VOLUME 013 MACHINE 4341- -0015871 MODEL M02 SYSTEM 0018167 MODE SCHED SHIP 82/09/17

LOGIC TYPE -0- SYSTEMS DIAGRAMS DOC COUNTER 04

PAGE NUM	SH	TITLE	PART NUM	EC NUM	FEATURE B/M OR B/MS
1000T		TAB	0005666255	865416	.W. 0002676002 .W. 0004432864
10005		MAINTENANCE INFORM	0005666449	379607	.W. 0004432864
10015		SAFETY	0005666450	379605	.W. 0004432864
10025		LOC CONTENTS	0005666239	379836	.W. 0004432864
10035D		FRAME FRONT VIEW	0002676231	379814	.W. 0004154512
10045D		FRAME REAR VIEW	0002676232	379836	.W. 0004154512
10055D		GATE 02A	0002676233	379607	.W. 0004154512
10061		FRAME 02	0005666207	379814	.W. 0004432864
10065		RELAYS	0005666243	379836	.W. 0004432864
10075		TOP CD CROSOVER CONN	0005666224	379814	.W. 0004432864
1100T		TAB	0005666256	865416	.W. 0002676002 .W. 0004432864
11005		TOOLS	0005666283	379602	.W. 0004432864
11015		MAINT TOOLS LST	0005666284	379605	.W. 0004432864
11025		CONTINUITY CK	0005666285	379598	.W. 0004432864
1200T		TAB	0005666257	865416	.W. 0002676002 .W. 0004432864
12005D		REMOVAL/REPLACEMENT	0002676213	379814	.W. 0004154512
12015		LSI BOARD	0005666287	379835	.W. 0004432864
12025		LIST LOG CD	0005666288	379817	.W. 0004432864
12035		I/O SIGNAL CABLE	0005666289	379602	.W. 0004432864
12043D		POWER SUPPLIES	0002676214	379606	.W. 0004154512
12045		PS104	0005666290	379605	.W. 0004432864
12055		PS101	0005666291	379605	.W. 0004432864
12057D		PS210	0002676215	379814	.W. 0004154512
12063D		PS212	0002676216	379814	.W. 0004154512
12069D		PS213	0002676217	379814	.W. 0004154512
12075D		VOLT CONVERSION	0002676218	379607	.W. 0004154512
12081D		TR216	0002676219	379606	.W. 0004154512
12085		PS301	0005666294	379605	.W. 0004432864
1300T		TAB	0005666258	865416	.W. 0002676002 .W. 0004432864
13005F		ADJUSTMENTS	0002676220	379606	.W. 0004230664
13015F		CLOCK ADJ PRODRS	0002676221	379606	.W. 0004230664
13025F		SCOPE & PROBE CALB	0002676222	379607	.W. 0004230664
13035F		HOW TO ADJ CLOCK GRP	0002676223	379606	.W. 0004230664
13045F		HOW TO ADJUST CLOCK	0002676224	379606	.W. 0004230664
1400T		TAB	0005666259	865416	.W. 0002676002 .W. 0004432864
14001		SERVICE AIDS	0005666334	379814	.W. 0004432864
14003		MTNCE INF	0005666432	379607	.W. 0004432864
14005		VOL 1	0005666406	379607	.W. 0004432864
14007		VOL 2	0005666407	379607	.W. 0004432864
14009		VOL 13	0005666408	379607	.W. 0004432864
14011		VOL 16	0005666409	379607	.W. 0004432864
14013		VOL 18	0005666410	379607	.W. 0004432864
14015F		SYSTEM CONFIG	0002676235	379827	.W. 0004230664
14025F		MODWLE TRANS	0002676418	379808	.W. 0004230664
14035		UCW ASSIGN PROCD	0005666336	379814	.W. 0004432864
14051		UCW TYPE ASSIGN	0002676250	379814	.W. 0004432864
14075		DISKETTE UPDATE PROC	0005666337	379814	.W. 0004432864
14079		DISKETTE RECOVER PRO	0005666338	379814	.W. 0004432864
14081		DISKETTE RECOVER PRO	0005666339	379817	.W. 0004432864
14095		EREP FAIL STG ADDR	0005666348	379594	.W. 0004432864
14105F		01A GATE-CD LAYOUT	0002676260	379815	.W. 0004230664
14111		BD SIG LEVELS	0002676240	379814	.W. 0004432864
14113		LOG BD PIN NUMB	0002676323	379814	.W. 0004432864
14115		PRO UNIT SER AIDS	0005666341	379814	.W. 0004432864
14205		CH SER AIDS	0005666342	379605	.W. 0004432864
14215		LP PROC FOR TIO/SIO	0005666343	379606	.W. 0004432864
14223		INTERF CH CHECK TR	0002676247	379814	.W. 0004432864
14225		IFA CARD	0005666344	379814	.W. 0004432864
14235		LIMITED CH LOGOUT	0005666345	379605	.W. 0004432864
14241		CONN EXT CABLE	0005666419	379607	.W. 0004432864
14305		MSS SER AIDS	0005666346	379814	.W. 0004432864
14317		OCP TO CTCA INTCON	0002676249	379814	.W. 0004432864
14325		BASIC CK LIGHT	0002676246	379606	.W. 0004432864
14405		POWER SERV AIDS	0005666347	379814	.W. 0004432864
14425		STD POWER INTFC	0005666433	379605	.W. 0004432864
14505		REMOTE SUP FAC SV PD	0005666412	379815	.W. 0004432864
14515		REM SUP FAC DIAG	0005666413	379602	.W. 0004432864
14525		RSF & WIRING CONF	0005666414	379607	.W. 0004432864
14535		38LS/ JAP CONF	0005666415	379600	.W. 0004432864
14545		LINE PL CONF	0005666416	379600	.W. 0004432864
14555		EIA ADPT CONF	0005666417	379814	.W. 0004432864
14565		PROT CPLR CONF	0002676261	379606	.W. 0004432864
14605F		CON FCTN SERV AIDS	0002676262	379808	.W. 0004230664
14615		I/O & CHAN TR PROC	0002676230	379605	.W. 0004432864
14619		PROCEDURE	0002676263	379605	.W. 0004432864
14625		SCREEN COPY OPTIONS	0002676248	379605	.W. 0004432864
14635F		CE LOGS	0002676420	379825	.W. 0004230664
14705		GRDG PATHS	0002676236	379605	.W. 0004432864
14715		GRDG MD GRP 2 FR 02	0002676237	379605	.W. 0004432864
14725		GRDG FR 03	0002676238	379814	.W. 0004432864
14735D		GRDG MOD GR2 F02	0002676239	379819	.W. 0004154512
1500T		TAB	0005666260	865416	.W. 0002676002 .W. 0004432864
15005		DISKETTE DRIVE 2D	0005666159	379600	.W. 0004432864
1600T		TAB	0005666261	865416	.W. 0002676002 .W. 0004432864
20005		MAINT INFORMATION	0005666160	379607	.W. 0004432864
20015		SAFETY	0005666161	376694	.W. 0004432864

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LOGIC TYPE -0- SYSTEMS DIAGRAMS DOC COUNTER 04

PAGE NUM	SH	TITLE	PART NUM	EC NUM	FEATURE B/M OR B/MS
20025D		CONTENTS	0002676330	379814	.W. 0004154512
20035D		GEN INFORMATION	0002676331	379816	.W. 0004154512
20045		BASIC PWR OFF SEQ	0005666164	379601	.W. 0004432864
20055D		POWER MAINTENANCE	0002676332	379607	.W. 0004154512
20065		PWR MAINT SCREEN	0005666166	376694	.W. 0004432864
20075D		MOMT STATUS DISPLAY	0002676333	379605	.W. 0004154512
20085D		ANALOG VOLTAGE	0002676334	379816	.W. 0004154512
20095D		TEMP DISPLAY SCREEN	0002676335	379607	.W. 0004154512
20105D		VOLT TRACK CHART	0002676336	379607	.W. 0004154512
20115		MV SCREEN EXPL 5	0005666171	376694	.W. 0004432864
20125		PWR LOG	0005666172	379598	.W. 0004432864
20135		TEMP TRACE	0005666173	379598	.W. 0004432864
20145		DIAGNOSTICS	0005666174	379598	.W. 0004432864
20155D		VOLT DIST	0002676337	379607	.W. 0004154512
20165D		DC DIST	0002676338	379607	.W. 0004154512
20175D		DC DIST	0002676339	379607	.W. 0004154512
20185D		SWITCHING REGULATORS	0002676340	379605	.W. 0004154512
20195D		IPS BOARD 03AA2	0002676341	379814	.W. 0004154512
20205D		BOARD	0002676342	379607	.W. 0004154512
20211D		VOLT PINS	0002676343	379835	.W. 0004154512
20213		BD 03AA1 VLTG PINS	0002676047	379814	.W. 0004432864
20215D		VOLT ADJUSTMENTS	0002676344	379607	.W. 0004154512
20225D		SENSORS	0002676345	379607	.W. 0004154512
20235D		BOARD 01AB2	0002676346	379816	.W. 0004154512
20241B		BD VLTG SENSE PTS	0005666204	379607	.W. 0004154512
20241D		DD VLTG SENSE PTS	0002676351	379607	.W. 0004154512
20245D		AIR FLOW SENSOR	0002676347	379814	.W. 0004154512
20255		INDICATORS	0005666185	376694	.W. 0004432864
20265		OP CONT PNL INDICATR	0005666186	379814	.W. 0004432864
20275		PWR MICROCODE	0005666187	379601	.W. 0004432864
20285		HRD WIRED SEQ	0005666188	379607	.W. 0004432864
20295		EMC DETECTOR/MONITOR	0005666189	379814	.W. 0004432864
20305		HWS SEC LEVEL SH 1-7	0005666190	376694	.W. 0004432864
20315		HWS SEC LEVEL SH 3	0005666191	379607	.W. 0004432864
20325		HWS SEC LEVEL SH 5	0005666192	379607	.W. 0004432864
20335D		HWS SECOND LEVEL	0002676348	379607	.W. 0004154512
20345		PWR CONT ADAPTER	0005666194	379594	.W. 0004432864
20355		PWR CONT DATA FL	0005666195	379607	.W. 0004432864
20365		SENSE CD	0005666196	379594	.W. 0004432864
20375		VOLT MONITORING FLOW	0005666197	379607	.W. 0004432864
20385D		INTEGRATED PWR SYSTM	0002676349	379607	.W. 0004154512
20395		DET PWR-ON SEQ LOGIC	0005666199	379607	.W. 0004432864
20405		DET PWR OFF SEQ LOG	0005666200	379607	.W. 0004432864
20415D		POWER ON ACT STRINGS	0002676350	379814	.W. 0004154512

TOTAL PART NUMBERS THIS VOLUME 130

IBM **Maintenance Information**

VOLUME 01 MAINTENANCE ANALYSIS PROCEDURE	VOLUME 02 MAINTENANCE ANALYSIS PROCEDURE	VOLUME 03 MAINTENANCE ANALYSIS PROCEDURE	VOLUME 13/16 SUPPLEMENT MAINTENANCE INFORMATION	VOLUME 17 GENERAL INFORMATION	VOLUME 18 GENERAL INFORMATION
START EXIT UU = 00 02	UU = 1X	UU = 4X 5X EX FX	LOCATIONS TOOLS REMOVAL/ REPLACEMENT ADJUSTMENTS SERVICE AIDS DISKETTE DRIVE PROCESSOR POWER	GENERAL DESCRIPTION FUNCTIONAL UNITS DIAGNOSTIC INFORMATION PROCESSOR LOGS SYSTEM TESTS FEATURES	CONSOLE FUNCTIONS INDEX INSTALLATION

4341 Supplement Maintenance Information

EC 379600 30Jun80
EC 379607 05Jun81
PN 5666449
1 of 2
10 005

PREFACE

This publication is the primary document needed by service personnel as a supplement to the maintenance analysis procedures to service and maintain the 4341 processor. It contains those items referred to by the maintenance analysis procedures for the basic machine for guided maintenance.

Technical changes and additions to the text and illustrations are indicated by a line to the left of the change.

LEGIBILITY CONVENTION

This manual contains material that is not fully legible. The size of type and the nature of the material is such that legible reproduction is not possible. This material is provided for illustration, usually serving as a sample, and is not intended for reading. Illegible material is enclosed in wavy lines, and marked with a P, as follows:

SAFETY

PERSONAL SAFETY

Personal safety cannot be overemphasized: it is a vital part of customer engineering. To ensure your safety and that of co-workers, always observe the safety precautions given during your safety training and adhere to the following:

Danger Notices

Observe all DANGER notices in this manual.

DANGER
Do not service any power supply or transformer outside the machine while still connected to the machine. (Page 12 043)

DANGER
This ground wire must be installed before you power on the system. (Page 12 072d, Step 11)

DANGER
Star washer [F] must be replaced for personal and machine safety. (Page 12 081d, Step 10)

DANGER
Use extreme care when you perform service while power is on. (Page 15 050, 15 055, 15 070, 15 075, 15 080)

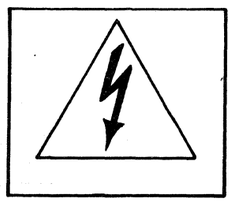
DANGER
Solenoid case becomes hot after continuous use. (Page 15 055)

DANGER
Drive motor case becomes hot after continuous use. (Page 15 065)

DANGER
To prevent personal injury on the 60Hz motors, ensure two large holes [B] in motor case are positioned up and under bracket. (Page 15 065)

Danger Labels

All danger labels must be observed and all necessary precautions must be excercised.



This danger label indicates an area or device containing high voltage.

General Safety Practices

Observe the general safety practices and the procedure for performing artificial respiration outlined in the *CE Safety Practice* card shown on following page.

Grounding

Ground current may reach dangerous levels. Never operate the system with the grounding conductor removed.

Line-Powered Equipment

Ground all line-powered test equipment through the third-wire grounding conductor in the power cord of the machine being tested.

Machine Warning Labels

Heed the warning labels placed in hazardous areas of the machines.

CE Safety Practices

All Customer Engineers are expected to take every safety precaution possible, and to observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you MUST work alone.
2. Remove all power ac and dc when removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, and installing changes in machine circuitry.
3. Wall box power switch, when turned off, should be locked or tagged in off position. 'Do Not Operate' tags, order number S229-1266, should be affixed when applicable. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, the following precautions must be followed:
   a. Another person familiar with power off controls must be in the immediate vicinity.
   b. Rings, wrist watches, chains, bracelets, and metal cuff links shall not be worn.
   c. Only insulated pliers and screwdrivers shall be used.
   d. Keep one hand in pocket.
   e. When using test equipment, be certain that controls are set correctly and to the proper capacity, and that insulated probes are used.
   f. Avoid contacting ground potential (metal floor strips, machine frames, etc. - use suitable rubber mats, purchased locally if necessary).
5. Safety glasses must be worn when:
   a. Using a hammer to drive pins, riveting, staking, etc.
   b. Power hand drilling, reaming, grinding, etc.
   c. Using spring hooks, or attaching springs.
   d. Soldering, wire cutting, or removing steel bands.
   e. Parts cleaning using solvents, sprays, cleaners, chemicals, etc.
   f. Exposed to any other condition that may be hazardous to your eyes. REMEMBER, THEY ARE YOUR EYES.
6. Special safety instructions, such as for handling cathode ray tubes and extreme high voltages, must be followed as outlined in CEMs and in the Safety section of the Maintenance Manuals.
7. Do not use solvents, chemicals, greases, or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that has not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. The maximum load to be lifted is that which, in the opinion of you and of management, does not jeopardize your own health or well-being, or that of other employees.
11. All safety devices, such as guards, shields, signs, ground wires, etc., shall be restored after maintenance.
12. Each Customer Engineer is responsible to be certain that no action on his part renders a product unsafe, or exposes hazards to customer personnel.
13. Place removed covers in an out-of-the-way place where no one can trip over them.
14. All machine covers must be in place before the machine is returned to the customer.
15. Always place CE tool kit away from walk areas (that is, under desk or table) where no one can trip over it.
16. Avoid touching moving mechanical parts (that is, when lubricating, checking for play, etc.).
17. When using stroboscope, do not touch ANYTHING; it may be moving.
18. Avoid wearing loose clothing that may become caught in machinery. Shirt sleeves must be left buttoned, or rolled to above the elbow.
19. Ties must be tucked in shirt or fastened with a tie clasp (preferably non-conductive), approximately 3 inches from the end. Tie chains are not recommended.
20. Before starting equipment, make certain that fellow CEs and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in the area of machines while performing, and after completing, maintenance.

Artificial Respiration

General Considerations

1. Start Immediately. Seconds Count.
   Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim, or apply stimulants.
2. Check Mouth for Obstructions.
   Remove foreign objects; pull tongue forward.
3. Loosen Clothing; Keep Warm.
   Take care of these items after victim is breathing by himself, or when help becomes available.
4. Remain in Position.
   After victim revives, be ready to resume respiration if necessary.
5. Call a Doctor.
   Have someone summon medical aid.
6. Don't Give Up.
   Continue without interruption until victim is breathing without help, or until victim is certainly dead.

Rescue Breathing for Adults

Victim on His Back Immediately.

1. Clear throat of water, food, or foreign matter.
2. Tilt head back to open air passage.
3. Lift jaw up to keep tongue out of air passage.
4. Pinch nostrils to prevent air leakage when you blow.
5. Blow until you see the chest rise.
6. Remove your lips and allow the lungs to empty.
7. Listen for snoring and gurgling, signs of throat obstruction.
8. Repeat mouth-to-mouth breathing 10-20 times per minute.
   Continue rescue breathing until victim breathes for himself.

Thumb and finger position

Final mouth-to-mouth position

Reprint Courtesy Mine Safety Appliance Co.

LOCATIONS

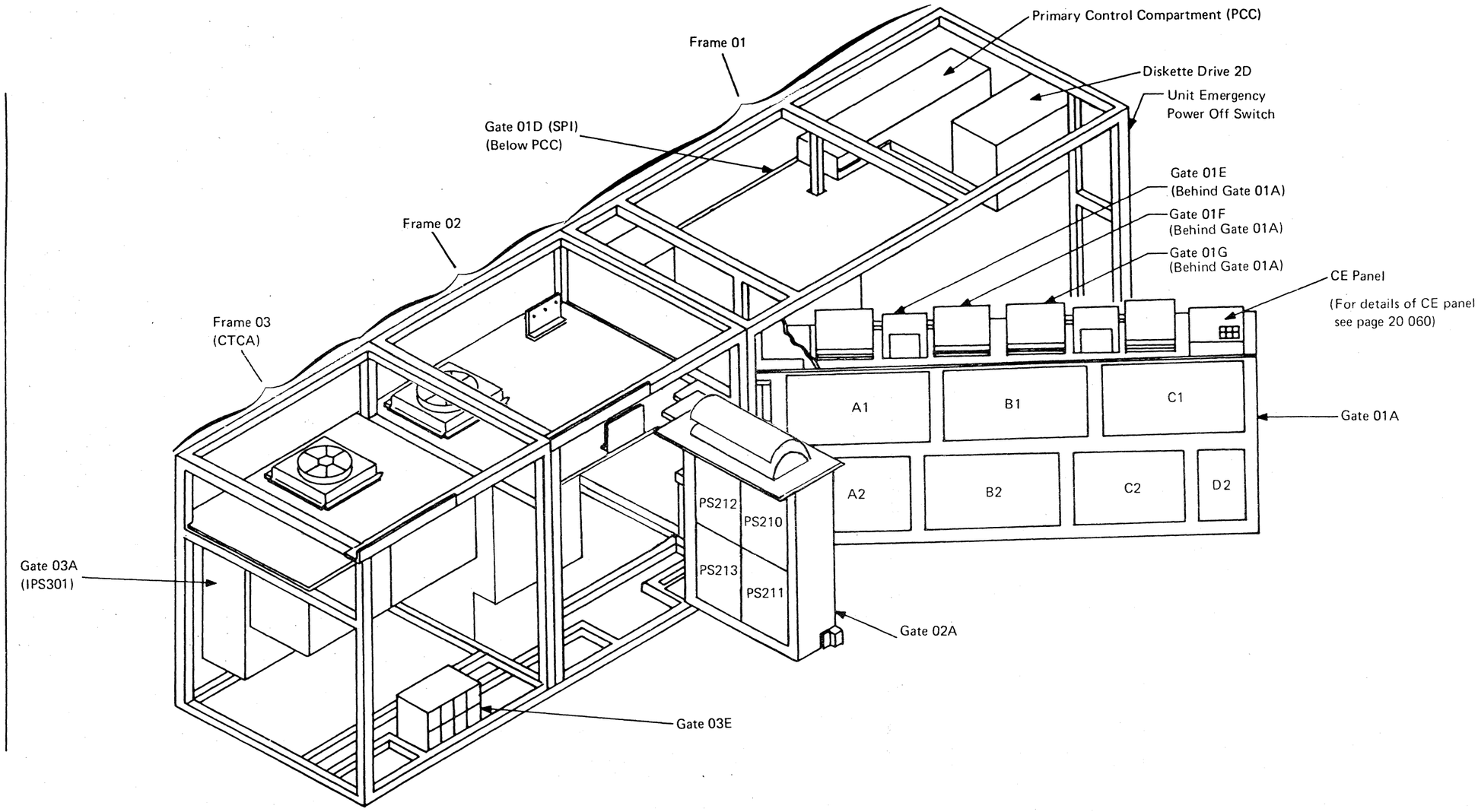
CONTENTS

* *Applies to machines with Ferro Power Supplies*

** *Applies to machines with Switching Regulator Power Supplies*

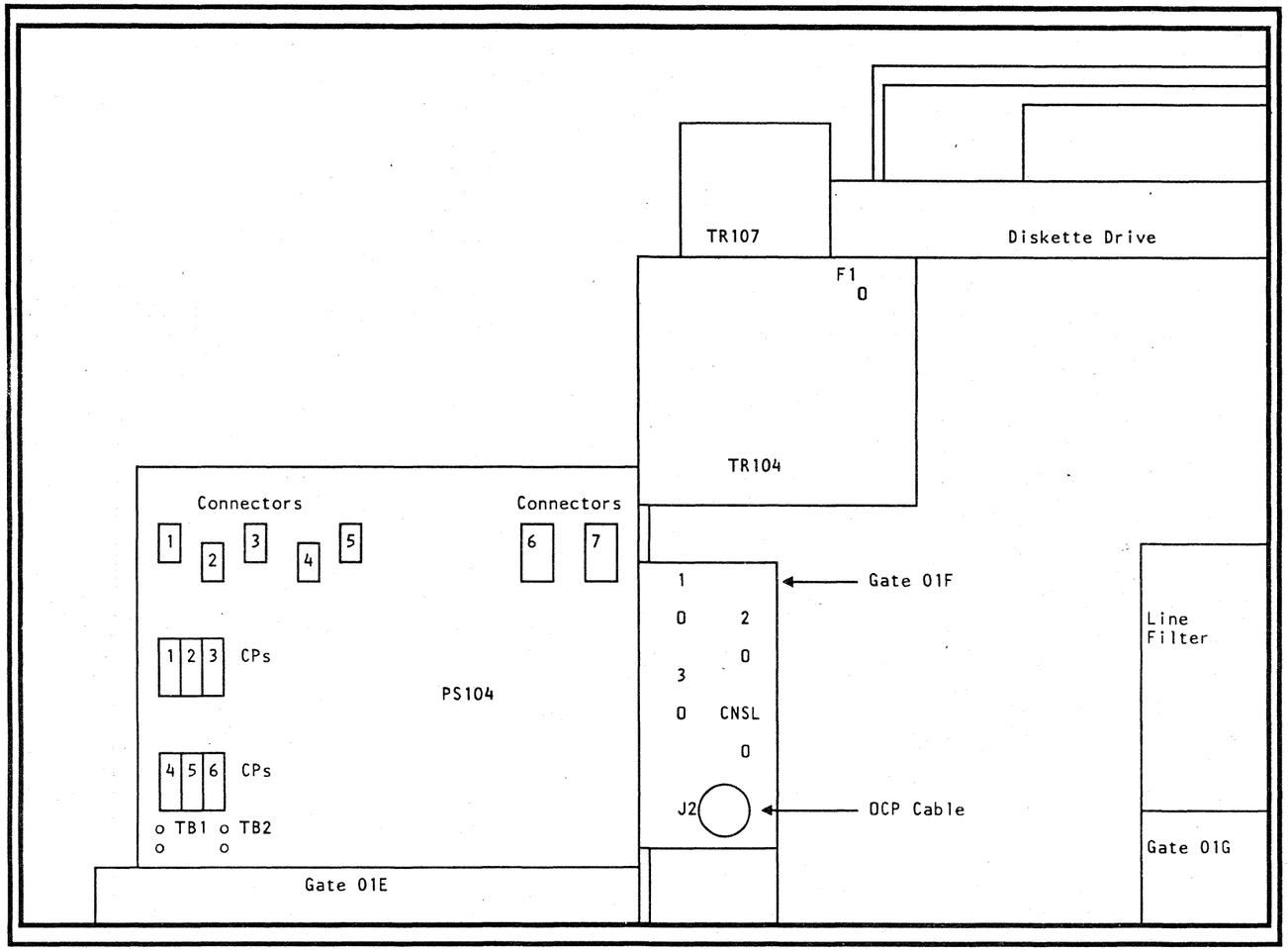
o o o

FRAME 01, 02, and 03 (FRONT VIEW)

