DOLCH
LOGIC INSTRUMENTS

OPERATOR'S MANUAL FOR 64300

PUBLICATION NUMBER: 88399N

DOLCH
LOGIC INSTRUMENTS

PRODUCT IDENTIFICATION SHEET

Model # _____

Date Shipped _____

Software Revision Level _____

Serial Number _____

Options Installed:

- ☐ HMS 300-High Speed Overlay Memory
- ☐ ETT 12-Extended Trigger and Trace
- ☐ TSO 16-Time Stamp Option
- ☐ ME 4K-4K Memory Extension
- ☐ HTO 48 Hardware Test Option

FOREWORD

This manual uses the "exploded block" concept whereby functional as well as physical descriptions correspond to an overall diagram that arranges subsystems into functional blocks. Thus, the general description of a block in the overall diagram is expanded to more detail in another section. The order of blocks is maintained from one explanation level to the next.

Detailed functional blocks and figures are shown with keys to text in cases where a higher level explanation is further expanded. Operational procedures are presented as flowcharts that show the step-by-step sequence of actions to be done by the operator along with responses expected from the Logic Analyzer. These flowcharts may also be keyed to supporting text.

This "Operator's Manual, Volume 1" provides theoretical and operational information on the 64300. It is divided into the following sections:

- General Description
- Unpacking and Installation
- Functional Description/Theory of Operation
- Controls and Displays
- Operating Procedures

Other options, accessories and modifications are covered by change pages or inserts as necessary.

For detailed theory of operation and repair procedures, see the 64300 "Service Manual, Volume 2".

CHANGES TO THIS MANUAL

This manual will be changed periodically to keep it current with improvements as we make them. Changes start with Service Notes that alert field service technicians to critical problem areas and changes in maintenance procedures. After a series of these notes are issued or a critical one is issued, we will publish change pages, which are the remove-the-old and insert-the-new type. When the company prepares a change package, it sends announcements to its users. The change packages are available upon request and without charge.

Record of Changes

The record of Changed Pages lists all the pages in this book, that are deleted, changed pages, added pages, and foldout pages.

Reader Comment Form

We have supplied the reader comment form (at the back of this manual) to get feedback from our customers. If you are dissatisfied with this publication, we want to hear from you. Tell us about inaccurate information. typographical errors, or missing information, If you know a way to improve a procedure, please let us know about that, too, When filling out the form. please be specific and give the page number, line reference, and the paragraph number, if possible.

RECORD OF CHANGES

CHANGE NUMBER	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY (NAME, DEPT.)

SAFETY PRECAUTIONS

As with any electronic equipment, precautions consistent with all standard industrial safety practices must be observed while servicing this equipment since it contains potentially lethal voltages. Any servicing that requires removing cabinet covers should be performed by qualified service personnel. Always disconnect power prior to inspection or servicing.

Admonishments are included throughout this manual to alert the reader to problem areas or situations that could cause loss of data, hardware damage, or personal injury.

A WARNING statement precedes the text of procedures that, if not strictly observed, could result in fatal injury to the service technician. A CAUTION statement precedes the text of a procedure that, if not strictly observed, could result in damage or destruction of equipment (hardware or software). A NOTE statement highlights essential operating or maintenance procedures, conditions, or clarifying facts. NOTEs also provide information that, though not necessary, is helpful to the understanding of a concept or the completion of a procedure.

NOTE:

This device conforms to safety class I as per IEC 348.

WARRANTY

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SECTION 1

GENERAL DESCRIPTION

1.1 INTRODUCTION

The 64300 is a modular logic analyzer designed around a maximum of four independent 16 channel Data Acquisition Blocks (DAB's). This architecture provides maximum flexibility and performance. The 64300 is shown in Figure 1-1. Figure 1-1 also shows the DataPak, which is used for storage and retrieval of data and set-ups. Various interface and control configurations are built-in, and optional functions are also available as firmware plug-ins.

1.2 EQUIPMENT DESCRIPTION

The 64300 is housed in a metal casing which features a large handle that doubles as a stand for test bench applications. Connectors for data and clock inputs are provided on the front panel. The front panel also contains a keyboard for system control, a power switch, a CRT display, and a slot provided for the insertion of the DataPak cartridge.

The back panel contains the fuse, control and monitoring interface connectors, trigger outputs, and brightness adjustments for the CRT. See Figure 1-2 for details.

1.2.1 Data Acquisition

Data from the system under test (SUT) is input through the front panel connectors. External clocks and qualifiers are also applied at this point. This allows for multiple input sensing configurations and other special probe use.

1.2.2 Input Sensing

All signals are sensed through high impedance probes using custom hybrid circuits. Four of these circuits are housed in each Active Logic Probe (ALP), which can be used stand-alone or mechanically linked to other ALP's. The input signals are compared to a threshold level as programmed in the TRACE MENU. Signals higher than the threshold level are shown as logical "1," and signals lower than the threshold level are shown as logical "0."

1.2.3 Pod Assignments

There are eight (A, B, C, D, E, F, a, b) data input groups, each 8 bits wide. These groups are divided into two probe connectors labelled 3-0 and 7-4, corresponding to the lower and upper nibbles of the 8 bit input byte. Signal input probes, each labelled differently, are supplied with the instrument. All probes are electrically identical and can be interchanged without restriction.

External clocks and corresponding clock qualifier signals are connected through the same type of probes as data signals. The external clock inputs are labelled "CLK," numbers 1, 2, and 3, as designated in the TRACE MENU. "CLK" Number 4 is used for options.

1.2.4 Personality Probes/Trace Modules

For special multi-channel set-ups, the ALP's can be replaced by personality probes or trace modules available for most microprocessors, IEEE-bus, and serial interfaces.

The personality probe or trace module is connected by a single clip or connector to the SUT. The probe organizes and generates control signals necessary for a clear display and/or disassembly listing.

1.3 SYSTEM CONFIGURATION

A typical configuration for the 64300 is shown in Figure 1-3. This figure shows the 64300 with ribbon connectors from the front panel data inputs to a typical system under test. In this figure, an external clock is connected to input "3". A TIMING DIAGRAM is present on the CRT that shows actual time measurement.

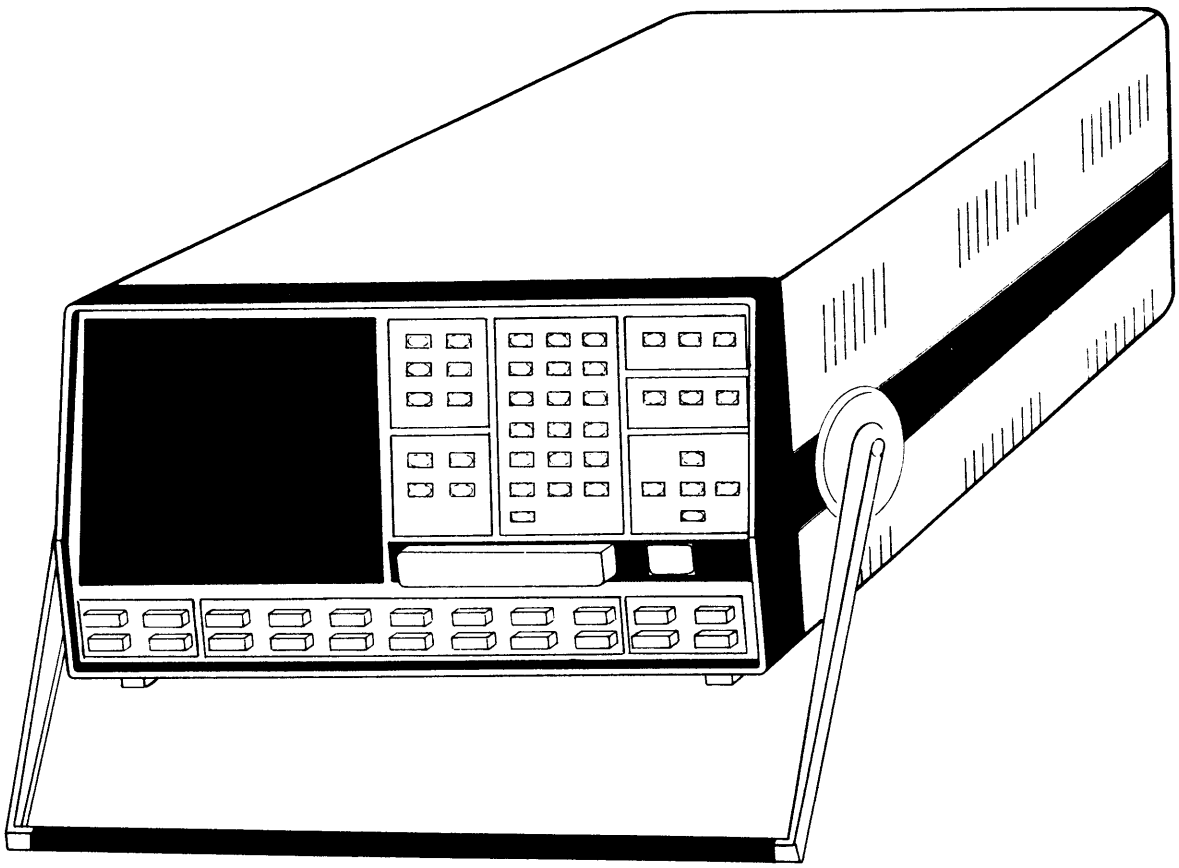


FIGURE 1-1. 64300 FRONT VIEW

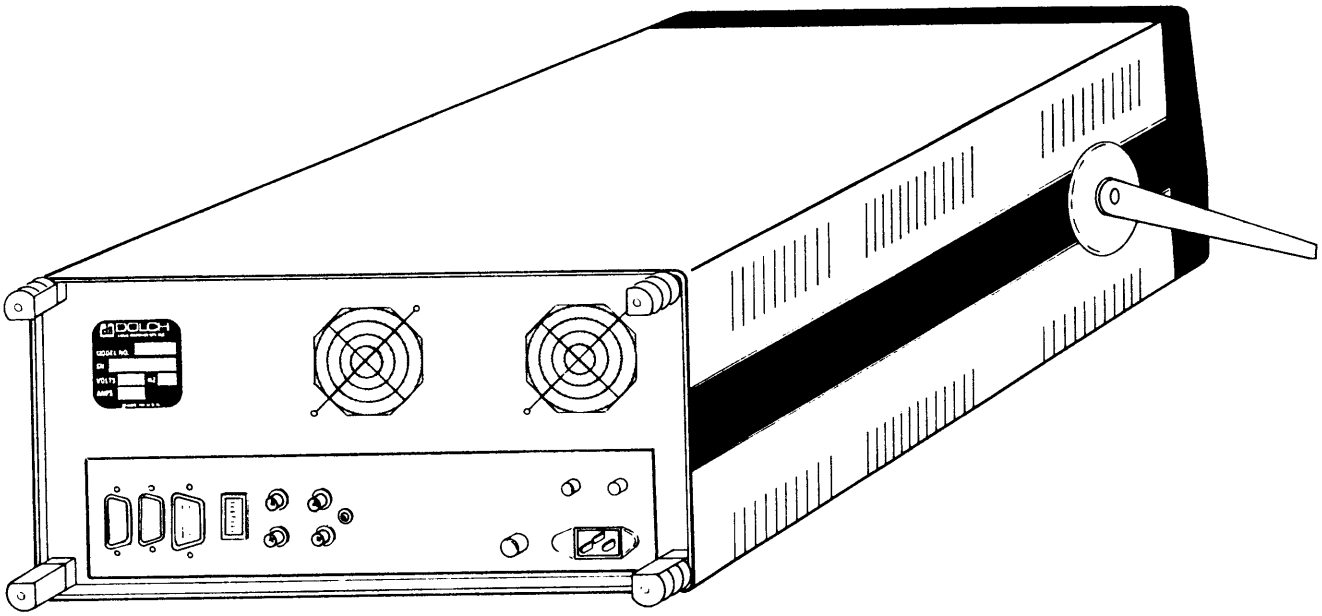
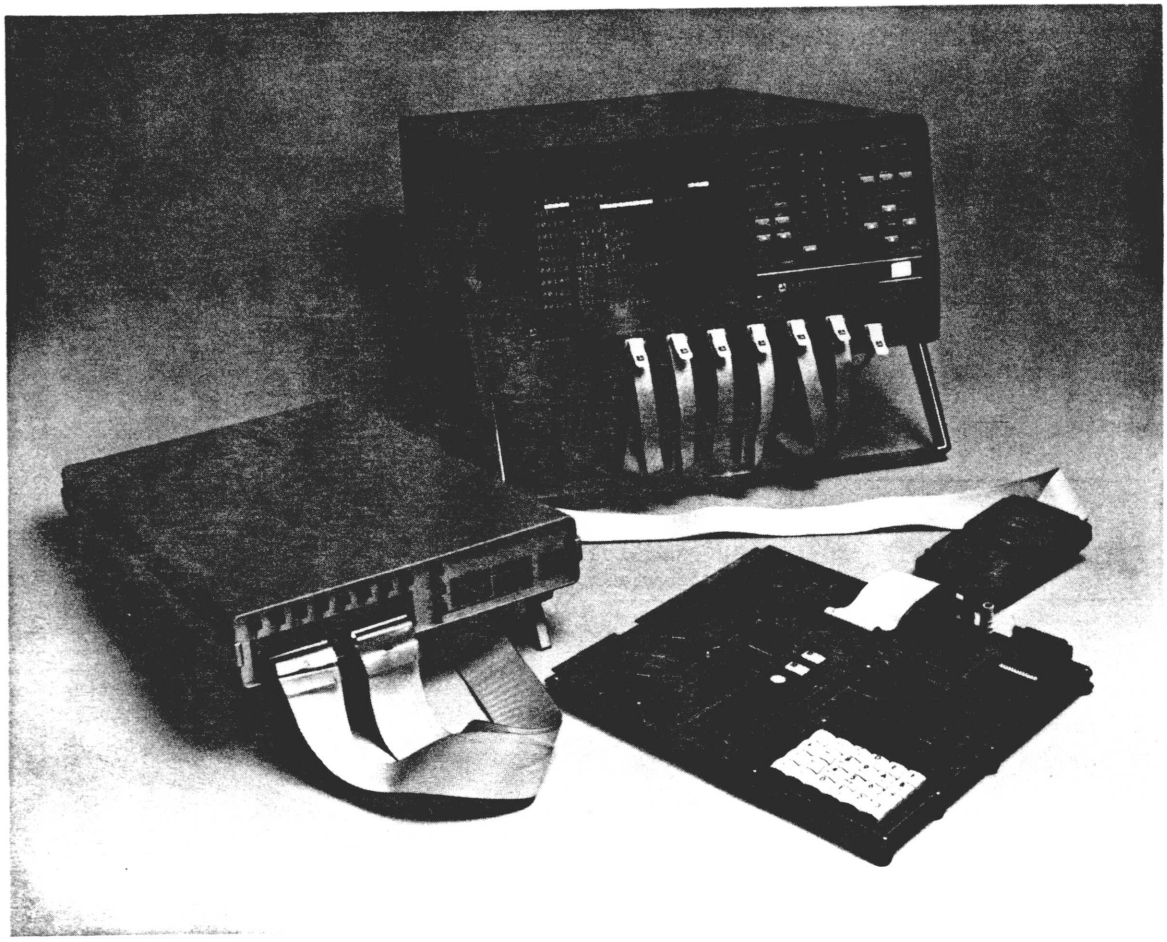


FIGURE 1-2. 64300 REAR VIEW



1.4 REFERENCE DATA

Reference data is divided into two parts: Equipment Specifications and Equipment, Accessories, and Documents Supplied.

Table 1-1, Equipment Specifications provides a tabular listing of:

- Nameplate Data
- Power Requirements
- Functional Characteristics
- Dimensions
- Environmental Characteristics
- Electrical Characteristics

Table 1-2, Equipment, Accesories, and Documents Supplied provides a tabular listing of:

- Quantity
- Model Number
- Name
- Description

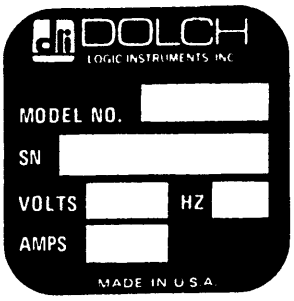
1.5 DESCRIPTION OF SYMBOLS, CODES AND ABBREVIATIONS

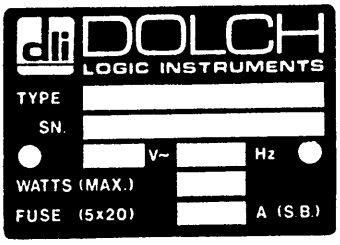
Table 1-3 shows a listing of the various symbols used throughout this manual for functional block diagrams and simplified circuit diagrams.

Table 1-4 provides an explanation of codes and abbreviations used throughout the documentation in text as well as block diagrams.

Table 1-1. EQUIPMENT SPECIFICATIONS

NAME PLATE DATA:





POWER REQUIREMENTS:	VOLTAGE	110 or 220 VAC (+10%/-25%); (Pre-Set at factory)
	FREQUENCY	47-63 Hz.
	WATTAGE	230 W Maximum
	BATTERIES (2)	G.E. Data Sentry Ni-Cad. 3.6V
	FUSING	110 V - 2 Amps (Slow/Blow) 220 V - 1 Amp (Slow/Blow)
FUNCTIONAL CHARACTERISTICS:	APPLICATION	Logic analysis of microprocessor based and other digital systems. Provides for input, sampling, tracing, triggering, recording, comparison, search, memory control, file manipulation, and display of all digitally based functions.
	SIGNAL INPUTS (64300 and ALP)	Number-77: 64 data, 4 external clocks, and 9 clock qualifiers Impedance - 1M Ohm/10pF at probe tip.

Table 1-1. EQUIPMENT SPECIFICATIONS (continued)

FUNCTIONAL CHARACTERISTICS:		Threshold - TTL (Preset to + 1.4 V) ECL (Preset to - 1.3 V) V1 + V2 programmable from -9.9 V to +9.9 V in 0.1 volt increments. (Pre-Set to + 2.9 Volts)
	SAMPLING FUNCTIONS	Internal Clock - 20 ns to 500 ms External Clocks - 3 Ext. Clock Rate - DC to 50 MHz Setup Time - Data 15 ns before active clock edge. Hold Time - Data stable 2 ns after active clock edge. Qualifiers - 3 Simultaneous Clock - Independent internal or external programmed "OR" function available Latch Mode - 5 ns with 250 millivolts threshold overdrive.

Table 1-1. EQUIPMENT SPECIFICATIONS (continued)

FUNCTIONAL CHARACTERISTICS:	TRIGGERING FUNCTIONS	Sequential Trigger - 12 Levels. Word Size - Up to 48 bits wide. Code Selection - Triggerwords may be specified as: ● Binary ● Hex ● Octal ● Positive ● Negative Pass Counters - User programmable event counter on each level from 1 to 255 counts. Recording Delay- 0-8192 counts of internal or external clock before recording is stopped.
	TRIGGER AND TRACE MONITOR	Pretrigger Sampling Trigger Tracing Trigger Delay Slow Clock(s)
	SOURCE AND REFERENCE MEMORIES:	Size - 48 bits by 1000 words (Source) and 48 bits by 1000 words (Reference memory) - 16 bits x 512 words burst memory.

Table 1-1. EQUIPMENT SPECIFICATIONS (continued)

FUNCTIONAL CHARACTERISTICS:		Organization - 1K Format 3 blocks 16 x 1K words. 2K Format 1 block, 16x 2K words and 1 block, 16x 1K words.
	FILE MANIPULATION	DataPak Table - Configuration storage of menu set-ups and data.
	COMPARE FUNCTIONS	Halt If - R=S, R≠S Count If - R=S, R≠S Compare Limits - Portions of Source Memory can be compared to Reference Memory. Compare Skew - Bit and Byte comparison.
	SEARCH FUNCTIONS	S = R S ≠ R Sequence Word
DIMENSIONS:	SIZE	Height / Width / Depth 241 / 483 / 673 mm 9.5 / 19.0 / 26.5 in.
	WEIGHT	30 kg (65 lbs) including standard accessories.

Table 1-1. EQUIPMENT SPECIFICATIONS (continued)

ENVIRONMENTAL CHARACTERISTICS:	OPERATING TEMPERATURE	Range from 0 to 50 degrees Centigrade ambient temperature
ELECTRICAL CHARACTERISTICS:	MAXIMUM VOLTAGE	+/- 50 Volts continous; +/- 250 Volts transient
	VIRTUAL GROUND	Continous GND potential differences up to +/- 5 Volts between 64300 and SUT are compensated for.

Table 1-2. EQUIPMENT, ACCESSORIES AND DOCUMENTS SUPPLIED

QTY.	MODEL NO.	NAME	DESCRIPTION
1	64300	64 Channel Logic Analyzer System	Logic Analyzer upgradable to a variety of advanced hardware and software configurations.
1	GPIB/ IEEE 488	General Purpose Interface Board	Allows remote control/-monitoring of 64300 functions (Parallel). GPIB connected through IEEE 488 connector.
1	RS-232C/ V24	RS-232C Interface	Allows remote control/-monitoring of 64300 functions (Serial).
1	88399N-1	64300 Operator's Manual	Volume I, which describes operation of the 64300.
1	VC 625	Video Adapter	Allows for external video monitor connection.

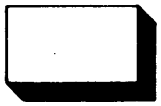
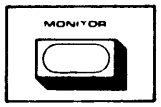
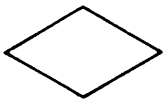
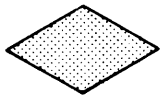
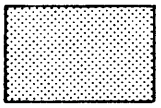
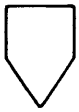
Symbol	Meaning
	CRT Display or other Hardware
	Pushbutton or Panel Control
	Start or End
	Operation (or user) Decision
	Internal Logic Analyzer Decision
	Process
	Internal Logic Analyzer Process
	Off-Page Connector
	On-Page Connector

Table 1-4. Symbols

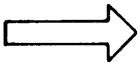
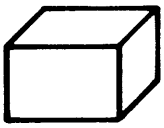
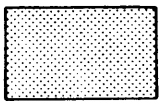
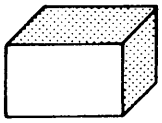
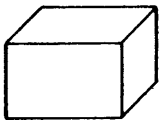
Symbol	Meaning
	Major Functional or Signal Flow
	Secondary Functional or Signal Flow
	Connection or Multiplication of Function or Signal
	Major Data or Function Transfer
	Key to Text or Note
	Signal or Function Flow Name
 	Major Function (Level 1) (Sometimes may be Shaded)
 	PCB or other Hardware (Level 2)
 	Subfunction (Level 2 or 3)

Table 1-4. Symbols

Table 1-3. CODES AND ABBREVIATIONS

Abbreviation	Meaning
ALP	Active Logic Probe
BIN	Binary
CLK	Clock
CRT	Cathode Ray Tube
CUR or "C"	Cursor
DAB	Data Acquisition Block
DAC	Digital-To-Analog Converter
DEC	Decrement
ECL	Emitter-Coupled-Logic
ENT	Enter
GPIB	General Purpose Interface Bus
HEX	Hexadecimal
INC	Increment
INT	Internal
KBD	Keyboard
LAM	Logic Analyzer Monitor
LAT	Latch (Mode)
NEG	Negative
OCT	Octal
PB	Pushbutton
PCB	Printed Circuit Board
POS	Positive
REF or "R"	Reference (Memory)
RS - 232	Serial Interface
S	Set Point
SAM	Sample (Mode)
SBLA	Single Board Logic Analyzer

Table 1-3. CODES AND ABBREVIATIONS (continued)

Abbreviation	Meaning
SEQ	Sequence
SRC or "S"	Source (Memory)
SRCH	Search
STP	Stop
SUT	System Under Test
TTL	Transistor-To-Transistor Logic
TRG or "T"	Trigger Point
V1	Variable Voltage 1
V2	Variable Voltage 2

SECTION 2

UNPACKING AND INSTALLATION

2.1 GENERAL

Information required for unpacking and preparation for use is contained in the following section. Reshipping instructions are included in case the device must be returned for calibration or repair.

2.2 UNPACKING

Refer to Figure 2-1 for an illustration of the unpacking sequence. Open the 64300 packaging carefully. The 64300 is packaged in a plastic covered form-fitting foam. Remove the equipment and verify that the shipment is complete according to the shipping list. You should find an operating manual and power cord.

Perform the following visual inspection to determine that no damage has occurred during shipment:

- Check for loose or missing screws, controls, etc.
- Check connectors for damaged pins.
- Check that controls operate freely and all labels are legible.
- Check for visible damage, e.g. chipped or broken controls, scratches, dents to case.

2.3 WARRANTY INFORMATION

If the instrument is damaged in any way or does not operate in accordance with the operation instructions, notify the Dolch distributor or the Dolch service department immediately. In case of physical damage, the shipping agent should also be notified. The Dolch warranty conditions are given in the front of the manual.

Retain packaging material and shipping carton for inspection if the instrument is damaged.

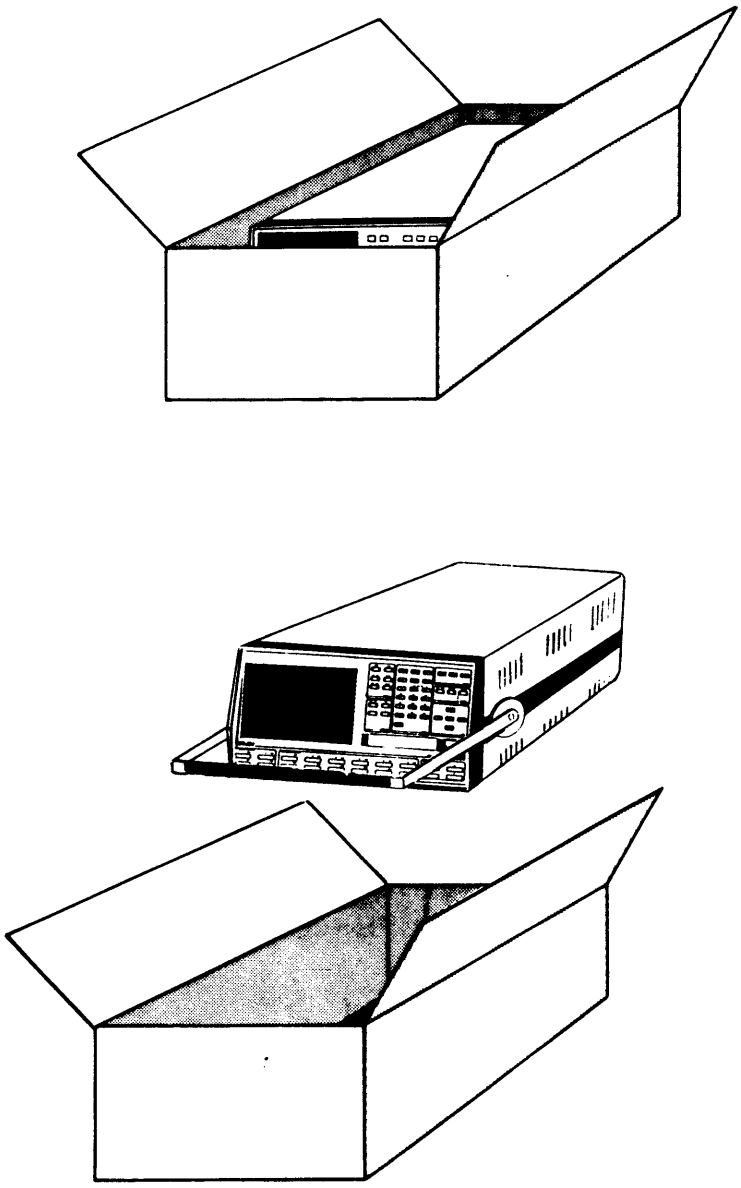


FIGURE 2-1. UNPACKING SEQUENCE

2.4 PRE-POWER PROCEDURES

The 64300 features self-test capabilities that allow for easy installation and power-up procedures. The following section provides details for these procedures.

2.4.1 Installation

Refer to Figure 2-2 for recommended installation steps. When the 64300 is unpacked, it may be placed in a standard test bench set-up by pressing both large buttons on the side of the case to release the handle. Release both buttons to lock the handle into place as a stand.

Install the Power Cord supplied. Refer to specific option documentation for details on other special configurations and their installation, as well as additional connections to the rear panel as necessary.

2.4.2 Power Requirements

The 64300 operates on 100, 110, 220 or 240 VAC, 50/60 Hz. Check the silkscreen nomenclature under the power connector for the proper voltage to be supplied. Also see Table 1-1. If the voltage is to be changed, it will be done at the factory.

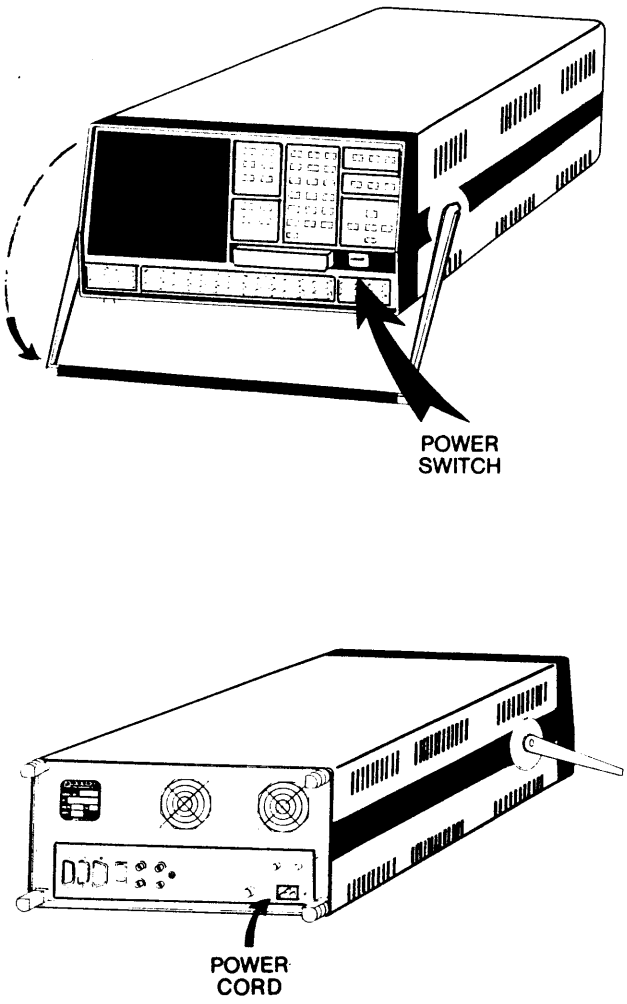


FIGURE 2-2. INSTALLATION STEPS

2.5 INITIAL TURN-ON/CHECK-OUT PROCEDURES

Verify that all pre-power procedures have been done. See Figure 2-3 and proceed as follows:

1) Set the front panel POWER switch to ON. The 64300 will show random blinking symbols for a few seconds.

2) Verify that the "POWER UP SELF TEST COMPLETE!" display is present on the CRT after approx. 15-30 seconds, depending on the options installed. If the "NON VOLATILE FILE TEST FAILED" message is received, it may be ignored. This message simply indicates that there

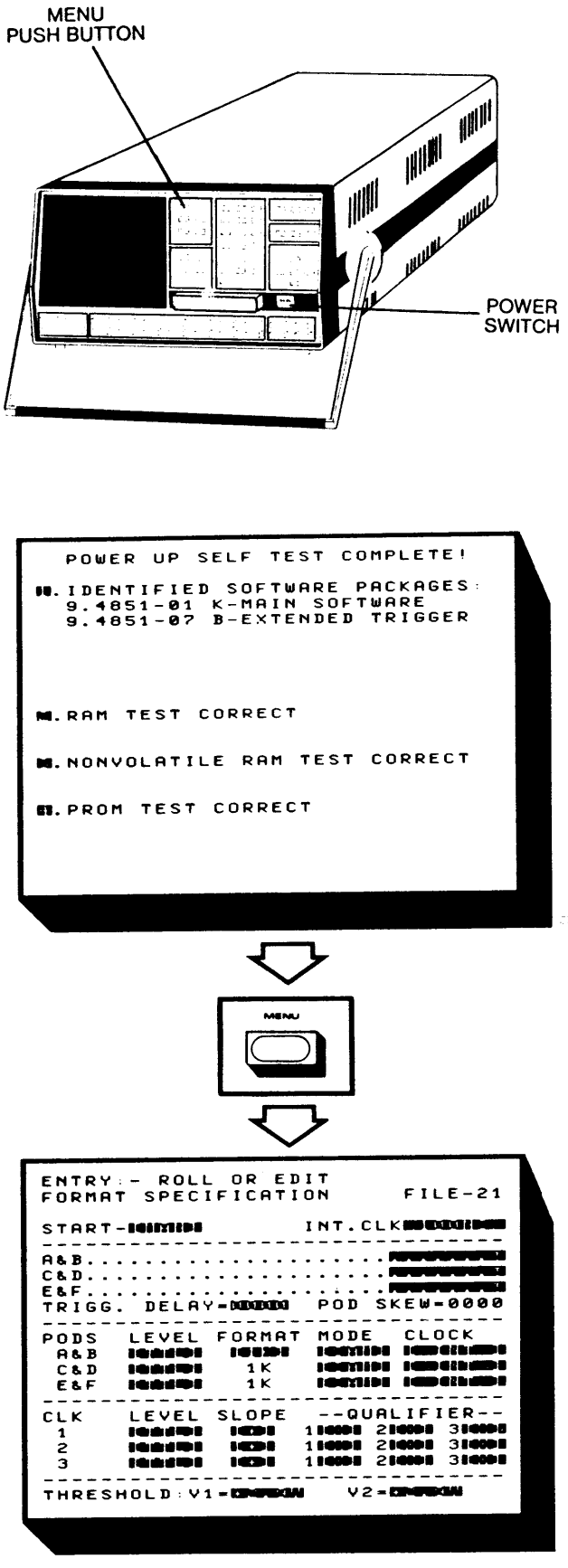


FIGURE 2-3. TURN-ON

are no set-ups in the "DATAPAK FILE" memory. This will not affect normal operation of the analyzer.

3) The "POWER UP SELF TEST COMPLETE!" message consists of the following parts:

   A) Part 1 - Lists software packages and/or options that have been installed in the device, with the revision number in effect.

   B) Part 2 - Shows the result of internal RAM test. A defect will be shown as a "1" in inverse video, indicating the RAM cell affected. If this message is shown, refer to the Service Manual for details.

   C) Part 3 - Shows the result of internal PROM test. A defect will be shown as a number in inverse video, indicating the PROM location affected. If this message is shown, refer to the Service Manual for details.

Make a note of any power-up problems. Press and release the "MENU" push-button. The "POWER UP" message is cancelled from the CRT. Verify that the TRACE MENU (FORMAT SPECIFICATION) is displayed.

If any of the above procedures fails to result in a successful Turn-On, try them again. If the analyzer is still unable to operate, call the factory for assistance.

2.6 TURN-OFF PROCEDURE

Nothing fancy -- just turn the power switch OFF. However, you may want to save your set-ups so see Section 5.6 for details.

2.7 REPACKING FOR SHIPMENT

If reshipment is required, the device should be repacked in the original packaging. If this is not available, pack the device using sufficient packing and a solid cardboard or wooden box. If repacking for device repair is necessary, inform your local representative. Enclose a note with the device describing the malfunction, damage, etc. with the company name, address, and department.

Shipment should be made to the Dolch service department or supplier, as listed on the back cover of this manual.

2.8 SHIPPING INSTRUCTIONS

Before sending in an instrument for repair, please read the following instructions:

1) Call one of our Customer Service Departments and request a Return Material Authorization (RMA) number. We will need the model number, serial number, the name and phone number of someone to contact concerning the repair, and the reason for repair.

2) Please include a packing list describing the problems in detail. Include the name and phone number of the user.

3) Reference the RMA number on all documents and on the outside of the shipping container.

4) Package the instrument per the instructions given in Figure 2-4. To prevent any shipping damage, package it securely, with the handle folded back onto the cover (eighty percent of all shipping damage is to the handte assembly--due to improper packing).

5) Ship the instrument prepaid to the closest authorized Dolch service center.

In the event that an instrument has been damaged in shipping, a damage report will be made at Dolch and a copy will be forwarded to you. Dolch is not responsible for any damage incurred in shipping, and claims should be settled directly between the customer and the freight carrier. Before repair work can begin, a verbal P.O. is required with a hard copy to follow.

See the Warranty for additional details, and please call us at the factory if you have any questions.

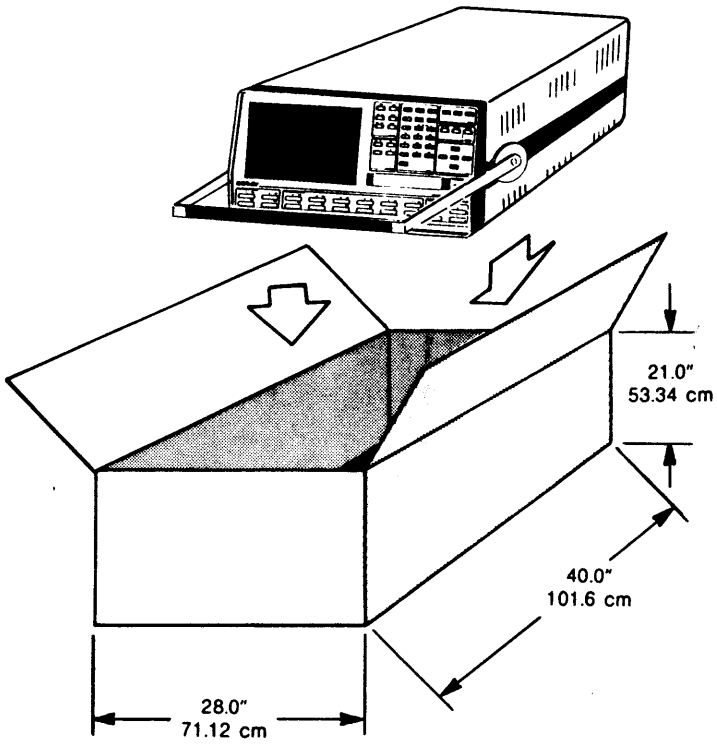


FIGURE 2-4. REPACKING

SECTION 3

FUNCTIONAL DESCRIPTION/THEORY OF OPERATION

3.1 GENERAL

This section is divided into two parts: the first provides a functional description of hardware elements, while the second provides the operational theory of the 64300. Figure 3-1 shows the top view of a 64300 with cover removed. Figure 3-2 shows an overall hardware function diagram, with keys to text. Figure 3-3 shows the overall operating sequence of the 64300. Figures 31, 3-2, and 3-3 are located in the back of this section.

3.2 OVERALL HARDWARE FUNCTION DIAGRAM

Refer to Figure 3-2 for details in the following discussion. Circled numbers are annotated to correspond to each subtitle in this section.

3.2.1 Input Function

The Input Function is shown in ①. This represents the first stage of operation. Incoming data is digitized and conditioned to ECL logic through the logic pods, which then pass the data to the Input PCB's. Pod connection to the Input PCB's is through the front panel connectors, labelled as follows:

Pods	Input
A	3-0, 7-4
B	3-0, 7-4
C	3-0, 7-4
D	3-0, 7-4
E	3-0, 7-4
F	3-0, 7-4
a	3-0, 7-4
b	3-0, 7-4

The standard Input PCB contains line receivers, and, for channel group A + B only, additional glitch capturing circuitry.

3.2.2 Clocking Function

The Clocking Function is shown in ②. It is comprised of the Timebase PCB and Clock/Qualifier Pods. Up to four external clocks and qualifiers and an internal sample clock (20 ns to 500 ms and 3.3 ns to 10 ms) can be assigned to the appropriate recording blocks. The selected clock edge latches the digitized information on the appropriate Input PCB with every active edge. The Timebase PCB provides the clocking function with two types of output: internal clock or external clock with qualifiers.

3.2.2.1 Clocks. The Internal Clock is used for asynchronous sampling. Note that the maximum sample rate in the 1K Format (48 bit word) is 20 MHz (50 ns). In the 2K Format (32 bit word), there are two sampling rates:

1) Pods A + B are combined with C + D, and Pods E + F are turned OFF (interlace mode, 16 x 2000 bits) or clocked internally; in which case the maximum sample rate is 50 MHz (20 ns).
2) Pods A + B are combined with C + D, and Pods E + F are turned ON (interlace mode 16 x 2000 bits); in which case the maximum sample rate is 20 MHz (50 ns). Note that the maximum sampling rate using External Clocks, either in 1K Format (48 bit words) or 2K (32 bit words) is 25 MHz. The maximum sampling rate using internal clocks for the high speed channels a + b is 300 MHz (3.3 ns).

3.2.2.2 Qualifiers. All four (4) external clocks and qualifiers may be assigned as desired. The maximum external clock rate specified for 1K or 2K Formats is 25 MHz. This allows for different external clocks that may be completely out of phase and asynchronous. Note that recording problems may occur between the 64300 and the SUT if clock or qualifier frequencies are higher than specified.

3.2.2.3 Clock and Qualifier Pods. These pods are electrically identical to the data pods. The only difference between data, clock, and qualifier pods is in the labelling on the connectors.

3.2.3 Memory Block

The Memory Block is shown in ③. This function is provided by the DAB's--one for each memory PCB. Data from input PCBs is stored in the appropriate DAB, which contains some control logic, 16 x 1K memory, and Trigger Word recognizers. The DAB memory is filled with data from the input PCB, depending on the status of an additional qualification control line (see clocking function ②). In the standard version, this line is held in a particular state so that every event will be stored, but, optionally, the line may be used for sophisticated data qualification.

3.2.3.1 Memory Formatting. The three Data Acquisition Blocks (DAB's) may be formatted in the following ways:

- 1K Format - where the three blocks are in parallel, each 1K deep with 16 bit words.
- 2K Format - where blocks A + B and C + D are combined, and E + F are also in "sampling" mode, SAM, with 16 bit words.
- 2K Format - when blocks A + B and C + D are combined, and E + F are turned OFF (32 bit word).
- The 300 MHz DAB memory format is always 500 bits (.5k) deep x 16 channels. It cannot be changed.

In the 2K Format, input data available to DAB A + C is also combined with DAB B + D. This switching occurs in an alternating fashion (interlace technique). Therefore, from the user's point of view, the memory depth of recording block A + C will be doubled. B + D is no longer available. Recording block E + F can be shifted relative to the pod-skew parameter defined in the TRACE MENU. See the Operating Procedures section of this manual for details.

3.2.3.2 Burst Memory PCB The Burst Memory PCB, ⑤A, receives data directly from Pod group connection "a + b." The Burst Memory PCB has the following features:

- Independent Time base is combined with the Time Base PCB.
- Block "E + F" is used as the display buffer for "a + b" in the Timing Diagram.
- Block "E + F" is still available in the List Display.
- Triggering from the Trigger PCB is the same as for the other 48 channels.

3.2.3.3 Reference Memory. For each DAB PCB, a Reference Memory exists which is equal in size to the recording block. Both memories can be compared automatically in the Compare Mode.

This is possible only if both memories are equally formatted (same number of blocks used, same recording mode, same pod-skew). The Reference Memory is formatted automatically when the Source Memory is copied to the Reference Memory. See paragraph 5.5.2.3 for details.

3.2.4 Triggering/Trace Control Function

The Triggering/Trace Control Function is shown in ④. It is comprised of the Control PCB (not shown) and the Trigger PCB.

The Control PCB is used to generate common signals for controlling the complete trace sequence of the Logic Analyzer (trigger delay, pod-skew, interlace). This board is flexible in the sense that any further modification of the DAB's memory depth, trigger and data qualify capabilities will not influence its operation.

The Trigger PCB receives the outputs of all Trigger word recognizers, and/or data-qualification word recognizers, from the DAS's inputs. It then combines them to perform all sequential trigger functions. This board is also used to control the Trigger function of the Burst Memory PCB.

3.2.5 Microprocessor Control Function

Control over all 64300 functions is exercised by a Z80 type microprocessor. This function, ⑤, is provided by the CPU PCB, where the Z80 resides, and the associated memory PCB's.

The Microprocessor Control Function controls the internal communication bus as well as 64300 interface to outside devices.

3.2.6 Operator Input Function

The normal input of system control and parameter manipulation is by the front panel keyboard. This is shown in ⑥. All front panel pushbuttons are connected to the keyboard PCB, which is situated immediately behind the front panel plate.

3.2.7 Display Function

The Display Function is shown in ⑦. It consists of the CRT, which is the primary monitor for all 64300 and operator interaction. The Character Generator PCB and Raster Counter PCB are associated with the actual CRT.

3.2.8 Remote Control Function

The Remote Control Function is shown in ⑧. The Threshold/GPIB PCB includes circuits for setting variable input data and qualifier voltages, as well as the General Purpose Interface Bus (GPIB). See Appendix A of this manual for details of GPIB operation.

The GPIB interface allows the user to control most functions of the 64300 remotely with the IEC bus. (Note that our internal IEC bus and external connector both correspond to the IEEE 488). Furthermore, it enables the transfer of data recordings to other GPIB compatible devices. Therefore, several types of remote control interfaces are possible at any one time:

- GPIB/IEEE 488
- RS 232C/V24 (without modem control lines)
- Optional (full RS 232C with modem control)

3.2.9 Optional Function

The Optional Function is shown in ⑨. Options installed may be accessed by using the "Option" pushbutton. There may be five software options available. However, some options require additional hardware support. One slot in the card cage is reserved for further harware expansions. The microprocessor detects the added features automatically and indicates their presence in a directory immediately after power-up.

3.2.10 Internal Communication Bus

All 64300 PCB's are connected to the microprocessor system (Z80) by a standardized internal communication bus, (10). Every board can be changed, modified, replaced, or added without affecting the system architecture. This capability forms the basis for future options.

3.3 OVERALL OPERATING SEQUENCE

Refer to Figure 3-3 for details in the following discussion. Each part of the overall operating sequence of the 64300 is referred to in the following sections.

The 64300 operates in four basic modes:

- Pre-Record Programming
- Data Recording
- Data Analysis
- File Manipulation

The 64300 can be considered as a shift register into which data is clocked continuously until a trigger event stops the recording. All parameters necessary to control the actual recording are inputted to the 64300 during the Pre-Record Programming Mode of operation. See paragraph 5.3.

During the Data Recording Mode, the Logic Analyzer samples all data until it finds the pre-programmed trigger conditions to initiate a stop of the recording. See paragraph 5.4.

During the Data Analysis Mode, the Logic Analyzer can be ordered to recall previously recorded data in a variety of manners and formats. In this mode, functions allow for searching through the data and for controlling the memory contents itself. See paragraph 5.5.

The File Manipulation Mode allows the operator to store and recall various test set-ups for future use. See paragraph 5.6.

3.3.1 Pre-Record Programming Mode

This mode of operation is best thought of as the time when the user tells the 64300 the following:

- What to do
- How to do it
- When to do it

One important note to be made is that the use of the word "Trigger" has a somewhat different meaning than normal, especially to those who are accustomed to oscilloscope operation. The Trigger Word is a particular piece of digital data that you tell the logic analyzer to look for. The analyzer then begins to record incoming data (you tell it when and how to record). When it recognizes the Trigger Word, it will cease recording after a pre-selected time delay.

Control over the sequence and type of recording to be done is provided by the following functions:

- Trace (Format Spec)
- Trigger (Trigger Sequence)
- Compare
- Set-Up Monitor
- Option(s)

3.3.1.1 Trace Function. The TRACE MENU provides control over the Trace Function. This function allows the user to select when the recording will be made, which memory format to use, how much data will be recorded before and after the Trigger Word is recognized, what pods will be used as data inputs, what type of sampling will be done by the various memory blocks, and what kind of clocks will be used.

3.3.1.2 Trigger Function. The Trigger Function allows the user to program the Trigger Word(s) to look for and how to look for them. This is done with the TRIGGER MENU and the TRIGGER WORD DEFINITION pages (1 + 2).

The TRIGGER MENU allows for extremely complex sequences of events to be programmed through many levels. The organization is as follows:

- 12 levels
- 4 sequences
- 3 levels per sequence

Using the TRIGGER MENU, the operator can program branches, jumps, loops and conditional operation.

The TRIGGER WORD DEFINITION PAGES allow the user to program up to 12 words for Trigger or Trace. In addition, each word may be up to 48 bits long.

3.3.1.3 **Compare Function.** The Compare Function allows the 64300 to "compare" information previously transferred (S -> R) into "reference" memory with a new recording of data. This function is particularly useful when one wishes to check the performance of the SUT against itself or a reference. The COMPARE MENU provides the control over this function.

With the COMPARE MENU, it is possible to select the beginning and ending addresses, skew range, compare mode, and compare conditions for test. The menu provides a running count of cycles and the times the pre-programmed conditions have occurred.

3.3.1.4 **Set-Up Monitor Function.** While programming parameters of the 64300, the user may call the Set-Up Function by pressing the MONITOR pushbutton. The analyzer will respond with one of two types of messages on the Set-Up Monitor Display. The first type of display indicates a "Valid Set-Up". This message shows a summary of programmed parameters. The second type of message is one that displays "Set-Up Results" to indicate that there is an invalid or wrong combination of parameters programmed. This type of message will appear when an incorrectly programmed recording is attempted.

The Set-Up Monitor can monitor only programmable parameters relating to the internal structure of the 64300. It cannot monitor set-up conditions external to the analyzer.

Note that the COMPARE MENU also features a separate Set-up Monitor.

3.3.1.5 **Option Function.** Some options that are installed in the 64300 may be called for use in the Pre-Record Programming Mode. The Option Table is displayed when the MENU pushbutton is pressed. The user may then select the option desired by pressing the OPTION pushbutton. See paragraph 5.3.6 for details.

3.3.2 Data Recording Mode

O"ce(the user has programmed the Pre-

Record parameters and has started the recording process, the analyzer steps through the three phases which are typical for each data recording. These phases are as follows:

- Pretrigger Sampling
- Trigger Trace
- Trigger Delay

The Pretrigger Sampling phase is a process whereby the analyzer readies itself to recognize the trigger word(s) programmed. This phase ensures that with a new recording the analyzer is completely filled with actual data. Every recording block must get enough clocks (memory depth minus trigger delay time) before it can accept a trigger word. Each recording block is independent of the other. Data is clocked in during the Pretrigger Sampling Phase, in accordance with the instructions given the analyzer. When all three DBAs are finished sampling data, the analyzer is ready for the Trigger Trace phase.

The Trigger Trace phase is active when the analyzer steps from sequence to sequence, searching for the programmed trigger word(s) conditions. Each recording block searches for the trigger word at its input with the assigned trigger word sample clock. Since these clocks can differ in frequency and phase, the trigger events coming from each DAB's word recognizer must be synchronized with a trigger word sample clock, as programmed. The se-

quential search is programmed in the TRIGGER MENU (Pre-Record Programming Mode), which can cause the sequence to either jump to the next level or restart the search from the beginning.

The Trigger Delay phase begins once the trigger word conditions have been met. When the trigger is found, each DAB must sample post-trigger data according to the programmed trigger delay. This delay is counted in clocks, which were selected previously for recording. Thus, each DAB can stop recording independently of other recording blocks.

3.3.2.1 Trace Monitor Function. During a recording, the trace activity of the analyzer may be displayed by pressing the MONITOR pushbutton. The activity, through all phases of recording, is presented in a bar graph manner. When the graph "blinks" on any of the recording blocks, that phase (for that block) is active. The Trace Monitor is shown in the top portion of the display. See Section 5.4.

3.3.2.2 Trigger Monitor Function. During a recording, the sequences of the TRIGGER MENU program may be displayed by pressing the MONITOR pushbutton. As each clock cycle or event is reached for the levels programmed, the counter is incremented (number of events, clock cycles, etc.). This display serves as a running "score card" of the TRIGGER MENU program because it duplicates exactly the instructions as programmed in the TRIGGER MENU. This monitor is shown on the bottom part of the TRACE/TRIGGER Monitor. See Section 5.4.

3.3.3 Data Analysis Mode

Once a recording has been made, the user may begin to analyse the data recorded in a variety of manners as follows:

- Arrange data in a DATA LIST, TIMING DIAGRAM or 300 MHz BURST MEMORY DISPLAY so that it is represented as clearly as possible. The user may do so by deleting channel groups, selecting different formats, etc.

- Allow the 64300 to analyse data with automatic search functions. These include source reference comparisons, searching for a word in memory, searching for a string of words, etc.

- Transfer the recorded data to the Reference Memory, search for a string of words, etc.

- Transfer the recorded data to the reference memory. When it is so stored, it can be formatted for further comparisons as reference or for history only.

- Transmit the data through the GPIB or a serial interface to an intelligent remote station.

The principle displays/functions used in the Data Analysis Mode of operation are the Timing Function and the List Function. The Memory and Search Functions are shared between them. In addition, options for each may also be called, as available.

3.3.3.1 Timing Function. The Timing Function is displayed with the TIMING DIAGRAM and the 300 MHz BURST MEMORY DISPLAY. These show, in graphic form, the logical state (Binary) of each channel recorded. The user may make time measurements, add or delete channels to the display, rearrange channels displayed, and change other programmed parameters. In addition, powerful memory and search functions can be called to further enhance analysis capabilities.

3.3.3.2 List Function. The List Function is shown with the LIST DISPLAY. This shows, in tabular form, the memory locations, the logical state on each channel, and pod group assignments as programmed. As in the TIMING DIAGRAM, the user may utilize powerful search and memory functions. A useful feature of the List Function is that the user can go from the TIMING DIAGRAM to the LIST DISPLAY, alternatively, and find corresponding information.

3.3.4 File Manipulation Mode

The File Manipulation Mode is a "save" file function. The DataPak is used to store and recall set-ups or reference data through the use of the DATAPAK TABLE.

3.3.4.1 DataPak Table. The DATAPAK TABLE provides access to the DataPak memory contents. It is used to manipulate the interchangeable, non-volatile DataPak memory cartridge that expands the machine's internal (Reference) memory.

