   (2) A low-order decimal digit of a field number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the selected address.

7. Alter data as desired and press ENTER.

   Example: QVM01=F..1F2.F3
   — (4) Hex data
   — (3) Op code
   — (2) Digit of a field number
   — (1) Digit of a field number

To Fast Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter Main Storage Hardware.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered in decimal, left to right and top to bottom, on the screen.*

- *A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

Label Identification

1. **A(AREG)**: PU A-reg.

2. **DFDREG**: PU D-reg.

3. **DREG01**: Cache data input/output data register. Eight-byte field associativity class 0.

4. **DREG10**: Cache data input/output data register. Eight-byte field associativity class 1.

5. **DREG23**: Cache data input/output data register. Eight-byte field associativity class 2.

6. **DREG32**: Cache data input/output data register. Eight-byte field associativity class 3.

7. **DREG45**: Cache data input/output data register. Eight-byte field associativity class 4.

8. **DREG54**: Cache data input/output data register. Eight-byte field associativity class 5.

9. **DREG67**: Cache data input/output data register. Eight-byte field associativity class 6.

10. **DREG76**: Cache data input/output data register. Eight-byte field associativity class 7.

11. **ECMDRE**: Even half main data register for the BSM and its input into the ECC logic. Extra byte is for check bits.

12. **ECMDRO**: Odd half main data register for the BSM and its input into the ECC logic. Extra byte is for check bits.

13. **ECRE**: Even half ECC register and its output of the ECC logic.

14. **ECRO**: Odd half ECC register and its output of the ECC logic.

15. **DIRRA03**: First through fourth 2-byte fields contain real address with bits 0-12 (bits 13-15 are zero) for Directory associativity classes 0, 1, 2, and 3, respectively.

16. **DIRRA47**: Fifth through eighth 2-byte fields contain real address with bits 0-12 (bits 13-15 are zero) for Directory associativity classes 4, 5, 6, and 7, respectively.

17. **DIRRAHL**: High-order two bytes contain real address bits 0-12 (bits 13-15 are zero) from Directory if a match occurred in one of the associativity classes 0-3. Low-order two bytes contain real address bits 0-12 (bits 13-15 are zero) from Directory if a match occurred in one of the associativity classes 4-7.

18. **DLDIST**: DLAT and directory status.

    Digit 1 - Bit 1 is Chan DLAT valid status bit.

    Digit 2 - Bits 4, 2, 1 (PU DLAT0 Stat) valid, real, and ACB bad, respectively.

    Digit 3 - Bits 4, 2, 1 (PU DLAT1 Stat) valid, real, and ACB bad, respectively.

    Digit 4 - Bits 4, 2, 1 (DIR 0 Stat) bad entry, invalid, and modified, respectively.

    Digit 5 - Directory 1 status bad entry, invalid, and modified, respectively.

    Digit 6 - Directory 2 status bad entry, invalid, and modified, respectively.

    Digit 7 - Directory 3 status bad entry, invalid, and modified, respectively.

19. **BSMST**:

Digit 1	Bit 1	Unused
	Bit 2	Unused
	Bit 3	SBE stop
	Bit 4	Inhibit ECC
Digit 2	Bit 1	Unused
	Bit 2	Fetch gate
	Bit 3	Out page
	Bit 4	Busy

20. **DIRRADDR**: Bits 0-12 of the real address (bits 13-15 are zero).

21. **DLKYRASM**: Bits 0-12 of the real address (bits 13-15 are zero) read from the DLAT if there was a match.

22. **BSMADR**: Address register for main storage. Bits 0 and 18-23 are unused. It is the actual, rather than the translated, address which is determined by the IML microcode.

23. **SAR**: Storage address register.

24. **DLATVA**:

    Digit 0 - Unused

    Digit 1 - Bits used for Ch-DLAT bits 8-11

    Digit 2 - DLAT0 virtual address

    Digit 3 - DLAT0 virtual address

    Digit 4 - DLAT1 virtual address

    Digit 5 - DLAT1 virtual address

25. **BSMDXCYC**:

    Digit 0 and 1 - DXR 0-7

    Digit 2 and 3 - DXR 0-7B

    Digit 4 and 5 - DXR 0-7D

    Digit 6 and 7 - Six-bit BSM ctrl ring (rt. adj.)

26. **VACMPR**: Address for virtual address match. Bits 21-23 are not used.

27. **KEYS**:

    Digit 1 - PU Key
    Digit 2 - KEYSTACK Key
    Digit 3 - DLAT0 Key
    Digit 4 - DLAT1 Key
    Digit 5 - KEYSTACK

	Bit 0	Unused
	Bit 1	Reference
	Bit 2	Change
	Bit 3	Fetch Protect.
Digit 6	Bit 0	Dlat0 Fetch Protect
	Bit 1	Dlat0 Parity
	Bit 2	Dlat1 Fetch Protect
	Bit 3	Dlat1 Parity.

Digit 7	Bit 0	PU Key Parity Check
	Bit 1	Keystack Protect Check
	Bit 2	Dlat Protect Check
	Bit 3	Keystack Protect Check.

    Digit 8 - Unused; always zero.

28. **CMDREG**: Five-bit storage command register. It has the same order as the command bus (0, 1, 2, 3, and 4 Real).

29. **RACMPR**: Address for real storage address match. Bits 0 and 21-23 are not used.

30. **RTYCTL**:

    Digit 0 and 1 - Retry flags

    Digit 2 and 3 - Retry counter look-ahead (right adjusted)

Digit 4	Bit 0	Cross doubleword boundary — first cycle
	Bit 1	Cross doubleword boundary — second cycle
	Bit 2	Hold count
	Bit 3	Retry active.
Digit 5	Bit 0	Unused
	Bit 1	Unused
	Bit 2	DLAT trap — first cycle
	Bit 3	Retry overflow.

31. **STRTADR**: Starting storage address for channel data. Bits correspond to real address bits 18-23, left justified.

32. **ACBCMPR**: Compare address used to determine if user has exceeded real storage. Bits 13-23 are unused.

33. **SYSCKS**: Checks on QVK screen

34. **STOPADR**: Stopping storage address for channel data. Bits correspond to real address bits 18-23, left justified.

35. **SLOTHIT**: Displays the Directory Associativity class as captured on each of the cache cards. An 'F' in a digit position indicates that the cache is working with data from that associativity class.

Digit 1	Associativity class 1
Digit 2	Associativity class 2
Digit 3	Associativity class 3
Digit 4	Associativity class 4
Digit 5	Associativity class 5
Digit 6	Associativity class 6
Digit 7	Associativity class 7

36. **CYCRING**:

Bit 0	Prime cycle
Bit 1	S1 cycle
Bit 2	S2 cycle
Bit 3	Follow cycle.

37. **CHID**: Channel ID register (right adjusted).

INSERT/EXTRACT MAIN STORAGE HARDWARE (QVM) (GRP 2)

Display Main Storage Hardware

To display the Main Storage Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key M next to SELECTION.
4. Press ENTER.

Notes:

- *The Main Storage Hardware facilities (not shown on another screen) are displayed on this screen in hex or binary whichever is applicable for that particular facility.*

- *The display can be fast selected by keying QVM instead of M if selection is from any other QV screen.*

Alter Main Storage Hardware

Note: *This screen cannot be full-screen altered.*

Save Main Storage Hardware

The data from the Main Storage Hardware screen can be saved by the Block function. The format is QVMxx? where xx is a field number on the screen. Only one field can be saved per selection.

```
*INSERT/EXTRACT*   MS HARDWARE (QVM)                              FIELDS 01-14
                   FFFF FFFF FFFF FFFF A           FFFF FFFF FFFF FFFF DFDREG
A  ARRAYS          0000 0000 0000 0000 DREG01      0000 0000 0000 0000 DREG10
S  STATUS SCAN RING 0000 0000 0000 0000 DREG23     0000 0000 0000 0000 DREG32
K  CHECKS IN SYSTEM 0000 0000 0000 0000 DREG45     0000 0000 0000 0000 DREG54
I  PU HARDWARE      0000 0000 0000 0000 DREG67     0000 0000 0000 0000 DREG76
B  CS HARDWARE    00 0000 0000 0000 0000 ECMDRE  00 0000 0000 0000 0000 ECMDRO
M  MS HARDWARE    00 0000 0000 0000 0000 ECRE    00 0000 0000 0000 0000 ECRO
H  CHANNEL HARDWARE                                            FIELDS 15-34
C  CHANNEL INTRFACE 0000 0000 0000 0000 DIRRA03     0000 0000 0000 0000 DIRRA47
X  EXTERNAL REGS    0000 0000 DIRRAHL  000 0000 0000 DLDIST   00 0000 BSMST
R  SCAN RING        0000 DIRRADDR       0000 0000 DLTRAASM     00 0000 BSMADR
Y  CLOCK SCAN RING 00 0000 SAR          00 0000 DLATVA        00 0000 BSMDXCYC
W  COMMAND SBA-CAC 00 0000 VACMPR       0000 0000 KEYS           00 CMDREG
T  ADDRESS TRANSLAT 00 0000 RACMPR      00 0000 RTYCTL          00 STRTADR
G  SET CSAR ADDRESS 00 0000 ACBCMPR     0000 0000 SYSCKS         00 STOPADR
                                                           FIELDS 35-37
Q  GENERAL SELECT   0000 0000 SLOTHIT          0 CYCRING       0 CHID
Z  RTRN TO PROG SYS
SELECTION: M                                  ==>
                                    CLOCK STOP
                                          4341
```

Fast Alter Main Storage Hardware

To Fast Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVM next to SELECTION followed by:

   (1) A high-order decimal digit of a field number.
   (2) A low-order decimal digit of a field number.
   (3) Op code = (MOVE), & (AND), / (OR).
   (4) Hex data.

5. Press ENTER.
6. Verify that the data displayed after the OP code is from the selected address.
7. Alter data as desired and press ENTER.

   Example: QVM01=F..1F2.F3
   ```
                  ├──(4) Hex data
              ├────(3) Op code
           ├───────(2) Digit of a field number
        ├──────────(1) Digit of a field number
   ```

To Fast Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter Main Storage Hardware.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered in decimal, left to right and top to bottom, on the screen.*

- *A period (.) is a digit place holder in the hex data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

Label Identification

1. **A(AREG)**: PU A-reg.

2. **DFDREG**: PU D-reg.

3. **DREG01**: Cache data input/output data register. Eight-byte field associativity class 0.

4. **DREG10**: Cache data input/output data register. Eight-byte field associativity class 1.

5. **DREG23**: Cache data input/output data register. Eight-byte field associativity class 2.

6. **DREG32**: Cache data input/output data register. Eight-byte field associativity class 3.

7. **DREG45**: Cache data input/output data register. Eight-byte field associativity class 4.

8. **DREG54**: Cache data input/output data register. Eight-byte field associativity class 5.

9. **DREG67**: Cache data input/output data register. Eight-byte field associativity class 6.

10. **DREG76**: Cache data input/output data register. Eight-byte field associativity class 7.

11. **ECMDRE**: Even half main data register for the BSM and its input into the ECC logic. Extra byte is for check bits.

12. **ECMDR0**: Odd half main data register for the BSM and its input into the ECC logic. Extra byte is for check bits.

13. **ECRE**: Even half ECC register and its output of the ECC logic.

14. **ECR0**: Odd half ECC register and its output of the ECC logic.

15. **DIRRA03**: First through fourth 2-byte fields contain real address with bits 0-12 (bits 13-15 are zero) for Directory associativity classes 0, 1, 2, and 3, respectively.

16. **DIRRA47**: Fifth through eighth 2-byte fields contain real address with bits 0-12 (bits 13-15 are zero) for Directory associativity classes 4, 5, 6, and 7, respectively.

17. **DIRRAHL**: High-order two bytes contain real address bits 0-12 (bits 13-15 are zero) from Directory if a match occurred in one of the associativity classes 0-3. Low-order two bytes contain real address bits 0-12 (bits 13-15 are zero) from Directory if a match occurred in one of the associativity classes 4-7.

18. **DLDIST**: DLAT and directory status.

    Digit 1 - Bit 1 is Chan DLAT valid status bit.

    Digit 2 - Bits 4, 2, 1 (PU DLAT0 Stat) valid, real, and ACB bad, respectively.

    Digit 3 - Bits 4, 2, 1 (PU DLAT1 Stat) valid, real, and ACB bad, respectively.

    Digit 4 - Bits 4, 2, 1 (DIR 0 Stat) bad entry, invalid, and modified, respectively.

    Digit 5 - Directory 1 status bad entry, invalid, and modified, respectively.

    Digit 6 - Directory 2 status bad entry, invalid, and modified, respectively.

    Digit 7 - Directory 3 status bad entry, invalid, and modified, respectively.

19. **BSMST**:

Digit 1	Bit 1	Unused
	Bit 2	Unused
	Bit 3	SBE stop
	Bit 4	Inhibit ECC
Digit 2	Bit 1	Unused
	Bit 2	Fetch gate
	Bit 3	Out page
	Bit 4	Busy

20. **DIRRADDR**: Bits 0-12 of the real address (bits 13-15 are zero).

21. **DLKYRASM**: Bits 0-12 of the real address (bits 13-15 are zero) read from the DLAT if there was a match.

22. **BSMADR**: Address register for main storage. Bits 0 and 18-23 are unused. It is the actual, rather than the translated, address which is determined by the IML microcode.

23. **SAR**: Storage address register.

24. **DLATVA**:

    Digit 0 - Unused

    Digit 1 - Bits used for Ch-DLAT bits 8-11

    Digit 2 - DLAT0 virtual address

    Digit 3 - DLAT0 virtual address

    Digit 4 - DLAT1 virtual address

    Digit 5 - DLAT1 virtual address

25. **BSMDXCYC**:

    Digit 0 and 1 - DXR 0-7

    Digit 2 and 3 - DXR 0-7B

    Digit 4 and 5 - DXR 0-7D

    Digit 6 and 7 - Six-bit BSM ctrl ring (rt. adj.)

26. **VACMPR**: Address for virtual address match. Bits 21-23 are not used.

27. **KEYS**:

Digit 1 - PU Key		
Digit 2 - KEYSTACK Key		
Digit 3 - DLAT0 Key		
Digit 4 - DLAT1 Key		
Digit 5 - KEYSTACK	Bit 0	Unused
	Bit 1	Reference
	Bit 2	Change
	Bit 3	Fetch Protect.
Digit 6	Bit 0	Dlat0 Fetch Protect
	Bit 1	Dlat0 Parity
	Bit 2	Dlat1 Fetch Protect
	Bit 3	Dlat1 Parity.
Digit 7	Bit 0	PU Key Parity Check
	Bit 1	Keystack Protect Check
	Bit 2	Dlat Protect Check
	Bit 3	Keystack Protect Check.

    Digit 8 - Unused; always zero.

28. **CMDREG**: Five-bit storage command register. It has the same order as the command bus (0, 1, 2, 3, and 4 Real).

29. **RACMPR**: Address for real storage address match. Bits 0 and 21-23 are not used.

30. **RTYCTL**:

    Digit 0 and 1 - Retry flags

    Digit 2 and 3 - Retry counter look-ahead (right adjusted)

Digit 4	Bit 0	Cross doubleword boundary — first cycle
	Bit 1	Cross doubleword boundary — second cycle
	Bit 2	Hold count
	Bit 3	Retry active.
Digit 5	Bit 0	Unused
	Bit 1	Unused
	Bit 2	DLAT trap — first cycle
	Bit 3	Retry overflow.

31. **STRTADR**: Starting storage address for channel data. Bits correspond to real address bits 18-23, left justified.

32. **ACBCMPR**: Compare address used to determine if user has exceeded real storage. Bits 13-23 are unused.

33. **SYSCKS**: Checks on QVK screen

34. **STOPADR**: Stopping storage address for channel data. Bits correspond to real address bits 18-23, left justified.

35. **SLOTHIT**: Displays the Directory Associativity class as captured on each of the cache cards. An 'F' in a digit position indicates that the cache is working with data from that associativity class.

Digit 1	Associativity class 1
Digit 2	Associativity class 2
Digit 3	Associativity class 3
Digit 4	Associativity class 4
Digit 5	Associativity class 5
Digit 6	Associativity class 6
Digit 7	Associativity class 7

36. **CYCRING**:

Bit 0	Prime cycle
Bit 1	S1 cycle
Bit 2	S2 cycle
Bit 3	Follow cycle.

37. **CHID**: Channel ID register (right adjusted).

INSERT/EXTRACT CHANNEL HARDWARE (QVH)

Display Channel Hardware

To display the Channel Hardware screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key H and a channel number (0-5) next to SELECTION. The channel number can be defaulted to zero.
4. Press ENTER.

Notes:

- *The Channel Hardware facilities (not shown on another screen) are displayed on this screen in hex or binary whichever is applicable for that particular facility.*

- *The display can be fast-selected by keying QVH and a channel number instead of H and a channel number if selection is from any other QV screen.*

Alter Channel Hardware

Note: *This screen is not to be full-screen altered.*

Save Channel Hardware

The data from the Channel Hardware screen can be saved by the Block function. The format is QVHcxx? where c is the channel and xx is the field number. Only one field can be saved per selection.

```
*INSERT/EXTRACT*  CHANNEL HARDWARE (QVH)  CHANNEL 0 = -            FIELDS 01-14
                  00 00 00 00 00 00 CH_DATA     0000 CHANIN     0000 CHANOUT
A ARRAYS          0  0  0  0  0  0 CH_FULL      0000 0000 0000 0000 CHDBREG
S STATUS SCAN RING       0  0  0  0 CH_PTR       0000 0000 0000 0000 CH_CCA
K CHECKS IN SYSTEM 0  0  0  0  0  0 CH_LCM                 0000 0000 CHCCAR1
I PU HARDWARE     00 CHDLR                                 0000 0000 CHCCAR2
B CS HARDWARE     00 CH_SYNCO 00 CH_STAT    O CHIOHW1          FIELDS 15-34
M MS HARDWARE     00 CHCOMONR 00 CH_IMODE   O CH_TRPRQ   00 CHMDMIN   O CHSLRFTH
H CHANNEL HARDWARE 00 CHACMDR              O CH_CURTP   00 CHMDMISC  O CHSLRSTG
C CHANNEL INTRFACE 00 CH_SYNC1             O CHTPUTRQ   00 CHMDMOUT  O CH_ADR23
X EXTERNAL REGS   00 CH_CMDR            00 CHTRPADR   00 CHMDMCTL  O CH_CMDRD
R SCAN RING       00 CH_SDBAR  O CH_MISC   O CH_LASTP
Y CLOCK SCAN RING                                      CHANNEL 1 NPL LINES
W COMMAND SBA-CAC  O OPOUT     O SRVOUT    O OPIN       O SRVIN
T ADDRESS TRANSLAT O HOLDOUT   O DATOUT    O SELIN      O DATIN
G SET CSAR ADDRESS O SUPROUT   O ADROUT    O REQIN      O ADRIN
                             O CMDOUT    O DISCIN     O STATIN
Q GENERAL SELECT           00 NPLBOUT              00 NPLBIN
Z RTRN TO PROG SYS            ANY CHANNEL CHECK O
SELECTION: HO                      ==>
                             CLOCK STOP
                                4341
```

Fast-Alter Channel Hardware

To Fast-Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.
2. Key QOC or QOM next to SELECTION to stop the PU clock.
3. Press ENTER.
4. Key QVH next to SELECTION followed by:
    (1) Channel number
    (2) A high-order decimal digit of a field number.
    (3) A low-order decimal digit of a field number.
    (4) Op code = (MOVE), & (AND), / (OR).
    (5) Hex data.
5. Press ENTER.
6. Verify that the data displayed after the OP code is from the selected address.
7. Alter data as desired and press ENTER.

   Example: QVH001=F..1F.2F3
   ```
        └────(5) Hex data
         └────(4) Op code
          └────(3) Digit of a field number
           └────(2) Digit of a field number
            └────(1) Channel number
   ```
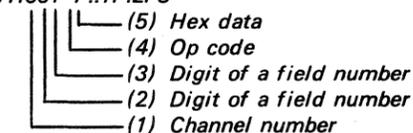
To Fast-Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of "Fast-Alter Channel Hardware."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *Facilities below CHANNEL 1 NPL LINES cannot be altered from the QVH screen.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered in decimal(1-34), left to right, and top to bottom, on the screen.*

- *A period (.) is a digit place holder in the hex data.*

- *A W-command also stops the PU clock.*

Model Group 2

Label Identification

1. **CH_DATA**: Six bytes of data are used by channels 1 and 2, while four bytes are used by channel 0 and channels 3 through 5.