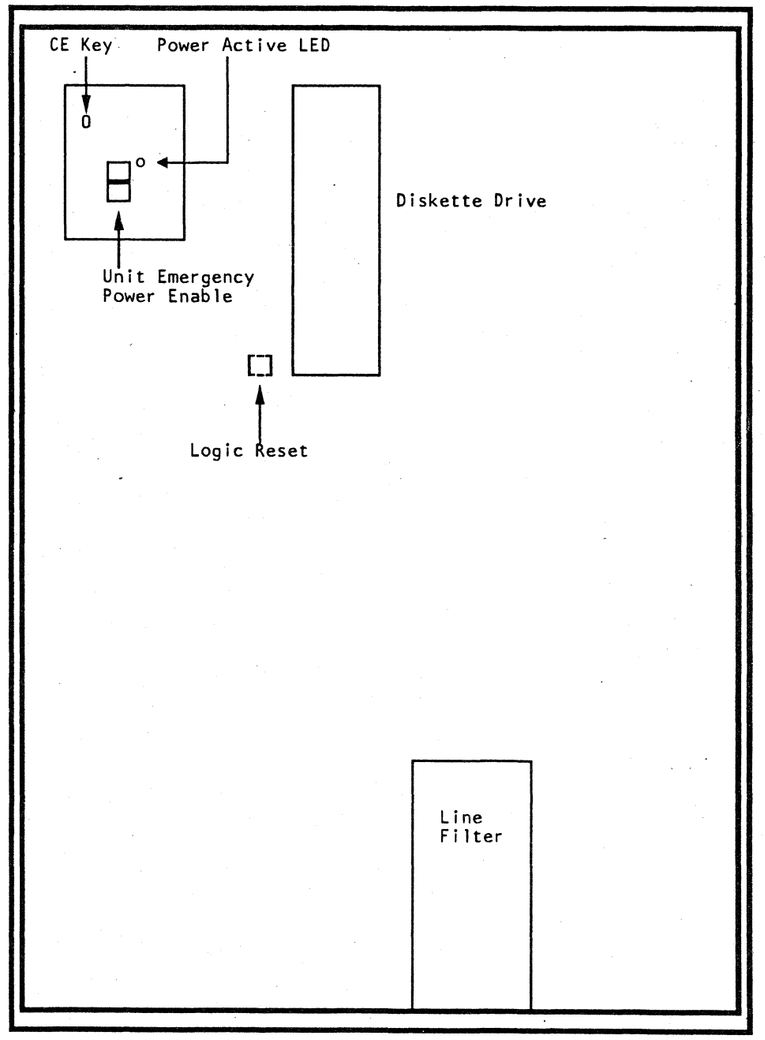


FRAME 01

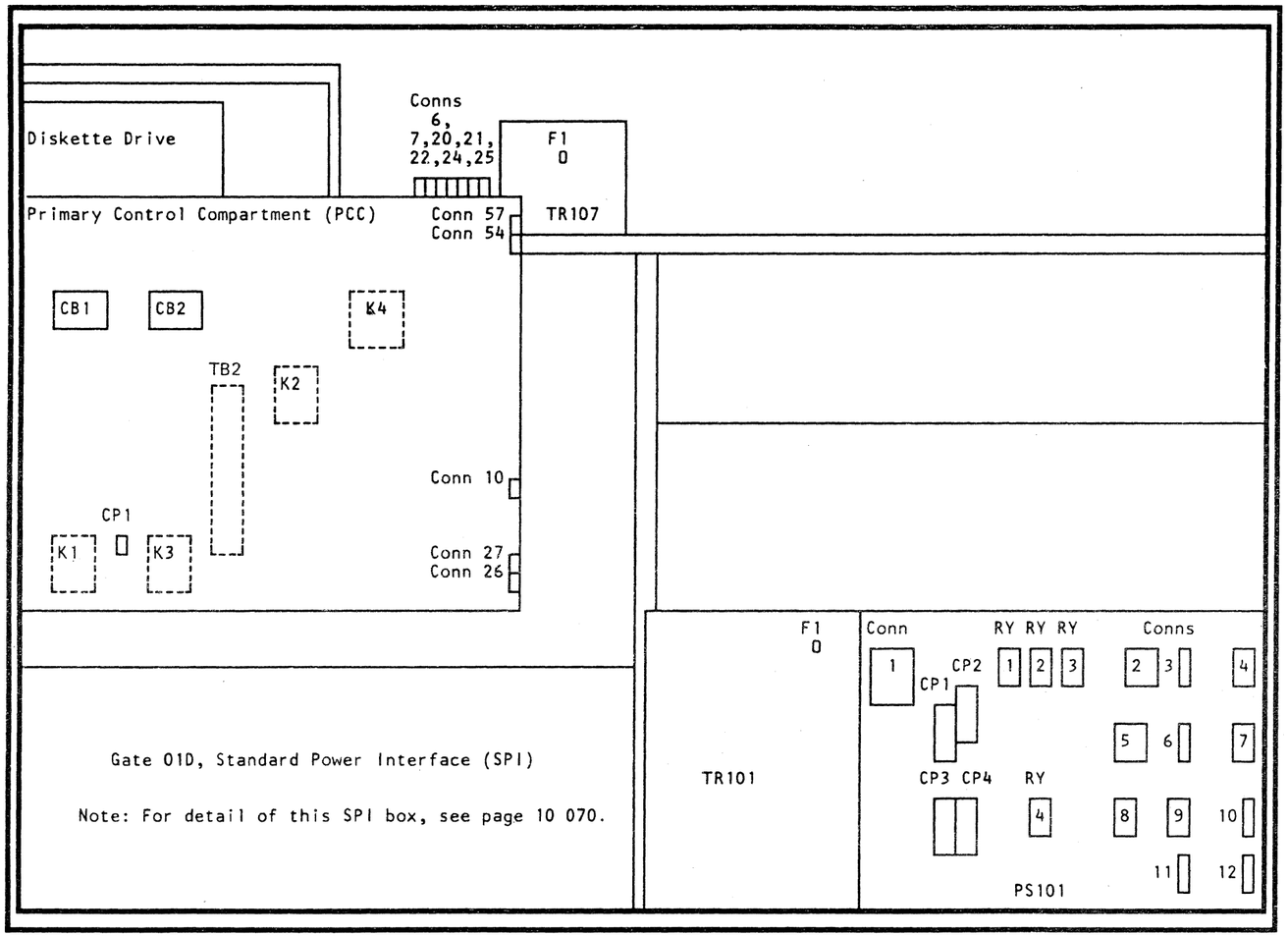
VIEW FROM BEHIND GATE 01A



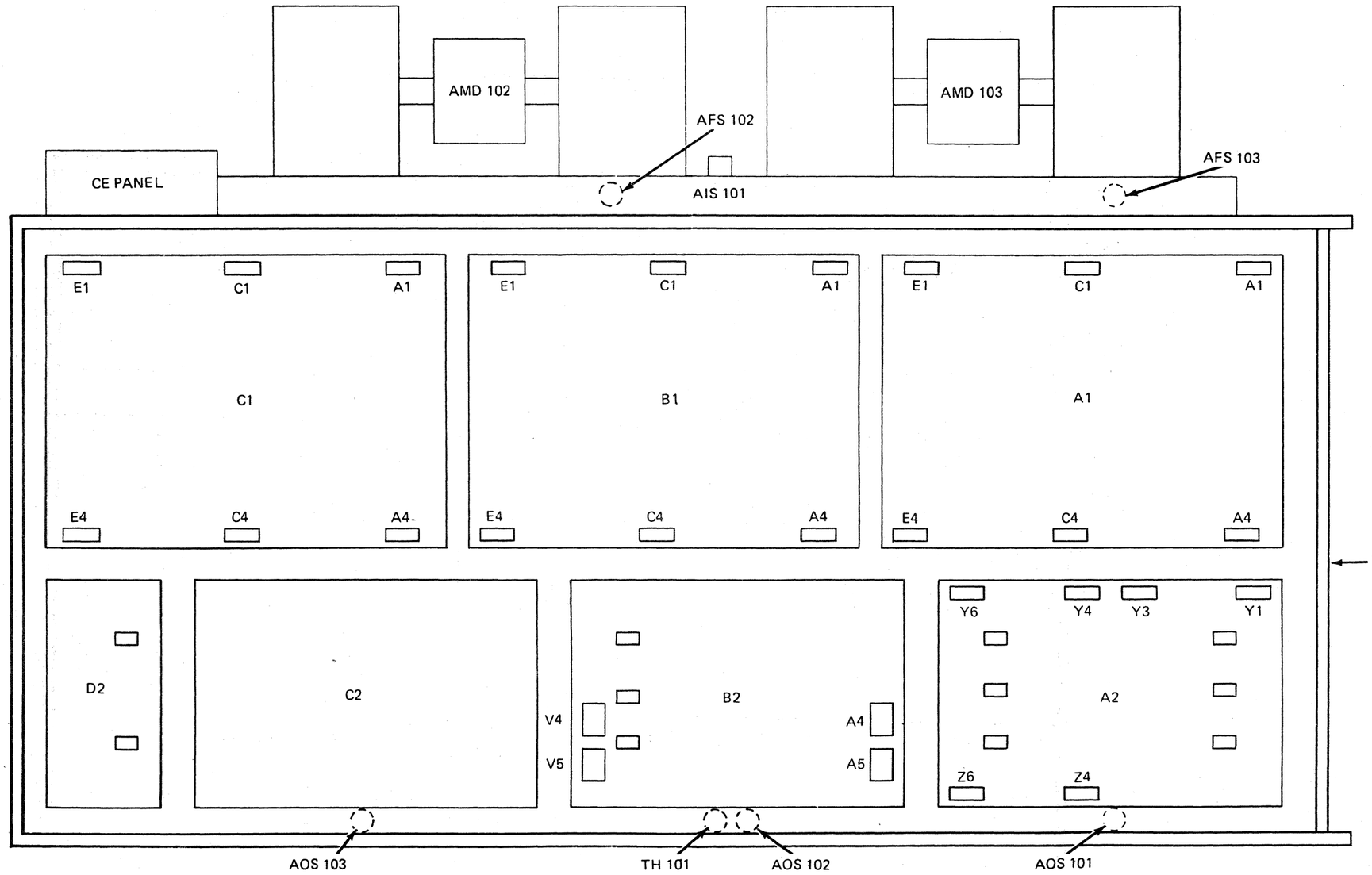
RIGHT SIDE VIEW



FRAME 01 (REAR VIEW)

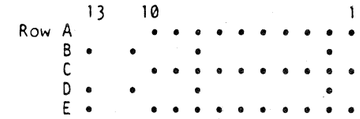


GATE 01A (PIN SIDE)

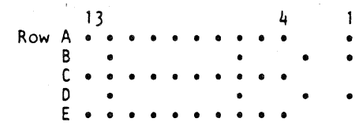


BOARDS A1, B1

CONNECTORS A1, C1, and E1



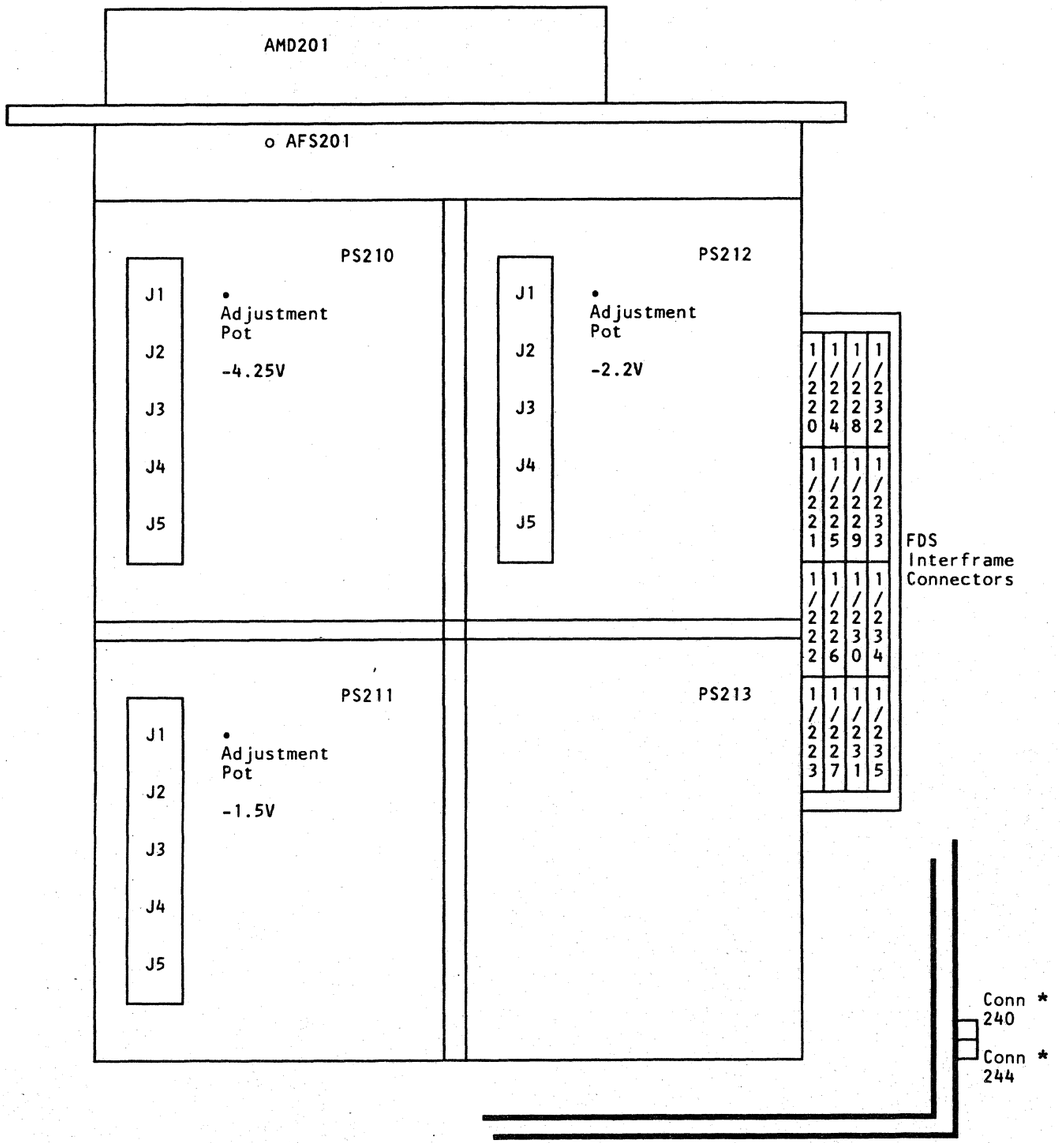
CONNECTORS A4, C4, and E4



Model Group 2, Switching Regulators

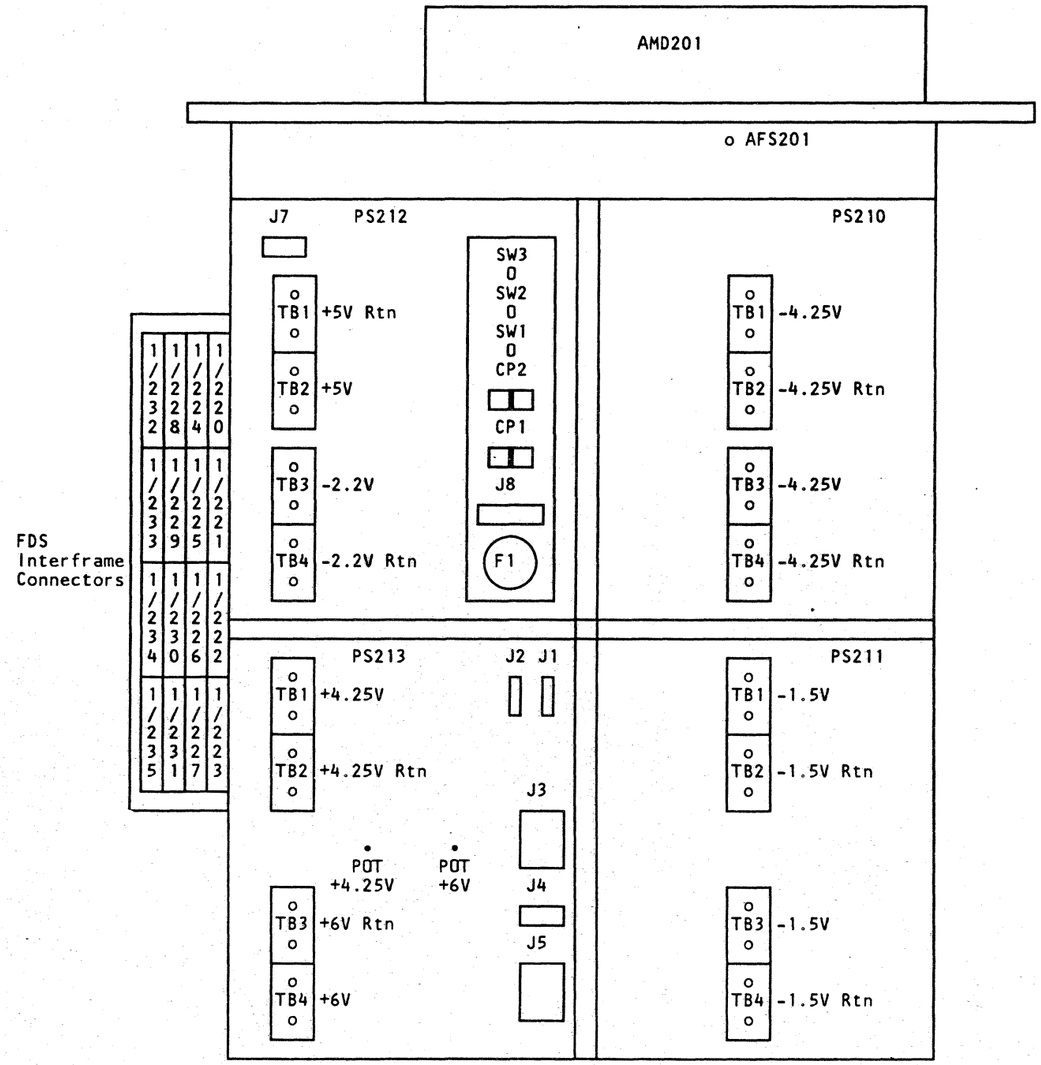
EC379816 20Oct80 EC379836 19Apr82	PN 2676232 2 of 2	10 050d

GATE 02A (FRONT VIEW)



* Connectors 240 and 244 are mounted on frame 02 directly to the right of gate 02A.

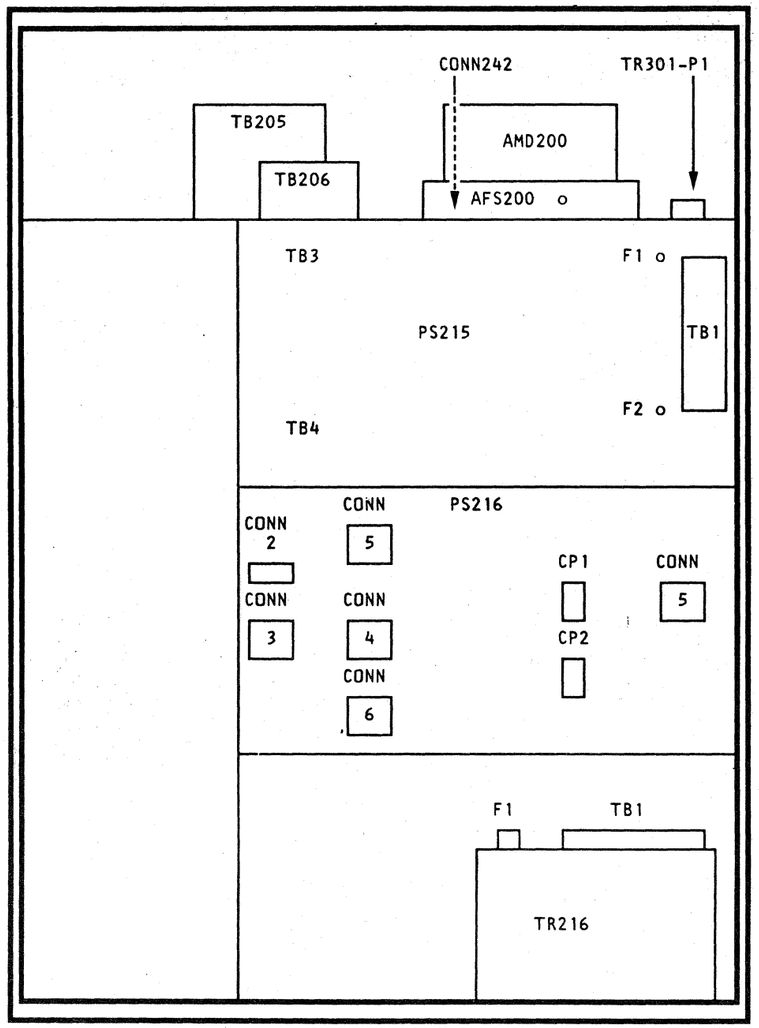
GATE 02A (REAR VIEW)



Model Group 2, Switching Regulators

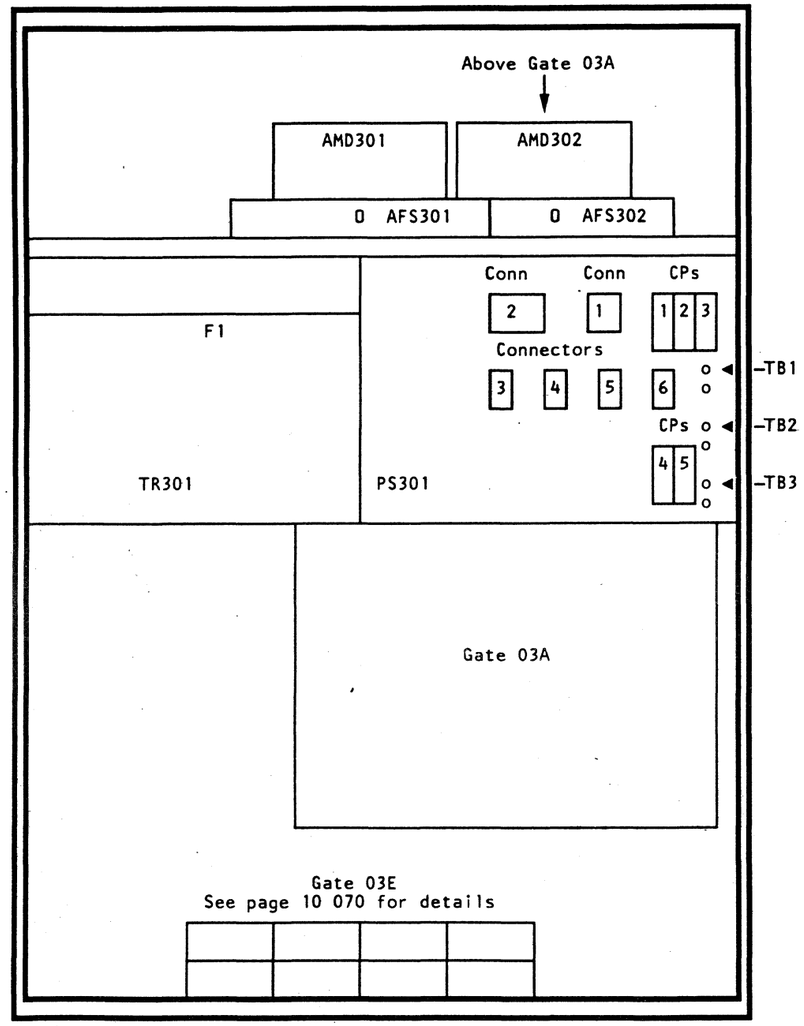
EC 379605 06Mar81 EC 379607 05Jun81	PN 2676233 1 of 2	10 055d

FRAME 02 (REAR VIEW)

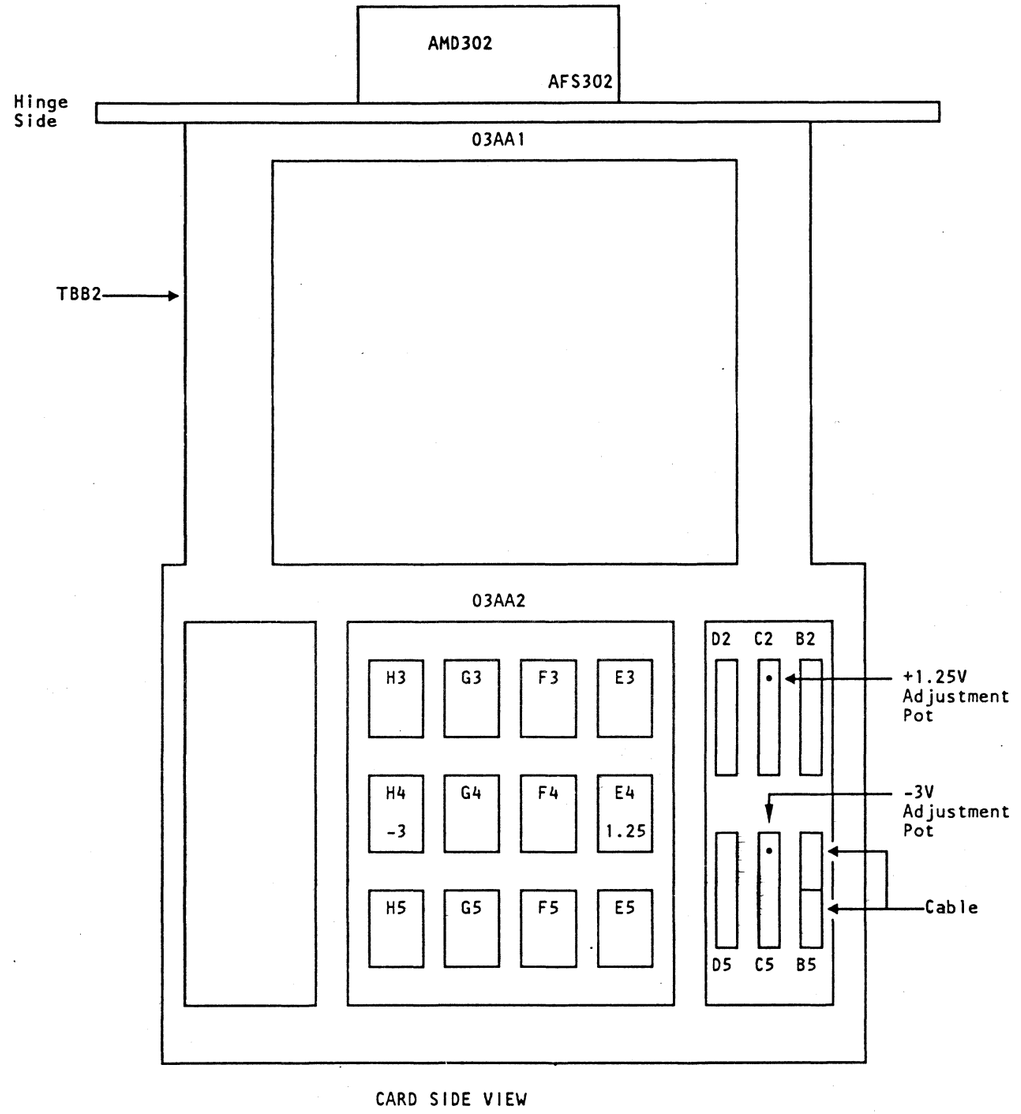


FRAME 03

(FRONT VIEW)