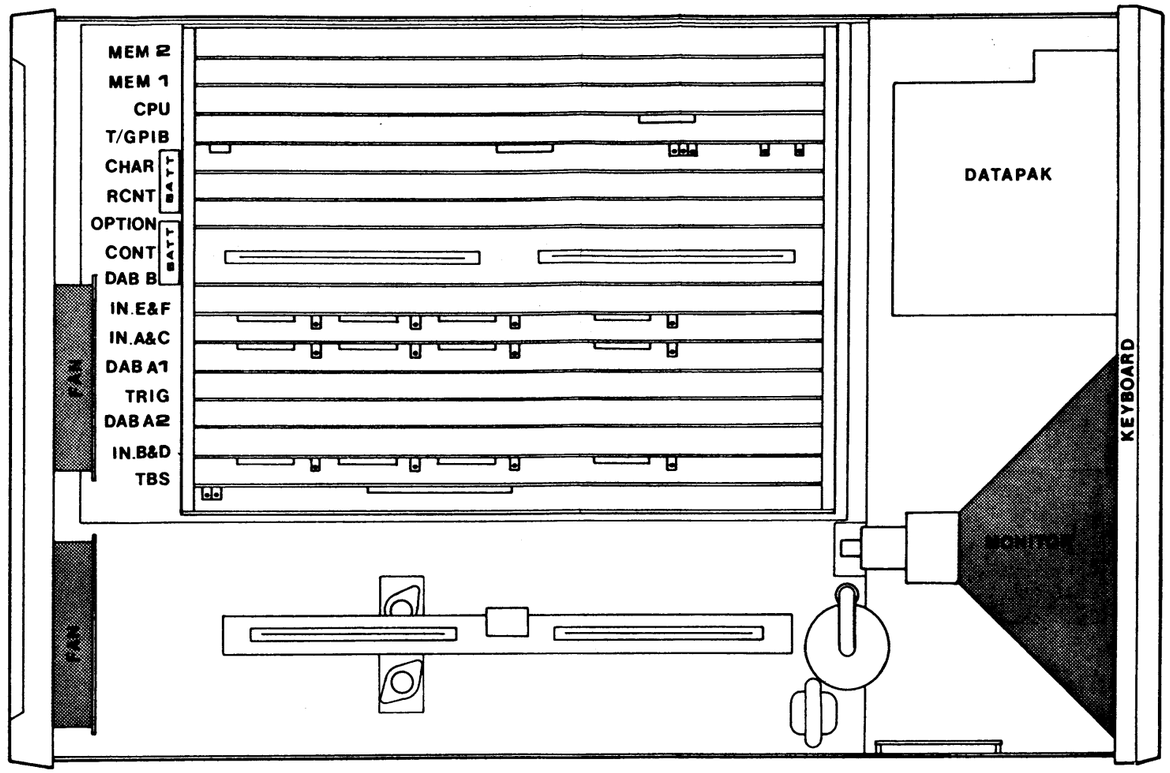


FIGURE 3-1. 64300 - TOP VIEW

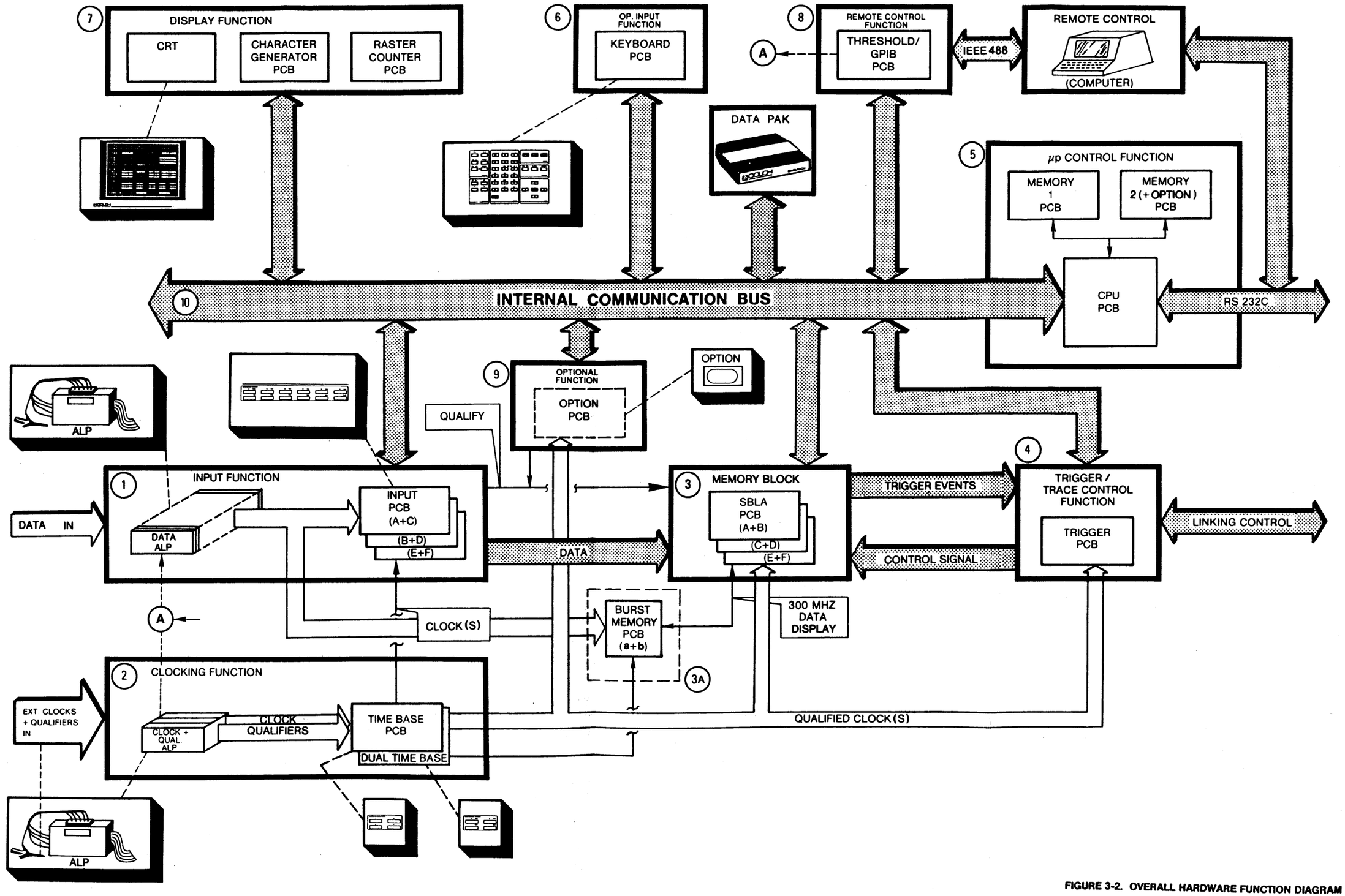


FIGURE 3-2. OVERALL HARDWARE FUNCTION DIAGRAM

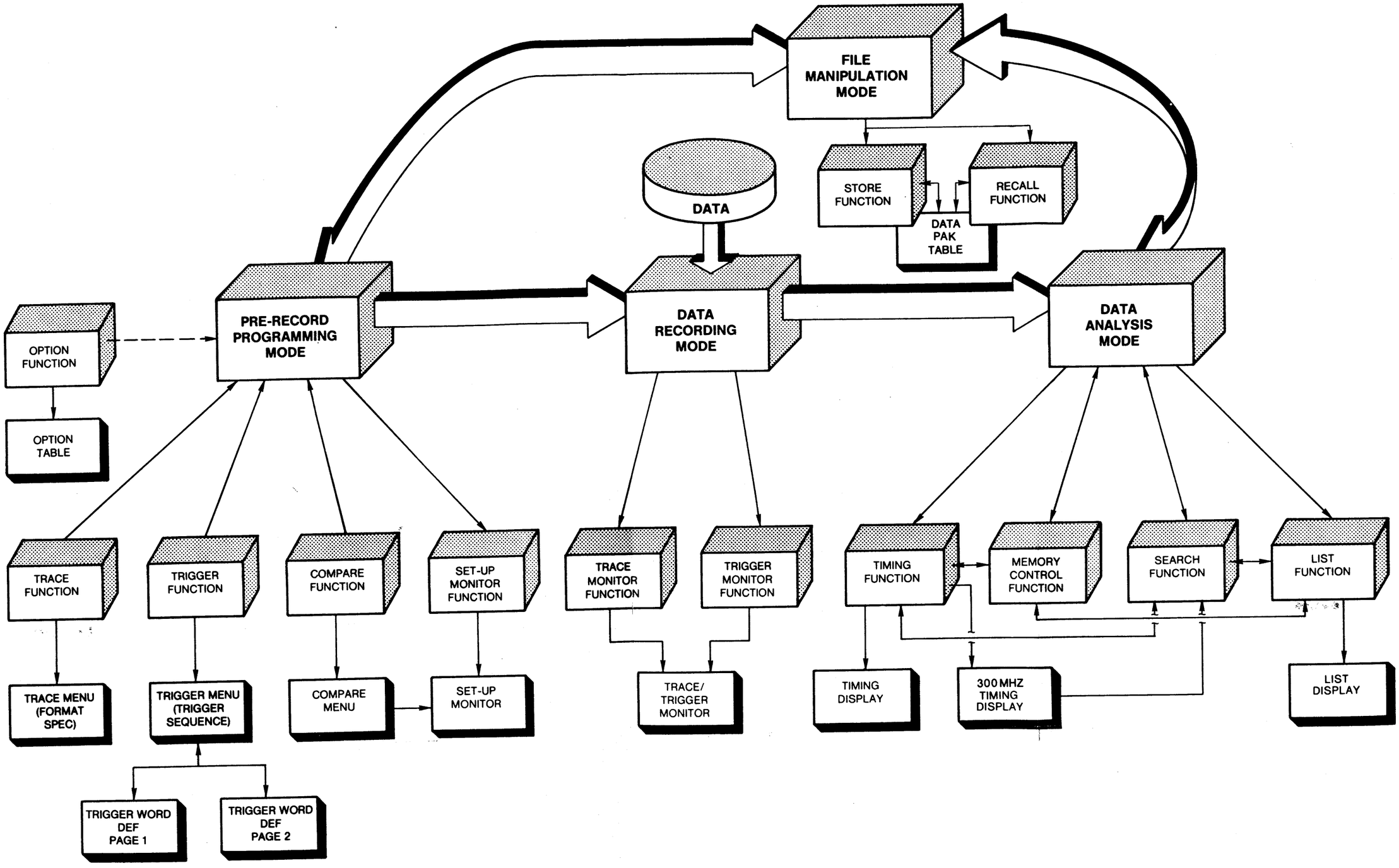


FIGURE 3-3. OVERALL OPERATING SEQUENCE

SECTION 4

CONTROLS AND DISPLAYS

4.1 GENERAL

In this section, the location and function of all controls, indicators, displays, menus and connectors are identified. In addition, the procedures necessary to gain access to the various menus and displays that control 64300 operating parameter are given. Note that this portion of the manual does not provide details on theory or operation of the elements identified. See Section 5 for operating procedures.

4.2 CONTROLS

Refer to Figures 4-1A and 4-1B for an overall view of the 64300. The major elements of this device are backpanel controls, data acquisition connectors and devices, the keyboard and the CRT. The CRT produces interactive menus, displays and monitors.

4.2.1 Backpanel Controls

Figure 4-2 shows the location of all backpanel controls and connectors. Table 4-1 gives the function of each control with keys to Figure 4-2.

4.2.2 Data Acquisition Connectors

Figure 4-3 shows the Data Acquisition Connectors, which form the lower part of the front panel. The Data Acquisition Connectors are comprised of three parts: High Speed Input Pods, Standard Input Pods, and External Clock and Qualifier Pods.

4.2.2.1 300 MHz Burst Memory Input Pods. These are divided into two parts, labelled a and b respectively. Each pod is separated into two four-bit connector groups -- the first of which is for data bits 0 through 3, and the second, which accommodates data bits 4 through 7. These two groups are used only for the 300 MHz Burst Memory.

4.2.2.2 Data Input Pods. These are divided into 6 parts, labelled A, B, C, D, E and F, respectively. Each Pod is separated into two four-bit connector groups, the first for data bits 0 through 3, and the second for data bits 4 through 7. These 6 groups are used for 25/50 MHz data only.

4.2.2.3 External Clocks and Qualifiers Pods. There are four External Clocks and Qualifiers Pods, labelled 1, 2, 3 and 4 respectively. Pod 1 may be used to assign an external clock to all input data pod groups. Other external Clocks (and Qualifiers) can be inputted through Pod 2 and Pod 3. Pod 4 is for future expansion.

4.2.2.4 Other Input Devices. Generally other devices such as serial-to-parallel probes, signature analyzers, serial interface probes, trace modules and microprocessor personality probes are connected to the front panel of the 64300 through ribbon connectors or other types of interfaces. Details on the controls, indicators and operation of these devices are found in documentation shipped with them.

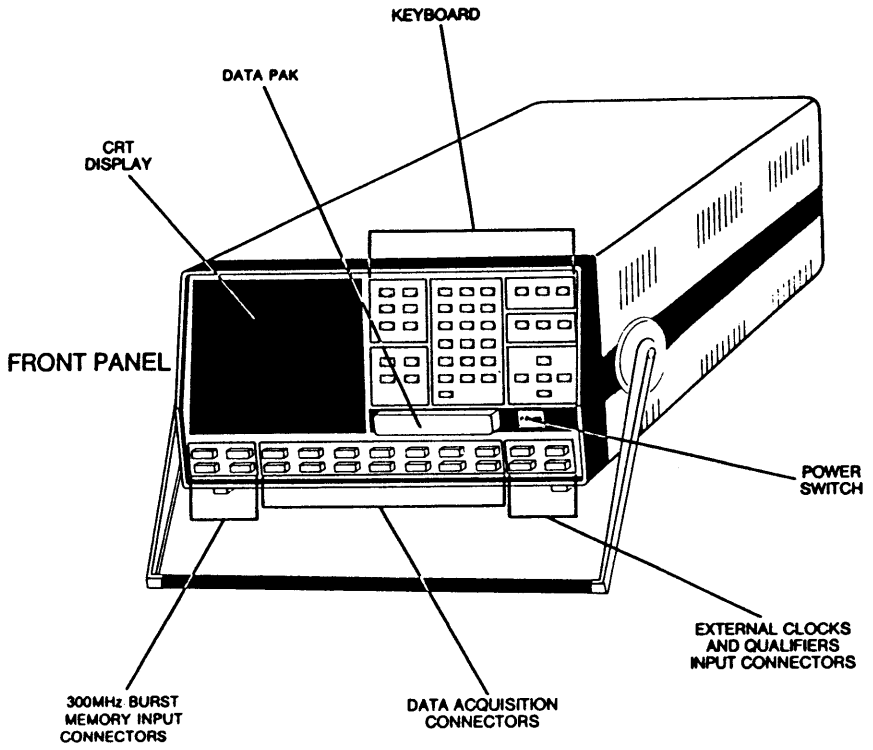
4.2.3 Keyboard

Figure 4-1 provides an illustration of the Keyboard. It is divided into the following parts (or groups):

- Display
- Trace
- Specify
- Cursor
- Entry
- Edit

Figure 4-4 shows the Keyboard Display, Trace, Specify and Cursor Group pushbuttons. Table 4-2 describes the elements shown in Figure 4-4.

Figure 4-5 shows the Keyboard Entry and Edit Group pushbuttons. Table 4-3 describes the elements shown in Figure 4-5.



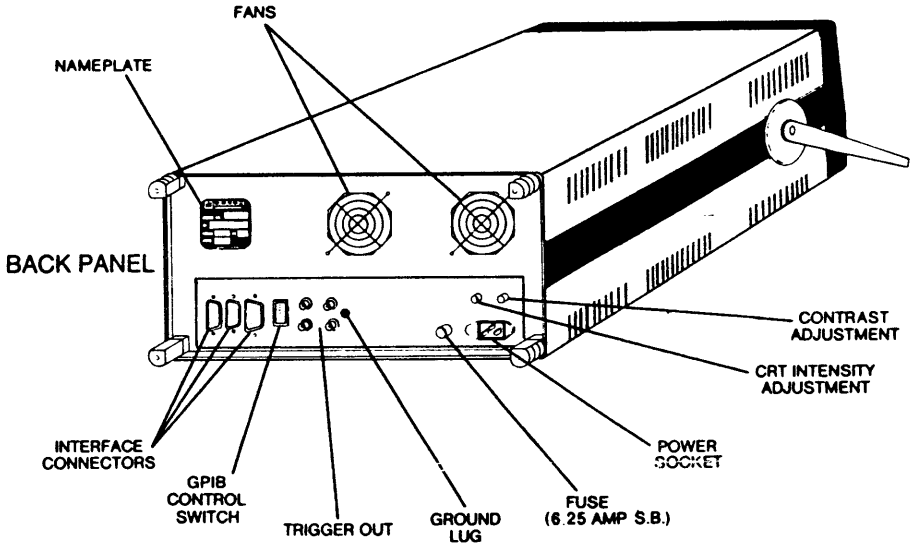
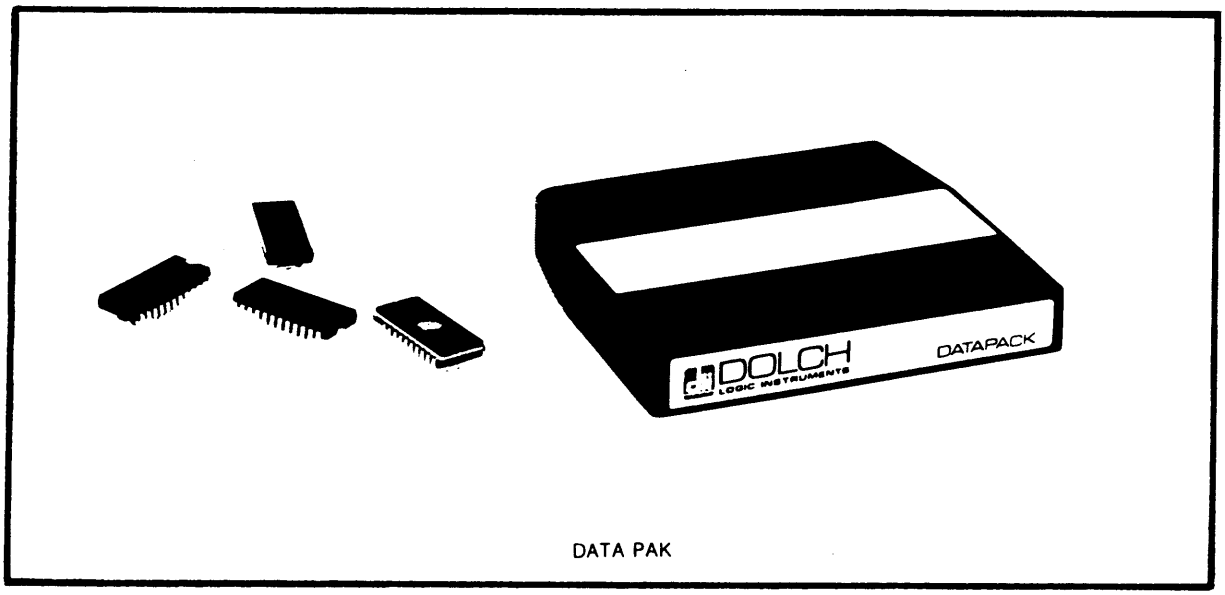
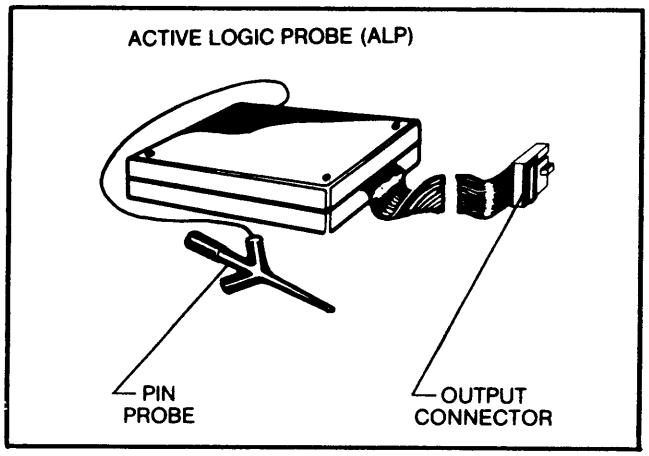


FIGURE 4-1. CONTROLS AND INDICATORS, OVERALL VIEW



DATA PAK



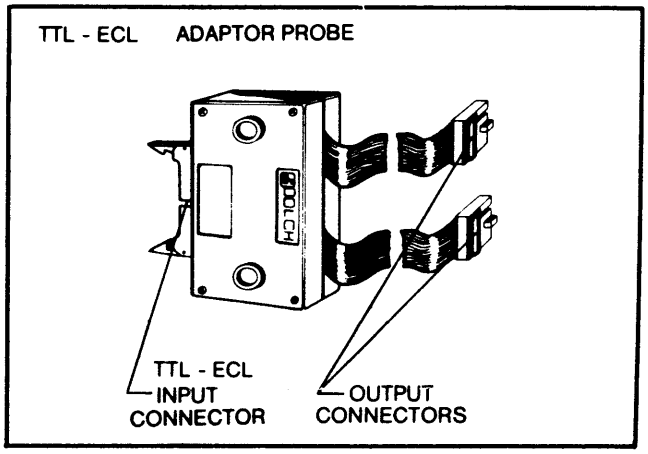


FIGURE 4-1A. CONTROLS AND INDICATORS, OVERALL VIEW

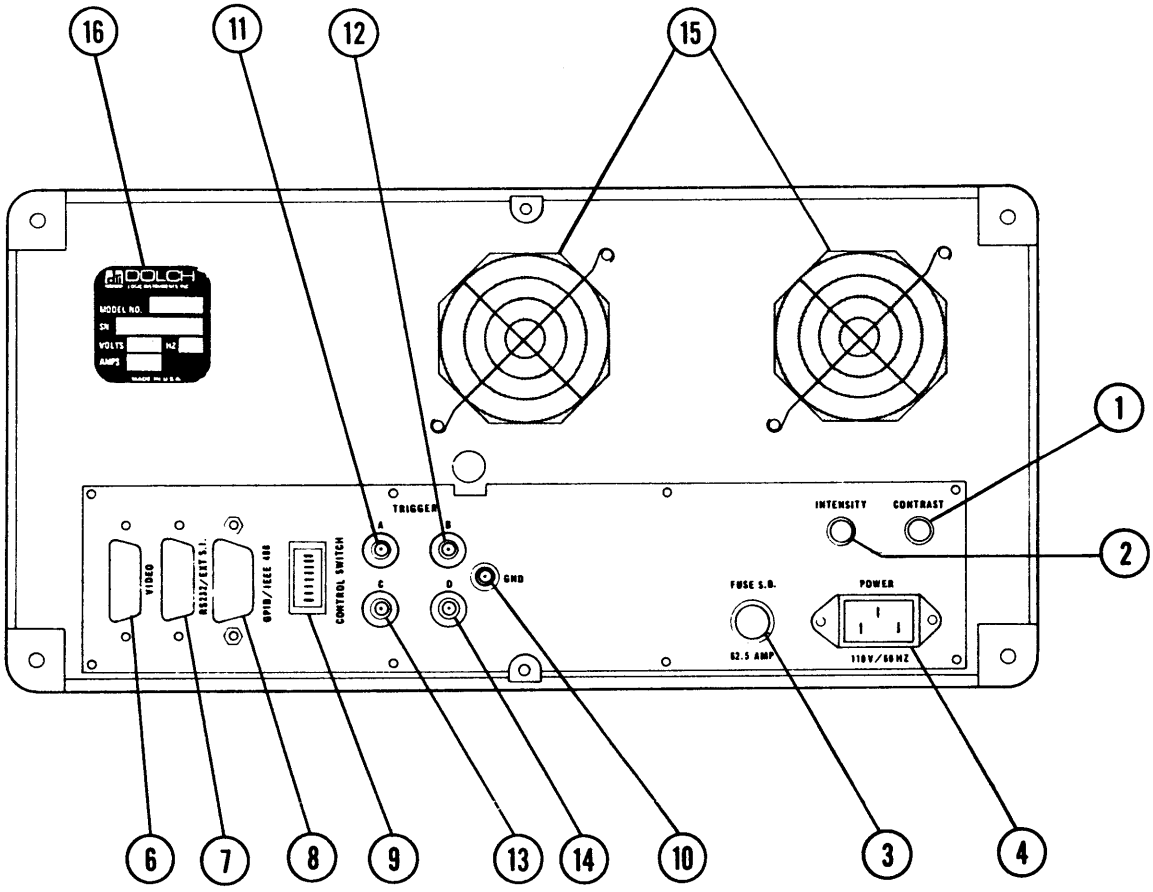


FIGURE 4-2. BACK PANEL CONTROLS AND CONNECTORS

TABLE 4-1. BACK PANEL CONTROLS AND CONNECTORS

LOC COR	DESCRIPTION
1	CRT Contrast adjustment
2	CRT Intensity adjustment
3	Fuse (S.B.)
4	Power socket
5	Option connector
6	External video interface connector
7	RS 232C/V24 interface connector
8	IEC-Bus interface connector (GPIB/IEEE 488)
9	Dual-In-Line switch for GPIB address selection
10	Ground lug
11	BNC (coaxial) "A" - Trigger Output A
12	BNC (coaxial) "B" - Trigger Output B
13	BNC (coaxial) "C" - Reserved for Options
14	BNC (coaxial) "D" - Reserved for Options
15	Cooling fan, 2 each located above rear control panel
16	Serial number label

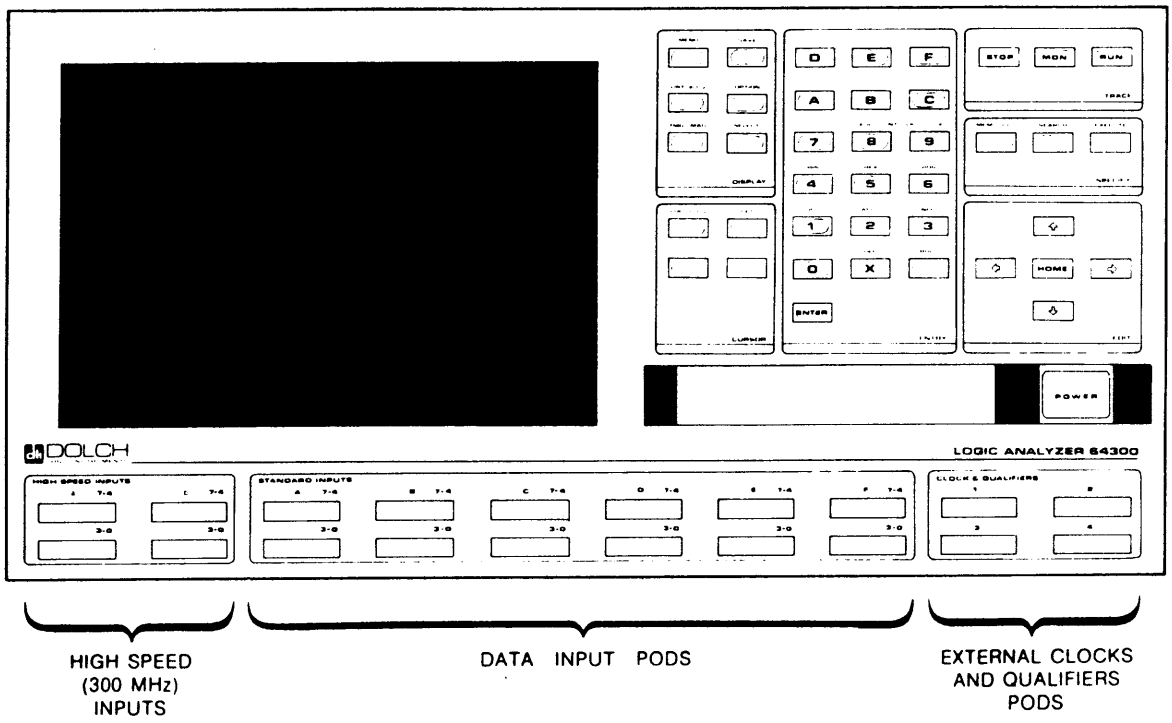


FIGURE 4-3. DATA/CLOCK CONNECTORS

NOTES

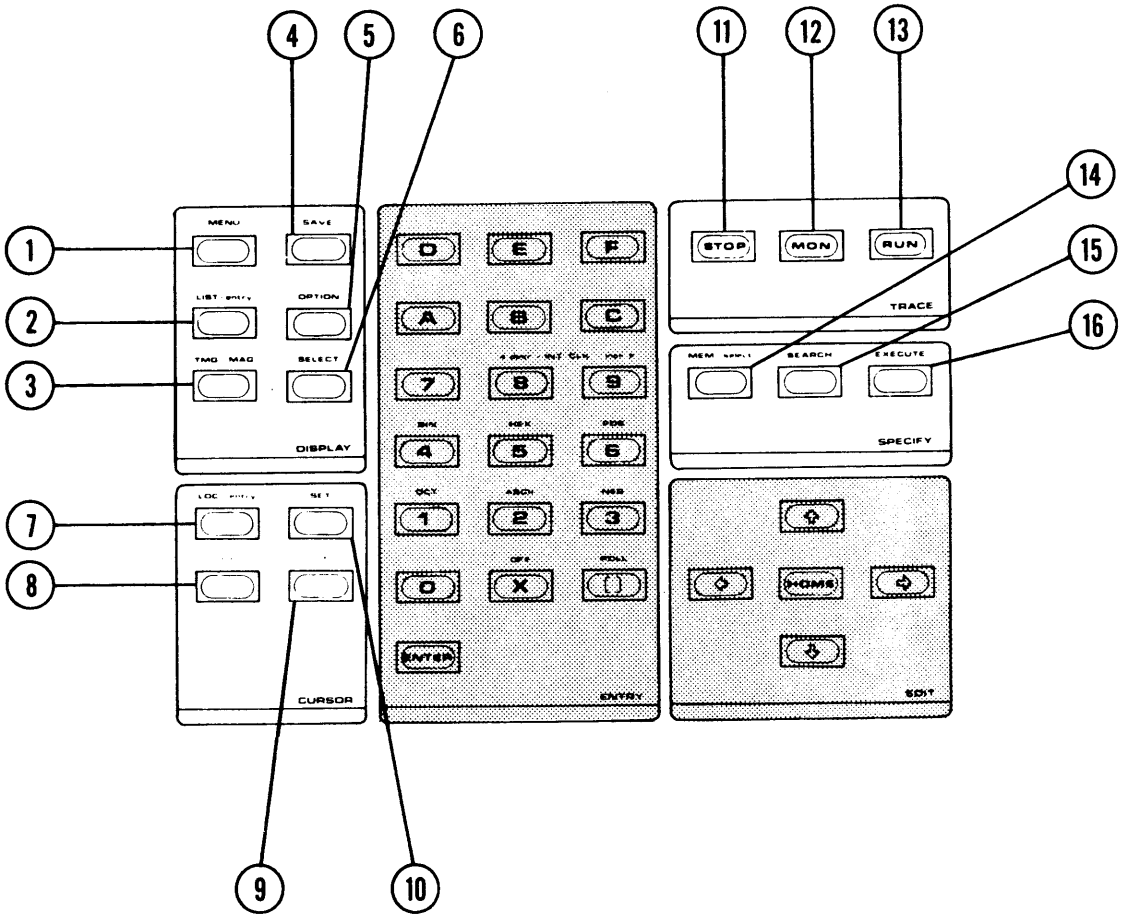


FIGURE 4-4. KEYBOARD DISPLAY, SPECIFY, CURSOR, AND TRACE GROUPS

TABLE 4-2. DISPLAY, SPECIFY, CURSOR, AND TRACE GROUPS

LOC COR	NOMENCLATURE	DESCRIPTION
1	MENU	Selects display of the various menus available. May be pressed in single strokes or pressed and held for rapid scroll through menus. (See also Section 4.3)
2	LIST-entry	Selects display of the DATA LIST.
3	TMG/MAG	1st pressing shows a TIMING DIAGRAM of data memory in x 1 expansion. In 1K Format 2nd pressing shows x 5 expansion. 3rd pressing shows x 10 expansion. For 2K Format expansion is x 10 and x 20 respectively.
4	SAVE	Calls the DATAPAK TABLE menu for display.
5	OPTION	Activates a pre-selected option for display or function desired.
6	SELECT	Selects pod group displays of the TIMING DIAGRAM. Repeated pressing scrolls the display through all chosen pod groups. Release the pushbutton to lock the desired group for display.
7	LOC-entry	Used to enter numerical values for cursor position in TIMING or LIST displays.
8		Used to move the cursor "backwards" in the TIMING display and "down" in the LIST display.
9		Used to move the cursor "forward" in the TIMING display and "up" in the LIST display.
10	SET	Used to "mark" the cursor position when the analyzer is in TIMING or LIST displays.
11	STOP	Used to manually abort data recording or comparison test.
12	MONITOR	If pressed while in the Pre-Record Programming mode, will show the SET-UP MONITOR. When pressed during the Data Recording Mode, will display the TRACE/TRIGGER MONITOR.
13	RUN	Used to initialize data recording or comparison test phase.
14	MEM-select	Selects different types of memory functions when the analyzer is in either TIMING or LIST displays.

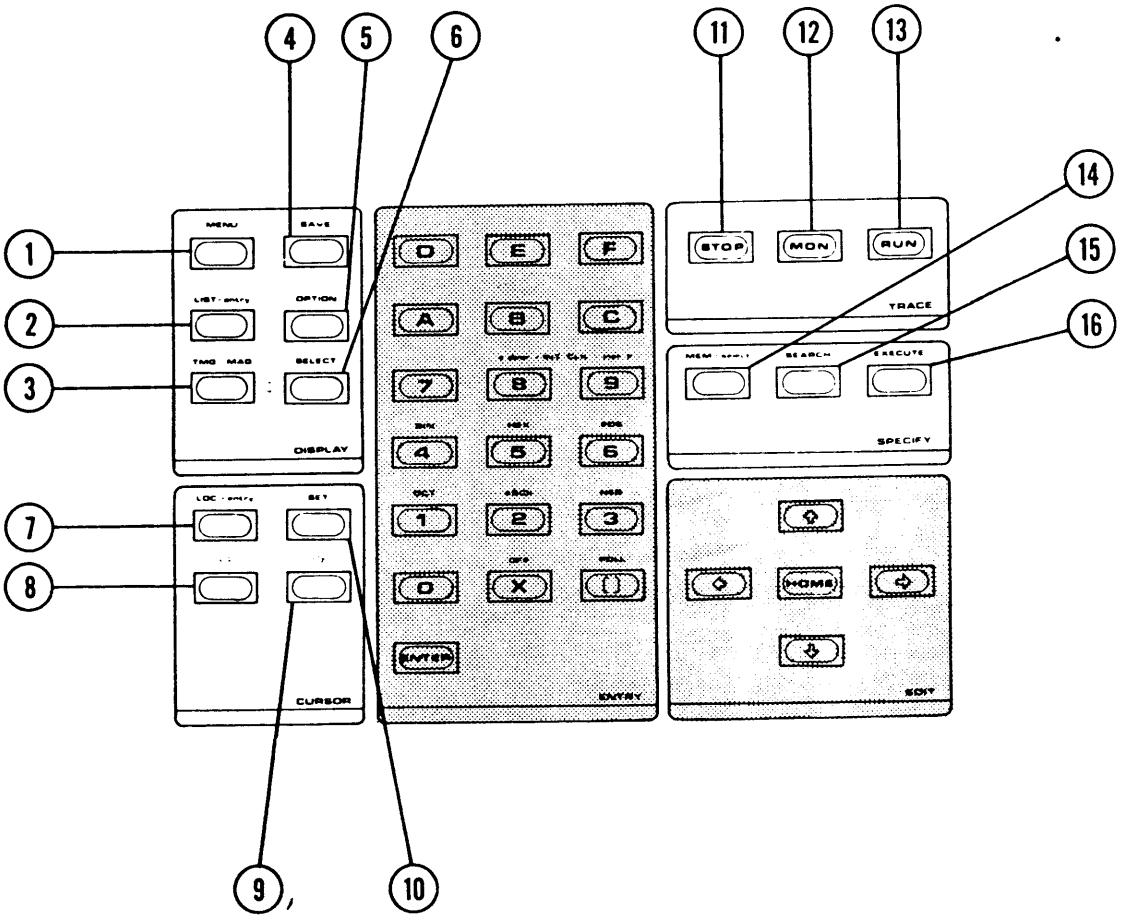


FIGURE 4-4 A. KEYBOARD DISPLAY, SPECIFY, CURSOR, AND TRACE GROUPS

TABLE 4-2. DISPLAY, SPECIFY, CURSOR, AND TRACE GROUPS (continued)

LOC COR	NOMENCLATURE	DESCRIPTION
15	SEARCH	Selects different types of search functions when the analyzer is in either TIMING or LIST displays.
16	EXECUTE	Used to initialize all functions selected in the SPECIFY GROUP of the Keyboard.

BEGIN COMMAND STRING WITH	END WITH
$MC ␣	,(COMMA)

COMPARE MENU PROTOCOL
$MC ␣ S ␣ E ␣ K ␣ P ␣ B ␣ F ␣,

START ADDRESS

(S) ϕϕϕϕ → ϕ999 IN 48 BIT MODE
ϕϕϕϕ → 1999 IN 32 BIT MODE

END ADDRESS

(E) ϕϕϕϕ → ϕ999 IN 48 BIT MODE
ϕϕϕϕ → 1999 IN 33 BIT MODE

COMPARE SKEW

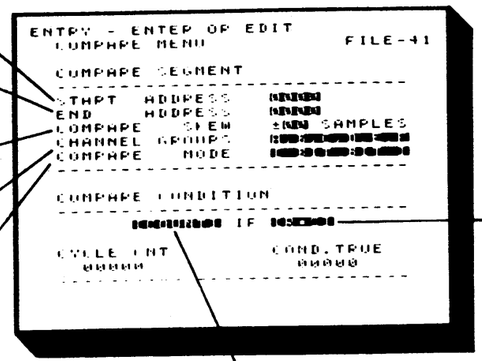
(K) IN RANGE OF
ϕϕ → 99

CHANNEL GROUPS POD SELECT

(P) A = POD A D = POD D
B = POD B E = POD E
C = POD C F = POD F

COMPARE MODE

(B) ϕ = BIT / BIT
1 = BYTE / BYTE
2 = CRC



COMPARE CONDITION

(F) ϕ = COUNT IF R≠S
1 = HALT IF R≠S
2 = COUNT IF R = S
3 = HALT IF R = S

Figure 4-3. Compare Menu Programming Protocol

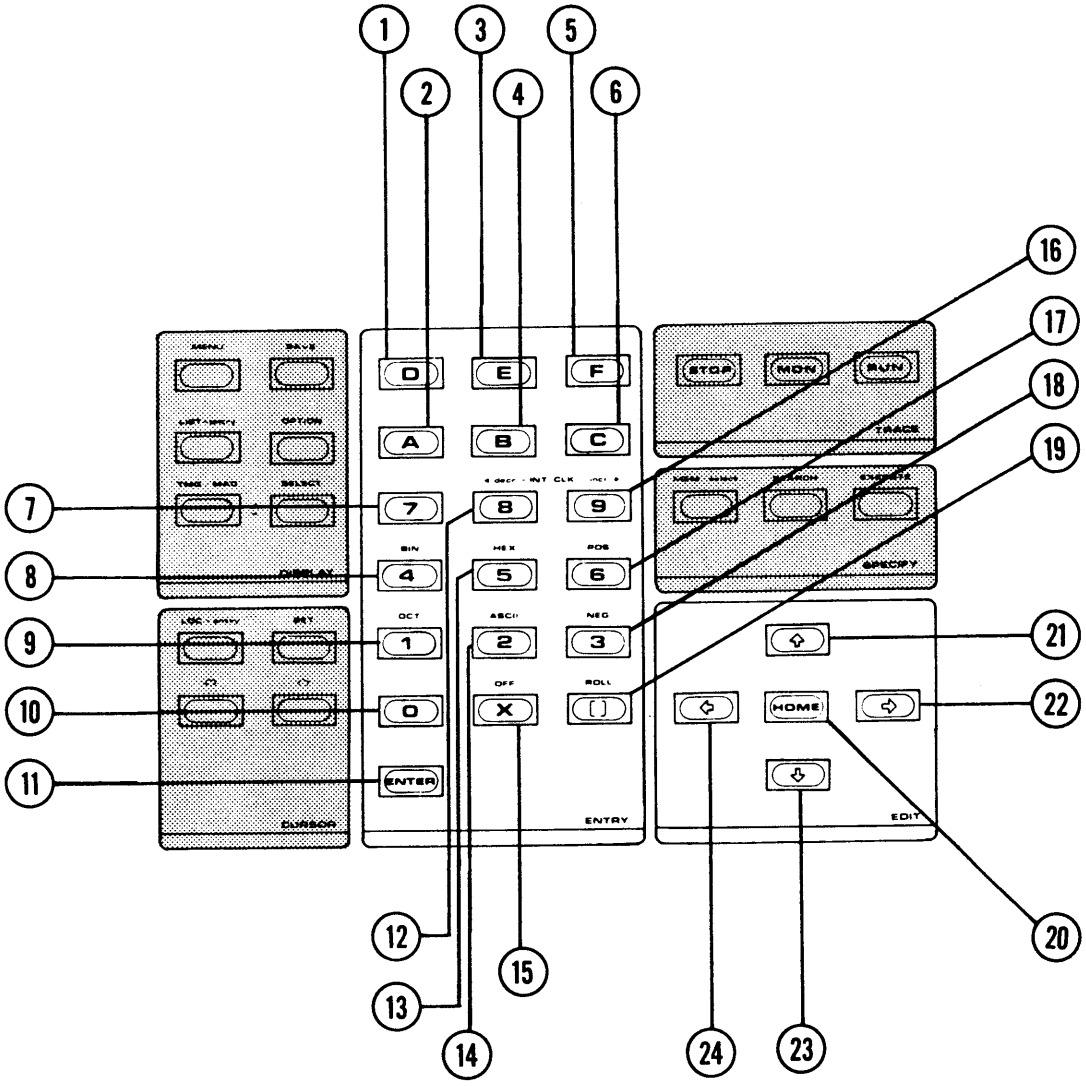


FIGURE 4-5. KEYBOARD ENTRY AND EDIT GROUPS

TABLE 4-3. ENTRY AND EDIT GROUPS

LOC COR	NOMENCLATURE	DESCRIPTION
1-6	A, B, C, D, E, F	Used in various modes to select pod groups or to input Hexadecimal values when specified or desired.
7	7	Used to input numerical value of seven when specified or desired.
8	4 (BIN)	Used to input numerical value of four when specified or desired. Also used to assign Binary number base to selected pod groups when in LIST DISPLAY, TRIGGER WORD MENU or SEQUENTIAL SEARCH MENU.
9	1 (OCT)	Used to input numerical value of one when specified or desired. Also used to assign Octal number base to selected pod groups when in LIST DISPLAY, TRIGGER WORD MENU or SEQUENTIAL SEARCH MENU.
10	0	Used to input numerical value of zero when specified or desired.
11	ENTER	Must be pressed before and after values inputted for parameter fields of the "Non-Bracketed Type" in any menu or set-up.
12	8 (dec-INT CLK)	Used to input numerical value of eight when specified or desired. Also used to decrement internal clock rate value in a menu or display that is in use. Pushbutton may be pressed in single strokes or pressed and held for rapid scroll through values.
13	5 (HEX)	Used to input numerical value of five when specified or desired. Also used to assign Hexadecimal number base to selected pod groups when in LIST DISPLAY, TRIGGER WORD MENU or SEQUENTIAL SEARCH MENU.
14	2 (ASCII)	Used to input numerical value of two when specified or desired. Also used to assign ASCII display of data when in LIST DISPLAY.
15	X (OFF)	Used to select the "Don't Care" state when defining trigerword configurations in the TRIGGER WORD MENU. Also used to delete a pod group from the TIMING DIAGRAM, LIST DISPLAY or SEQUENTIAL SEARCH MENU.

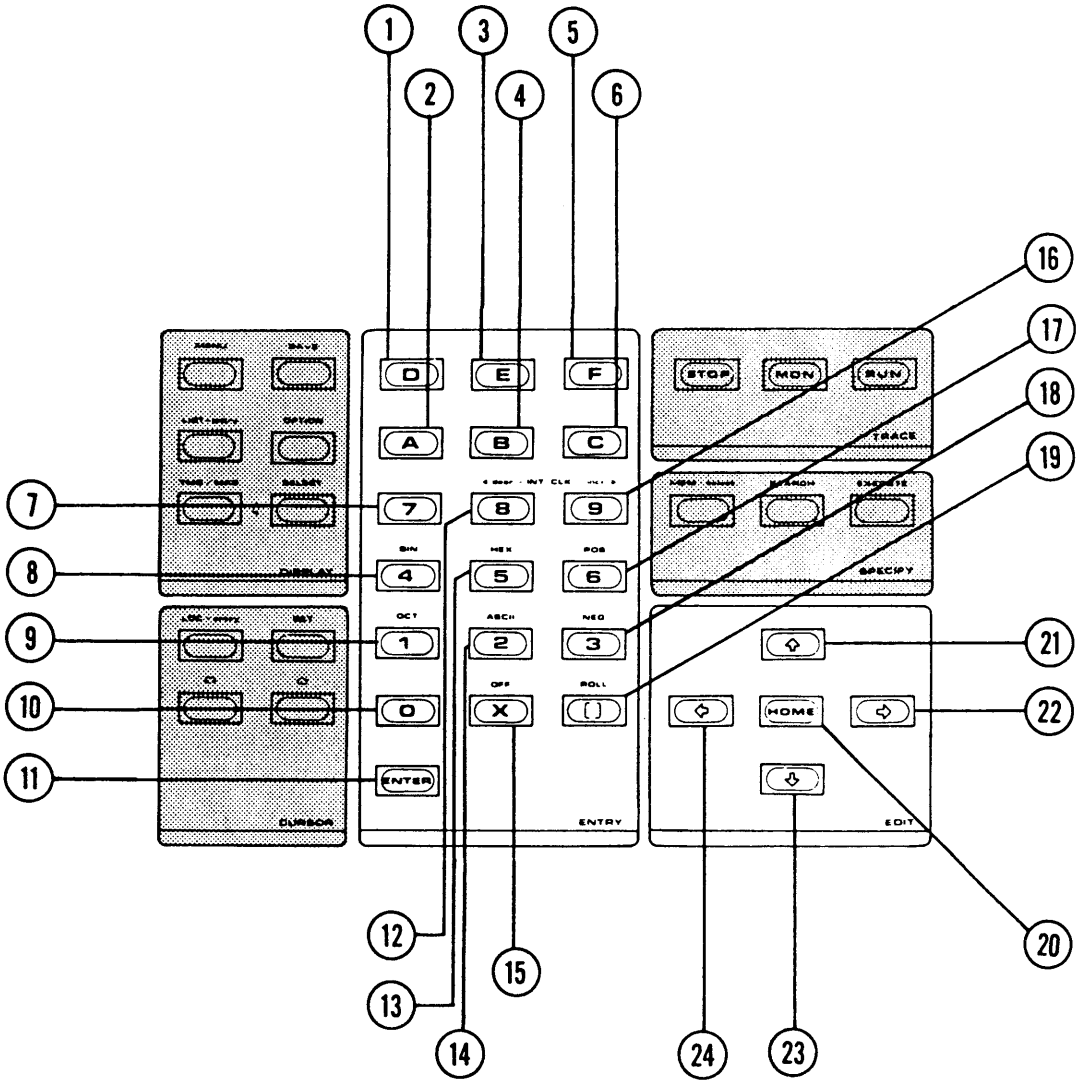


FIGURE 4-5 A. KEYBOARD ENTRY AND EDIT GROUPS

TABLE 4-3. ENTRY AND EDIT GROUPS (continued)

LOC COR	NOMENCLATURE	DESCRIPTION
16	9 (INT CLK-Incr)	Used to input numerical value of nine when specified or desired. Operation is identical to "dec" pushbutton for incrementing internal clock rate values.
17	6 (POS)	Used to input numerical value of six when specified or desired. Also used to assign Positive polarity of data when in LIST display, TRIGGER WORD MENU or SEQUENTIAL SEARCH MENU.
18	3 (NEG)	Used to input numerical value of three when specified or desired. Also used to assign Negative polarity of data when in LIST DISPLAY, TRIGGER WORD MENU or SEQUENTIAL SEARCH MENU.
19	(ROLL)	Used to select functions available when the cursor is positioned at a "Bracket-Type Input" field of the set-up or menu desired. (See Section 5.2.1.)
20	HOME	Used to position the cursor back to the first programmable field in any menu or set-up.
21-24		Cursor controls used to move the cursor to 24 programmable fields during menu or set-up programming.

4.3 MENUS

The 64300 features six CRT displays called Menus. These are so called because the user may select parameters from their fields or may program parameters directly from the keyboard with interactive display. Figure 4-7 shows the menus in a group:

- Trace
  (Format Specification)
- Trigger
  (Trigger Sequence)
- Trigger Word Menu
- Compare
- DataPak Table
- Option(s)

Figure 4-6 illustrates the way to gain access to each of the displays. The list below indicates the Figure, and Table number describing it, for each menu in the following section.

MENU	FIGURE	TABLE
TRACE	4-8	4-4
TRIGGER	4-9	4-5
TRIGGER WORD (DEFINITION)	4-10	4-6
COMPARE	4-11	4-7
DATAPAK	4-12	4-8
OPTIONS	4-13	-

Note that each menu displays a prompt message at the top portion of the CRT to inform the user as to the menu name and the type of control available at the present cursor position.