2. **CHANIN**: Two bytes of data to the channel-in register.

3. **CHANOUT**: Two bytes of data from the channel-out register.

4. **CH_FULL**: Byte indicates that a channel data register position is full; a bit is on for each byte.

5. **CHDBREG**: Eight bytes of data in the channel data buffer register.

6. **CH_PTR**: This byte points with a bit on, left to right, to those bytes that are to be transferred from the channel data register next.

7. **CH_CCA**: Eight bytes of data is two words per channel where bytes 0-3 are used in data mode (bytes 4-7 are used in sequence mode only).

8. **CH_LCM**: These bits point, left to right, to the last of data to be transferred.

9. **CHCCAR1**: Eight digits are the output from the channel control array.

10. **CHDLR**: Contains the value of the channel data length register. It has a maximum value of hex 40 (64).

11. **CHCCAR2**: Eight digits are the input to the channel control array.

12. **CH_SYNC0**: Contains a value in the channel sync 0 register. It is used to pass information between the microcode and the channel hardware. The external address is 7,0.

13. **CH_STAT**: This byte contains status information set by channel hardware. The external address is 2,1.

14. **CHIOHW1**: PU I/O register value.

15. **CHCOMONR**: These values are the control bits of the common register. The external address is 2,0.

   Bit 0 Channel 370 mode latch
   1 Allow external source
   2 Meter on latch
   3 Microdetected channel control check
   4 Storage busy
   5 Valid TIC
   6 Valid CC CCW
   7 Valid CD CCW

16. **CH_IMODE**: This byte contains (when corresponding bit is on) gating controls for ACB checking and hardware set latches for PCI and CDA controlling. The external address is 3,1.

17. **CH_TRPRQ**: This digit indicates whether this channel has a trap request.

18. **CHMDMIN**: One-byte MDM bus-in.

19. **CHSLRFTH**: This digit indicates that a channel (0-5) is aligned with the channel control array fetch cycle.

20. **CHACMDR**: A command to the channel from the asynchronous command register. The external address is 3,0.

   Bit 0 Channel ID latches
   1 Channel ID latches
   2 Channel ID latches
   3 I/O spin latch
   4 Inhibit select-out and unload trap latch
   5 Command function bit latches
   6 Command function bit latches
   7 Command function bit latches

21. **CH_CURTP**: This digit identifies whether or not this channel is in a trap.

22. **CHMDMISC**: MDM miscellaneous bus-in. It is 6 bits wide. The bits are right adjusted.

23. **CHSLRSTG**: This digit identifies whether or not a channel (0-5) has a slot rotor time for storage access.

24. **CH_SYNC1**: This byte contains conditions, such as trap addresses, flags, and timeout values. It is used to pass information between the microcode and the channel hardware. The external address is 4,0.

25. **CHIPUTRQ**: This digit identifies whether or not a channel (0-5) has a trap request line active to the PU.

26. **CHMDMOUT**: MDM bus-out. It is one byte.

27. **CH_ADR23**: When both digits are the same, it is in sequence count mode.

28. **CH_CMDR**: Command register content for this channel. The external address is 5,0. The types of commands are:

   Data transfer
   Sequence count
   I/O instruction load
   UCW load
   Misc
   CCW fetched
   Interface adapter
   Interface controller

29. **CHTRPADR**: This byte identifies the trap address (00-1F).

30. **CHMDMCTL**: MDM control bus. It is 5 bits. The bits are right adjusted.

31. **CH_CMDRD**: External signifies that a channel command is ready.

32. **CH_SDBAR**: Used to address the channel data bus when transferring and receiving data from storage buffer. The external address is 6,0.

33. **CH_MISC**: This byte uses only the first 4 bits 0-3 to identify data in parity, output, ISB and first character transferred. The external address is 6,1.

   Bit 0 DI parity check
   1 Output
   2 ISB
   3 First character transferred
   4 Spare
   5 Spare
   6 Spare
   7 Spare

34. **CH_LASTP**: This digit identifies whether or not this channel had the last trap taken.

INSERT/EXTRACT CHANNEL INTERFACE (QVC)

Display Channel Interface

To display the Channel Interface screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key C next to SELECTION.
4. Press ENTER.

Note: *The display can be fast selected by keying QVC instead of C if the selection is from any other QV screen.*

Alter Channel Interface

Note: *This screen cannot be full-screen altered.*

Save Channel Interface

The data from the Channel Interface screen can be saved by the Block function. The format is QVCxx?, where xx is a 2 digit field number.

Fast Alter Channel Interface

Note: *This screen cannot be fast altered.*

```
*INSERT/EXTRACT*  CHANNEL INTERFACE (QVC)                      FIELDS 1-10
                   0 1 2 3 4 5  CHANNEL      0  1  2  3  4  5   CHANNEL
A ARRAYS           0 0 0 0 0 0  PARITYCK     1  1  1  1  1  1   OPOUT
S STATUS SCAN RING 0 0 0 0 0 0  OKLATE       0  0  0  0  0  0   HOLDOUT
K CHECKS IN SYSTEM 0 0 0 0 0 0  SEQERROR     0  0  0  0  0  0   ADROUT
I PU HARDWARE      0 0 0 0 0 0  OVLAPERR     0  0  0  0  0  0   CMDOUT
B CS HARDWARE      0 0 0 0 0 0  SHORTPLS     0  0  0  0  0  0   SRVOUT
M MS HARDWARE                  FIELDS 11-21  0  0  0  0  0  0   DATOUT
H CHANNEL HARDWARE 0 0 0 0 0 0  HALTBRST     0  0  0  0  0  0   SUPROUT
C CHANNEL INTRFACE 0 0 0 0 0 0  INHIBDBO    00 CE 01 00 02 20   NPLBOUT
X EXTERNAL REGS    0 0 0 0 0 0  RSTADROT     0  0  0  0  0  0   OPIN
R SCAN RING        0 0 0 0 0 0  DIAGMODE     0  0  0  0  0  0   SELIN
Y CLOCK SCAN RING  0 0 0 0 0 0  DATAMODE     0  0  0  0  0  0   ADRIN
W COMMAND SBA-CAC              FIELDS 22-32  0  0  0  0  0  0   STATIN
T ADDRESS TRANSLAT 0 0 0 0 0 0  HOLDUP       0  0  0  0  0  0   SRVIN
G SET CSAR ADDRESS 0 0 0 0 0 0  ODDLATCH     0  0  0  0  0  0   DATIN
                   0 0 1 1 0 1  OUTMODE      0  0  0  0  0  0   REQIN
Q GENERAL SELECT   0 0 0 0 0 0  ALLOWHI      0  0  0  0  0  0   DISCIN
Z RTRN TO PROG SYS 0 0 0 0 0 0  HIMODE      00 00 00 00 00 00   NPLBIN
SELECTION: C                          ==>
                                  CLOCK STOP
                                      4341
```

Label Identification

PARITYCK: 1 identifies a parity check on the channel data bus.

OKLATE: Not used.

SEQERROR: Not used.

OVLAPERR: Not used.

SHORTPLS: Not used.

HALTBRST: 1 identifies a halt operation.

INHIBDBO: 1 inhibits the NPL BUS OUT lines.

RSTADROT: 1 resets NPL ADR OUT.

DIAGMODE: 1 assigns the diagnostics and microcode to monitor all the NPL BUS and TAG lines.

DATAMODE: 1 enables the interface to transfer data.

HOLDUP: 1 causes NPLSRVOUT to be held up until the channel is ready to transfer data.

ODDLATCH: 0 tells the interface that an even byte of data is to be transferred. 1 tells the interface that an odd byte of data is to be transferred.

OUTMODE: 1 tells the interface that the data is to be transferred out. 0 tells the interface that the data is to be transferred in.

ALLOWHI: Not used.

HIMODE: Not used.

INSERT/EXTRACT EXTERNAL REGISTERS (QVX) (GRP 2)

Display External Registers

To display the External Registers screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key X and a channel number (0-5) next to SELECTION. The channel number can be defaulted to zero.

4. Press ENTER.

Notes:

- *This provides a display of the external registers whenever the PU microcode is unavailable.*

- *The contents of the external registers can be displayed with errors highlighted by brightened characters.*

- *The TOD clock is not displayed because the scan rings destroy its contents.*

- *The display can be fast selected by keying QVX and a channel number instead of X and a channel number, if selection is from any other QV screen.*

Alter External Registers

Note: *This screen cannot be full-screen altered.*

Save External Registers

The data from the External Registers screen can be saved by the Block function. The format is QVXcxx? where c is a channel number and xx is a field number. Only one field can be saved per selection.

```
*INSERT/EXTRACT*    EXTERNAL REGISTERS (QVX)      FIELDS 1-46
                 FFFF FFFF FFFF FFFF A(AREG)    0000 0000 0000 0000 DFCAREG
A ARRAYS                ** CHANNEL 0 =  **                    00 INEXTREQ
S STATUS SCAN RING (4)  0: CHDLR           SIR  INT5 INDIRO CHKEY CHAN SAR
K CHECKS IN SYSTEM         00               00   00   00    00   00 00 00
I PU HARDWARE     (10)  1: CH_SYNCO CH_DATAO W1  MNTR STAT1       L1BU
B CS HARDWARE              00      00        00  00   00          00 00 00
M MS HARDWARE     (16)  2: CHCOMONR CH_STAT W2  INT4 STAT2  CTLRO SAR2
H CHANNEL HARDWARE         00      00       00  00   00     0     00 00 00
C CHANNEL INTRFACE (23) 3: CHACMDR  CH_IMODE PSWO PSW1 PSW2       SAR1
X EXTERNAL REGS            00      00        00  00   00          00 00 00
R SCAN RING       (29)  4: CH_SYNC1 CH_DATA2     INT3 STATO       ICTR
Y CLOCK SCAN RING          00      00            00   00          00 00 00
W COMMAND SBA-CAC (34)  5: CH_CMDR       ICYC INT2 INDIR1         NIB1
T ADDRESS TRANSLAT         00            02   00   00                   00
G SET CSAR ADDRESS (39) 6: CH_SDBAR CH_MISC OP  INT1 RETRY        NIB1BFR
                           00      00       00  00   20                 00
Q GENERAL SELECT  (45)  7:              HREG INTO
Z RTRN TO PROG SYS                      00   00
SELECTION: XO                             ==>
                           CLOCK STOP
                             4341
```

Fast Alter External Registers

To Fast Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVX next to SELECTION followed by:

   (1) Channel number.
   (2) A high-order decimal digit of a field number.
   (3) A low-order decimal digit of a field number.
   (4) Op code = (MOVE), & (AND), / (OR).
   (5) Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the selected address.

7. Alter data as desired and press ENTER.

   Example: QVX045=F..1F2
   ```
                 (5) Hex data
                 (4) Op code
                 (3) Digit of a field number
                 (2) Digit of a field number
                 (1) Channel number
   ```

To Fast Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of Fast Alter External Registers.

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears, and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered left to right, top to bottom on the screen.*

- *A period (.) is a digit place holder in the hex data.*

- *A W-command also stops the PU clock.*

Label Identification

1. **A(A-REG):** PU A-register.

2. **DFCAREG:** Eight-byte register containing hex data from the channel.

3. **INEXTREQ:** External signal request.

4. **CHDLR:** Contains the count value of the channel data length register. The channel external address is 0,0.

5. **SIR:** This byte contains data which determines the number of bits or bytes that are to be shifted. The PU external address is 0,0.

6. **INT5:** This byte contains eight bits used in channel mode. The external address is 0,1.

Bit 0	Channel 0 interrupt request
1	Channel 1 interrupt request
2	Channel 2 interrupt request
3	Channel 3 interrupt request
4	Channel 4 interrupt request
5	Channel 5 interrupt request
6	Unused
7	Reset ADDRMATCH

7. **INDIR0:** This byte contains the address that is the R1 field of the current instruction. The external address is 0,2.

8. **CHKEY:** Bits 0-3 are key bits; 4-7 are unimplemented bits, sourced as zero. The external address is 0,4.

9. **CHANSAR:** Three-byte address invoked when the channel is used. The external address is 0, 5-7.

10. **CH__SYNC0:** Contains a value in the channel sync 0 register. The Channel external address is 1,0.

11. **CH__DATA0:** This byte is the first byte of the channel data register. It is assigned to contain the channel address protect key. It is assigned to obtain device address, device status, interface status and other information from the interface adapter. The channel external address is 1,1.

12. **W1:** This byte contains the shift length value when W1 register is specified as a length parameter. The PU external address is 1, 0.

13. **MNTR:** Monitor external senses certain system status information. The external address is 1,1.

Bit 0	Start I/O count
1	SVC interrupt
2	I/O interrupt
3	Page fault interrupt
4	Unassigned
5	Unassigned
6	Unassigned
7	Unassigned

14. **STAT1:** This byte contains conditions (status) relative to ALU. The external address is 1,2.

Bit 0	W1 (4) = 0
1	W2 (0-4) = 0
2	Invalid decimal format (cumulative)
3	True/complement decimal
4	Unassigned
5	Unassigned
6	Unassigned
7	ACB check enable

15. **L1BU:** Three bytes contain the cache backup address. The external address is 1, 5-7.

16. **CHCOMONR:** This byte contains the channel control bits in the common register. The channel external address is 2,0.

17. **CH__STAT:** This byte contains hardware set channel status indicators. The channel external address is 6,0.

Bit 0	Spare = 0
1	Incorrect length latch
2	Prog or Prot check latch
3	Spare = 0
4	Channel data length latch
5	Channel control check latch
6	Spare = 0
7	Chaining check latch

18. **W2:** This byte contains the shift length value when W2 register is specified as a length parameter. It may also serve as a loop counter. The PU external address is 2,0.

19. **INT4:** This byte contains eight bits used in channel mode. The PU external address is 2,1.

Bit 0	CPUTIA
1	CCOMPIA
2	ITIMIA
3	Pending machine check interrupt
4	Retry interrupt force
5	Spare
6	Restart request
7	Spare

20. **STAT2:** This byte contains status conditions relative to arithmetic, branch, shift, etc. of ALU. The external address is 2,2.

Bit 0	Working stat 0
1	Working stat 1
2	Working stat 2
3	Working stat 3
4	Channel working stat 0
5	Channel working stat 1
6	Instruction length counter
7	Instruction length counter

21. **CTLR0:** Control register 0 bit 8-12 with bit 12 OR'd into bit 10.

22. **SAR2:** Three bytes contain the address of operand 2 of an instruction. The external address is 3, 5-7.

23. **CHACMDR:** One-byte command from the channel asynchronous command register to the channel. The external address is 3,0.

24. **CH__IMODE:** This byte contains gating controls for ACB checking and hardware set latches for PCI and CDA controlling. The Channel external address is 3,1.

Bit 0	Block-multiplexer mode latch
1	Byte-multiplexer mode latch
2	Enable ACB check latch
3	Hi-speed mode latch
4	Internal interrupt request latch
5	Implement spare latch
6	PCI latch
7	CD prefetch latch

25. **PSW0:** Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The PU external address is 3,0.

26. **PSW1:** Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The PU external address is 3,1.

27. **PSW2:** Consult your reference summary card or consult the Display/Alter function Current PSW for byte and bit significance. The external address is 3,2.

28. **SAR1:** Three bytes contain the address of operand 1 of an instruction. The external address is 3, 5-7.

29. **CH__SYNC1:** This byte contains conditions as trap addresses, flags, timeout values, etc. The channel external address is 4,0.

30. **CH__DATA2:** This byte contains the sequence count from the channel. The channel external address is 4,1.

31. **INT3:** This byte contains eight bits used in channel mode. The PU external address is 4,1.

Bit 0	ITIMIB
1	Interrupt key
2	External signal 2
3	External signal 3
4	External signal 4
5	External signal 5
6	External signal 6
7	External signal 7

32. **STAT0:** This byte contains status conditions of various conditions in ALU. The external address is 4,2.

Bit 0	ALU overflow
1	Negative result
2	Recomplement
3	Destination = 0
4	ALU carry
5	1-bit carry
6	Z /*= 0
7	ALU size exception

33. **ICTR:** Three bytes contain the starting address of the next instruction. The external address is 4, 5-7.

34. **CH__CMDR:** Command register content for this channel. The external address is 5,0.

Bit 0	Data transfer
1	Sequence count
2	I/O instruction load
3	UCW load
4	Misc
5	CCW fetched
6	Interface adapter
7	Interface controller

35. **ICYC:** Byte (I-cycle control register) contains status information of I-cycles. It contains I-cycle function and flags. The PU external address is 5,0.

Bit 0	370 mode
1	Unconditional I-cycle store error
2	Conditional I-cycle store error
3	Successful branch
4	Execute
5	PU retry mask
6	IB empty
7	Operate latch

36. **INT2:** This byte contains eight bits used in channel mode. The PU external address is 5,1.

Bit 0	Signal DIAGM
1	ITIMWRPA
2	ADRMATCH
3	ISTRSTEP
4	Pending machine check interrupt
5	Decrementer adjustment
6	CCOMPIB
7	CPUTIB

37. **INDIR1:** This byte contains the address which is the R2 or X2 field of the current instruction. The external address is 5,2.

38. **NIB1:** This byte is the second byte of the NIB. The external address is 5,7.

39. **CH__SDBAR:** Used to address the channel data bus when transferring and receiving data from storage. The channel external address is 6, 0.

40. **CH__MISC**: Uses only the first 4 bits 0-3 to identify data in parity, output, ISB and first character transferred. The external address is 6,1.

Bit 0   DI parity check
    1   Output
    2   ISB
    3   First character transferred
    4   Spare
    5   Spare
    6   Spare
    7   Spare

41. **OP**: Contains the first byte (byte 0) of the current instruction. It implies 256 op code possibilities. It is driven by the NIB. The PU external address is 6,0.

42. **INT1**: This byte contains eight bits used in channel mode. The PU external address is 6,1.

Bit 0   Channel 0 interrupt
    1   Channel 1 interrupt
    2   Channel 2 interrupt
    3   Channel 3 interrupt
    4   Channel 4 interrupt
    5   Channel 5 interrupt
    6   Unused
    7   Channel external interrupt

43. **RETRY**: This byte contains eight bits that indicate the status conditions relative to a retry operation. The external address is 6,2.

Bit 0   Hardstop
    1   Sequential processing
    2   Instruction processing
    3   SS operation
    4   Refresh in progress
    5   Retry in progress
    6   Unretriable section of code
    7   System operation

44. **NIBIBFR**: This byte is the second byte of the NIB buffer. The external address is 6,7.

45. **HREG**: This byte contains eight bits that act as status conditions for taking traps. The external address is 7,0.

Bit 0   Spare
    1   Odd branch address - trap level 0
    2   L1 miss - trap level 0
    3   ACB check - trap level 0
    4   DLAT miss - trap level 1
    5   Storage protect check - trap level 1
    6   Block channel traps
    7   Channel trap - trap level 2

46. **INT0**: This byte contains eight bits used in channel mode. The external address is 0,3.

Bit 0   Interrupt pending
    1   PER
    2   Pending channel interrupt
    3   Pending external interrupt
    4   MSVP request
    5   Execute interrupt
    6   Decrementer = 0
    7   ITIMWRP

INSERT/EXTRACT EXTERNAL REGISTERS (QVX) (GRP 2)

Display External Registers

To display the External Registers screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key X and a channel number (0-5) next to SELECTION. The channel number can be defaulted to zero.