FRONT VIEW OF GATE 03A (IPS301)

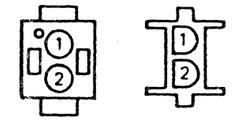


CARD SIDE VIEW

CONNECTORS AND RELAYS

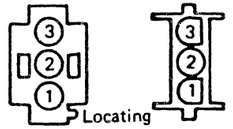
CONNECTOR PIN NUMBERING

2-Pin



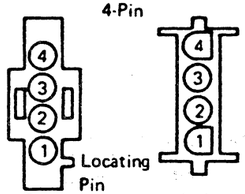
Plug (Wiring Side) Jack (Pin Side)

3-Pin



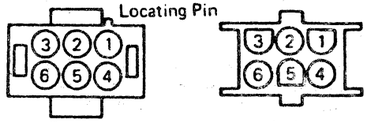
Plug (Wiring Side) Pin Jack (Pin Side)

4-Pin



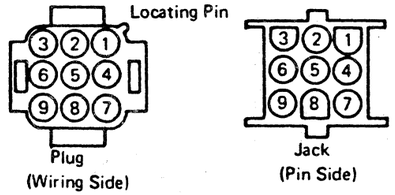
Plug (Wiring Side) Pin Jack (Pin Side)

6-Pin



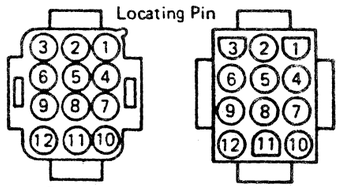
Plug (Wiring Side) Jack (Pin Side)

9-Pin



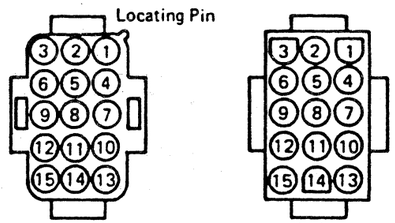
Plug (Wiring Side) Jack (Pin Side)

12-Pin



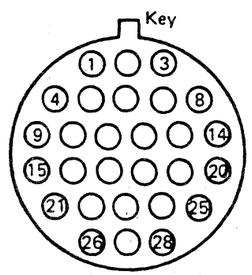
Plug (Wiring Side) Jack (Pin Side)

15-Pin



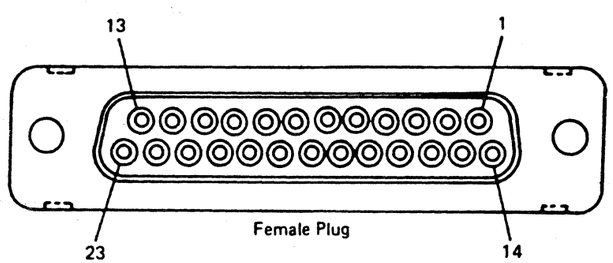
Plug (Wiring Side) Jack (Pin Side)

Key



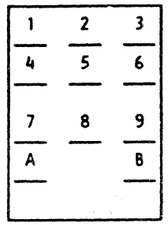
OCP Jack (Pin Side)

OCP Connector (located in keyboard housing)

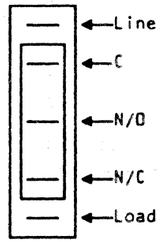


Female Plug

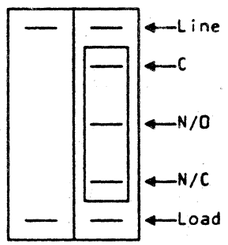
RELAY PIN NUMBERING



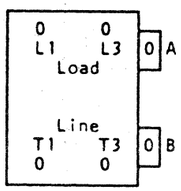
PCC K1 and K3 (Pin Side)



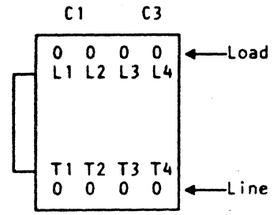
PCC CP1 (Single Pole)



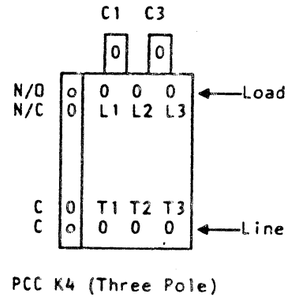
PCC CP1 (Two Pole)



PCC K2

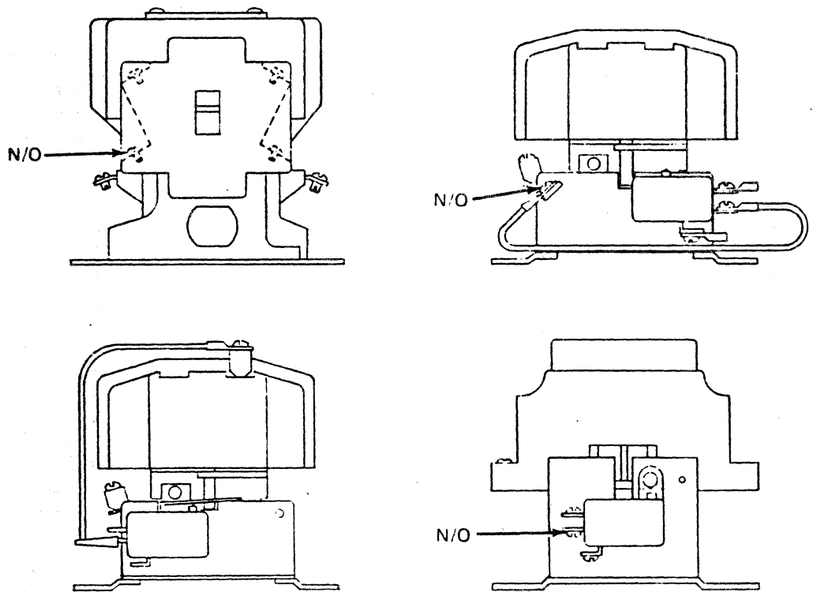


PCC K4 (Four Pole)



PCC K4 (Three Pole)

Below are the four 60Hz K4 relays, indicating the location of the N/O terminal:



Model Groups 1 and 2

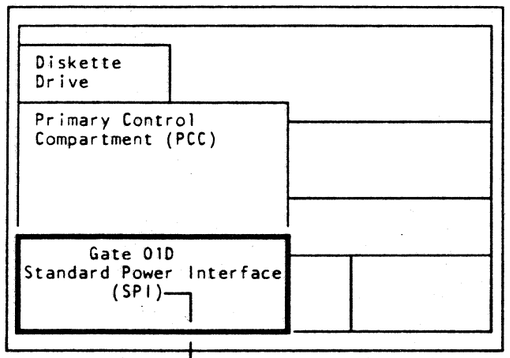
GATES 01D, 01E, 01G, and 03E

SPI GATE 01D (STANDARD POWER INTERFACE)

Notes:

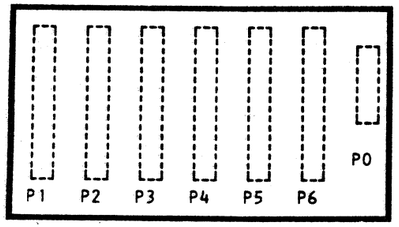
1. Look at the machine to determine the SPI box layout that applies.
2. SPI panels P4, P5, P6 are not present on all machines.
3. The diagrams show relative position of the SPI box and panels in frame 01.

FRAME 01 (REAR VIEW)

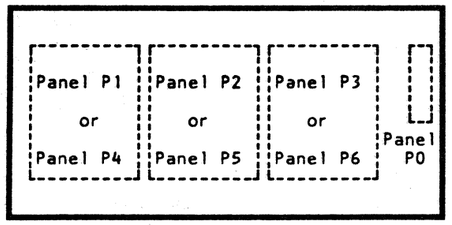


One or the other apply

Standard Power Interface Box



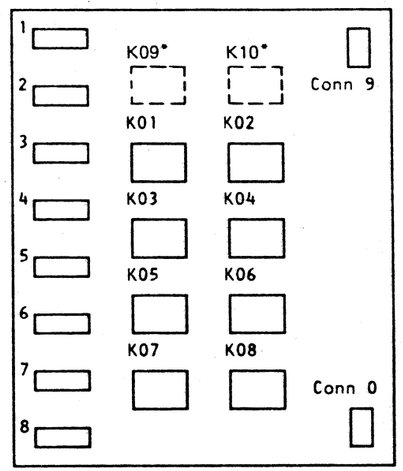
Standard Power Interface Box



Note: SPI panels P4, P5, and P6 are mounted directly in front of SPI panels P1, P2, P3, respectively.

SPI PANELS P1 THROUGH P6

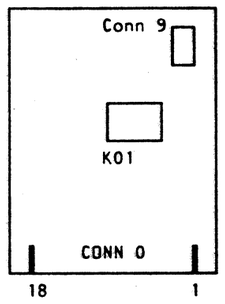
(Component View)



*If present

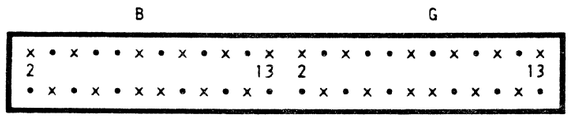
SPI PANEL P0

(Component View)



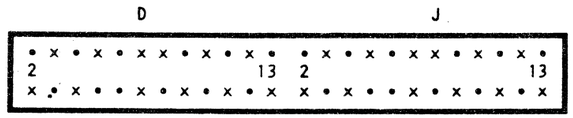
GATE 01E (CHANNEL INTERFACE)

CHAN 0	CHAN 1	CHAN 2	CHAN 3	CHAN 4	CHAN 5
A1 TAG	B1 TAG	C1 TAG	D1 TAG	E1 TAG	F1 TAG
A2 BUS	B2 BUS	C2 BUS	D2 BUS	E2 BUS	F2 BUS



BUS/TAG CABLE RECEPTACLE PIN NUMBERING
(Pin Side)

x = Shield Pin



BUS/TAG CABLE-END CONNECTOR PIN NUMBERING
(Pin Side)

x = Shield Pin

B G

GATE 01G

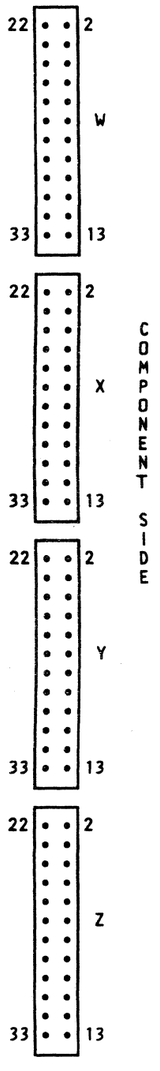
Spare	Spare
Spare	Spare
Spare	Spare
RSF	Spare
Ext Int	Spare

GATE 03E (CTCA)

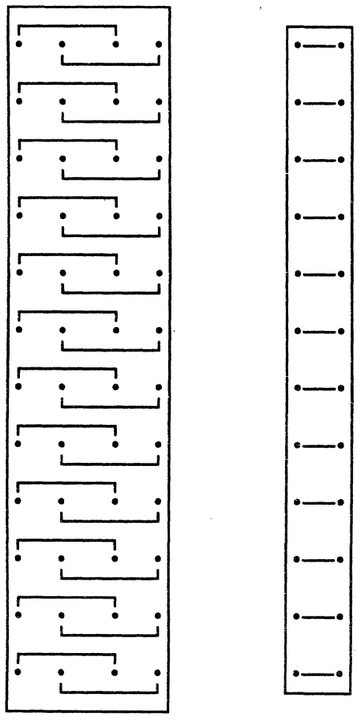
A1 TAG IN X	B1 TAG OUT X	C1 TAG IN Y	D1 TAG OUT Y
A2 BUS IN X	B2 BUS OUT X	C2 BUS IN Y	D2 BUS OUT Y

TOP CARD CROSSOVER CONNECTORS (TCC)

PIN NUMBERING

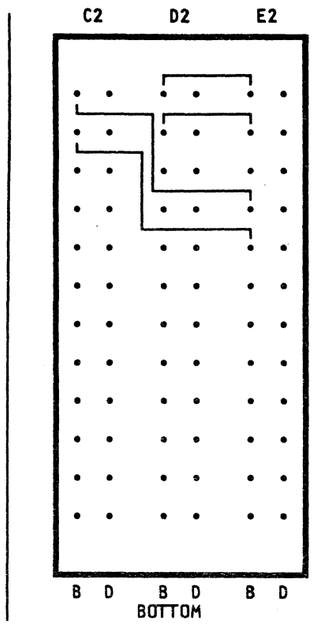


TOP CARD CROSSOVER CONNECTORS (EXCEPT FOR THE PCA)

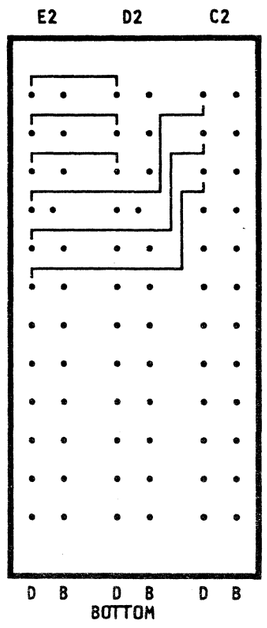


Note: *Ensure that TCC connectors are not one pin position high or low when replugging.*

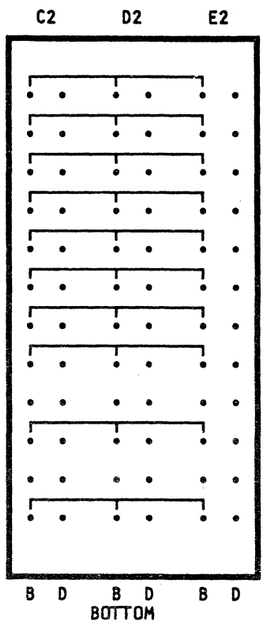
PCA TOP CARD CROSSOVER CONNECTORS (01AB2)



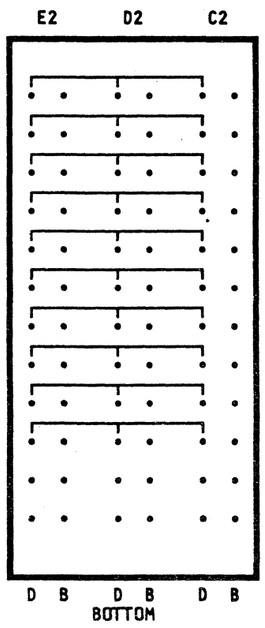
W Position non-card side view



W Position Card Side View



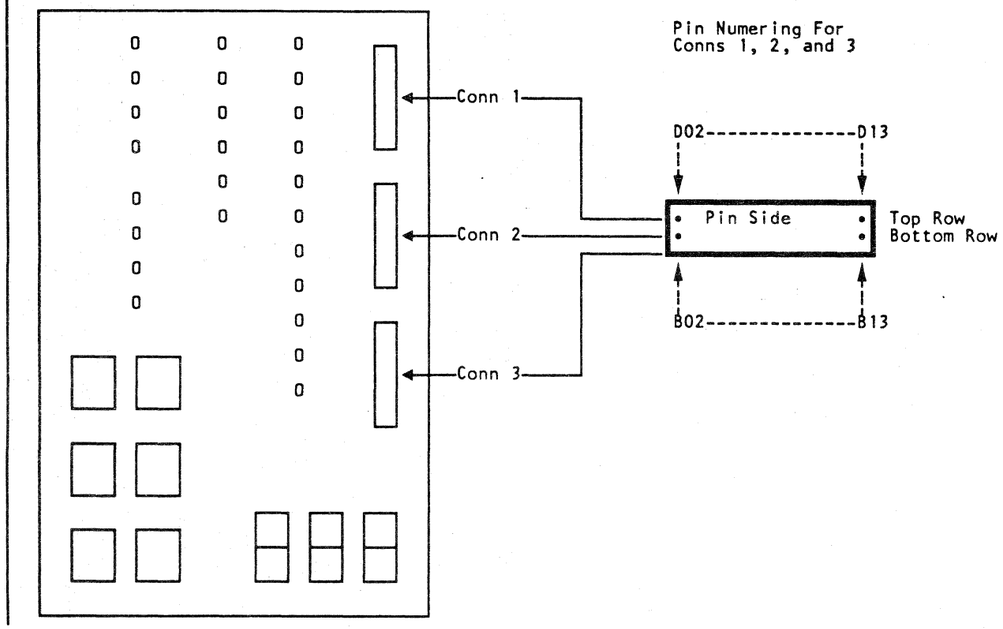
X Position Non-card Side View



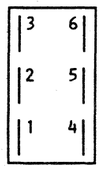
X Position Card Side View

MISCELLANEOUS LOCATIONS

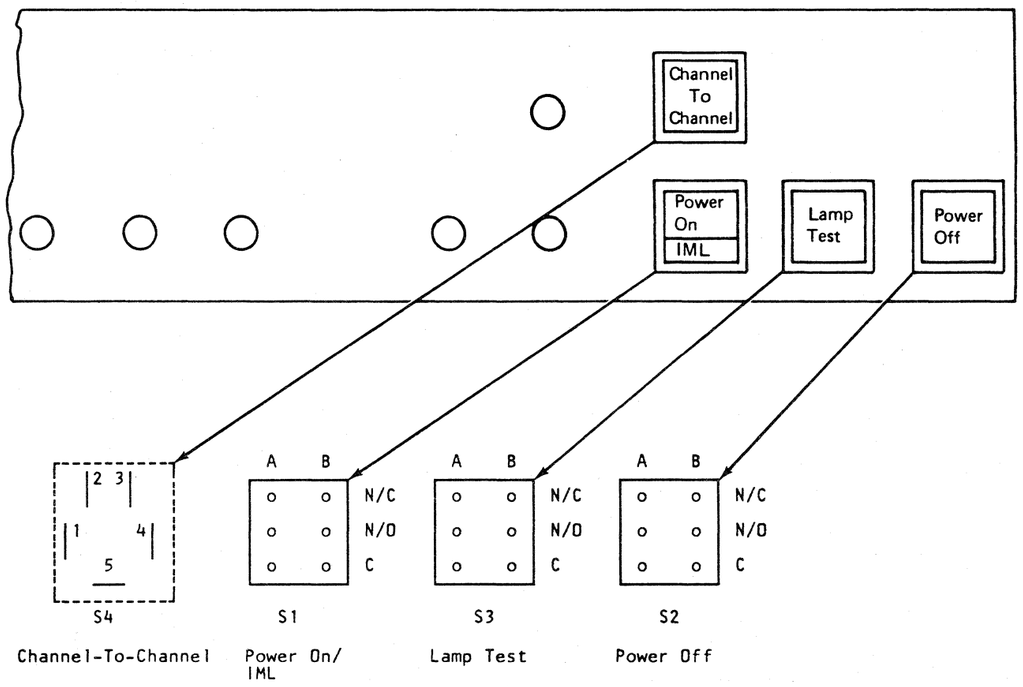
CE PANEL CONNECTORS



UNIT EMERGENCY POWER OFF SWITCH



OPERATOR CONTROL PANEL (OCP) SWITCHES



TOOLS

CONTENTS

* *Trademark of Tektronix Inc.*

MAINTENANCE TOOLS LIST

The following tools are used to maintain the 4341 processor and Large Scale Integration (LSI) logic.

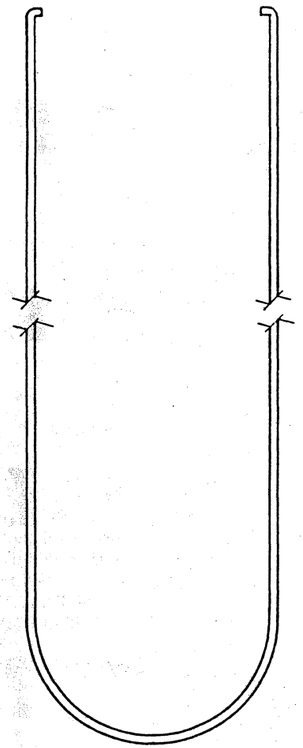
Tool Description	Part Number	Figure Page
Battery 1.35V	453119	11 025
Battery 2.8V	453120	11 025
Power Cable Removal Tool	453132	11 016
Decoupling Capacitor Insert/Removal Tool	453467	12 030
Continuity Checker	453587	11 016
Special Voltage Power Decoupling Capacitor Pin Aligner	453727	11 017
Card Container	453841	11 017
Card Pin Aligner	453849	11 030
Single-Pin Aligner	453857	11 030
Signal and Ground Probe Tip	453915	11 016
Probe Tip Adapter	1310714	11 016
Adapter	453954	11 025
Tool Bag	963400	
Card Puller	1310707	11 016
Tektronix* 475/DM44 Oscilloscope	1650782	11 017
Tektronix P6106 Probe	1650776	
Digitec** 2210 Multimeter	1749233	
Board Probe Mask	2360334	11 017
Signal Cable Removal Tool	2360340	11 016
Cable Clamp Position Tool	2360406	11 017
Cable Probe Adapter	2360408	11 017
Lead Extension Assembly	2360417	
Actuation Tool	4134750	11 016
Actuation Tool Blade	4138537	11 016
Channel Wrap Test Cable		
Bus	8483772	
Tag	8483773	

* Trademark of Tektronix Inc.

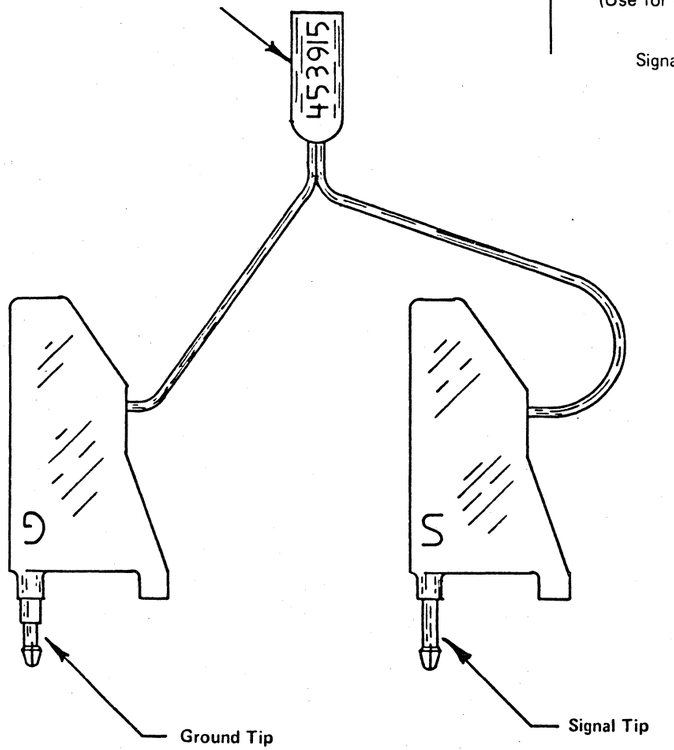
** Trademark of United System Corp.

TOOL FIGURES

POWER CABLE REMOVAL TOOL PN 453132

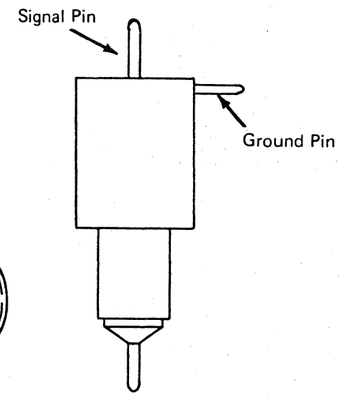


PROBE ASSEMBLY PN 453915

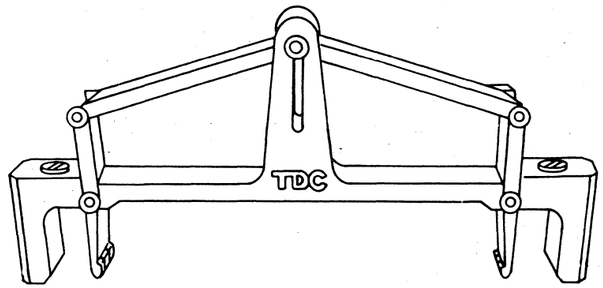


PROBE TIP ADAPTER Part 1310714

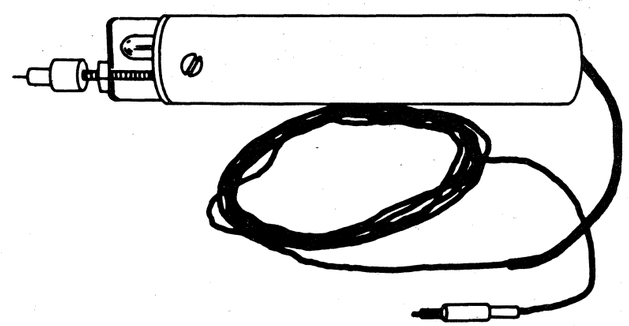
(Use for voltage level checking.)