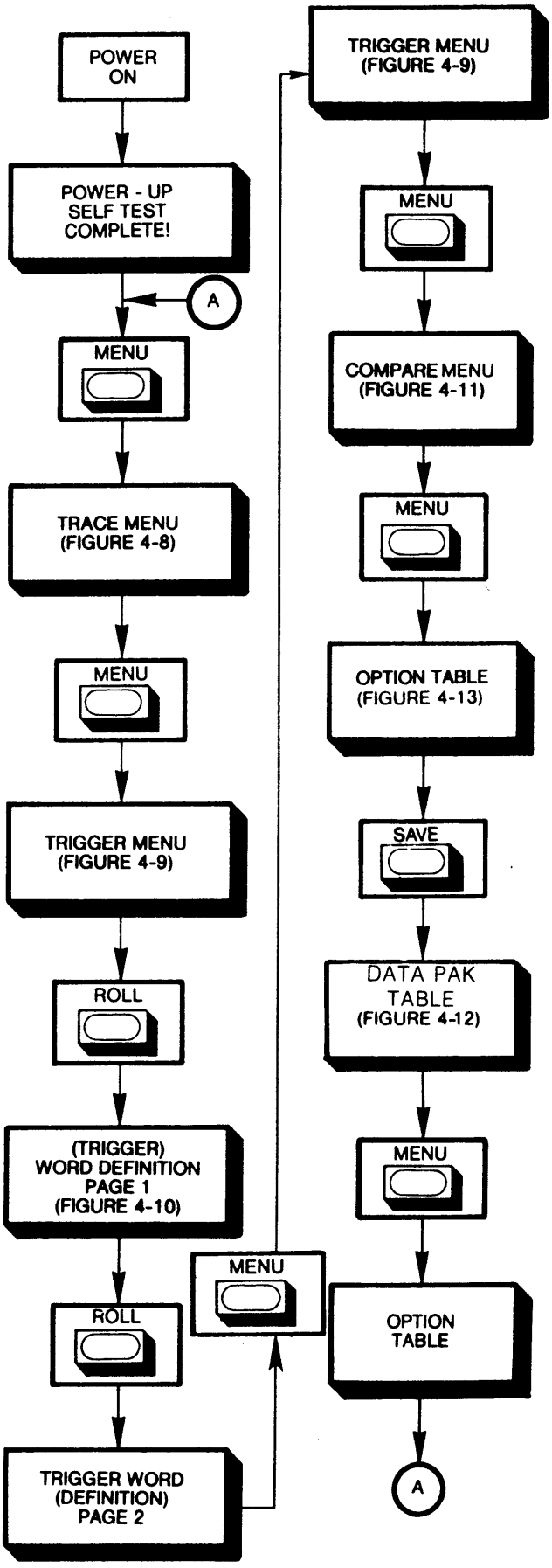
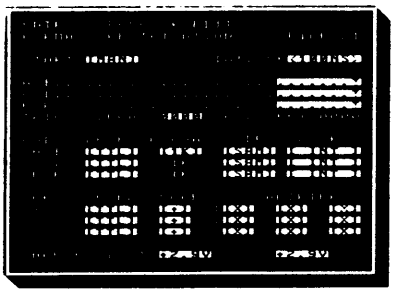
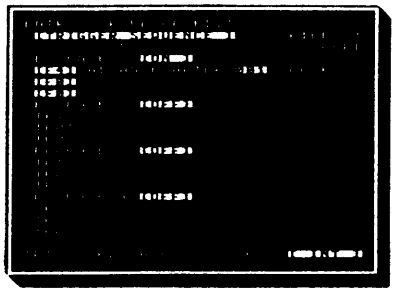


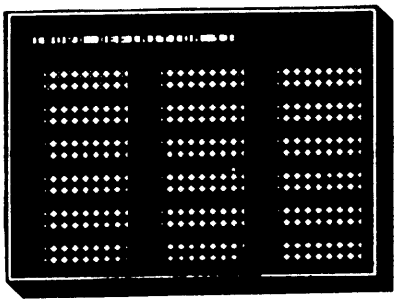
FIGURE 4-6. MENU ACCESS



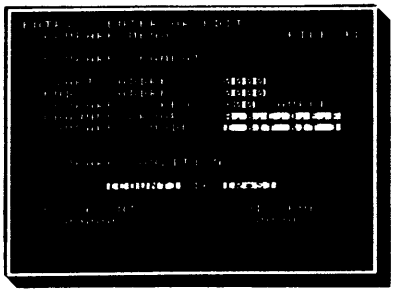
TRACE MENU
(FORMAT SPEC)



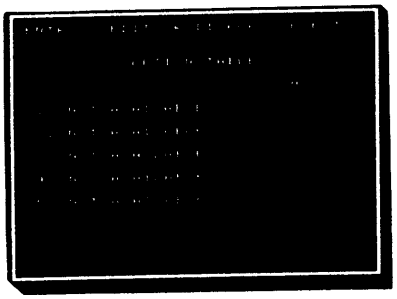
TRIGGER MENU
(TRIGGER SEQUENCE)



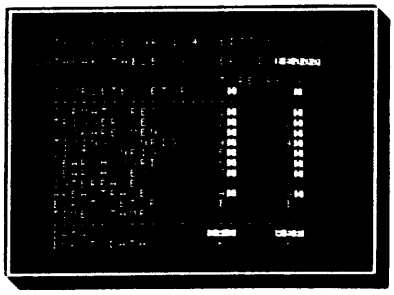
TRIGGER WORD
DEFINITION
PAGE



COMPARE
MENU



OPTION
TABLE



DATA PAK
TABLE

FIGURE 4-7. 64300 MENUS

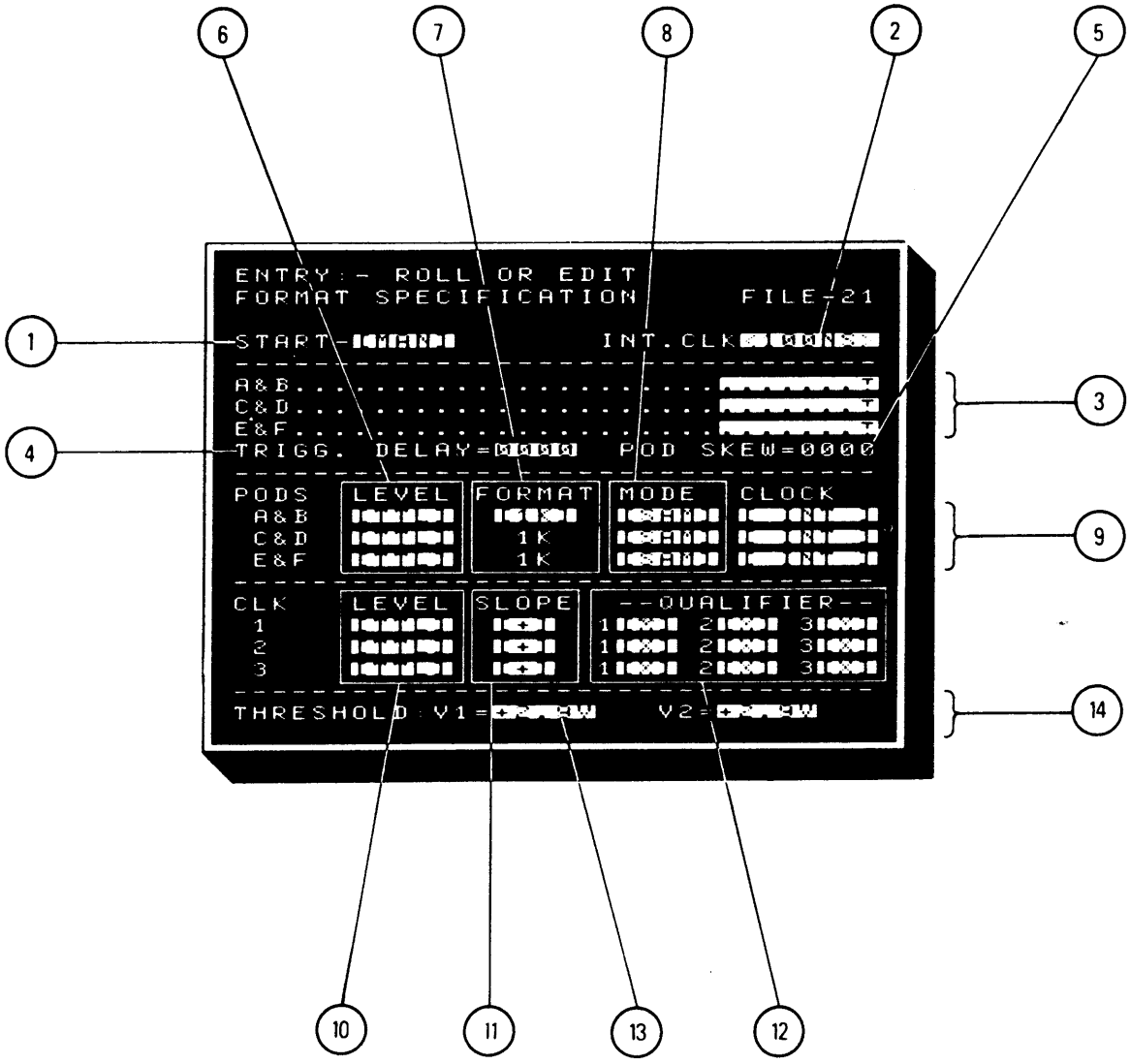


FIGURE 4-8. TRACE MENU

TABLE 4-4. TRACE MENU ELEMENTS

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
1	START		Displays type of recording initialization.
		MAN	Indicates "Manual" mode of data recording.
		REP	Indicates "Repeat" mode of data recording. Subsequent recordings will be initiated automatically after a delay as defined in the "XX Second" field (up to 99 seconds).
2	INT. CLOCK	20ns -500ms	Indicates sample rate of the internal Clock. (pre-selected at 100 ns)
3	(BAR GRAPH)	1K Format 2K Format	Displays in graphic form, the organization of data memory. (See Item No.7)
4	TRIGGER DELAY	0-8192 memory locations	Indicates the defined Trigger word location in data memory. Position is indicated in the Bar Graph with "T".
5	POD SKEW	0-1000 memory locations	Indicates memory location difference (skew) between pods E+F and A+B in 2K mode relative to memory end.
6	LEVEL		Displays type of threshold levels active for each pod group:
		TTL	Transistor-to-Transistor Logic

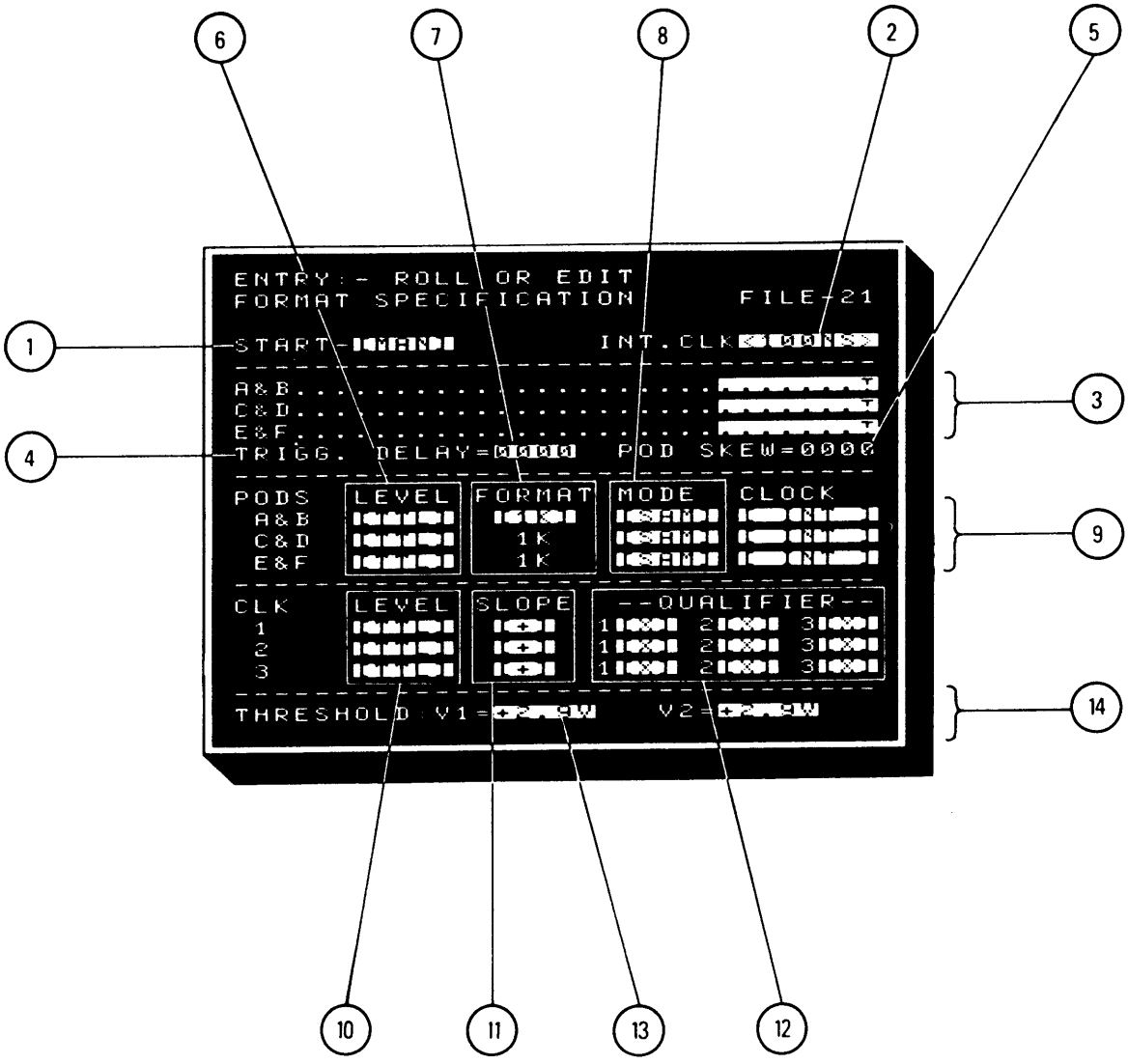


FIGURE 4-8 A. TRACE MENU

TABLE 4-4. TRACE MENU ELEMENTS (continued)

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
		ECL	Emitter-Coupled Logic
		V1	Variable Voltage Threshold 1 (See Item No. 13)
		V2	Variable Voltage Threshold 2 (See Item No. 14)
7	FORMAT		Displays memory format of SBLA's (See Item No. 3)
		1K	48 bit
		2K	32 bit with Pods C + D turned OFF.
8	MODE		Displays recording mode selected for each recording block.
		SAM	Sample Mode.
		LAT	Latch Mode (glitch catching) for Pods A + B only
		OFF	Pod group is turned OFF.
9	CLOCK		Displays clock(s) source active for each pod group.
		*INT	Internal Clock
		C1	External Clock #1
		C2	External Clock #2
		C3	External Clock #3 (E+F only)
		INT + 1	Internal Clock "OR"ed with C1
		INT + 2	Internal Clock "OR"ed with C2 (C+D only)
		INT + 3	Internal Clock "OR"ed with C3 (E+F only)
		C1 + C2	External Clocks #1 + #2 "OR"ed

* Actual order shown is different

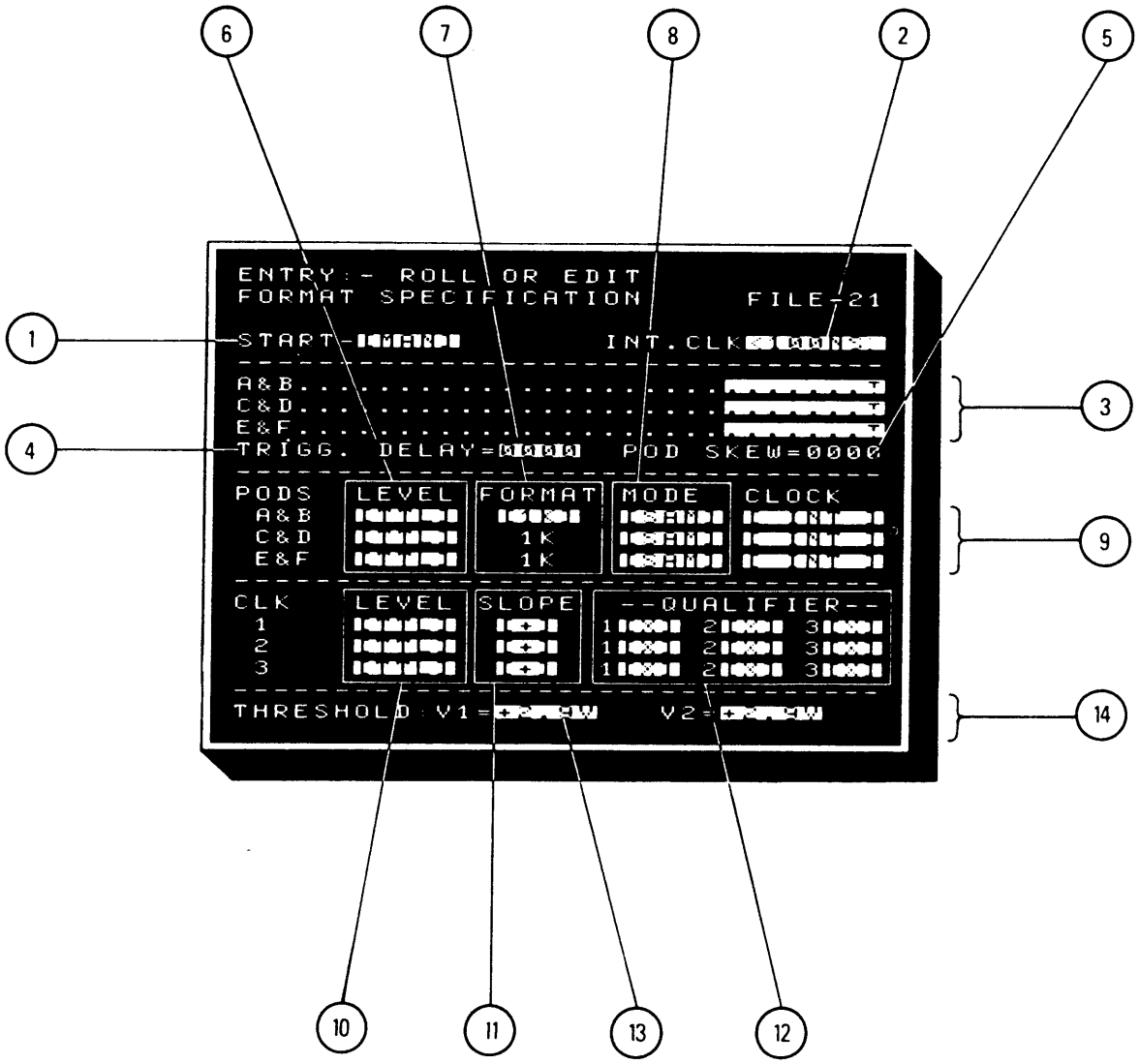


FIGURE 4-8B. TRACE MENU

TABLE 4-4. TRACE MENU ELEMENTS (continued)

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
10	(CLK) LEVEL		Displays logical state of all External Clocks and qualifier inputs. Selectable for entire group.
		TTL	Fixed Transistor-to-Transistor Logic level
		ECL	Fixed Emitter-Coupled Logic level
		V2	Fixed variable threshold voltage 2 level
		V1	Fixed variable threshold voltage 1 level
11	(CLK) SCOPE		Displays active edge of each External Clock.
		+	Active on the rising edge
		-	Active on the falling edge
12	(CLK) QUALIFIER		Displays "Qualified" outputs of each External Clock to enable a clock count
		X	Don't care
		H	Qualifier must be high
		L	Qualifier must be low
13	THRESHOLD: V1	-9.9 V to +9.9 V	Displays the threshold level programmed for variable voltage number 1. Pre-set at 2.9 Volts
14	THRESHOLD: V2	-9.9 V to +9.9 V	Displays the threshold level programmed for variable voltage number 2. Pre-set at 2.9 Volts

* Actual order shown is different

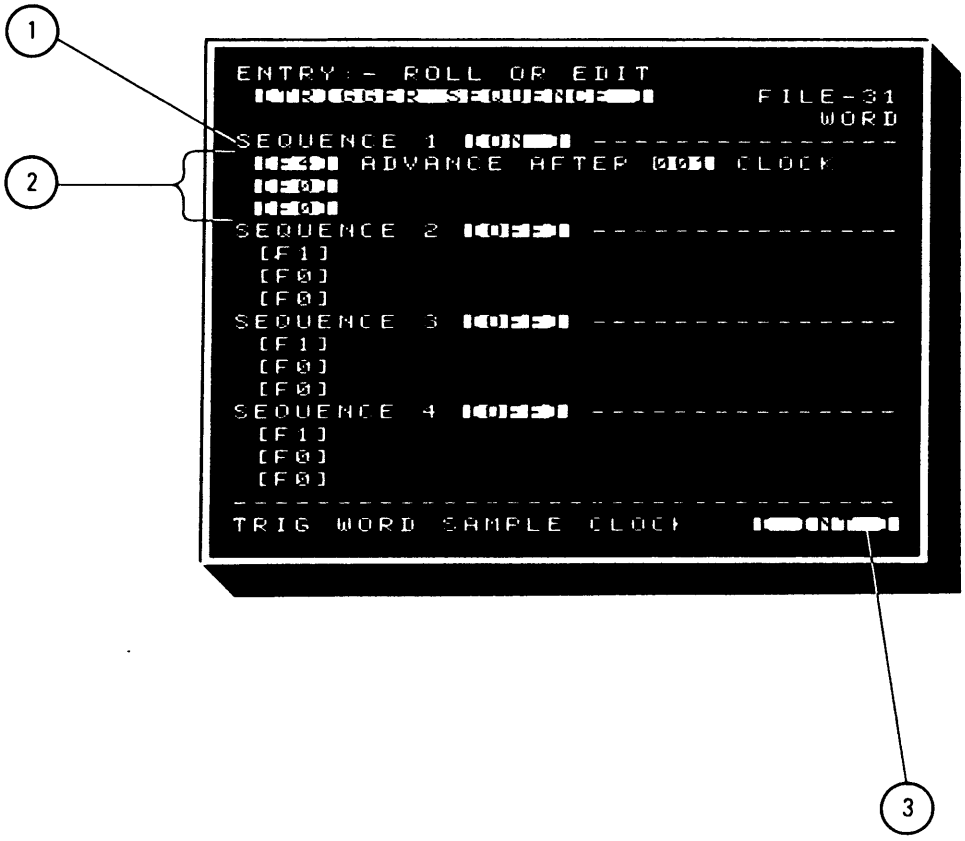


FIGURE 4-9. TRIGGER MENU

TABLE 4-5. TRIGGER MENU ELEMENTS

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
1	SEQUENCE		Indicates Sequence activity
		ON	Indicates that the Sequence is active.
		OFF	Indicates that the Sequence is not active.
2	F	F0-F7	Function indicator for level in sequence. See section 5.3.3, Operating Procedures, of this manual for Function details.
3	TRIG WORD SAMPLE CLOCK		Clock used to scan Trigger words and synchronous sequential triggering. Must be assigned to at least one active (ON) Pod group.
		*INT	Internal Clock
		C1	External Clock #1
		C2	External Clock #2
		C3	External Clock #3
		INT+1	Internal Clock "OR"ed with EXT.CLK 1
		INT+2	Internal Clock "OR"ed with EXT.CLK 2
		INT+3	Internal Clock "OR"ed with EXT.CLK 3
		C1 + C2	External Clocks #1 + #2 "OR"ed

*Actual order shown is different.

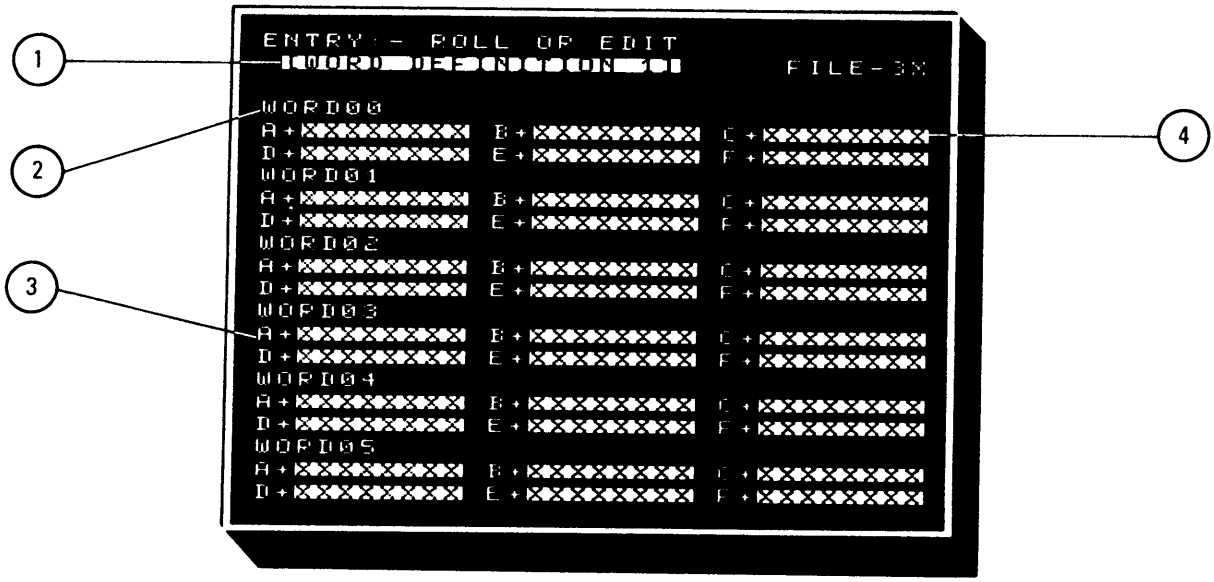


FIGURE 4-10. TRIGGER WORD DEFINITION MENU

TABLE 4-6. TRIGGER WORD DEFINITION MENU ELEMENTS

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
1	WORD DEFINITION		Displays which page of the TRIGGER WORD DEFINITION is active.
		1	Page 1 active
		2	Page 2 active
2	WORD		Displays the Triggerword field
		00-05	Words 00-05, Page 1
		06-11	Words 06-11, Page 2
3	A-F		Displays Pod Group(s) for Triggerword programming
		+	Positive Polarity
		-	Negative Polarity
4	(WORD CONFIGURATION)		Displays Triggerword configuration programmed.
		BIN	Binary assignment of Triggerword values.
		HEX	Hexadecimal assignment of Triggerword values.
		OCT	Octal assignment of Triggerword values.
		X	Don't Care
		1	Logical One (In Binary)
		0	Logical Zero (In Binary)

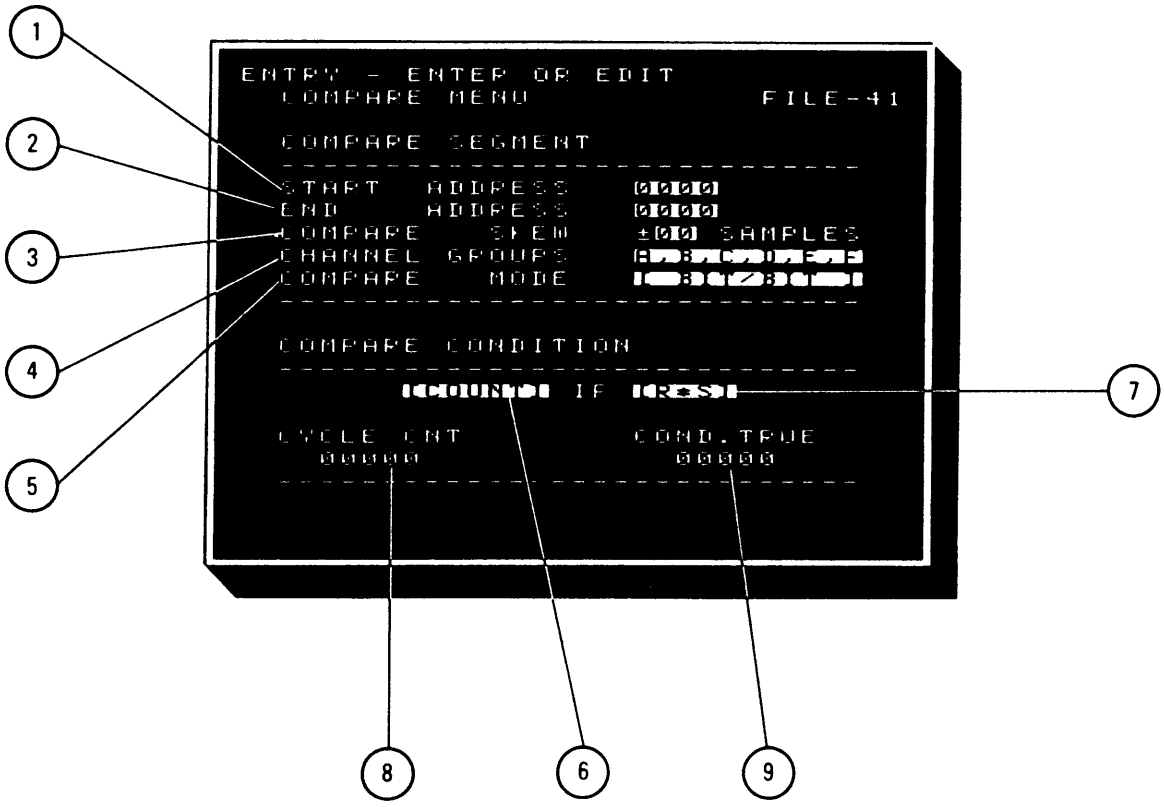


FIGURE 4-11. COMPARE MENU

TABLE 4-7. COMPARE MENU ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	START ADDRESS	0-0999 Memory locations in 1K Format 0-1999 Memory locations in 2K Format	Displays the memory location where the compare mode begins in the internal memory
2	END ADDRESS	0-0999 Memory locations in 1K Format 0-1999 Memory locations in 2K Format	Displays the memory location where the compare mode ends in the internal memory.
3	COMPARE SKEW	+/-0-99 Memory locations	Displaysthe tolerance area for error (or data mismatch) around every programmed location of the Reference Memory, as compared to the Source Memory. This is expressed as + or - "XX" Samples.
4	CHANNEL GROUPS	A - F	Displays the Pod Groups active in the Compare mode.
5	COMPARE MODE		Displays the type of Comparison activity to be done.
		BIT/BIT	Indicates comparison between the Reference Memory and Source Memory is on a Bit-by-Bit basis, within the tolerance area programmed.

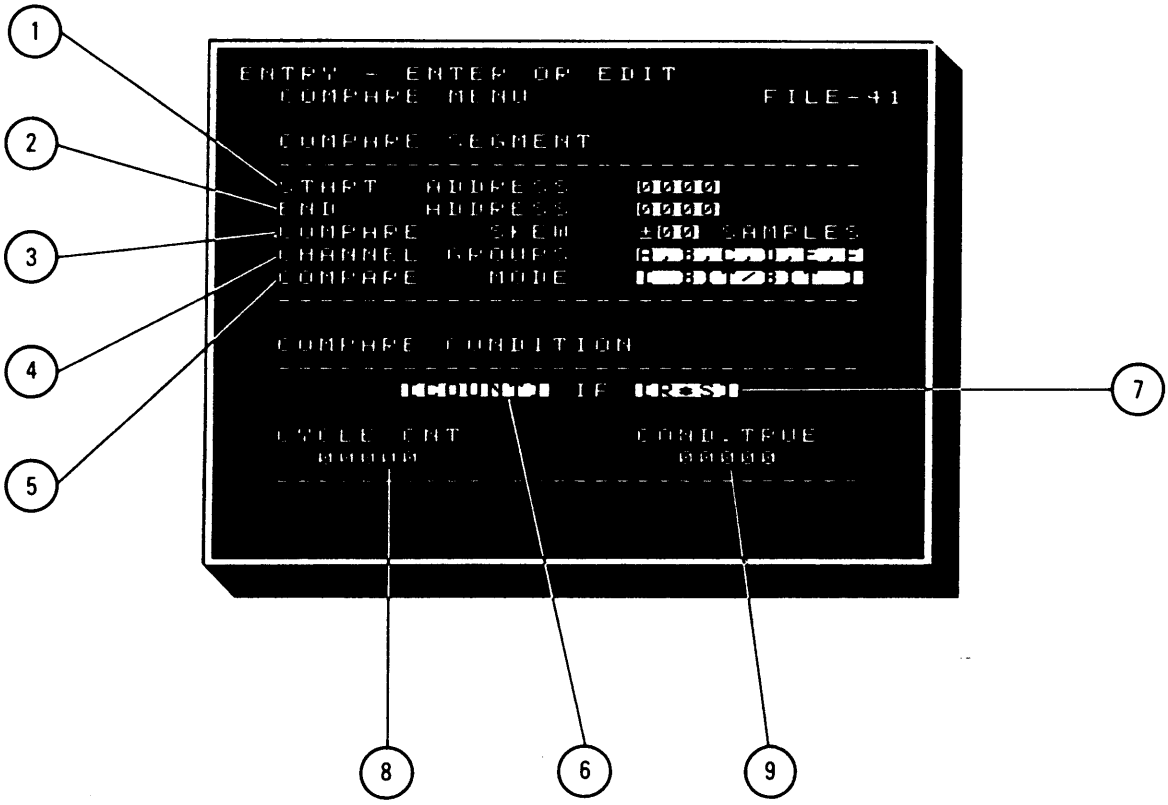


FIGURE 4-11A. COMPARE MENU

TABLE 4-7. COMPARE MENU ELEMENTS (continued)

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
		BYTE/BYTE	Indicates comparison between the Reference Memory and Source Memory is on a Word-by-Word basis within the tolerance area programmed.
6	COMPARE CONDITION	COUNT	Indicates that the analyzer will increment the "Condition True" counter if a programmed condition is met.
		HALT	Indicates that the analyzer will stop if a programmed condition is met.
7	COMPARE CONDITION	R = S	Indicates that the Reference Memory data must be equal to the Source Memory data to satisfy a compare condition.
		R ≠ S	Indicates that the Reference Memory data must not be equal to the Source Memory data to satisfy a compare condition.
8	CYCLE CNT (XXXX)		Displays the number of times the Cycle Counter has been incremented at every recording during the compare mode.
9	COND. TRUE (XXXX)		Displays the number of times a preprogrammed compare condition is true during a recording.

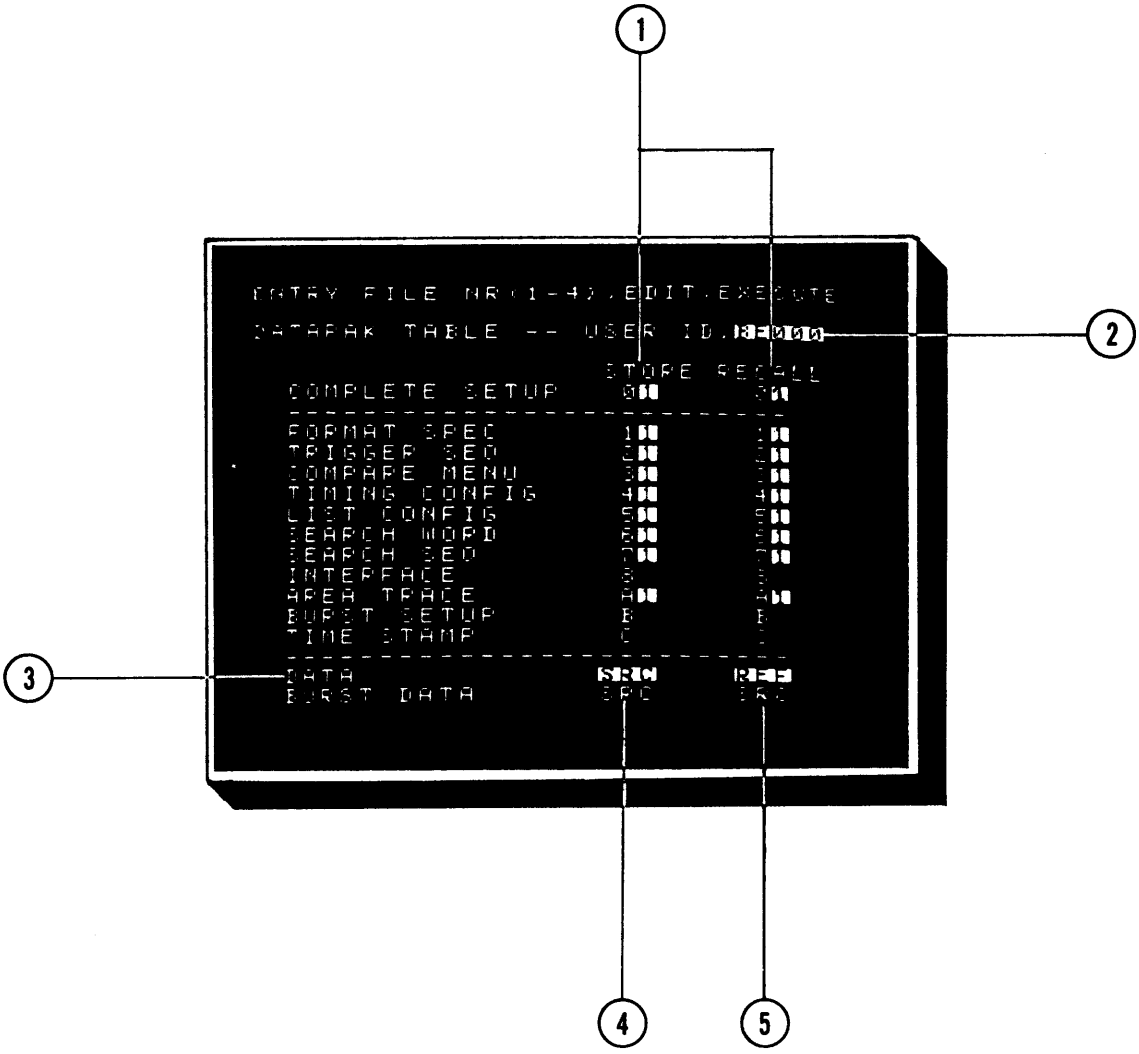


FIGURE 4-12. DATAPAK TABLE

TABLE 4-8. DATAPAK TABLE ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	STORE		Displays file number selected for storage of each type of file.
	RECALL		Displays file number selected for recall of each type of file.
		1-4 files each type	List of the type of files to be stored or recalled.
2	USER ID	0-9 A-F	Allows the user to assign a unique combination of alpha numerics for the DataPak contents.
3	DATA	SRC	Indicates data is being stored from source memory to the Data Pak.
		REF	Indicates data is being recalled from the DataPak to the Reference Memory.
4	BURST DATA (STORE)	SRC	Indicates that Burst Data (300 MHz) is being stored from Source Memory to the DataPak.
5	BURST DATA (RECALL)	SRC	Indicates that data is being recalled from the DataPak to the Source Memory.

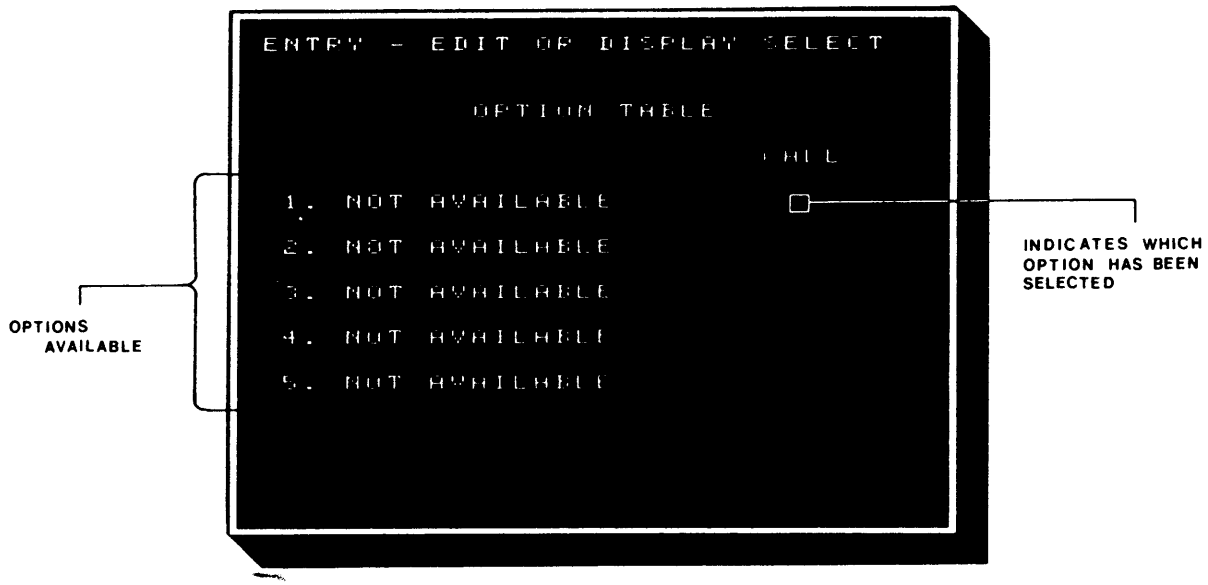


FIGURE 4-13. OPTION TABLE

4.4 DISPLAYS

The 64300 features six displays associated with the Data Analysis Mode of operation:

- Timing Diagram
- Timing Diagram Word Search
- Timing Diagram Sequence Search
- 300 MHz Burst Memory Display
- List Display
- List Display Sequence Search

Figure 4-14 shows the means to access these displays.*

The list below indicates the figure and table number describing it, for each display in the following section.

DISPLAY	FIGURE	TABLE
TIMING DIAGRAM	4-16	4-9
SEQUENCE SEARCH	4-17	4-10
TIMING DIAGRAM WORD SEARCH	4-18	4-11
300 MHZ BURST MEMORY DISPLAY	4-19	4-12
LIST DISPLAY	4-20	4-13
LIST DISPLAY WORD SEARCH	4-21	4-14

4.5 MONITORS

The 64300 features three types of monitors of system operation:

- Trace/Trigger Monitor
- Valid Set-up
- Set-up Check Results

Figure 4-15 shows the means to access these displays.

Figure 4-22 shows an illustration of the Trace/Trigger Monitor, and Table 4-15 describes its elements. Figure 4-23 shows some typical examples of the Set-up Monitors.

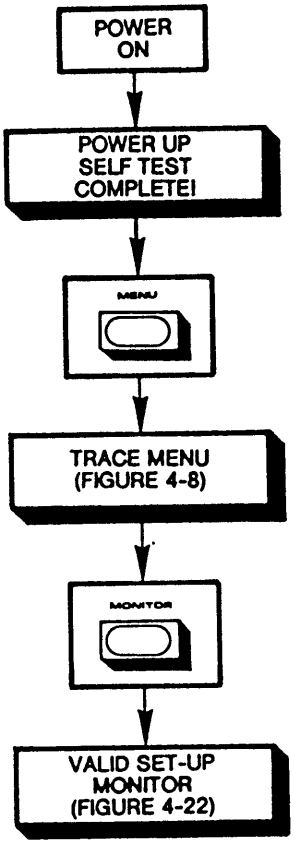


FIGURE 4-15. MONITOR ACCESS

*See Section 5.5.4 for 300MHz Burst Memory Option display access.

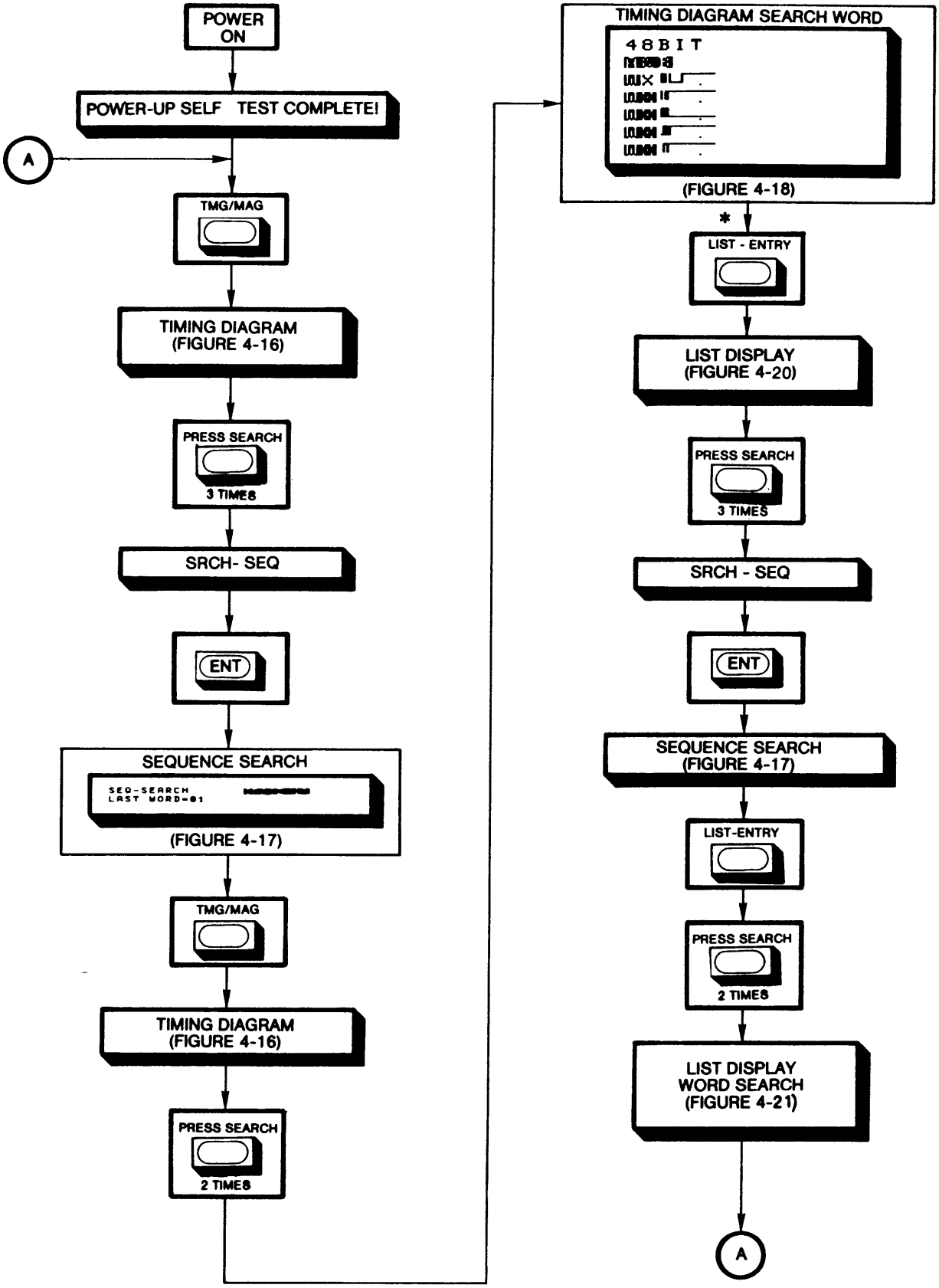


FIGURE 4-14. DISPLAY ACCESS

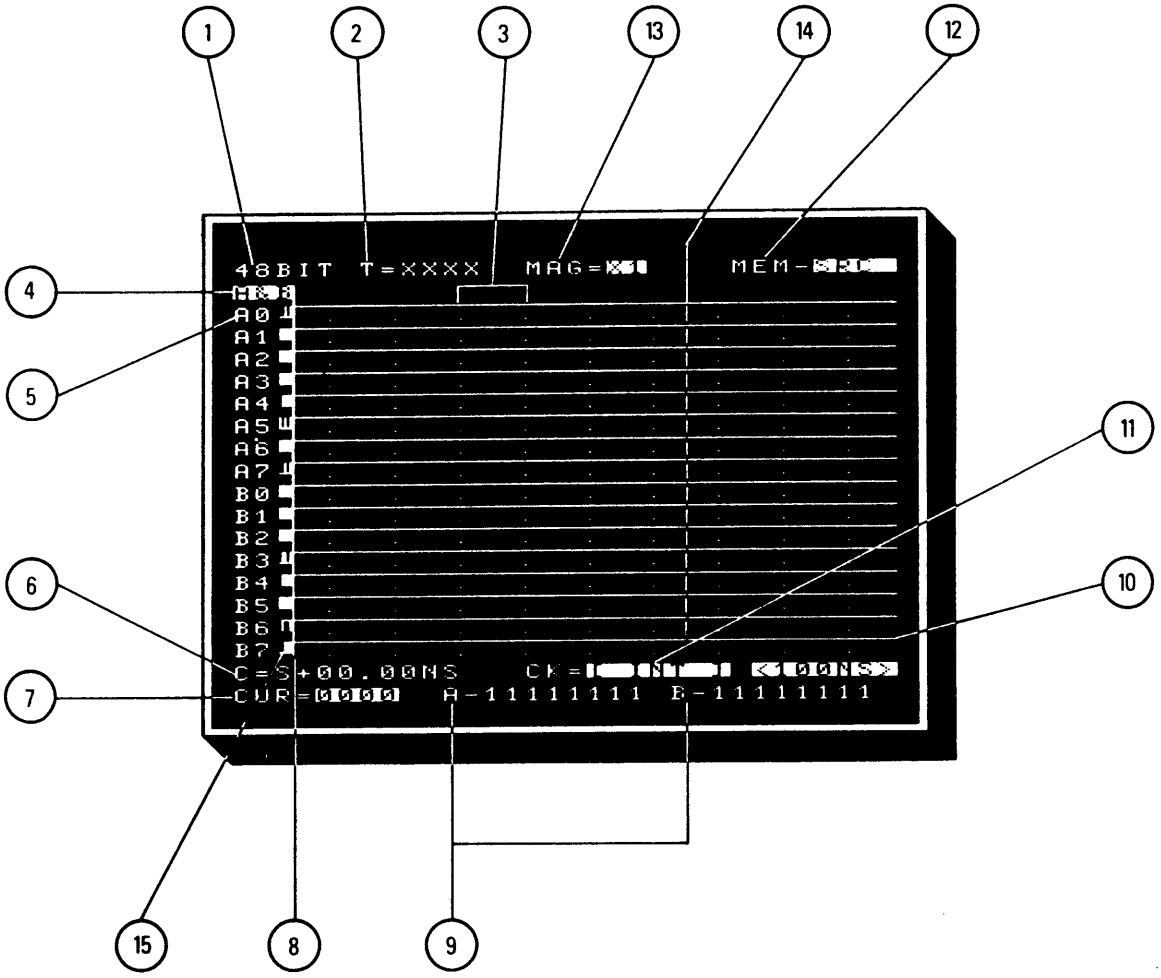


FIGURE 4-16. TIMING DIAGRAM

TABLE 4-9. TIMING DIAGRAM ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	(RECORDING FORMAT)		Displays the recording format used.
		48 BIT	Indicates that all SBLA's were configured for 16 channels X 1K words of memory during recording.
		32 BIT	Indicates that Pod Group A + B was configured for 16 channels X 2K words of memory, while Pod Group E + F was configured for 16 channels X 1K words of memory during recording.
2	T =	0-999 (48 Bit) 0-1999 (32 Bit) XXXX	Displays the programmed Trigger word location. Represents the maximum of locations minus the trigger delay. "XXXX" indicates that the Trigger word is outside the memory or that there is no Trigger.
3	(TIMING MARKERS)		Indicates 100 memory locations in 1K Format mode, and 200 locations in 2K Format.
4	(POD GROUP LABEL)	A + B C + D E + F	Indicates TIMING DIAGRAM displayed for a selected Pod group.
5	(CHANNEL NAME)		Indicates channel or word name of group displayed.

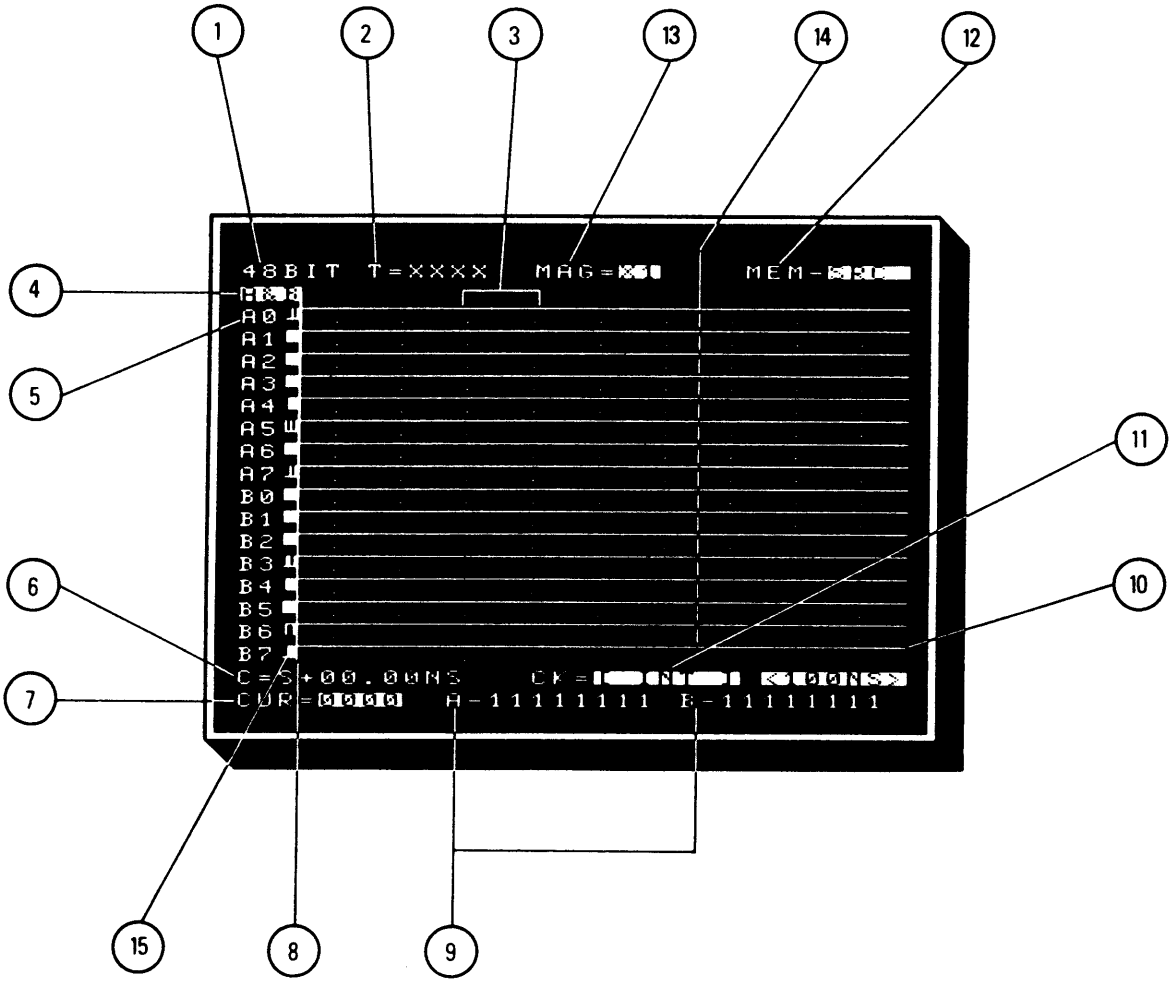


FIGURE 4-16A. TIMING DIAGRAM

TABLE 4-9. TIMING DIAGRAM ELEMENTS (continued)

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
6	C = S (+/-) XXXX		Displays the time measurement expressed as the difference between the actual cursor position and the Set point.
7	CUR = XXXX		Displays actual cursor position.
8	(CURSOR LINE)		Indicates the cursor position for all channels (Pod groups) displayed.
9	(BINARY INFORMATION)		Displays the logical state of each channel for the Pods displayed in Binary.
10	(LOGIC STATE)		Displays the logical state of each channel as "High" or "Low".
11	CK = XX	INT<XXX> C1 INT + <XXX> C1 + C2	Displays the Clock selected for recording. Also displays sample rate of Internal Clock. Pre-set at 100 ns at power-on.
12	MEM		Displays the type of Memory function selected for analysis.
		S R C S + R S -> R	Source Memory Source and Reference ("OR") Source assigned to Reference

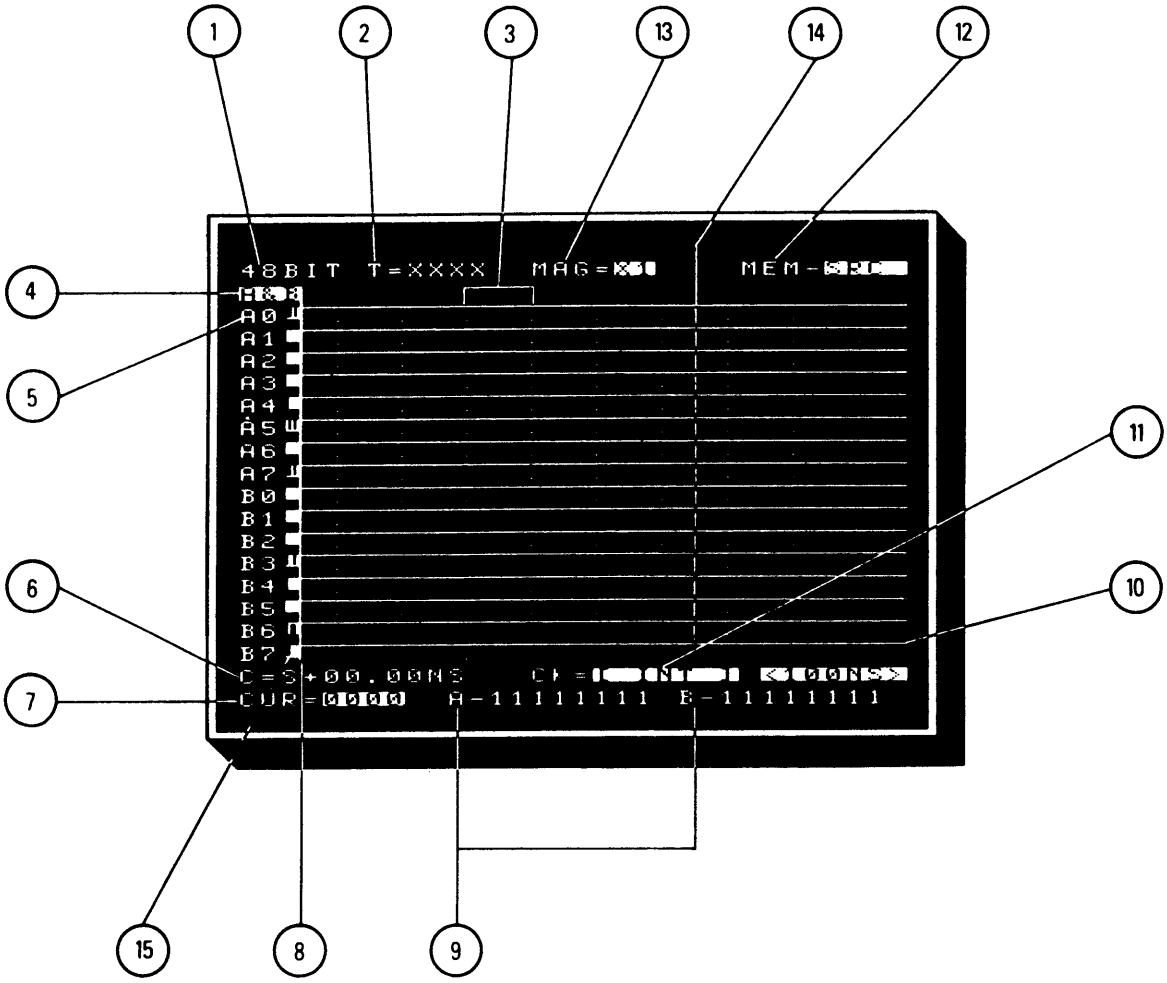


FIGURE 4-16B. TIMING DIAGRAM

TABLE 4-9. TIMING DIAGRAM ELEMENTS (continued)

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
	SRCH		Displays the type of Search function selected for analysis.
		S = R	Source is equal to Reference Memory
		S ≠ R	Source not equal to Reference Memory
		S E Q	Sequential Word Search
		W O R D	Word Search
13	MAG	X1 X5 X10 X20	Displays the "Magnification" level selected for the TIMING DISPLAY.
14	(TRIGGER WORD MARK)		Non-moving vertical line that indicates the Triggerword location.
15	(RANDOM DATA)		These are the first 24 data locations used by software for internal functions. These locations are not accessible by the user.