4. Press ENTER.

Notes:

- *This provides a display of the external registers whenever the PU microcode is unavailable.*

- *The contents of the external registers can be displayed with errors highlighted by brightened characters.*

- *The TOD clock is not displayed because the scan rings destroy its contents.*

- *The display can be fast-selected by keying QVX and a channel number instead of X and a channel number, if selection is from any other QV screen.*

Alter External Registers

Note: *This screen cannot be full-screen altered.*

Save External Registers

The data from the External Registers screen can be saved by the Block function. The format is QVXcxx? where c is a channel number and xx is a field number. Only one field can be saved per selection.

```
*INSERT/EXTRACT*      EXTERNAL REGISTERS (QVX)      FIELDS 1-46
                      FFFF FFFF FFFF FFFF A(AREG)   0000 0000 0000 0000 DFCAREG
A ARRAYS                      ** CHANNEL 0 = _ **                    00 INEXTREQ
S STATUS SCAN RING (4)   0: CHDLR           -      SIR  INT5 INDIRO CHKEY CHAN SAR
K CHECKS IN SYSTEM          00                     00   00   00        00 00 00
I PU HARDWARE      (10)   1: CH_SYNCO CH_DATAO W1   MNTR STAT1        L1BU
B CS HARDWARE               00       00       00   00   00           00 00 00
M MS HARDWARE      (16)   2: CHCOMONR CH_STAT  W2   INT4 STAT2  CTLRO SAR2
H CHANNEL HARDWARE          00       00       00   00   00      0    00 00 00
C CHANNEL INTRFACE (23)   3: CHACMDR  CH_IMODE PSWO PSW1 PSW2        SAR1
X EXTERNAL REGS             00       00       00   00   00           00 00 00
R SCAN RING        (29)   4: CH_SYNC1 CH_DATA2      INT3 STATO       ICTR
Y CLOCK SCAN RING           00       00            00   00           00 00 00
W COMMAND SBA-CAC  (34)   5: CH_CMDR             ICYC INT2 INDIR1    NIB1
T ADDRESS TRANSLAT          00                   02   00   00           00
G SET CSAR ADDRESS (39)   6: CH_SDBAR  CH_MISC  OP   INT1 RETRY      NIB1BFR
                            00       00       00   00   20           00
Q GENERAL SELECT   (45)   7:                    HREG INTO
Z RTRN TO PROG SYS                              00   00
SELECTION: XO                                   ==>
                               CLOCK STOP
                                   4341
```

Fast-Alter External Registers

To Fast-Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVX next to SELECTION followed by:

   (1)   Channel number.
   (2)   A high-order decimal digit of a field number.
   (3)   A low-order decimal digit of a field number.
   (4)   Op code = (MOVE), & (AND), / (OR).
   (5)   Hex data.

5. Press ENTER.

6. Verify that the data displayed after the OP code is from the selected address.

7. Alter data as desired and press ENTER.

   Example: QVX045=F..1F2
   ```
              ├──(5) Hex data
              ├──(4) Op code
              ├──(3) Digit of a field number
              ├──(2) Digit of a field number
              └──(1) Channel number
   ```

To Fast-Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4, 5, 6, and 7 of "Fast-Alter External Registers."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the selected field permits, the message INVALID INPUT appears, and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to, ANDs with, or ORs with the data in the selected location(s).*

- *The facilities (field number) are numbered left to right, top to bottom on the screen.*

- *A period (.) is a digit place holder in the hex data.*

- *A W-command also stops the PU clock.*

Model Group 2

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Label Identification

1. **A(A-REG)**: PU A-register.

2. **DFCAREG**: Eight-byte register containing hex data from the channel.

3. **INEXTREQ**: External signal request.

4. **CHDLR**: Contains the count value of the channel data length register. The channel external address is 0,0.

5. **SIR**: This byte contains data which determines the number of bits or bytes that are to be shifted. The PU external address is 0,0.

6. **INT5**: This byte contains eight bits used in channel mode. The external address is 0,1.

   Bit 0 Channel 0 interrupt request
   1 Channel 1 interrupt request
   2 Channel 2 interrupt request
   3 Channel 3 interrupt request
   4 Channel 4 interrupt request
   5 Channel 5 interrupt request
   6 Unused
   7 Reset ADDRMATCH

7. **INDIR0**: This byte contains the address that is the R1 field of the current instruction. The external address is 0,2.

8. **CHKEY**: Bits 0-3 are key bits; 4-7 are unimplemented bits, sourced as zero. The external address is 0,4.

9. **CHANSAR**: Three-byte address invoked when the channel is used. The external address is 0, 5-7.

10. **CH__SYNC0**: Contains a value in the channel sync 0 register. The Channel external address is 1,0.

11. **CH__DATA0**: This byte is the first byte of the channel data register. It is assigned to obtain device address, device status, interface status and other information from the interface adapter. The channel external address is 1,1.

12. **W1**: This byte contains the shift length value when W1 register is specified as a length parameter. The PU external address is 1, 0.

13. **MNTR**: Monitor external senses certain system status information. The external address is 1,1.

    Bit 0 Start I/O count
    1 SVC interrupt
    2 I/O interrupt
    3 Page fault interrupt
    4 Unassigned
    5 Unassigned
    6 Unassigned
    7 Unassigned

14. **STAT1**: This byte contains conditions (status) relative to ALU. The external address is 1,2.

    Bit 0 W1 (4) = 0
    1 W2 (0-4) = 0
    2 Invalid decimal format (cumulative)
    3 True/complement decimal
    4 Unassigned
    5 Unassigned
    6 Unassigned
    7 ACB check enable

15. **L1BU**: Three bytes contain the cache backup address. The external address is 1, 5-7.

16. **CHCOMONR**: This byte contains the channel control bits in the common register. The channel external address is 2,0.

17. **CH__STAT**: This byte contains hardware set channel status indicators. The channel external address is 6,0.

    Bit 0 Spare = 0
    1 Incorrect length latch
    2 Prog or Prot check latch
    3 Spare = 0
    4 Channel data check latch
    5 Channel control check latch
    6 Spare = 0
    7 Chaining check latch

18. **W2**: This byte contains the shift length value when W2 register is specified as a length parameter. It may also serve as a loop counter. The PU external address is 2,0.

19. **INT4**: This byte contains eight bits used in channel mode. The PU external address is 2,1.

    Bit 0 CPUTIA
    1 CCOMPIA
    2 ITIMIA
    3 Pending machine check interrupt
    4 Retry interrupt force
    5 Spare
    6 Restart request
    7 Spare

20. **STAT2**: This byte contains status conditions relative to arithmetic, branch, shift, etc. of ALU. The external address is 2,2.

    Bit 0 Working stat 0
    1 Working stat 1
    2 Working stat 2
    3 Working stat 3
    4 Channel working stat 0
    5 Channel working stat 1
    6 Instruction length counter
    7 Instruction length counter

21. **CTLR0**: Control register 0 bit 8-12 with bit 12 ORed into bit 10.

22. **SAR2**: Three bytes contain the address of operand 2 of an instruction. The external address is 3, 5-7.

23. **CHACMDR**: One-byte command from the channel asynchronous command register to the channel. The external address is 3,0.

24. **CH__IMODE**: This byte contains gating controls for ACB checking and hardware set latches for PCI and CDA controlling. The Channel external address is 3,1.

    Bit 0 Block-multiplexer mode latch
    1 Byte-multiplexer mode latch
    2 Enable ACB check latch
    3 Data stream mode latch
    4 Internal interrupt request latch
    5 Implement spare latch
    6 PCI latch
    7 CD prefetch latch

25. **PSW0**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The PU external address is 3,0.

26. **PSW1**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The PU external address is 3,1.

27. **PSW2**: Consult your reference summary card or consult the Display/Alter function "Current PSW" for byte and bit significance. The external address is 3,2.

28. **SAR1**: Three bytes contain the address of operand 1 of an instruction. The external address is 3, 5-7.

29. **CH__SYNC1**: This byte contains conditions as trap addresses, flags, timeout values, etc. The channel external address is 4,0.

30. **CH__DATA2**: This byte contains the sequence count from the channel. The channel external address is 4,1.

31. **INT3**: This byte contains eight bits used in channel mode. The PU external address is 4,1.

    Bit 0 ITIMIB
    1 Interrupt key
    2 External signal 2
    3 External signal 3
    4 External signal 4
    5 External signal 5
    6 External signal 6
    7 External signal 7

32. **STAT0**: This byte contains status conditions of various conditions in ALU. The external address is 4,2.

    Bit 0 ALU overflow
    1 Negative result
    2 Recomplement
    3 Destination = 0
    4 ALU carry
    5 1-bit carry
    6 Z /*= 0
    7 ALU size exception

33. **ICTR**: Three bytes contain the starting address of the next instruction. The external address is 4, 5-7.

34. **CH__CMDR**: Command register content for this channel. The external address is 5,0. The types of commands are:

    Data transfer
    Sequence count
    I/O instruction load
    UCW load
    Misc
    CCW fetched
    Interface adapter
    Interface controller

35. **ICYC**: Byte (I-cycle control register) contains status information of I-cycles. It contains I-cycle function and flags. The PU external address is 5,0.

    Bit 0 370 mode
    1 Unconditional I-cycle store error
    2 Conditional I-cycle store error
    3 Successful branch
    4 Execute
    5 PU retry mask
    6 IB empty
    7 Operate latch

36. **INT2**: This byte contains eight bits used in channel mode. The PU external address is 5,1.

    Bit 0 Signal DIAGM
    1 ITIMWRPA
    2 ADRMATCH
    3 ISTRSTEP
    4 Pending machine check interrupt
    5 Decrementer adjustment
    6 CCOMPIB
    7 CPUTIB

37. **INDIR1**: This byte contains the address which is the R2 or X2 field of the current instruction. The external address is 5,2.

38. **NIB1**: This byte is the second byte of the NIB. The external address is 5,7.

39. **CH__SDBAR**: Used to address the channel data buffer when transferring and receiving data from storage. The channel external address is 6, 0.

40. **CH__MISC**: Uses only the first 4 bits 0-3 to identify data in parity, output, ISB and first character transferred. The external address is 6,1.

    Bit 0   DI parity check
       1   Output
       2   ISB
       3   First character transferred
       4   Spare
       5   Spare
       6   Spare
       7   Spare

41. **OP**: Contains the first byte (byte 0) of the current instruction. It implies 256 op code possibilities. It is driven by the NIB. The PU external address is 6,0.

42. **INT1**: This byte contains eight bits used in channel mode. The PU external address is 6,1.

    Bit 0   Channel 0 interrupt
       1   Channel 1 interrupt
       2   Channel 2 interrupt
       3   Channel 3 interrupt
       4   Channel 4 interrupt
       5   Channel 5 interrupt
       6   Unused
       7   Channel external interrupt

43. **RETRY**: This byte contains eight bits that indicate the status conditions relative to a retry operation. The external address is 6,2.

    Bit 0   Hardstop
       1   Sequential processing
       2   Instruction processing
       3   SS operation
       4   Refresh in progress
       5   Retry in progress
       6   Unretriable section of code
       7   System operation

44. **NIBIBFR**: This byte is the second byte of the NIB buffer. The external address is 6,7.

45. **HREG**: This byte contains eight bits that act as status conditions for taking traps. The external address is 7,0.

    Bit 0   Spare
       1   Odd branch address - trap level 0
       2   L1 miss - trap level 0
       3   ACB check - trap level 0
       4   DLAT miss - trap level 1
       5   Storage protect check - trap level 1
       6   Block channel traps
       7   Channel trap - trap level 2

46. **INT0**: This byte contains eight bits used in channel mode. The external address is 0,3.

    Bit 0   Interrupt pending
       1   PER
       2   Pending channel interrupt
       3   Pending external interrupt
       4   MSVP request
       5   Execute interrupt
       6   Decrementer = 0
       7   ITIMWRP

INSERT/EXTRACT SCAN RINGS (QVR) (GRP 2)

Display Scan Rings

To display the Scan Rings Screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key R and a two-digit scan ring number plus a byte number next to SELECTION. The scan ring and byte number can be defaulted to zero.

4. Press ENTER.

Notes:

- *All 38 scan rings can be displayed in unformatted binary.*

- *The refresh clock must be stopped when displaying/altering 21, 22 41, 42, 81, C1, and C7.*

- *The time-of-day clock is invalidated when displaying/altering SR 42.*

- *This screen can be paged.*

Alter Scan Rings

1. Display the selected scan ring as in the preceding steps.

2. Move the cursor below the location(s) to be altered and key the new bit data.

3. Leave the SELECTION line unchanged and press ENTER.

Save Scan Rings

The data from the scan rings can be saved by the Block function. The format is QVRxxbb? where xx is a ring number and bb a byte number.

Fast-Alter Scan Rings

To Fast-Alter from any screen other than the Insert/Extract facilities screen (QV) or one of the Array (QVA) subscreens:

1. Place the CE MODE switch ON.

2. Key QOC or QOM next to SELECTION to stop the PU clock.

3. Press ENTER.

4. Key QVR next to SELECTION followed by:
   (1) A high-order hex digit of a scan ring number.
   (2) A low-order hex digit of a scan ring number.
   (3) A high-order hex digit of a byte number.
   (4) A low-order hex digit of a byte number.
   (5) Op code = (MOVE).
   (6) Bit data.

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```
*INSERT/EXTRACT*  SCAN RING (QVR)   4E CHANNEL CONTROLS

                        00 0000 0000  *01 0000 0000  *02 0000 0000  *03 0000 0000
A ARRAYS
S STATUS SCAN RING 04 0000 0000  *05 0000 0000  *06 0000 0000  *07 0000 0000
K CHECKS IN SYSTEM
I PU HARDWARE      08 0000 0000  *09 0000 0000  *0A 0000 0000  *0B 0000 0000
B CS HARDWARE
M MS HARDWARE      0C 0000 0000  *0D 0000 0000  *0E 0000 0000  *0F 0000 0000
H CHANNEL HARDWARE
C CHANNEL INTRFACE
X EXTERNAL REGS    10 0000 0000  *11 0000 0000  *12 0000 0000  *13 0000 0000
R SCAN RING
Y CLOCK SCAN RING  14 0000 0000  *15 0000 0000  *16 0000 0000  *17 0000 0000
W COMMAND SBA-CAC
T ADDRESS TRANSLAT 18 0000 0000  *19 0000 0000  *1A 0000 0000  *1B 0000 0000
G SET CSAR ADDRESS
                   1C 0000 0000  *1D 0000 0000  *1E 0000 0000  *1F 0000 0000
Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: R000                          ==>
                                   CLOCK STOP
                                           4341
```

5. Press ENTER.

   Example: QVR8514=11..11
   - (6) Bit data
   - (5) Op code
   - (4) Byte number
   - (3) Byte number
   - (2) Scan ring number
   - (1) Scan ring number
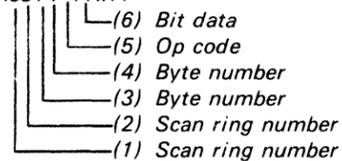
To Fast-Alter from the Insert/Extract facilities screen or one of the array subscreens:

1. Invoke steps 4 and 5 of "Fast-Alter Scan Rings."

Notes:

- *Spaces between characters are deleted before the command is analyzed.*

- *If more data is keyed than the select line permits, the message INVALID INPUT appears, and the cursor moves to the right of the op code.*

- *If hex data is keyed instead of bit data, the message INVALID INPUT appears, and the cursor moves to the right of the op code.*

- *The op code MOVEs the data to the selected location(s).*

- *A period (.) is place holder in the data. When the operation is executed, that digit is unaffected.*

- *A W-command also stops the PU clock.*

- *The 38 scan rings are:*

20	SERDES (Clock Chip)
21	Diagnostic Latches
22	Refresh Clock and SM1 Latch
23	Dynamic Status (M2 Chip)
24	Maintenance Clock
25	PU, CHNL, and L1 Clock
26	L1 Clock
40	Serdes (PU Maintenance Chip)
41	Diagnostic (PU)
42	Timer and SM1 (TOD)
43	Interrupt
44	PU SAR
45	PU Shifter
46	PU Shifter Controls
47	Local Storage Addressing
48	I-Cycles
49	Data Flow Low
4A	Data Flow High
4B	I/O Interface
4C	Channel Data Buffer
4D	Channel Interface Card
4E	Channel Controls
80	SERDES (Cache/Storage Chip)
81	Diagnostic Latches
82	SAR, Keys, and Cache Controls
83	Cache, Data Reg Bytes 0:3
84	Cache, Data Reg Bytes 4:7
85	DLAT and DIR
86	BSM Controls
87	ECC/Data Flow

C0	SERDES (Control Storage)
C1	Diagnostic (Control Storage)
C2	CS Controls and SM 1
C3	Scan first Array Byte 0 and 4
C4	Scan second Array Byte 1 and 5
C5	Scan third Array Byte 2 and 6
C6	Scan fourth Array Byte 3 and 7
C7	Main Storage Refresh

Loop Scan Rings

The scan rings can be placed into a loop and an 8-bit data pattern can be scanned into the looped scan ring.

The following commands can be used to invoke this function:

   QVRLxx
   QVRLxx0
   QVRLxx=yy

where xx represents the scan ring number and yy represents the optional bit patern in hex.

If the bit pattern is not specified, it defaults to X'00'. Looping continues until the MODE key is pressed.

Note: *An initial test pattern of X'A5' and parity precedes the data pattern. The eight-bit data pattern is scanned into the specified scan ring without parity.*

Model Group 2
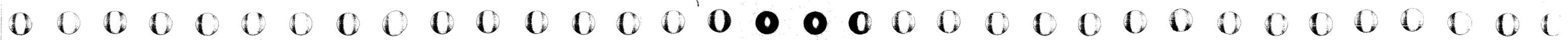
INSERT/EXTRACT CLOCK SCAN RINGS (QVY) (GRP 2)

CAUTION
Observe notes before attempting this procedure.

Display Clock Scan Rings

To display the Clock Scan Rings screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key W2B next to SELECTION to stop the refresh clock, as all clocks must be stopped.

4. Press ENTER.

5. Key Y22 next to SELECTION.

6. Press ENTER.

Notes:

- Setting off of the refresh clock (W2B) destroys the main memory contents.

- This procedure should never be used, except when the 4341 clock Distribution Adjustment is performed.

- Normally, these values do not require change, except when a new diskette has been installed, cards H or K replaced, some ECs installed which add new groups (modules), or the board has been replaced.

- When installing a new diskette, you must use the update function of the 4341 Clock Distribution Adjustment.

- The values of the clocks are critical and have been established and set by the producing plant. Each machine has its unique values and should not be compared with those of another system.

- No attempt should be made to modify the clock values. These values should be displayed periodically to assure that the values have not been accidentally modified. Compare with your on-site plant copy.

- If the values must be changed, refer to 4341 Clock Distribution Adjustment.

- For clock adjustment procedure, see supplements to the MAPs.

- Displayed serial number and the NS field is for reference purposes only.