SIGNAL CABLE REMOVAL TOOL PN 2360340

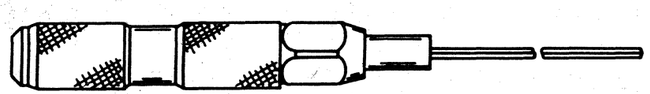


CONTINUITY CHECKER PN 453587

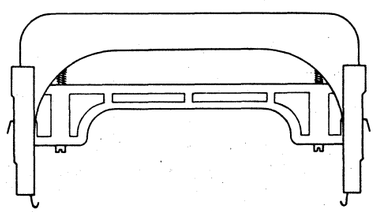


ACTUATION TOOL PN 4134750

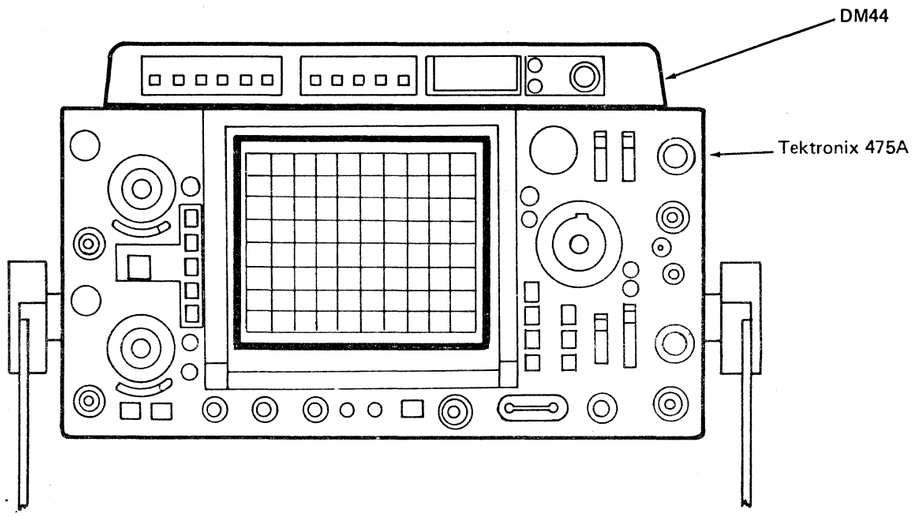
ACTUATION TOOL BLADE PN 4138537



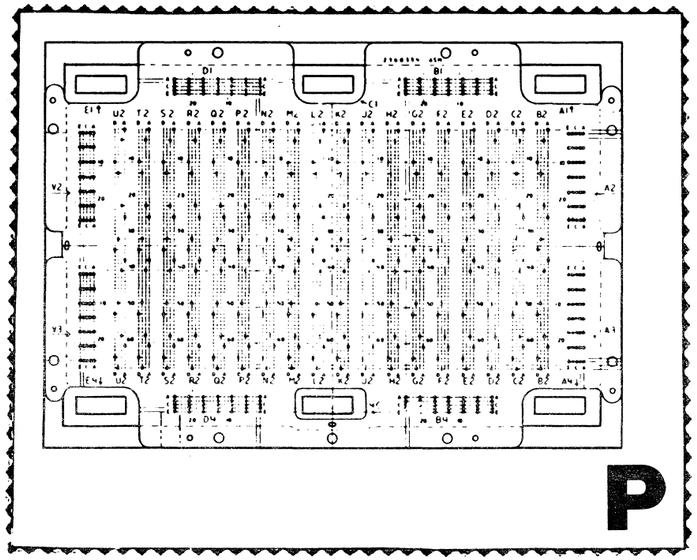
CARD PULLER PN 1310707



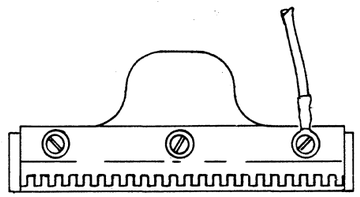
TEKTRONIX 475/DM44 OSCILLOSCOPE PN 1650782



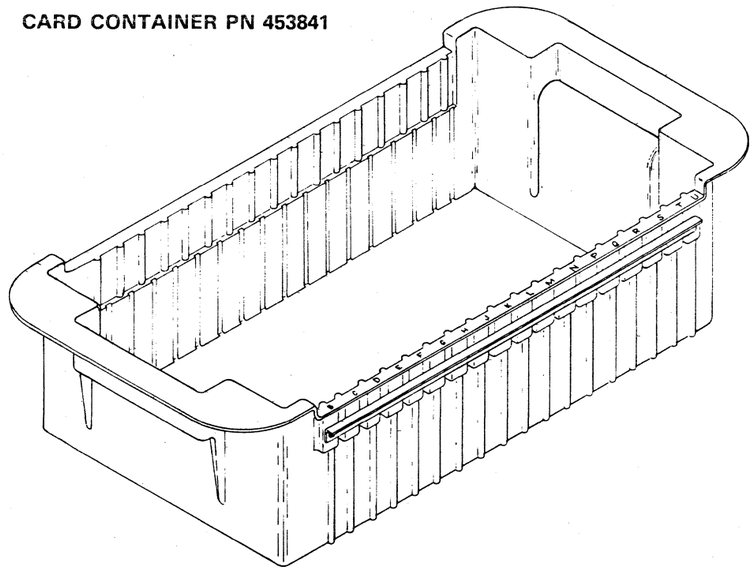
BOARD PROBE MASK PN 2360334
(CAPTIVE SCREW PN 2360072)



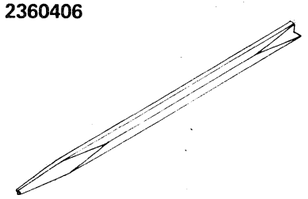
CABLE PROBE ADAPTER PN 2360408



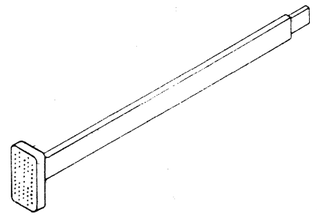
CARD CONTAINER PN 453841



CABLE CLAMP POSITION TOOL
PN 2360406



SPECIAL VOLTAGE POWER DECOUPLING
CAPACITOR PIN ALIGNER PN 453727



Model Groups 1 and 2

ACTUATION TOOL (Part 4134750)

This tool is used to remove/replace:

- Probe mask
- Power cable (FDS) housing clamp
- Board stiffener assembly
- LSI logic card
- Card guidance hardware
- I/O signal cable groupers.

The actuation tool is a hand-operated tool with a preset torque setting when turned clockwise. Torque control is needed to prevent damage to the screw threads and inserts.

Note: *Actuation tool blade is part 4138537.*

OPERATION

Ensure the tip of tool is seated in the socket head screw to be removed/replaced. When tightening the screw, turn the tool clockwise until you feel the tool slip and hear a clicking sound. Screw is now fully tightened.

When removing a screw, ensure the tip is fully seated in the socket head screw. The actuation tool has a positive drive in a counterclockwise direction.

ACTUATION TOOL PN 4134750

CONTINUITY CHECKER (PN 453587)

The continuity checker is a plastic housing with a clear plastic lens that contains an indicator. A 6-32 threaded rod extends from one end and a flexible lead with a 6-32 threaded stud extends from the other end. Various probe tips can be adapted to the continuity checker.

OPERATION

Assemble the necessary probe tip to the continuity checker. Connect the probe tip on the flexible lead to a convienent checkpoint. Probe with the threaded rod (with probe tip) protruding from the other end of the continuity checker.

Caution: Do not use the CE ohm-meter on LSI logic. Circuits could be damaged.

MAINTENANCE

Maintenance consists of replacement of the following:

1.35V battery	PN 453119
2.8V battery	PN 453120
Indicator lamp	PN 5353889

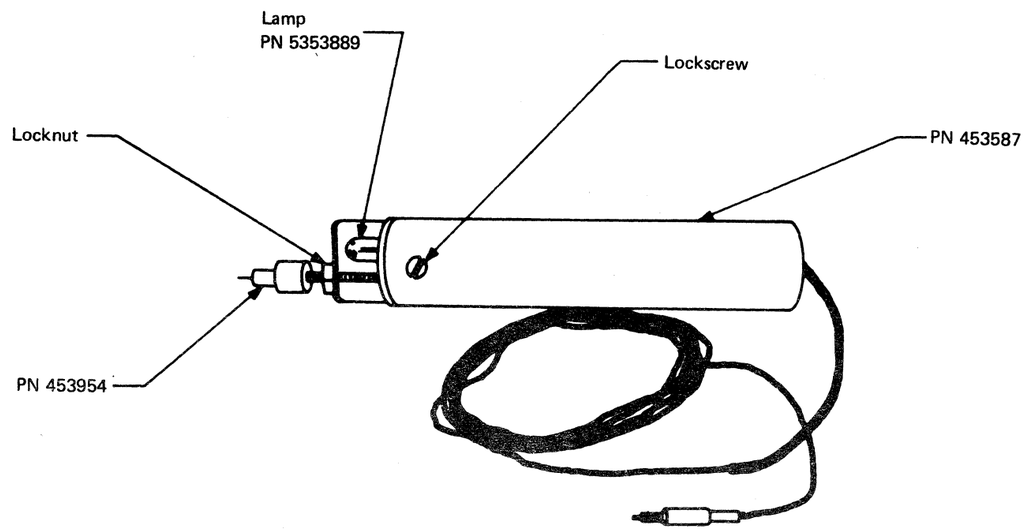
Battery Replacement

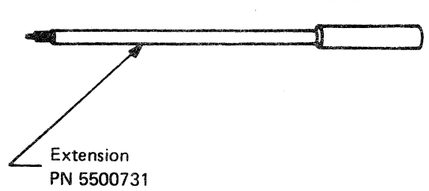
Remove the lock screw near the front of the continuity checker. Hold the body, and pull the clear plastic end until the two parts are separated. Replace the bad batteries (observe the polarity). Reassemble checker in reverse order.

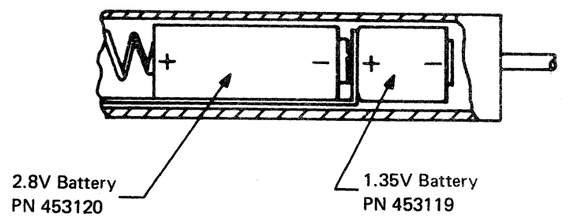
Lamp Replacement

Disassemble the tool as in Battery Replacement procedure. Loosen locknut and remove the circuit card assembly from the plastic lens. Remove the bad lamp. Remove the lens cap from the new lamp and insert in the circuit card assembly. Reassemble the continuity checker in reverse order.

CONTINUITY CHECKER







CARD PIN ALIGNMENT

Card pins must be straight for card installation.

Tools used are:

Card pin aligner	PN 453849
Single-pin aligner	PN 453857

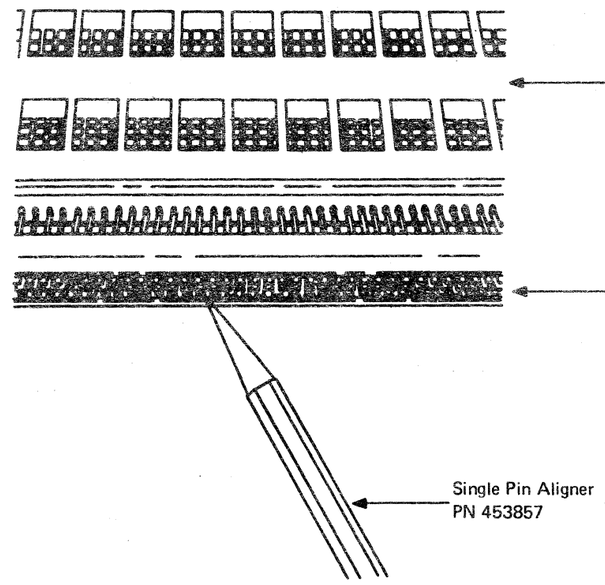
SINGLE-PIN ALIGNER

The single-pin aligner **A** is used to straighten pins that are bent too much to use the card pin aligner. Use the single-pin aligner to straighten the pin to its approximate position, and then use the card pin aligner.

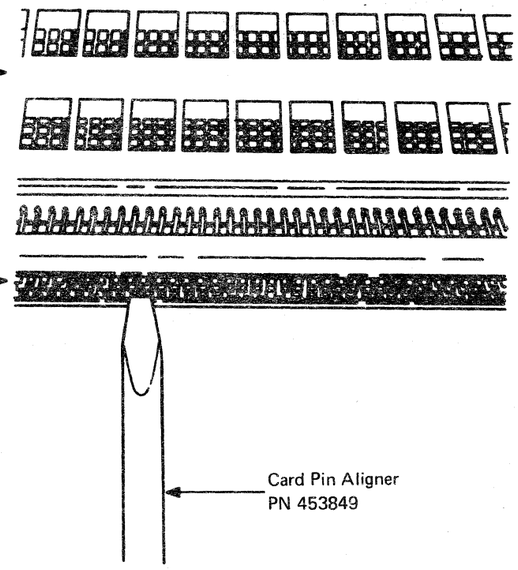
CARD PIN ALIGNER

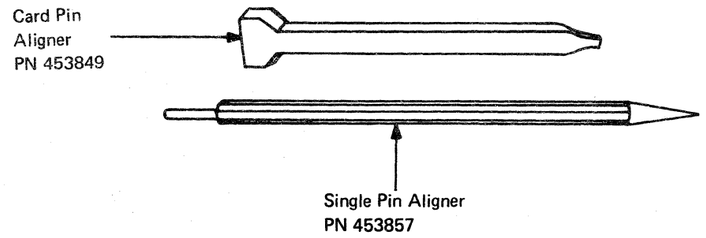
1. Place slot in the narrow end of tool over bent pin **B**. Keep tool at a right angle to the card housing surface.
2. Push the tool on the pin until it is seated against the card housing surface.
3. Remove the tool by pulling straight out.
4. Repeat steps 1, 2, and 3 until pin is straight.
5. Using the wide end of the tool, repeat steps 1, 2, and 3. This ensures alignement with the other pins **C**.

A Using the Single Pin Aligner

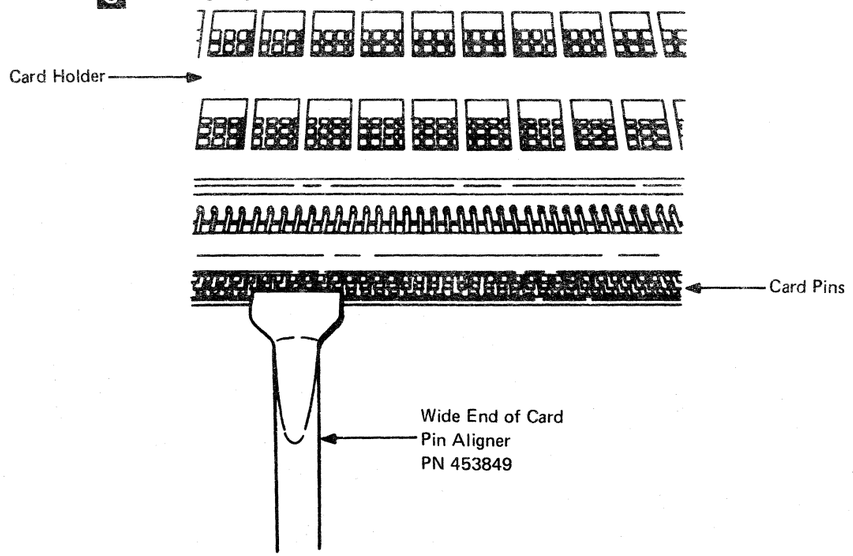


B Using the Card Pin Aligner





C Ensuring Alignment of Straightened Pins



REMOVALS AND REPLACEMENTS

CONTENTS

CE Safety Practices

All Customer Engineers are expected to take every safety precaution possible, and to observe the following safety practices while maintaining IBM equipment:

1. You should not work alone under hazardous conditions or around equipment with dangerous voltage. Always advise your manager if you MUST work alone.
2. Remove all power ac and dc when removing or assembling major components, working in the immediate area of power supplies, performing mechanical inspection of power supplies, and installing changes in machine circuitry.
3. Wall box power switch, when turned off, should be locked or tagged in off position. 'Do Not Operate' tags, order number S229-1266, should be affixed when applicable. Pull power supply cord whenever possible.
4. When it is absolutely necessary to work on equipment having exposed operating mechanical parts or exposed live electrical circuitry anywhere in the machine, the following precautions must be followed:
   a. Another person familiar with power off controls must be in the immediate vicinity.
   b. Rings, wrist watches, chains, bracelets, and metal cuff links shall not be worn.
   c. Only insulated pliers and screwdrivers shall be used.
   d. Keep one hand in pocket.
   e. When using test equipment, be certain that controls are set correctly and to the proper capacity, and that insulated probes are used.
   f. Avoid contacting ground potential (metal floor strips, machine frames, etc. - use suitable rubber mats, purchased locally if necessary).
5. Safety glasses must be worn when:
   a. Using a hammer to drive pins, riveting, staking, etc.
   b. Power hand drilling, reaming, grinding, etc.
   c. Using spring hooks, or attaching springs.
   d. Soldering, wire cutting, or removing steel bands.
   e. Parts cleaning using solvents, sprays, cleaners, chemicals, etc.
   f. Exposed to any other condition that may be hazardous to your eyes. REMEMBER, THEY ARE YOUR EYES.
6. Special safety instructions, such as for handling cathode ray tubes and extreme high voltages, must be followed as outlined in CEMs and in the Safety section of the Maintenance Manuals.
7. Do not use solvents, chemicals, greases, or oils that have not been approved by IBM.
8. Avoid using tools or test equipment that has not been approved by IBM.
9. Replace worn or broken tools and test equipment.
10. The maximum load to be lifted is that which, in the opinion of you and of management, does not jeopardize your own health or well-being, or that of other employees.
11. All safety devices, such as guards, shields, signs, ground wires, etc., shall be restored after maintenance.
12. Each Customer Engineer is responsible to be certain that no action on his part renders a product unsafe, or exposes hazards to customer personnel.
13. Place removed covers in an out-of-the-way place where no one can trip over them.
14. All machine covers must be in place before the machine is returned to the customer.
15. Always place CE tool kit away from walk areas (that is, under desk or table) where no one can trip over it.
16. Avoid touching moving mechanical parts (that is, when lubricating, checking for play, etc.).
17. When using stroboscope, do not touch ANYTHING; it may be moving.
18. Avoid wearing loose clothing that may become caught in machinery. Shirt sleeves must be left buttoned, or rolled to above the elbow.
19. Ties must be tucked in shirt or fastened with a tie clasp (preferably non-conductive), approximately 3 inches from the end. Tie chains are not recommended.
20. Before starting equipment, make certain that fellow CEs and customer personnel are not in a hazardous position.
21. Maintain good housekeeping in the area of machines while performing, and after completing, maintenance.

Artificial Respiration

General Considerations

1. Start Immediately. Seconds Count.
   Do not move victim unless absolutely necessary to remove from danger. Do not wait or look for help or stop to loosen clothing, warm the victim, or apply stimulants.
2. Check Mouth for Obstructions.
   Remove foreign objects; pull tongue forward.
3. Loosen Clothing; Keep Warm.
   Take care of these items after victim is breathing by himself, or when help becomes available.
4. Remain in Position.
   After victim revives, be ready to resume respiration if necessary.
5. Call a Doctor.
   Have someone summon medical aid.
6. Don't Give Up.
   Continue without interruption until victim is breathing without help, or until victim is certainly dead.

Rescue Breathing for Adults

Victim on His Back Immediately.

1. Clear throat of water, food, or foreign matter.
2. Tilt head back to open air passage.
3. Lift jaw up to keep tongue out of air passage.
4. Pinch nostrils to prevent air leakage when you blow.
5. Blow until you see the chest rise.
6. Remove your lips and allow the lungs to empty.
7. Listen for snoring and gurgling, signs of throat obstruction.
8. Repeat mouth-to-mouth breathing 10-20 times per minute. Continue rescue breathing until victim breathes for himself.

Thumb and finger position

Final mouth-to-mouth position

Reprint Courtesy Mine Safety Appliance Co.

LSI BOARD

REMOVE BOARD ASSEMBLY

Card Side

1. Press **POWER OFF** key on the OCP.

CAUTION
Observe label for closing the 01A gate.

2. Remove board card cover.
3. Disconnect I/O signal cables (A2, A3, B1, B4, D1, D4, V2, and V3) by:
   a. Obtaining an actuation tool (part 4134750) to loosen or tighten captive screws as directed.
   b. Completely loosening the 16 captive screws [A].

Note: *Note the position and placement of the air baffle before removal. The position, placement, and number of the air baffles depend on the board being serviced.*

4. Remove air baffle [D] from between the frame and card guidance hardware [E].

Pin Side

1. Disconnect all voltage connectors (FDS and special voltage housings).
2. Completely loosen the 16 captive screws which hold the board assembly to the frame.
   - Loosen *top center screw last*, and support the board assembly with free hand.
3. Carefully remove board assembly from frame.
   Place the board assembly, pin side down, on a flat surface.

Disassemble the Board

1. Remove all logic cards:
   a. Remove top card connectors (TCCs).
   b. Completely loosen all logic card captive screws [B].
   c. Remove all logic cards and put in container (part 453841).
2. Remove card guidance hardware [E].
   a. Completely loosen eight captive screws [C].
3. Disconnect the decoupling capacitors (A1, C1, E1, A4, C4, and E4) by:
   a. Obtaining tool (part 453467).
   b. Disconnecting each decoupling capacitor, one at a time, and plugging into the same location on the new board.

Notes:

- *Every LSI board does not contain capacitors in all six positions.*
- *Decoupling capacitor part 4138522 apply to positions A1, A4, E1, and E4. The C1 and C4 positions could have: part 4138522, part 4138587, or none.*

Prepare the New Board Assembly

1. Place new board assembly on a flat surface, pin side down, so the board part number is in the upper right corner [F].
2. Reinstall the card guidance hardware [E] on the new board:
   a. Ensure card position lettering is as shown in [G].
   b. Tighten eight captive screws [C].
3. Reinstall logic cards from container into the new board:
   a. Match the card position lettering shown on the cards to the card position lettering [G].
      - Ensure that the components are to the right.
   b. Alternately tighten all logic card captive screws [B].
4. Reinstall top card connectors (TCCs).
   - To ensure that the TCCs are connected in the correct positions, see the section 14, *Service Aids,* page 14 105, "01A-Gate Card Layout."

INSTALL NEW BOARD ASSEMBLY

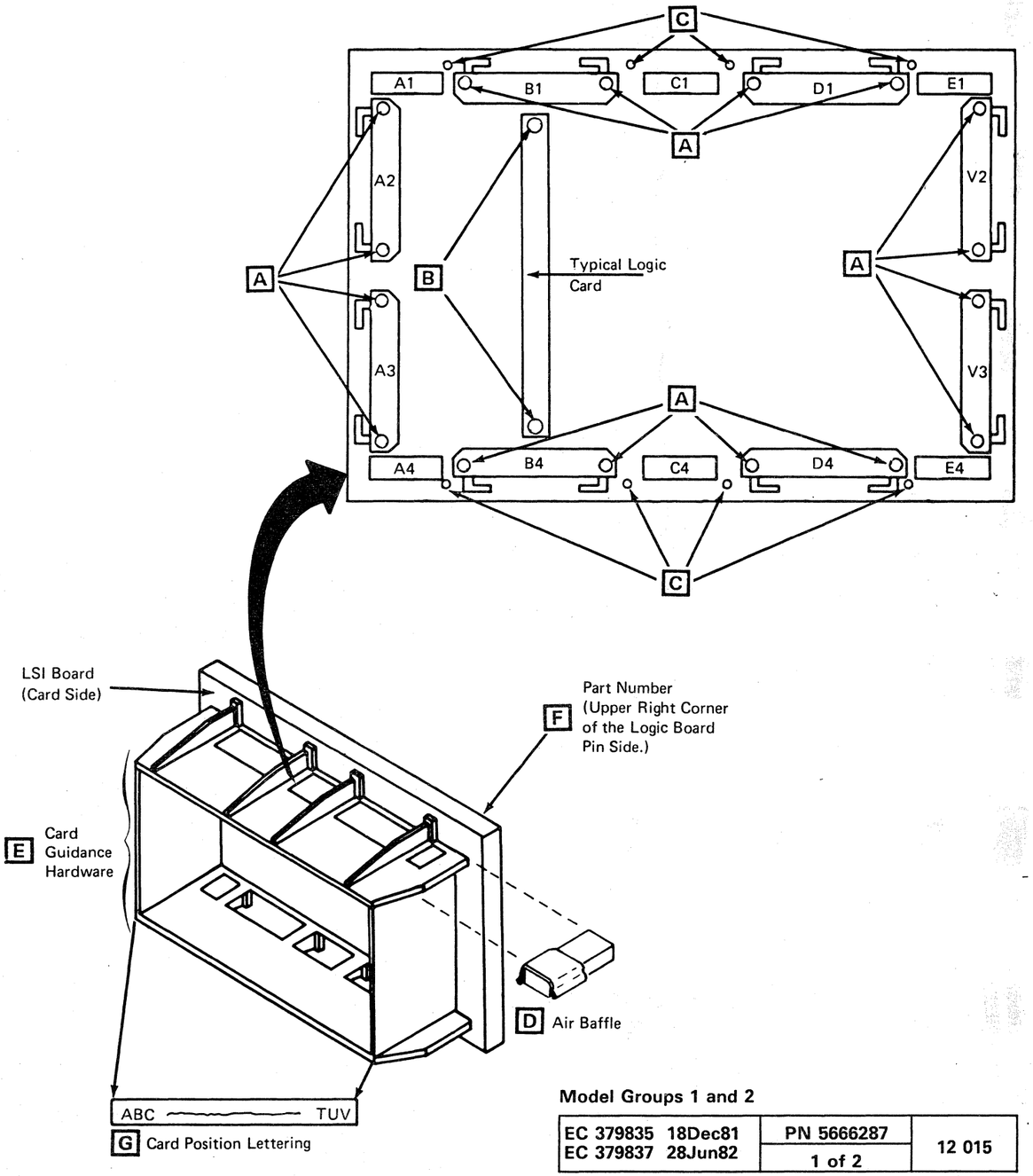
Pin Side

1. Carefully install board assembly on the frame, and tighten the 16 board captive screws.
2. Reinstall all voltage connectors (FDS and special voltage housings).