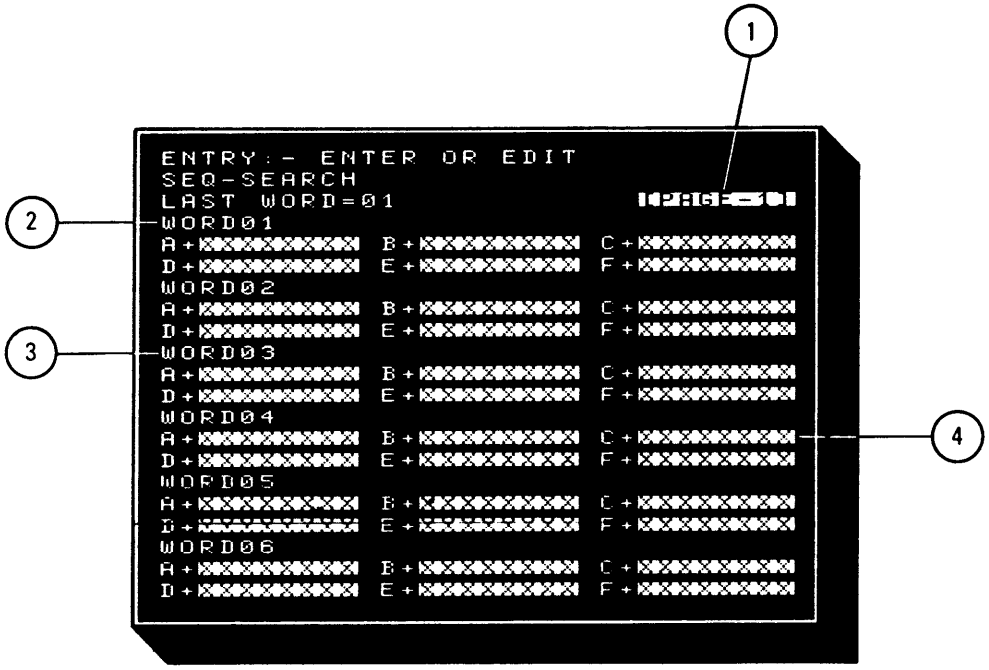


FIGURE 4-17. SEQUENCE SEARCH MENU

Table 4-10 SEQUENTIAL SEARCH DISPLAY ELEMENTS

ITEM NO.	FIELD HEADING	PARAMETERS	DESCRIPTION
1	PAGE		Displays which page of the SEQUENCE SEARCH DISPLAY is active.
		1	Page 1 active.
		2	Page 2 active.
2	WORD		Displays the Triggerword field.
3	A - F		Displays Pod Group(s) for Triggerword programming.
4	(WORD CONFIGURATION)		Displays Triggerword configuration programmed.
		BIN	Binary assignment of Triggerword values.
		HEX	Hexadecimnal assignment of Triggerword values.
		OCT	Octal assignment of Triggerword values.
		X	Don't Care
		1	Logical One (In Binary)
		0	Logical Zero (In Binary)

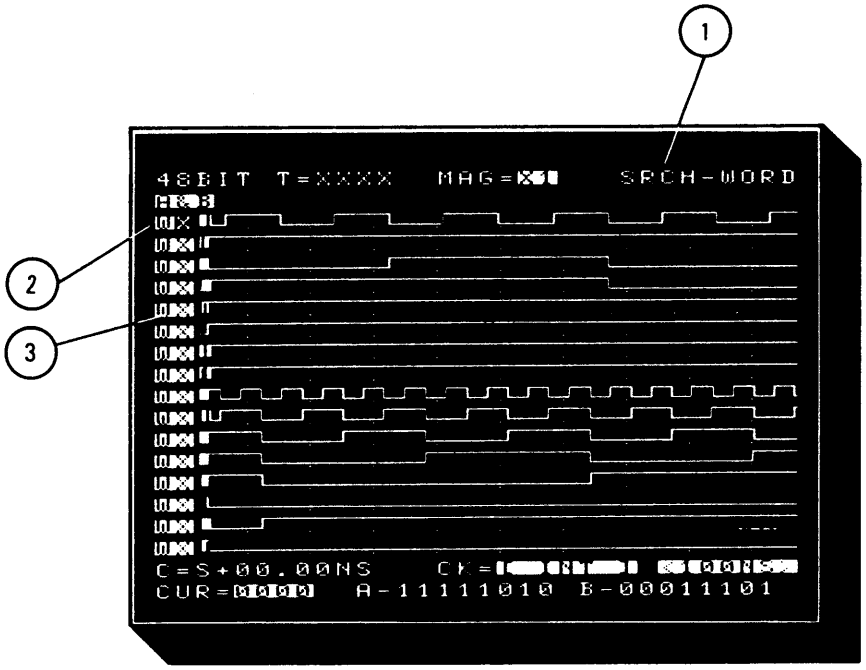


FIGURE 4-18. TIMING DIAGRAM WORD SEARCH

Table 4-11. TIMING DIAGRAM SEARCH WORD DISPLAY ELEMENTS *

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	SEARCH	WORD	Indicates that the "WORD" search for TIMING DISPLAY is selected.
2	W		"WORD" configuration marker
3	X		Blinking cursor shows current value inputed.
		1	Logical "1"
		0	Logical "0"
		X	Don't Care

* All other elements are the same as in the TIMING DIAGRAM (See Figure 4-16).

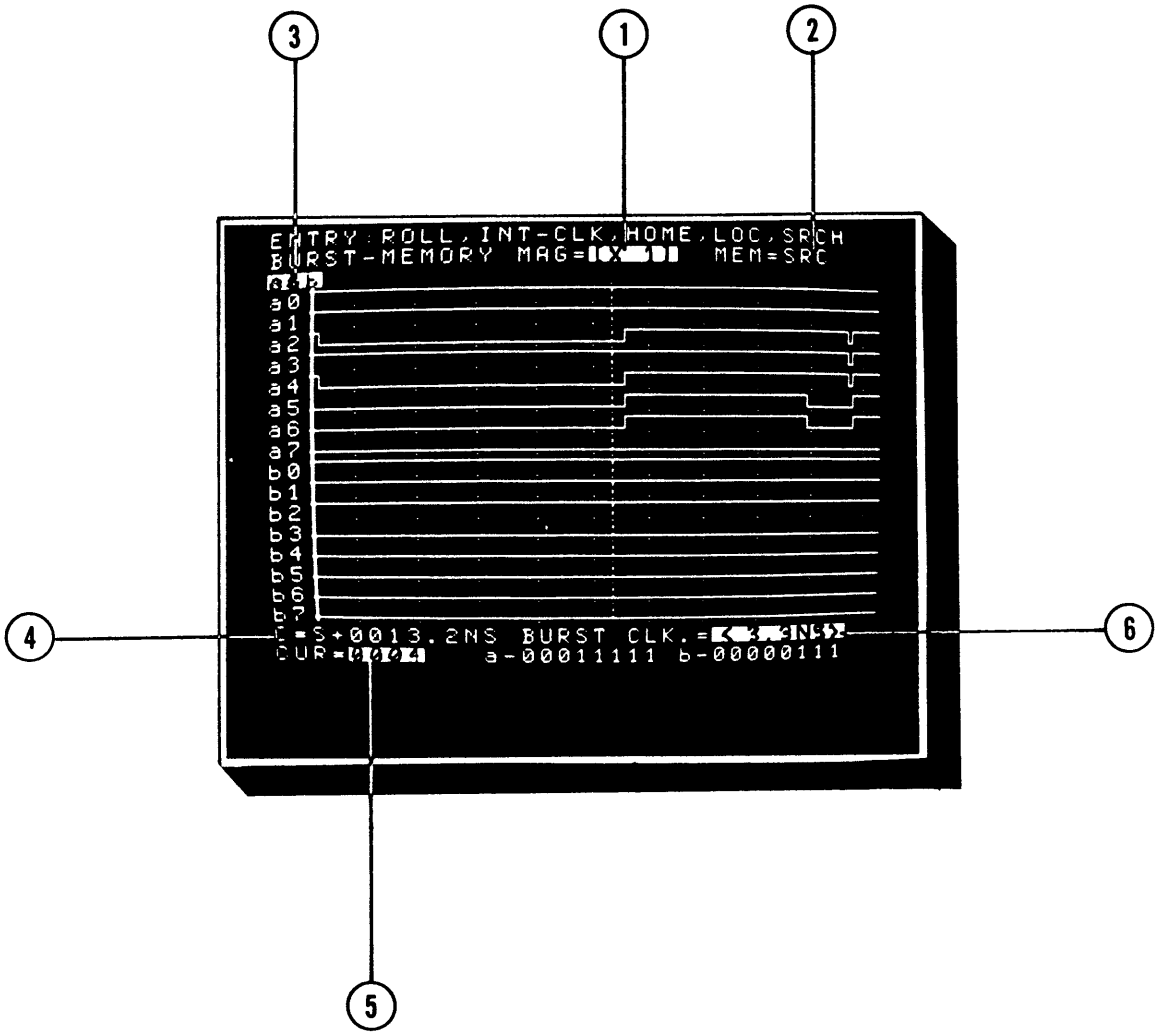


FIGURE 4-19. 300MHz BURST MEMORY DISPLAY

TABLE 4-12. 300 MHZ BURST MEMORY MENU ELEMENTS

LOC COR	FIELD HEADING	DESCRIPTION
1	X1, X5, X10	
2	MEM = SRC	Only Source available (standard). (S+R, S->R are options).
	SCH = Word	Search Word only
3	a + b	Channel arrangement - within pod a + b.
4	C = S ± XXXX ns	Time measurement depending on Dual Time Base.
5	Cursor Position	Indicates the cursor position for all channels (pod groups) displayed.
6	Time Base	3.3 ns...10 ms. Preset at 3.3 ns (300 MHz) at power-up.

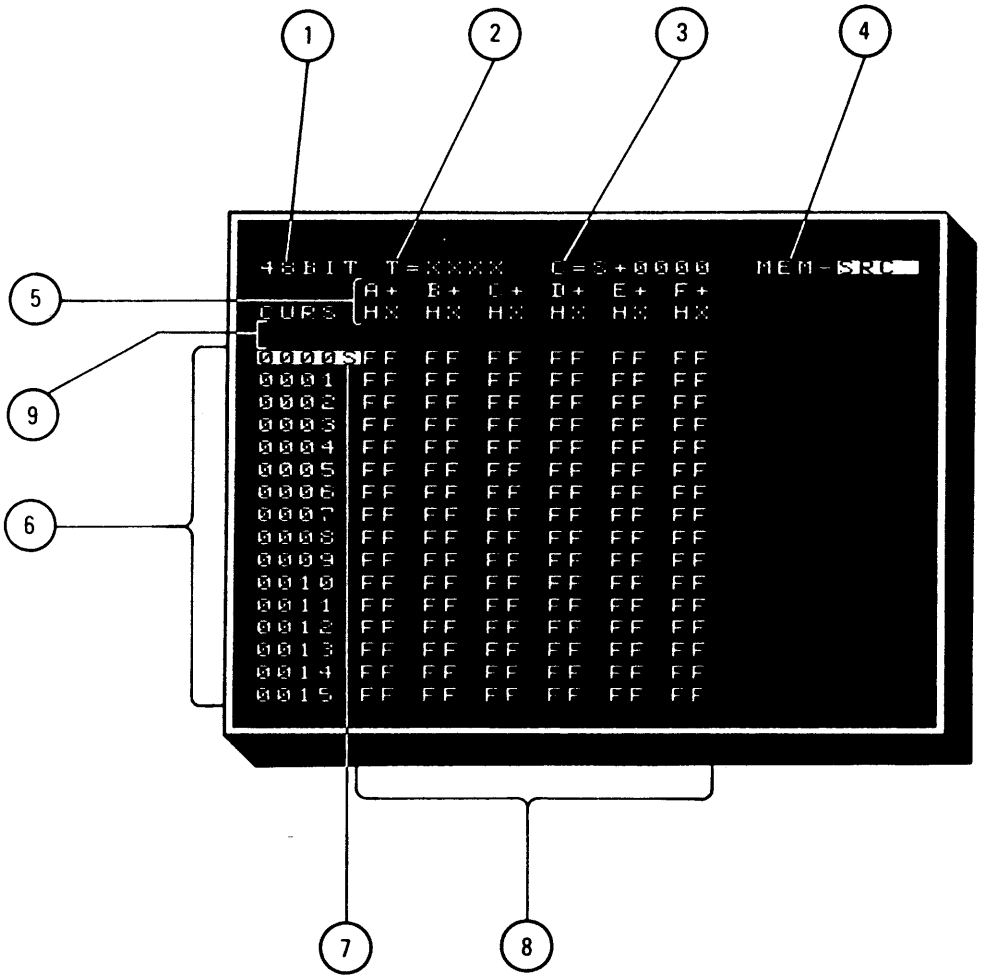


FIGURE 4-20. LIST DISPLAY

TABLE 4-13. LIST DISPLAY ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	XX BIT	48 BIT 32 BIT	Displays recording mode used during the last recording.
2	T = XXXX		Displays programmed Triggerword location. See Table 4-9, Item 2.
3	C = S (+/-)XXXX		Displays memory location expressed as the difference between the present memory location and the set point selected.
4	MEM	SRC REF R+S S+R S->R	Displays the type of Memory function selected for analysis.
	SRCH	S=R S≠R SEQ WORD	Displays the Search function selected for analysis.
5	(POD GROUP SELECT)		Displays the following information: 1) Pod group active 2) Polarity of Pod group 3) Number base of Pod group
6	CURS		Shows actual memory addresses of the analyzer.
7	S		Displays the present "Set" point selected.

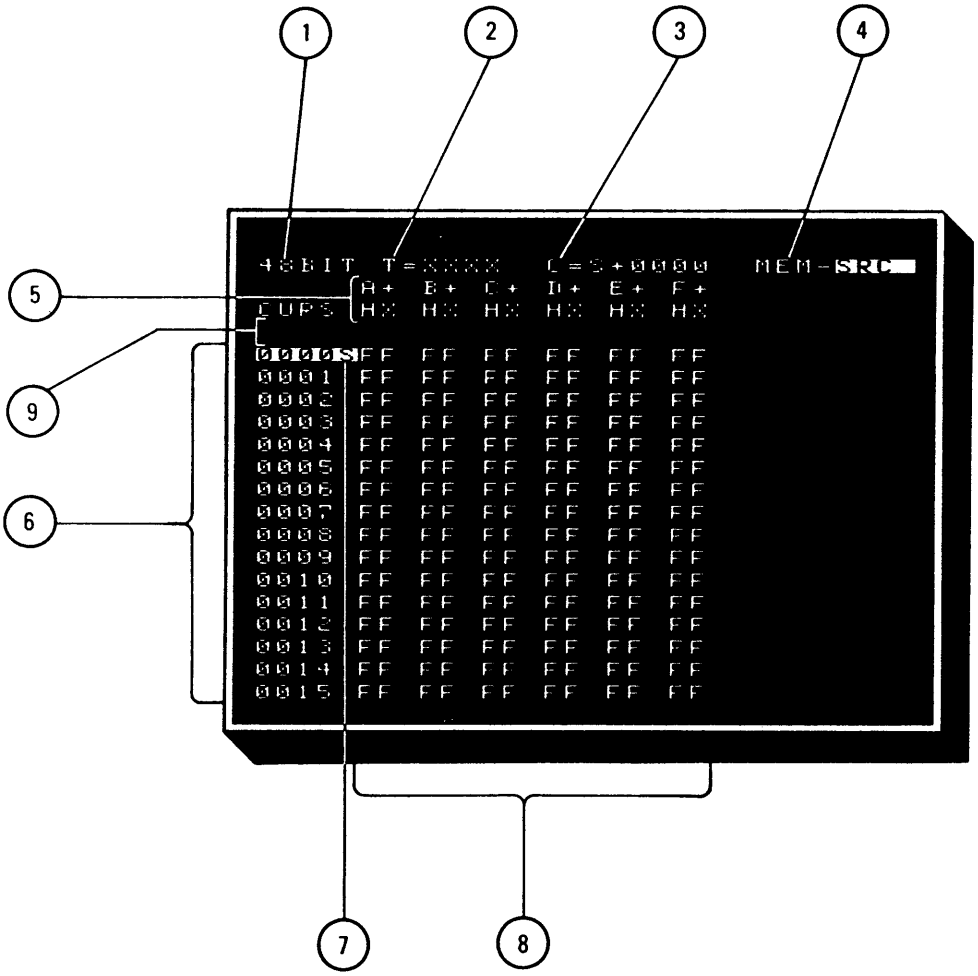


FIGURE 4-20A. LIST DISPLAY

TABLE 4-13. LIST DISPLAY ELEMENTS (continued)

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
8	(GROUP DATA)		Displays selected contents of all data recorded for each active Pod group.
9	(CHANNEL ARRANGEMENT MONITOR)		Used to add or change a desired channel. Appears if "HOME" pushbutton is pressed.

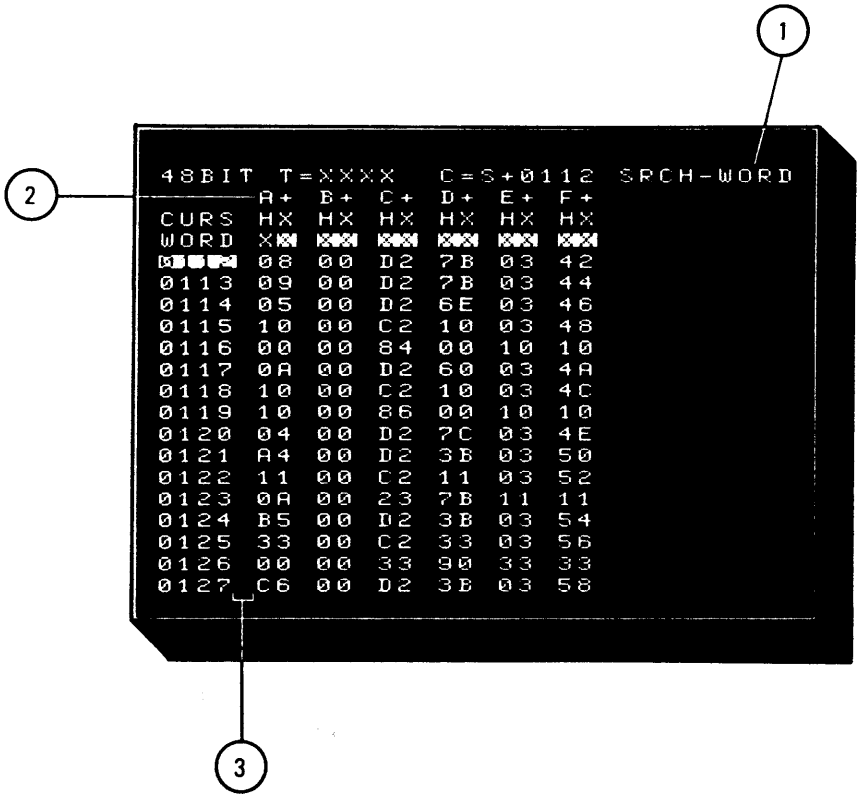


FIGURE 4-21. LIST DISPLAY WORD SEARCH AND SEQUENTIAL SEARCH

TABLE 4-14. LIST DISPLAY WORD SEARCH AND SEQUENTIAL SEARCH ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	SEARCH	WORD SEQ	Indicates that the Search function is selected for the LIST DISPLAY.
2	(WORD ENTRY FIELD)	XX	Words for Word Search are entered in this field.
3	(EVENTS)	>	Column that indicates occurrences of Search events with the "greater than" sign after the sequential search is ended. The first blinking symbol indicates the beginning of the string.

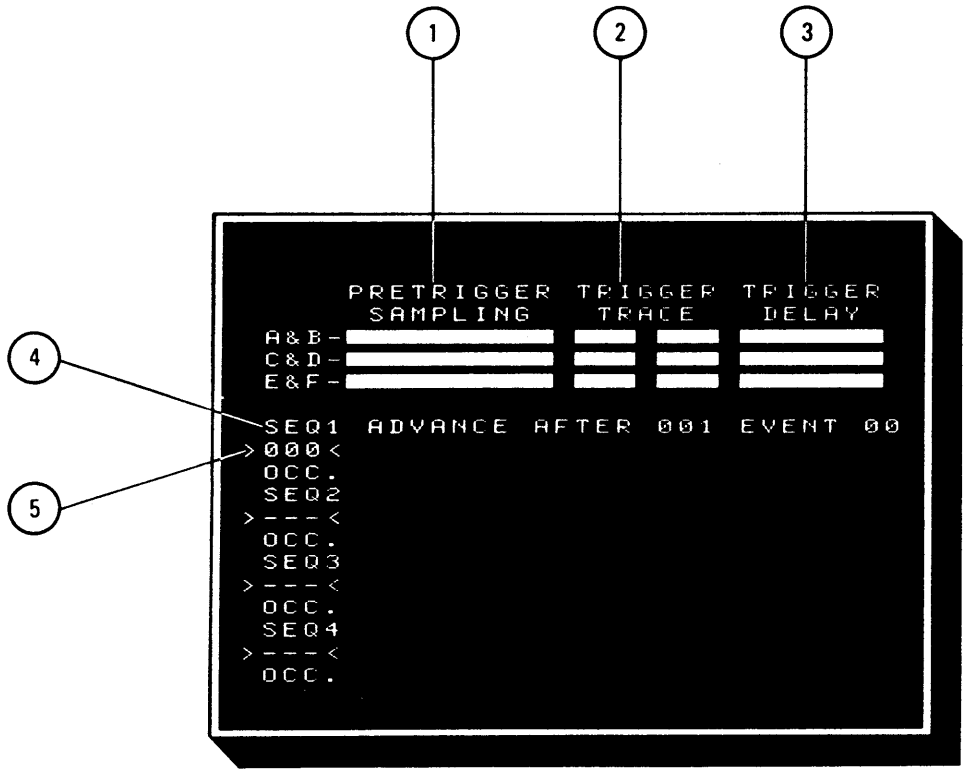
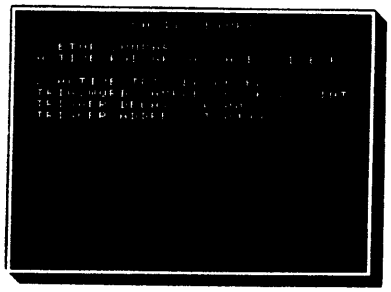
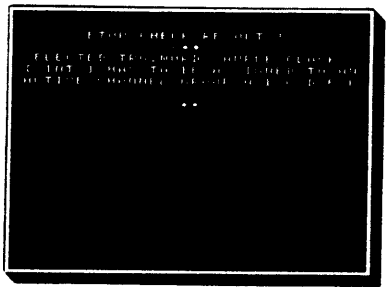


FIGURE 4-22. TRACE / TRIGGER MONITOR

TABLE 4-15. TRACE/TRIGGER MONITOR ELEMENTS

LOC COR	FIELD HEADING	PARAMETERS	DESCRIPTION
1	PRETRIGGER SAMPLING		Indicates the Pre-trigger Sampling activity for each memory block during recording.
2	TRIGGER TRACE		Indicates the Trigger Trace activity for each memory block during recording.
3	TRIGGER DELAY		Indicates the Trigger Delay activity for each memory block during recording.
4	SEQ X		Displays the sequence and level function activity in the TRIGGER MENU.
5	>XXX< OCC.		Indicates the number of occurances of a particular event as programmed in the TRIGGER MENU during the Trigger Trace activity.





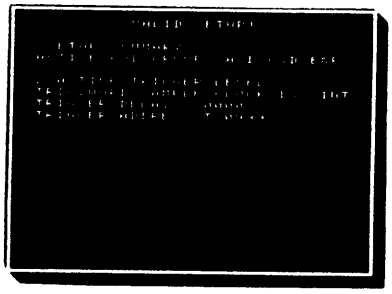


FIGURE 4-23. SET-UP MONITOR DISPLAYS

SECTION 5

OPERATING PROCEDURES

5.1 GENERAL

This section describes detailed operating procedures for the following modes of 64300 operation:

- Pre-Record Programming
- Data Recording
- Data Analysis
- File Manipulation

Operating procedures for menus and displays used to control parameters are presented on a theoretical basis and as specific procedures (generally in a flowchart form).

NOTE

Refer to Figure 5-1, Overall Functional Family Tree at the end of this section. This figure is on fold-out sheets that provide easy reference to all functions available for the various displays and menues, and where to locate a description of them in this section.

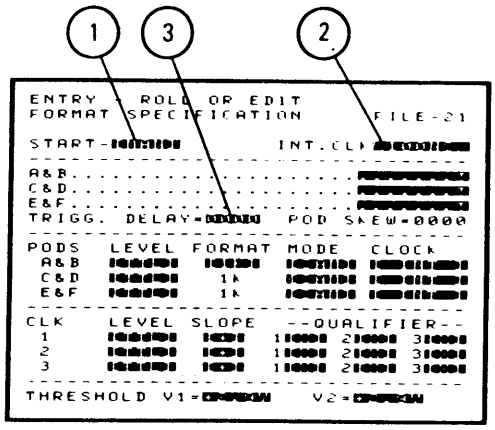
5.2 BASIC PROGRAMMING RULES

Programmable and selectable parameters are shown in inverse video, and are located in the menues and displays in what are called "fields". When a field is active it blinks off and on, indicating the present cursor position in the menu or display. There are a number of ways to program parameter fields. Figure 5-2 shows the types of parameter inputs listed below:

- Bracket Input Types 1
- Range Selection Input Types 2
- Non-Bracketed Input Types 3

5.2.1 Bracket Input Types

Refer to Figure 5-3 for Bracket Input Types. These are Group Controls before parameters are selected by pressing (or pressing and holding) the "ROLL" pushbutton.



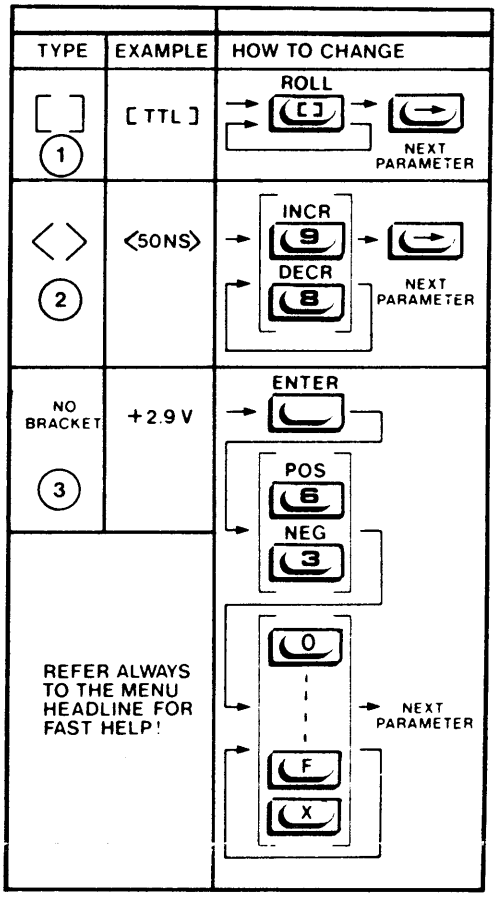


FIGURE 5-2. INPUT TYPES

5.2.2 Range Selection Input Types

Refer to Figure 5-4 for Range Selection Input Types. These are represented by those fields enclosed in "less than" and "greater than" signs. The cursor must be set to the desired field before increments of pre-set values may be selected by pressing (or pressing and holding) the pushbuttons labelled "9" (increment) or "8" (decrement). In the detailed procedures that follow, the allowable ranges are given.

5.2.3 Non-Bracketed Input Types

The Non-Bracketed Input Types are represented by fields that follow different forms. One form allows for input of digital information with the "ENTER" pushbutton before and after numbers entered. (The Cursor field needs other pushbuttons like the "LOC-entry" for initial input). Another form allows numerical or other symbolic entry without use of the "ENTER" pushbutton. For this form, it may only be necessary to advance the cursor to the desired field and input program data.

Figure 5-5A shows Non-Bracketed Input Types, and the procedure to be used with the "ENTER" pushbutton. Figure 5-5B shows Non-Bracketed Input Types, and the procedures to be used for those fields that do not require the "ENTER" pushbutton before or after selection of input data.

5.2.4 How To Reach Parameters

Movement of the blinking cursor during menu programming is controlled by the cursor pushbuttons in the "EDIT Group" of the keyboard. (See Figure 4-5 and Table 4-3). Pressing a pushbutton sends the blinking cursor to the next possible field in the direction chosen. The "HOME" pushbutton sends the cursor immediately back to the first programmable field in the upper part of the menu or display. See Figure 5-6 for details on the line structure and cursor controls.

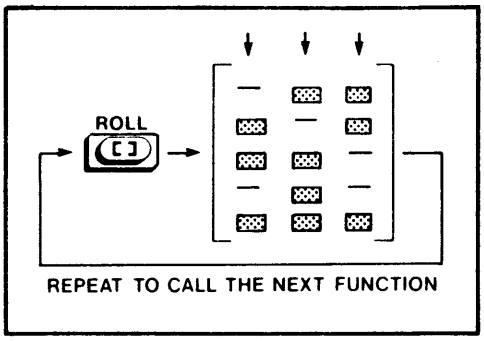
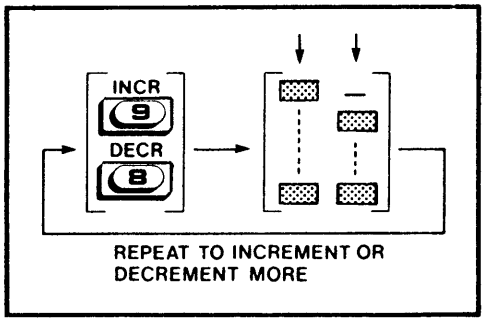
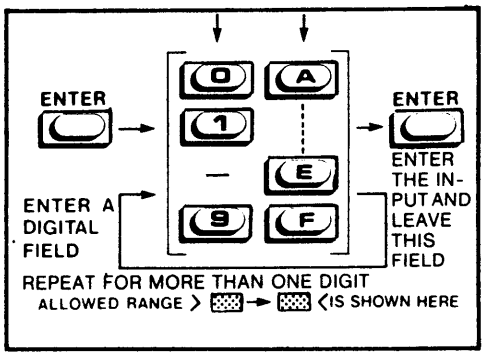


FIGURE 5-3. BRACKET TYPE INPUTS



A FIGURE 5-4. RANGE SELECTION INPUT TYPES



B

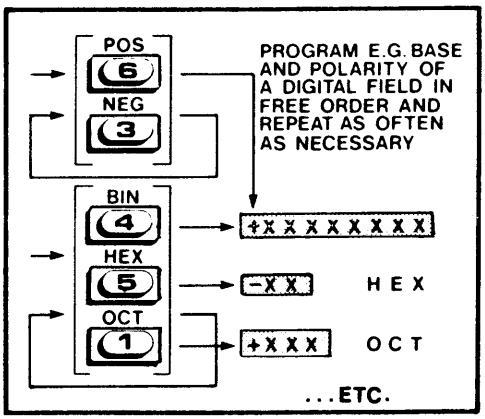


FIGURE 5-5. NON-BRACKET INPUT TYPES

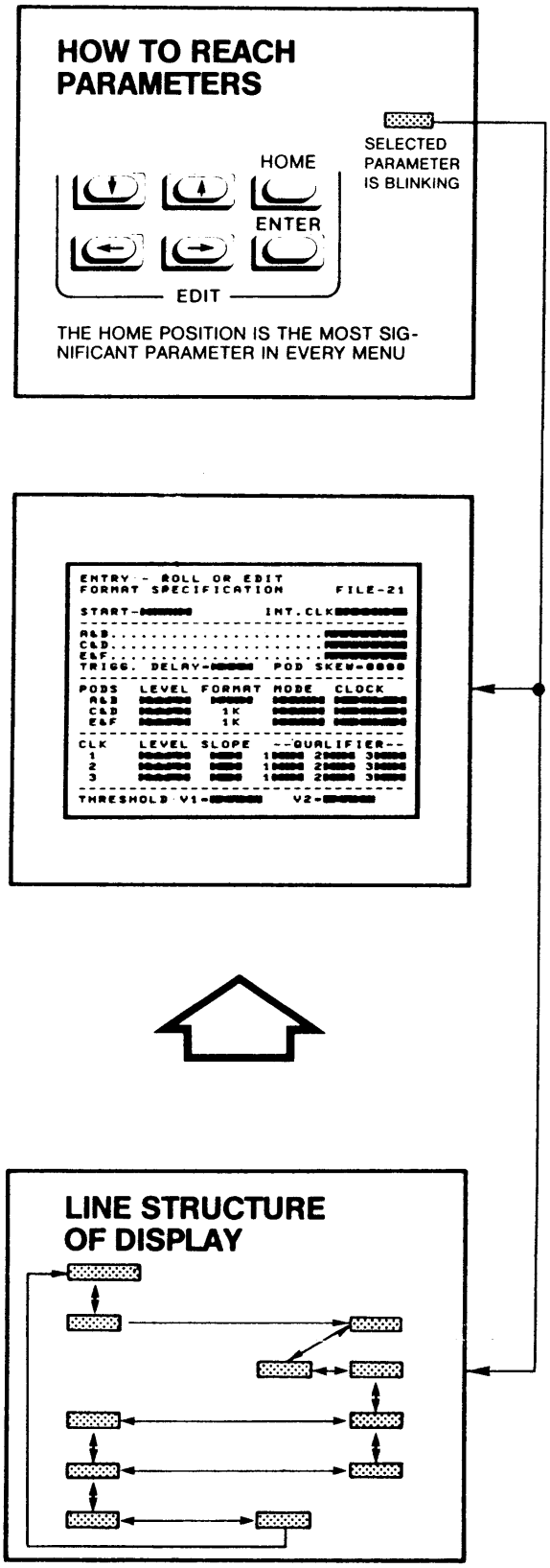


FIGURE 5-6. HOW TO REACH PARAMETERS

5.2.5 How To Call Menus and Displays

Refer to Figure 5-1 at the end of this section, Overall Functional Family Tree for an illustration of how to call menues and displays. These can be called after the "Pre-Power Self Test Complete" is displayed on the CRT.

5.3 PRE-RECORD PROGRAMMING MODE

In the Pre-Record Programming Mode, the recording parameters of the analyzer are given as a set of instructions on Menues. The 64300 uses a tiered structure for programming these instructions. There are several functions associated with this mode. Each one provides a subset of instructions that are independent, starting from a high level and ending in a bit-to-bit lower level. The first instruction set represents the Trace Function (accessed by the TRACE MENU), which sets up the major parameters of the recording. With it, the user provides what amounts to the "rules of play" for the analyzer. The second instruction set represents the Trigger Function (accessed by the TRIGGER MENU), which defines the sequence of trigger activity, as well as specific commands to be carried out in each sequence. Associated with the TRIGGER MENU (on a further, more detailed level) are two "pages" called TRIGGER WORD DEFINITIONS that allow the user to specify the exact words the analyzer is expected to find. Thus the tiered structure is organized from the general to the specific, and finally, to the detailed level of programming possibilities.

The Pre-Record Programming Mode also features several other functions that help organize data recording. The first of these is the Compare Function (accessed only when the COMPARE MENU is displayed), which allows the analyzer to compare certain aspects of a previous recording with a new recording. The results are displayed in real-time. Another function (accessed by the OPTION TABLE) provides for selection of firmware options that are not automatically implemented. The last function in the Pre-Record Programming Mode is represented by Set-Up Monitors. These prompts are displayed by the analyzer to inform the user of the status of parameters as programmed.

Detailed operational theory and specific operating procedures are provided in this section for the following:

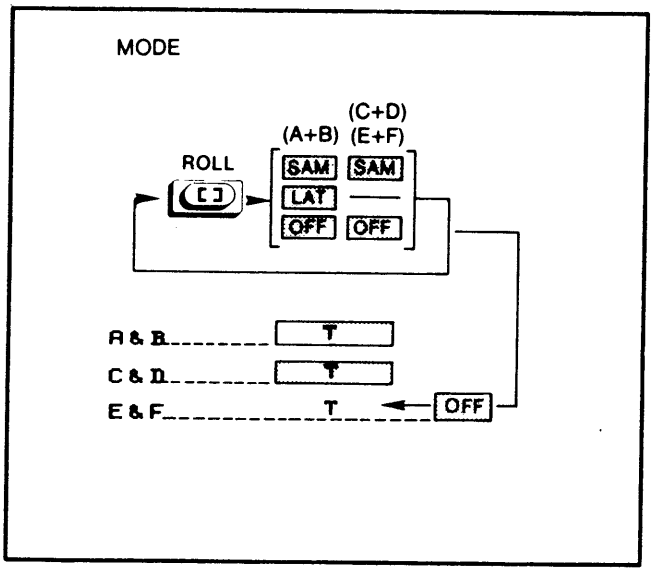
- Trace
- Trigger
- Compare
- Option Table
- Set-Up Monitors

5.3.1 Trace Menu Operational Theory

Refer to Figure 5-7 in the following discussion. Circle numbers are annotated to correspond to paragraphs in this section.

5.3.1.1 Sample Mode. Data input ALP 44's, ①, (or other input devices) provide the line receiver circuits of the input PCB's with signals of a specified level. These input channel groups (A+B, C+D, E+F) can be individually set to one of four reference voltages, as programmed in the "PODS A+B, C+D, E+F LEVEL" portion of the TRACE MENU (See ⑤). In order to sample, data must be present 15 ns before an active clock edge and 2 ns after the active clock edge.

5.3.1.2 Latch Mode. In addition to the normal sampling mode, Pods A + B also only feature D - Type glitch catching circuitry. These circuits are enabled when the "LATCH MODE" is selected ②. Whenever a threshold transition occurs between two successive clock intervals, a latch stores the state of the previous clock interval, thus detecting and displaying "glitches". Figure 5-8 shows the operation of the sampling modes. The minimum detectable glitch is 5 ns with 250 millivolts threshold overdrive.



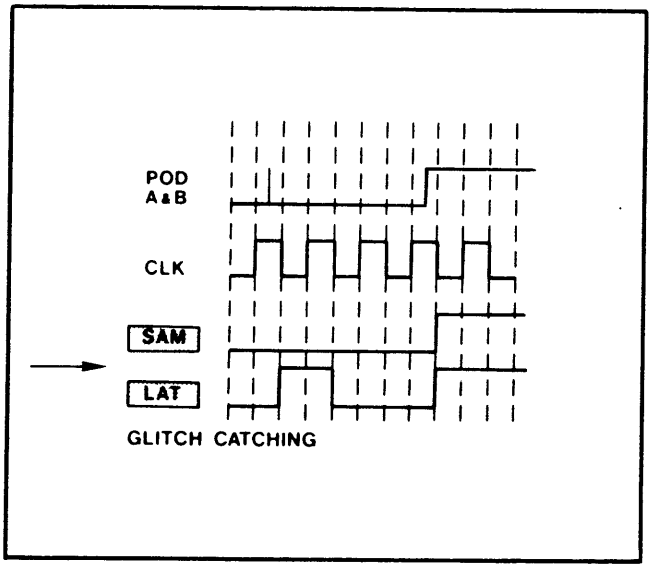


FIGURE 5-8. SAMPLING MODES

5.3.1.3 Memory Blocks ③ . The DAB's represent the memory blocks of the 64300. These DAB's can be organized for 1K or 2K Formats (See Figure 5-9). In the 1K Format, the user may select 48 channels by turning ON all Pod groups (See Figure 5-10A). In the 2K Format (where Pods A + B and C + D are combined), the user may leave Pod groups E + F ON or OFF (See Figure 5-10B). In this case, an asynchronous sampling rate of 20 ns (50 MHz) can be achieved with the Internal Clock.

5.3.1.4 Trigger Delay. The Logic Analyzer can be programmed to delay the end of a recording after a specified Trigger Word is recognized (the Trigger Word is defined in the TRIGGER MENU: See paragraph 5.3.3). This allows data to be recorded both before and after the Trigger Word. The actual position of the Trigger Word is set in the "TRIGG.DELAY" field heading and is represented as a "T" in a bar graph showing relative size and memory of each pod group (See Figure 5-11). Memory depth minus the Trigger Delay is equal to the Trigger location. The programmed delay number is counted from the right side of the bar graph (i.e., zero is at the far right side). The dots on the time line represents 100 memory locations. Note that the location of the Trigger word may be set outside of the memory. If the number is greater than the memory depth available, it will be displayed as: "T<-". The maximum number programmable in both 1K and 2K Formats is 8192 memory locations.

5.3.1.5. Pod Skew. The "POD SKEW" field heading indicates the number of memory locations "skewed" before Pods E + F are told to begin recording. Refer to Figure 5 - 12. The maximum number of pod skew is 1000. Note that the Pod Skew is only programmable in the 2K Format. Since the Trigger Word location can't be set beyond the memory boundaries, any Trigger Delay desired must be greater than or equal to the programmed Pod Skew number. This is necessary because the Logic Analyzer cannot stop recording before the Trigger word is found.

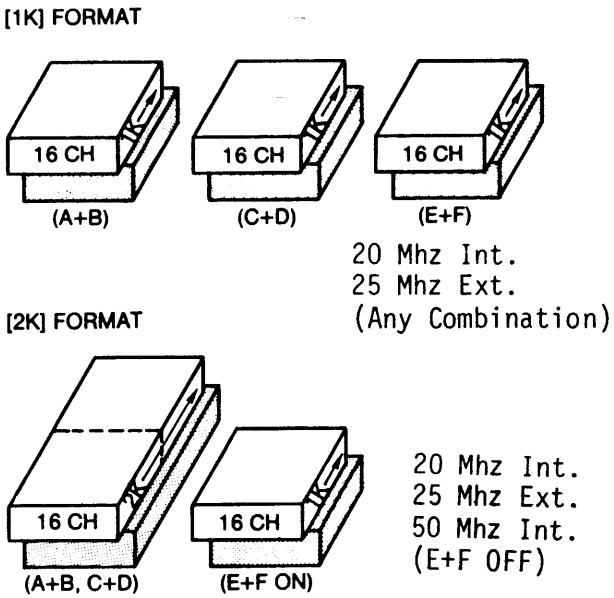


FIGURE 5-9. MEMORY BLOCK CONFIGURATIONS

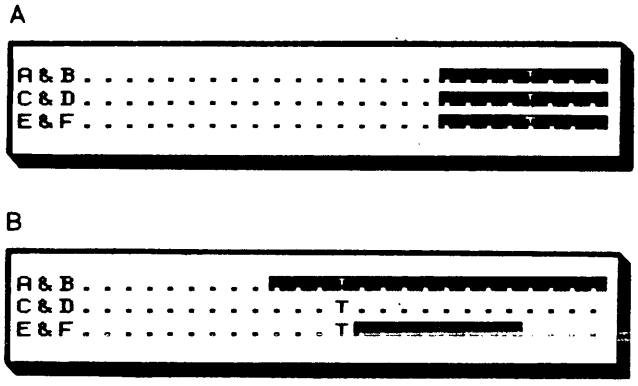


FIGURE 5-10. MEMORY FORMAT DISPLAYS

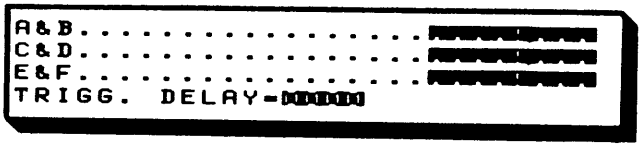
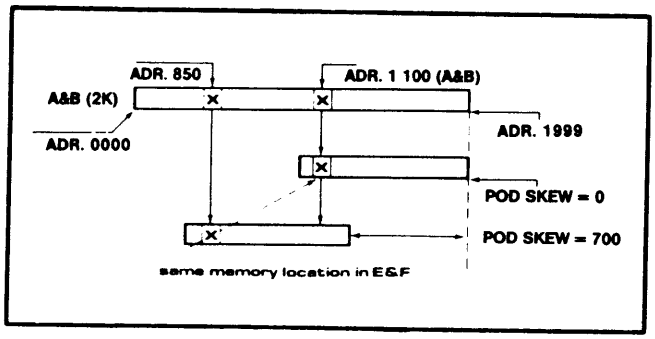


FIGURE 5-11. TRIGGER WORD



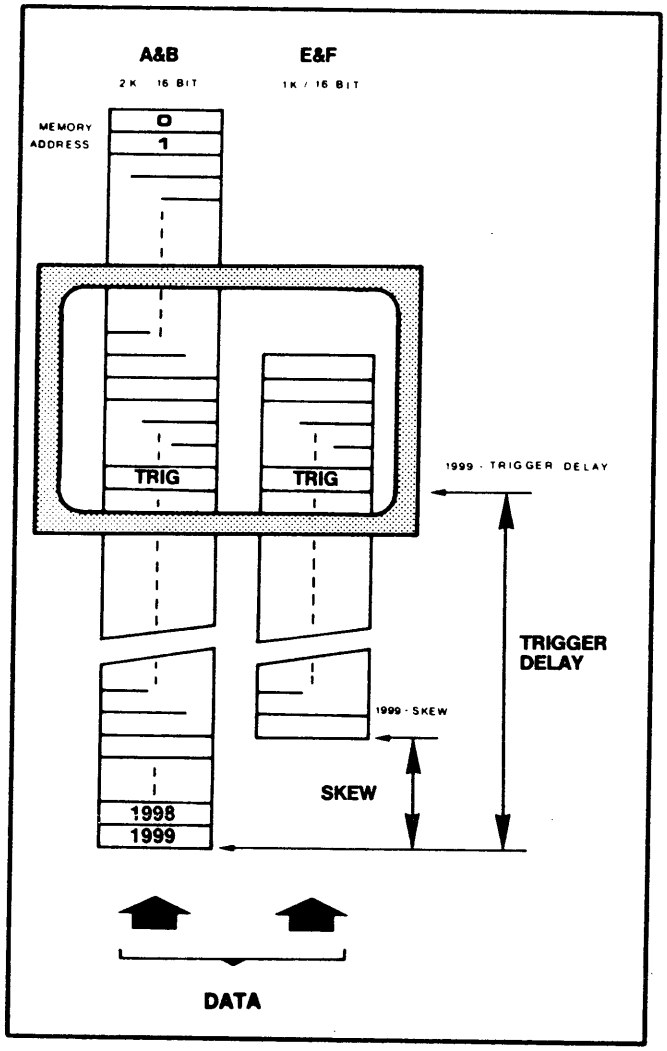


FIGURE 5-12. POD SKEW

After a recording is done, the memory location of Pods E + F when selected for display, and will be modified in accordance to the pre-programmed Pod Skew number. Therefore, the first memory location for E + F is always 1000 minus the programmed Pod Skew number.

5.3.1.6 Threshold. The "Threshold" throughout this documentation, and through all levels of the 64300 operation, refers to the allowable threshold level of either pre-set or variable voltages that are accepted as inputs to the logic analyzer. See ④ on Figure 5-7. The two pre-set levels are TTL (+ 1.4 V) and ECL (- 1.3 V). The two variable voltages, V1 + V2, are each programmable from -9.9 volts to +9.9 volts in 0.1 volt increments.

The assigned threshold levels are sent out to the ALP's 1 and 4 through the DAC on the Threshold/GPIB PCB and a comparison is made with the incoming signal. Refer to Figure 5-13. Depending on the result, a logical HIGH or LOW level is sent back to the Logic Analyzer. Pod levels may be individually assigned, however clock and qualifier threshold levels are assigned for the entire group. Note that if used without an ALP, the assigned threshold level has no function and data must be inputed in ECL Logic.

5.3.1.7 ALP 44. Clock and Qualifier ALP 44's, ⑤, (or other input devices) provide the Timebase PCB with external clocks that can be assigned to control the timing of Pod groups.

5.3.1.8 Clocks. There are four clocks, ⑥, available for data synchronization:

- Internal Clock (synchronous)
- External Clock 1(asynchronous)
- External Clock 2(asynchronous)
- External Clock 3(asynchronous)

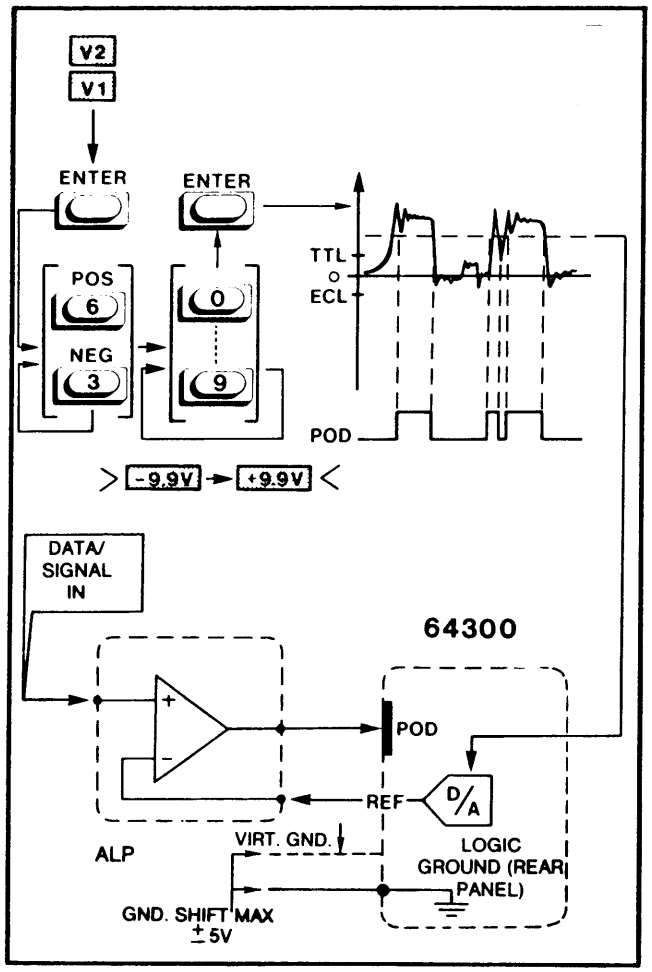


FIGURE 5-13. THRESHOLD ADJUST

5.3.1.9 OR. The External Clocks can be combined in an "OR" function (exactly analogous to a logical OR gate), either with one another or with the Internal Clock. Figure 5-14 shows such an "OR"combination for the External Clocks. The table below lists the "OR" function combinations possible for each pod group. The clock source is programmed individually for each pod group in the CLOCK field heading. Note that when an external clock is applied to Input #1 it controls all pod groups unless otherwise specified in the TRACE MENU programming.

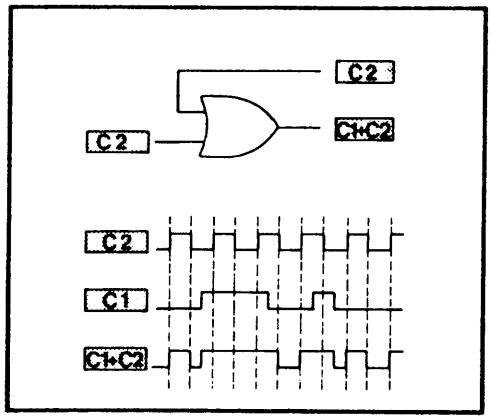


FIGURE 5-14. CLOCK SOURCE PROGRAMMING

CLOCK SOURCE	POD GROUP		
	A&B	C&D	E&F
INT	X	X	X
C 1	X	X	X
C 2		X	
C 3			X
INT+C1	X	X	X
INT+C 2		X	
INT+C3			X
C1 + C2	X	X	X

5.3.1.10 Slope and Qualifiers. For each external clock two other parameters may be controlled:

- Slope (+/-)
- Qualifiers

When a "+" is assigned to an external clock, it is active on the rising edge; a "-" causes it to be active on the falling edge of the pulse. For each External Clock three qualifiers (High, Low, and Don't Care) are programmable. The Threshold level for the qualifier is the same as that assigned for the External Clock in the "CLK LEVEL" field heading.