```
*INSERT/EXTRACT*   CLOCK RING (QVY)      CGRPNNXX        **IML REQUIRED**
                   CP DL PW   CP DL PW   CP DL PW   CP DL PW   CP DL PW   CP DL PW
A ARRAYS              1          2          3          4          5          6
S STATUS SCAN RING 1  0 02 00   0 00 15   1 15 11   1 12 08   1 16 13   1 12 08
K CHECKS IN SYSTEM
I PU HARDWARE      2  1 14 10   1 13 09   1 15 10   1 11 07   1 17 11   1 17 11
B CS HARDWARE
M MS HARDWARE      3  1 17 13   1 16 11   1 16 16   1 13 09   1 11 08   1 11 07
H CHANNEL HARDWARE
C CHANNEL INTRFACE 4  1 17 12   1 17 13   1 17 13   1 17 12   1 12 06   1 12 08
X EXTERNAL REGS
R SCAN RING        5  1 16 10   1 15 10   1 16 10   1 16 10   1 09 06
Y CLOCK SCAN RING
W COMMAND SBA-CAC  6  0 08 08   0 00 00   0 08 08   0 00 00
T ADDRESS TRANS
G SET CSAR ADDRESS

Q GENERAL SELECT   SERIAL NO. 000000     000 CCSYSOSC 00 CCOSCDIV   XXX NS
Z RTRN TO PROG SYS
SELECTION: Y22                              ==>
                                         CLOCK STOP
                                            4341
```

Label Identification

CGRPNNXX: Represents 15 clock pulses within one pulse of each group. Two groups are addressed at once designated as NN and XX.

CP: Represents the chip select SRL. The CP value is for engineering use only.

DL: Represents a delay selector. The DL values are for engineering use only.

PW: Represents a delay selector. The PW value is for engineering use only.

CCSYSOSC: Represents the value of the oscillator frequency. The oscillator frequency is for engineering use only.

CCOSCDIV: Represents a value for engineering use only.

INSERT/EXTRACT CLOCK SCAN RINGS (QVY) (GRP 1)

Warning: Observe notes before attempting this procedure.

Display Clock Scan Rings

To display the Clock Scan Rings screen from the QV screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key W2B next to SELECTION to stop the refresh clock, as all clocks must be stopped.

4. Press ENTER.

5. Key Y22 next to SELECTION.

6. Press ENTER.

Notes:

- *Setting off of the refresh clock (W2B) destroys the main memory contents.*

- *This procedure should never be used, except when the 4341 clock Distribution Adjustment is performed.*

- *Normally, these values do not require change, except when a new diskette has been installed, cards H or K replaced, some ECs installed which add new groups (modules), or the board has been replaced.*

- *When installing a new diskette, you must use the update function of the 4341 Clock Distribution Adjustment.*

- *The values of the clocks are critical and have been established and set by the producing plant. Each machine has its unique values and should not be compared with those of another system.*

- *No attempt should be made to modify the clock values. These values should be displayed periodically to assure that the values have not been accidentally modified. Compare with your on-site plant copy.*

- *If the values must be changed, refer to 4341 Clock Distribution Adjustment.*

- *For clock adjustment procedure, see supplements to the MAPs.*

- *Displayed serial number and the NS field is for reference purposes only.*

```
*INSERT/EXTRACT*  CLOCK RING (QVY)    CGRPNNXX      **IML REQUIRED**
```

		CP	DL	PW	CP	DL	PW	CP	DL	PW	CP	DL	PW	CP	DL	PW	CP	DL	PW
A	ARRAYS	1			2			3			4			5			6		
S	STATUS SCAN RING	1	0	02	00	0	00	15	1	15	11	1	12	08	1	16	13	1	12	08
K	CHECKS IN SYSTEM																			
I	PU HARDWARE																			
B	CS HARDWARE	2	1	14	10	1	13	09	1	15	10	1	11	07	1	17	11	1	17	11
M	MS HARDWARE																			
H	CHANNEL HARDWARE																			
C	CHANNEL INTRFACE	3	1	17	13	1	16	11	1	16	16	1	13	09	1	11	08	1	11	07
X	EXTERNAL REGS																			
R	SCAN RING																			
Y	CLOCK SCAN RING	4	1	17	12	1	17	13	1	17	13	1	17	12	1	12	06	1	12	08
W	COMMAND SBA-CAC																			
T	ADDRESS TRANS																			
G	SET CSAR ADDRESS	5	1	16	10	1	15	10	1	16	10	1	16	10						

```
Q GENERAL SELECT   SERIAL NO. 000000      100 CCSYSOSC   100 CCOSCDIV      150NS
Z RTRN TO PROG SYS
SELECTION: Y22                              ==>
                                        CLOCK STOP
                                             4341
```

Label Identification

CGRPNNXX: Represents 15 clock pulses within one pulse of each group. Two groups are addressed at once designated as NN and XX.

CP: Represents the chip select SRL. The CP value is for engineering use only.

DL: Represents a delay selector. The DL values are for engineering use only.

PW: Represents a delay selector. The PW value is for engineering use only.

CCSYSOSC: Represents the value of the oscillator frequency. The oscillator frequency is for engineering use only.

CCOSCDIV: Represents a value for engineering use only.

INSERT/EXTRACT W COMMAND (QVW) (GRP 2)

Note: This function is to be used only under the guidance of your support structure.

The W-command sends a command across the Service Bus Adapter (SBA) as a preliminary step to other manual functions. The command is analyzed for valid hex values, and an error message is displayed if incorrect. The scan ring numbers are considered invalid. This command does not require stopping of the PU clock to be invoked.

Warning: The W-command is a specialized function designed for debuging activity of the hardware. The PU must be set to the required state for the command to function properly; otherwise, unreliable results occur.

W-Command Invoke Procedure

1. Place the CE MODE switch ON.

2. Key QVW and a two-digit command number next to SELECTION.

3. Press ENTER.

Notes:

- *Observe that SBA CMD xx SENT is displayed next to the message indicator, where xx is the two-digit command number. This message remains until another command is sent or until a null (ENTER key only) is performed.*

- *When the first manual op command is invoked, the entire command appears along the SELECTION line. If followed by a second command, only the selection character (two-digit number) appears.*

- *The W-command can be placed into a loop by using the command QVWLxxyyyy, where L is the loop command, xx represents the command to be performed and yyyy equals the number of times it is to be performed. When this command is used, the message SBA CMD SENT YYYY is displayed next to the message indicator.*

- *This command displays the Insert/Extract menu when entered from any non-Insert/Extract screen. The last display remains on the screen when the command is entered from an Insert/Extract screen.*

Clock Maintenance Chip Command List

Cmd	Description
2A	Start Refresh Clock command
2B	Stop Refresh Clock command
2C	Set Clock-0 Start
	This is required for each single cycle.
2D	Set Single-Cycle Mode/Hard-Stop Mode command
2E	Set Clock Cycle Mode command
2F	Set Run/Reset Stop Mode command
30	Start PU Clock command
31	Read Local Store Array
	Read Local Store Retry Array
	Read Channel Data Buffer Array
	Read Channel Control Array
	Read PU TRAP/BAL (TBALSAVE) Array
32	Write Local Store Array
	Write Local Store Retry Array
	Write Channel Data Buffer Array
	Write Channel Control Array
	Write PU TRAP/BAL (TBALSAVE) Array
34	Pulse Go command
35	Set Instruction Step Mode/Soft-Stop Mode command
36	Set Single Pulse Mode command
37	Reset Pulse Mode command

Control Storage Maintenance Chip Command List

Cmd	Description
CA	Set/Reset CSAR command
CB	Set/Reset CREG command
CC	Read TRACE Array command
CD	Set/Reset Trace Buffer Address (TBADR)
CE	Set/Reset CS errors
CF	Read/Write CS Array command
D0	Write TRAPBAL Array command
D1	Write TRACE Array

Cache/Storage Maintenance Chip CMD List

Cmd	Description
8A	Read Directory 0-7 Array command
	Read Channel DLAT Array command
	Read DLAT0 Array command
	Read DLAT1 Array command
8B	Read Cache Array command
	Read Retry Address and Flags Array command
	Read Retry Buffer Array command
8C	Read Keystack Array Command
8E	Write Key Stack Array command
90	Write Cache Array command
91	Write Swap Buffer Even Array command
	Write Swap Buffer Odd Array command
92	Read Swap Buffer Even Array command
	Read Swap Buffer Odd Array command
93	Write Channel DLAT Array command
	Write DLAT0 Array command
	Write DLAT1 Array command
94	Write Directory 0-7 Array command
95	Write Retry Address and Flags Array command
97	Write Retry Data Buffer Array command

INSERT/EXTRACT TRANSLATE ADDRESS (QVT)

Translate Address Any V-Screen

To display any V-Screen:

1. Key QOC or QOM next to SELECTION to stop the PU clock.
2. Press ENTER.
3. Key T next to SELECTION.
4. Press ENTER.
5. Observe message: ENTER 6 DIG AND V OR R.
6. Key the six digits plus V (virtual) or R (real) next to T.
7. Observe that a DLAT address and a Cache address is decoded and displayed next to the message indicator.

Notes:

- *The Insert/Extract Screen selected remains when the translate address is entered.*
- *Message ENTER 6 DIG AND V OR R is displayed when T is entered.*
- *Message BAD ADDRESS is displayed if an incorrect address format is used.*
- *Message DLAT MISS AUxx is displayed if no match was found in the DLAT array.*
- *Message DIR MISS AFxx is displayed if there is no match in the Directory array.*
- *Message AUxx DIR MISS AFxx is displayed if a match is found in the DLAT array, but not found in the Directory.*
- *Message Code is:*

  a. *AUxx — matched DLAT address*
  b. *AFxx — matched DIRECTORY address*
  c. *AGxxxx — cache address which holds data.*

Alter Translate

Note: *There is no alter for the Translate function.*

Save Translate

Note: *There is no save for the Translate function.*

```
*INSERT/EXTRACT*

A ARRAYS                   AL PU LS
S STATUS SCAN RING         AP PU RETRY LS
K CHECKS IN SYSTEM         AD CHNL DATA BUFFER
I PU HARDWARE              AN CHNL CONTROL
B CS HARDWARE
M MS HARDWARE              AS SWAP BUFFER
H CHANNEL HARDWARE         AC CONTROL STORAGE
C CHANNEL INTRFACE         AT TRAP/BAL STACK
X EXTERNAL REGS            AB CSAR BACKUP
R SCAN RING                AU PU DLAT
Y CLOCK SCAN RING          AH CHNL DLAT
W COMMAND SBA-CAC          AY KEY
T ADDRESS TRANSLAT         AF L1 DIR
G SET CSAR ADDRESS         AG L1 CACHE DATA
                           AR CACHE RETRY DATA
Q GENERAL SELECT
Z RTRN TO PROG SYS
SELECTION: TOOC511V              ==> AU18    AF14    AG0A21
                            CLOCK STOP
                                     4341
```

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INSERT/EXTRACT SET CSAR ADDRESS
(QVG)

Set CSAR Address

1. Key QOC or QOM next to SELECTION to stop the PU clock.

2. Press ENTER.

3. Key QVG and a control storage address next to SELECTION.

   Note: *The address may be 1 to 5 digits long and must have a value within the range of the control storage that the machine is configured for.*

3. Press ENTER.

Notes:

- *The G-command causes the machine to branch to a microword at a specified control storage address. This microword is the next one to be executed.*

- *This command sets up a double-branch microword in the CREG, and cycles the machine to bring the doubleword at the specified control storage address into the CREG.*

- *THE CSAR HAS BEEN SET is displayed next to the message indicator. This message remains until another command is sent or a null (ENTER key only) is performed.*

- *This command causes the Insert/Extract menu to be displayed.*

Return to General Selection (Q)

1. Key Q next to SELECTION.

2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.

2. Press ENTER.
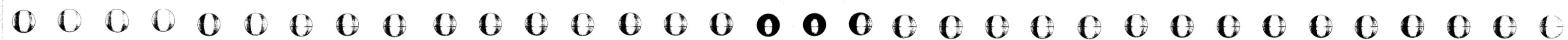
ERROR LOGOUT SCREENS

ERROR LOGOUTS (QE)

The Error Logouts are a manually invoked function to observe errors that have been collected from the processing unit or the support processor. The error screens are a CE function only. To invoke them, you must first place the CE MODE switch ON.

Note: *Detailed information pertaining to the logs can be found as follows:*

- *For SELECTION C, S, R, I, and D, see Volume 17, Processor Logs.*

- *For SELECTION L and B, see Volume 16, Processor Power.*

Display Error Logouts

To display the Error Logout screen from the General Selection screen:

1. Key E next to SELECTION.

2. Press ENTER.

PU Logouts (QEC)

To display the PU Error Logouts from the E-screen:

1. Key C next to SELECTION.

2. Press ENTER.

```
                    *ERROR LOGOUTS*

            C PU LOGOUTS
            S SP LOGOUTS
            L POWER LOGOUTS
            B TEMPERATURE LOGOUTS
            T RSF LINE ERROR STATISTICS

            R REFERENCE CODE LOGOUTS
            I CAP INITIATOR

            W SAVED SCREENS

            D DISKETTE ANALYSIS

            Q GENERAL SELECTION
            Z RETURN TO PROG SYS

SELECTION:                          ==>
                               CLOCK STOP

                                  4341
```

```
            *PROCESSING UNIT LOGOUT SELECTION*


            D DIRECTORY DISPLAY

            P PURGE

            S SUMMARY DISPLAY







SELECTION: C                        ==>
                               CLOCK STOP

                                  4341
```

PU Directory Display (QECD)

To display the PU Directory Display from the PU Logouts screen:

1. Key CD next to SELECTION.

2. Press ENTER.

PU Purge Function

·You can purge the PU Error Log, but this does not bring up a particular screen. The instructional messages appear on the screen.

```
PROCESSING UNIT LOGOUT DIRECTORY    MODEL: 4341    SERIAL NUMBER:  000000


ID   TODC EQUIVALENT  REF CODE  STORAGE ERROR  MACHINE STATUS AND CHANNEL RESET
                                                                         123450
00F9  00/001 05:20:28  602986AE              CHECK STOP (RESET)         ------
00F8  00/001 05:20:11  602986AE  D   AT 000100  SUCCESSFUL CC=1 ON I/O  X-----
00F7  00/001 01:16:31  660452AE  D   AT 000100  SUCCESSFUL CC=1 ON I/O  X-----
00F6  00/001 01:11:39  660452AE              CHECK STOP (FIRST)         XXXXXX
00F5  00/001 00:21:40  6B2075A6              CHECK STOP (RESET)         ------
00F4  00/001 00:06:50  5E3336AC              CHECK STOP (RESET)         ------
00F3  00/001 00:06:46  5E3336AC              CHECK STOP (RESET)         ------
00F2  00/001 00:05:59  634137AC              LOGOUT HAS BEEN PURGED
00F1  00/001 00:04:24  633977AE              LOGOUT HAS BEEN PURGED




SELECTION: CD                            ==>
     MAN     TEST           370 TIMER: ON CLOCK STOP            CSAR:   0000

                                            4341
```

PU Logout Summary (QECS)

To invoke the PU Logout Summary screen from the PU Logout screen:

1. Key CS next to SELECTION.

2. Press ENTER.

```
PU LOG SUMMARY MODEL:  4341   SERIAL:   000000  CURRENT TODC EQU: 79/062  14:27:15

008C 008C SUCCESSFUL RTY       0011 0011 CHN CONTROL      0008 0008 CLK CLOCK
000C 000C SUCCESSFUL I/O       0000 0000 CHN DATA BFR H   0000 0000 STG CACHE 0
000D 000D UNSUCCESSFUL RTY     0006 0006 CHN DATA BFR L   0000 0000 STG CACHE 1
0005 0005 UNSUCCESSFUL I/O     000A 000A CHN INTERFACE    0000 0000 STG CACHE 2
001C 001C UNRTY (NORMAL)       0019 0019 CS ARRAY 0       0000 0000 STG CACHE 3
0010 0010 UNRTY (EHC)          0019 0019 CS ARRAY 1       0001 0001 STG CACHE 4
0000 0000 UNRTY (NO RETRY)     0019 0019 CS ARRAY 2       0002 0002 STG CACHE 5
001E 001E CK ST (FIRST)        0019 0019 CS ARRAY 3       0004 0004 STG CACHE 6
0005 0005 CK ST (EHC)          002A 002A CS CONTROL       0003 0003 STG CACHE 7
0007 0007 CK ST (NO LOG)       0038 0038 PU DATA FLOW H   0010 0010 STG CONTROL 0
0000 0000 SK ST (MACH RST)     0037 0037 PU DATA FLOW L   0020 0020 STG CONTROL 1
                               000A 000A PU I-CYCLES      0003 0003 STG DLAT/DIR 0
                               0002 0002 PU INTERRUPTS    0001 0001 STG DLAT/DIR 1
0002 0002 KEY                  001A 001A PU DF CONTROL    0000 0000 STG SAR/KEY 0
0000 0000 ENABLED SINGLE       0008 0008 PU SAR           0004 0004 STG SAR/KEY 1
0000 0000 DOUBLE (PU)          0008 0008 PU SHIFTER
001B 001B DOUBLE (CHANNEL)     0002 0002 PU TIMER

SELECTION: CS                          ==>
                                    CLOCK STOP
                                        4341
```

SP Logouts (QES)

To invoke the SP Logout screen from the E-screen:

1. Key S next to SELECTION.
2. Press ENTER.

```
                         *SP LOGOUTS*

                         A   SUMMARY SCREEN

                         P   PURGE ALL LOGS

                         0 TO 15   DETAIL SCREEN


                         Q   GENERAL SELECTION

                         Z   RETURN TO PROG SYS




        SELECTION: S                      ==>
                                     CLOCK STOP

                                        4341
```

SP Logout Summary (QESA)

To display the SP Logout Summary from the SP Logout screen:

1. Key SA next to SELECTION.
2. Press ENTER.

SP Purge All Logs

This function purges all log records in the SP error area on the diskette. No new screen is involved when you use this function.

```
      ***SP LOGOUT SUMMARY***        CURRENT TODC EQUIVALENT: 79/264 11:53:12
  ==============================================================================
  LN EVNT CT TODC EQUIVALENT   LVL MM MC --MSW--- C-IC INST ADPT SIC- LMR- REF.CODE
  00 0017 01 79/263 16:43:24   07 00 20 845C2F2E 845A A9CB 0000 2164 3900 F1100114
  01 0015 02 79/263 16:09:53   07 00 20 845C2F2E 845A A9CB 0000 2164 3900 F1100114
  02 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  03 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  04 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  05 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  06 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  07 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  08 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  09 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  10 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  11 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  12 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  13 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  14 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  15 0000 00 00/001 00:00:00   00 00 00 00000000 0000 0000 0000 0000 0000 00000000
  SELECTION: SA                                ==>

                                        4341
```

SP Detail Screen

To display the SP Detail screen from the SP Logout screen:

1. Key Sx next to E on the SELECTION line.
   (where x = 00 through 15)

2. Press ENTER.

Notes:

- An SP Log request from an interrupt level 0, lines 17-19 are blank.
- An SP Log request from a interrupt level 1, 6, or 7, lines 17-19 display the current and last SPIL instructions.
- An SP Log request from a interrupt level 2, 3, 4, or 5, line 17-19 display the Device Control Block.

Power Logouts (QEL)

To display the Power Logouts screen from the Error Logouts screen:

1. Key L next to SELECTION.

2. Press ENTER.

```
 SP LOG:00  TODC EQUIV:81/029 00:05:57     ID:0100034341  EC:000000    EVENT:0002
================================================================================
07 LEVEL     7942 IC         00 IOADPT     00000000AA38F0F88238F0790000 CNFG
00 MMASK       34 PP         00 IOCMD      --------------MSW'S--------------
DF CMASK       35 SP       2020 LMR        D5E4 E160 LVL0       82D0 6362 LVL1
12 SPCK        80 ZHCV     2000 LMRBASE    456E A524 LVL2       0FD0 2726 LVL3
00 IOIRR     7942 C-IC  F5000120 REFCODE   B5AA A928 LVL4       C242 AB2A LVL5
01 MIRR      EE05 INST  00000000 RC EXTN   82D0 AD2C LVL6       7946 B534 LVL7
---------I/O STATUS----------  -------BURST MODE-------    -------PLDA--------
02   DISK          0002 DCA              5AFC LCA    68 C1  0F C2  80 C3
FE C SCL         000200 LCA         DF24 00G0 DISK   2F AS  A0 IM  D3 ID
02   PWR     0000000000 T CCA   0000 0000 AECE AEE0 DCA  00 OP  00 CK  30 PG
02 C SBA       00000000 PU      AF60 AFE0 A86C B0E0 DCA  44 TM  C8 PF  00 BF
                                                         00 CC  00 CA  00 CT
REGS:2     4     6     8    10    12    14    16    18    20    22    24    26    28    30
1100 0100 1E00 2A93 0002 2A00 7256 726C EODE E300 7235 7534 7920 7C7A 72F6 7214
-------SPIL CURRENT INSTRUCTION------     --------SPIL LAST INSTRUCTION--------
ADDR:20EE    DATA:5000 249A 215A 04F0    ADDR:20D6    DATA:5201 0000 2494 20EE
SPIL BRN TABLE:20DE 2180 2160 20F4 20DE 2180 2160 20F4 20DE 2180 2160 20F4 20DE
 SELECTION: S00                           ==>
      MAN     TEST                        INSTR STOP DATA: 47F0 R-ADDR: 000420

                              4341
```

```
                  EXPANDED POWER ERROR INFORMATION
                  ===================================

LOG 1: ADDR= 81839193 A1A3B1B3   85879597 A5A7B5B7   40424446 50525456 32  ADDR
LAST LOG     54001560 40801780   2401FFB5 E7FFF1FF   03448F78 00008F98 00  20F6
             008007C0 03800380   01F02228 00C00600

LOG 2: ADDR= 81839193 A1A3B1B3   85879597 A5A7B5B7   40424446 50525456 32  ADDR
             54201560 40801780   2401FFB5 E7FFF1FF   03448F78 00008F78 00  20F6
             008007C0 03800380   01F02228 00C00600

LOG 3: ADDR= 81839193 A1A3B1B3   85879597 A5A7B5B7   40424446 50525456 32  ADDR
             40000400 40000001   000109B1 8322D1DF   20658F77 8DF08F98 0D  3DB5
             1F8077FB 03807783   FFFEF66E 7CC02E20

LOG 4: ADDR= 81839193 A1A3B1B3   85879597 A5A7B5B7   40424446 50525456 32  ADDR
             40200400 40000001   000109B1 0322D1DF   20658F78 8DF08FB6 0D  3DB5
             1F8077FB 03807783   FBFEF66E 1C802E20

REFERENCE CODES:
  101FF202 101FF202 1010400A 1010400A 1010400A 1010400A 1010400A 1010400A
  MAN     TEST                     INSTR STOP
                                        4341
```

```
 SP LOG:00  TODC EQUIV:81/029 00:05:57     ID:0100034341  EC:000000    EVENT:0002
================================================================================
07 LEVEL     7942 IC         00 IOADPT     00000000AA38F0F88238F0790000 CNFG
00 MMASK       34 PP         00 IOCMD      --------------MSW'S--------------
DF CMASK       35 SP       2020 LMR        D5E4 E160 LVL0       82D0 6362 LVL1
12 SPCK        80 ZHCV     2000 LMRBASE    456E A524 LVL2       0FD0 2726 LVL3
00 IOIRR     7942 C-IC  F5000120 REFCODE   B5AA A928 LVL4       C242 AB2A LVL5
01 MIRR      EE05 INST  00000000 RC EXTN   82D0 AD2C LVL6       7946 B534 LVL7
---------I/O STATUS----------  -------BURST MODE-------    -------PLDA--------
02   DISK          0002 DCA              5AFC LCA    68 C1  0F C2  80 C3
FE C SCL         000200 LCA         DF24 0000 DISK   2F AS  A0 IM  D3 ID
02   PWR     0000000000 T CCA   0000 0000 AECE AEE0 DCA  00 OP  00 CK  30 PG
02 C SBA       00000000 PU      AF60 AFE0 A86C B0E0 DCA  44 TM  C8 PF  00 BF
                                                         00 CC  00 CA  00 CT
REGS:2     4     6     8    10    12    14    16    18    20    22    24    26    28    30
1100 0100 1E00 2A93 0002 2A00 7256 726C EODE E300 7235 7534 7920 7C7A 72F6 7214
------------------------------DEVICE CONTROL BLOCK----------------------------
0200 FF01 1000 0000 003C 8117 ED00 0000 5400 5406 0801 0000 190C 0000 60C2 073C
C1E8 0746 0757 0769 0767 077F E500 B2BA 0000 0000 F028 C1F8 E520 BED6 B9FC FFFF
 SELECTION: S01                           ==>
      MAN     TEST                        INSTR STOP DATA: 47F0 R-ADDR: 000420

                              4341
```

Temperature Logouts (QEB)

To display the Temperature Logouts screen from the Error Logouts screen:

1. Key B next to SELECTION.

2. Press ENTER.