Card Side

1. Reinstall the air baffle [D].
2. Reinstall all I/O signal cables.
   a. Tighten captive screws [A].
   (You may need to remove the cable clamps.)
   b. Ensure that each connector in the super grouper is seated properly.
3. Reinstall cable clamps (if removed), and ensure that TCCs are fully seated in the correct positions.
4. Install board card cover.
5. Turn on system power.

LSI BOARD AND CARD GUIDANCE HARDWARE



Model Groups 1 and 2

EC 379835 18Dec81 EC 379837 28Jun82	PN 5666287 1 of 2	12 015

MST BOARD

MST Board Removal/Replacement

1. Power off.
2. Open front and rear covers of frame 01.
3. Open gate 01A.

CAUTION
Observe label for closing gate 01A.

4. Place CB1 and CB2 in OFF position.
5. Locate board to be removed.
6. Remove front and rear covers from board.
7. Remove all cards from board.

Note: *Ensure that all cards are labeled for their board positions.*

8. Remove all cable connectors from card side (front) of board.

Note: *Ensure that all cable connectors are labeled for their board positions.*

9. Go to pin side of gate 01A and locate rear of board.
10. Remove flat wire and minibus connectors from board.

CAUTION
During replacement, be careful to align flat wire and minibus connectors properly on their pin positions.

11. If there are back panel jumpers/capacitors, transfer them to the new board.

    Note: *Record the board and pin positions of any jumpers/capacitors being removed.*

12. Remove mounting screws from top and both sides of board.
13. Loosen (do not remove) mounting screws from bottom of board; tilt top of board and lift it from its position.
14. Reverse procedure for MST board replacement.

PROBE MASK INSTALLATION

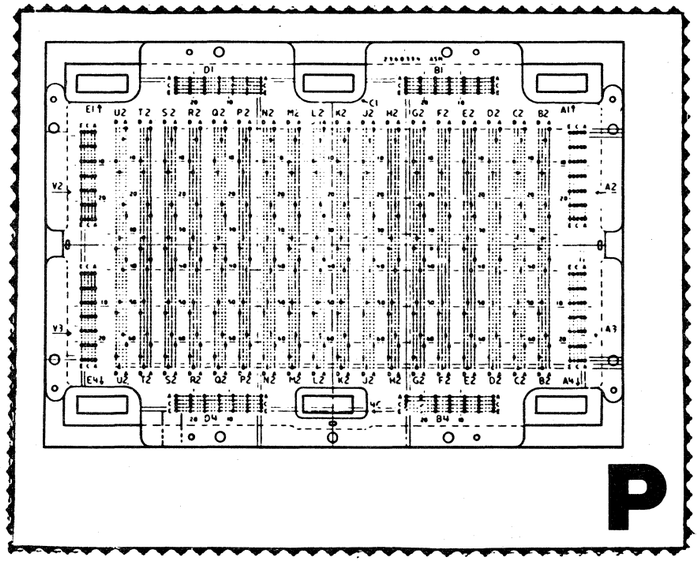
1. Turn off processor power.
2. Disconnect two cables from C4 position (bottom center) of board.
3. Remove logic board pin cover.
4. Align the three probe mask locating pins and push probe mask on until it contacts the board stiffener.
5. Tighten all probe mask captive screws with the actuation tool (part 4134750).

   Note: *Captive screw is part 2360072.*

6. Connect the two cables into the C4 position (where removed).
7. Turn on processor power.

Warning: Do not use CE ohmmeter on LSI logic. Circuits could be damaged.

PROBE MASK INSTALLED ON LOGIC BOARD



LSI LOGIC CARD

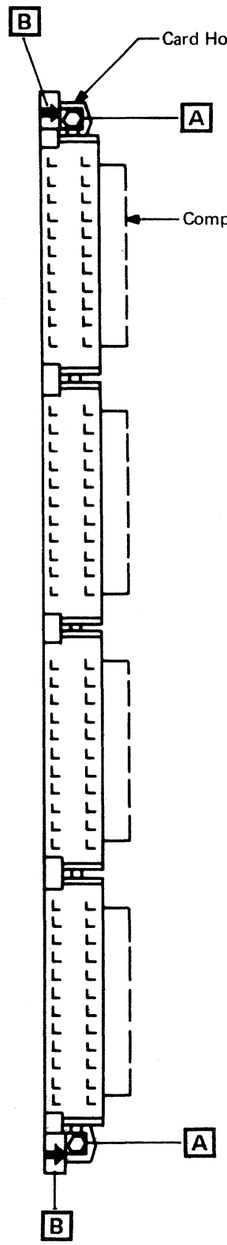
REMOVAL

1. Turn off processor power.
2. Open board card cover.
3. Remove (if present) top card crossover connectors (TCCC) from the card to be removed.
4. Using actuation tool (PN 4134750), completely loosen two captive screws [A] of the card to be removed.
5. Using both hands, move upper and lower lever arms, [B] in the direction of the arrows, and pull the card out.

REPLACEMENT

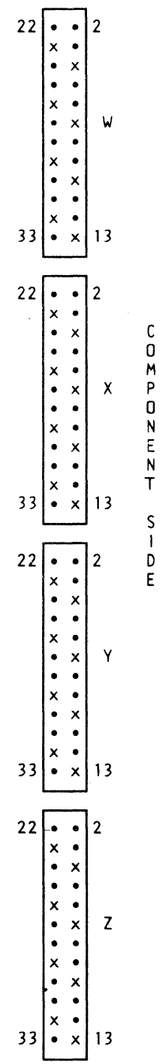
1. Insert the card so the arrows on the levers and card components point to the right.
2. Using actuation tool (PN 4134750), alternately tighten two screws [A].
3. Install TCCC (if removed).
4. Close board card cover.
5. Turn on processor power.

LSI CARD EXAMPLE
VIEW FROM TCCC SIDE



TOP CARD CROSSOVER CONNECTORS (TCC)

PIN NUMBERING
(x = ground when TCC is plugged.)



Note: *Ensure that TCC connectors are not one pin position high or low when replugging.*

FLEXIBLE DISTRIBUTION SYSTEM (FDS)

REPAIR

Repair of the FDS cables is limited to repairing torn or cut insulation. The repair is made by applying one turn, but not more than two, of insulation tape (PN 817979) so that it overlaps itself after one complete turn around the damaged connector. The length of the tape is to be 57 mm (2.25 inches) minimum.

The number of repairs per cable is not limited.

FDS CABLE REMOVAL

1. Turn off processor power.
2. Disconnect cable housing to be removed from the board (use cable card puller, PN 453132).
3. Remove cable retainers from channel containing the cable to be removed.
4. Tape together the cables that are above the cable to be removed.
5. Remove the cable from the terminal block.
6. Carefully remove the cable from the channel.
7. Turn on processor power.

FDS CABLE REPLACEMENT

1. Complete cable folding operation by folding at each precrease (fold mark). Make folds in the same direction as the precrease. (Fold mark should be on inside of radius being formed).
2. Insert the replacement cable between the taped cables and those left free.
3. Install the cable housing on the board.
4. Connect the cable to its position on the terminal block.
5. Remove all tape.
6. Install the cable retainers.
7. Turn on processor power.

DECOUPLING CAPACITOR (C-PAC)

REMOVAL

Use insert/removal tool (PN 453467) to remove a decoupling capacitor (C-PAC).

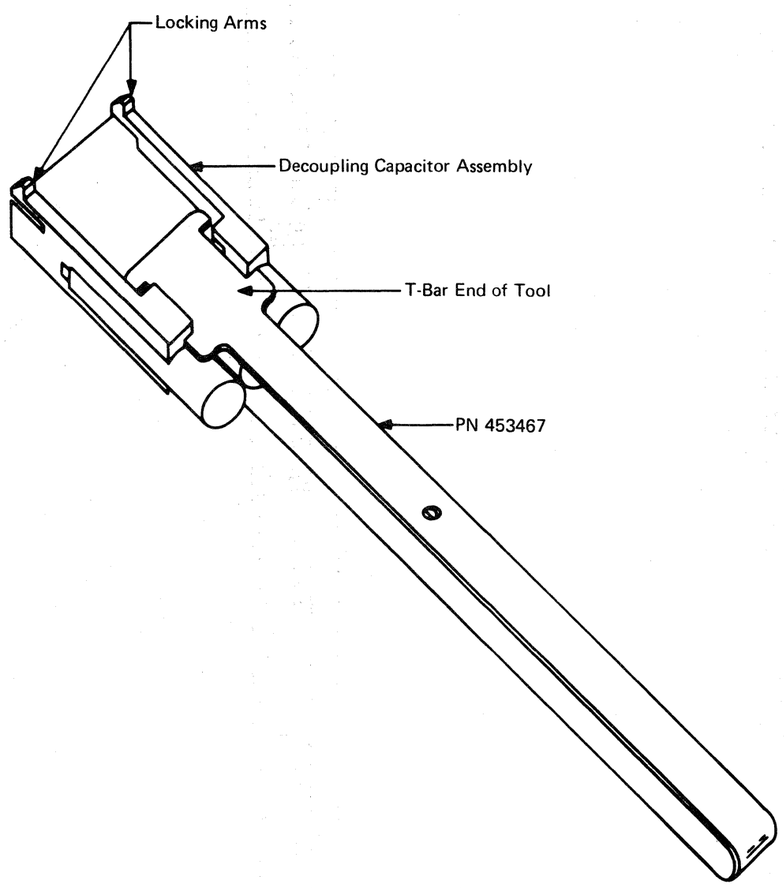
1. Turn off processor power.
2. Hold tool so that the small hole and the T-bar are facing up to remove upper C-PACs, and facing down to remove lower C-PACs.
3. Put tool on C-PAC as shown in diagram and pull straight out, at a right angle to the board surface.

REPLACEMENT

Use insert/removal tool (PN 453467) to install a C-PAC.

1. Turn off processor power.
2. Hold tool so that the small hole and the T-bar are facing up to install upper C-PACs, and facing down to install lower C-PACs.
3. Put the tool on C-PAC, as shown in the diagram, and push straight in at a right angle to the board surface.

INSERT/EXTRACT TOOL



I/O SIGNAL CABLE

REMOVAL

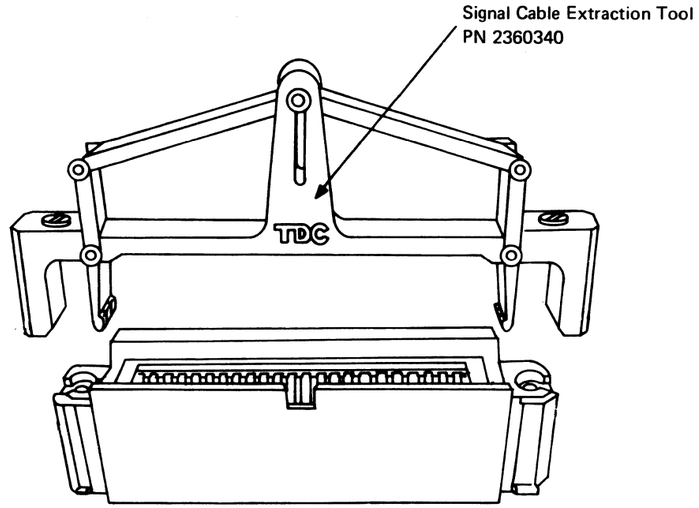
Use cable extraction tool (PN 2360340) to remove a signal cable from a super grouper.

1. Move pivot [A] to the top of the tool.
2. Position tool above contact side of the super grouper as shown.
3. Ensure tool is seated on the super grouper housing, and then move pivot [A] to the bottom of the tool.
4. Remove cable from super grouper, one cable at a time.
5. Remove cable extraction tool.

REPLACEMENT

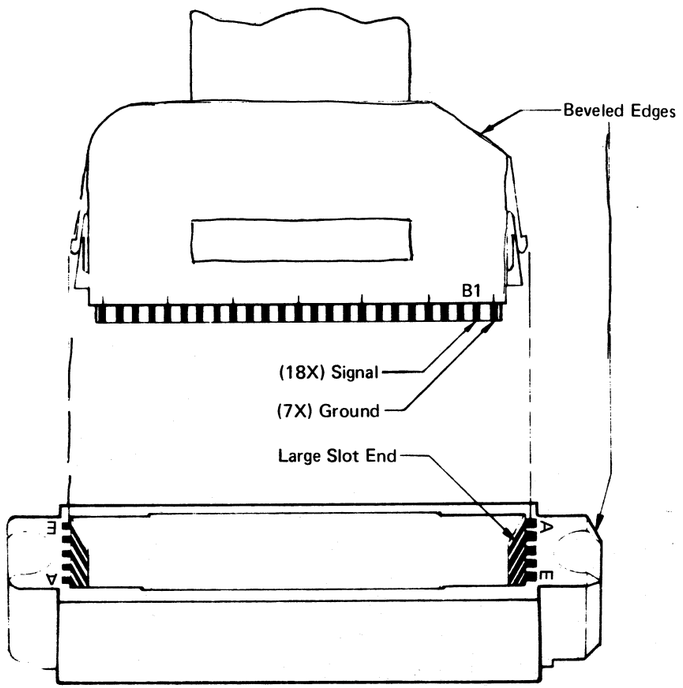
1. Position cable on housing with beveled edges as shown [B].
2. Push cable in correct slot until the latch arms snap in place.

[A] ORIENTING THE CABLE EXTRACTION TOOL

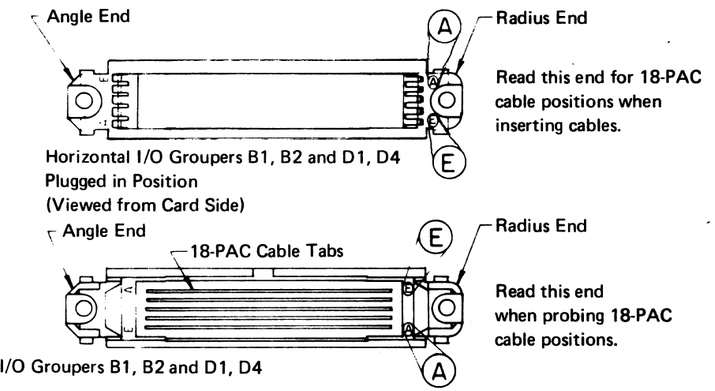


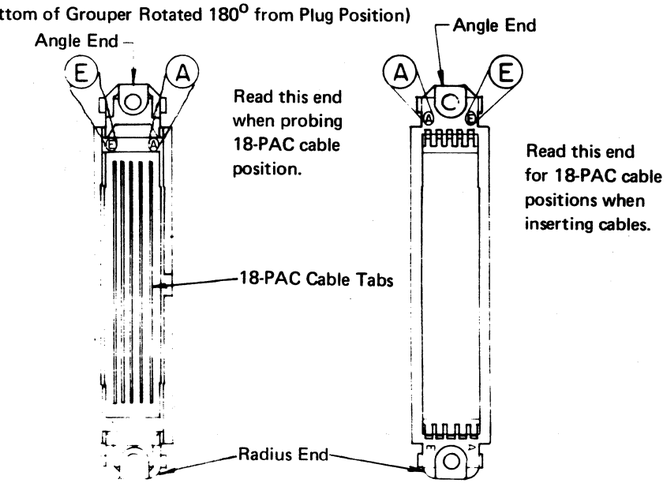
18-PAC Cable Grouper

[B] FIVE-POSITION CABLE GROUPER



[C] SUPER GROUPER DETAIL



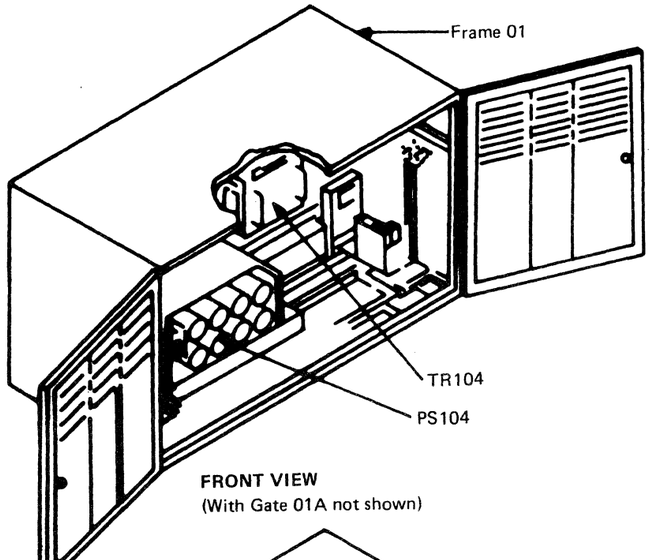


EC 379602 15Sep80	PN 5666289	12 035
	1 of 1	

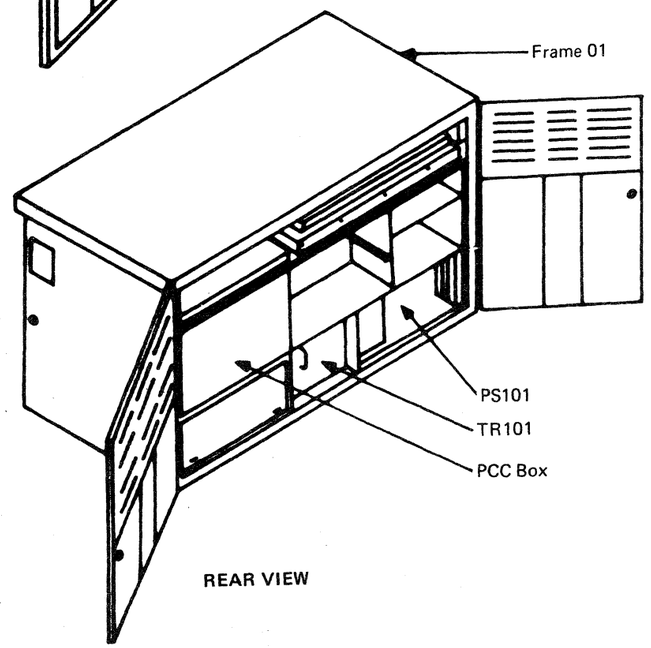
POWER SUPPLIES AND TRANSFORMERS

POWER SUPPLIES AND TRANSFORMERS LOCATIONS

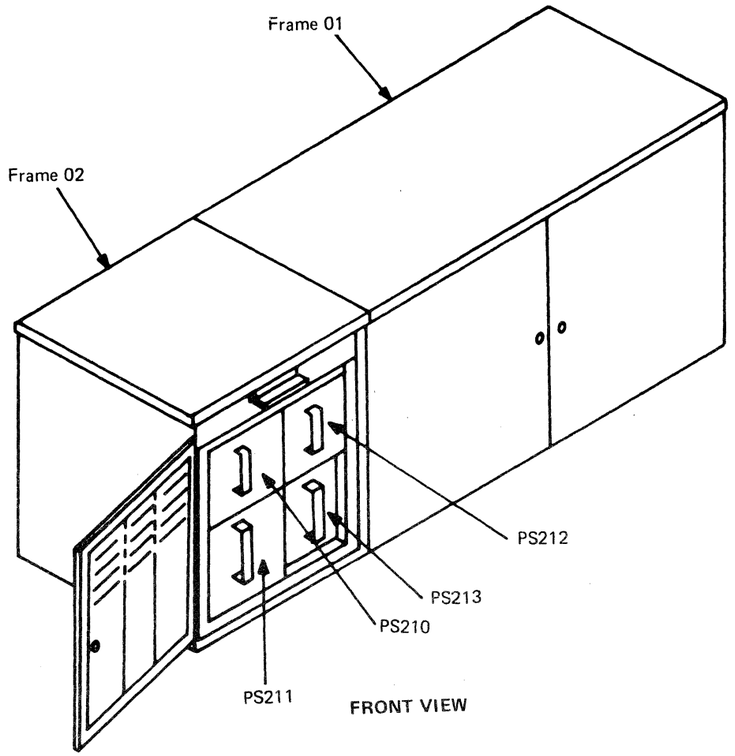
DANGER
Do not service any power supply or transformer outside the machine while still connected to the machine.



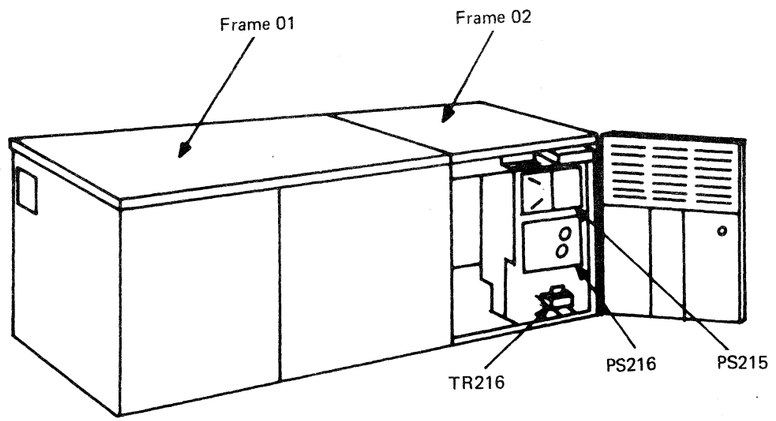
FRONT VIEW
(With Gate 01A not shown)



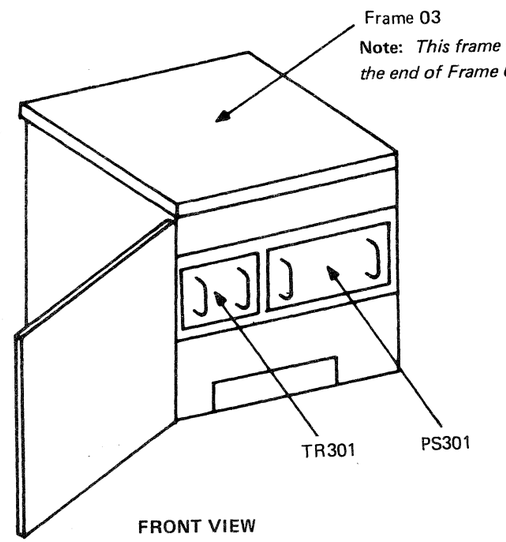
REAR VIEW



FRONT VIEW



REAR VIEW



FRONT VIEW

PS104

CAUTION
Perform steps 1-4 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open front and rear covers of frame 01.
3. Open gate 01A.

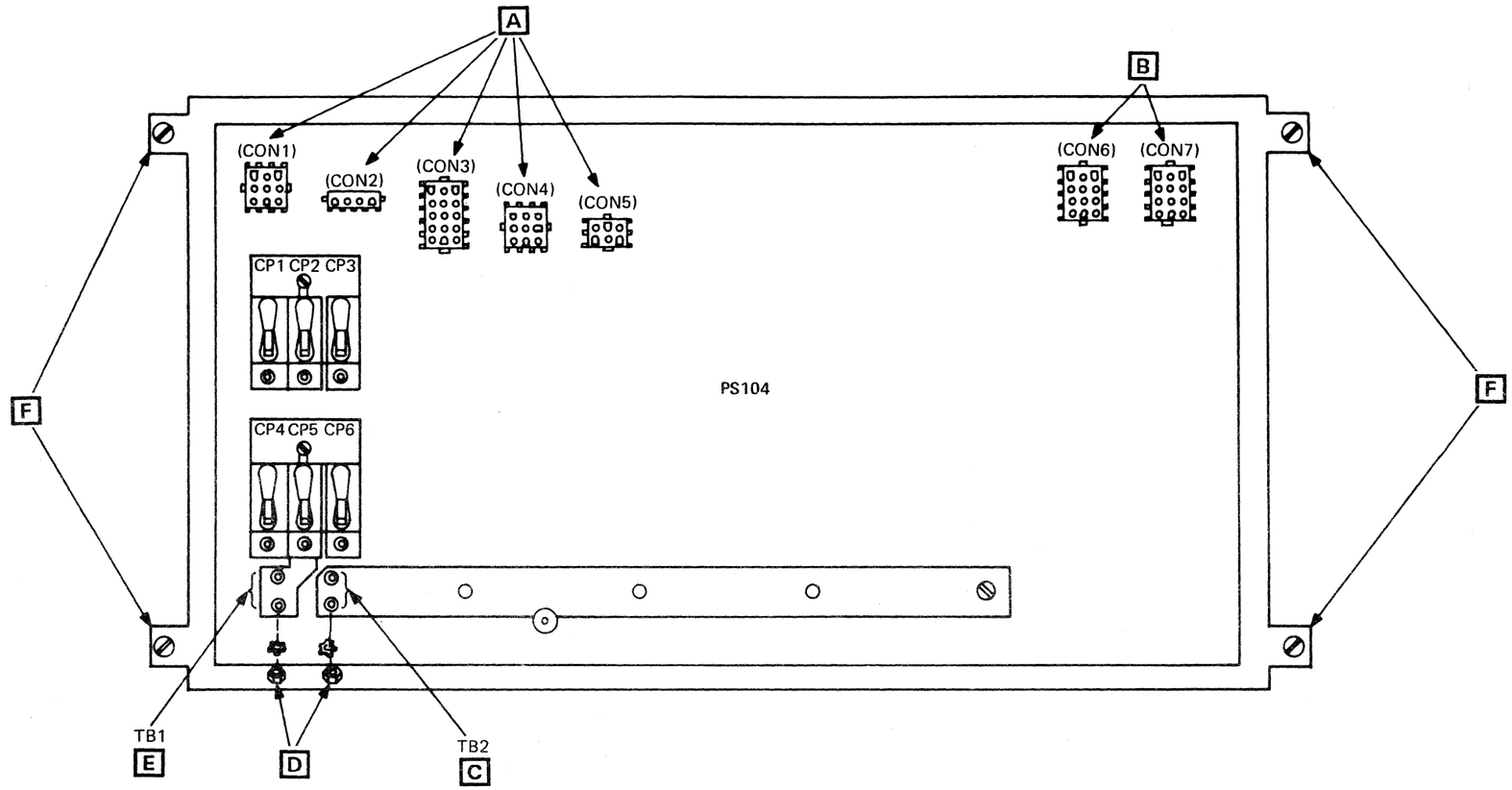
CAUTION
Observe label for closing gate 01A.