The Slope and Qualifiers are both associated with the Control Logic Circuitry of the Timebase PCB. Figure 5-15 shows the Clock Slope and Clock Qualifier operation.

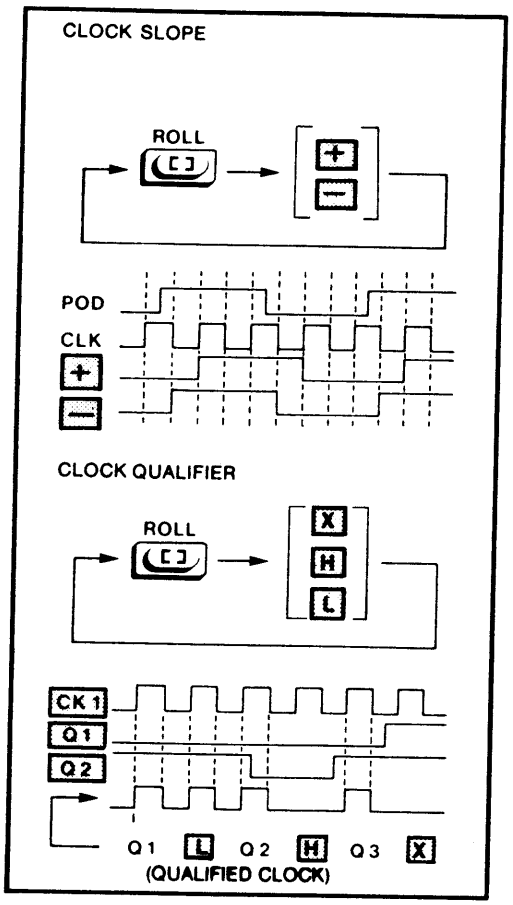


FIGURE 5-15. SLOPE AND QUALIFIERS

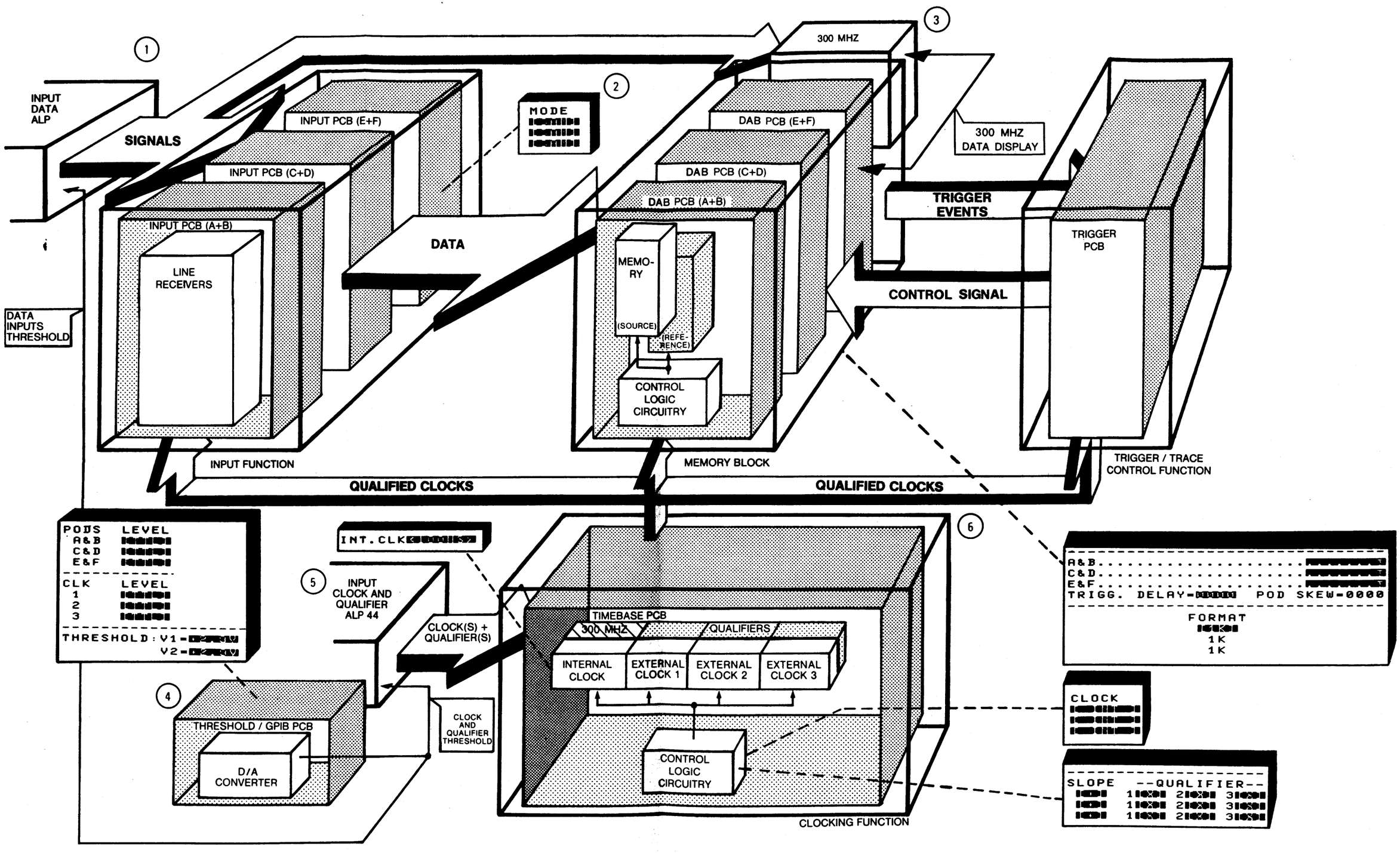


FIGURE 5-7. TRACE MENU FUNCTIONAL BLOCK

5.3.2 Trace Menu Operating Procedures

Refer to Figure 5-16 in the following section. Circle numbers in Figure 5-16 correspond to those in Figure 5-17. The TRACE MENU operating procedures are shown in Figure 5-17; a flowchart covering the next pages. Operating procedures are presented in an operator decision-oriented manner. Major decisions correspond to field headings in the TRACE MENU display.

NOTE:

Move Cursor to all fields desired in the TRACE MENU with EDIT Group pushbuttons.

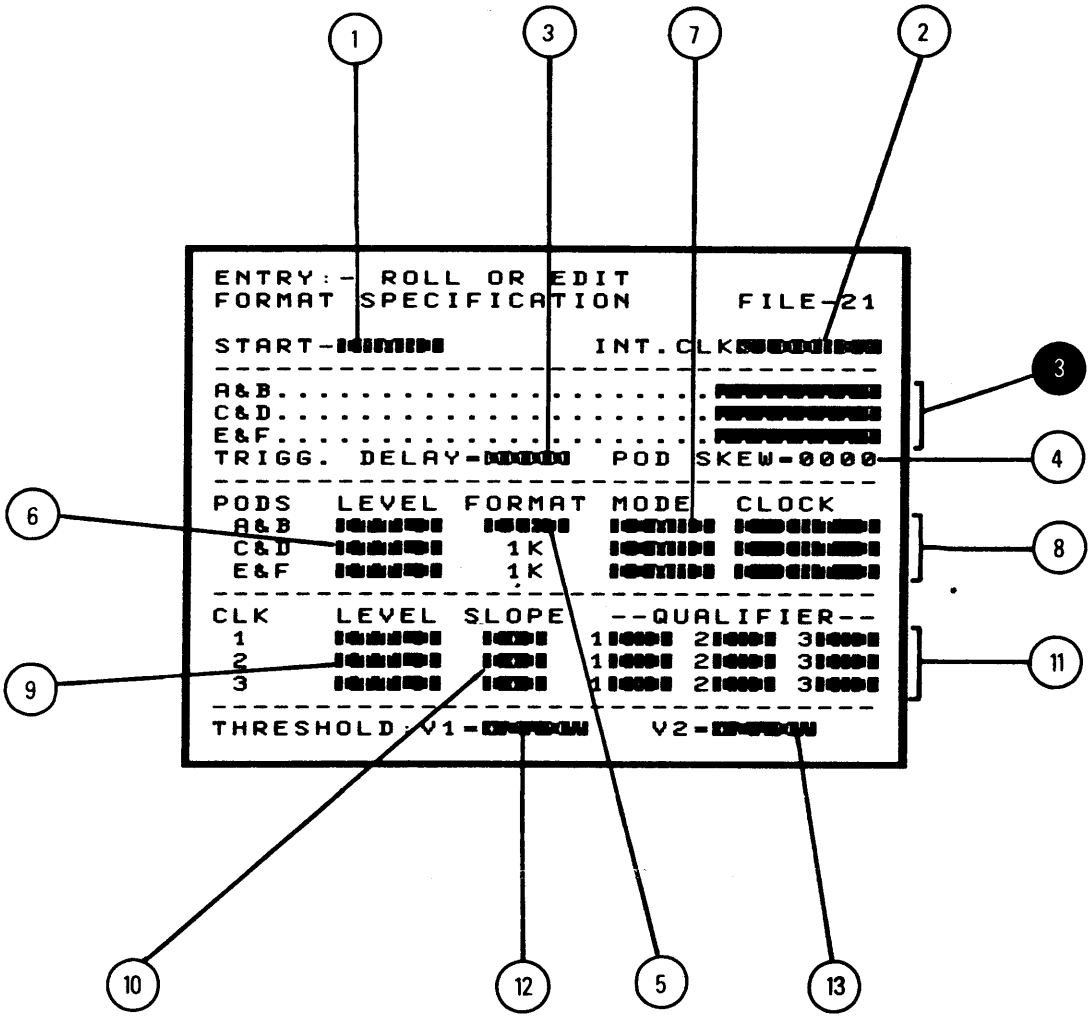


FIGURE 5-16. TRACE MENU KEYS

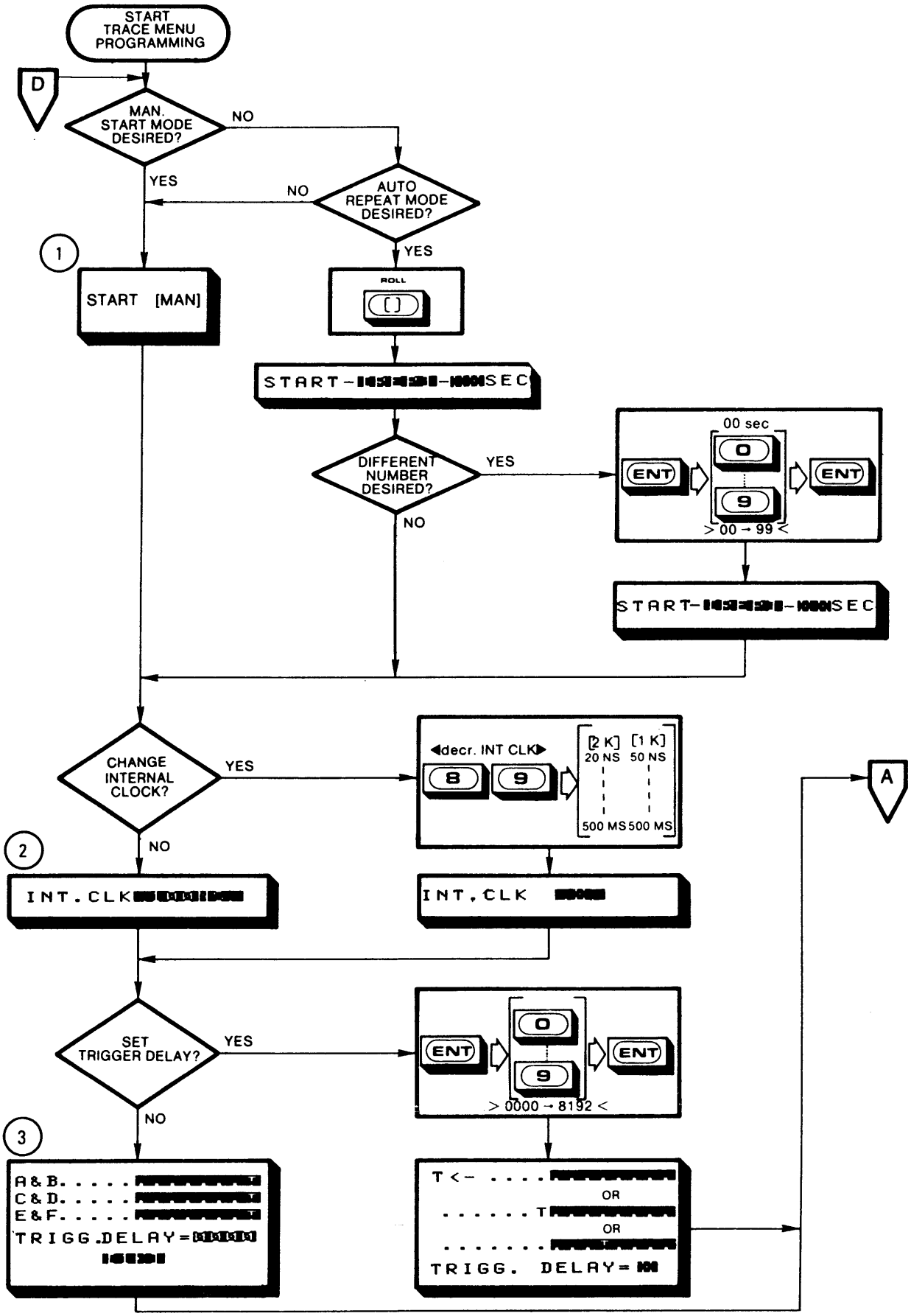


FIGURE 5-17A. TRACE MENU OPERATION

*POD SKEW CANNOT BE CHANGED UNLESS [2K] FORMAT IS SELECTED

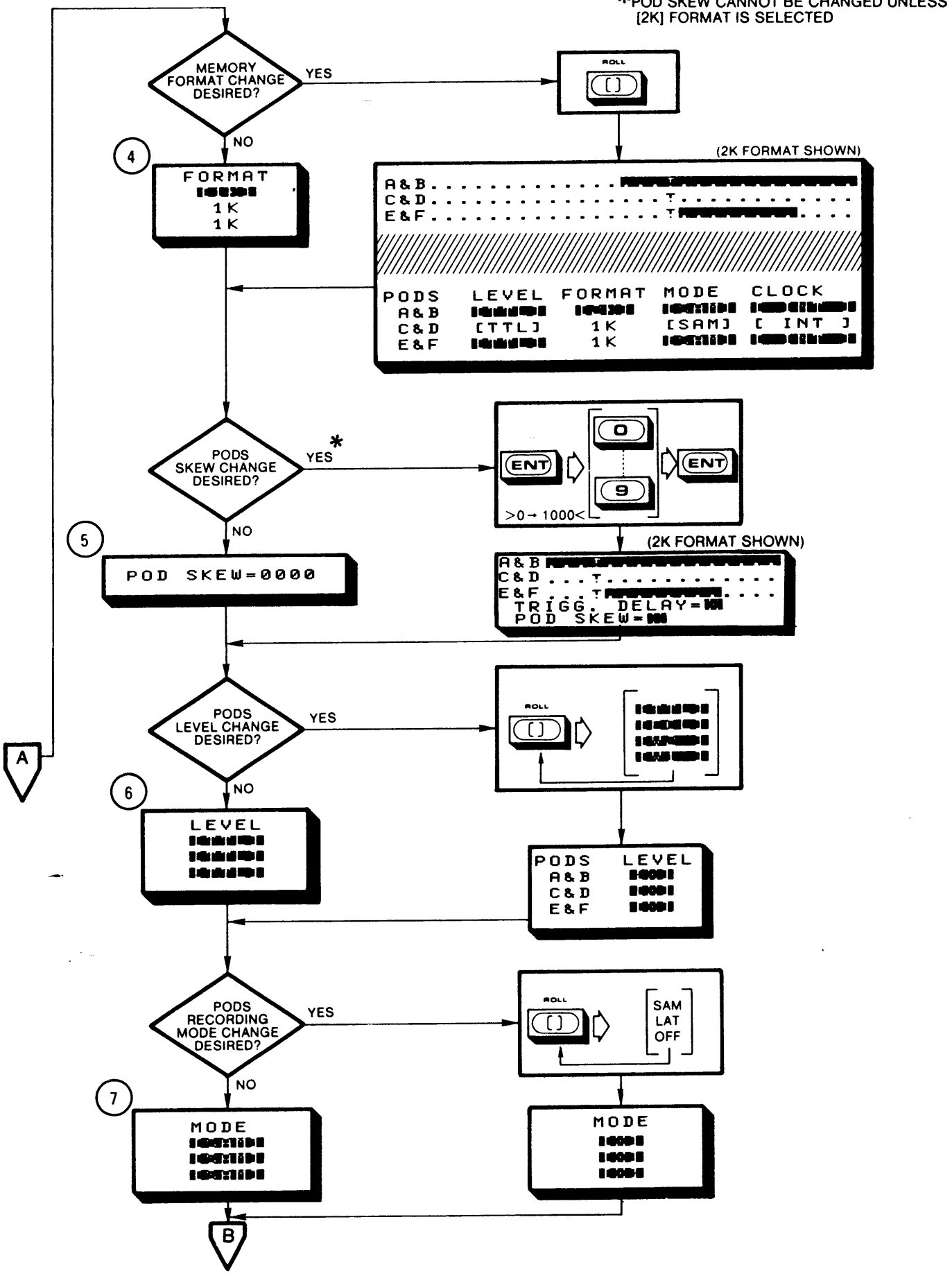
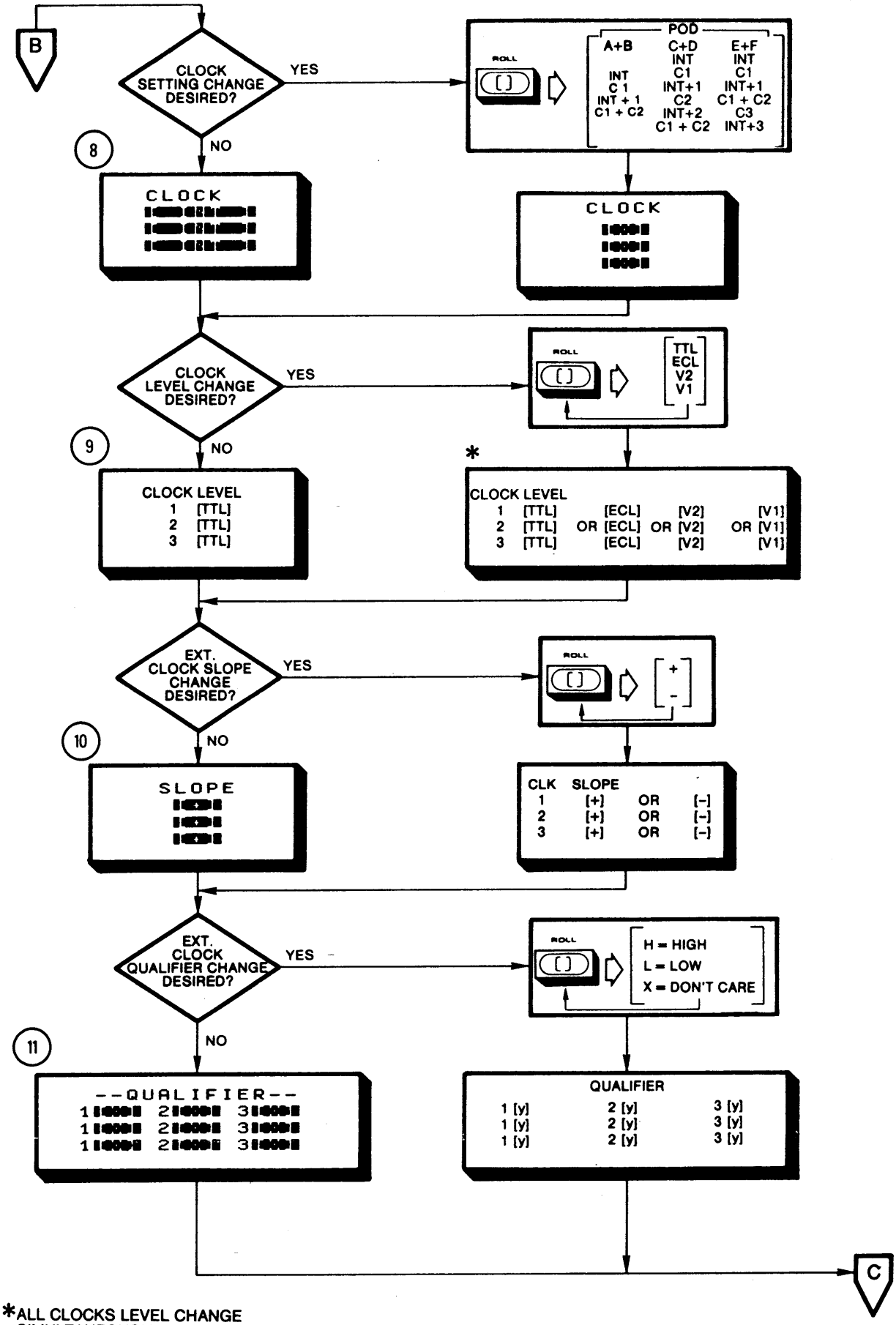


FIGURE 5-17B. TRACE MENU OPERATION



*ALL CLOCKS LEVEL CHANGE SIMULTANEOUSLY

FIGURE 5-17C. TRACE MENU OPERATION

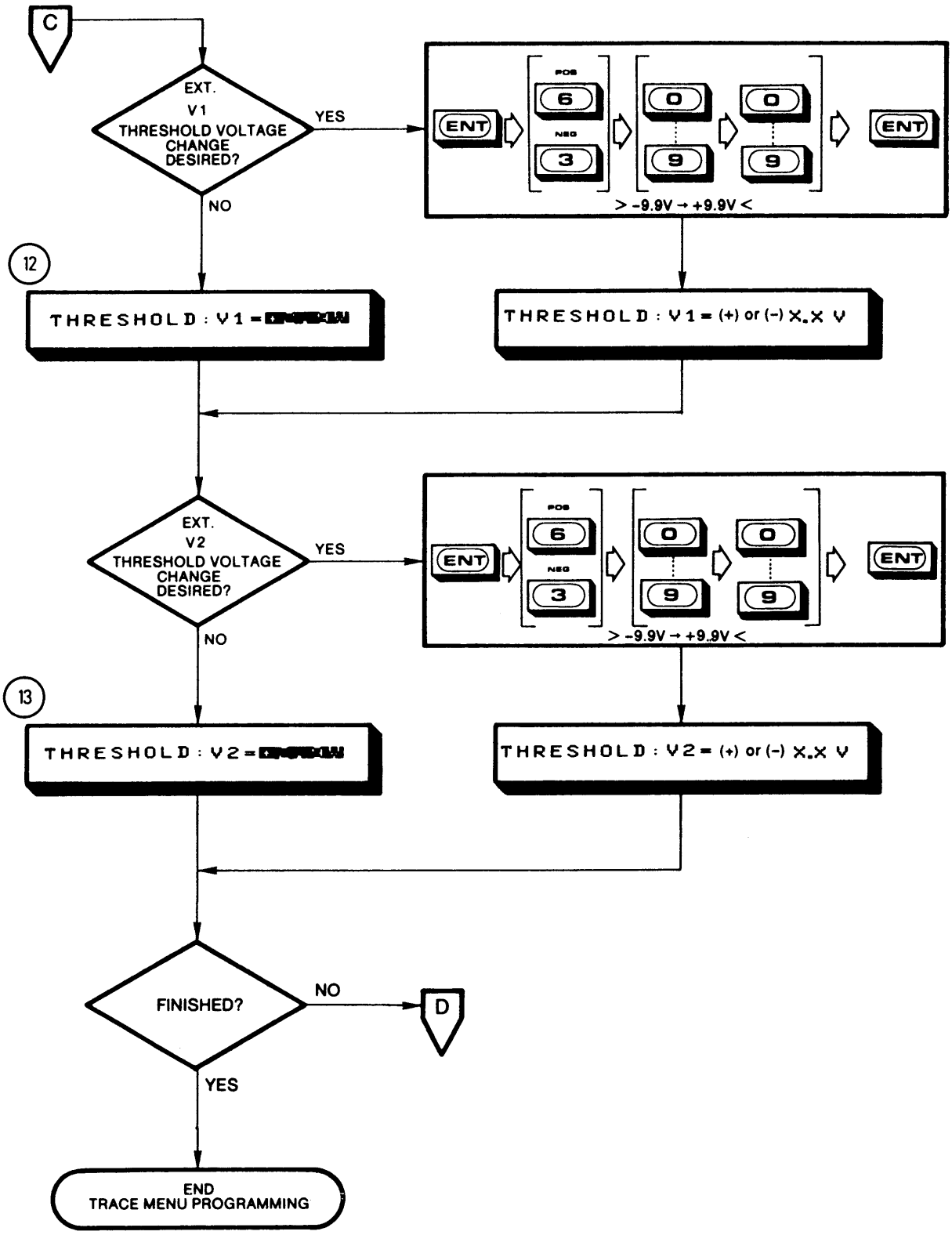


FIGURE 5-17D. TRACE MENU OPERATION

5.3.3 Trigger Menu Operational Theory

The best way to understand the TRIGGER MENU is to imagine it as a "net" with which you will trap data. You arrange the data flow through the net with the TRIGGER MENU (Figure 5-18) and design the shape of it with the TRIGGER WORD DEF PAGE (Figure 5-19). The TRIGGER MENU arranges the data flow by providing programmable control over the four sequences of search and the particular functions of levels (3 for each) within those sequences. Table 5-1 describes the TRIGGER MENU functions. The TRIGGER WORD DEF PAGE, which are accessible only when the TRIGGER MENU is displayed, are used to define the actual Trigger words (12 maximum). Note that any one Trigger word may be up to 48 bits wide. The TRIGGER MENU is used to program the general flow of the sequential Trigger Search. At power-up, it is always displayed, preset to the simplest trigger condition:

ADVANCE AFTER 001 CLOCKS

This means that no trigger word at the input to the Logic Analyzer is needed for triggering (FREE RUN condition).

To extend this function the user may activate more sequences by programming the (ON/OFF) fields and by adding further commands to each sequence level selected. To activate the sequences, the EDIT group cursor must be moved through the TRIGGER MENU, where functions (F0) to (F7) can be selected with the "ROLL" pushbutton. The function is explained in brief text.

The Trigger word, which may be part of a function display, is shown as a reference number at the end of the function line. These reference numbers correspond to those selected in the TRIGGER WORD DEFINITION pages, where the Trigger words can be programmed.

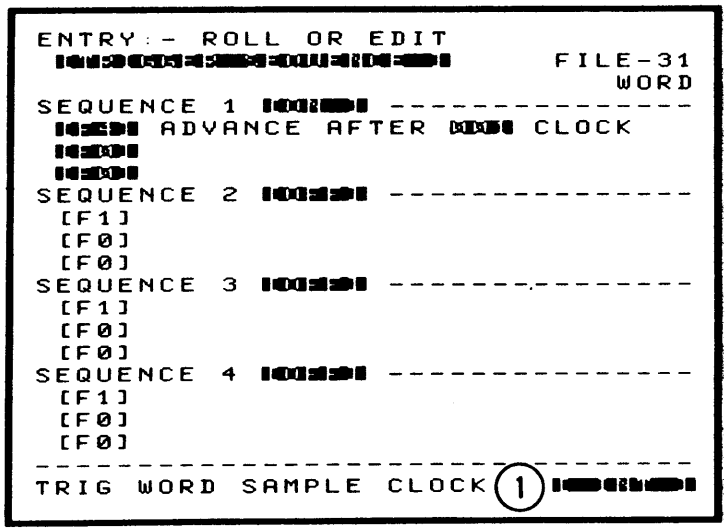


FIGURE 5-18. TRIGGER MENU

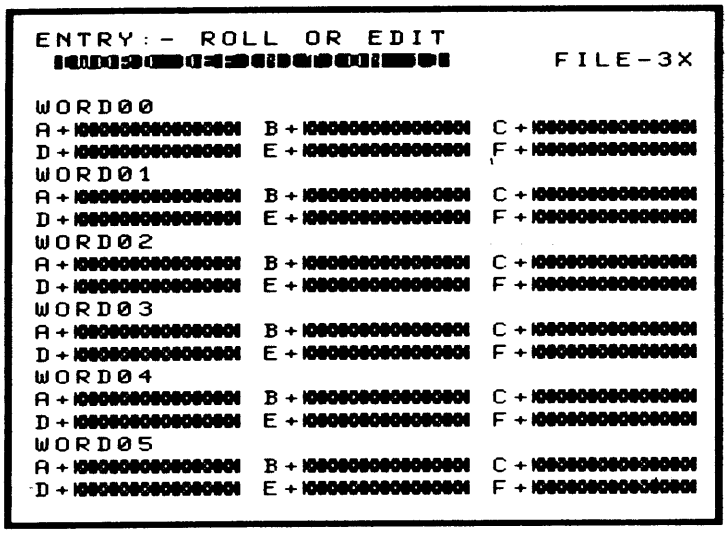


FIGURE 5-19. TRIGGER WORD DEFINITION MENU

TABLE 5-1. TRIGGER MENU FUNCTIONS

COMMAND/FUNCTION	DESCRIPTION
OFF	Used to deactivate all levels within a sequence. When the sequence is turned off, function codes appear in normal, non-inverse video. All other text for levels are erased.
ADVANCE AFTER XXX EVENT(s) WORD XX	When the Trigger word XX has been recognized X times (maximum 255), the analyzer will jump to the next level. The Trigger words may occur in any time sequence.
ADVANCE IF NEXT (WORD) X	This condition is linked to the previous trigger level. If the word X immediately follows the word in the previous level, the analyzer will jump to the next level. If the word X does not come immediately after the previous word the analyzer will jump to Sequence 1.
ADVANCE IF NEXT NOT (WORD) X	This condition is also linked to the previous trigger level. It's function is exactly opposite to that of the ADVANCE IF NEXT WORD command. Only if the word X does not immediately follow the previous level, the analyzer will jump to Sequence 1.
ADVANCE AFTER XXX CLOCK(s)	Independent of the Trigger word, a jump will be made to the next level after XXX (maximum 255) clock cycles.
OR TRIGGER IF (WORD) X	The analyzer will be triggered immediately if it recognizes word X as long as it searches for the comparison "advance" function.
OR GO TO SEQUENCE 1 IF (WORD) XX	This is the "restart" function, which when combined with an "advance" function, will reset the trigger circuitry to Sequence 1. This is done whenever the word X is recognized before an "advance" function appears.
AND TRACE DATA IF (WORD)XX	As long as the analyzer trigger circuitry is seeking an ADVANCE, OR TRIGGER IF, or OR GO TO SEQUENCE 1 function, only data that meets the conditions of word X will be clocked in the analyzer's memory. If a jump to another ADVANCE, OR TRIGGER IF, or OR GO TO SEQUENCE 1 is effected, you may select another AND TRACE DATA IF (WORD) XX function in the next level.
OR	When selected, the OR function is tied to the previous level function. It then takes the function number assigned to the previous one. The OR function can also be selected if the Trigger word of the previous level can be linked with the word defined in the following level (CURRENT OR level). Note that ADVANCE functions can also be "OR"ed.

Trigger Menu Operational Notes:

1) When all sequences are ON or all are OFF, and no level functions are selected, the 64300 will be in the "FREE RUN" mode when the "RUN" pushbutton is pressed. The memory is filled without a trigger event.

2) A & B memory cannot be formatted to 2K if the "AND TRACE DATA IF" function is active.

3) If no "AND TRACE DATA IF" function is selected, all data will be stored.

4) While sampling pretrigger data, all incoming data will be qualified with "AND TRACE DATA IF" condition as programmed within trigger sequence 1 until the programmed Trigger word is recognized.

5) When the trigger search is completed (TRIGGER DELAY ACTIVE), data will be qualified with "AND TRACE DATA IF" condition as programmed until the end of recording.

6) Note the following specifications:

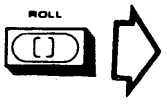
   - Trigger Word Recognition - 50 MHz.
   - Advance "dead" time between trigger levels - 100 ns (for Triggering).
   - Maximum data qualification frequency when "TRACE DATA" is selected - 8 MHz, 1K Format only.

5.3.4 Trigger Menu Operating Procedures

Figure 5-20 shows the method of programming the TRIGGER MENU. You must advance the cursor with the Keyboard EDIT group controls to the field heading desired and then use the "ROLL" pushbutton to select functions or the clock source. Verify that Trigger Words selected in the TRIGGER MENU are programmed in the respective TRIGGER WORD DEFINITION PAGE.

5.3.4.1 Trigger Sequence Programming. When a sequence is turned ON, the three levels of that sequence are available for programming with the "ROLL" pushbutton. With some functions you will have to enter numbers (see Non-Bracketed Input Types, Section 5.2.3 for details) before proceeding to the next sequence or level.

5.3.4.2 Trigger Menu Sample Clock Programming. Table 5-2 shows the sample clock sources and their selection order when the cursor is in the "Sample Clock" field (See Figure 5-18, ①) and the "ROLL" pushbutton is pressed. Note that the programmed clock source for the TRIGGER MENU Sample must be assigned also to one of the active Pod groups (see TRACE MENU, Section 5.3.1.7). If the "Clock" field is changed in the TRIGGER MENU, the TRACE MENU must also be changed to correspond with the TRIGGER MENU.

TABLE 5-2. SAMPLE CLOCK	
SELECTION	CLOCK SOURCE
	INT C1 INT+1 C2 INT+2 C1 + C2 C3 INT+3

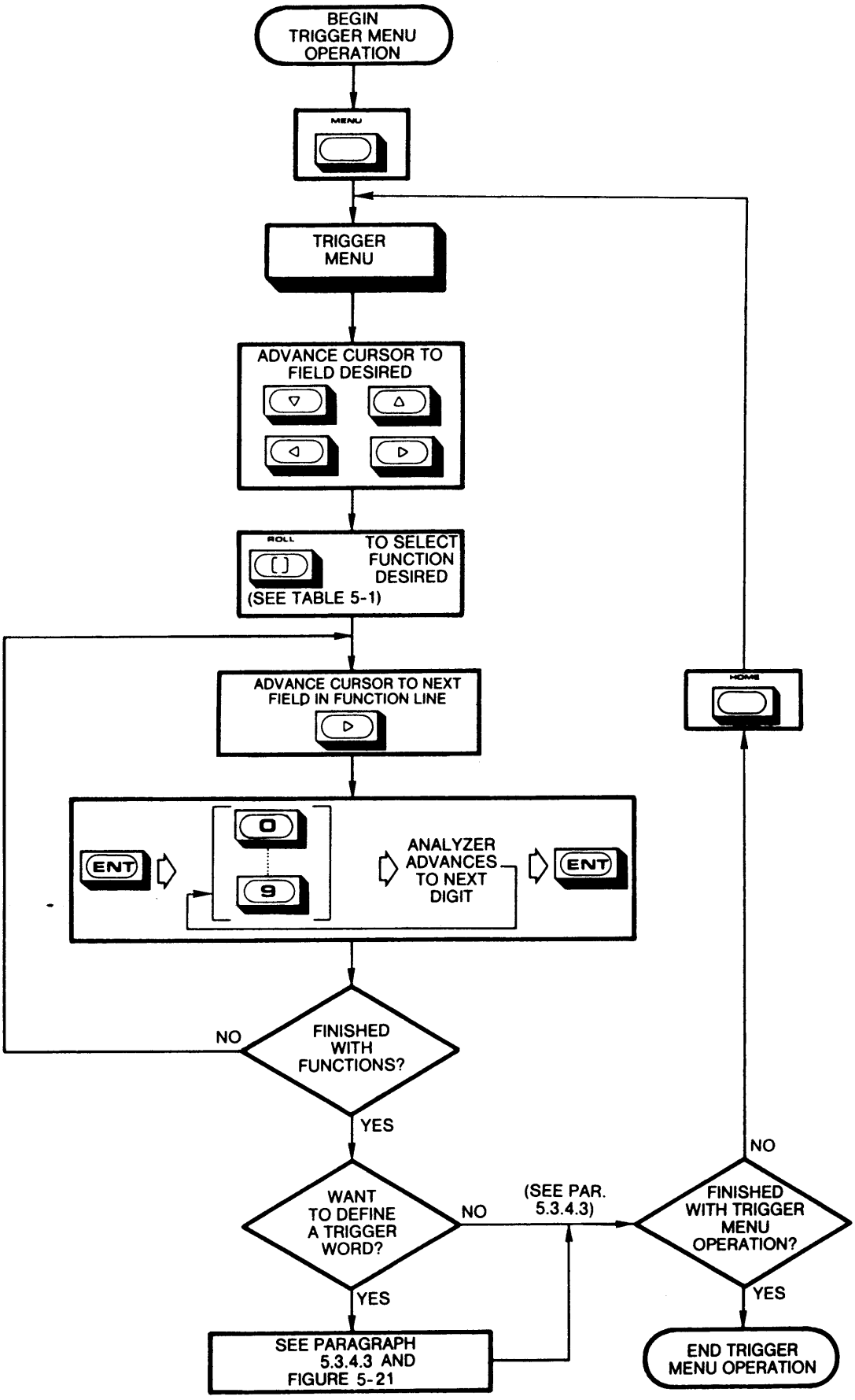


FIGURE 5-20. TRIGGER MENU OPERATION

5.3.4.3 Trigger Word Definition Operating Procedures. In order to use the TRIGGER WORD DEF (page 1 or 2), you must first be in the TRIGGER MENU. Press "HOME" to set the cursor to the first field heading and then press the "ROLL" pushbutton to select the TRIGGER WORD DEF page desired. Figure 5-21 shows the Trigger Word Definition operating procedures in flowchart form.

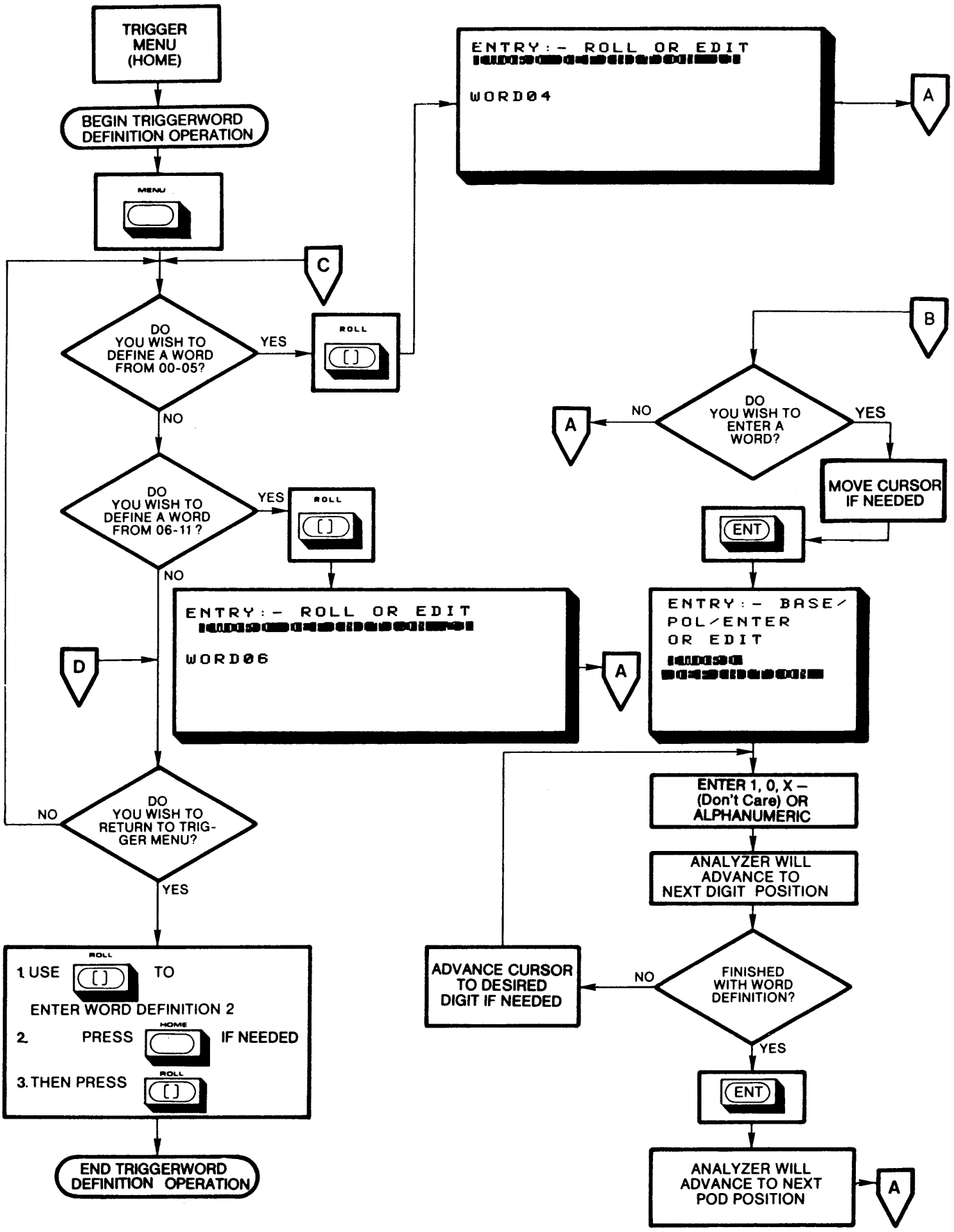


FIGURE 5-21A. TRIGGER WORD DEFINITION MENU OPERATION

★ When selected, all words (00-11) in the POD being programmed will change to positive or negative polarity.

★★ When selected, all words (00-11) in the POD being programmed will change to number base. After word definition, the Analyzer will automatically convert number entered in one base to the equivalent notation in another.

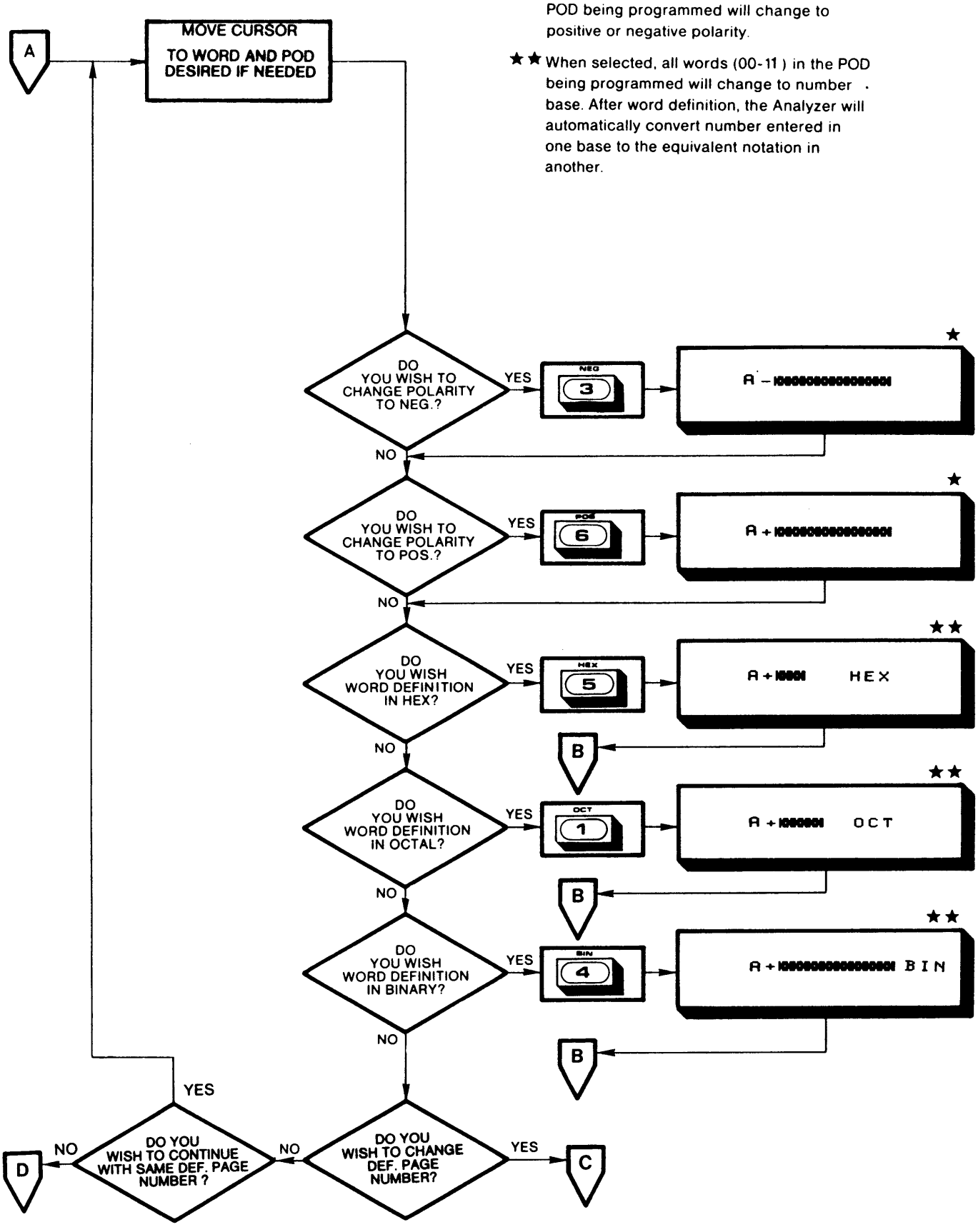


FIGURE 5-21B. TRIGGER WORD DEFINITION MENU OPERATION

5.3.5 Compare Menu Operation Theory and Procedures

In the following section, the operational theory and procedures for programming the COMPARE MENU are given. The text is keyed to circle numbers in Figure 5-22. The operating procedure for each major field is found in the figures in this section.

The COMPARE MENU allows the user to program parameters for the 64300 automatic comparison function. Comparison is made between previously recorded data (stored in the Reference Memory) and new data (stored in the Source Memory). To compare, a recording must first be made with proper TRIGGER and TRACE MENU parameters. This recording must then be transferred into the Reference Memory. See Section 5.2.3.

When the recorded data is transferred to the Reference Memory the COMPARE MENU may be programmed. The COMPARE MENU is only active when it is displayed on the CRT. To program the COMPARE MENU the user must give the start and end addresses of comparison, number of compare skew, sample number, and set the channels to be compared, as well as how they will be compared (ie., Byte-to-Byte or Bit-to-Bit). In addition, compare conditions (HALT or COUNT, if R= S or R≠S) must be programmed.

Before the comparison is activated, the user may press the "Monitor" pushbutton to verify proper set-up. If an erroneous set-up is programmed and a comparison is attempted, an "INVALID SET-UP" message is displayed. When the "RUN" pushbutton is pressed, "COMPARE PROCESS ACTIVE" is displayed if the COMPARE MENU is properly programmed. The analyzer then starts a recording, filling the Source Memory with new data. When the Source Memory is filled, the recording is stopped. A comparison is then made in accordance to the parameters programmed.

A "dead time" occurs while the comparison is made. During this time all other incoming data are ignored. If the COMPARE MENU parameters programmed are complex, the "dead time" is increased. Once comparison is made the analyzer repeats the record-compare-record process automatically until each memory location between the compare start and end addresses has been examined. Results of the comparison are displayed in the CYCLE COUNTER (which indicates all completed comparisons) and the COND TRUE COUNTER (which indicates the number of times R=S or R≠S). The compare process will be repeated as long as programmed conditions are met or the user manually halts the comparison with the "STOP" pushbutton. When the analyzer is halted, it will return to the COMPARE MENU for further programming.

Source and Reference Memories must be in the same format, must have the same Pod Skew, and the same Pod Groups must be configured per the TRACE MENU. See Figure 5-23 for an illustration of the 1K and 2K Formats.

NOTE:

The cursor is advanced to the desired field headings in this menu with the Keyboard EDIT group pushbuttons.

5.3.5.1 Range of Compare. The "START ADDRESS" ① and "END ADDRESS" ② field headings are used to enter the range of memory comparisons. See Figure 5-24 for operating procedures.

5.3.5.2 Compare Skew. The "COMPARE SKEW" ③ allows the user to set a tolerance area from 0 to 99 samples before and after each location in the Source Memory. In this area Bit-to-Bit or Byte-to-Byte comparison is made between the Source and Reference Memories, but the chances of a data match are increased in proportion to the skew range defined. Figure 5-25 shows the "COMPARE SKEW" programming procedure.