```
                  TEMPERATURE TRACE                   LAST ERASE DATE  YY/MM/DD
DEGREES C.        ==================                                   00/00/00
42        .       .    .    .    .    .         .      .    .    .    .     .    .
40        .       .    .    .    .    .         .      .    .    .    .     .    .
38        .       .    .    .    .    .         .      .    .    .    .     .    .
36        .       .    .    .    .    .         .      .    .    .    .     .    .
34        .       .    .    .    .    .         .      .    .    .    .     .    .
32        .       .    .    .    .    .         .      .    .    .    .     .    .
30        .       .    .    .    .    .         .      .    .    .    .     .    .
28        .       .    .    .    .    .         .      .    .    .    .     .    .
26      .+  .+   . +.    .++  .    .    .    + +++ +++++++   .   . + +++  .   .  + +++
24      + +++-++. + +++++    .    .    .  -++---++- --- +++++++-+.--+++++++-+--
22      .-  .-  ++ -. --. -    .    .   .   .--  .    .    .    -----   .--
20        .       .    .    .    .    .  .       .      .    .    .    .     .    .
18        .       .    .    .    .    .         .      .    .    .    .     .    .
16        .       .    .    .    .    .         .      .    .    .    .     .    .
14        .       .    .    .    .    .         .      .    .    .    .     .    .
12        .       .    .   .  +++++++++++++.    .      .    .    .    .     .    .
10        .       .    .   +++++++++++++.       .      .    .    .    .     .    .
TO PURGE ENTER "P" AND DATE ..  ........
   MAN      TEST                         INSTR STOP

                                            4341
```

RSF Line Error Statistics (QET)

The Line Error Statistics screen enables you to read all send/receive operations and any errors that occurred during a Remote Support session. These statistics are accumulated and the counters are reset at the beginning of each new session.

Display RSF Line Error Statistics Screen

To display the RSF Line Error Statistics screen from the General Selection screen:

1. Key ET next to SELECTION.

2. Press ENTER.

```
                              *RSF LINE ERROR STATISTICS*

                                   SEND        RECEIVE
       NUMBER OF OPERATIONS         0000        0000
       NUMBER OF ERRORS             0000        0000




       Q GENERAL SELECTION
       Z RETURN TO PROG SYS


       SELECTION: T                                  ==>


                                                4341
```

Model Group 2

Reference Code Logouts (QER)

To display the Reference Code Logouts from the Error Logouts screen:

1. Key R next to SELECTION.
2. Press ENTER.

```
                    *REFERENCE CODE LOGOUTS*


              D  DISPLAY REFERENCE CODES


              P  PURGE ALL LOGS



              Q  GENERAL SELECTION


              Z  RETURN TO PROG SYS




    SELECTION: R                              ==>
          MAN     TEST                    INSTR STOP


                                              4341
```

Reference Code Logout File (QERD)

To display the Reference Code Logout File from the Reference Code Logouts screen:

1. Key RD next to SELECTION.
2. Press ENTER.

```
   **REFERENCE CODE LOGOUT FILE**    CURRENT TODC EQUIVALENT: 79/264 11:48:43
   =============================================================================
   RN CT ---TODC EQUIV-- REF CODE RC EXTN.   RN CT ---TODC EQUIV-- REF CODE RC EXTN.
   0  01 79/263 16:43:24 F1100114 00000000   16 00 00/001 00:00:00 00000000 00000000
   1  02 79/263 16:09:53 F1100114 00000000   17 00 00/001 00:00:00 00000000 00000000
   2  00 00/001 00:00:00 00000000 00000000   18 00 00/001 00:00:00 00000000 00000000
   3  00 00/001 00:00:00 00000000 00000000   19 00 00/001 00:00:00 00000000 00000000
   4  00 00/001 00:00:00 00000000 00000000   20 00 00/001 00:00:00 00000000 00000000
   5  00 00/001 00:00:00 00000000 00000000   21 00 00/001 00:00:00 00000000 00000000
   6  00 00/001 00:00:00 00000000 00000000   22 00 00/001 00:00:00 00000000 00000000
   7  00 00/001 00:00:00 00000000 00000000   23 00 00/001 00:00:00 00000000 00000000
   8  00 00/001 00:00:00 00000000 00000000   24 00 00/001 00:00:00 00000000 00000000
   9  00 00/001 00:00:00 00000000 00000000   25 00 00/001 00:00:00 00000000 00000000
   10 00 00/001 00:00:00 00000000 00000000   26 00 00/001 00:00:00 00000000 00000000
   11 00 00/001 00:00:00 00000000 00000000   27 00 00/001 00:00:00 00000000 00000000
   12 00 00/001 00:00:00 00000000 00000000   28 00 00/001 00:00:00 00000000 00000000
   13 00 00/001 00:00:00 00000000 00000000   29 00 00/001 00:00:00 00000000 00000000
   14 00 00/001 00:00:00 00000000 00000000   30 00 00/001 00:00:00 00000000 00000000
   15 00 00/001 00:00:00 00000000 00000000   TIME OF LAST PURGE: 81/003 13:34:43
   SELECTION: RD                              ==>
         MAN     TEST                    CLOCK STOP

                                              4341
```

Purge All Logs

Use this function (P) to purge all logs.

CAP Initiator (QEI)

To invoke the CAP Initiator function from the Error Logouts screen:

1. Key I next to SELECTION.

2. Press ENTER.

```
CAP INITIATOR




                    



ENTER REFERENCE CODE (8 DIGITS), OR ADD EXTENSION (8 MORE)

  MAN      TEST                   INSTR STOP
                                            4341
```

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SAVED SCREENS (QEW)

The Saved Screens screen provides an area (screen) for a log entry by the service representative or allows the display of a screen(s) that have been saved by the COPY Key (KD) function.

The CE Log screen is a preformatted screen with input fields used for log entry of problems and/or repair actions.

The CE screen is a copy of a saved screen and the current TOD clock value on the diskette when the COPY key is pressed.

The Saved Screens screen contains all the commands necessary to manipulate the CE Log screen(s) or the CE screen(s).

Display Saved Screens

To display the Saved Screens from the General Selection screen:

1. Key EW next to SELECTION.
2. Press ENTER.

```
*SAVED SCREENS*      ADDR RANGE (00/OE)           DATE: YY/DDD HH:MM

 T LIST

 D DISPLAY           ***** LOG TITLE **************** LOG TITLE ***********
 L RE-TITLE          00   DIR MISS
                     01   CACHE PROBLEMS            POWER DROP
                     02   CLOCK CARD FAILURE        A1-B1 BOARD PROB
 E CE LOG EDIT
                     ***** CE TITLE *********************** SAVED DATE *
 R ERASE ONE         03   QVAF00                                00/001 00:00
 X PURGE CE LOG SCRNS
 Y PURGE CE SCRNS

 F SEND TO CONS PRT
 C SEND TO CHNL PRT

 Q GENERAL SELECT
 Z RTN TO PROG SYS

 SELECTION: WT00                              ==>

                                         4341
```

```
 LOG1:                    (ENTER KEYWORD SYMPTON)     YY/MM/DD
 SYMPTON:

 FRUS CALLED:                        FRUS CHANGED:

 DIAGNOSTIC RESULTS/COMMENTS:


 INCIDENT:        PROBLEM:        CE NAME
 LOG2:                    (ENTER KEYWORD SYMPTON)     YY/MM/DD
 SYMPTON:

 FRUS CALLED:                        FRUS CHANGED:

 DIAGNOSTIC RESULTS/COMMENTS:


 INCIDENT:        PROBLEM:        CE NAME
 SELECTION: WD00                              ==>

                                         4341
```

Screen Layout

The Saved Screens screen menu is displayed on the left side of the screen. The area on the right (top) displays the address and title of any CE Log(s). Two logs are contained on each CE Log screen. The area on the right (bottom) displays the address, title, and saved date of any CE screen copied to the diskette.

The Saved Screen function displays the most recent saved CE Log screen or CE screen at the top of its respective grouping. A maximum combination of four screens (between the two groups) can be saved.

Notes:

- *One or two logs saved to a CE Log screen is considered as one saved screen.*

- *Log1 serves as the title to the CE Log screen.*

- *Paging may be required to see the complete list of saved screens.*

CE Log Screen Layout

The CE Log screen is a preformatted screen with input fields. Each screen provides for two log entries. This enables the service representative to communicate intermittent problems and repair activities.

Note: *Pressing the EOF key when the cursor is positioned after SYMPTOM: clears, up to CE NAME, the remaining titles to provide more space for describing a problem.*

CE Screen Layout

The CE screen is a copy of a screen and the current TOD clock value. SAVED-title is displayed on the screen next to the message indicator.

Commands

List

T addr

Displays the addresses, titles, and saved dates (CE screen) of the saved CE Log and CE screens; addr is an address from 00-03.

Notes:

- Entering QEW defaults to WT00.
- Entering WT1 defaults to WT01.

Display

D addr

Displays the specified saved screen; addr is an address from 00-03.

Displaying a saved screen lines (1-19) also displays lines 20-24 of the current screen. Lines 20-24 of the saved screen are displayed on lines 2-6 when paging forward (still keeping lines 20-24 of current displayed screen). Row 1, column 1 characters are not displayed, and the SAVED-title is displayed on the screen next to the message indicator.

Note: All fields are protected when displaying a saved screen.

Re-Title

L addr new title

If the address of the saved screen is specified, this command renames the title at that address to the specified title. If no title is given, the title is not changed, but a copy of the title of the address specified is put on the SELECTION line after L addr.

Notes:

- CE Log screens cannot be retitled.
- Because all blanks are taken out of the SELECTION line commands, a period must be used in place of a blank.

CE Log Edit

E addr

Displays the CE Log screen at the specified address. If no address is specified, a new CE Log screen is displayed.

This command enables the inputting of log entry data or editing to existing log entries. After any required entries or editing has been made, pressing the ENTER key saves the screen at address location 00.

Notes:

- If an existing CE Log screen is displayed and the ENTER key (saved) is pressed, its new address location is 00.
- Pressing the MODE SEL key or changing the command on the SELECTION line prevents the displayed CE Log screen from being saved.
- QEWT is redisplayed and SAVE-title appears on line 23 after saving.

Erase One

R addr

Erases the specified screen from the diskette.

Purge CE Log Screens

X

Erases all CE Log screens from the diskette.

Purge CE Screens

Y

Erases all CE screens from the diskette.

Send to Console Printer

F addr

Prints the specified saved screen on the console printer (Kn); addr is the address of the screen to be printed.

Notes:

- The console printer must be disconnected (assigned Kdsc) on the program load (QL) screen before using this command.
- Entering FALL next to SELECTION and pressing ENTER prints all saved screens.
- Entering Faddr1-addr2 (addr1= beginning address, addr2 = ending address) prints the screens specified from the beginning address through the ending address.

Send to Channel Printer

C addr cuu

Prints the specified saved screen on the channel printer; addr is the address of the screen to be printed, and cuu is the channel unit address of the channel printer.

Notes:

- This selection is valid when the machine has been IMLed but not IPLed.
- The channel unit address (cuu) defaults to the KCcuu assignment if not specified. See "Program Load (QL)."
- Entering CALL cuu next to SELECTION and pressing ENTER prints all saved screens.
- Entering Caddr1-addr2 cuu (addr1= beginning address, addr2= ending address) prints the screens specified from the beginning address through the ending address.

Warning: If the machine has been IPLed, a QCLEAR is required. However, a loss of customer data can result with this selection.

Return to General Selection (Q)

1. Key Q next to SELECTION.
2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.
2. Press ENTER.

Model Group 2

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EC 379829 28Jun82	3 of 4	

DISKETTE READABILITY (QED)

The Diskette Readability screen enables you to read all records on a diskette, starting at a given address. This function tests the ability to read the record. Any unreadable records are reported, and the function continues to the end of the diskette.

Normal operation time for this function is about one minute, unless the program is interrupted by the operator if he presses the MODE SEL key or the LOGIC RESET button.

The diskette has 76 cylinders with 26 records on each side. A four-digit hex number is the address at which this function begins its analysis. The first two digits are the cylinder number (range 00 to 4C); the second two digits are the record number. Range 80 to 9A is for the front of the diskette, and range 00 to 1A is for the back. The front is the side with the permanent label.

Diskette Readability Screen

To select the Diskette Readability screen from the General Selection screen:

1. Key ED next to SELECTION.

2. Press ENTER. The Diskette Analysis screen appears.

3. Change the diskette to the one to be analyzed.

4. Enter the starting address, and press ENTER.

   Note: *The analysis begins with cylinder 0 and record 1 if no address is entered.*

5. Any error is displayed on the screen. If the screen becomes full, press ENTER to continue the analysis. You can interrupt the program by selecting another screen.

6. If you get the message OPERATOR TROUBLE, check the diskette drive. Usually, the door is open. Close the door and start the analysis from the beginning. If the door is not open, there is a physical problem with the drive.

7. At the end of the analysis or if you wish to interrupt the analysis, be sure to replace the original disk.

Note: *If a module ID of FFFF appears, one of the following has occurred:*

- *The module ID is beyond the end of the written data*
- *Cylinder 0 was read*
- *A cylinder index was read*
- *The master index was read.*

```
                    -DISKETTE READABILITY TEST-

         TO START:  1) MAKE SURE DISKETTE TO BE TESTED IS INSTALLED
                     2) TYPE CYLINDER- AND RECORD-NUMBER IN HEX
                        INTO SELECTION-FIELD AND PRESS ENTER-KE
                     OR
                     2) PRESS ENTER-KEY ONLY TO START ANALYSIS
                        WITH CYLINDER 0  AND RECORD 1.

         TO  EXIT:  1) MAKE SURE ORIGINAL-DISKETTE IS INSTALLED.
                    2) SELECT ANY SCREEN.


    SELECTION-FORMAT:  DCCRR   (ALL NUMBERS IN HEX)
                       CC=CYLINDER, 00 TO 4C
                       RR=RECORD,   00 TO 1A, BACK-HEAD
                                    80 TO 9A, FRONT-HEAD

    SELECTION: D                              ==>

                                          4341
```

```
              -DISKETTE READABILITY TEST-

       LINE CYLINDER HEAD   RECORD MODULE  DEVICE
       NUMB  NUMBER         NUMBER   ID    STATUS
        01    12    FRONT     04    0580     42
        02    16    BACK      11    1120     42
        03    1A    BACK      1A    1145     42        PARAMETERS ARE
        04    25    FRONT     0E    44B4     42        GIVEN IN HEX-VALUES
        05    2C    FRONT     01    9000     42
        06    39    FRONT     09    9E24     42
        07    3F    BACK      12    D72A     C4



    IF THERE IS MORE TO DO, PRESS ENTER-KEY OR EXIT.
    TO INTERRUPT, INSTALL ORIG.-DISK AND PRESS MODE KEY.
    IF ANALYSIS IS COMPLETED YOU MAY START AGAIN
                                      NO MORE READ ERROR
    SELECTION: D1284                  ==>ANALYSIS COMPLETED

                                          4341
```

Status Field

The following fields combine to create the one-byte device status.

Field 1	–	Error Status
80	–	Command Error
40	–	CRC Error
C0	–	Hardware Error

Field 2	–	Operational Status
08	–	Control Operation Complete
18	–	Busy
20	–	Overrun or Underrun
28	–	Timeout
30	–	Record Not Found
38	–	Diskette Not Ready

Field 3	–	Interrupt Status
01	–	Interrupt Request
02	–	Enable Interrupt
04	–	Machine Check

Return to General Selection (Q)

1. Key Q next to SELECTION.

2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.

2. Press ENTER.

POWER/TEMPERATURE SCREENS

POWER/TEMPERATURE (M-SCREEN)

You use the Power/Temperature screen to invoke the power
or temperature programs. When these functions are invoked,
the diagnostic monitors assume control and other manual
functions are not available, except under the monitor's
control. Each function makes reference to the proper manual
for additional information.

Display Power/Temperature Screen

To display the Power/Temperature screen from the General
Selection screen:

1. Key M next to SELECTION.

2. Press ENTER.

```
                         *POWER/TEMPERATURE*

                    W PARTIAL POWER UP/DOWN

                    U FULL POWER UP

                    A ANALOG SENSOR DISPLAY

                    D DIGITAL SENSOR DISPLAY

                    T TEMPERATURE SENSOR DISPLAY

                 WITH POWER OFF ONLY:
                    V VOLTAGE TRACKING

                    P POWER DIAGNOSTICS

                    Q GENERAL SELECION
                    Z RETURN TO PROG SYS
SELECTION:                                ==>
                              INSTR STOP

                                       4341
```

Partial Power Up and Down Screen (QMW)

To display the Partial Power Up and Down screen from the
Power/Temperature screen:

1. Key W next to SELECTION.

2. Press ENTER.

Full Power Up Function (QMV)

When you press QMU, the system automatically powers up
completely. This function alone does not bring up a special
screen.

```
         PARTLY POWER UP AND DOWN
         ==========================

    POWER UP---------------------- 00
    POWER DOWN-------------------- 01

    FUNCTION:  COMPLETE SYSTEM    00    STATUS
               PART 1 / PROC UNIT 01    ON
               PART 2             02    OFF
               PART 3             03    OFF
               PART 4 / CTCA      04    ON
               PART 5             05    OFF
               PART 6             06    OFF
               PART 7 / I-0       07    OFF


POWER UP/DOWN: ..        FUNCTION: ..

                         INSTR STOP

                                  4341
```

Momentary Status Display

To display the Momentary Status screen from the Partial Power Up and Down screen:

1. Press the PF8 key once.

```
            MOMENTARY STATUS DISPLAY
            ========================
CONTROL LATCH ADDRESSES:      40424446   50525456   30
CONTROL LATCHES:              01450FA0   0CF00FA0   00

DIGITAL SENSE ADDRESSES:      81839193   A1A3B1B3
DIGITAL SENSES:               00200000   60000000

ANALOG SENSE ADDRESSES:       85879597   A5A7B5B7
ANALOG SENSES:                FF0EFF6C   7C010FC0

INTERRUPT AND STATUS BYTE:    00   02

ADDR OF STOP AND SEQUENCE:    2116   000000 000000 000000 000000
               SEQUENCE:             000000 000000 000000 000000
ERROR BITS--BIT/ADDR:         0000 0000 00A3 20A3 9495

1034   1034


                                                    4341
```

Error Status Display

To display the Error Status Display from the Partial Power Up and Down screen:

1. Press the PF8 key twice.

2. Press PF8 again to return to the Partial Power Up and Down screen.