4. Place CB1 and CB2, located on front of PCC box, in OFF position.
5. Identify the location of PS104 in frame 01. See "Power Supplies and Transformers Locations," page 12 043.
6. Disconnect all connectors at the connector sockets [A] and [B]. Place cables away from PS104.

Note: *Be careful not to lose the nut and washer* [D] *when doing the next two steps.*

7. Use a metric socket wrench to disconnect FDS cables connected to TB2 [C] and place them away from PS104.
8. Use a metric socket wrench and disconnect FDS cables connected to TB1 [E] and place them away from PS104.
9. Remove four screws [F].
10. Carefully remove PS104 from frame 01.
11. Reverse this procedure for PS104 replacement.

Note: *After reinstalling new PS104, ensure that all CP switches are in the ON position.*



TR104

CAUTION
Perform steps 1-4 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open front and back covers of frame 01.
3. Open gate 01A.

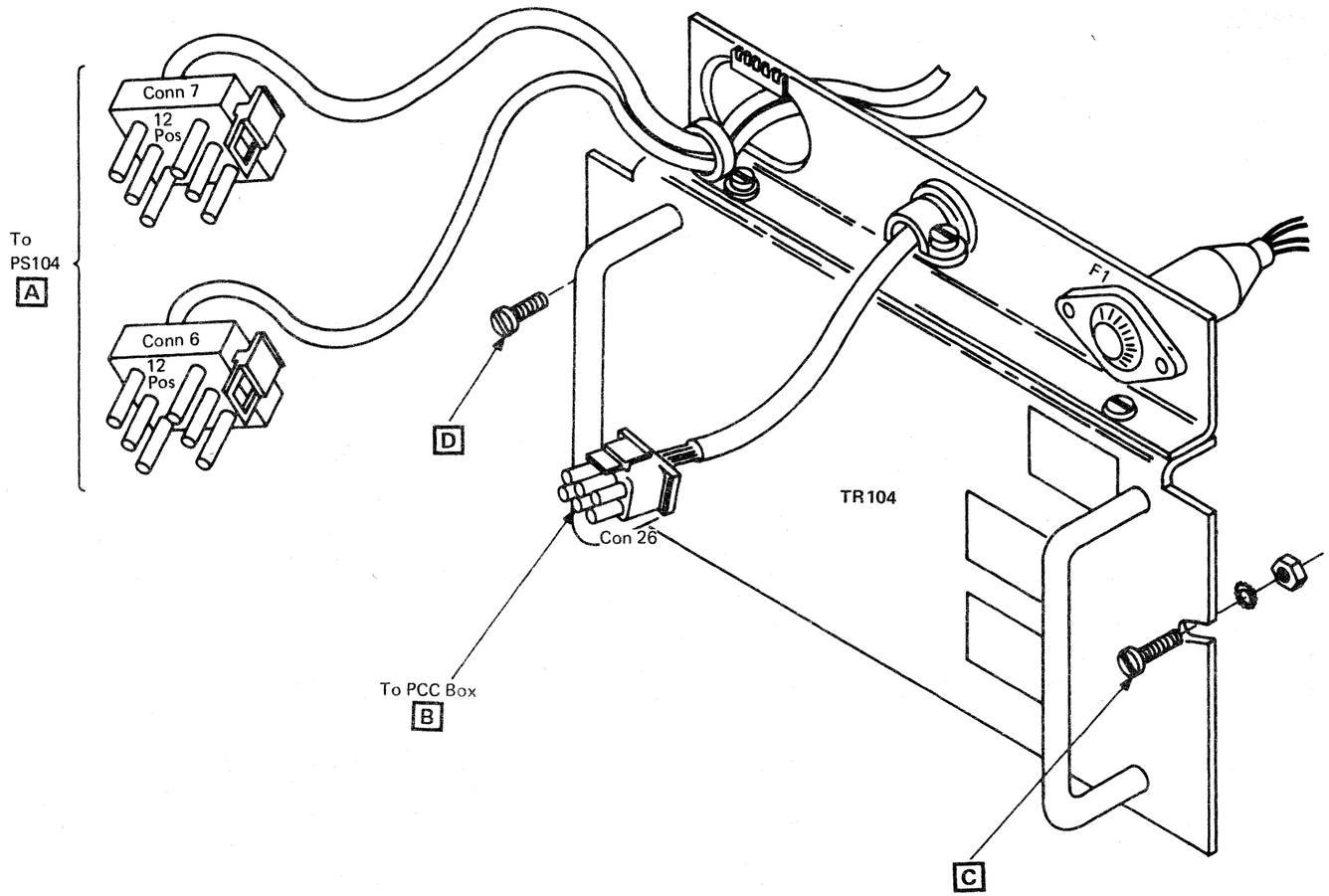
CAUTION
Observe label for closing gate 01A.

4. Place CB1 and CB2, on front of PCC box, in OFF position.
5. Identify location of TR104 in front of frame 01. See "Power Supplies and Transformers Locations," page 12 043.
6. Disconnect connectors [A].
7. Disconnect connector 26 [B] from PCC box.
8. Remove screw, nut, and washer [C].
9. Remove screw [D].
10. Carefully remove TR104 from frame 01.

Note: *If the line voltage at the machine installation is not 208V, the internal TB of the transformer needs to be adjusted to match the line voltage. For TB adjustments, refer to ALD page YA015, and then locate the name of transformer and the voltage needed.*

11. Reverse procedure for TR104 replacement.

Warning: Be careful not to damage the wires of TR104 while removing or reinstalling it.



Model Groups 1 and 2

EC 379604 05Dec80 EC 379605 06Mar81	PN 5666290 2 of 2	12 050

PS101

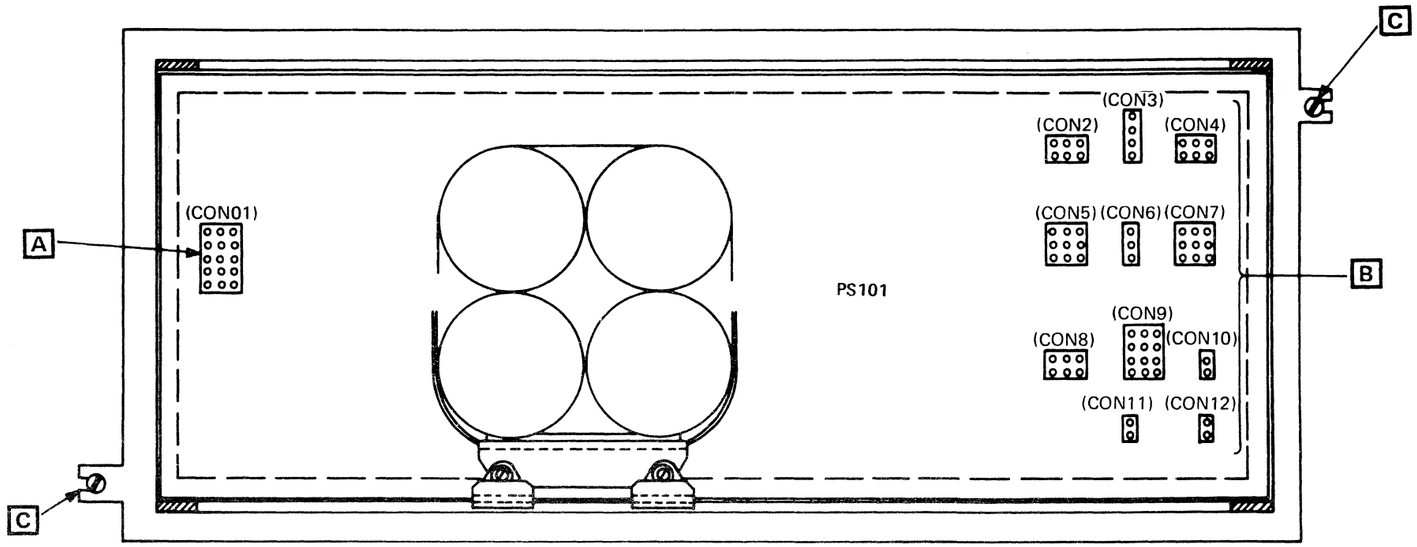
CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, located on front of PCC box, in OFF position.
4. Identify location of PS101 at rear of frame 01. See "Power Supplies and Transformers Locations," page 12 043.
5. Disconnect connector at con 01 A.
6. Disconnect connectors from sockets B. Place cables away from PS101.

Note: *No connectors are plugged at sockets Con 02, 10, 11, and 12.*

7. Remove two screws C.
8. Carefully remove PS101 from frame 01.
9. Reverse procedure for PS101 replacement.

Note: *After reinstalling PS101, ensure that all of its CP switches are in the ON position.*



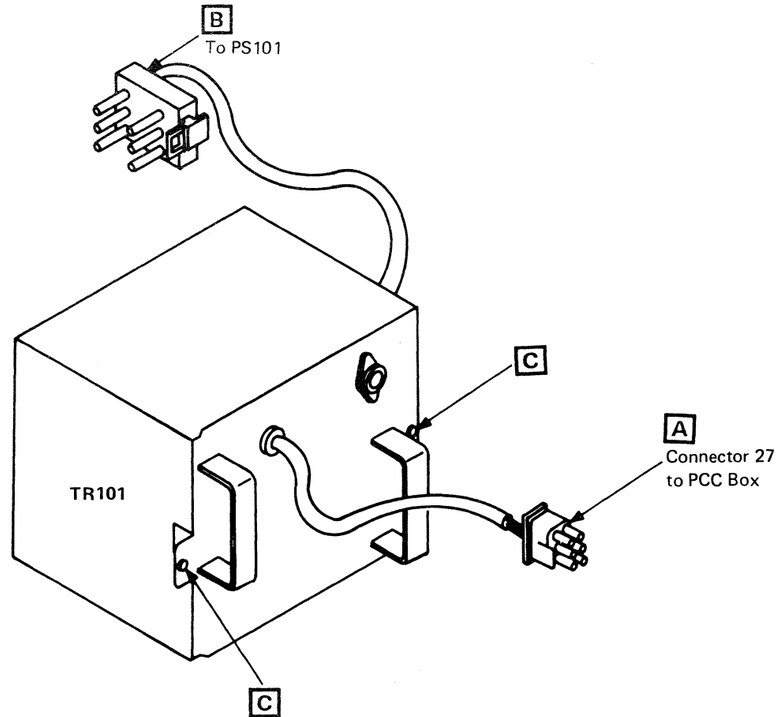
TR101

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Identify location of TR101 at rear of frame 01. See "Power Supplies and Transformers Locations," page 12 043.
5. Disconnect connector 27 A from PCC box.
6. Disconnect connector 01 B from PS101.
7. Remove two screws C.
8. Carefully remove TR101 from frame 01.

Note: *If the line voltage at the machine installation is not 208V, the internal TB of the transformer needs to be adjusted to match the line voltage. For TB adjustments, refer to ALD page YA015, and then locate the name of transformer and the voltage needed.*

9. Reverse procedure for TR101 replacement.



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PS210

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open front cover of frame 02.

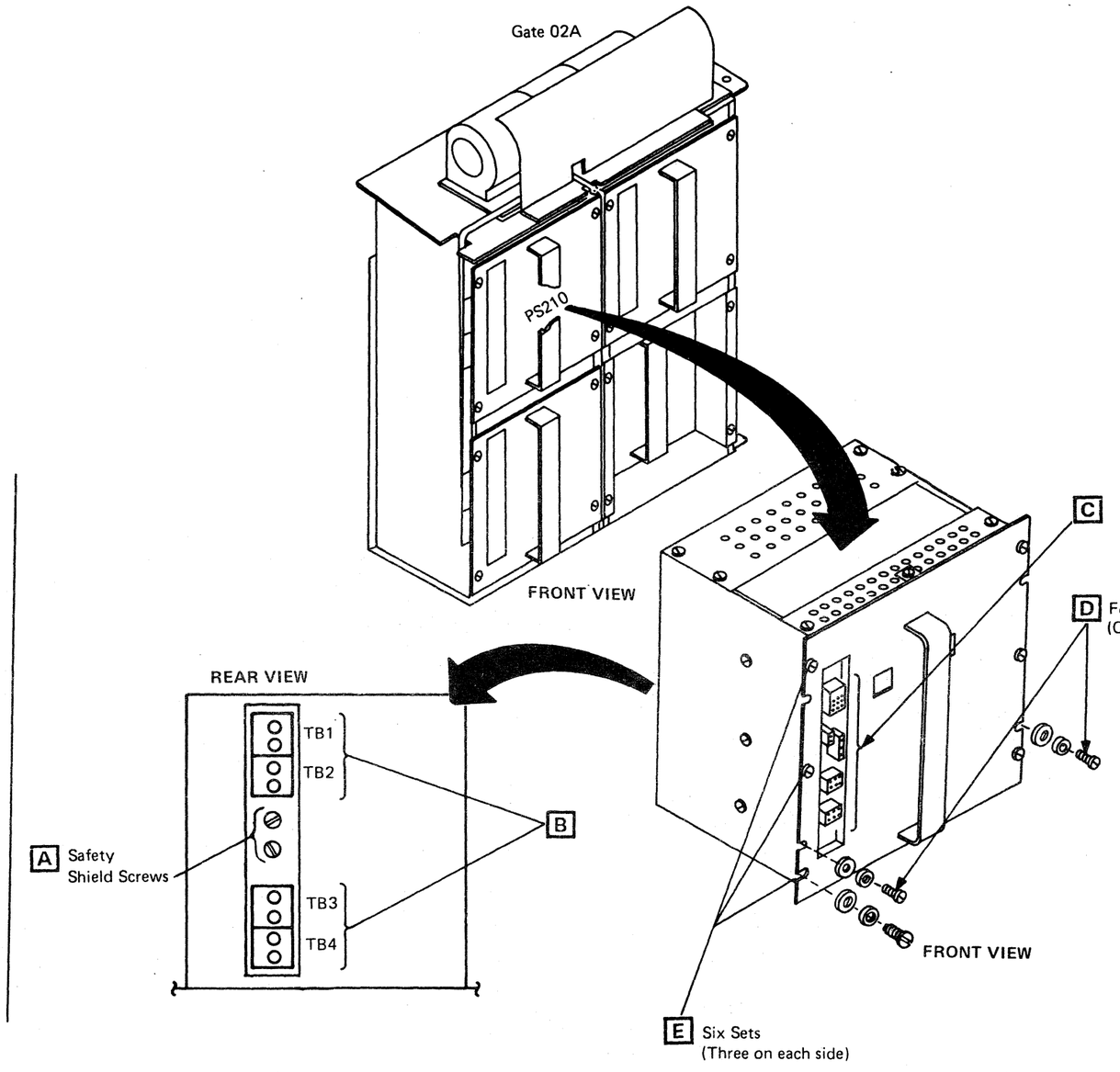
Note: *Remove cover if necessary.*

5. Identify location of PS210.
6. Open gate 02A.
7. Remove safety shield [A] by removing the two screws.
8. Remove FDS cables from TBs [B] .
9. Close gate 02A.
10. Disconnect connectors from sockets [C] .
    Note: *Sockets J2 and J4 are not used.*
11. Remove the four sets of mounting screws, washers, and lock washers [D] .

Warning: PS210 weighs 17 kg (38 lb). During the removal of PS210, support it with one hand holding the handle and the other hand supporting the bottom.

12. Carefully remove PS210 from front of gate 02A.
13. Remove front cover by removing the six sets of screws, washers, and lock washers [E] .
14. Record the positions of the switches on the control card.
15. Perform "Switch Settings and Adjustments" on page 12 066; then return.
16. Reverse procedure for PS210 replacement.

Warning: Do not interchange PS210 with PS211 because it could cause damage to cards.



PS211

CAUTION

Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open front cover of frame 02.

   Note: *Remove cover if necessary.*

5. Identify location of PS211.
6. Open gate 02A.
7. Remove safety shield [A] by removing the two screws.
8. Remove FDS cables from TBs [B].
9. Close gate 02A.
10. Disconnect connectors from sockets [C].

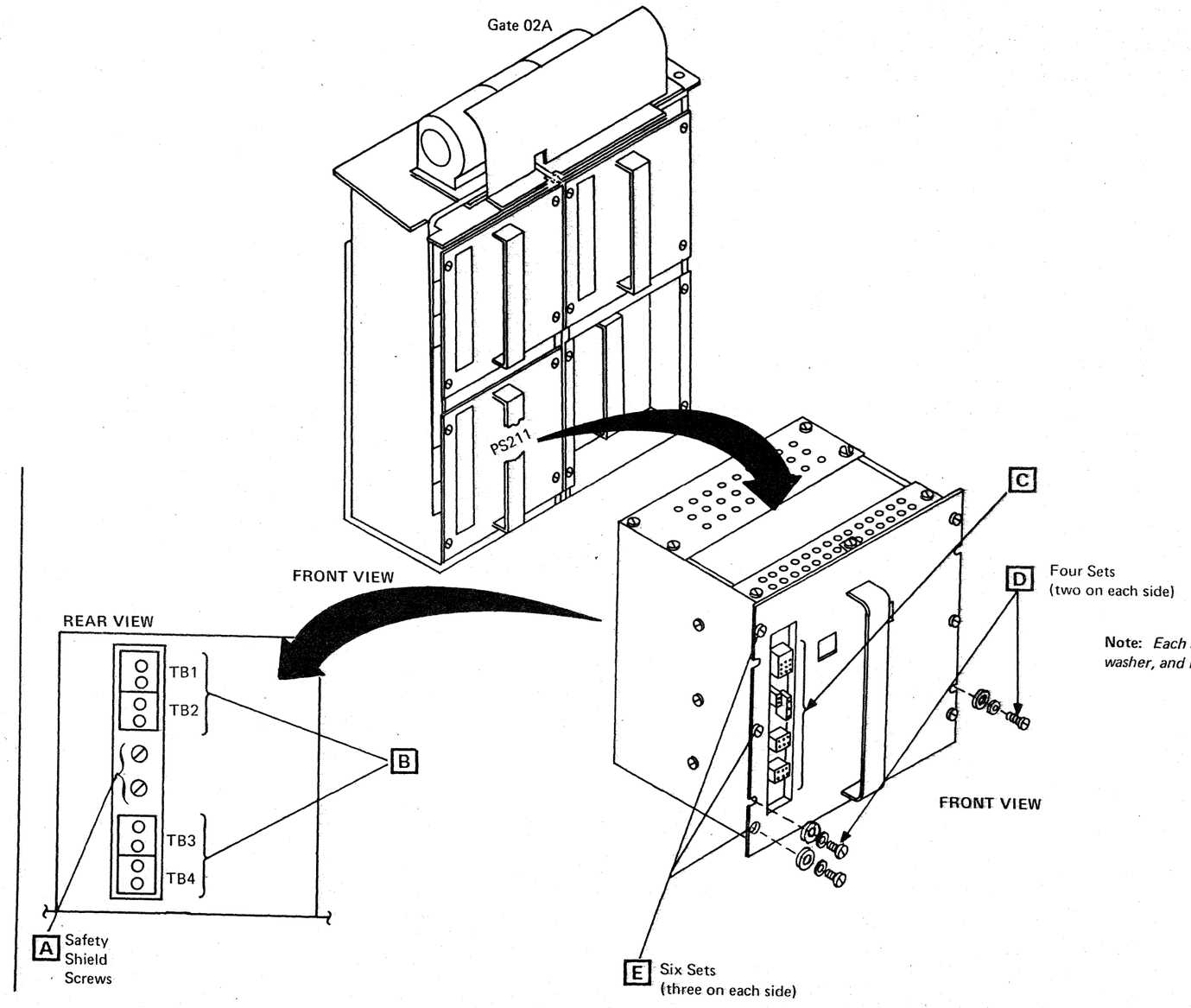
    Note: *Sockets J2 and J4 are not used.*

11. Remove the four sets of mounting screws, washers, and lock washers [D].

Warning: PS211 weighs 17 kg (38 lb). During the removal of PS211, support it with one hand holding the handle and the other hand supporting the bottom.

12. Carefully remove PS211 from front of gate 02A.
13. Remove front cover by removing the six sets of screws, washers, and lock washers [E].
14. Record the positions of the switches on the control card.
15. Perform "Switch Settings and Adjustments" on page 12 066; then return.
16. Reverse procedure for PS211 replacement.

Warning: Do not interchange PS211 with PS210 because it could cause damage to cards.



PS212

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open front cover of frame 02.

   Note: *Remove cover if necessary.*
5. Identify location of PS212.
6. Open gate 02A.
7. Record the position of the toggle switches [A].

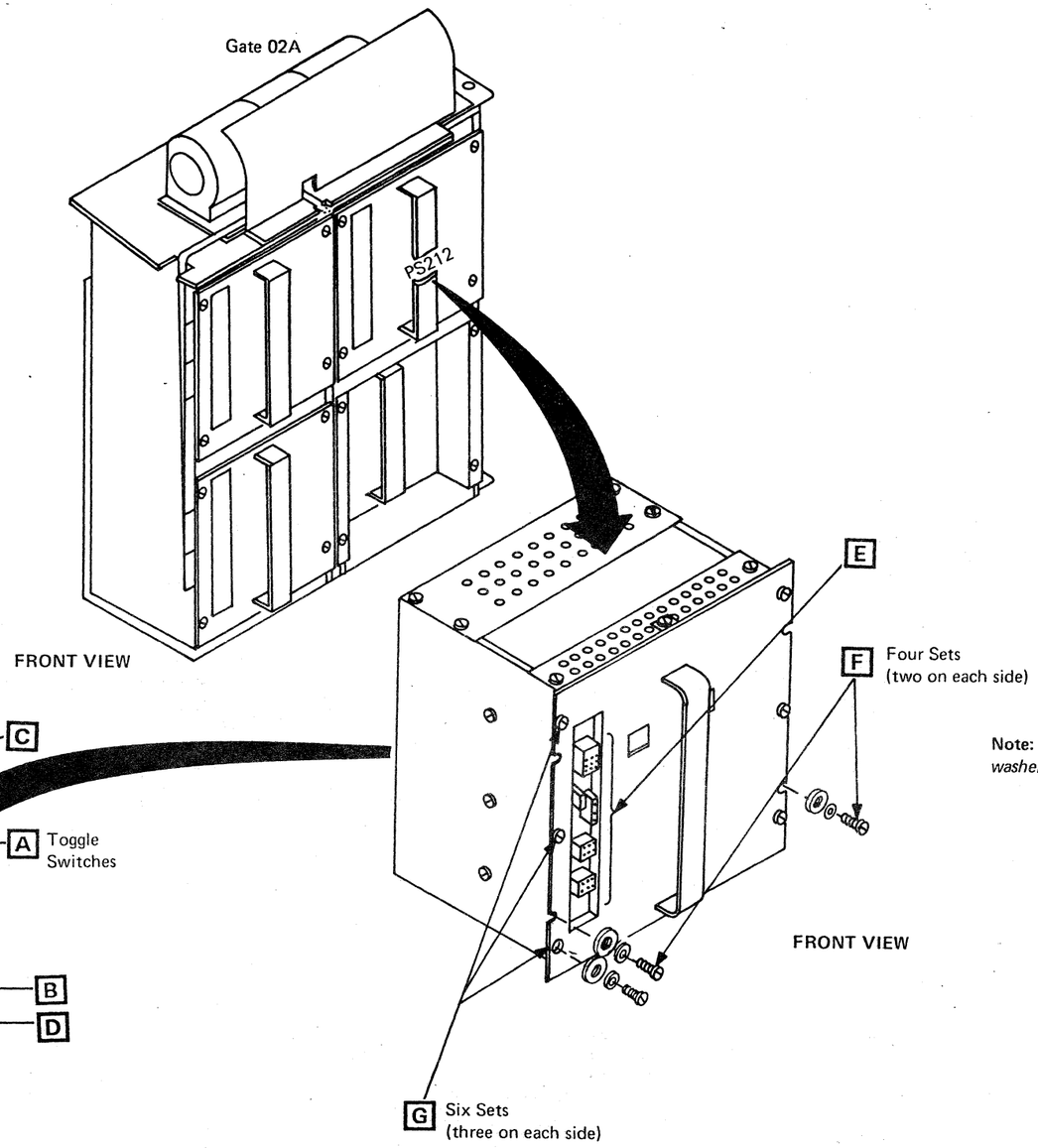
   Note: *Refer to MAP 1005, entry point A, for toggle switch setting procedure if needed.*
8. Disconnect connectors from sockets [B] and [C].
9. Remove FDS cables from TBs [D].
10. Close gate 02A.
11. Remove connectors from sockets [E].

    Note: *Socket J4 is not used.*
12. Remove the four sets of mounting screws, washers, and lock washers [F].

Warning: PS212 weighs 18 kg (40 lb). During the removal of PS212, support it with one hand holding the handle and the other hand supporting the bottom.

13. Carefully remove PS212 from front of gate 02A.
14. Remove front cover by removing six sets of screws, washers, and lock washers [G].
15. Record the positions of the switches on the control card.
16. Perform "Switch Settings and Adjustments" on page 12 066; then return.
17. Reverse procedure for PS212 replacement.

    Note: *After replacing PS212, ensure that CP1 and CP2 are in the ON position.*



Switch Settings and Adjustments

This procedure assists MAP 1005 and MAP 1003 to set the switches and to adjust the voltages for PS210, PS211, and PS212.