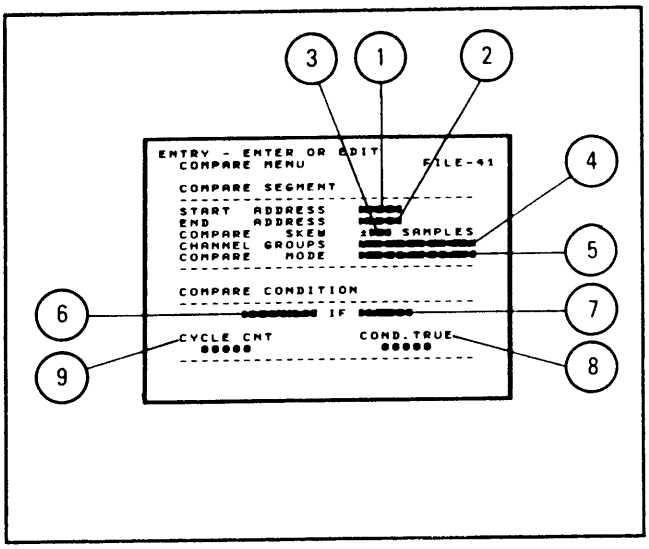


FIGURE 5-22. COMPARE MENU KEYS

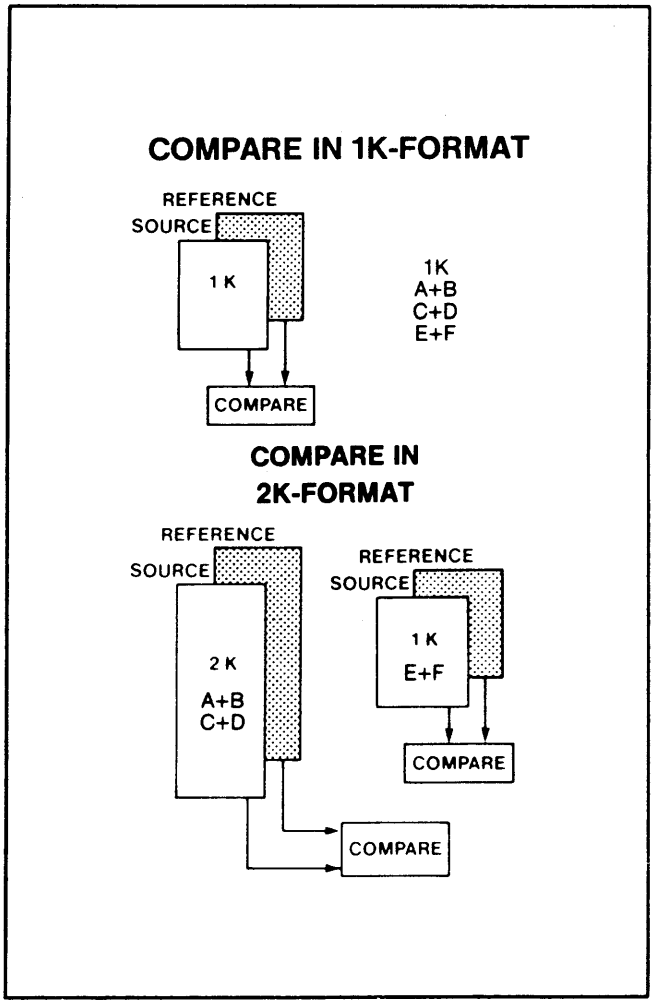


FIGURE 5-23. COMPARE MENU FORMATS

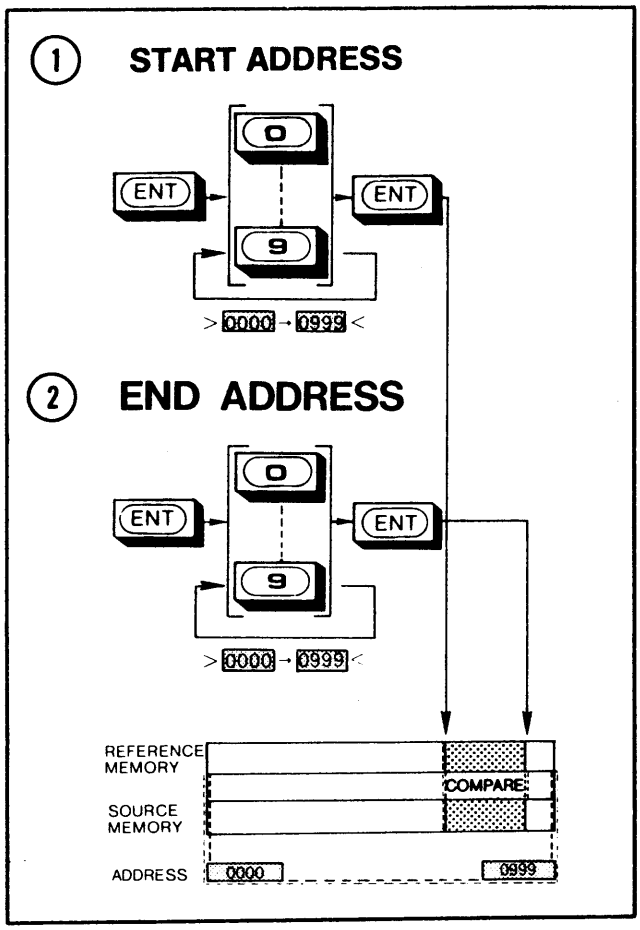


FIGURE 5-24. RANGE OF COMPARE

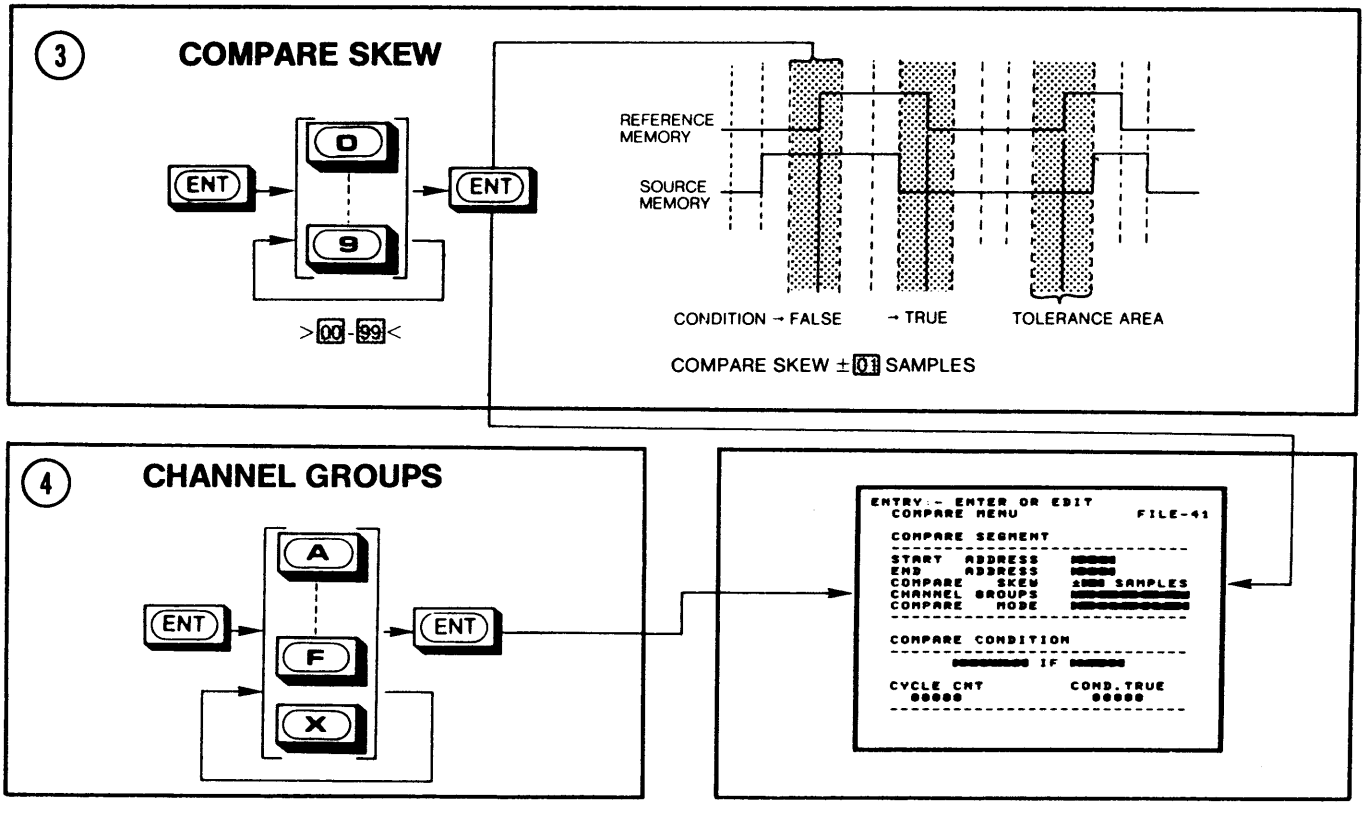


FIGURE 5-25. SKEW AND CHANNEL GROUPS

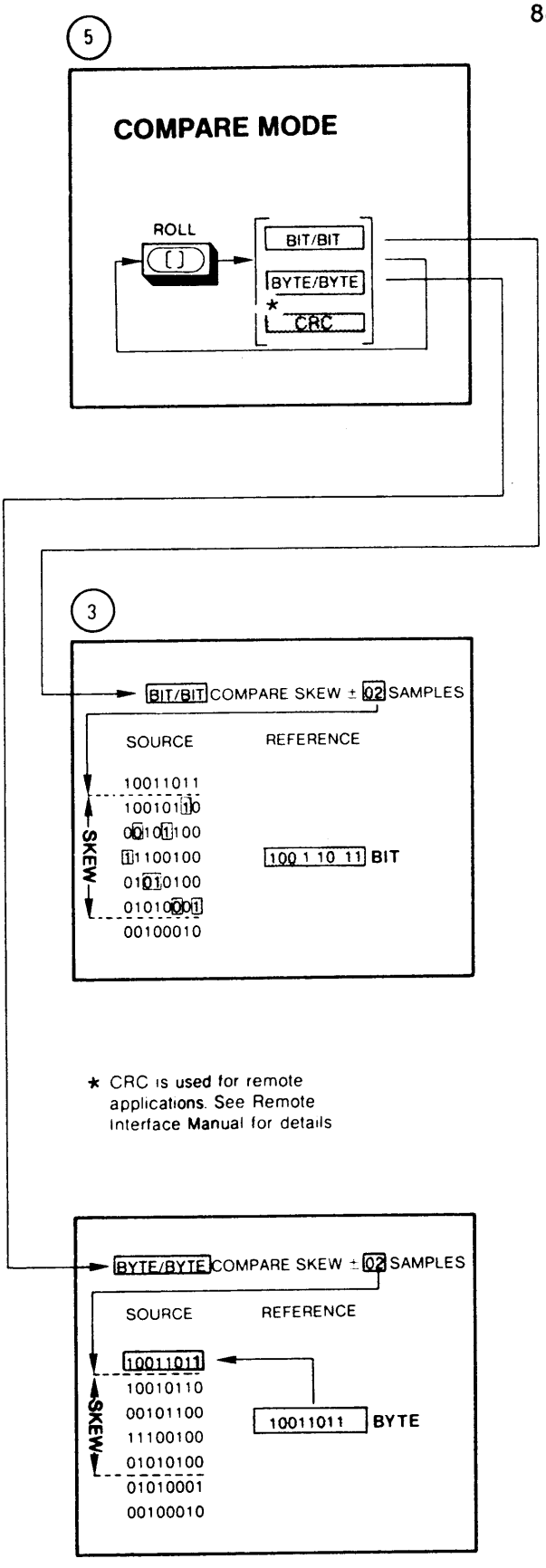


FIGURE 5-26. COMPARE MODES

5.3.5.3 Channel Groups. The "CHANNEL GROUP" ④ field heading is used to select the Pod groups which will be active during the compare process. The "X" is used to disable a Pod from comparison. See Figure 5-25.

5.3.5.4 Compare Mode. The "COMPARE MODE" ⑤ field heading allows the operator to select either Bit-to-Bit or Byte-to-Byte comparison between the Reference and Source Memories. Figure 5-26 shows these two modes. Operation is dependent on the "COMPARE SKEW" ③ programmed. In Figure 5-26, the compare skew is +/-2 samples of the word in the Reference Memory.

5.3.5.5 Compare Condition. In this portion of the COMPARE MENU there are two fields: ⑥ controls the compare process and ⑦ controls the comparison conditions. An explanation of the parameters available in these fields is below.

COUNT ⑥: If a compare condition is "true", the "CONDITION TRUE" counter, and "CYCLE COUNTER" (⑨), are incremented. The next comparison is made automatically. To stop the 64300 in this mode, the STOP pushbutton must be pressed.

HALT ⑥: If a compare condition is "true", the compare process is disabled. The compare process may be manually interrupted by pressing the STOP pushbutton.

R=S ⑦: Specifies that the data of the Reference Memory must be equal to the Source Memory to meet either a "HALT" or "COUNT" compare condition.

R≠S ⑦: Specifies that the data of the Reference Memory must not be equal to the Source Memory to meet either a "HALT" or "COUNT" compare condition.

CRC ⑦: Cyclic Redundancy Check specifies that Source and Reference Memory data compares by calculating check sums for both blocks of memory.

5.3.5.6 Compare Counters. In this portion of the COMPARE MENU there are two fields that only display information: the "CONDITION TRUE" counter ⑨ and the "CYCLE COUNTER" ⑧ (See Figure 5-22). The "CONDITION TRUE" counter displays the number of times a condition has been met. The "CYCLE COUNTER" displays the number of times the comparison has been made.

5.3.5.7 Overall Operation. Figure 5-27A shows the overall internal operation of the COMPARE MENU. This figure shows all cases for a "COUNT IF" and "HALT IF" compare condition for Bit-to-Bit and Byte-to-Byte comparison, and Cycle Redundancy Check. Figure 5-27B, a fold-out figure on the next page, shows the operations keyed to circled numbers in the flowcharts in Figure 5-27A.

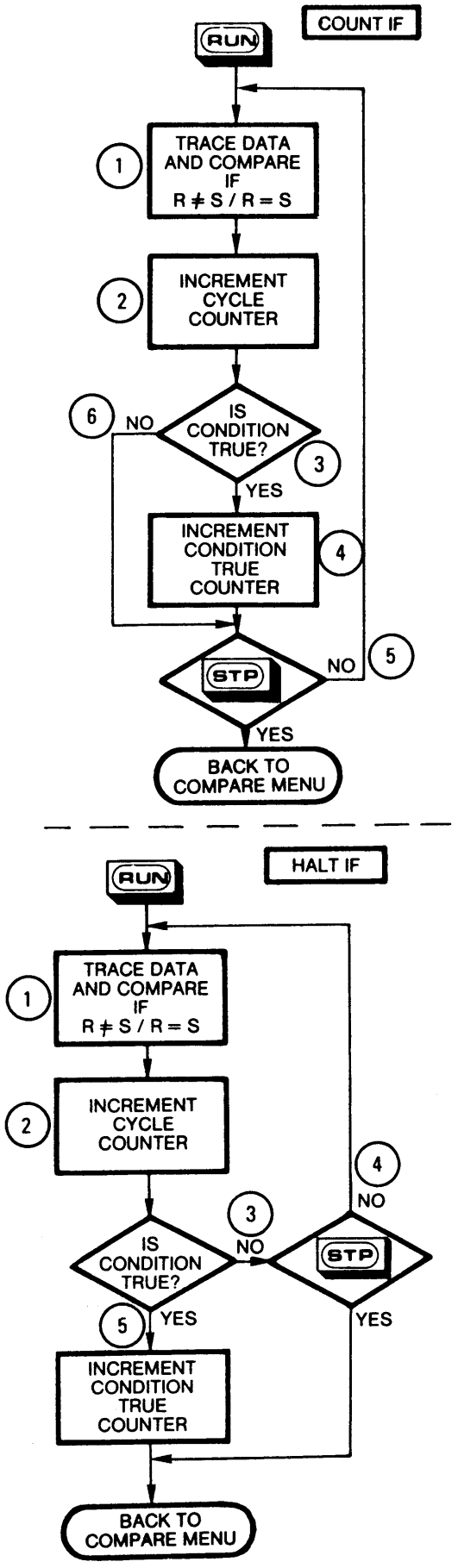


FIGURE 5-27A. COMPARE MENU OPERATION

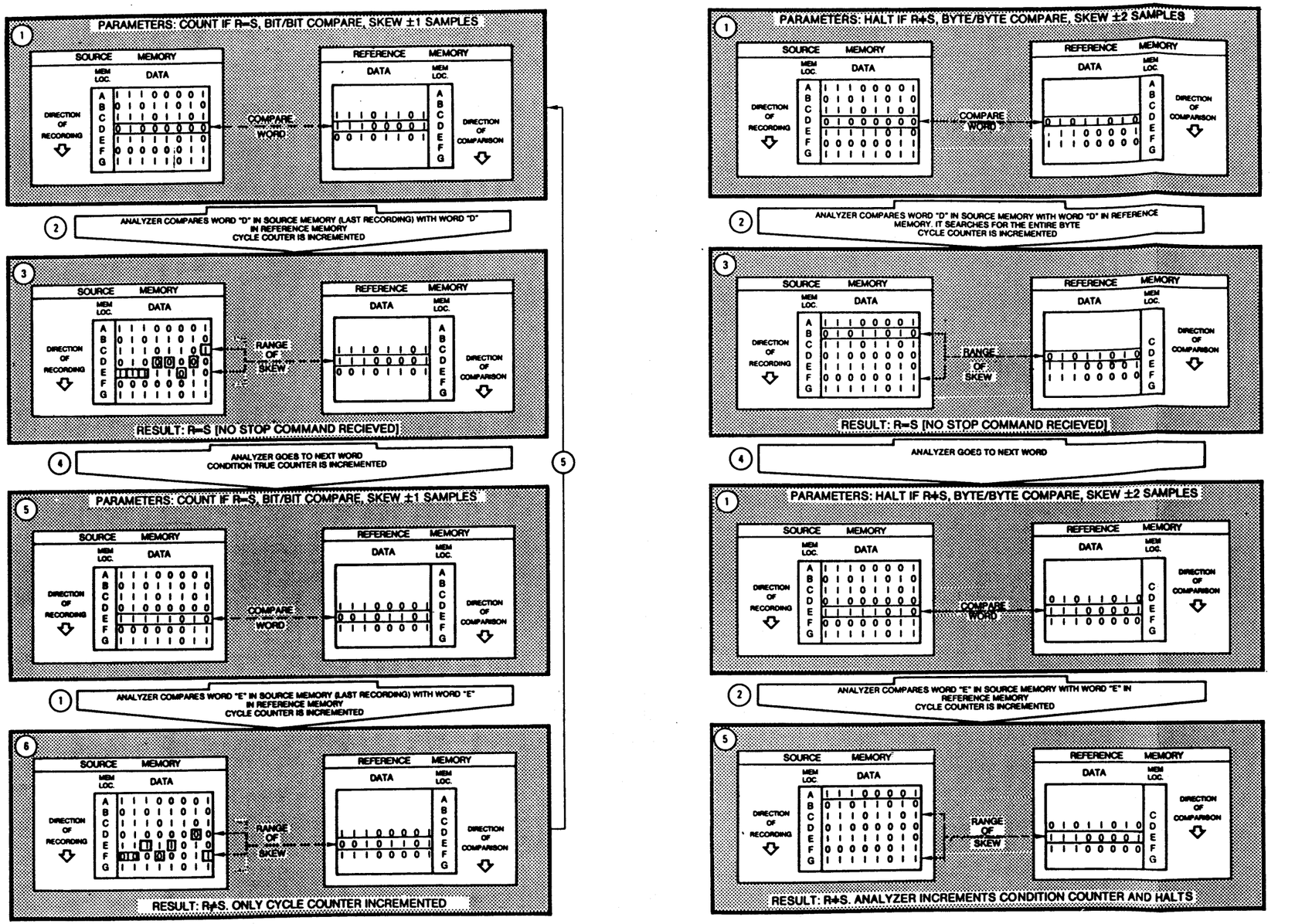


FIGURE 5-27B. COMPARE MENU OPERATION

5.3.6 Option Table Operation

The OPTION TABLE is a display that shows which options are available for the 64300 being used. The operation is straight-forward, as shown in Figure 5-28. Option selections are made only when the LAM is <u>not</u> in the recording mode. To select options proceed as follows:

1) Use the "MENU" pushbutton to access the OPTION TABLE.

2) Move the cursor to the desired option using the keyboard "EDIT" group pushbuttons .

3) Press the "OPTION" pushbutton. The optional menu selected will appear on the CRT.

4) Any time the "OPTION" pushbutton is pressed, it will cause the menu selected to appear (or the function to activate). If you want to change the option, repeat steps 1 through 3 above.

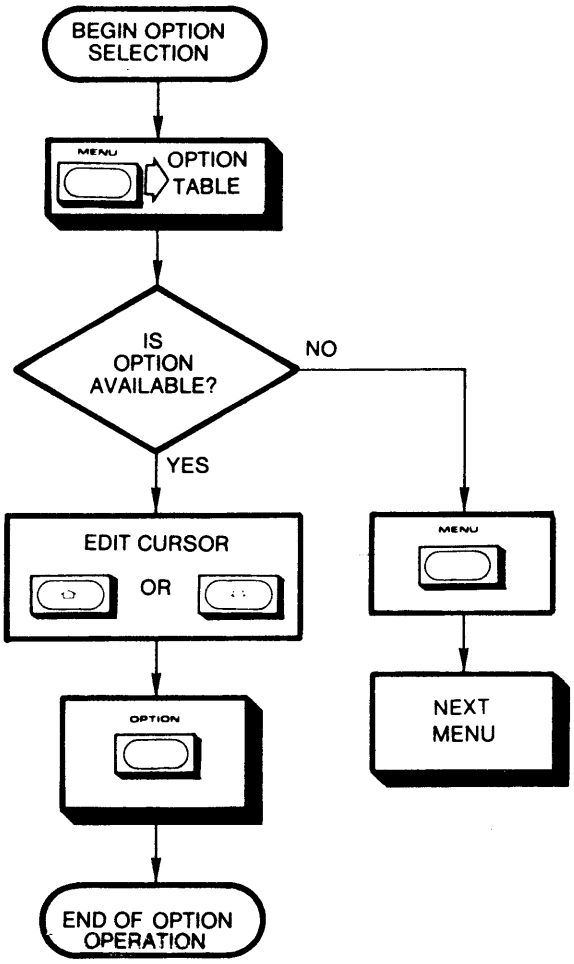


FIGURE 5-28. OPTION SELECTION

5.3.7 Set-Up Monitor

The SET UP MONITOR is used primarily during the Pre-Record Programming Mode to aid the user in setting up recording parameters. During this mode, any time the "MONITOR" pushbutton is pressed the internal software tests the combination of programmed parameters and sends a message to the CRT. This message is in one of two forms: either that the set-up is correct (VALID SETUP!), along with a summary of the parameters programmed, or that the set-up is wrong (SETUP CHECK RESULTS), along with the reasons why.

Note that the Set-up Monitor function is automatically present whenever a recording is made. When the programmed set-up is correct, and the user begins a recording, the Set-up Monitor operation is transparent. If, however, there is something wrong with programmed parameters the "SETUP CHECK RESULTS" monitor is displayed and the recording is disabled until those parameters identified are changed.

5.4 DATA RECORDING MODE

Once the recording parameters have been inputed and the "RUN" pushbutton has been pressed, the Data Recording Mode operation is completely internal. The recording is stopped either automatically or by the user pressing the "STOP" pushbutton. It is not possible to change parameters that have been preprogrammed. The user may only monitor a recording in progress. Thus, the Data Recording Mode operation is as follows:

- Begin Recording
- Monitor Recording
- End Recording

5.4.1 Trace/Trigger Monitor Operation

The TRACE/TRIGGER MONITOR provides the only way to monitor what the 64300 is doing during a recording. This may be done if it is known that the recording will take some time or if it is suspected that too much time is being taken. Usually, recordings are done too quickly for the monitor to be effective. Figure 5-29 shows the TRACE/TRIGGER MONITOR operation. Circle numbers are keyed to the following notes that explain how to interpret the monitor display.

① "SLOW CLOCK ON: "X+X"-This message has two meanings: there is really no clock or a very slow clock (less than 20 ms) is active. If the "SLOW CLOCK ON:" message is blinking off and on, it indicates the moments when the source clock edge is active. If the message remains on, there is a problem with the clock source(s).

② "PRETRIGGER SAMPLING"-The blinking space in these bar graphs indicates that the pretrigger sampling phase is active.

③ Trigger Sequence Display - In this field the TRIGGER MENU functions are displayed to remind the user of the Trigger configurations programmed. This is displayed only during a Pre-Trigger Sampling phase.

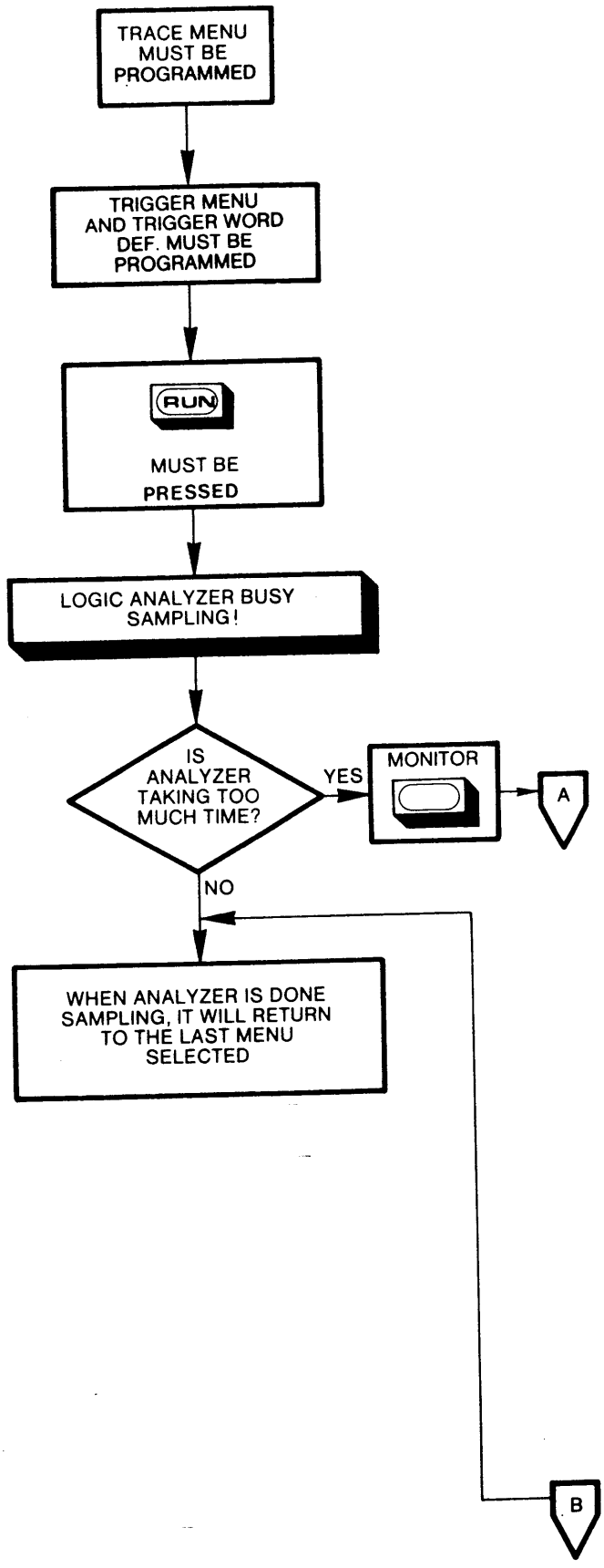
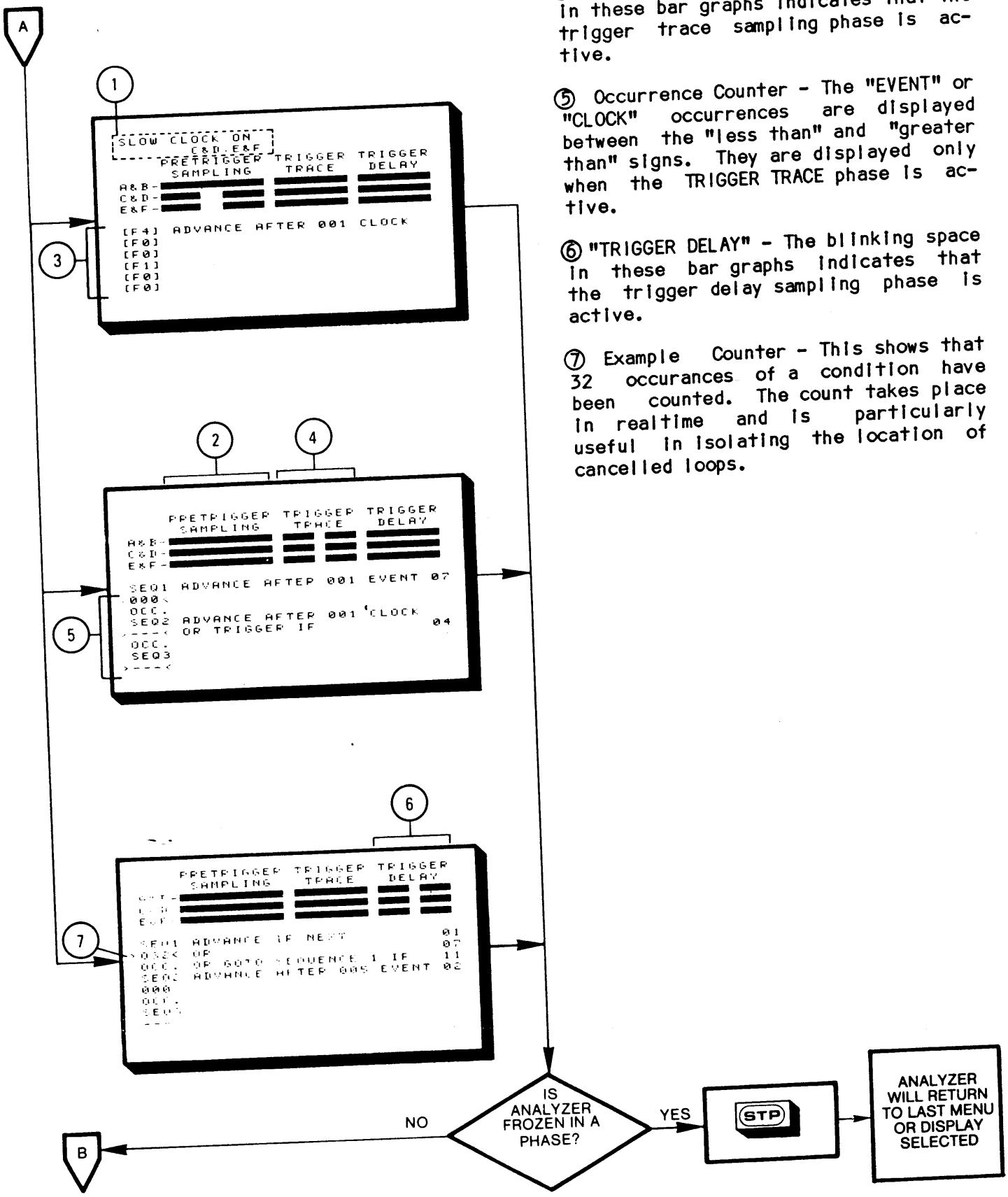


FIGURE 5-29A. TRACE / TRIGGER MONITOR OPERATION



④ "TRIGGER TRACE" - The blinking space in these bar graphs indicates that the trigger trace sampling phase is active.

⑤ Occurrence Counter - The "EVENT" or "CLOCK" occurrences are displayed between the "less than" and "greater than" signs. They are displayed only when the TRIGGER TRACE phase is active.

⑥ "TRIGGER DELAY" - The blinking space in these bar graphs indicates that the trigger delay sampling phase is active.

⑦ Example Counter - This shows that 32 occurances of a condition have been counted. The count takes place in realtime and is particularly useful in isolating the location of cancelled loops.

FIGURE 5-29B. TRACE / TRIGGER MONITOR OPERATION

5.5 DATA ANALYSIS MODE

The Data Analysis Mode allows for powerful analysis functions of recorded data by use of the TIMING DIAGRAM, LIST DISPLAY, and other optional features that may be combined with these. Many of the TIMING modes, interpretation aspects, and operating procedures are the same as those for the LIST DISPLAY. In fact, it is possible to transfer from one to the other and observe the analogous positions of the Trigger Point, Set Point, Cursor positions, etc. They both work with the same memory contents at the same time.

The true flexibility of analysis capabilities of the 64300 is evident by the fact that the analysis functions of the TIMING and LIST displays can be operated independently of one another. As an example, the user may use the TIMING DIAGRAM to indicate unequal conditions between the Source and the Reference memories, while at the same time conducting complex programmed search routines for specific word sequence with the LIST DISPLAY.

The major difference between them is that the LIST DISPLAY shows data on each line channel in numeric form (depending on the number base selected), while the TIMING DIAGRAM offers the same information in graphic form.

Detailed interpretation instructions and specific operating procedures are provided in this section for the following:

- Timing Diagram Analysis
- Timing Diagram Memory Functions
- Timing Diagram Search Functions and Interpretation
- 300 MHz Burst Memory Display Operational Theory
- 300 MHz Burst Memory Display Analysis
- List Display Analysis
- List Display Memory Functions
- List Display Search Functions and Interpretation
- Options

5.5.1 Timing Diagram Analysis

The TIMING DIAGRAM primarily displays the logic states of all channels recorded. It also shows other forms of data and provides control over the analyzer memory and search functions. These are covered in separate sections under their respective titles. Refer to Figure 5-30 in the following explanations of the TIMING DIAGRAM. Figure 5-30 shows the TIMING DIAGRAM in the 1K Format only. Circle numbers and letters in the figure are keyed to the text in this section as well as the small TIMING DIAGRAM in the Figure. The TIMING DIAGRAM provides these controls:

- Selection of Pod groups to be displayed
- Selecting magnification
- Moving the magnified display
- Making time measurements
- Arranging channels
- Reprogramming Clock(s) Source
- Controlling memory
- Search functions

5.5.1.1 Pod Group Selection. Pod group selection is done with the "SELECT" pushbutton, ③. In the 1K mode, those Pod groups set to OFF (TRACE MENU) are skipped. In the 2K mode, selection of Pod groups A + B or E + F are also done with the "SELECT" pushbutton. However, all data for Pod groups A + B is presented (in X1 magnification) on the full width of the CRT. If Pod groups E + F are selected, the data will appear to be magnified in relation to Pods A + B.

Check the POD SKEW field in the TRACE MENU to see how many memory locations have been shifted. Depending on the present cursor position, in conjunction with the Pod Skew, the cursor may change position in the E + F Pod group display (it may even disappear). Notice that the cursor position numeric

value, Ⓓ, doesn't change. The same display considerations should be made for the possible difference in appearance of the "SET/CURSOR" position.

5.5.1.2 Selecting Magnification. The TIMING DIAGRAM information may be expanded for a more detailed view of recorded data by pressing the "TMG/MAG" pushbutton, ④. The display of the Pod groups presently selected will be magnified by factors shown in the "MAG=" field heading, Ⓒ. In the 1K Format, Magnification is X1, X5, and X10. In the 2K Format, it is X1, X10, and X20. Note that when the first and second levels of magnification are selected, the display shows all data, Ⓙ, to the right of the cursor, Ⓓ (including the Set Point).

5.5.1.3 Moving the Magnified Display. When any Pod group display is magnified, the cursor is fixed at the left side of the monitor. As further magnification is selected, Ⓚ, the data takes more room on the CRT. Certain elements of the display may momentarily disappear. It is possible to move the data "window," to either the left or right of the display. Pushbutton ⑤ is used to move the window to the left, and pushbutton ⑥ is used to move it to the right. Notice that the Cursor Position numbers, Ⓓ, Cursor Set Point numbers, Ⓕ, and Binaray Information field, Ⓗ, also change with respect to Cursor movement.

5.5.1.4 Making Time Measurements The evenly spaced dotted lines, Ⓝ, show 100 memory locations in the 1K Format and 200 memory locations in the 2K Format. These are shown as 16 vertical dots, forming 10 rows across the screen. These may be used for quick approximation of memory (time). To make detailed time measurements of a desired area of the display, several methods are available. In field heading, Ⓓ, a time value based upon the sample clock of the recording is shown.

The memory location difference, Ⓖ, between the cursor's present position, Ⓓ, and a selectable Cursor Set Point, Ⓕ, is shown in relation to the sample clock. This reveals the actual amount of time between the two locations. If the recording was taken by an external clock, the difference is presented as the number of samples (memory locations). Note that time (sample) measurement works in both directions from the Cursor "Set" point. Letter Ⓓ shows a negative measurement and Ⓔ shows a positive measurement.

The normal procedure for making logic measurements is to select an area of interest on the display. This is usually at a change of logic state from high to low or low to high. Use the Binary Information field, Ⓗ, to help find a change if it is difficult to see on the display. Proceed as follows:

1) Position the Cursor, either by pressing the "CURSOR" pushbutton (CURSOR group) or by directly entering the desired location.

2) Press the "SET" pushbutton to fix the "Set Point".

3) Position the Cursor again to either before or after the set point, by using the "CURSOR" pushbutton or by direct location.

The difference between the set point and the new cursor position is presented as a half tone inverse video field (shading).

5.5.1.5 Arranging Channels. It is sometimes helpful to view the TIMING DIAGRAM in a way that is not normally presented. For instance, the user may wish to view line channel A3 with B5 immediately under it, delete an entire group of unimportant channels, or rename a previously changed line channel. Figure 5-31 shows the procedures to be used when changing the channels displayed. The following functions are available:

- Delete a line
- Reassign a Pod Number
- Change (swap) Pods
- Recall functions

5.5.1.6 Reprogramming The Clock(s) Source. In the TIMING DIAGRAM it is possible to change two trace parameters which are usually programmed in the TRACE MENU:

1) The Internal Clock sample rate
2) The clock source for recording

You do not need to advance the cursor to the "CLK" field heading, Ⓞ . Simply use the "ROLL" pushbutton to select the desired clock. Enter the Internal Clock sample rate with the "DEC" and "INC" pushbuttons. The TRACE MENU is automatically changed as well. When a recording is desired, press the "RUN" pushbutton. The new recording results are displayed in the TIMING DIAGRAM and the "CLK" field stops blinking.

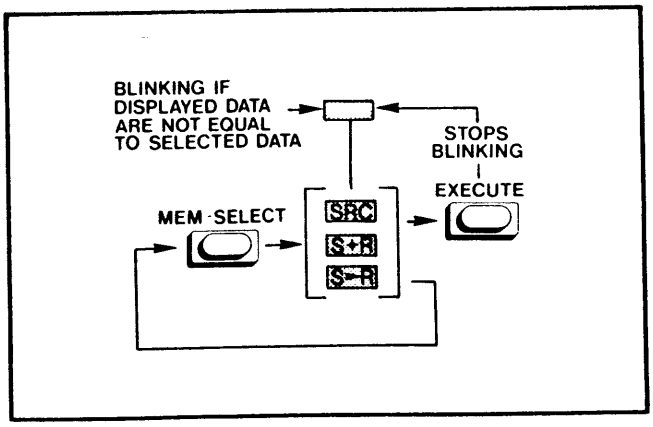


FIGURE 5-32. TIMING DIAGRAM MEMORY SELECTION

5.5.2 Timing Diagram Memory Functions

In the TIMING DIAGRAM, it is possible to display the contents of the Source Memory (SRC), an OR function of both the Source and Reference Memories (S + R), and to transfer the present Source Memory contents to the Reference Memory (S -> R). Figure 5-32 shows how these functions are selected.

5.5.2.1 SRC. When the TIMING DIAGRAM is initially selected, it shows the Source Memory contents. Binary information on the logic states for all channels at the current cursor position is shown at the bottom of the display (See Figure 5-31, Ⓗ).

5.5.2.2 S + R. When the "MEM-select" pushbutton is pressed the first time, the "S + R" function is shown on the "MEM" field of the display. Pressing the "EXECUTE" pushbutton causes data of the Source Memory to be shown on the display but with an OR indication of every location corresponding to the Reference memory. If there is a difference of data at the corresponding locations, these positions are highlighted in inverse video, as shown in the Binary Information field of the display. This function can be thought of as an "overlay" of two color transparencies.

5.5.2.3 S -> R. When the "MEM-select" pushbutton is pressed a second time, the "S -> R" function is shown in the "MEM" field of the display. Pressing the "EXECUTE" pushbutton causes the analyzer to transfer data from the present Source Memory to the Reference Memory. All previous Reference Memory information is lost, and it is replaced by the new or actual Source Memory. A new recording (Source) can now be done, and a comparison between the old Source (now Reference) and the new Source data can be made.

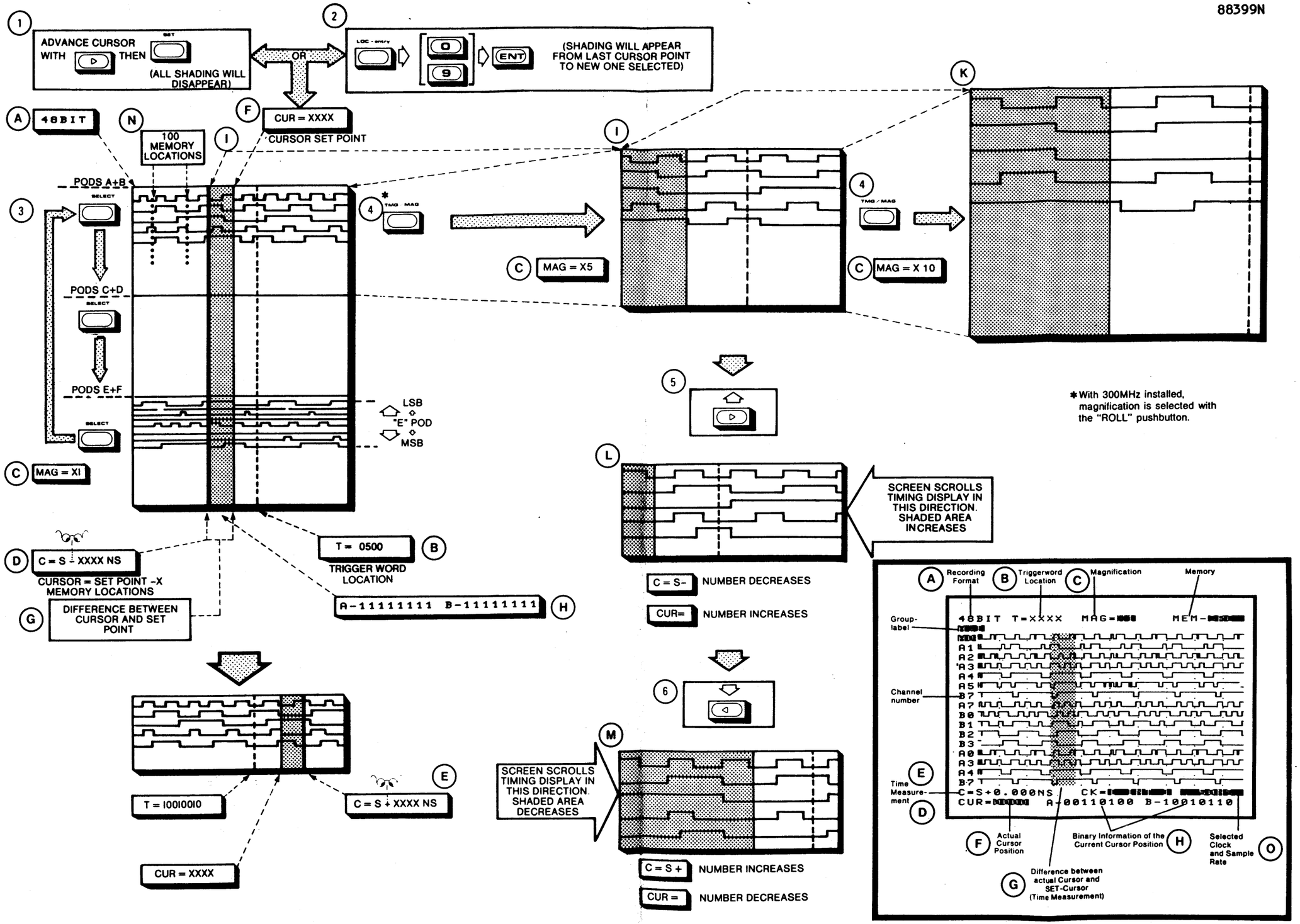
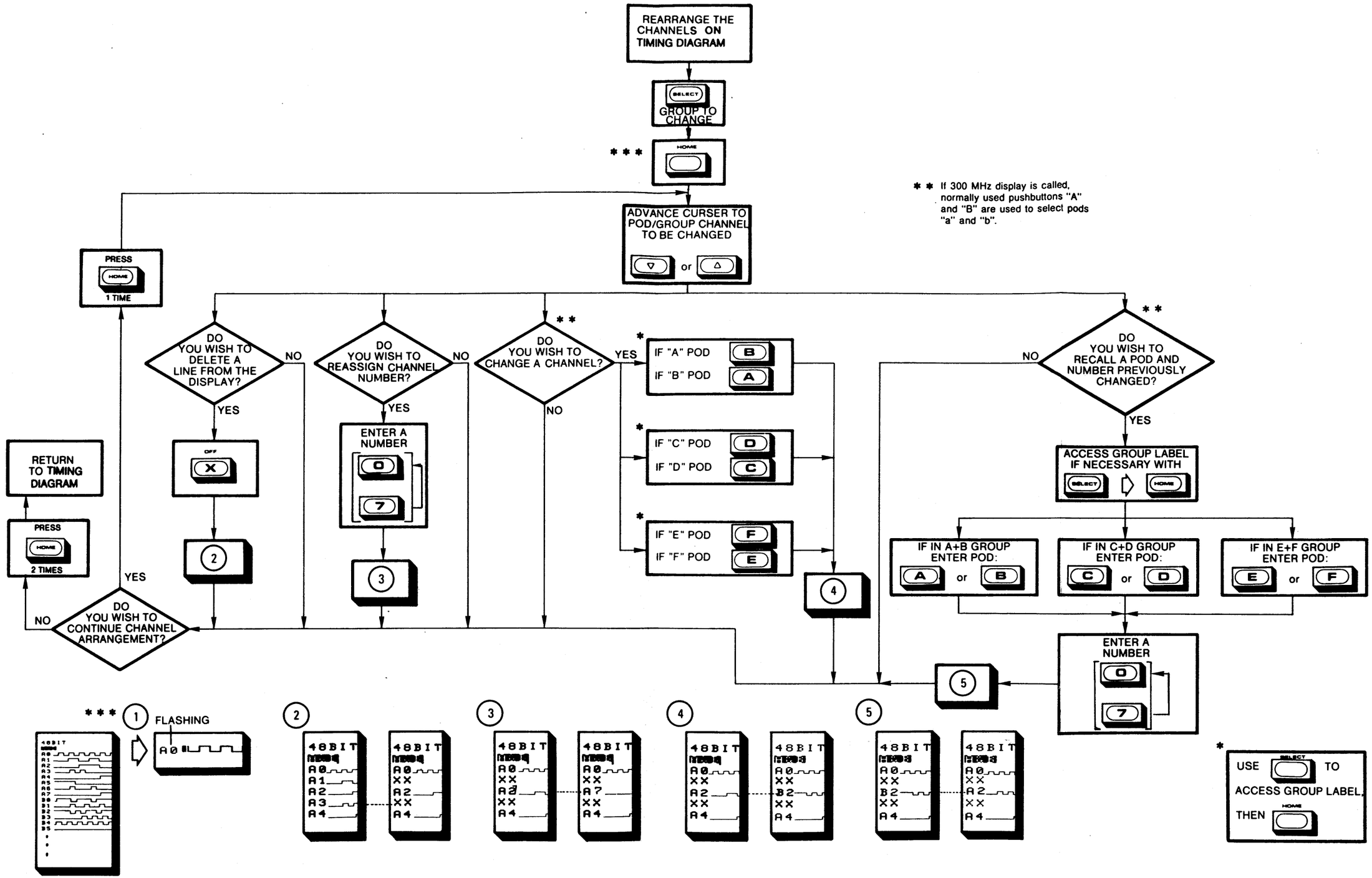


FIGURE 5-30. TIMING DIAGRAM ELEMENTS



* If 300 MHz display is called, normally used pushbuttons "A" and "B" are used to select pods "a" and "b".

FIGURE 5-31. TIMING DIAGRAM CHANNEL ARRANGEMENT

5.5.3 Timing Diagram Search Functions

This section provides details on procedures used to operate the search functions. Figure 5-33 shows the selection order. Figure 5-34 is a flowchart showing these procedures on several pages. Additionally, means of analysing the search results are given after the sections explaining those functions. The search functions associated with the TIMING DIAGRAM provide powerful and flexible means of analysing recorded data. The following search functions are available:

- S = R
- S ≠ R
- Word
- Sequence

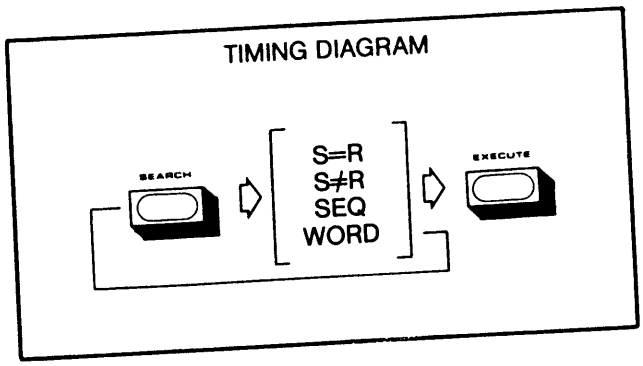


FIGURE 5-33. TIMING DIAGRAM SEARCH SELECTION

Note that the order presented is not the same as selections order. This is done for clarity of explanation. In Figure 5-33 the selection order is maintained. It is important for the user to know that the search mode selected is only done for the data Pod displayed--not for all active Pod groups. Also note that the memory format used effects the search functions. In the 1K Format the memory is tested from location 0 to 999 of the programmed search condition. In the 2K Format the search is done for the whole Pod group, but only in the range of the 1K Pod group, E + F, depending on the POD SKEW programmed. See Section 5.3.1.5 for details. If in the 2K Format, the Pod groups E + F are turned OFF, the search is done automatically from location 0 to 1999.

5.5.3.1 S = R. When this function is selected, the analyzer executes a search in the range of the allowable area (either 1K or 2K formats). It searches for conditions when the Source Memory equals the Reference Memory. During this time it displays the number of search cycles (SEARCH EVENT) and the total number of times the condition is true (TOTAL). See Figure 5-34A for operating details.

5.5.3.2 S ≠ R. This function operates in the same way as the S = R function, except that the analyzer looks for unequal conditions between the Source and Reference Memories. See Figure 5-34A for operating details.

5.5.3.4 Word. The Word search function allows the user to input a particular word desired for search directly into the TIMING DIAGRAM display. The word is entered in Binary form for all channels desired. When this mode is executed, the analyzer will search for the word and display the first occurance of it in memory. See Figure 5-34D for details on operating procedures to program the Word search.