```
            ERROR STATUS DISPLAY
            ====================

CONTROL LATCH ADDRESSES:      40424446   50525456   32
CONTROL LATCHES:              00000000   00000000   00

DIGITAL SENSE ADDRESSES:      81839193   A1A3B1B3
DIGITAL SENSES:               00000000   00000000
DIGITAL COMPARE MASK          00000000   00000000
AND RESULT                    00000000   00000000

ANALOG SENSE ADDRESSES:       85879597   A5A7B5B7
ANALOG SENSES:                00000000   00000000
ANALOG COMPARE MASK           00000000   00000000
AND RESULT                    00000000   00000000

SEQUENCE: ADDR/DATA           2116   000000 000000 000000 000000
          DATA                       000000 000000 000000 000000
ERROR BITS--BIT/ADDR:         0000 0000 0 00 0000 0000
                                                    REF CODE  F70CE002
1034   1034
                                                    4341
```

Analog Sense Display (QMA)

To display the Analog Sense Display screen from the Power/Temperature screen:

1. Key A next to SELECTION.

2. Press ENTER.

```
                                                                THIS DISPLAY IS TO BE USED
  MAXIMUM      ************************************             FOR COARSE ADJUSTMENT ONLY

  C E CALL     ************************************             WHEN ADJUSTMENT IS COMPLETE,
                                                                PRESS FUNCTION KEY 9.
                  - - -              ++
                  + -+- -+      -++ ++++ ++    -+ -+-
  ANALOG SENSE  00000000 01111111 11122222 22222333
  A01 TO A32    12345678 90123456 78901234 56789012

  MAXIMUM      ************************************        ***************************

  C E CALL     ************************************        ***************************

                  ++
                  ++
                  ++--+   -            + --     -
  ANALOG SENSE  33333334 44444444 45555555 55566666
  A33 TO A64    34567890 12345678 90123456 78901234


                                                     4341
```

Digital Sensor Display (QMD)

To display the Digital Sensor Display screen from the Power/Temperature screen:

1. Key D next to SELECTION.

2. Press ENTER.

```
              DIGITAL  SENSE  DATA  DISPLAY
              - REPRESENTS INACTIVE STATE
              * REPRESENTS ACTIVE STATE

   SAMPLE    MODE IS ACTIVE
             MODES: SAMPLE- READ DIGITAL INPUTS ONCE AND DISPLAY
                    CONTINUOUS- READ AND DISPLAY DIGITAL INPUTS CONTINUOUSLY


   DIGITAL    1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
              -  *  -  -  -  -  -  -  -  -  *  -  -  -  -  -  -  -  -  -  -  -  -

   DIGITAL   24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46
              -  -  -  -  -  -  -  -  -  -  *  -  -  -  -  -  -  -  -  -  -  -  -

   DIGITAL   47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
              -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -


   ENTER DISPLAY CONTROL CHARACTER S, OR C:         ==>
        MAN      TEST                        INSTR STOP

                                                     4341
```

Thermal Sense Data Display (QMT)

To display the Thermal Sense Data Display screen from the Power/Temperature screen:

1. Key T next to SELECTION.

2. Press ENTER.

```
            THERMAL   SENSE   DATA   DISPLAY

   SAMPLE    MODE IS ACTIVE
             MODES: SAMPLE- READ THERMAL INPUTS ONCE AND DISPLAY
                    CONTINUOUS- READ AND DISPLAY THERMAL INPUTS CONTINUOUSLY


THERMAL   1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
DEGREES C 24 29 28 25

MAXIMUM   -------------------------------------------------------------------

CE CALL   -------------------------------------------------------------------


NOMINAL   **********************************************************************

ENTER DISPLAY CONTROL CHARACTER S, OR C:      ==>
    MAN      TEST                          INSTR STOP


                                                4341
```

Voltage Tracking Display (QMV)

To display the Voltage Tracking screen from the Power/Temperature screen:

1. Key V next to SELECTION.

2. Press ENTER.

```
   VOLTAGE TRACKING DISPLAYS THE TURN ON OF SELECTED VOLTAGES IN THE PROCESSING
   UNIT AND CTCA (IF INSTALLED). THERE MUST BE TWO INPUTS, TRACK NUMBER (01-14)
   AND VOLTAGE(S) (V1-V7). THE TRACKS ARE IN THE ORDER OF THE POWER ON SEQUENCE


TRACK                                TRACK
NUMBER   V1        V2        V4       NUMBER   V1          V2          V4
01   -2.2 BIAS  -4.25 BIAS -1.5 BIAS  08   -1.5(A1)    -1.5(A2)    -1.5(B1)
02   +4.25 BIAS                       09   -4.25(A1)   -4.25(A2)   -4.25(B1)
03   +6 BIAS                          10   -6.45
04   +6 BULK    -2.2 BULK  -1.5 BULK  11   +6
05   +4.25 BULK -4.25 BULK +5 VOLTS   12   +4.25 FINAL
06   -6.45 INITIAL (-2.2)             13   +1.25*       -3*
07   +4.25 INITIAL                    14   +6*
                                           * = CTCA VOLTAGE

EXAMPLES:  TRACK NUMBER 04 V2 = -2.2 BULK
           TRACK NUMBER 04 V5 = +6 & -1.5 BULK
           TRACK NUMBER 04 V7 = +6,-2.2, & -1.5 BULK
                    ENTER: TRACK NUMBER .. VOLTAGE(S) V

   1004 1004                                    4341
```

Note: *This screen reflects a typical voltage tracking display. Refer to "Processor Power" section for the machine's correct version.*

Power Diagnostics

Use this function to run diagnostics on the power controller
adapter section of the machine.

Return to General Selection from the M-Screen

1. Key Q next to SELECTION.
2. Press ENTER.

Return to Prog Sys

1. Key Z next to SELECTION.
2. Press ENTER.

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Diskette IPL (QI)

The Diskette IPL screen provides the service representative with a selection of diagnostic tools. These tools are diskette dependent; the screen identifies which one is required.

The Diskette IPL screen is a CE function and can only be invoked in CE mode.

Display Diskette IPL

To display the Diskette IPL screen from the General Selection screen:

1. Key I next to SELECTION.

2. Press ENTER.

```
                          *DISKETTE IPL*

              E    4300 FRIEND                    DIAG 1
              C    CHANNEL-TO-CHANNEL             DIAG 1

              S    SYSTEM TEST ST/4300            DIAG 5
          Txxxx    TAPE OLTS  (xxxx = DEVICE TYPE)  DIAG 5

           FEnn    LOAD MODULE -FEnn-             DIAG

              D    SP DUMP TO MAIN STORAGE        FUNC


              Q    GENERAL SELECTION
              Z    RETURN TO PROG SYS


           NOTE:   'QRES' REQUIRED AFTER DISKETTE IPL

       SELECTION:                              ==>
```

Return to Prog Sys (Z)

1. Key Z next to SELECTION.

2. Press ENTER.

Return to General Selection (Q)

1. Key Q next to SELECTION.

2. Press ENTER.

E 4300 Friend

For detailed information about 4300 Friend, see Volume 17, section 40, "4300-FRIEND."

C Channel-To-Channel

For detailed information about Channel-to-Channel, see volume 17, section 42, "Channel-to-Channel Adapter Test."

S System Test ST/4300

For detailed information about System Test ST/4300, see volume 17, section 40, "ST/4300."

Txxxx Tape OLTS

For detailed information about Tape OLTS, see volume 17, section 40, "ONLINE TESTS (OLTS)."

FEnn Load Module

This selection allows loading a module from a disk into main storage.

To use this function:

1. Key FEnn (nn=module ID number) next to SELECTION.

2. Press ENTER.

3. When the message MOUNT PROPER DISK ENTER appears. Mount the required disk.

4. Press ENTER.

5. When the message REMOUNT FUNCTIONAL DISK appears. Mount the functional disk.

6. Key QRES next to SELECTION.

7. Press ENTER.

D SP Dump To Main Storage

This selection is used with the SP STAND-ALONE DUMP SUPPORT option.

SP STAND-ALONE DUMP SUPPORT

Note: *Use this function only as directed by your Support Structure.*

This command provides a support processor storage dump to main storage which then can be printed.

To invoke SP Stand-Alone Dump:

1. Place the CE MODE switch ON.

2. Press CE panel switches A, B, and C together. This invokes SP trace.

   ```
   Format:  x(x> <xxxx xxxx)x
                 ↑
                 └── Enter J here
   ```

3. Enter J were indicated, and press ENTER key. SP now dumps SP storage onto the diskette. If an address 0000 appears, dump was successful. If an address FFFF appears, dump was unsuccessful; try again.

4. Enter Z in place of J, and press ENTER key to clear Trace message.

Note: *The system may be returned to normal operation at this time by pushing the LOGIC RESET button. The stand-alone dump may be performed later by continuing this procedure.*

5. Enter QCLEAR on the SELECTION line, and press ENTER key.

6. Enter QID on the SELECTION line, and press ENTER key. SP Storage is now dumped from the diskette to main storage.

7. Use Stand-Alone Dump program to print the data in main storage.

8. Return system to operational state (successful Load Clear reset and IPL performed).

Note: *Use QX DUMP or QDD0DDD to view the dump on the display console.*
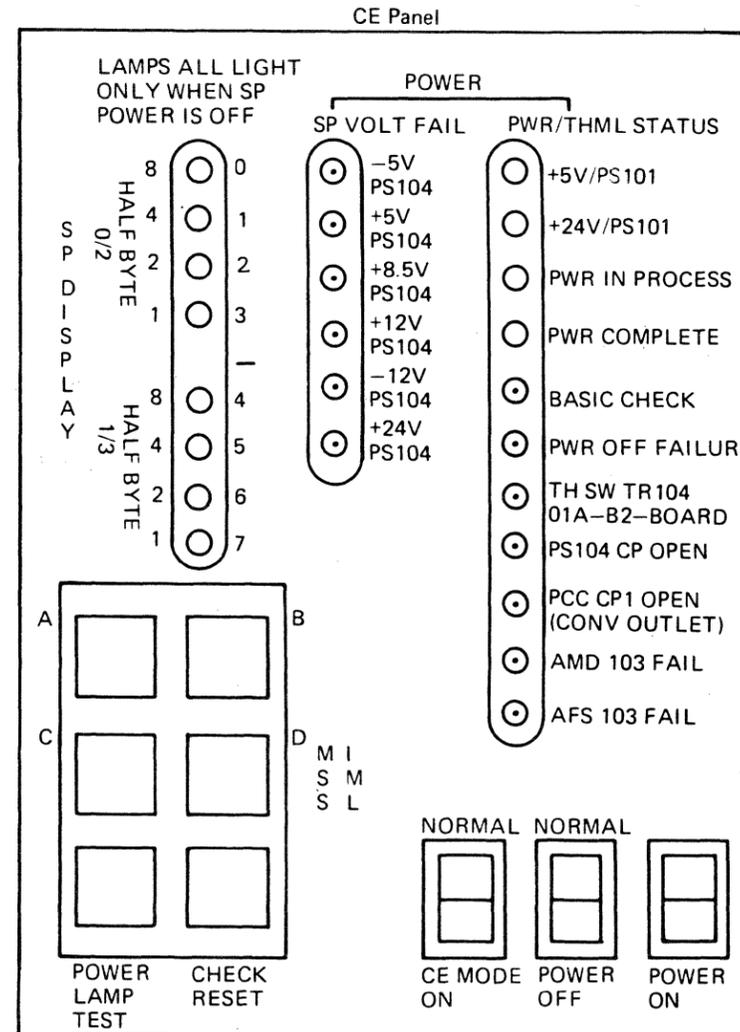
CE Panel

LAMPS ALL LIGHT ONLY WHEN SP POWER IS OFF

POWER

SP VOLT FAIL

SP DISPLAY	HALF BYTE 0/2

8 ○ 0
4 ○ 1
2 ○ 2
1 ○ 3

HALF BYTE 1/3

8 ○ 4
4 ○ 5
2 ○ 6
1 ○ 7

SP VOLT FAIL
⊙ −5V PS104
⊙ +5V PS104
⊙ +8.5V PS104
⊙ +12V PS104
⊙ −12V PS104
⊙ +24V PS104

PWR/THML STATUS
○ +5V/PS101
○ +24V/PS101
○ PWR IN PROCESS
○ PWR COMPLETE
⊙ BASIC CHECK
⊙ PWR OFF FAILURE
⊙ TH SW TR104 01A−B2−BOARD
⊙ PS104 CP OPEN
⊙ PCC CP1 OPEN (CONV OUTLET)
⊙ AMD 103 FAIL
⊙ AFS 103 FAIL

A [ ] [ ] B
C [ ] [ ] D   M I   S M   S L

POWER LAMP TEST   CHECK RESET

NORMAL   NORMAL
[ ]   [ ]   [ ]
CE MODE ON   POWER OFF   POWER ON

UCW ASSIGNMENT PROCEDURE

All devices attached to a 4341 system must have a UCW
associated with the device address. The UCW provides a
status-save area for each device. An I/O instruction issued
to a nonassigned device address is terminated, condition code
3 is given, and the channel does not attempt an initial
selection sequence.

The UCWs reside in a common pool in the auxiliary storage.
The pool consists of a minimum of 128 UCWs and is
expandable up to 1024, in increments of 32. This is
automatically done as required during an assignment
procedure. The first 16 UCWs are reserved for native devices
and internal functions.

Each channel has a directory with 256 entries, one for each
possible device address (00-FF). Each Directory Entry has
the reference number of the UCW associated with the device
address. Also, the directory has a descriptor of the type of
UCW required, such as Shared (SHR) and Selector (SEL).

In order to assign a UCW, set up the directories by using
the QDUU screen. Addresses 0F0 and 0FF are reserved and
cannot be assigned to channel attached I/O.

When a device is removed from the system, unassign its
address by using the X-option on the QDUU screen.

The QDU selection gives you a menu of the subscreens that
can be selected. The QDUU (U selection) function updates
the same directory that you can display by using the QDUC
(C selection) and the QDUE (E selection). The U and E
selections display the directory that associates the channel
devices to the UCW.

Note: *For additional information about UCW assignments,
refer to the UCW Assignment table in the "Service Aid"
section of Volume 13.*

```
*DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS                    *UCW/DEVICE DIRECTORY*
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY                    UU UPDATE DIRECTORY
V VIRTUAL STORAGE
M REAL STORAGE                   UC COMPRESSED DIRECTORIES DISPLAY
T TRACE AREA
S BLOCK SAVE AREA                UE EXPANDED DIRECTORIES DISPLAY
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: U                           ==>
                                 INSTR STOP

                                       4341
```

UCW FACILITIES

Display QDU Menu Screen (QDU)

1. Place the CE MODE switch ON.

2. Key in QDU.

3. Press ENTER.

Display UCW Directory Update Screen (QDUU)

This screen is used to make updates to the UCW Directory.

1. Key U and a three-digit device address next to U on the SELECTION line if you have the facility screen displayed. Key QDUU and a three-digit address next to SELECTION if you are doing a fast-select.

   Note: *The address is in the form of XXX-YYY. The XXX is a required three-digit device address. The -YYY is optional and gives the ending address of a range of device addresses. The addresses can range, with three channels installed, from 000 to 2FF, and with six channels installed, from 000 to 5FF. Addresses 0F0 through 0FF are reserved.*

2. Press ENTER.

Note: *Including the characteristics after the address may be required. If included, they replace those characteristics which are set by default. The default assigns the device to a byte- or block-multiplexer UCW. The default is determined from the channel list shown on the top of the QDUU screen. The following list shows the optional characteristics and how they are displayed on the UC and UE function screens.*

Char	Display	Function
def*	BYT	Byte-multiplexer device
def*	BLK	Block-multiplexer device
L	SEL	Selector device on block-multiplexer channel
S	SHR	Use a shared UCW
X	UNA	No device assigned to address
	INV	UCW has invalid format for channel mode
D	DST	Data streaming mode

* Abbreviation for default.

Notes:

- The paging keys are inoperative for the UCW function.

- Channel 0 defaults to BYT; channels 1-5 default to BLK.

- Channel 4 defaults to BYT when selected to do so on the System Configuration screen (QFS).

- Do not IML the processor if using this procedure during the installation of the processor.

```
*DISPLAY/ALTER*                      *UCW DIRECTORY UPDATES*
G GENERAL REGISTERS                     LASTREF=00F
C CONTROL REGISTERS         CHANNEL: 0-BYTE    1-BLOCK    2-BLOCK
F FLOATING POINT REGISTERS           3-BLOCK   4-BLOCK    5-BLOCK
P CURRENT PSW
K STORAGE KEY               FORMAT:  UU XXX -YYY CHARACTERISTICS
V VIRTUAL STORAGE                    XXX STARTING DEVICE ADDR
M REAL STORAGE                       -YYY ENDING DEVICE ADDR (OPTIONAL)
T TRACE AREA
S BLOCK SAVE AREA           CHARACTERISTICS (OPTIONAL, ANY ORDER)
A AUXILIARY STORAGE               S SHARED UCW
U UCW/DEVICE DIRECTORY            L SELECTOR MODE        -BLOCK ONLY
L LOCAL STORAGE                   D DATA STREAMING MODE  -BLOCK ONLY
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE               X UNASSIGN DIRECTORY
= HEX CALCULATOR
Q GENERAL SELECTION         PU-IML REQUIRED AFTER UPDATES
Z RETURN TO PROG SYS
SELECTION: UU 380-387 SL               ==>
                                    INSTR STOP

                                      4341
```

EXAMPLES OF UCW ENTRIES

- One example of an entry is illustrated on the screen. By keying U and 380-387, and then S and L, the entry shows on the QDUC screen across from the Trace Function selection on the Display/Alter screen. Note that the device is shared and a selector device on a channel is listed in the CHARACTERISTICS column.

- Another example: If you keyed 003-006 next to the U on the SELECTION line, you permit a default to occur. In this example, if you display QDUC, note that under the CHARACTERISTICS column, the device address defaults to byte-multiplexer mode, and thus has one UCW per device.

UCW Compressed Directories (QDUC)

This screen is used to verify any changes made while using the Update screen (QDUU) in the assignment procedure.

Display UCW/Device Directory–Compressed Directories Display

To display the UCW/Device Directory—Compressed Directories Display from the D-screen:

1. Place the CE MODE switch ON.

2. Key UC and a three-digit address (000-5FF) next to SELECTION.

   Note: *The three-digit address can be defaulted to 000.*

3. Press ENTER.

Notes:

- *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*

- *The Compressed Directories Display screen cannot be altered. If you need to alter it, it must be done by the Update screen (QDUU).*

```
    *DISPLAY/ALTER*            *UCW DIRECTORIES DISPLAY*
  G GENERAL REGISTERS         CUU       REF       CHARACTERISTICS
  C CONTROL REGISTERS         003-006   010-013   BYT
  F FLOATING POINT REGISTERS  010       003       BYT
  P CURRENT PSW               060-067   014       BYT,SHR
  K STORAGE KEY               150-15F   015-024   BLK
  V VIRTUAL STORAGE           240-243   025-028   SEL,BLK
  M REAL STORAGE              280       029       BLK
  T TRACE AREA                380-387   02A       SEL,SHR
  S BLOCK SAVE AREA           388-38F   02B       SEL,SHR
  A AUXILIARY STORAGE
  U UCW/DEVICE DIRECTORY      4B8       02C       INV
  L LOCAL STORAGE             4C0-4C5   02D-032   BLK,DST
  X EXTERNAL REGISTERS        503-506   033-036   BLK
  W SP STORAGE                51A       037       SEL
  D CONSOLE DISK FILE         520-527   038-03F   BLK
  = HEX CALCULATOR
  Q GENERAL SELECTION
  Z RETURN TO PROG SYS
  SELECTION: UC                            ==>
                                      INSTR STOP

                                          4341
```

```
    *DISPLAY/ALTER*            *UCW DIRECTORIES DISPLAY*
  G GENERAL REGISTERS         CUU       REF       CHARACTERISTICS   HEX
  C CONTROL REGISTERS         0F0       007       INV               01C0
  F FLOATING POINT REGISTERS  0F1       008       INV               0200
  P CURRENT PSW               0F2       003       BYT               00E0
  K STORAGE KEY               0F3       004       INV               0100
  V VIRTUAL STORAGE           0F4       005       INV               0140
  M REAL STORAGE              0F5       006       INV               0180
  T TRACE AREA                0F6       001       BYT               0060
  S BLOCK SAVE AREA           0F7       002       BYT               00A0
  A AUXILIARY STORAGE
  U UCW/DEVICE DIRECTORY      0F8       00F       UNA               03D0
  L LOCAL STORAGE             0F9       00F       UNA               03D0
  X EXTERNAL REGISTERS        0FA       00F       UNA               03D0
  W SP STPRAGE                0FB       00F       UNA               03D0
  D CONSOLE DISK FILE         0FC       00F       UNA               03D0
  = HEX CALCULATOR            0FD       00F       UNA               03D0
  Q GENERAL SELECTION         0FE       00F       INV               03C0
  Z RETURN TO PROG SYS        0FF       009       BYT               0260
  SELECTION: UE0F0                         ==>
                                      INSTR STOP