Note: *For toggle switches on PS212, page 12 063,* [A] *, see MAP 1005; for PS213 voltage adjustment, see page 12 069, and MAP 1003.*

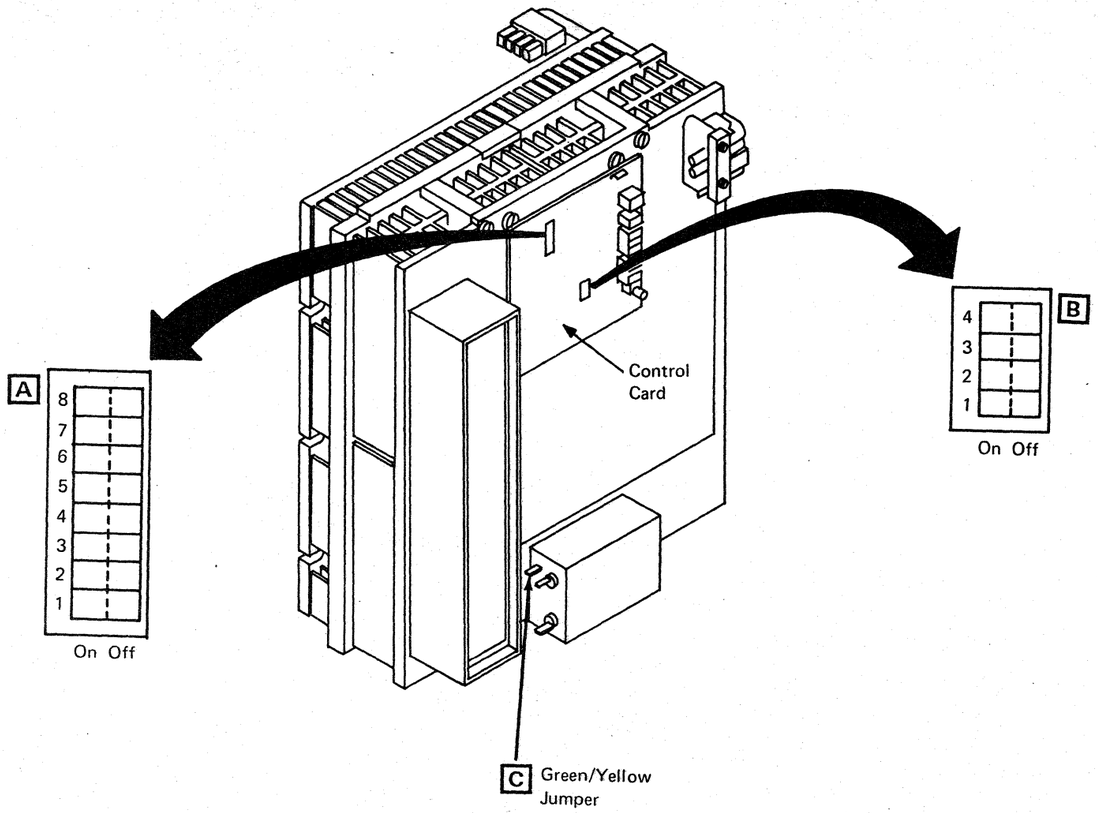
After the removal procedure for the power supply is complete, perform the following steps on the supply being installed:

1. Set switches [A] and [B] like the switch settings of the supply being removed. To verify the switch settings, see MAP 1005, entry point A.

Note: *If you are servicing a power supply in* **JAPAN**, *remove the GREEN/YELLOW jumper* [C] *by clipping 25.4 mm (1 inch) from each end.*

2. Return to the removal/replacement procedure to assemble and install the power supply in frame 02. Then perform the voltage adjustment through the opening in front of the supply.

   To perform voltage adjustments, refer to *MAP 1003*, entry point A.



PS213

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

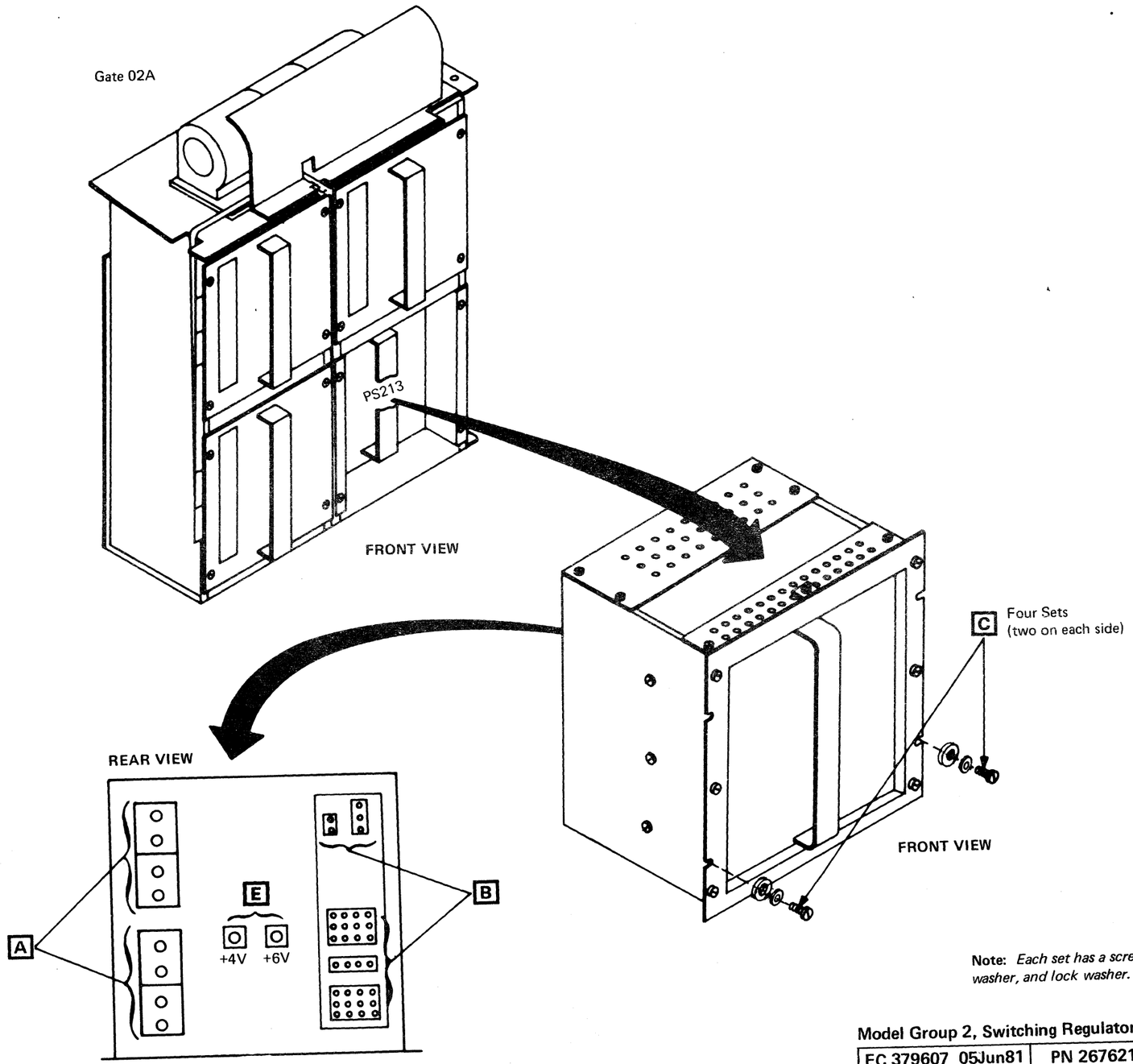
1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open front cover of frame 02.

   Note: *Remove cover if necessary.*
5. Identify location of PS213.
6. Open gate 02A.
7. Remove FDS cables from TBs [A].
8. Disconnect connectors from sockets [B].
9. Close gate 02A.
10. Remove the four sets of mounting screws, washers, and lock washers [C].

Warning: PS213 weighs 9 kg (20 lb).

11. Carefully remove PS213 from front of gate 02A.
12. For voltage adjustments, see MAP 1003, entry point A.

    Note: *The openings for the 4V and 6V adjustments are indicated by* [D].
13. Reverse procedure for PS213 replacement.



Note: *Each set has a screw, washer, and lock washer.*

PS215

CAUTION

Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, located on front of PCC box, in OFF position.
4. Open rear cover of frame 02.
5. Identify location of PS215 from rear view of frame 02. See Power Supplies and Transformers Locations, page 12 043d.
6. Remove shields covering TB1, TB3 and TB4. See diagram of PS215 shown to the right.
7. Remove wires [A] from TB3. (Note the star washers under each terminal.)
8. Remove wires [B] from TB4. (Note the star washers under each terminal.)
9. Remove wires [C] from TB1.
10. Remove the four mounting screws, washers, and lock washers [D] and [E].

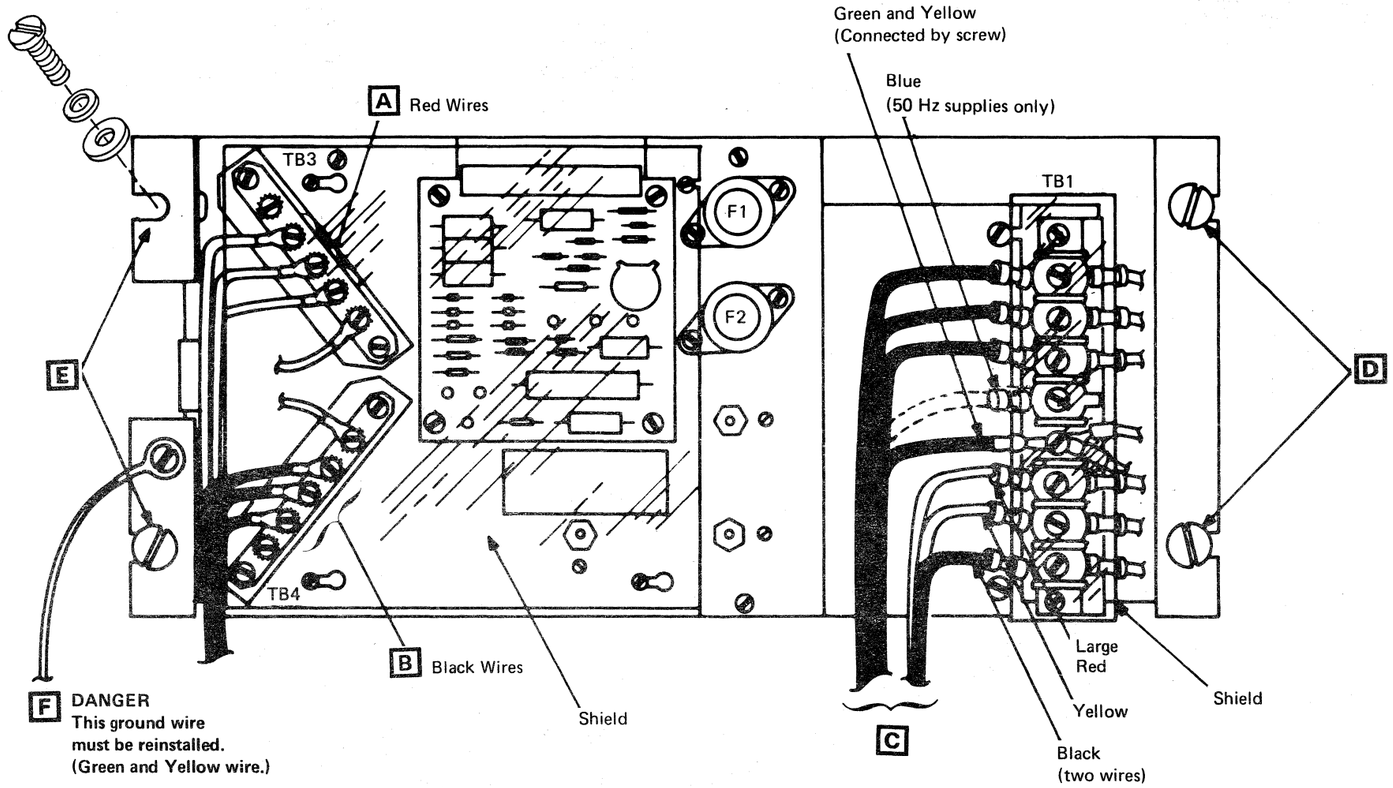
DANGER

Ground wire [F] must be reinstalled before you power on the processor.

11. Remove ground wire [F].
12. Carefully remove PS215 from frame 02.

Note: *If the supply being installed needs to have the line voltage converted, refer to page 12 075d and use ALD page YA015.*

13. Reverse procedure for PS215 replacement.

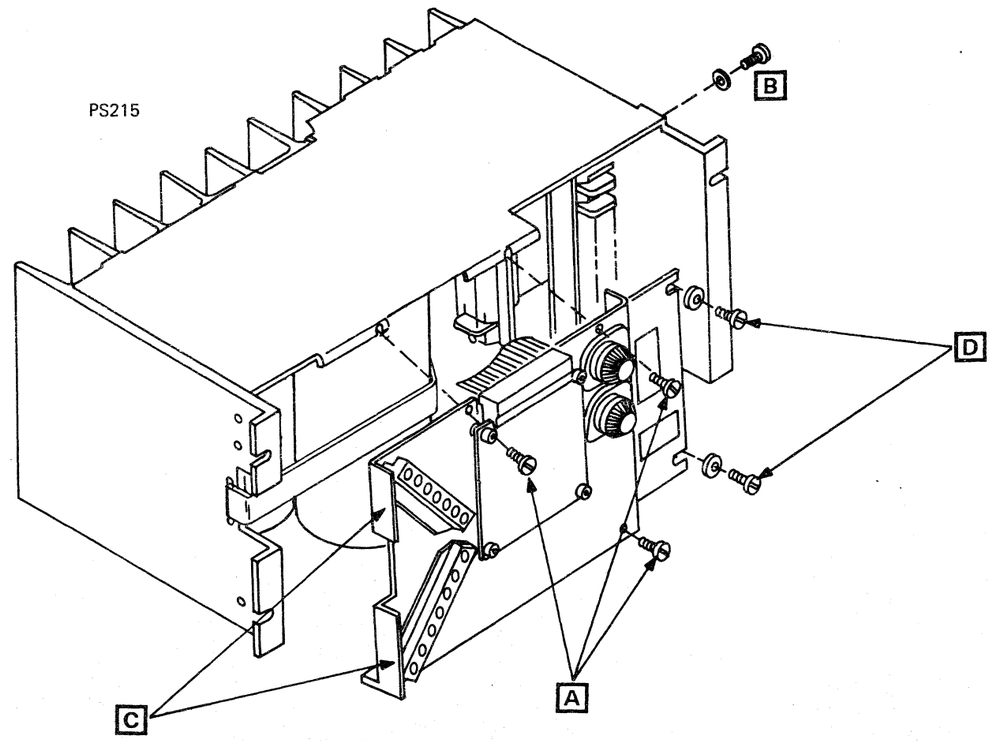


PS215 Voltage Conversion

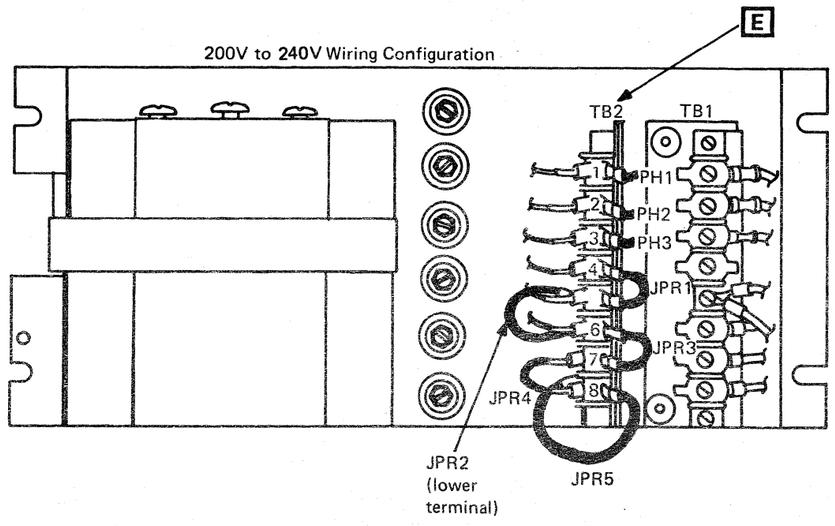
1. Set power supply on a table.
2. Loosen screws [A] and [B] ; then move screen covers so that they clear the outer plate of the supply.
3. Set PS215 on the back surface to continue.
4. Remove the four screws [C] and [D] .
4. Carefully lift the outer plate of the supply and locate TB2 [E] .
5. Wire TB2 as shown on ALD page YA015. Use the correct wiring configuration as a starting point.

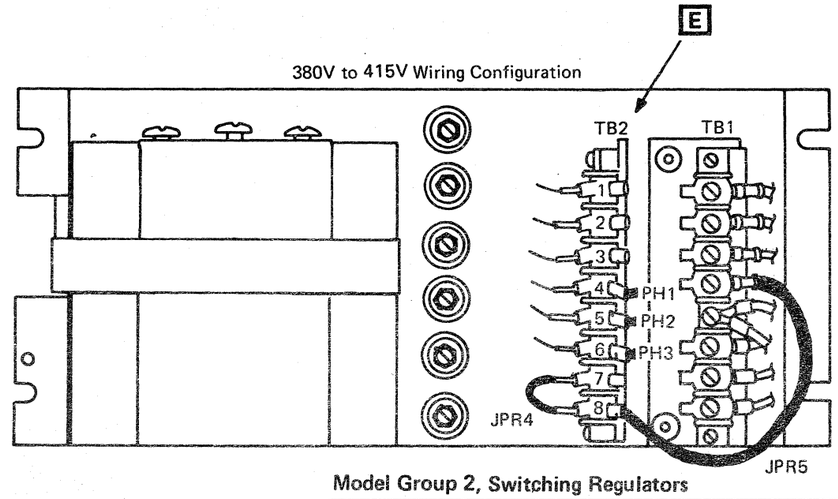
Note: *If converting from a voltage between 200 and 240 to a voltage of 380 and above, tape the unused jumpers on the inside on frame 02, next to PS215. This ensures that these jumpers are available if a reverse conversion is needed.*

6. Reverse procedure to assemble power supply.
7. Install PS215 in frame 02; refer to 12 067d, step 13.



FRONT VIEW



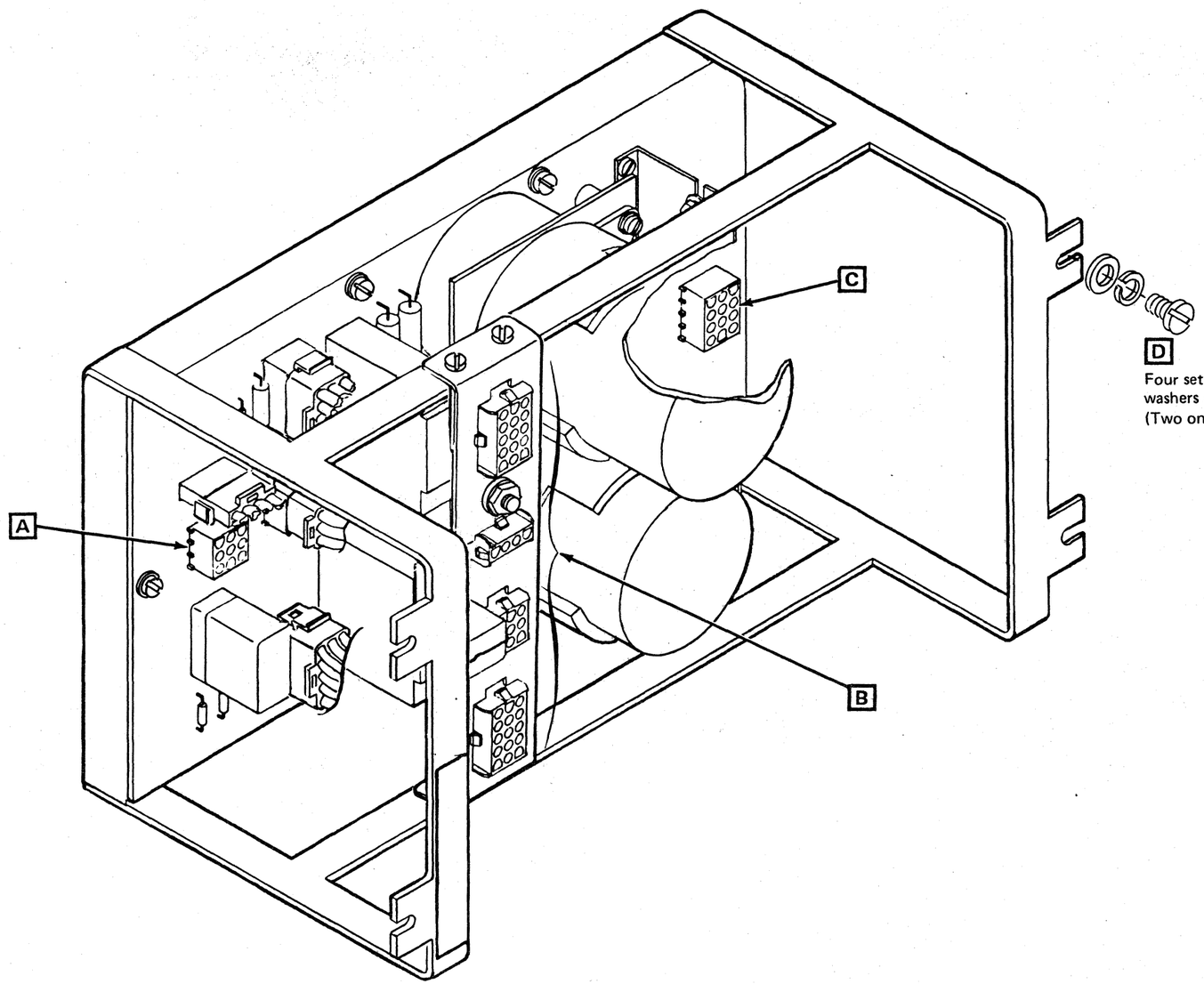


PS216

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off from the OCP.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, located on front of PCC box, in OFF position.
4. Open rear cover of frame 02.
5. Identify location of PS216 from rear view of frame 02. See Power Supplies and Transformers Locations, page 12 043.
6. Remove connectors from sockets A, B, and C.
7. Remove the four sets of screws, washers, and lock washers D.
8. Carefully remove PS216 from frame 02.
9. Reverse this procedure to replace PS216.

   Note: *After replacing PS216, ensure that CP1 and CP2 are in the ON position.*



TR216

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

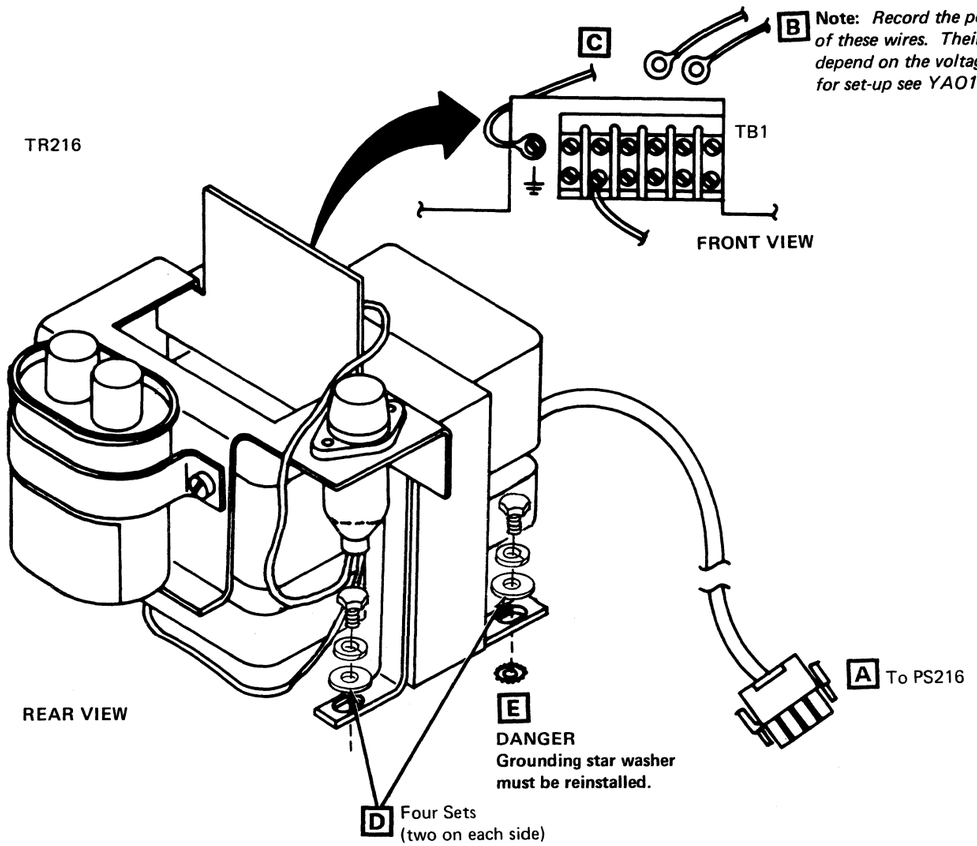
1. Power Off.
2. Open rear cover frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open rear cover of frame 02.
5. Identify location of TR216 from rear view of frame 02, see "Power Supplies and Transformers Locations," on page 12 043.
6. Remove shield over TB1.
7. Remove connector [A] from PS216.

   Note: *Record the position of wires on TB1 before removing them.*
8. Remove wires [B] from TB1.

Note: *If the line voltage at the machine installation is not 208V, the TB1 needs to be adjusted to match the line voltage. For TB adjustments, refer to ALD page YA015, and then locate the name of transformer and the voltage needed.*

9. Remove ground wire [C] from TB1 mounting plate.
10. Remove the four sets of screws, washers, lock washers [D], and the star washer [E].

DANGER
Star washer [E] is for grounding and must be replaced for personal and machine safety.