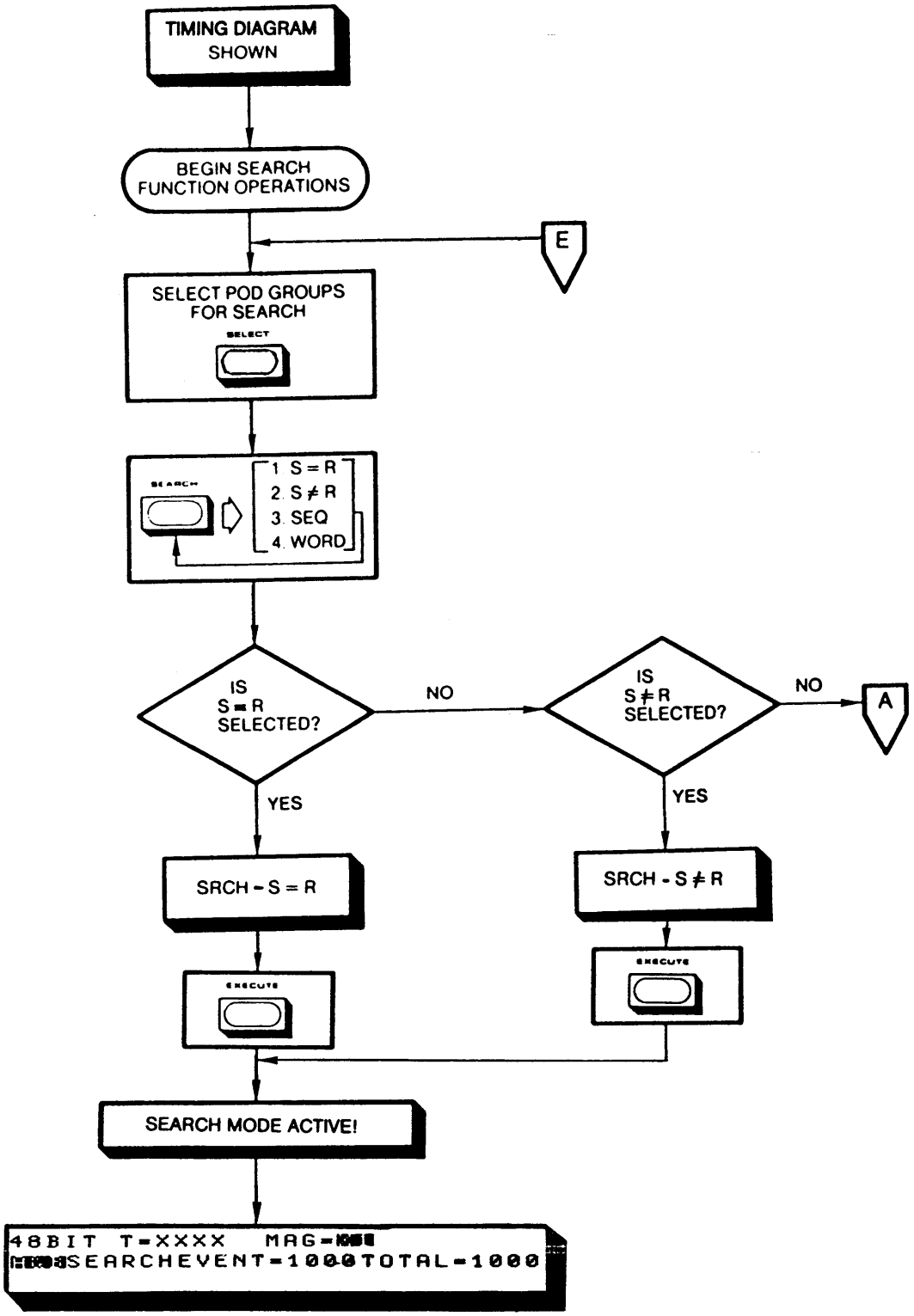


FIGURE 5-34A. TIMING DIAGRAM SEARCH

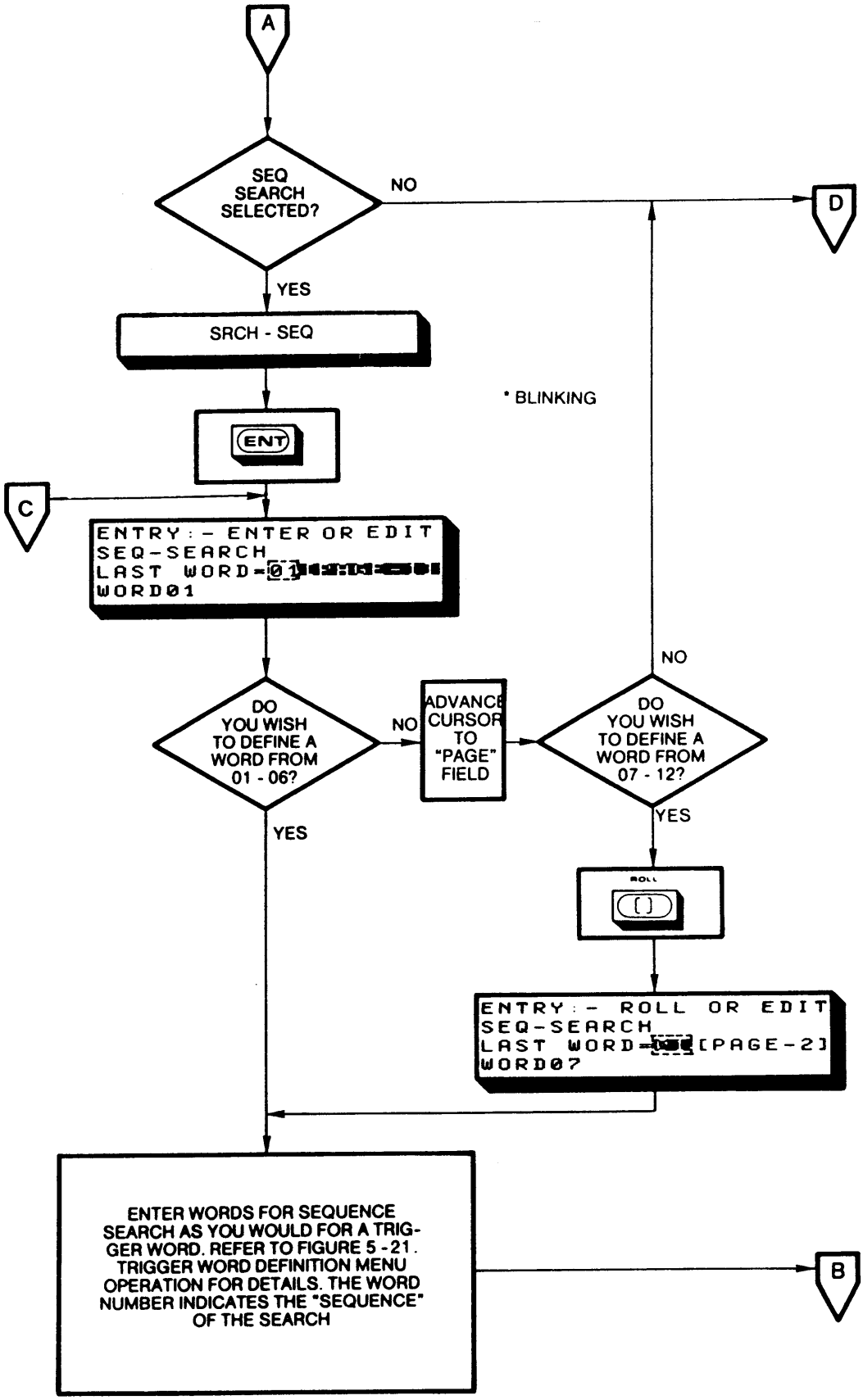


FIGURE 5-34B. TIMING DIAGRAM SEARCH

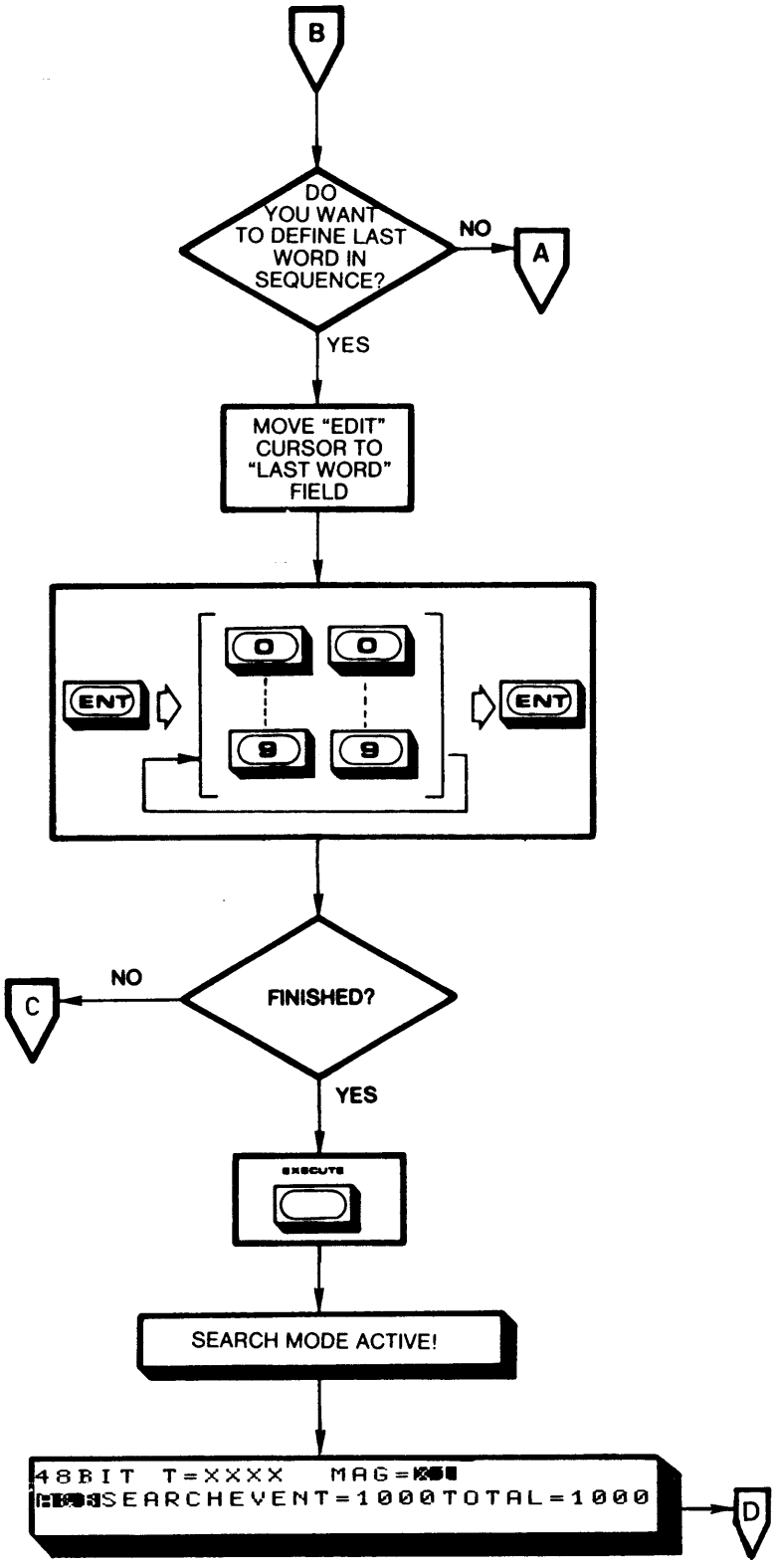


FIGURE 5-34C. TIMING DIAGRAM SEARCH

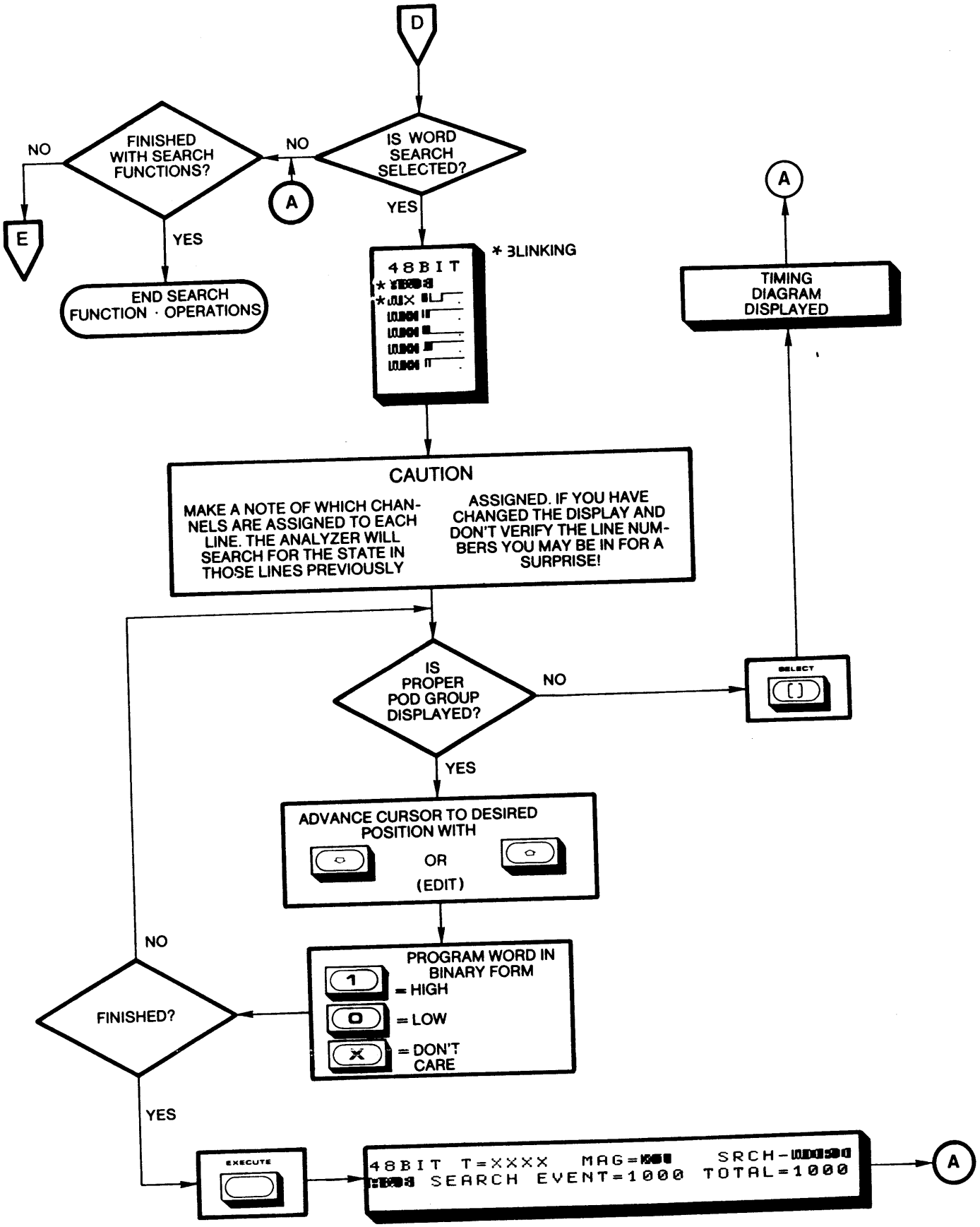


FIGURE 5-34D. TIMING DIAGRAM SEARCH

5.5.3.5 Interpreting S = R, S ≠ R, and WORD SEARCH Results. See Figure 5-35 for reference in the following discussion. At every true event of the programmed mode, an internal counter is incremented beginning at 0, and is shown in the "TOTAL" field heading. After the search is executed, the cursor moves automatically to the beginning position of the next search event in the programmed mode. The automatic direction of cursor movement is towards the higher number in memory location. As with the Memory Functions, differences of data are also shown in inverse video in the Binary Information field. An indication of the present cursor position is shown in the "SEARCH EVENT" field heading as well as in the CUR = XXX field.

By pressing the "EXECUTE" pushbutton, the user may advance the cursor through the memory to find each occurrence of a "true" condition. At the first pressing of the "EXECUTE" pushbutton, the cursor moves to the beginning of the event and displays the "TOTAL" number of conditions true. At the next pressing of the "EXECUTE" pushbutton, the cursor moves to the end of the event. This action can be repeated indefinitely.

Note:

Use only the "CURSOR" group pushbuttons to move the cursor locations through the display. If you change the TIMING DIAGRAM, or exit from it, the Search function selected will be disabled.

If there are more than one events that follow immediately, one after the other, the cursor moves to the beginning of the first block at an EXECUTE command (SEARCH EVENT). The cursor moves to the end of the block of search events. At the next "EXECUTE" command, this operation is repeated until the highest number of events in the memory has been reached. The cursor then automatically recycles back to the beginning of the memory (or search area).

Between every "EXECUTE," after search, the user may move the cursor at random to any position in the TIMING DIAGRAM without disabling the search mode selected. This movement is accomplished with the cursor movement pushbuttons in the keyboard "CURSOR" group only. As long as the "SEARCH EVENT" and "TOTAL" messages are displayed, the cursor can be moved in the search mode. When the TIMING DIAGRAM is further modified, the search mode is disabled.

5.5.3.6 **Sequence.** The Sequence search function is an extended word search. When this function is selected, a maximum of 12 words (each up to 48 bits wide) may be searched for in a programmed sequence. The sequence search is presented on two "pages." Page one provides programming for words 1 through 6, and page two provides programming for words 7 through 12. The number of the word entered is its number in the sequence. The analyzer will look for each occurrence of that particular sequence. The "Last Word" is used to tell the analyzer where to stop in the sequence. Thus, a sequence of 12 words may be entered, but the user may program varying length of the sequence by using the "Last Word" option. Figure 5-34B and 5-34C describes the procedures used to program the Sequence Search.

5.5.3.7 **Interpreting Sequence Search Results.** When the Sequence function is executed and the results are displayed, the interpretation is somewhat different from the other search functions. The "TOTAL" then means that this is the number of completely found programmed sequences--not the number of single words contained in a sequence event. Also, by pressing the "EXECUTE" pushbutton, the cursor moves automatically to the next beginning of a true sequence--not to the end of the current event.

As with the other Search functions, the cursor may be moved at random within the TIMING DIAGRAM as long as this search function is active. It will be disabled once the TIMING DIAGRAM is further modified.

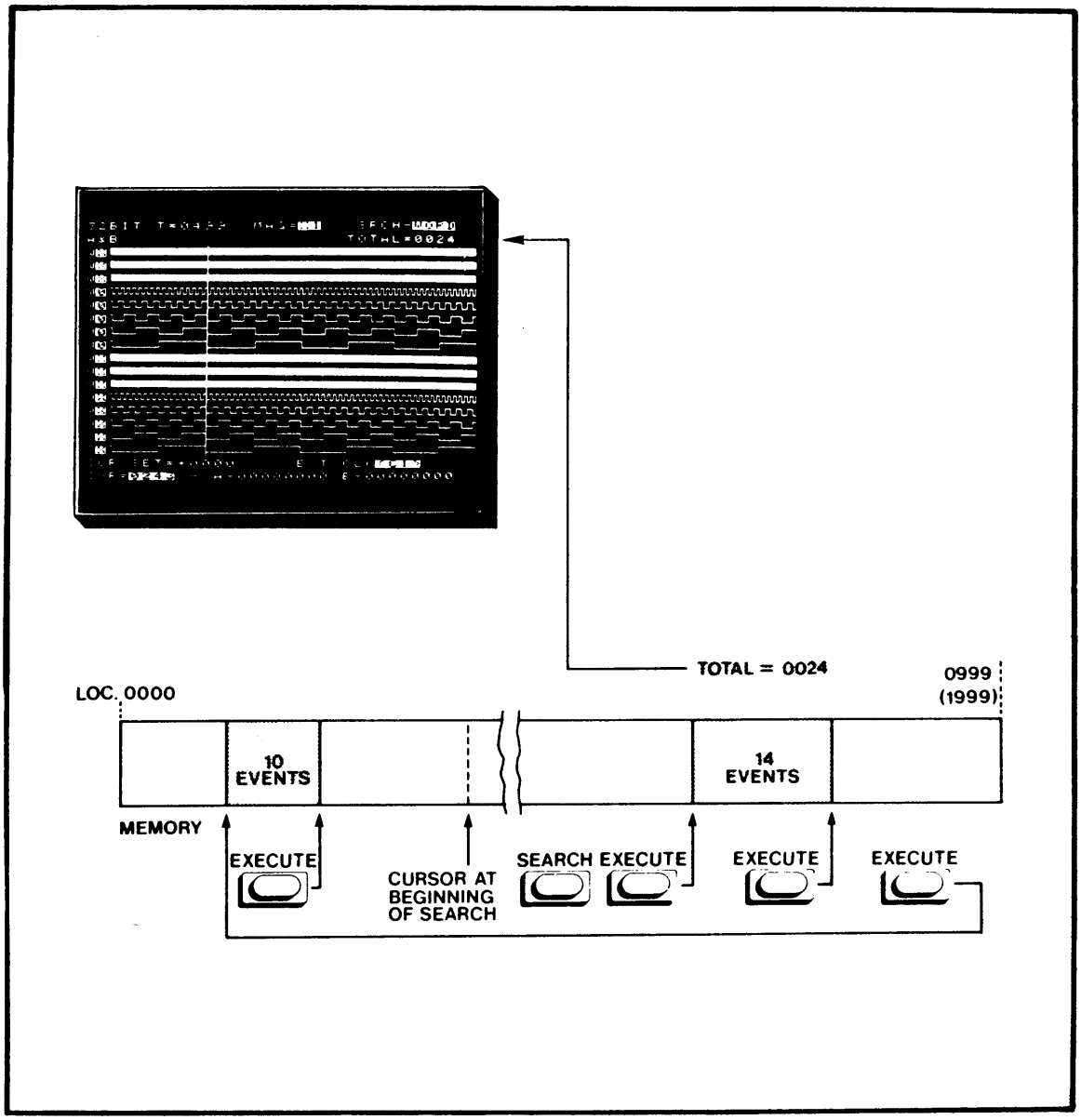


FIGURE 5-35. EXECUTING SEARCH IN TIMING DIAGRAM

5.5.4 300 MHz Burst Memory Operational Theory

The 300 MHz Burst Memory provides the user with a higher speed sampling capability than is available with the normal recording mode. The sixteen input channels labelled "a" and "b" are clocked with a sample rate as low as 3.3 ns into a 512 Words deep, high-speed memory. The 300 MHz function receives data from the Input Pods "a" and "b". The recording window is centered around the last trigger occurrence. Timing measurements are enhanced with an Independent Cursor and Cursor Set function on a separate Timing Display.

This display can be magnified X1, X5 and X10 so that fine data structures may be clearly examined. Because the standard four channel ALP has a rise time of 2 ns and a skew of less than 1 ns, measurements can be made with a timing error of less than one sample period. Thus, the 300 MHZ MEMORY DISPLAY appears to the user as if a magnifying lens had been placed over the trigger region in the data memory.

NOTE

Displaying channels "a + b" will cause "E + F" to be cancelled from the TIMING DIAGRAM. Data on channels "E + F" can be viewed in the LIST DISPLAY.

5.5.4.1 300 MHz Overlay Method. The 64300 Burst Memory is an independent logic analyzer with its own timebase, which can be overlaid to memory blocks A, B, C, D, E and F.

Triggering of the Burst Memory is accomplished by the TRIG OUT B, which is also available at the rear panel of the 64300. After the TRIG OUT B goes active, the Burst Memory is stopped with a delay so that the trigger can be located between memory locations 0 and 256 of the display.

This delay is used to check out the trigger conditions and to synchronize trigger words from the different memory blocks. The delay, which is dependent upon how many NOT or OFF trigger sequences follow after the last ADVANCE trigger sequence, is automatically compensated for within the logic analyzer. Therefore, the trigger marker is always located exactly at the last ADVANCE trigger word.

Because the TRIG OUT B point is always near the center of the Burst Memory, the actual trigger word is located to the left of this point, depending on the ratio of the burst clock interval to the internal sample clock interval. This ratio is automatically determined and limited by the software, to ensure that the trigger can always be identified within the the 300 MHZ BURST MEMORY TIMING DIAGRAM. Note that the trigger word location can also be affected by which sequential level the last ADVANCE condition was programmed.

5.5.5 300 MHz Burst Memory Analysis

Analysis of the 300 MHZ BURST MEMORY TIMING DIAGRAM is exactly like that of the normal TIMING DIAGRAM, as outlined in Sections 5.5.1 through 5.5.3. The methods of manipulating the display as well as using the memory and search functions are identical, with the following exceptions:

- Magnification must be changed using the ROLL pushbutton, not the TMG-MAG. Magnification is selected in X1, X5, and X10 ranges.

- The Trigger Marker must be considered to be where the last ADVANCE trigger condition is, to the left of this point.

5.5.5.1 Programming the Burst Memory Timebase. The Burst Memory Timebase clock can be changed while the memory is displayed using the INC/DEC pushbuttons. This is the only recording parameter which must be additionally programmed. At power-up, the clock is set to 300 MHz. It represents a second internal clock, ranging from 3.3 ns to 10 ms. The ratio between the two timebases can be seen when the displays are called. See Table 5.3 for the 300 MHz Burst Memory Clock settings.

TABLE 5-3. 300 MHz BURST MEMORY CLOCK

Burst Clock Select F(N)			
N = 00	3.3 ns	N = 11	10 us
01	6.6 ns	12	20 us
02	13.3 ns	13	50 us
03	20 ns	14	100 us
04	50 ns	15	200 us
05	100 ns	16	500 us
06	200 ns	17	1 ms
07	500 ns	18	2 ms
08	1 us	19	5 ms
09	2 us	20	10 ms
10	5 us		

5.5.6 List Display Analysis

The LIST DISPLAY primarily shows the data recorded at each memory location of all line channels in numerical form. It also provides control over the analyzer memory and search functions. These are covered in separate sections under their respective titles. Refer to Figure 5-36 in the following explanation of the LIST DISPLAY operation. Circle numbers in the figure are keyed to the text in this section. The LIST DISPLAY provides these controls:

- Cursor movement and control
- Making sample measurements
- Changing Pod groups parameters
- Arranging channels in display
- Controlling memory
- Search functions

5.5.6.1 Cursor Movement And Control. Cursor movement is shown in Figure 5-36. Circle number ① shows that the cursor can be moved up or down on the monitor with the Keyboard CURSOR group pushbuttons. Circle number ② shows how to position the "Set" point. Number ③ illustrates how to directly enter the location desired for the cursor.

5.5.6.2 Making Sample Measurements. Sample memory measurements are expressed as the difference between the cursor's present position and a selectable Cursor "Set" point as shown in the field heading "C = S +/- XXXX" (Circle number ④) in the LIST DISPLAY. Note that as in the TIMING DIAGRAM the sample measurement works in both directions from the cursor set point.

The normal procedure for making logic measurements is to select an area of interest on the display. Then proceed as follows:

1) Position the cursor, either by pressing the CURSOR pushbuttons (CURSOR group) or by directly entering the desired location.

2) Press the "Set" pushbutton to fix the "Set Point".

3) Position the cursor again to either before or after the set point, by using the CURSOR pushbuttons or by direct location.

The measurement is the resultant difference between the new cursor position and the set point, as expressed in the "C=S +/- XXXX" field heading.

5.5.6.3 Changing Pod Group Parameters. As with the TIMING DIAGRAM, it is sometimes helpful to view the LIST DISPLAY in a way that it is not normally presented. For instance, the user may wish to delete Pods, change the number base, etc. It is possible to make such changes to Pod groups that are already displayed on the monitor (not previously changed). Number keys to Figure 5-36 that show procedures and the changes possible are as follows:

- Turn a Pod OFF (delete from display) ⑥
- Change the Pod name ⑦
- Change the Pod polarity ⑧
- Change the number base ⑨

To make the changes listed above, the cursor must be in the "HOME" position. This is indicated by the "Greater Than" sign in flashing inverse video. See circle number ⑤. With these functions, it is possible to mix number bases of Pod groups on the display. For instance, Pod group A may be presented in Binary, Pod group B in Hex. and Pod group C in Octal.

5.5.6.4 Arranging Channels In The Display. The procedure to add a Pod group back to the display once it has been deleted is shown in circle number ⑩.

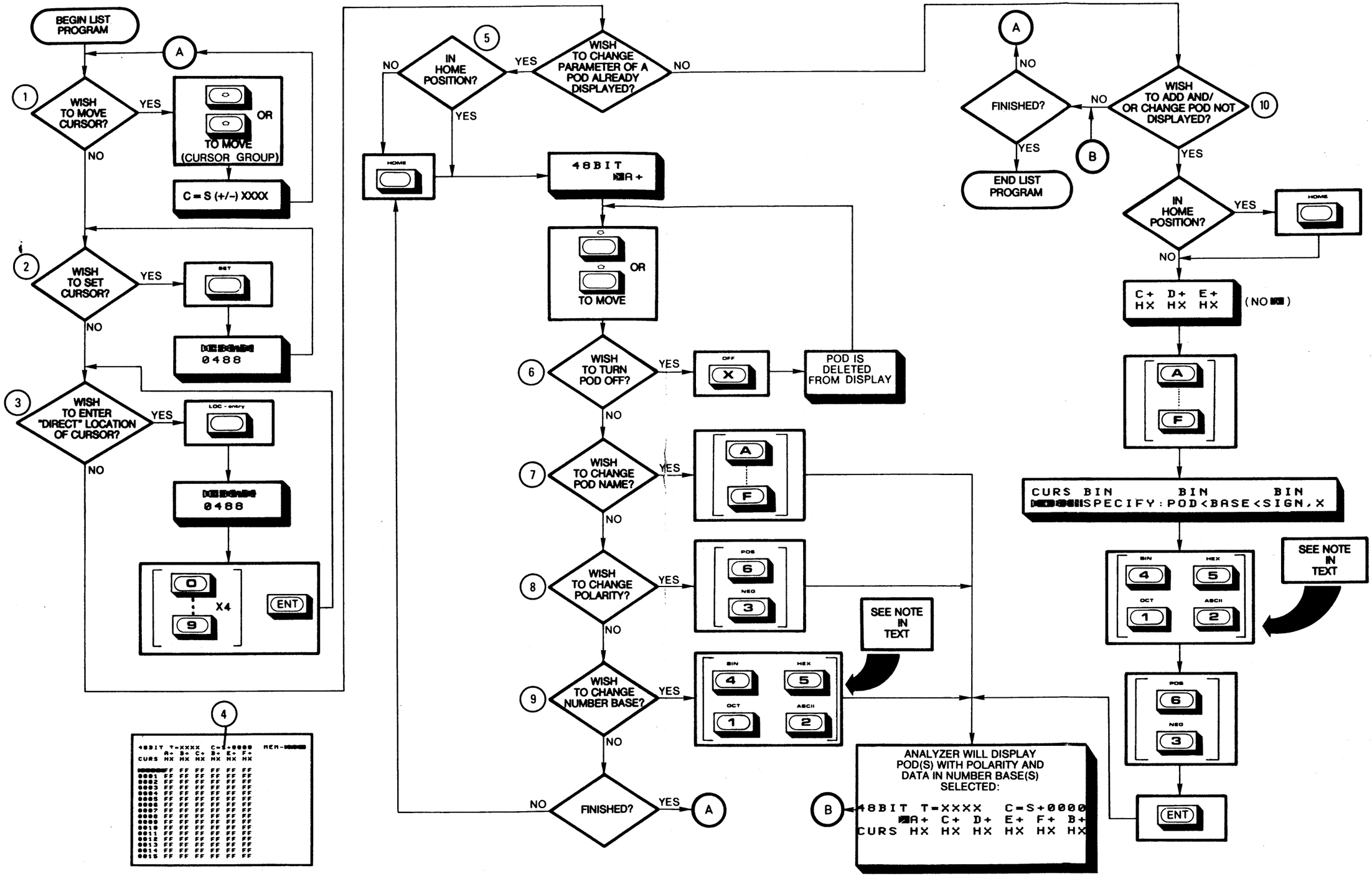


FIGURE 5-36. LIST DISPLAY OPERATION

NOTE

Pod groups display is limited by the size of the CRT. Therefore the column (Pod) to be reprogrammed assumes highest priority. The analyzer performs a shift operation of the displayed data, depending on how much space is available in either direction. The analyzer will warn the user prior to the "EXECUTE" command which Pod(s) will be deleted. This is done by flashing the label(s) in inverse video.

5.5.7 List Display Memory Functions

In the LIST DISPLAY, it is possible to call up the contents of the Source Memory (SRC), the Reference Memory (REF), an OR function of both Reference and Source memories (R + S), and an EXCLUSIVE OR of the Source and Reference memories (S + R). Figure 5-37 shows how these functions are selected.

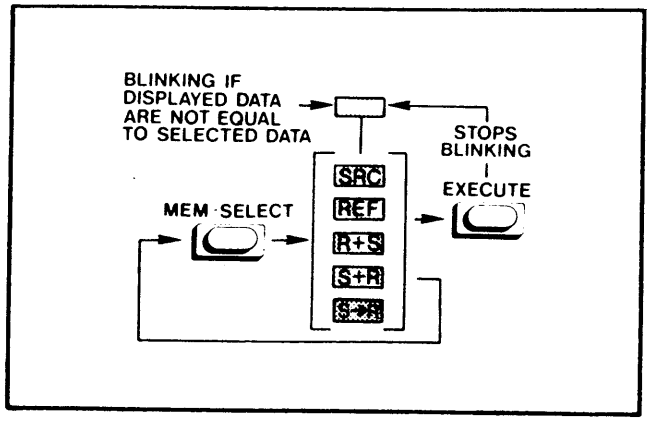


FIGURE 5-37. LIST DISPLAY MEMORY SELECTION

5.5.7.1 SRC. When the LIST DISPLAY is initially selected, it shows the Source Memory contents. This is presented in numerical form, depending upon the number base selected. The initial display shows Pod group data in Hexadecimal form.

5.5.7.2 REF. When the "MEM-select" pushbutton is pressed the first time, the "REF" function is shown in the "MEM" field of the display. Pressing the "EXECUTE" pushbutton causes the contents of the Reference memory to be displayed.

5.5.7.3 R+S. When the "MEM-select" pushbutton is pressed a second time, the "R+S" function is shown in the "MEM" field of the display. Pressing the "EXECUTE" pushbutton causes the Reference Memory to be displayed, but with an OR indication of every location corresponding to the same Source Memory location. If there is a difference of data at the corresponding locations, these positions are highlighted in inverse video. Movement of the cursor in either direction shows the differences between the two memories in inverse video.

5.5.7.4 S+R. When the "MEM- select" pushbutton is pressed a third time, the "S+R" function is shown in the "MEM" field of the display. Its function is exactly the same as the "R+S" except that the OR is based upon the Source Memory contents.

5.5.7.5 S->R. When the "MEM-select" pushbutton is pressed a fourth time, the "S->R" function is shown in the "MEM" field of the display. Pressing the "EXECUTE" pushbutton causes the analyzer to transfer data from the present Source Memory to the Reference Memory. All previous Reference Memory information is lost, and it is replaced by the old Source Memory. A new recording (Source) can be now done, and a comparison between the old Source (now Reference) and the new Source data can be made.

5.5.8 List Display Search Functions

This section provides details on procedures used to operate the search functions. Figure 5-38 shows the selection order. Figure 5-39 is a flowchart showing these procedures on several pages. Additionally, means of analysing the Search results are given after the section explaining those functions. The search functions associated with the LIST DISPLAY provide powerful and flexible means of analysing recorded data. The following search modes are available:

- S = R
- S ≠ R
- Word
- Sequence

Note that the order presented is not the same as selection order. This is done for clarity of explanation. In Figure 5-38, the selection order is maintained. It is important for the user to know that the search mode selected is only done for the data Pod displayed--not for all active Pod groups. Also note that the memory format used effects the search functions. In the 1K Format, the memory is tested from location 0 to 999 of the programmed search condition. In the 2K Format, the search is done for the whole Pod group, but only in the range of the 1K Pod group, E+F, depending on the POD SKEW programmed. See section 5.3.1.5 for details. If, in the 2K Format, the Pod groups E+F are turned off, the search is done automatically from location 0 to 1999.

5.5.8.1 S = R. When this function is selected, the analyzer executes a search in the range of the allowable area (either 1K or 2K formats). It searches for conditions when the Source memory equals the Reference memory. During this time, it displays the number of search cycles (SEARCH EVENT) and the total number of times the condition is true (TOTAL). See Figure 5-39A for operating details.

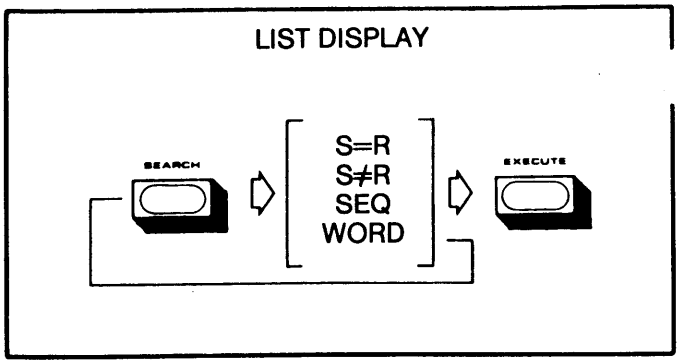


FIGURE 5-38. LIST DISPLAY SEARCH SELECTION

5.5.8.2 S ≠ R. This function operates in the same way as the S = R function, except that the analyzer looks for unequal conditions between the Source and Reference memories. See Figure 5-39A for operating details.

5.5.8.3 Word. The word search function allows the user to input a particular word desired for search directly into the LIST DISPLAY. The word is initially entered in Hexadecimal form for all channels desired. When this mode is executed, the analyzer will search for the word and display the first occurance of it in memory. See Figure 5-39B for details on operating procedures to program the Word search.

5.5.8.4 Interpreting S=R, S≠R, and WORD Search Results. See Figure 5-40 for reference in the following section. At every true event of the programmed mode, an internal counter is incremented beginning at 0, and is shown in the "TOTAL" field heading. After the search is executed, the cursor moves automatically to the beginning position of the next search event in the programmed mode. The automatic direction of cursor movement is towards the higher number in memory location. As with the Memory Control functions for the LIST DISPLAY, differences of data are also shown in inverse video. An indication of the present cursor position is shown in the "SEARCH EVENT" field heading as well as the "CUR=XXXX" field.

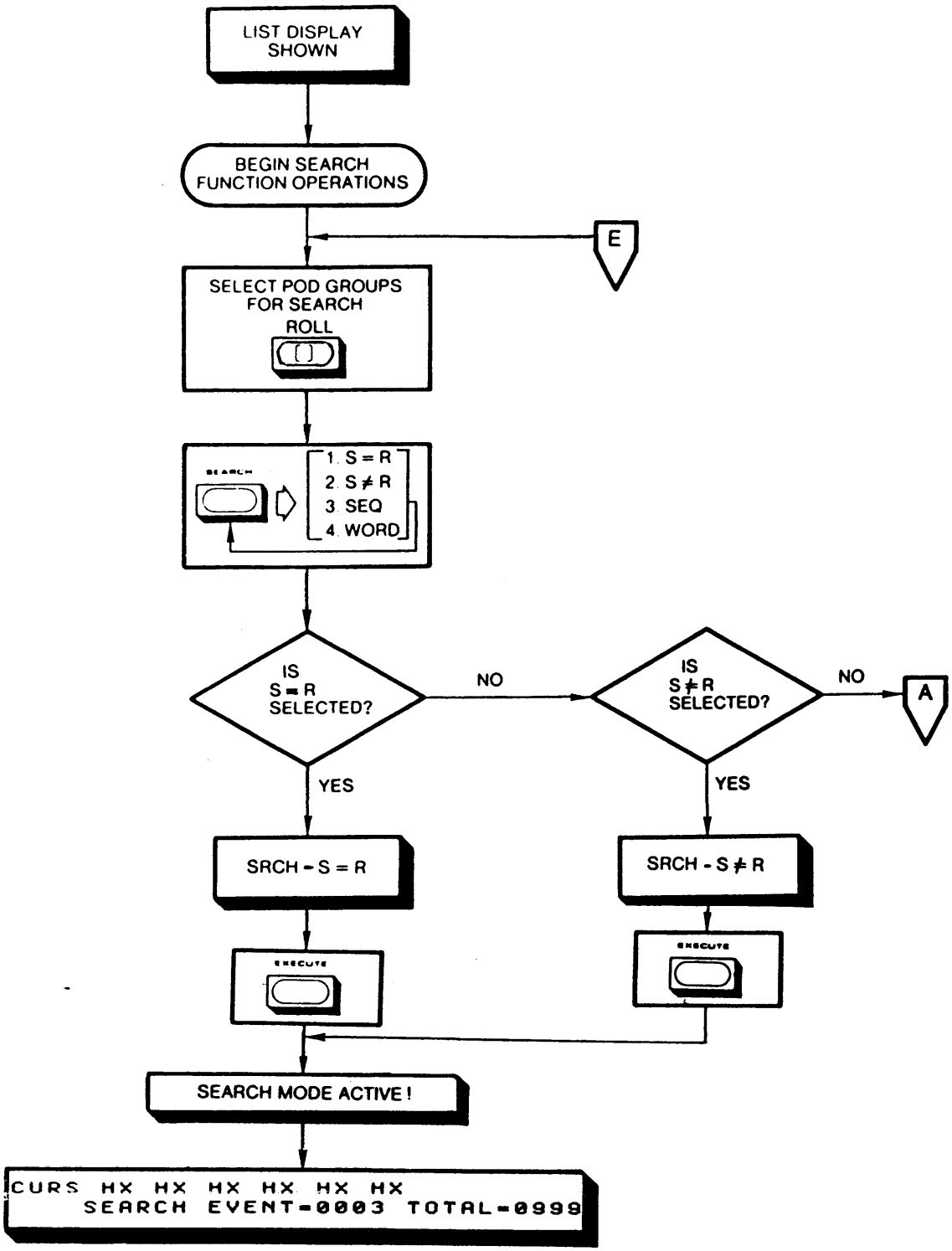


FIGURE 5-39A. LIST DISPLAY SEARCH

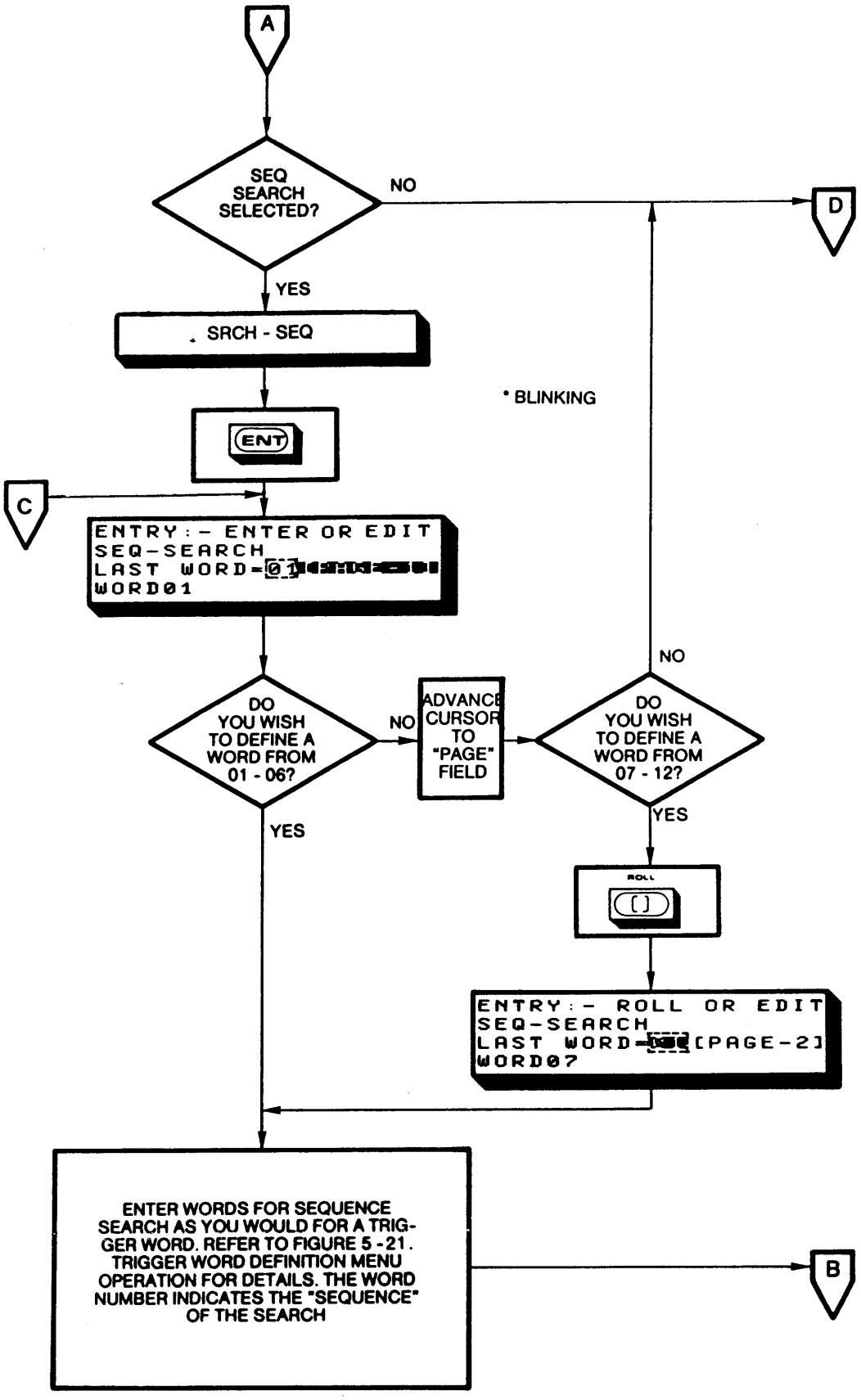


FIGURE 5-39B. LIST DISPLAY SEARCH

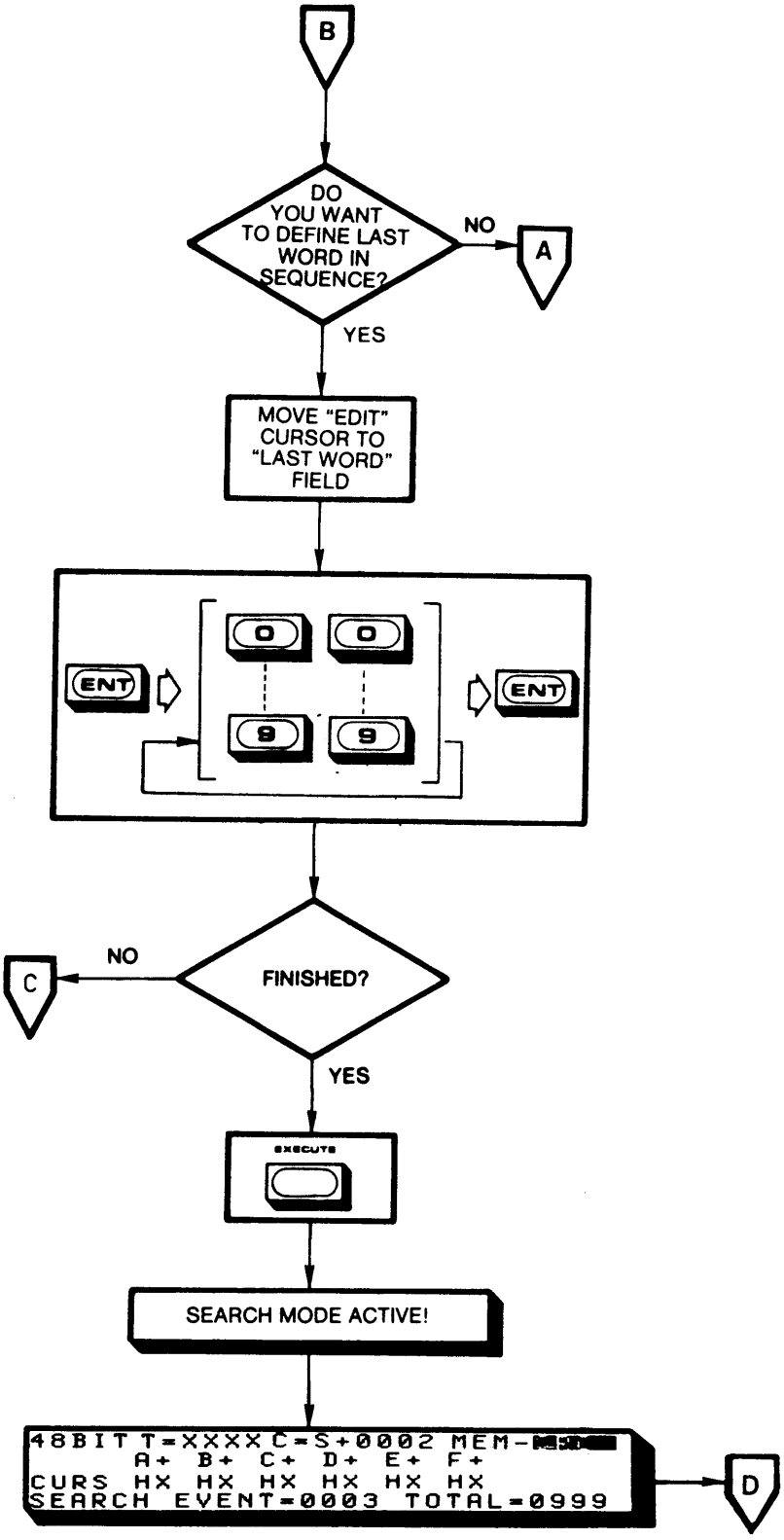


FIGURE 5-39C. LIST DISPLAY SEARCH

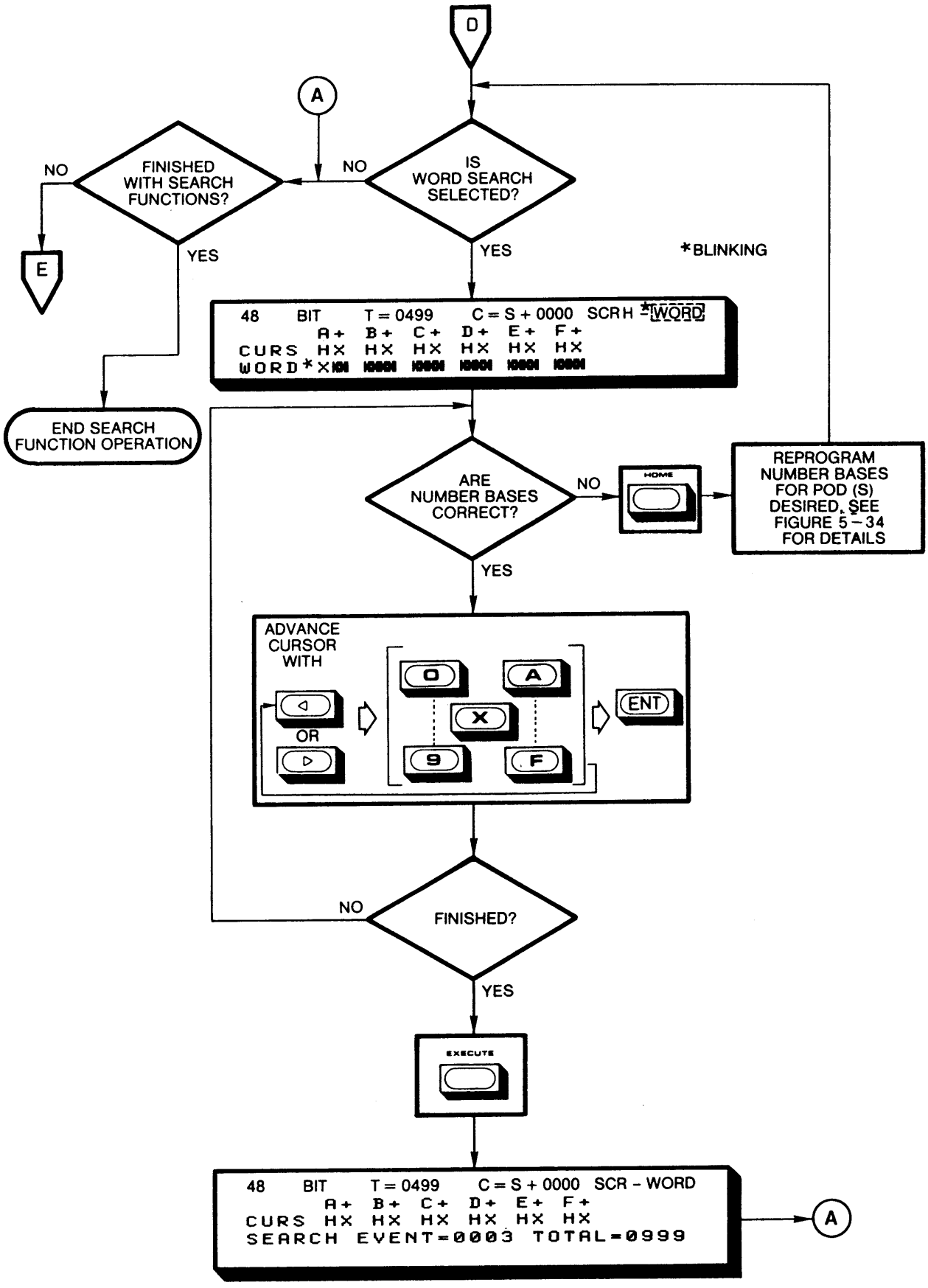


FIGURE 5-39D. LIST DISPLAY SEARCH

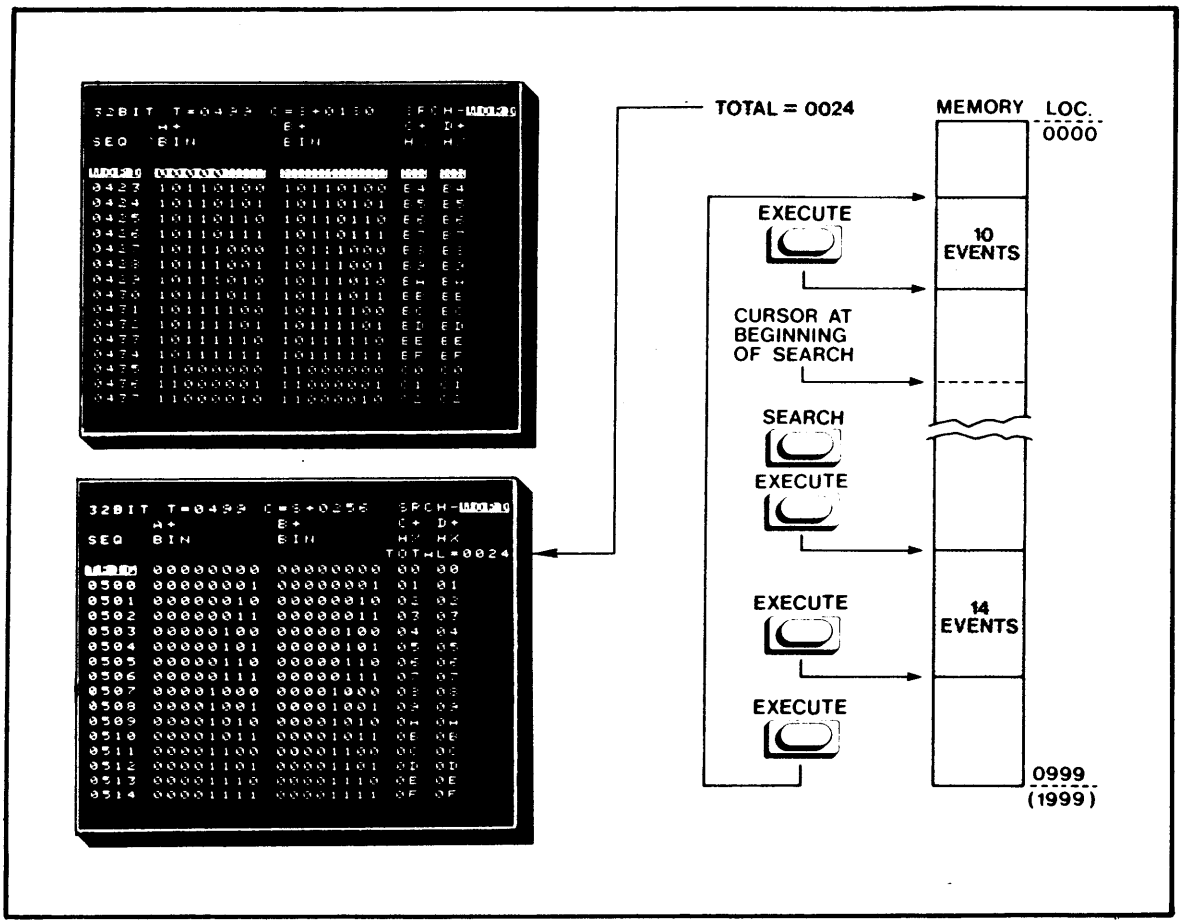


FIGURE 5-40. EXECUTING SEARCH IN LIST DISPLAY

By pressing the "EXECUTE" pushbutton, the user may advance the cursor through the memory to find each occurrence of a "true condition". At the first pressing of the "EXECUTE" pushbutton, the cursor moves to the beginnng of the event and displays the "TOTAL" number of conditions true. At the next pressing of the "EXECUTE" pushbutton, the cursor moves to the end of the event. This action can be repeated indefinitely.

Note

Use only the "CURSOR" group pushbuttons to move the Cursor locations through the display. If you change the LIST DISPLAY, or exit from it, the Search function selected will be disabled.

If there are more than one events that follow immediately, one after the other, the cursor moves to the beginning of the first block at an "EXECUTE" command (SEARCH EVENT). The cursor moves to the end of the block of search events. At the next "EXECUTE" command, this operation is repeated until the highest number of events in the memory has been reached. The cursor then automatically recycles back to the beginning of the memory (or search area).

Between every "EXECUTE," after search, the user may move the cursor at random to any position in the LIST DISPLAY without disabling the search mode selected. This movement is accomplished with the cursor movement pushbuttons in the keyboard CURSOR group only. As long as the "SEARCH EVENT" and "TOTAL" messages are displayed, the cursor can be moved in the search mode. When the LIST DISPLAY is further modified, the search mode is disabled.

5.5.8.5 Sequence. The Sequence Search function is an extended word search. When this mode is selected, a maximum of 12 words--each up to 48 bits wide--may be searched for in a programmed sequence. The Sequence Search is presented on two "pages". Page one provides programming for words 1 through 6, and page two provides programming for words 7 through 12. The number of the word entered is its number in the sequence. The Analyzer will look for each occurrence of that particular sequence. The "Last Word" is used to tell the analyzer where to stop in the sequence. Thus, a sequence of 12 words may be entered, but the user may program varying length of the sequence by using the "Last Word" option. Figure 5-39B and 5-39C describes the procedures used to program the Sequence Search.

5.5.8.6 Interpreting SEQUENCE Search Results. When the Sequence function is executed and the results are displayed, the interpretation is somewhat different from the other search modes. The "TOTAL" then means that this is the number of completely found programmed sequences--not the number of single words contained in a sequence event. Also, by pressing the "EXECUTE" pushbutton, the cursor moves automatically to the next beginning of a true sequence--not to the end of the current event.

As with the other Search functions, the cursor may be moved at random within the LIST DISPLAY as long as this Search mode is active. It will be disabled once the LIST DISPLAY is further modified.

In the LIST DISPLAY, the complete sequence (depending on the number of the last word) is explained by the "GREATER THAN" sign and "X" at the beginning of the data line (immediately to the right of the memory location number). A blinking sign marks the beginning of the sequence. The "GREATER THAN" sign indicates a programmed value, where the "X" indicates a "DON'T CARE" Word within the search sequence.

5.5.9 Data Analysis Options. Option selection procedures for the Data Analysis Mode are the same as those for the Pre-Record Programming Mode. Refer to Section 5.3.6 for details.

5.6 FILE MANIPULATION MODE

The 64300 provides memory for storage of menus, set-ups and Word Search definitions. These are accessed through the DATAPAK TABLE (Figure 5-41). Each solid state DataPak cartridge offers 16K bytes of EEPROM for set-up parameters, 48K bytes (48 channels wide x 1K deep) for Reference Memory, plus 8K bytes EPROM space for software options such as microprocessor disassemblers.

The DataPak allows several users to share the unit and facilitates its configuration for different analysis needs. Operational flexibility is also increased because the user may either load Reference Memory from the DataPak for comparison with sampled data, or record data samples up to 48 channels x 1K bytes and transfer them back to the DataPak for analysis.

The 64300 will automatically store all machine parameters when power is turned off, and then reload them at the next power-on. The DataPak can thus be used for storage and retrieval, and for transport of stored configurations and data to other locations for further testing. Note that the DataPak is fully compatible with the ATLAS and-4850A lines of Dolch products.

The DATAPAK MEMORY TABLE is organized into a 4 x 12 matrix. For 12 different types of menus, displays and optional functions, a total of 3 set-ups (files) may be stored. Storing and recalling of files can be done singly or for all states.