                                          4341
```

UCW Expanded Directories (QDUE)

This screen is used to verify any changes made while using the Update screen (QDUU) in the assignment procedure.

Display UCW/Device Directory–Expanded Directories Display

To display the UCW/Device Directory—Expanded Directories Display from the D-screen:

1. Place the CE MODE switch ON.

2. Key UE and a three-digit address (000-5FF) next to SELECTION.

   Note: *The three-digit address can be defaulted to 000.*

3. Press ENTER.

Use Restrictions

The routine does not allow the user to assign or unassign a UCW for a native device. The Load screen handles the native device mappings dynamically.

If two ranges of shared UCW devices are adjacent, they must be assigned at different times (a different entry); otherwise, the same reference number is assigned to both ranges. This is not true with nonshared devices, where a range over many control units may be assigned at one time.

The reference numbers 000 through 00F are reserved. Device numbers 0F0 through 0FF are also reserved.

The routine only changes the console file (diskette) holding the directories. It does not change the UCWs in auxiliary storage. Do a processor re-IML to have the changes made on the screen reflect the UCWs in auxiliary storage.

If the characteristics of a device must be changed, first unassign the UCW for that device address, and then perform a new assignment with the proper characteristics.

BLOCK FACILITY

The block facility allows you to create a block of one or more commands and store it on the system diskette. You can create a block that contains up to 19 commands (one command per line). You usually use a block to gather problem determination information. You do this by setting up an address compare with a QA... command. When the address match occurs, needed information can then be read into a save area.

Information from the Insert/Extract and Display/Alter screens can also be saved on the system diskette and can be displayed (via the QDS screen) after the block facility has executed. After you set up a block, customers can operate normally with the exception of address match commands or block execution.

Two types of block commands are available to you:

- Commands that create, alter, and control the execution of a block (see "Block Commands").

- Commands that are within a block and are used in the execution of the block (see "Block Execution Commands").

With the block facility you also are able to have a block run automatically after a successful IML. (For more information, see "Automatically Running a Block at IML.")

Rules For Specifying Blockname

The name you choose for a block can be up to eight characters long and must follow these conventions:

- The first character must be some character other than a P.

- The next seven (or less) characters can be any characters you choose.

Block Commands

Use the following commands to create, alter, and control the execution of a block:

DISPLAYING THE BLOCK LIST (T)

Enter *T* (or *QBT*) on the SELECTION line to get a list of all the blocks on the system diskette (displayed are module IDs, block names, and the block status). Block status can be either MATCH-WAIT (indicates that the block is positioned at a match command waiting for an address compare to occur) or no status.

EDITING BLOCKS (F blockname)

Use the *F blockname* command to create a new block or to make changes to an existing block (replace *blockname* with the name of the block you want to edit). Enter *F blockname* (or *QBF blockname*) on the SELECTION line; this puts the desired block in edit mode. You can now enter block data by positioning the cursor and keying in the data. After keying in all the data, press the ENTER key. The code checks the syntax of the lines (if an error occurs, the cursor is positioned under the error). Any blanks within a line of data are deleted. Also checked is the size of the block and whether or not the DO and END commands are in the proper places.

Pressing the ENTER key also performs a cyclical redundancy check (CRC) on the body of the block (CRC is sometimes called CHECKSUM). The CRC check includes the first line (DO command) and all remaining lines except lines with NOP, *, and the END commands. The check value (calculated by the processor) is compared with the four-digit hex number specified in the END command.

Use the following commands to edit a block (enter them to the left of the line numbers on the screen):

Command	Edit Function
S	Saves data and ends edit. Use the S command to write the block on the system diskette and enter the block name in the block index. If you enter an incorrect CRC value (or none), the correct CRC value is displayed for you when you use the S command.
N	Ends edit immediately (no data is saved).
X	Deletes a line. Use the X command to delete the specified line. The remaining lines move up one.
A	Adds a blank line. Use the A command to put a blank line ahead of the line with the A command.
D	Duplicates a line. Use the D command to duplicate the line that contains the D command.
M	Moves a line. Use the M command, in combination with the > command, to move the line preceded by an M, ahead of the line with the >.
>	Inserts a line. Use the > command, in combination with the M command, to move the line preceded by an M, ahead of the line with the >.
=	Executes a line and ends edit immediately. Use the = command to execute the line as if it were entered from the SELECTION line. The line must begin with a Q command; else, it is not executed. (You use the = command to diagnose errors that occur during the attempted activation of a block.) Note that after executing the = command, no block data is saved and the processor exits from the block facility.

DISPLAYING THE BLOCK LIST

```
*BLOCKS*            BLOCK LIST
TP PATCH LIST       ID    NAME                    ID    NAME
F  EDIT             9540  IFCCSAVE                9550
R  ERASE            9541  ADDRWAIT   MATCH-WAIT   9551
A  ACTIVATE         9542  DETECTST                9552
                    9543                          9553
                    9544                          9554
H  HALT             9545                          9555
K  TRANSFER         9546                          9556
                    9547                          9557

X  INIT INDEX
M  IML PATCHES      9548                          9558
                    9549                          9559
                    954A                          955A
                    954B                          955B
                    954C                          955C
Q  GENERAL SELECTION 954D                         955D
Z  RETURN TO PROG SYS 954E                        955E
                    954F                          955F

SELECTION:T                                 ==>


                                            4341
```

EDITING A BLOCK

```
*EDIT MODE COMMANDS*    01 DO.02.DETECTST
S SAVE, END EDIT        02 MSG.WAITING.FOR.DATA.STORE
N END EDIT, NO SAVE   _ 03 QASD040080
                      _ 04 MATCH
X DELETE LINE         _ 05 S1=5QDP?
A ADD BEFORE LINE     _ 06 COMP.S1.00A30000.070909
D DUPLICATE LINE      _ 07 MSG.PSW.LT.A300
M MOVE BEFORE > LINE  _ 08 GOTO.OE
                      _ 09 MSG.PSW.GE.A300
= EXECUTE LINE, END EDIT _ 0A *.SAVE.GENERAL.REGISTERS.E&F
                      _ 0B QDGE?
                      _ 0C QDGF?
                      _ 0D XFER.SAVEMEM
                      _ 0E S2=S2+00000001.LOOP.INDICATION
                      _ 0F KEY.START.01.GET.GOING.AGAIN
                      _ 10 NOP.LOOK.FOR.DATA.STORE.TWICE
                      _ 11
                      _ 12
                      _ 13 END.0000.I.LAST NAME.MM/DD/YY
                            ==>


                                            4341
```

Model Group 2

ERASING BLOCKS (R blockname)

Enter *R blockname* (or *QBR blockname)* on the SELECTION line to erase the block from the diskette and remove its name from the block index (replace *blockname* with the name of the block you want to erase).

ACTIVATING BLOCKS (A blockname)

Enter *A blockname* (or *QBA blockname)* on the SELECTION line to start the block running (replace *blockname* with the name of the block you want to activate). The block runs until an error occurs, the MATCH command is encountered, the MODE SEL key is pressed (aborts the run), or the block successfully terminates.

Block Status Area While the block is running (via the A (activate) command), the current status of the block is displayed in the message area. The status field is in the following format:

ACT: sts save LN line LP loop

- ACT = indicates that the block is being activated.

- sts = Status field; either:

  RUN = running
  ERR = error in LN line
  END = successful completion of block
  HLT = aborted with the MODE SEL key
  MAT = waiting for an address match to occur
  XFR = transfer in progress.
- save = Set to SAVE if the QDS area is full (QDS savearea overflow); otherwise blank.

- LN line = Two-digit line number in hex.

- LP loop = Two-digit loop number in hex.

HALTING BLOCKS (H)

Enter *H* (or *QBH)* on the SELECTION line to clear the block message and status areas on line 23, and reset all information pertaining to running blocks. If a block is in MATCH-WAIT status, a message appears to warn you that an address-compare match is still waiting to occur and therefore has not been removed by the H command. Note that H can only be used to stop a block in match-wait status (the keyboard remains locked until MATCH-WAIT status is attained).

TRANSFERRING BLOCKS

(K blockname1 <.blockname2>)

Enter *K blockname1 < .blockname2 >* (or QBK blockname1 < *.blockname2 >)* on the SELECTION line to transfer (copy) a block from one diskette to another (replace *blockname1 and blockname2* with the name(s) of the block involved in the transfer). If you do not specify *blockname2,* the processor assumes that *blockname2* is the same as *blockname1.*

The action that occurs after entering *K blockname1 < .blockname2 >* is as follows:

- The block index is searched for blockname1. After the block is located, it is read into storage.

- You are now prompted to switch diskettes.

- *Blockname1* (or *.blockname2* in the case where *.blockname2* is specified) is now compared with the block names on the new (to be copied to) diskette. If the same block name is found, the old block data is overwritten with the new block data. If it is not found, the new block name is entered into the block index and the block is written in the first available area on the diskette.

Note: *Do not press the Copy key while transferring a block; the transfer is not completed. If you mistakenly press the Copy Key, re-enter the transfer* (K) *command.*

INITIALIZING THE INDEX (X)

Use the *X* (or *QBX)* command to initialize the block index. This command applies in those instances where a block has been written on the diskette via the Module Transfer function. If any block names are missing from the block index, the X command automatically places them in the index.

AUTOMATICALLY RUNNING A BLOCK AT IML (M)

Use the *M* (or *QBM)* command to automatically run a block after a successful IML. Enter on the IML PATCH screen (after S/370 or VSE mode) the desired block name(s). (Note that you can enter only one block name per CORELOAD. If you need to run more than one block, give control to subsequent blocks by including the XFER command within the previous block.)

To run the block, answer YES to the RUN PATCHES question that appears after a successful IML. After you press the ENTER key, the processor is placed in a hard-stopped state (operation rate set to microword step). If the block runs successfully, the status field on the Program Load screen displays IML COMPLETE. If unsuccessful, IML does not complete, and the screen displays PATCH ERROR.

IML PATCH SCREEN

```
*BLOCKS*                    IML PATCHES
T LIST
F EDIT
R ERASE                     CORELOAD   BLOCK NAME
A ACTIVATE
                            S/370:
H HALT                      VSE:
K TRANSFER

X INIT INDEX
M IML PATCHES



Q GENERAL SELECTION
Z RETURN TO PROG SYS

SELECTION:M                                ==>

                                     4341
```

Block Execution Commands

Block execution commands are those commands that are within a block.

FAST-SELECTING A SCREEN (Q screenid)

This is the most common type of block command. It is what you would enter on the SELECTION line to get from one screen to another in order to perform a function on the called screen. Use the *Q screenid* command to either:

- Alter some state of the machine (For an example, see line 03 on the "Editing a Block" screen).

- Return information to the block facility (places the returned information into the block save area via the QDS command). (For an example, see lines 0B and 0C on the "Editing a Block" screen.)

Note: *The machine must be soft-stopped before executing a QD command that modifies PU data.*

DO.xx.blockname

This command is the first command in the block and appears only once. *xx* is the loop number in hex. Replace it with the number of times you want the block to execute. The name of the block *blockname* is automatically inserted in the DO command; therefore, do not try to change its name.

NOPS<.comment>

This command is used only for spacing or commenting purposes.

* comment

This command is used only for spacing or commenting purposes.

TOD<.comment>

Use this command to set the time-of-day clock in the save area.

END.xxxx<.name.date>

This command must be the last command in a block; it terminates the block. *xxxx* is a four-digit hex number (entered by you when you first key in the END command) that is compared with the CRC value when the block is saved. You can enter *name.date* either when you first key in the END command or when it is requested by the S (save) command. (CRC value is sometimes called CHECKSUM.)

HALT <.comment>

Use the HALT command to immediately terminate execution of the block even if more loops remain to be executed.
Note: *Do not confuse this HALT command with the block screen H (or QBH) command which suspends the execution of a block at MATCH-WAIT only.*

MSG <.text>

This command allows you to enter informational messages within a block. When the *MSG* command is encountered during execution of the block, the text of the message is displayed on line 23 of the display console. To make the message easy to read, place a period (.) between each word (recall that the code removes all blanks within a line).

GOTO.line <.comment>

Use the *GOTO* command to go to the line number specified and then continue processing there.

SETTING (AND SAVING) VARIABLE DATA

Sn=<x> Q screenid
Sn=aaa <opcode aaa><.comment>

Use this command to set and save variable data within a four-byte save area. You can enter up to five of these commands within a block (substitute the number 1 to 5 for the *n* in the command).

You have the following two ways of specifying this command:

- Sn=<x> Q screenid
  Use the following two examples as an aid in understanding this method.

  S2=QDM000078? - This example indicates that the bytes stored at locations 78 through 7B of main storage are to be set into a save area named S2 (the save area can hold up to four bytes of information).

  S3=2QDM000078? - In this example, the number 2 immediately after the equal (=) sign indicates that the first two bytes in main storage address 78 (that is, bytes 78 and 79) are to be skipped. Therefore, the save area named S3 contains the bytes stored at storage locations 7A through 7D. This method allows you to get to the data you want to save in those instances where the field contains more than four bytes. For example when you specify a main storage address (as in this example), eight bytes are available to you, but you can save only four of the available eight bytes. [The number immediately following the equal (=) sign indicates the number of bytes to be skipped, proceeding from left to right. If the saved data is less than four bytes long, the save area is padded with zeroes to the right of the data.]

- Sn=aaa <opcode aaa><.comment>
  Use this method if you either want to set a constant (for example, S2=00000002) or you want to calculate and save a variable by using an arithmetic expression (for example, S3=S1+00000008). In the above command, substitute the number 1 through 5 for *n*, substitute S1 through S5 or an eight-digit constant for *aaa*, and substitute one of the following op codes for *opcode*.

  + Add
  - Subtract
  & And
  / Or

SAVING DATA

QD...?
QV...?

Use these commands to save data within the save area. For a list of the QD and QV commands that you can use to save data, see "Display/Alter Block Save Area (QDS)" in Volume 18, Console functions. The question mark (?) after the command instructs the processor to save the data pointed to by the command. For example, the QDGE? command copies the data in general register E, into a block save area. (You can see what has been saved in the block save area by using the Display/Alter QDS screen.)

Block Save Area The block save area is used to store data that you point to via the QD, QV, or Sn commands. For more information on the block save area, see "Display/Alter Block Save Area (QDS)" in Volume 18, Console Functions.

COMPARING DATA

COMP.aaa.bbb.line1 line2 line3 <.comment>

Use this command to compare *aaa* with *bbb* and as a result of the comparison (see below), branch to *line1*, *line2*, or *line3*. Substitute S1 through S5 or an eight-digit constant for *aaa* and *bbb*. *Line1*, *line2*, and *line3* are two-digit line numbers (hex) that identify a line within the block.

If aaa < bbb then go to line1
If aaa = bbb then go to line2
If aaa > bbb then go to line3.

Example:

COMP.S2.00000002.0A110B.CHECK.S2

In this example the data in area S2 is compared with constant 00000002. Execution continues at line 0A if S2 is zero or one, at line 11 if S2 is two, and at line 0B if S2 is greater than two. CHECK.S2 is an optional comment

SIMULATING THE START OR STOP KEY

KEY.START.xx<.comment>
KEY.STOP<.comment>

This command simulates pressing the START or STOP key on the console. If you specify START, you must also provide a two-digit hex number to indicate the number of times the key is to be activated. You can also provide an optional comment.

TRANSFERRING CONTROL FROM ONE BLOCK TO ANOTHER

XFER.blockname

Use the XFER command to transfer control from the current block to the block indicated by *blockname*. XFER terminates the current block without error, regardless of how many loops remain to be executed (has the same effect as the block execution HALT command). The new block is activated and starts running as though it were started from the SELECTION line. The data saved by the save-variable, QD, or QV commands (in the block save area) is not cleared when the new block starts running; this data is saved from one block to another.

WAITING FOR AN ADDRESS MATCH TO OCCUR

MATCH <.comment>

Use the MATCH command to signal the block to stop running and to begin waiting for the address compare set up by the QA... command to occur. The MATCH command does not need to follow the QA... command immediately. Also, once you set up an address compare in a block, you do not need to set up another match using the same conditions. The following example illustrates a possible block:

QAHC8600	Set compare for hard-stop on storage address match
KEY.START.01	Start PU running
MATCH	Wait for match to occur
QOM	Set op rate for microword step
KEY.START.02	Run two microwords
QVAL108?	Record data in local storage
QAN	Set address compare to normal
QON	Set op rate to normal
KEY.START.02	Start PU running again

NOTE: *A QD or QV command cannot be executed between the QA and MATCH commands.*

Executing a Block

You initiate the execution of a block with the A (activate) command. The block starts to execute after the block data and initial status information are displayed and the message area is cleared.

The order of execution of the block commands depends on those commands that change the flow of control (for example, by using the compare command you can skip to a predetermined line).

Using the Address Compare (QA...) and MATCH Commands

The only way you can suspend execution of a block is with the Fast-Select Address Compare (QA...) command combined with the block MATCH command. After the address compare is set by the QA... command, the block executes until it encounters a MATCH command. The block facility then releases control and unlocks the keyboard so that normal processing can begin (the block is transparent to the user).

When a match occurs, execution of the block resumes at the next command following the MATCH command. Because the match can occur anytime, the machine can be in any state upon return to the block facility. If block execution resumes when a keyboard is in manual mode, that keyboard is locked until the block releases control. (During this time, the screen that was displayed remains unchanged.)

Aborting a Block

If a block is executing, you can stop its execution by pressing the MODE SEL key (if inhibited, the keyboard must be reset first). Any Fast-Select commands waiting to be executed, finish execution before termination occurs.

If a block is waiting for a match to occur, the block screen Halt (H) command must be used. This terminates block execution but leaves the address compare active (you can clear this compare with the address compare screen QAN command).

IML Effect on a Running Block

If you IML the machine while a block is waiting for a match to occur, the block is halted.

If you want to trap or record an error condition, the block you use must be active (waiting for a match) whenever the processor is running. Make the block active by using the block screen M command. See "Automatically Running a Block at IML (M)."

PATCH FACILITY

The patch facility allows you to patch (make changes to) microcode and store the patch on the system diskette. You can enter a patch that contains up to 19 commands (one command per line). Two types of patch commands are available to you:

- Commands that Display (TP), Edit (F), Erase (R), Activate (A), Deactivate (D), and Transfer (K) patches (see "Patch Commands"). Note that the Edit (F) command provides you with additional commands to edit the patch (see "Editing Patches").

- Commands that are used in the execution of the patch are: the DO, END, NOPS, * comment, and QDD commands (see "Patch Execution Commands").

Rules For Patchnames

The patch name is eight characters long and follows these conventions:

- The first character must be a P.

- The next three characters must be the last three digits of the microcode EC number.

- The next character should be an M.

- The last three characters are a three-digit numbering scheme.

Patch Commands

Use the following commands to enter, control, and transfer patches:

DISPLAYING THE PATCH LIST (TP)

Enter TP (or QBTP) on the SELECTION line to get a list of all the patches on the system diskette (displayed are module IDs, patch names, and patch status). The patch status can be:

Status	Description
Active	Indicates that the patch is recorded on the diskette and applied to the microcode.
Inactive	Indicates that the patch name is in the patch index, but the patch is not functional (the effects of the patch have been removed from the microcode).
Error	Indicates that an error occurred while a patch was being activated. The patch is not activated, but its name remains in the patch index.

EDITING PATCHES (F patchname)

Use the F patchname command to install (for a step-by-step procedure, see "Patch Installation and Update Procedure" in Console Functions Service Aids) a new patch or to make changes to an existing patch (replace patchname with the

name of the patch you want to edit). Enter F patchname (or QBF patchname) on the SELECTION line; this puts the desired patch in edit mode. You can now enter patch data by positioning the cursor and keying in the data. After keying in all the data, press the ENTER key; the code checks the syntax of the lines. (If an error occurs, the cursor is positioned under the error.) Any blanks within a line of data are deleted. Also checked is the size of the patch and whether or not the DO and END commands are in the proper places.

Pressing the ENTER key also performs a cyclical redundancy check (CRC) on the body of the patch (CRC is sometimes called CHECKSUM). The CRC check includes the first line (DO command) and all remaining lines except lines with NOP, *, and the END commands. The check value (calculated by the processor) is compared with the four-digit hex number specified in the END command.

Use the following commands to edit a patch (enter them to the left of the line numbers on the screen):

Command	Edit Function
S	Saves data and activates the patch. The S command writes the patch on the system diskette, enters the patch name in the patch index, applies the patch to the microcode, and sets the patch status to active. (If you enter incorrect patch data, the patch is not applied to the microcode nor set to active status). During the execution of the S command, the status of the patch is displayed in the message area (see "Patch Status Area").
N	Ends edit immediately (no data is saved).
X	Deletes a line. Use the X command to delete the specified line. The remaining lines move up one.
A	Adds a blank line. Use the A command to put a blank line ahead of the line with the A command.
D	Duplicates a line. Use the D command to duplicate the line that contains the D command.
M	Moves a line. Use the M command, in combination with the > command, to move the line preceded by an M, ahead of the line with the >.
>	Inserts a line. Use the > command, in combination with the M command, to move the line preceded by an M, ahead of the line with the >.
=	Executes a line and ends edit immediately. Use the = command to execute the line as if it were entered from the SELECTION line. The line must begin with a Q command; else, it is not executed. (You use the = command to diagnose errors that occur during the attempted activation of a patch). Note that after executing the = command, no patch data is saved, and the processor exits from the patch facility.

DISPLAYING THE PATCH LIST