In addition, the user may assign a unique identification label to each DATAPAK TABLE. At power-on, this label is decoded and written into the "USER ID" field. The DataPak also allows

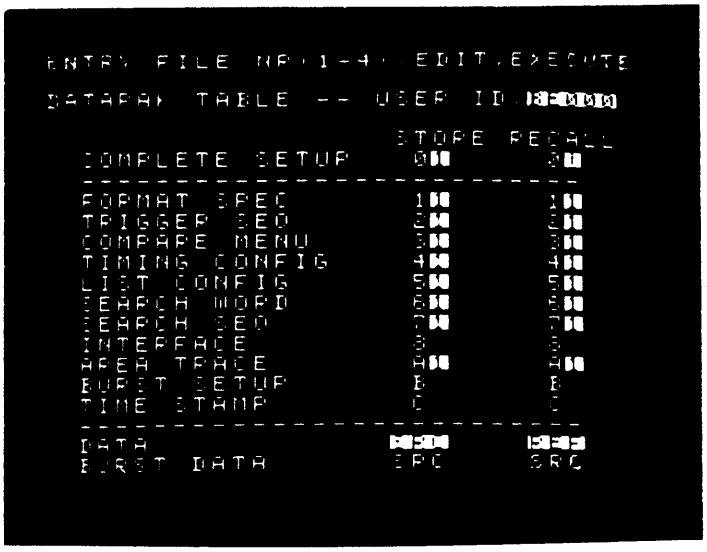


FIGURE 5-41. DATAPAK TABLE

for the transfer of Source Memory contents to the Reference Memory (and Reference to Source) for storage of "normal" data, and for the storage and transfer of the 300 MHz Burst Data separate Source Memories.

Note that if an option is not installed, or if it is not compatible with another option (i.e., Time Stamp with 300 MHz), the field will not be accessible.

The DATAPAK TABLE provides the following functions:

- Assigning user ID (Section 5.6.2)
- Storing files (Section 5.6.3)
- Storing all files to the same number (Section 5.6.4)
- Recalling files (Section 5.6.5)
- Recalling all files with the same number (Section 5.6.6)
- Transferring 1K or 2K data to/from Memories (Section 5.6.7)
- Transferring 300 MHz Burst Memory to Source Memories (Section 5.6.8)

Operating instructions for each function are presented in this section. Note that it is possible to use each function only once (Single Mode) or to sequentially repeat that function (Multiple Mode).

5.6.1 DataPak Table Operating Notes

The following items should be noted before beginning operations in the DATAPAK TABLE:

1) The DataPak must be plugged into the slot at the front of the 64300 before power is turned on. After power-on, and after the "SAVE" pushbutton is pressed, the 64300 will display a blinking Cursor at file "01" of the COMPLETE SET-UP (RECALL) field. If the DataPak is not inserted, and the "SAVE" pushbutton is pressed, the analyzer wil respond with a flashing "INSERT DATAPAK" message.

2) Use the keyboard EDIT group pushbuttons to control cursor movement in the table.

3) To store or recall a specific menu or display, you must first enter the menu or display set-up and then press the SAVE pushbutton. The analyzer will return to that menu or display selected after each "EXECUTE" command until another file is selected.

4) After store or recall operations, the analyzer will return to the last menu or display set-up selected. The exception to this is the "SEARCH WORD" field. The analyzer will return either to the last TIMING DIAGRAM or LIST DISPLAY programmed for Word Search. After each return, the file number is incremented.

5) If the user has programmed a menu while the "X" is showing in the "FILE" field heading, and reaches a point where the set-up parameters match those of another one already in memory, the "X" will be changed to the number of the file in memory. The converse is also true: If the user changes a file with a number displayed, the "X" will appear.

6) The "FILE" field heading is not displayed for the LIST DISPLAY, TIMING DIAGRAM, or SEARCH WORD files.

7) If a set-up display is stored in more than one file number, at recall, the lowest file number is displayed as long as the file contents are the same. The user may then decide how many files may be "written over."

8) To store or recall in the "ALL STATES" or "SEARCH WORD" files, the cursor must be positioned with the EDIT group pushbuttons to the field desired.

9) If the memory of the DATAPAK TABLE is empty, a "FIRST INVALID FILE 11" message will be displayed at power-on. All menus and displays must be reloaded. This message also indicates the first free file number after files have been stored at each subsequent power-on.

10) Options, menus, and displays availale will be indicated by a highlighted cursor in each field. Highlighted cursors will not be present for any uninstalled or non-functioning features.

5.6.2 Assigning User I.D.

The identification label of each DataPak is always displayed in the uppermost field of the DataPak Table. This feature allows the user to readily identify the DataPak contents. When the DataPak is first received from the factory, it will have an arbitrary label assigned to it. To reassign the label, perform the following steps:

1) Advance the cursor with the "EDIT" pushbuttons to the "USER I.D:" field. Pressing "HOME" will also move the cursor immediately to that field.

2) Press the "ENTER" pushbutton.

3) Enter any combination (maximum of 5) of alphanumerics in the "ENTRY" section of the front panel.

4) Press "ENTER" again.

5.6.3 Store File Operation

It is possible to store a particular menu or display set-up in both single and multiple modes. Figures 5-42A, 5-42B, and 5-42C show the operating procedures. If the analyzer cannot store a file for any reason, it will display a "STORE FAILED AT POINTED RECORDS" message to indicate this. A "Greater Than" sign will indicate the file(s) that cannot be stored at the extreme left side of the field affected.

5.6.4 Complete Set-Up Store

As with individual file storage, this function may be operated in both single and multiple modes. However, the difference is that when a number is selected for storage all file numbers will be stored in one block and assigned as the file number. It is therefore advisable to quickly recall all files in memory to ensure that the DATAPAK TABLE is properly configured before you perform this operation. All menus and display set-ups that are active (those which can be immediately accessed without further recall) will be stored to the number assigned in the Complete Set-Up Store function under their individual file numbers. It may be useful to keep a log of all file management changes. Figures 5-42B and 5-42C show the operation for the Complete Set-Up Store function.

5.6.5 Recall File Operation

It is possible to recall a particular menu or display set-up in both single and multiple modes. Figures 5-43A, 43B, and 5-43C show the operating procedures. If a non-existant file number is recalled, the analyzer will display a "RECALL FAILED AT POINTED RECORDS" message to indicate this. A "Greater Than" sign will indicate the file(s) that cannot be recalled in the extreme left side of the field affected.

5.6.6 Complete Set-Up Recall

The Complete Set-Up Recall function operation is exactly like that of the Complete Set-Up Store--with the exception that entire file numbers can be recalled in blocks. Figures 5-43B and 5-43C show the operation for this function.

5.6.7 Transferring Data To/From Memories

The DataPak Table allows the user to transfer all data from the 64300 to the "SOURCE" memory of the DataPak. This data can then be recalled from the DataPak "REFERENCE" memory when it is plugged into any 64300. Figure 5-42 and 5-43 show how to Store and Recall data.

5.6.8 Transferring 300 MHz Burst Memory

The DataPak Table allows the user to transfer data from two separate recordings of the 300 MHz Burst Memory into two files. These are found at the extreme bottom of the DataPak Table in the "SRC" fields. Figure 5-43B shows how to operate this feature.

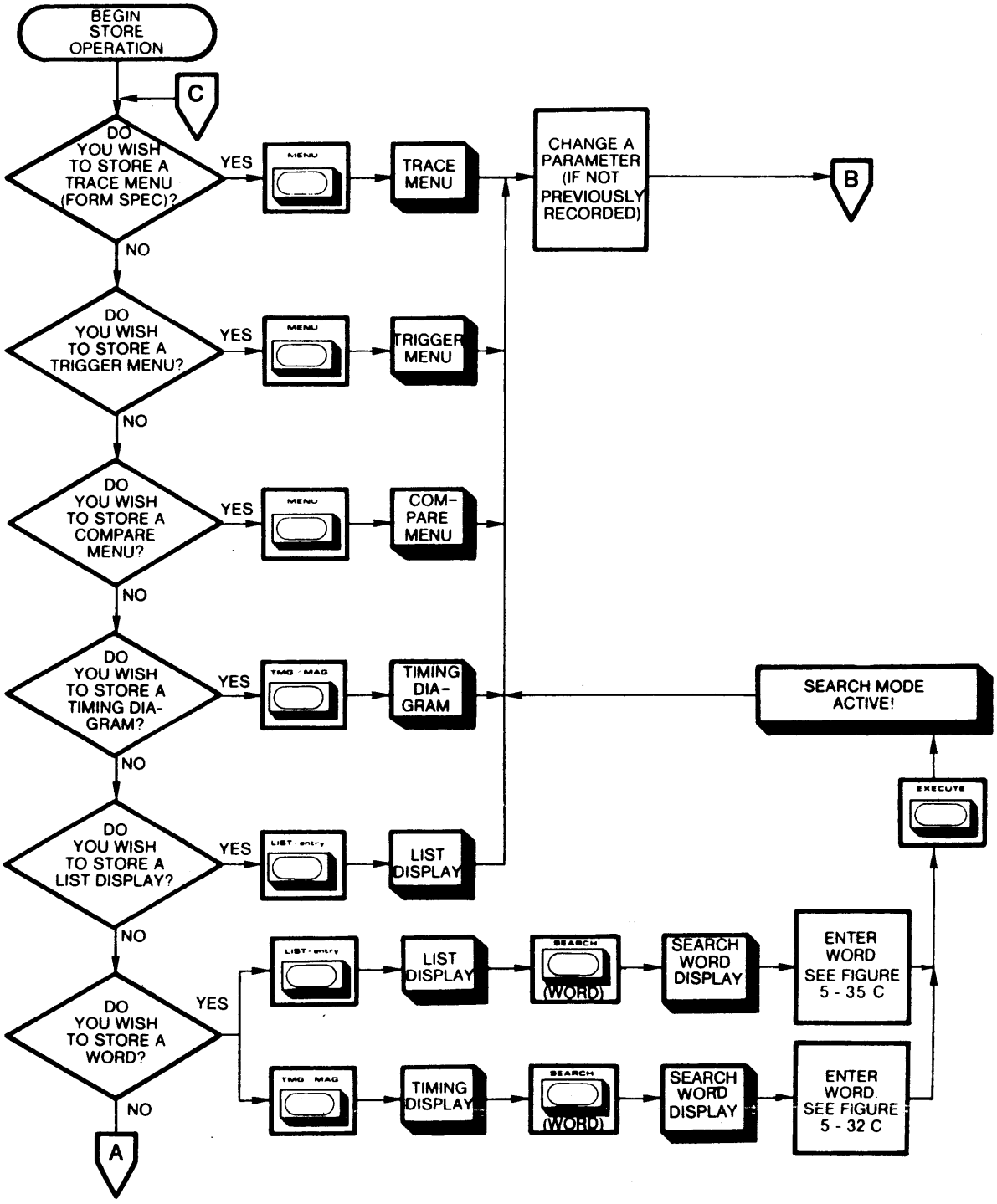


FIGURE 5-42A. STORE FILE OPERATION

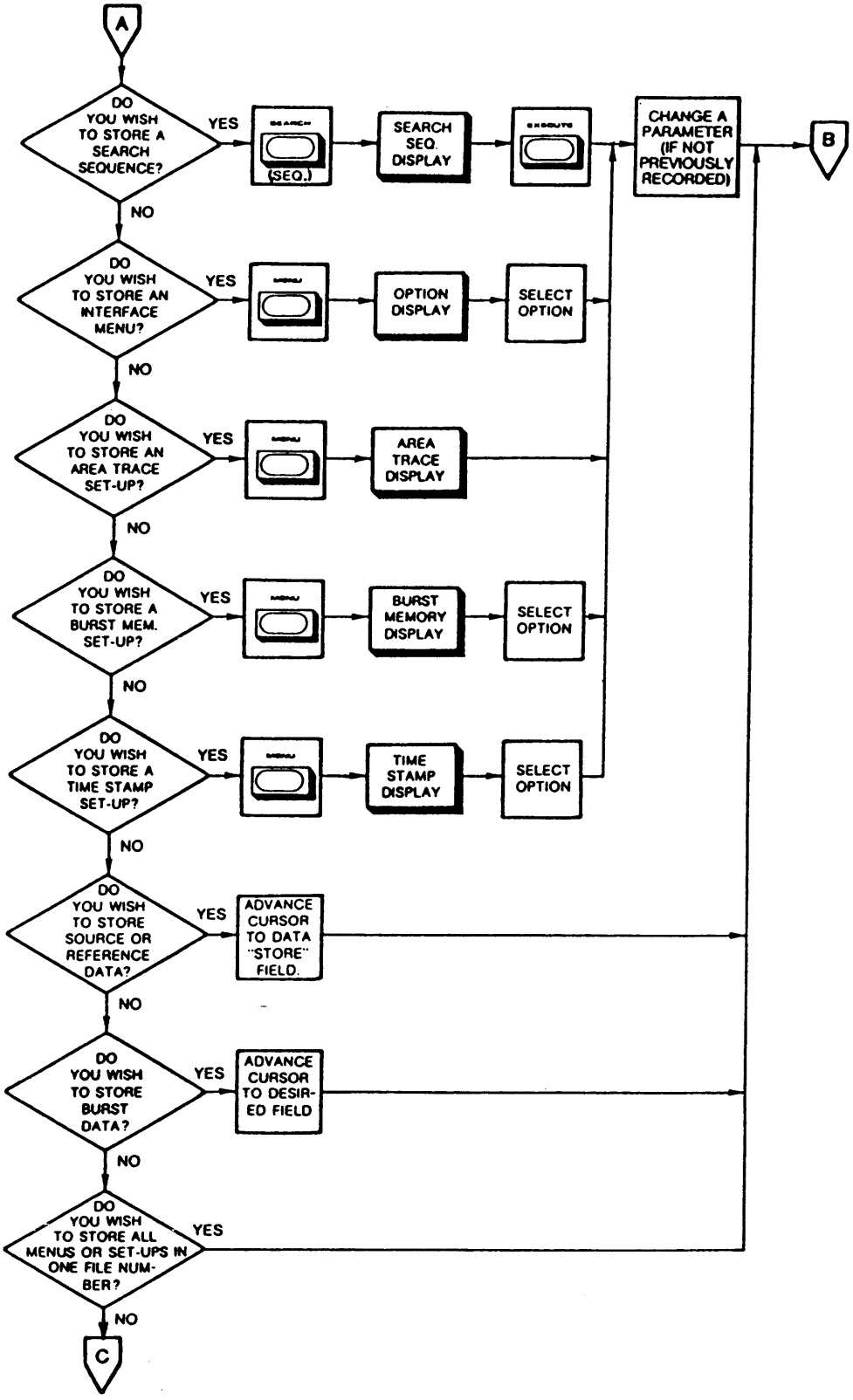


FIGURE 5-42B. STORE FILE OPERATION

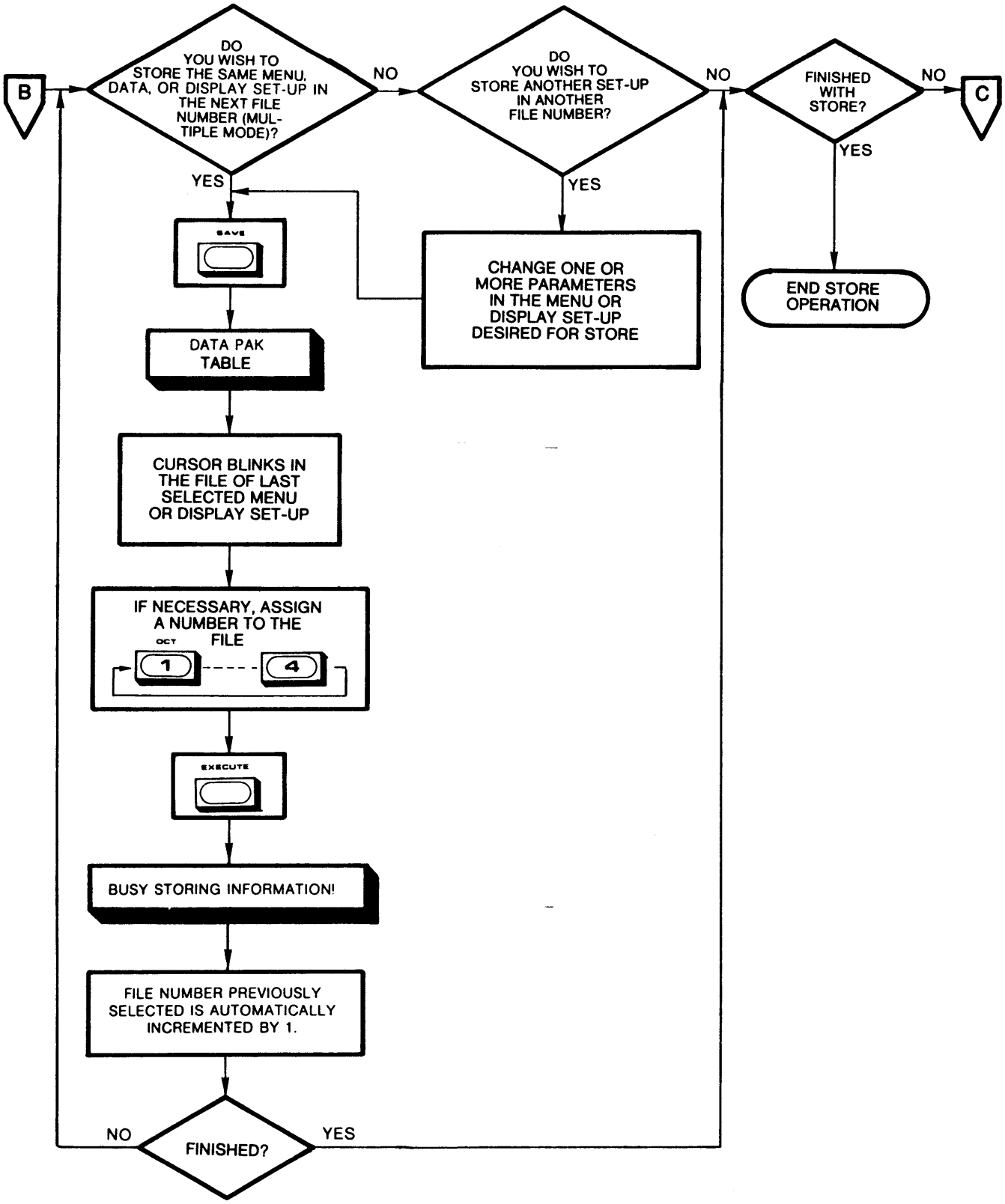


FIGURE 5-42C. STORE FILE OPERATION

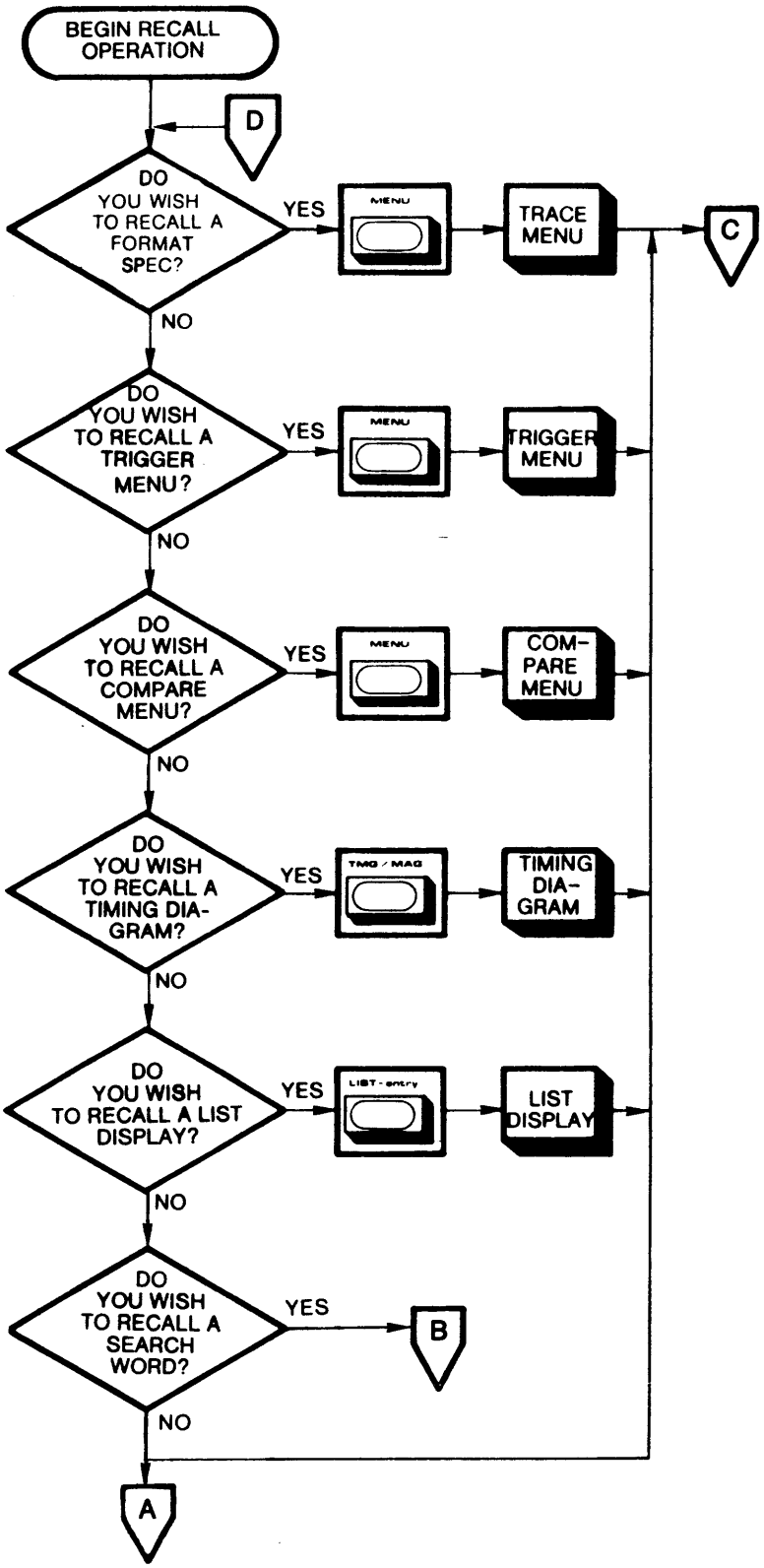


FIGURE 5-43A. RECALL FILE OPERATION

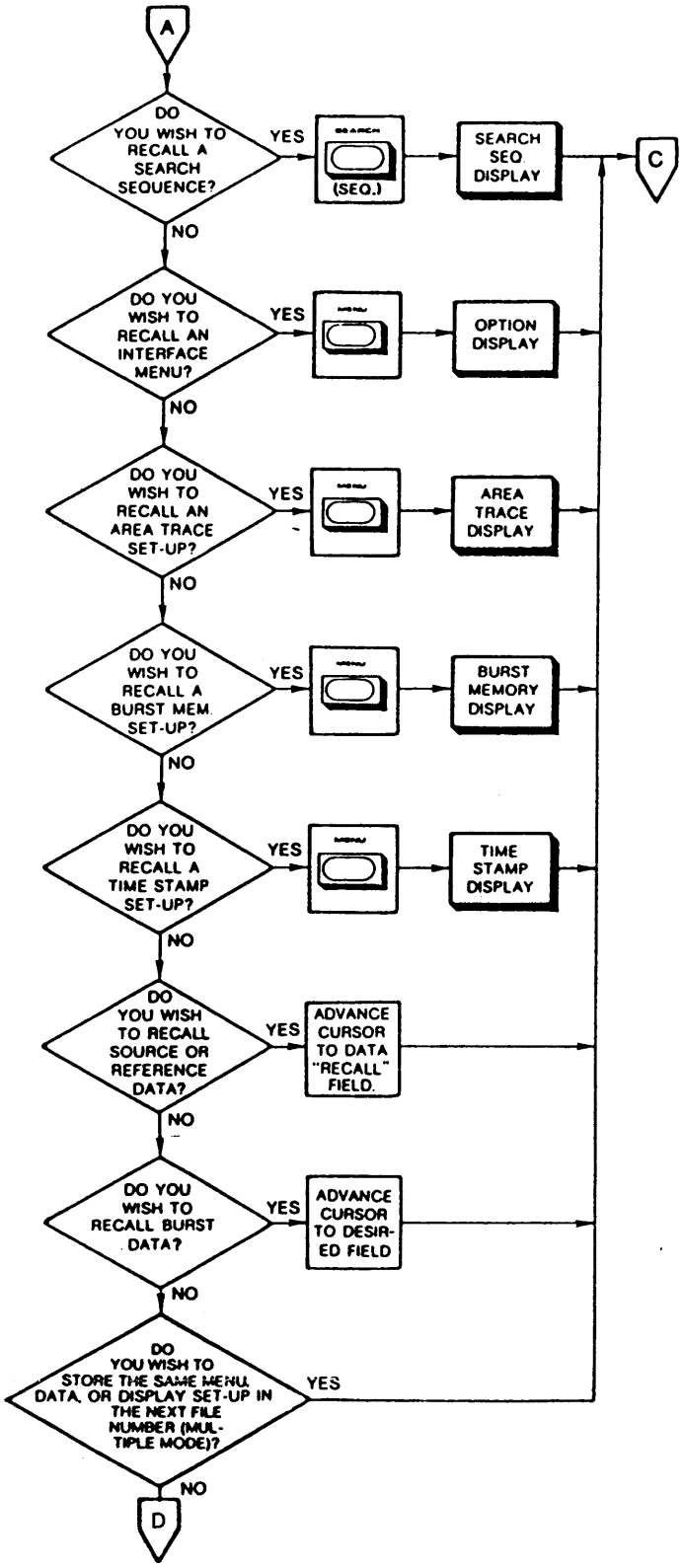


FIGURE 5-43B. RECALL FILE OPERATION

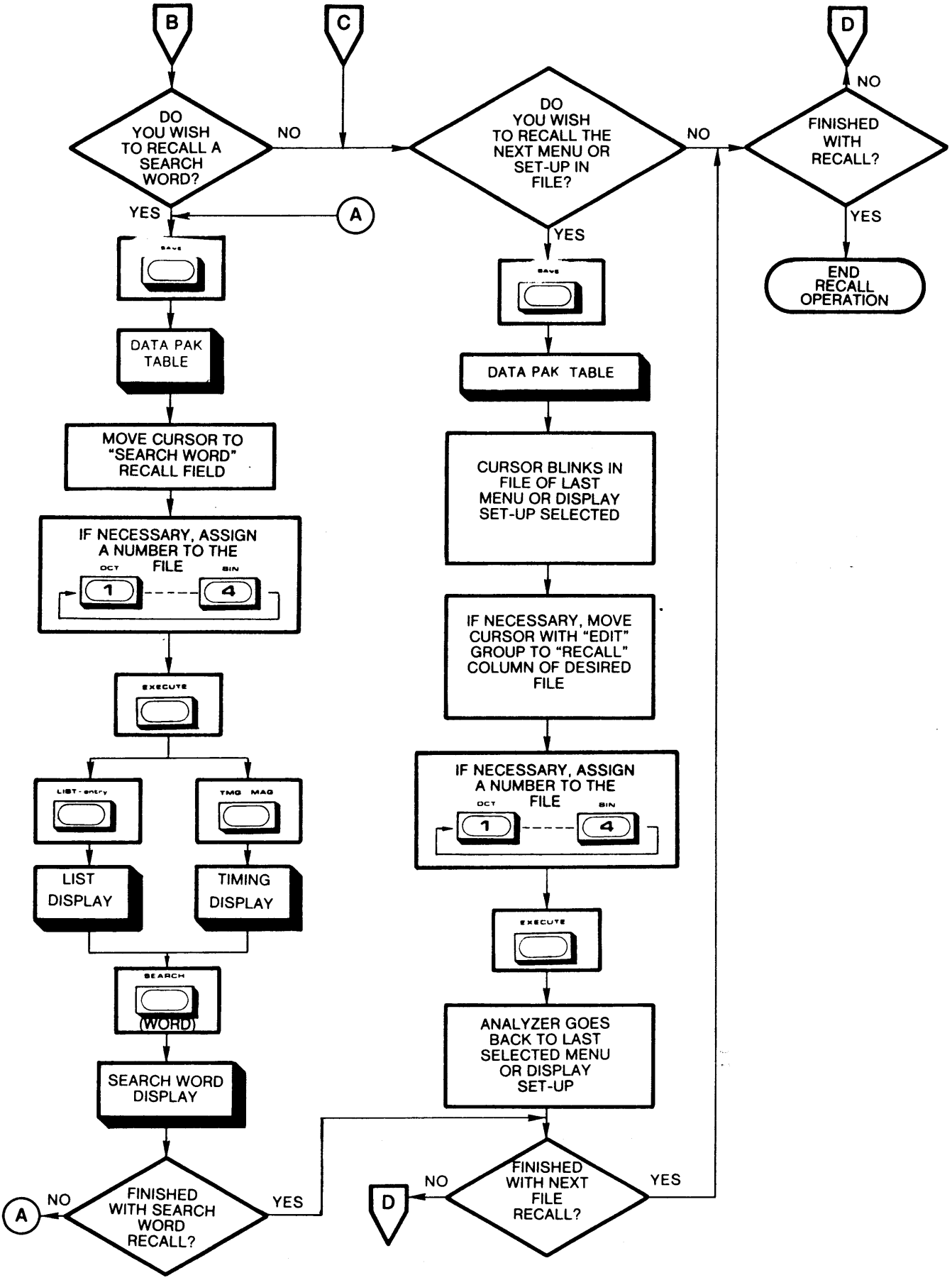


FIGURE 5-43C. RECALL FILE OPERATION

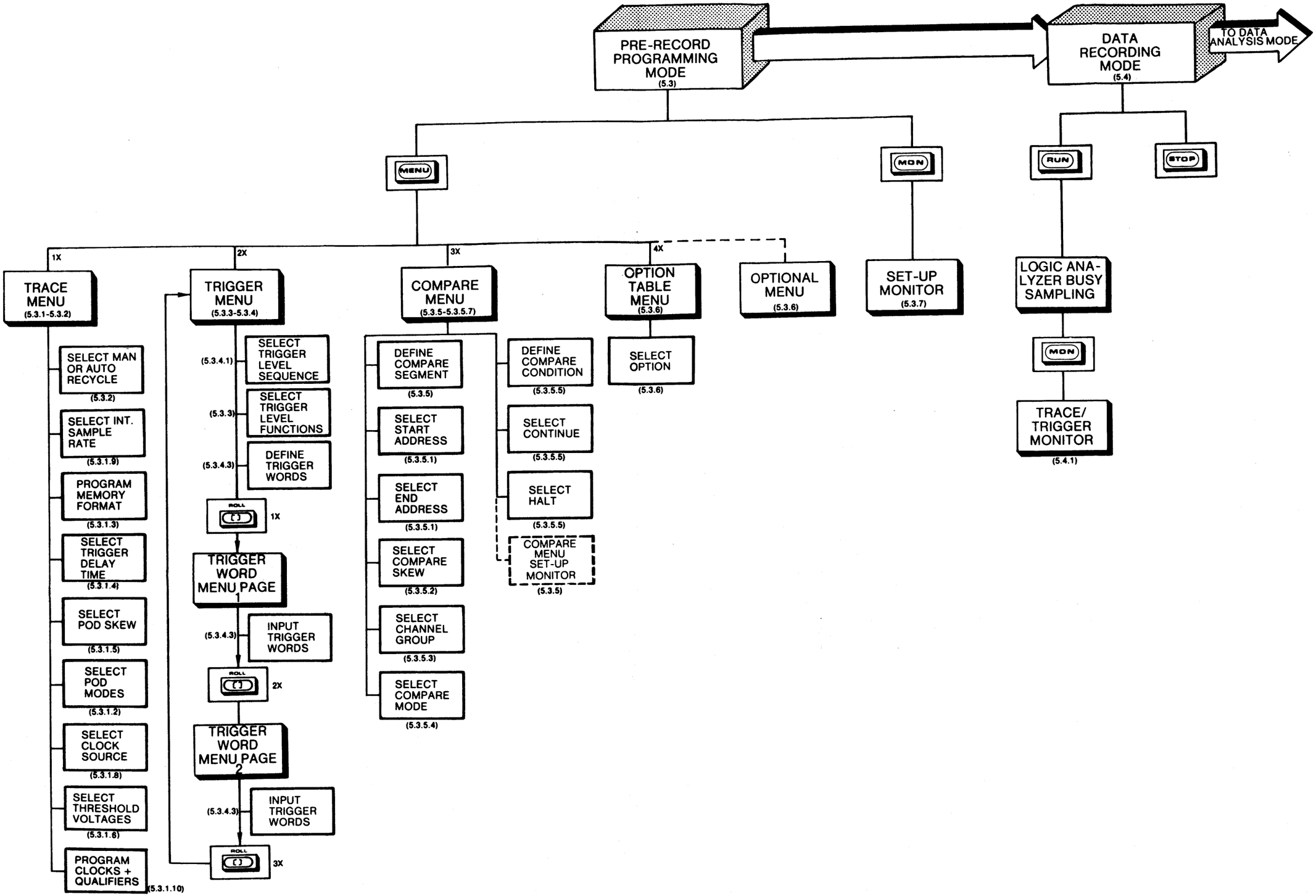


FIGURE 5-1A. FUNCTIONAL FAMILY TREE

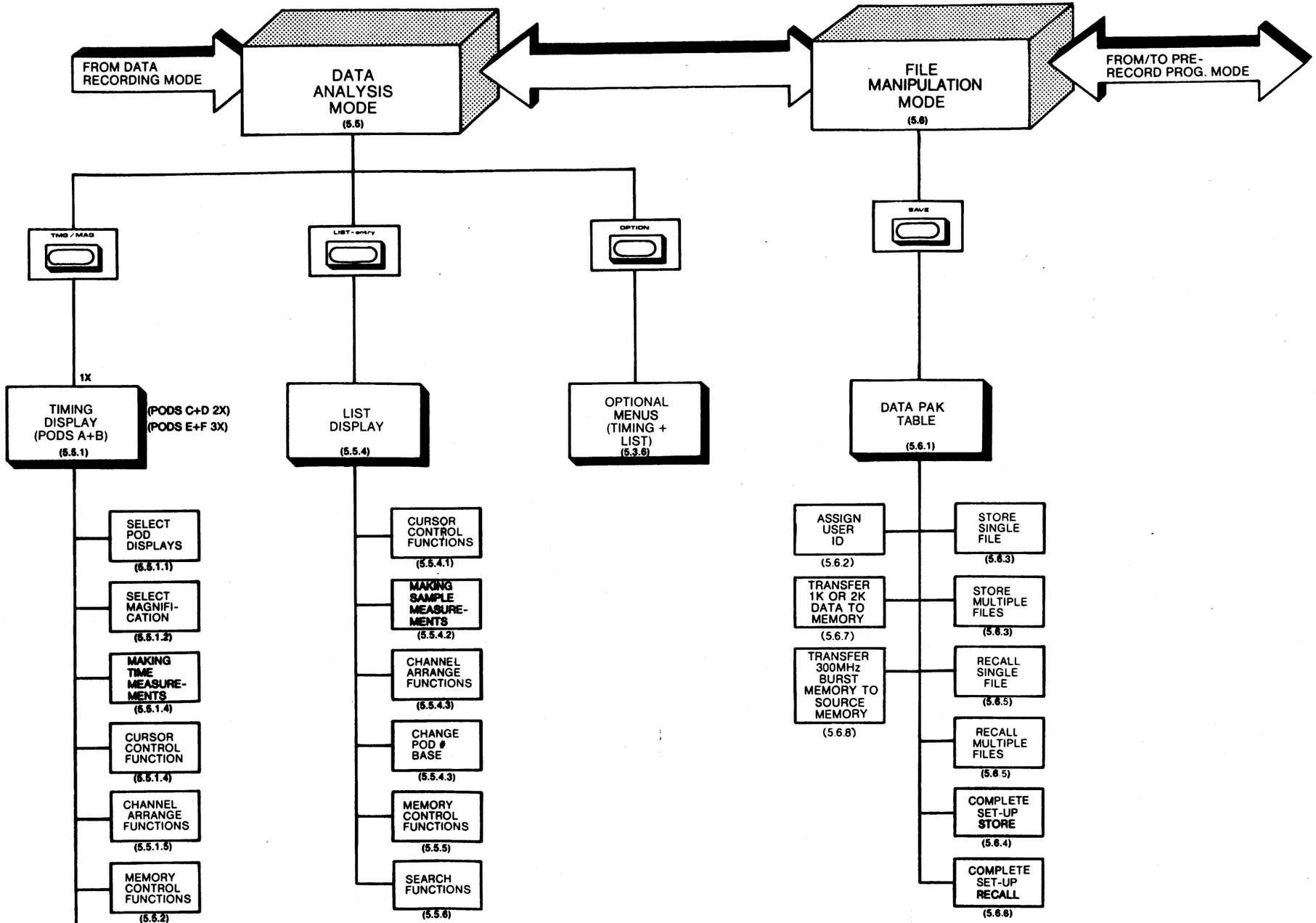


FIGURE 5-1B. FUNCTIONAL FAMILY TREE

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ADDENDUM TO THE 64300 OPERATOR'S MANUAL

TIMING LABELING

This addendum to the 64300 manual (88399N) describes the operation and the programming of the timing display channel labeling. This feature requires that the main software installed in the 64300 logic analyzer be at revision D or later.

I. INTRODUCTION

With revision D (or later) software, it is now possible to assign the input channels in the timing diagram with a 5 character, alphanumeric label. Labeling in the timing display makes it easy to identify the individual channels by matching the label to a mnemonic or function associated with the particular line.

Labels are easily programmed through the front panel of the 64300, using the "EDIT" and "ENTRY" functions. Both the physical (channel input) and the logical (mnemonic) labels are shown in the display.

Timing labels can be stored in the DataPak's AUTOSAVE file. All active channel inputs, including the 300 MHz channels, can be labeled.

II. OPERATING PROCEDURES

Programming of the timing labels is accomplished on the timing display. First select the timing channel group that will be labeled by pressing the "TMG/MAG" key then the "SELECT" key, until the proper channels are displayed. If labeling is to be done on the 300MHz channels, select that option in the "OPTION TABLE" menu then press the "OPTION" key. We can now begin to program the labels.

1. Press the "HOME" key. This causes the timing display to go into a LABEL FORMAT mode. Notice that the timing display looks something like that on the next page and that none of the fields are flashing.

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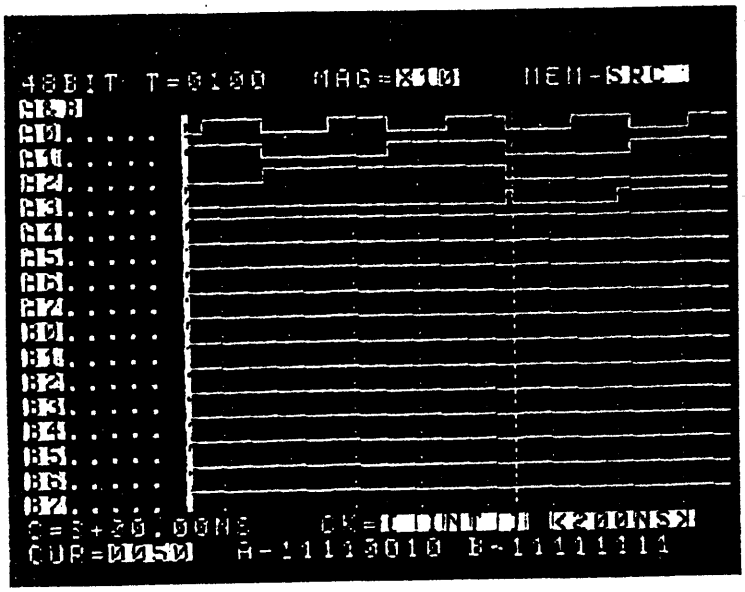

FIGURE 1. TIMING DISPLAY
IN LABEL FORMAT MODE

If the "HOME" key is pressed again, the label section is not displayed. It is possible to select either display and by doing so, it will not change the present cursor and set position. (Going into a labeled display will only display the first 80% of the original display. However, cursor control will access all of the recording.)

2. First use the "EDIT" group up & down keys to position the cursor at the channel where labeling or editing is to be performed. The logic analyzer is now in a LABEL ENTRY mode.

2.1 If the channel format is to be changed, stop the cursor on the physical label (A0, A4, D6, etc..) and type in the new channel. Note that only channels within the selected display can be programmed in that display, i.e. channel group C & D inputs cannot be programmed on channel group A & B display. When completed, press the "EDIT" right key to get to the first label position.

2.2 If the format is not to be changed and only labels added, use the "EDIT" right key to get to the first label position.

3. There are two methods used to enter in an alphanumeric label.

3.1 "ENTRY" KEYPAD is used to enter in characters "A" through "F" and numbers "0" through "9". The cursor automatically moves to the next position.

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3.2 "EDIT" UP & DOWN KEYS are used to scroll through a table containing characters "G" through "Z" and "space". The "EDIT" up key scrolls up through the alpha-table, going from "G" to "Z" while the "EDIT" down key scrolls down through the alpha-table. Once the proper character is entered, use the "EDIT" right key to get to the next position. The cursor does not automatically move to the next position.

4. When a full five character label is inputted, the cursor jumps back to the physical label. If all five positions are not used, pressing the "ENT" (enter) key causes the cursor to exit from the label field and jump to the next physical label.

5. Repeat this procedure, as needed, to label other channels. The "SELECT" key can be used to access the other pod group display without exiting the LABEL FORMAT mode. To exit from the LABEL ENTRY mode (which permits 100% of data to be viewed), press "HOME" once to get back to the LABEL FORMAT mode, then a second time to get to the standard timing display.

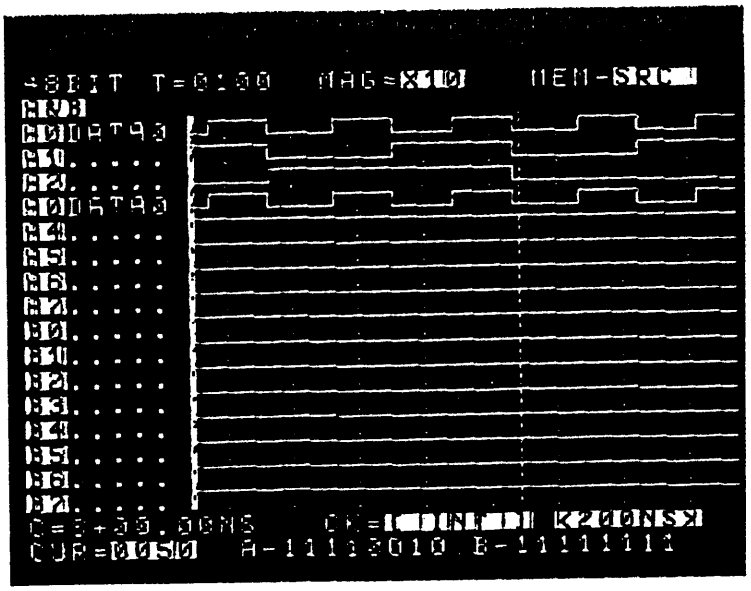

FIGURE 2. TIMING DISPLAY
SHOWING LABELS & EDITING

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APPLICATIONS NOTE

AREA TRACE OPTION WITH HISTOGRAM

The latest software revision for the Area Trace Option, Rev F, includes statistical analysis of recorded data. This feature provides a convenient method of analyzing the recorded data and displaying the results in numerical and graphic form. The analysis calculates the number of recorded samples which are within each of the defined areas, and the percentage of the total samples in each area.

The Area Trace menu is used to define up to ten areas for data recording and/or statistical analysis, and to access the analysis function and display the results. Since the analysis is independent from the actual recording, the area limits may be changed after a recording and the analysis performed on different areas within the original recording (source memory only). This makes it possible to examine one part of the original recording more closely by dividing the original area into several smaller areas. Each area is independent and the areas may overlap if desired.

The statistical analysis is accessed from the Area Trace menu, shown below (Fig. 1).

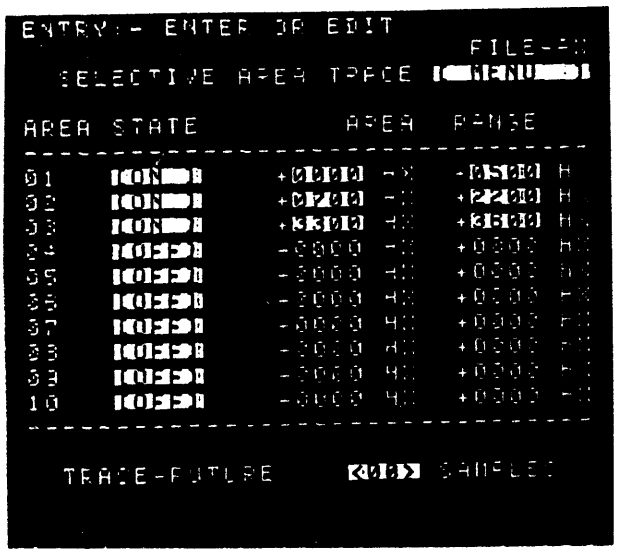

FIGURE 1.

By moving the cursor to the "MENU" field and pressing the "ROLL" key, the calculation will be started and the menu will display "LOGIC ANALYZER ACTIVE" for several seconds. When the calculation is complete, the display will change to "VIEW" mode, as shown below.

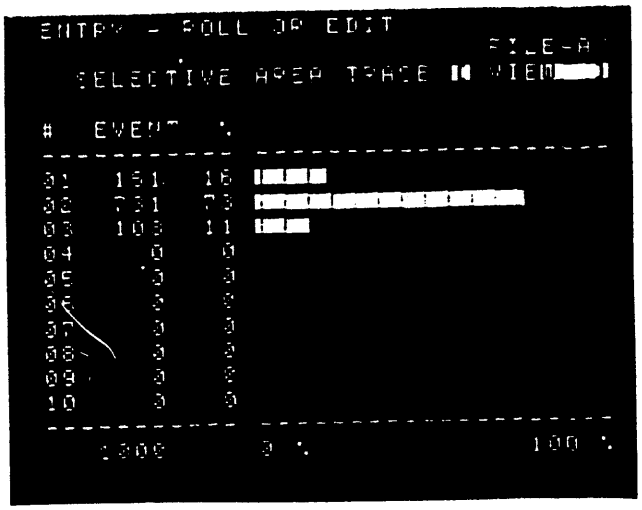

FIGURE 2

Each defined area will show the number of sampled events within that area and the percent of the total events shown below the dashed line. The total events will be greater than 1000 if any area overlaps another area, or less than 1000 if "TRACE-HISTORY" and/or "TRACE-FUTURE" were used (Extended Area Trace only). The graphic display shows the percentage value for each defined area from 0% to 100%.

By pressing the "ROLL" key again, the "TABLE" will be displayed, showing the event and percent values together with the defined area ranges. The "TABLE" is shown below.

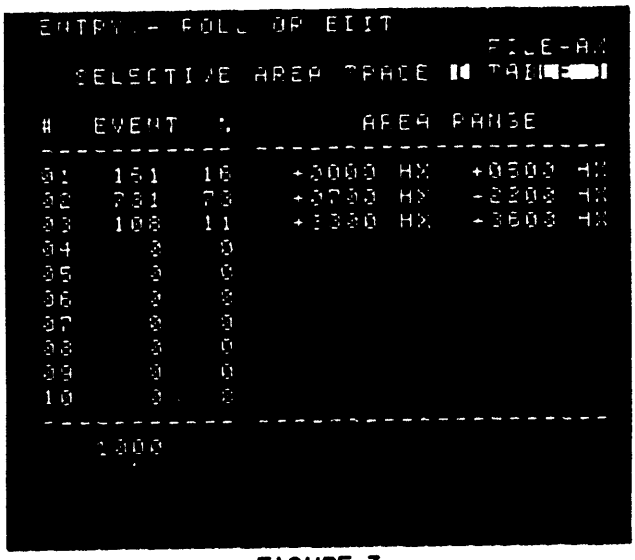

FIGURE 3

Pressing the "ROLL" key again, the "GRAPH" mode will be displayed. GRAPH mode graphically displays the presence of any area in the order of their occurence. This display has cursor control which is used to indicate active areas at the cursor position. Again, areas may overlap and are indicated in the "AREAS ON CURSOR" field. Cursor control will also allow measurement of two separate events by samples, exactly like that found in the "LIST" mode of the logic analyzer. The trigger point is indicated by the dotted vertical line and the "TRIG=" field. "GRAPH" display is shown below.

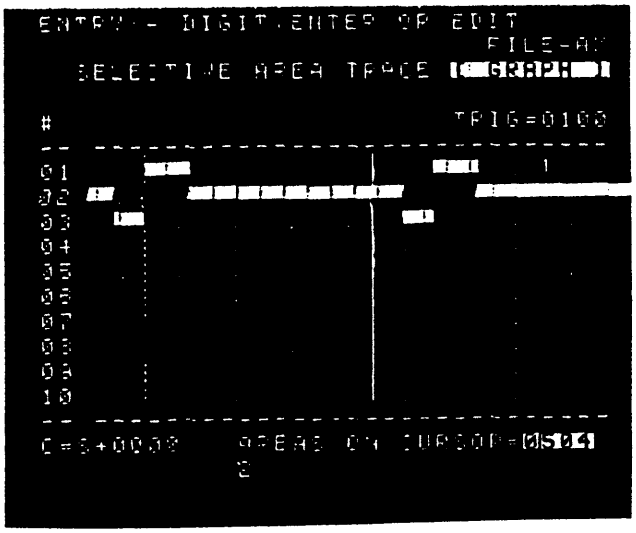

FIGURE 4

Pressing the "ROLL" key again will display the original Area Trace menu. The "RUN" key may be used from within any display to start a recording, but the statistical anlysis must be accessed as described above after each recording.

Note that an area in which the start address is greater than the end address is defined as the area from the start address through FFFF HX and from 0000 HX through the end address, as shown in the example below.

AREA	STATE	AREA RANGE	
01	ON	+8000 HX	+7000 HX

Possible Data Range:

8000 } DEFINED DATA
FFFF }

0000 } DEFINED DATA
7000 }

The statistical analysis function is available only from the keyboard; no remote interface commands are provided for access or readout. If a permanent record is required, a video printer may be used to print the display.

The statistical analysis may be used when the DAB 4K is installed.

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Field
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FSN-008
DEC., 1983

OPTION SOFTWARE INSTALLATION

FOR DATAPAK CARTRIDGE

Each DataPak cartridge is capable of handling one option software package such as disassemblers, reference timing and data list formatting software. This Field Service Note describes the procedure for installing the software into the DataPak cartridge.

1. Remove the cartridge from the logic analyzer (if installed) then remove the two flathead phillips screws on the top of the cartridge. The top cover should come off, exposing the backside of the p.c. board.

2. Remove the four, 4mm hex nuts from the backside of the p.c. board. With the bottom cover sitting on a flat surface, pull the p.c. board up and off the bottom cover. Note the positions of the spacers on the bottom cover —— they must remain in that order.

3. Place the p.c. board on a flat surface with the component side facing up. Position it such that the 64 pin connector is facing you.

4. Referring to figure 1, locate socket U11, positioned at the bottom right corner of the p.c. board. Install PROM 1 of 2 in this socket with pin 1 at the top left corner of that socket. Position jumper J1 to the left position.

5. Install PROM 2 of 2 into socket U10, located to the left of U11. Again pin 1 is the top left corner. If this PROM 2 of 2 is actually a RAM, then position the jumper J2 to the right. Otherwise, the jumper should be in the left position.

6. Re-install the p.c. board onto the bottom cover with the 4mm hex nuts. Assemble this part with the top cover and fasten with the two flat head phillips screws.

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The software option is now installed. Insert it into the 64300 and power-up the instrument. The power-up test should recognize the cartridge installed option and display it in the power-up message. It is a good idea to label the DataPak with the option installed for easy reference.

Jumper J3 is a write protect for the cartridge. To set it in a write protect mode, position the jumper to "A" or lower position. To inhibit the write protect, place the jumper in the "B" or upper position.

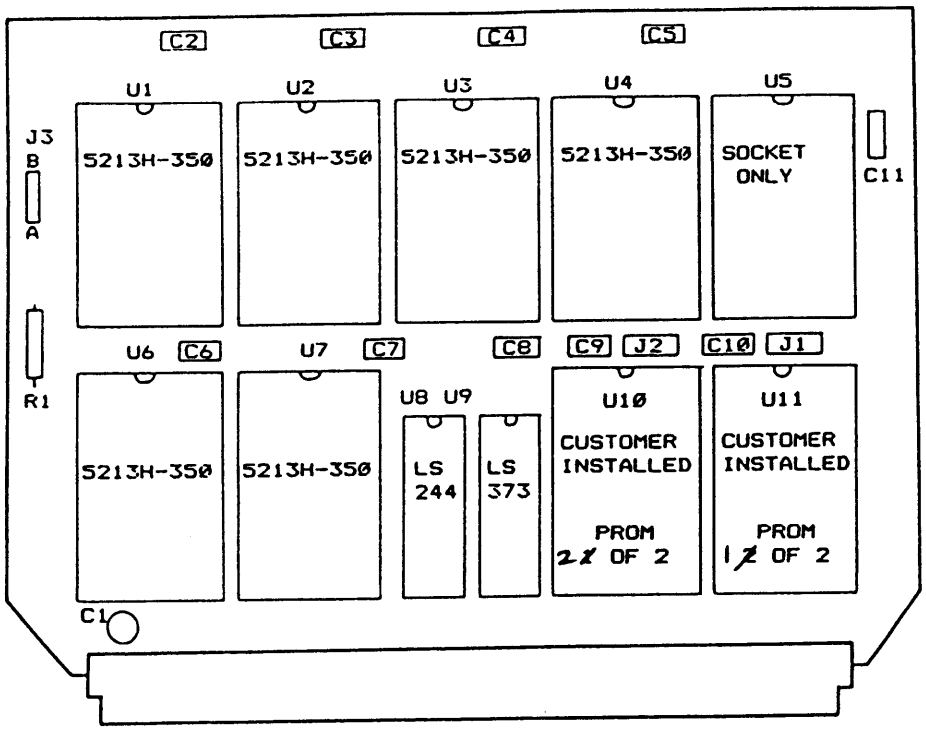

FIGURE 1

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