```
*PATCHES*              PATCH LIST
T   BLOCK LIST         ID    NAME                    ID    NAME
F   EDIT               9580  P322M001  INACTIVE      9590
R   ERASE              9581  P322M008  ACTIVE        9591
A   ACTIVATE           9582  P322M010  ERROR         9592
D   DEACTIVATE         9583                          9593
                       9584                          9594
                       9585                          9595
K   TRANSFER           9586                          9596
                       9587                          9597

                       9588                          9598
                       9589                          9599
                       958A                          959A
                       958B                          959B
                       958C                          959C
Q GENERAL SELECTION    958D                          959D
Z RETURN TO PROG SYS   958E                          959E
                       958F                          959F

SELECTION:TP                                ==>


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```

EDITING A PATCH

```
*EDIT MODE COMMANDS*        01 DO.01.P000M000
S SAVE, ACTIVATE            02 QDD90010008?A3410=78880
N END EDIT, NO SAVE        _03 QDD90010034?3555=3554
                           _04 QDD9001013A?A5=09F0345004F032AC
X DELETE LINE              _05
A ADD BEFORE LINE          _06
D DUPLICATE LINE           _07
M MOVE BEFORE > LINE       _08
                           _09
= EXECUTE LINE, END EDIT   _0A
                           _0B
                           _0C
                           _0D
                           _0E
                           _0F
                           _10
                           _11
                           _12
                           _13 END.0000.I.LAST NAME.MM/DD/YY
                                       ==>

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ERASING PATCHES (R patchname)

Enter *R patchname* (or *QBR patchname*) on the SELECTION line to: remove the effects of the specified patch from the microcode, erase the patch from the diskette, and remove the patch name from the patch index (replace *patchname* with the name of the patch you want to erase).

ACTIVATING PATCHES (A patchname)

Enter *A patchname* (or *QBA patchname*) on the SELECTION line to apply the specified patch to the microcode (replace *patchname* with the name of the patch you want to activate). The patch runs until an error occurs or the patch successfully terminates.

DEACTIVATING PATCHES (D patchname)

Enter *D patchname* (or *QBD patchname*) on the SELECTION line to remove the effects of the patch from the microcode (replace *patchname* with the name of the patch you want to deactivate). The patch name remains in the patch list; however, its status becomes inactive.

PATCH STATUS AREA While the patch is running [via the S (save), A (activate), or D (deactivate) commands], the current status of the patch is displayed in the message area. The status field is in the following format:

func: sts   LN line LP 01

- func = Function being performed; either,

    CHK = checking patch to verify that it will activate or deactivate.

    ACT = patch is being activated.

    DAC = patch is being deactivated.

- sts = Status field; either:

    RUN = running.

    ERR = error in LN line.

    END = successful completion of patch.

- LN line = Two-digit line number in hex.
- LP 01 = Loop number (always 01).

TRANSFERRING PATCHES (K patchname)

Enter *K patchname* (or *QBK patchname*) on the SELECTION line to transfer (copy) a patch from one diskette to another (replace *patchname* with the name of the patch you want to transfer). *If a patch with the same name exists on the new (to be copied to) diskette, and it is in the active state, the transfer is not made.* After you successfully transfer the patch, it is automatically activated.

The action that occurs after entering *K patchname* is as follows:

- The patch index is searched for *patchname* to locate the patch. Then the patch is read into storage.

- You are now prompted to switch diskettes.

- *Patchname* is now compared with the patch names on the new (to be copied to) diskette. *If a patch with the same name exists on the new (to be copied to) diskette, and it is in the active state, the transfer is not made.* If the same patch name is found and it is not active, the old patch data is overwritten with the new patch data. If it is not found, the new patch name is entered into the patch list, and the patch is written in the first available area on the diskette.

- The patch is applied to the microcode.

Patch Execution Commands

Patch execution commands are those commands that are within a patch.

DO.01.patchname

This command is the first command in the patch and appears only once. The name of the patch *(patchname)* is automatically inserted in the DO command; therefore, do not try to change its name.

QDD

This command alters the microcode on the diskette.

NOPS<.comment>

This command is used only for spacing or commenting purposes.

* comment

This command is used only for spacing or commenting purposes.

END.xxxx<.name.date>

This command must be the last command in a patch; it terminates the patch. xxxx is a four-digit hex number (entered by you when you first key in the END command) that is compared with the CRC value when the patch is saved. You can enter *name.date* either when you first key in the END command or when it is requested by the S (save) command. (CRC value is sometimes called CHECKSUM.)

Patch Execution

You initiate the execution of a patch with the S (save) or A (activate) commands. The patch starts to execute after the patch data and initial status information are displayed and the message area is cleared.

REMOTE SUPPORT FACILITY

The Remote Support Facility (RSF) enables linking the display console, through a switched network, to a support center or to a data bank system (if available) for diagnostic assistance. The RSF is for service usage, and is not meant to be used as a teleprocessing port.

If the maintenance package does not successfully resolve a problem, the on-site service personnel can invoke a data bank operation (if a data bank system is available) for additional diagnostic information. The RSF also enables a remote specialist to assist on-site service personnel in problem resolution by observing and initiating functional operations of the 4341. The RSF permits remote operation of all system functions except those requiring manual intervention (power on/off, IML, initial I/O control, etc.).

REMOTE SUPPORT FACILITY KEYS

Two keys on the 4341 operator console keyboard are dedicated to the RSF:

1. Communications Request (COMM REQ) Key — This key initiates voice or terminal communication between an on-site service representative and a remote specialist. Initiating a communications request can be done by either the on-site service representative or the remote specialist.

2. Line Disconnect (LINE DISC) Key — This key can be used to abort RSF initialization. It can also be used to disconnect the data link.

DATA BANK MODE

If the maintenance package does not successfully resolve a problem, the on-site service personnel may invoke a data bank operation (if a data bank system is available) for additional diagnostic information.
In Remote Data Bank (RDB) mode, the 4341 console operates as a data bank system terminal. For details concerning the use of RDB mode, invoke your support structure.

Data Bank Invoke Procedures

To establish a data bank connection:

1. Ensure that the 4341 has the required hardware (two cards) installed. Information on the types of cards, installation procedures, and card setup is in the *Installation Procedures*.

   Note: *If you install the cards, run the diagnostics (MSS option diagnostics, selection D0) before proceeding.*

   Also ensure that a CDT 1000A coupler (or equivalent) and dataphone are available.

2. Set the CE MODE switch ON, and stop the PU (QOM).

3. Select the General Selection screen:

   a. Key in Q next to SELECTION.

   b. Press the ENTER key.

4. Select the Configuration screen:

   a. Key in F next to SELECTION.

   b. Press the ENTER key.

5. Select the RDB Initialization screen:

   a. Key in D.

   b. Press the ENTER key.
   (Once the procedure becomes familiar, you can do a fast-selection by entering QFD.)

```
                          *GENERAL SELECTION*

      Y    TIME OF DAY-ENABLE            .     F  CONFIGURATION
                                               L  PROGRAM LOAD
      J    INTERVAL TIMER-SWITCH               B  BLOCK/PATCH

   PROGR   SYSTEM RESET-PROGRAM                A  COMPARE/TRACE
   CLEAR   SYSTEM RESET-CLEAR                  K  CHECK CONTROL
      CM   MACHINE RESET                       O  OPERATION RATE

     RES   RESTART
                                               D  DISPLAY/ALTER
    SAVE   MACHINE SAVE                        V  INSERT/EXTRACT


      Z    RETURN TO PROG SYS                  E  ERROR LOGOUTS
      X    SP STORAGE DISPLAY                  M  POWER/TEMPERATURE
                                               I  DISKETTE IPL

   SELECTION:                                  ==>

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```

```
                          *CONFIGURATION*



            S   SYSTEM CONFIGURATION
            A   CONSOLE COLOR CONVERGENCE
            P   CONSOLE TEST PATTERN
            M   MODULE TRANSFER
            R   REMOTE CONSOLE INITIALIZATION
            C   REMOTE CONSOLE COMMUNICATIONS
            D   DATA BANK INITIALIZATION

            T   TAPE TO DISKETTE BUILD (IBM AFE ONLY)

            Q   GENERAL SELECTION
            Z   RETURN TO PROG SYS




   SELECTION:                         ==>

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```

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- MACHINE TYPE – The data in this field is supplied by the microcode.
- MACHINE SERIAL NO. – The data in this field is supplied by the microcode.
- EXTERNAL MODEM INSTALLED – You supply this data. You must enter the proper response (N for internal modem; Y for external modem) depending on the hardware configuration. (The default answer is N.)

6. Put the correct response into the input field of the screen.

7. Press ENTER.

   Note: *The LINE DISC key is now functional.*

8. Invoke your support structure.

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│                  *DATA BANK INITIALIZATION*                       │
│                                                                   │
│     MACHINE TYPE.....: 4341                                       │
│     MACHINE SERIAL NO: yyyyyy                                     │
│                                                                   │
│                                                                   │
│     EXTERNAL MODEM INSTALLED...(Y/N): N                           │
│                                                                   │
│     Q GENERAL SELECTION                                           │
│     Z RETURN TO PROG SYS                                          │
│                                                                   │
│                                                                   │
│                                                                   │
│     SELECTION: D                              ==>                 │
│                                                                   │
│                                                                   │
│                                                      4341         │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│                  *DATA BANK INITIALIZATION*                       │
│                                                                   │
│     MACHINE TYPE.....: 4341                                       │
│     MACHINE SERIAL NO: yyyyyy                                     │
│                                                                   │
│                                                                   │
│     EXTERNAL MODEM INSTALLED...(Y/N): N                           │
│                                                                   │
│                                                                   │
│                                                                   │
│                                                                   │
│     APPLICATION: (64 byte non-displayable input area)            │
│                                                                   │
│                                                      4341         │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```

Data Bank Operations

Follow the instructions in your support structure.

Data Bank Disconnect Procedures

Follow the instructions in your support structure.

Data Bank Mode Restrictions

1. The following 4341 display console system function keys are NOT supported in RDB mode:

START	CHG DPLY
STOP	SPM/O
INTR	MODE SEL
COMM REQ	DIAG
PAGE UP	PAGE DOWN

2. After Data Bank mode is terminated, the state of the 4341 is unpredictable. SP reset, re-IML, or re-IPL is necessary, depending on the state of the 4341 at that time.

REMOTE CONSOLE SUPPORT

For Remote Console Support, invoke your support structure.

REMOTE OPERATOR CONSOLE FACILITY (QFB)

The B-selection from the Configuration screen displays the Remote Operator Console Facility screen. The Remote Operator Console Facility screen provides selections which assist system operation in a Distributed Data Processing environment. When the system is operated in this mode, personnel at a host site have the ability to control the 4341 via the Remote Support Facility (RSF) port.

The Remote Operator Console Facility screen is selectable only when the ROCF Auto-Ans modem is configured on the System Configuration (QFS) screen.

To select the Remote Operator Console Facility screen from the Configuration screen:

1. Key B next to F on the SELECTION line.

2. Press ENTER. Remote Operator Console Facility screen is displayed.

To update the Remote Operator Console Facility record:

M ROCF Mode-Switch: The Remote Operator Console Facility is alternately enabled and disabled each time the M-option is entered on the SELECTION line and the ENTER key is pressed. The current status is highlighted in the status area on the right side of the screen.

Note: *If the protection switch is set to PASSWORDS NOT REQUIRED, the entry is cleared after pressing ENTER. The message REENTER SELECTION appears. Reenter the M-option and press ENTER again.*

P Protection-Switch: Passwords are alternately Required or Not Required each time the P-option is selected. Entering P on the SELECTION line and pressing ENTER prompts you to enter the correct password. Entering the correct password and pressing the ENTER key completes the selection. The current status is highlighted in the status area on the right side of the screen.

Notes:

- *When passwords are required, all selections require entering the current password before any changes take effect.*

- *The passwords are entered into a nondisplayable field.*

```
*REMOTE OPERATOR CONSOLE FACILITY*          * STATUS AREA *

     M   ROCF MODE-SWITCH               ROCF MODE ENABLED
     P   PROTECTION-SWITCH              PASSWORDS REQUIRED
     C   CHANGE PASSWORD

     S   LINE SPEED-SWITCH              LINE SPEED 1200BPS
     R   RESET SECURITY COUNT           SEC COUNT 14

     N   SYSTEM NODE ID                 SYS NODE ID IBM 4341
     T   CONSOLE DEVICE                 CONSOLE DEV T1

     D   SYSTEM POWER DOWN              SYS POWER ON

     Q   GENERAL SELECTION
     Z   RETURN TO PROG SYS


SELECTION: B                            ==>


                                        4341
```

C Change Password: To change the password for the Remote Operator Console Facility:

1. Enter C next to SELECTION.

2. Press ENTER. ENTER NEW PASSWORD message is displayed.

3. Enter new password.

4. Press ENTER. REPEAT NEW PASSWORD message is displayed.

5. Enter new password again.

6. Press ENTER. ENTER OLD PASSWORD message is displayed.

7. Enter old password.

8. Press ENTER. ENTER DATE MM/DD/YY message is displayed.

9. Enter the date.

10. Press ENTER. PASSWORD CHANGED message is displayed.

Notes:

- *The passwords are entered into a nondisplayable field.*

- *A minimum of four and a maximum of eight characters are required for the password.*

- *If the entered date is not a valid date, the user is allowed one attempt to correct the date.*

S Line Speed Switch: The Line Speed switch is alternately changed between 600 bps and 1200 bps each time the S-option is entered on the SELECTION line and the ENTER key is pressed. The current line speed is highlighted in the status area on the right side of the screen.

Note: *If the protection switch is set to PASSWORDS NOT REQUIRED, the entry is cleared after pressing ENTER. The message REENTER SELECTION appears. Reenter the S-option and press ENTER again.*

R Reset Security Count: The security counter is reset each time the R-option is entered on the SELECTION line and the ENTER key is pressed. The current count is displayed in the status area on the right side of the screen.

N System Node ID: The node identification is changed each time the N-option followed by the new node ID is entered on the SELECTION line and the ENTER key is pressed. The current node ID is highlighted in the status area on the right side of the screen.

Notes:

- *Entering N on the SELECTION line and pressing ENTER prompts you for a Node ID.*

- *The Node ID can consist of eight characters maximum.*

T Console Device: The Console Device to which the Remote Operator Console Facility is initialized is assigned with the T-option. Entering Tn (where n = 0, 1, 2, or 3) next to SELECTION assigns that device for the facility. The status area on the right side of the screen indicates which console is to be linked to the host system when the Remote Operator Console Facility is activated.

Notes:

- *If no device is assigned when selecting the T-option, you are prompted with the choice of valid consoles to enter.*

- *The console assignment is valid only when that device has been installed to the system through the System Configuration (QFS) screen.*

- *If the assigned device is not ready when the Remote Operator Console link is activated, an alternate console is selected.*

D System Power Down: Entering D on the SELECTION line and pressing ENTER powers down the Remote system.

Note: *If the protection switch is set to PASSWORDS NOT REQUIRED, the entry is cleared after pressing ENTER. The message REENTER SELECTION appears. Reenter the D-option and press ENTER again.*

Return to General Selection (Q)

1. Key Q next to SELECTION.

2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.

2. Press ENTER.

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DISKETTE BUILD (QFT)

The diskette build function enables the service representative to build functional and/or diagnostic diskettes from a tape.

The tape used to build the required diskette contains the machine serial number and the diskette image data format generated by manufacturing.

The diskette build procedure is divided into steps with instruction sequenced screens.

This procedure requires:

- A successful IML of the processor.
- CE MODE switch set to ON.
- Operation Rate set to NORMAL (QON)

Diskette Build Procedure

To display the Diskette Build Function screen from the QF screen:

1. Key T next to SELECTION.

2. Press ENTER.

This step requires mounting the tape containing the diskette image and entering the correct three-digit address for the tape drive being used.

Tape Load

The Tape Load screen (Step 2) is displayed after the tape drive address has been entered.

This step requires entering the correct part number of the diskette to be built.

Diskette Part Numbers:

DISKETTE	GRP 1 56k PART NUMBER	GRP 1 64k PART NUMBER	GRP 2 PART NUMBER
FUNCTIONAL	1954214	1954230	1954255
DIAGNOSTICS 1	1954215	1954231	1954256
DIAGNOSTICS 2	1954216	1954232	1954257
DIAGNOSTICS 3	1954217	1954233	1954258
DIAGNOSTICS 4	1954218	1954234	1954259
DIAGNOSTICS 5	1954166	1954166	1954166
PAD1	1954189	1954224	1954254

After the part number has been entered, the message LOADING TAPE is displayed in the system message area.

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(Diskette Build Function)

```
                    DISKETTE BUILDER FUNCTION
                    -------------------------
                           STEP  ONE




              MOUNT TAPE CONTAINING THE DISKETTE IMAGE AND THEN
              ENTER THE TAPE UNIT ADDRESS IN THE FORMAT 'CUU'



    Q GENERAL SELECTION

    Z RETURN TO PROG SYS


    SELECTION: T                              ==>

                                         4341
```

(Tape Load)

```
                    DISKETTE BUILDER FUNCTION
                    -------------------------
                           STEP TWO




              ENTER THE PART NUMBER OF THE DISKETTE
              TO BE BUILT (7 DIGITS)



    Q GENERAL SELECTION

    Z RETURN TO PROG SYS


    SELECTION: T191                         ==>

                                         4341
```

Diskette Build

The Diskette Build screen (Step 3) is displayed after the diskette image has been read from the tape into PU storage. The message TAPE LOADED is displayed in the system message area.

Mount a formatted 4341 diskette into the diskette drive, and press the ENTER key. The message DISKETTE BEING BUILT is displayed in the system message area.

(Diskette Build)

```
               DISKETTE BUILDER FUNCTION
               ------------------------
                     STEP THREE




            MOUNT A 4341 FORMATTED DISKETTE IN THE CONSOLE
            DISKETTE DRIVER AND THEN PRESS THE ENTER KEY



Q GENERAL SELECTION

Z RETURN TO PROG SYS


SELECTION: T1234567                     ==> TAPE LOADED


                                        4341
```

Return to General Selection (Q)

1. Key Q next to SELECTION.
2. Press ENTER.

Return to Prog Sys (Z)

1. Key Z next to SELECTION.
2. Press ENTER.

Diskette Label

The Diskette Label screen (Step 4) is displayed after the diskette is built. Copy this information or mount a copy of the screen displayed onto the diskette. After a copy of the information is obtained, replace the diskette. The Q-screen now appears.

For installing this diskette, follow the same procedure as for any new diskette. See Volume 13/16, Section 14, "Diskette EC Update Procedure."

(Diskette Label)

```
                       DISKETTE BUILDER FUNCTION
                       ------------------------
                       LABEL FOR THE DISKETTE JUST BUILT:


                  **********************************
                  *                         53FD   *
                  * 4341-001    SER NO. 0123456    *
                  * FUNCT                  001FU1  *
                  * LINK DATE 00000000000 ISEQ 01  *
                  *                                *
                  * PN- 0001234567                 *
                  * EC- 000000000                  *
                  * REA                            *
Q GENERAL SELECTION  * GID- T1234567               *
                  * XX9999          0001234567     *
Z RETURN TO PROG SYS * DATE                        *
                  **********************************
SELECTION: T1234567                  ==> REPLACE ORIGINAL DISK


                                     4341
```

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