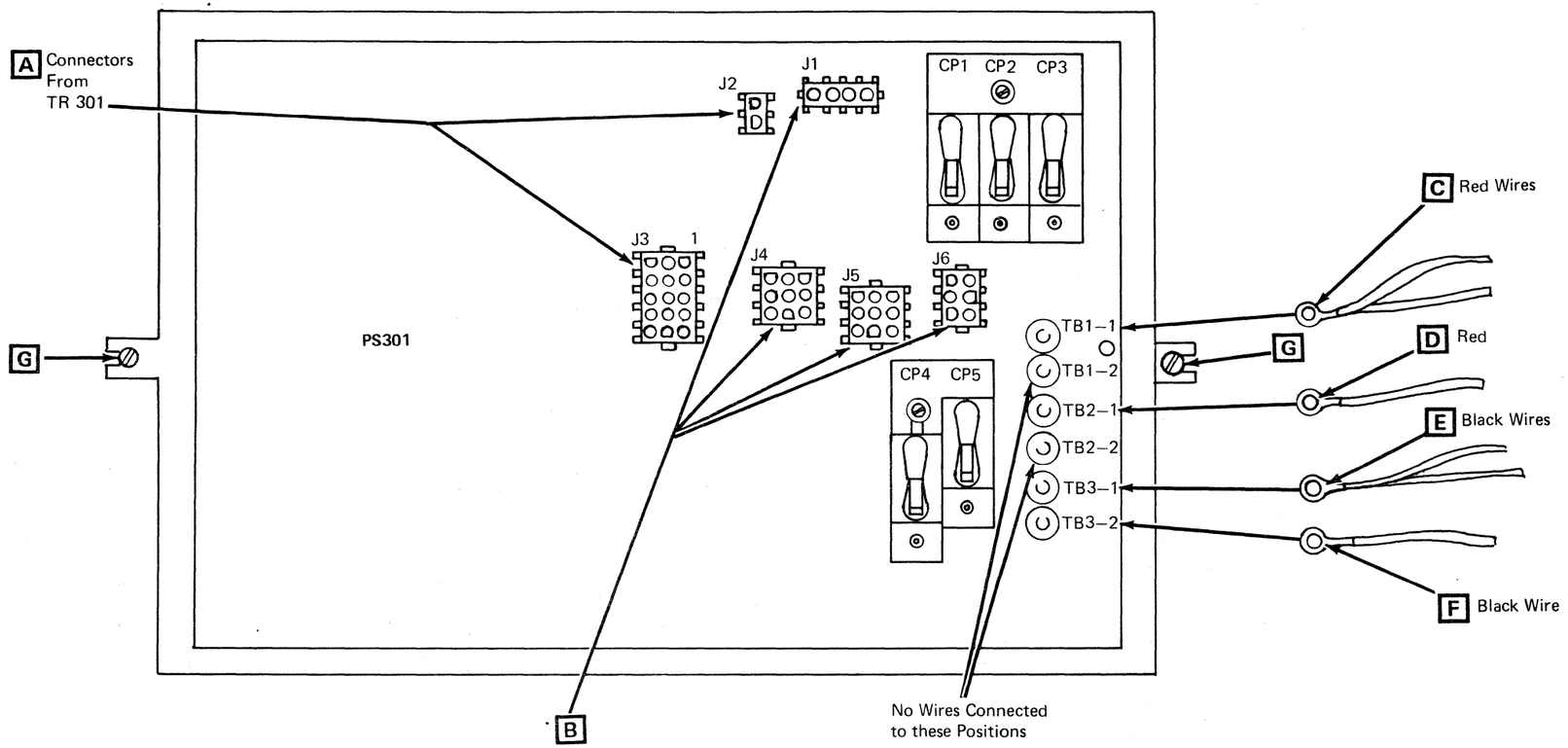


PS301

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, located on front of PCC box, in OFF position.
4. Open front cover of frame 03.
5. Identify location of PS301 from front view of frame 03. See "Power Supplies and Transformers Locations," page 12 043.
6. Disconnect connectors from sockets A.
7. Disconnect connectors from sockets B.
8. Disconnect wires C, D, E, and F from the terminals.
9. Remove two screws G.
10. Carefully remove PS301 from frame 03.
11. Reverse procedure for PS301 replacement.

Note: *After reinstalling PS301, ensure that all its CP switches are in the ON position.*



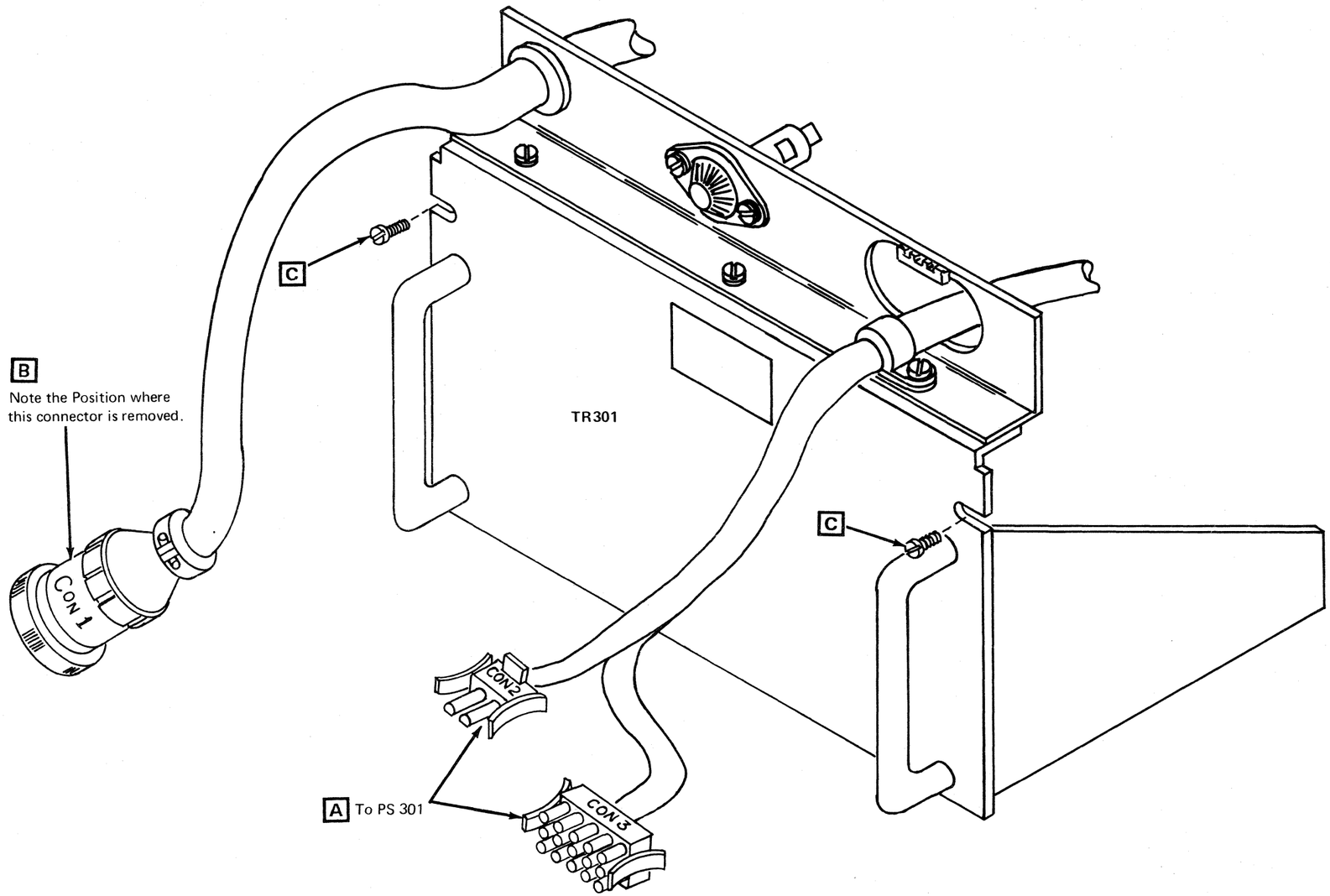
TR301

CAUTION
Perform steps 1, 2, and 3 to ensure that power is not in the processor during this procedure.

1. Power off.
2. Open rear cover of frame 01.
3. Place CB1 and CB2, on front of PCC box, in OFF position.
4. Open front cover of frame 03.
5. Identify location of TR301 from front view of frame 03. See "Power Supplies and Transformers Locations," page 12 043.
6. Disconnect connectors [A] from PS301.
7. Disconnect connector [B].
   Note the position where this connector is removed.
8. Remove two screws [C].
9. Carefully remove TR301 from frame 03.

Note: *If the line voltage at the machine installation is not 208V, the internal TB of the transformer needs to be adjusted to match the line voltage. For TB adjustments, refer to ALD page YA015, and then locate the name of transformer and the voltage needed.*

10. Reverse procedure for TR301 replacement.



Model Groups 1 and 2

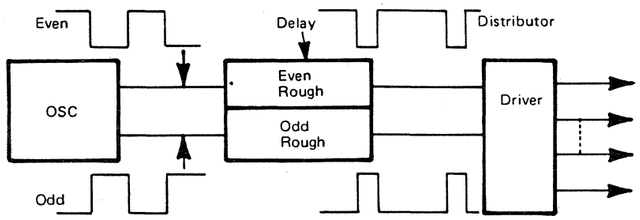
EC 379604 05Dec80 EC 379605 06Mar81	PN 5666294 2 of 2	12 090

ADJUSTMENTS

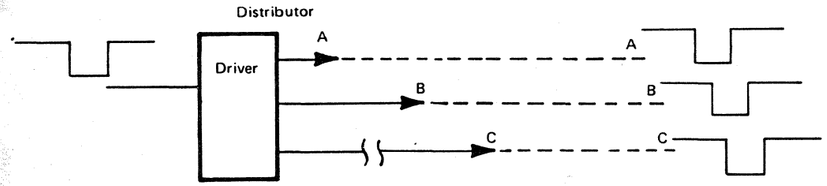
CONTENTS

CLOCK DISTRIBUTION

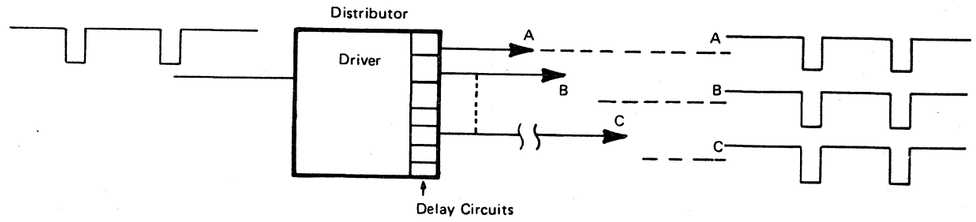
The odd and even oscillator outputs are changed by the coarse adjust circuits, and then distributed to several points in the O1A gate. See diagram below.



Because of differing lengths of distribution wiring, clock pulses reach the various logic points at different times. See diagram below.



Adjustable delay circuits in the clock distributor delay the clock pulses so that they reach all the logic points at the same time. See diagram below.



CLOCK DISTRIBUTION CARDS

The following lists the sources of all the clock GRPs. If you cannot adjust correctly a clock GRP, replace the applicable distribution card.

Clock Card	Clock GRPs
A1H2	11 46 14 51 15 52 16 53 45 54
A1J2	55 61 62 63 64
A1K2	21 26 36 22 31 41 23 32 42 24 34 43 25 35 44

CLOCK ADJUSTMENT PROCEDURES

Do the following clock adjustment procedure whenever the Timing Verification Test (TVT) detects that the clocks are improperly adjusted.

TIMING VERIFICATION TEST (TVT) DESCRIPTION

The TVT is used by the MAPs to determine whether the system clocks are adjusted properly. You can also run the TVT to try to recreate an intermittent failure (especially if you suspect a failing clock signal). The TVT automatically skews the clock group values while running selected MSMD diagnostics.

Do the clock adjustments, only if the TVT detects a failure. (Do the entire clock adjustment procedure because the suspected clock group may not be the one that is actually failing.)

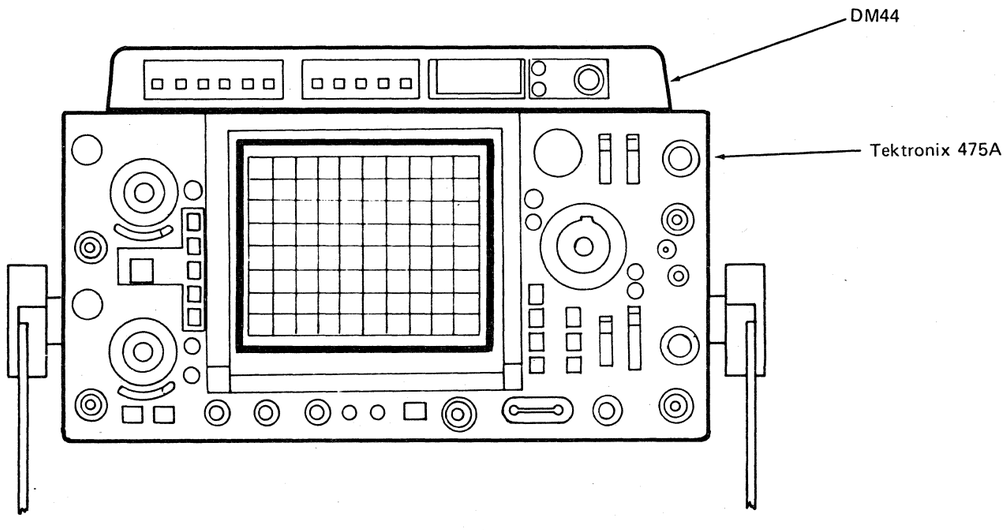
Invoke the TVT by selecting the PUMA option on the Diagnostic General Selection screen. When you are prompted to enter a reference code, key in TVT.

NEEDED EQUIPMENT

- Tektronix* Model 475A oscilloscope with DM44 option (PN 1650782), or equivalent.
- Two Tektronix P6106 probes (PN 1650776), or equivalent, of equal length and attenuation.
- Two board probe masks (PN 2360334). Install on board 01AA1 and 01AB1. See "Probe Mask Installation" in Volume 13, "Removals/Replacements."
- Two probe tips (PN 453915).
- One probe-tip adapter (PN 1310714).
- Digitec** 2210 multimeter (PN 1749233), or equivalent.

* Trademark of Tektronix, Inc.

** Trademark of United Systems Corporation



DC VOLTAGE ADJUSTMENT

Before you adjust the clock delays, adjust the -1.5V and -4.25V dc voltages.

Use the Digitec and the following chart to check the voltages.

FERRO POWER SUPPLIES

Checkpoint: PS201 installed in frame 02 (rear side).

If a voltage is out of range, adjust it to the level shown in the column, "Adjust Tolerance."

Voltage	Range	Adjust Tolerance	Measurement Points	Control Card Location
-4.25V	-4.249V to -4.422V	-4.336V ±.005V	01AA1C2B34 C31 (Gnd)	02AA1D2
-1.5V	-1.439V to -1.554V	-1.524V ±.005V	01AA1C2B28 C31 (Gnd)	02AA2D4

SWITCHING REGULATOR POWER SUPPLIES

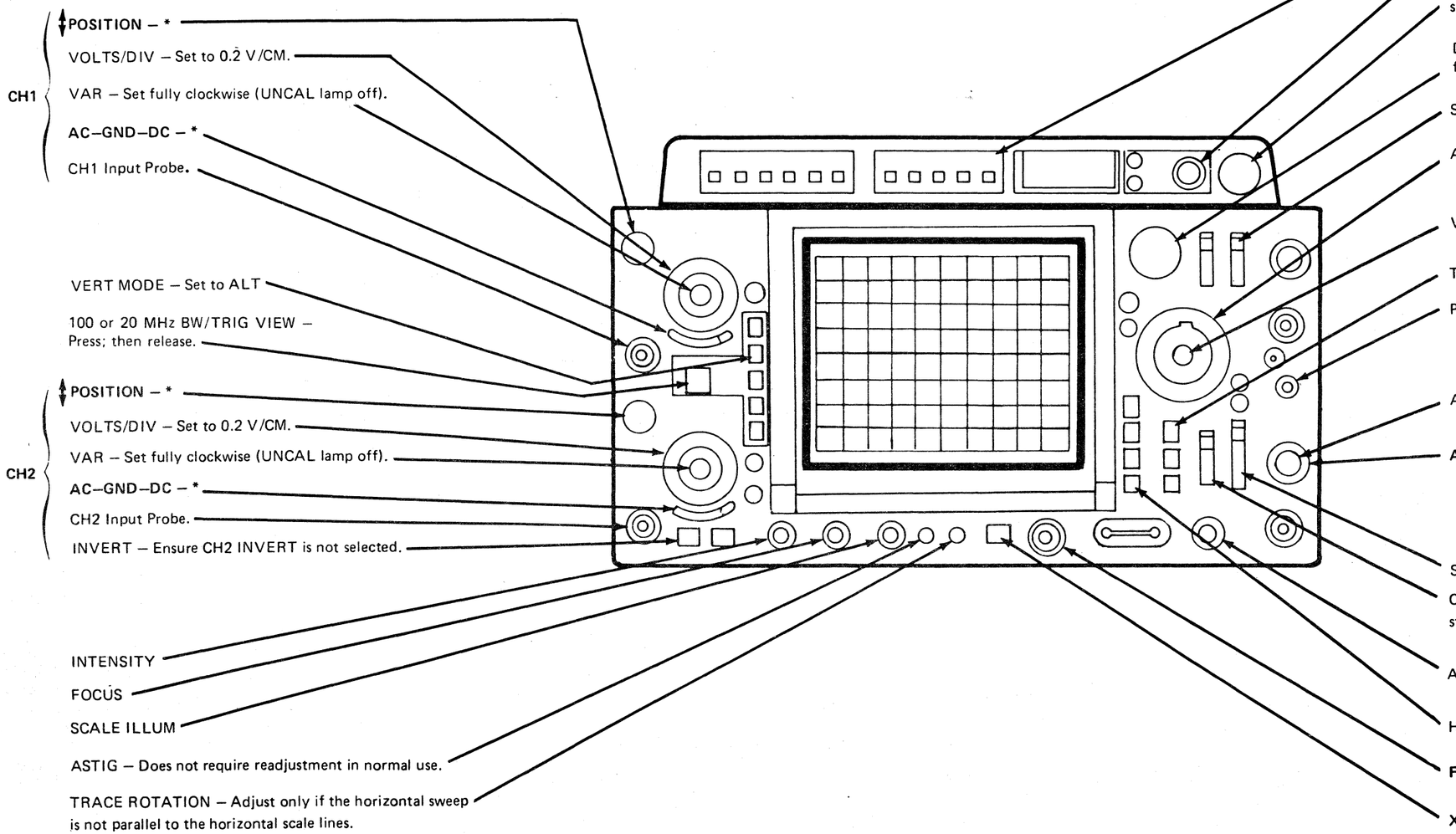
Checkpoint: PS215 installed in frame 02 (rear side).

If a voltage is out of range, adjust it to the level shown in the column, "Adjust Tolerance."

Voltage	Range	Adjust Tolerance	Measurement Points	Power Supply Location
-4.25V	-4.249V to -4.422V	-4.336V ±.005V	01AA1C2B34 C31 (Gnd)	PS210
-1.5V	-1.439V to -1.554V	-1.524V ±.005V	01AA1C2B28 C31 (Gnd)	PS211

INITIAL SCOPE SETTINGS

Before you begin to adjust the clock, you must set up your scope as shown on this page. Note that the asterisks (*) on this page identify the controls you adjust during the subsequent clock adjustment procedure.



* Indicates a control to be adjusted during the clock adjustment procedure.

Model Group 2

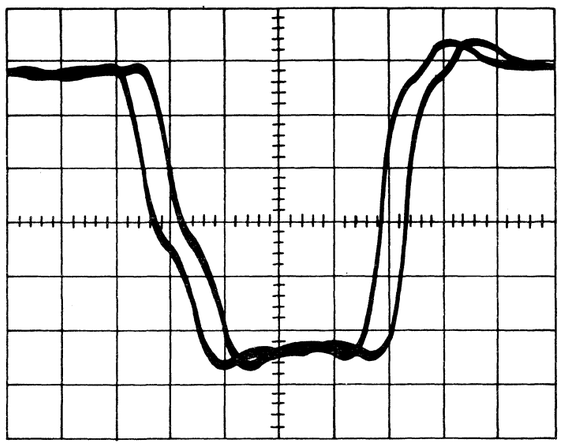
EC 379606 20Apr81 EC 379837 28Jun82	PN 2676221 2 of 2	13 020f

Scope and Probe Calibration

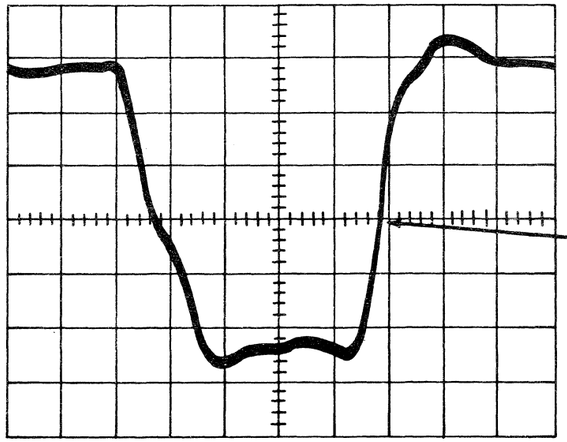
When scoping, always connect the black probe tip to ground. Ground is indicated by a yellow circle on the probe mask.

1. Set the CH1 AC-GND-DC switch to GND.
2. Adjust the CH1 vertical POSITION control until the CH1 trace is along the center line of the scope. Do not change this setting until you are so directed in the clock adjustment procedure.
3. Set the CH1 AC-GND-DC switch to DC.
4. Connect the CH1 probe to 01A-A1G2B15 (+ SYS OSC TEST POINT).
5. Adjust the A TRIGGER LEVEL control (larger knob) to obtain a stable sweep.
6. Set the DM44 FUNCTION switch to VOLTS.
7. Vary the horizontal FINE/POSITION control (larger knob) to display one-half cycle of the CH1 waveform. (The scope picture should look like the bottom picture on this page.)
8. Set the CH2 AC-GND-DC switch to GND.
9. Adjust the CH2 vertical POSITION control until the CH2 trace is along the center line of the scope.
10. Set the CH2 AC-GND-DC switch to DC.
11. Connect the CH2 probe to 01A-A1G2A15 (+ SYS OSC TEST POINT).
12. Set the DM44 FUNCTION switch to TIME.
13. Set the DM44 Δ TIME control so the digital display is approximately 0000.
14. Set the DM44 Δ TIME control so the positive-going edges of the CH1 and CH2 traces cross the horizontal reference line at the same point. (See the scope pictures on this page.)
15. Read the value in the DM44 digital display.
16. If this value is not 0000, adjust it to 0000 with the ZERO ADJUST screw on the DM44. Repeat steps 14, 15, and 16 until the value is 0000. The scope and probes are now calibrated.

    Note: *If the DM44 does not have a ZERO ADJUST screw, swap probes until a matched pair is found.*



Scope and Probe Calibration - Step 14.
CH1 and CH2 traces before adjustment.



Scope and Probe Calibration - Step 14.
CH1 and CH2 traces after adjustment.

Adjust so both positive-going traces cross the horizontal center line at the same point.

INITIAL CLOCK SETTINGS

1. Insert the FUNCT diskette into the diskette drive.
2. Set the CE MODE switch to CE MODE.
3. Press "POWER ON/IML" on the operator control panel.
4. Key in QCM and press ENTER.
   This sets the clock values (stored on the diskette) into the clock scan ring latches.
5. Key in QKD and press ENTER.
   This disables machine checks.
6. Key in QVU22ADJUST and press ENTER.
   This sets the clock distribution to adjust mode and displays the clock values on the screen.
7. Copy this screen (recommended to guard against loss of the clock values).
8. If the clock values for your machine have been lost, set them (as a starting point) to the nominal values shown below.
9. If the DL (delay) and PW (pulse width) values in groups 11 and 12 are FF, set DL to 01 and PW to 14.
10. For groups 13 and 15, set DL to 13 and PW to 11.
    These values are not changed during the adjustment.

NOMINAL ADJUST VALUES DIAGRAM (QVU22ADJUST SCREEN)

```
  *INSERT/EXTRACT*  CLOCK RING (QVY)    CGRPNNXX       **IML REQUIRED**
                     CP DL PW  CP DL PW  CP DL PW  CP DL PW  CP DL PW  CP DL PW
A ARRAYS             1         2         3         4         5         6
S STATUS SCAN RING 1 0 01 14   0 01 14   1 13 11   1 08 06   1 13 11   1 08 06
K CHECKS IN SYSTEM                                                              ----GRP 11
I IPU HARDWARE     2 1 09 07   1 10 08   1 13 09   1 09 06   1 13 11   1 14 10
B CS HARDWARE
M MS HARDWARE      3 1 13 11   1 14 12   1 11 11   1 08 05   1 08 05   1 07 05
H CHANNEL HARDWARE
C CHNNL INTERFACE  4 1 13 09   1 13 09   1 14 10   1 14 10   1 04 01   1 04 01
X EXTERNAL REGS                                                                 ----GRP 43
R SCAN RING        5 1 13 10   1 13 10   1 12 08   1 12 07   1 07 05
Y CLOCK SCAN RING
W COMMAND SBA-CAC  6 1 07 03   1 08 05   1 08 04   1 08 04
T ADDRESS TRANSLAT
G SET CSAR ADDRESS

                   SERIAL NO. 000000
Q GENERAL SELECT
Z RTRN TO PROG SYS                                 ==>
SELECTION: U22ADJUST
   MAN      TEST
            CHK: DSBL
                                                      4341
96D2  96D2
```

HOW TO CHANGE A GRP VALUE

To change a GRP value on the screen do A or B:

A. Position the cursor (by using the Tab, Back Tab, or New Line keys) directly under and one line below the value you want to change.

   Key in the new value and press ENTER.

   The old value is replaced with the new value.

B. For Fast-Alter:

   Key in the GRP number and equal sign (=) after "SELECTION: U22ADJUST."

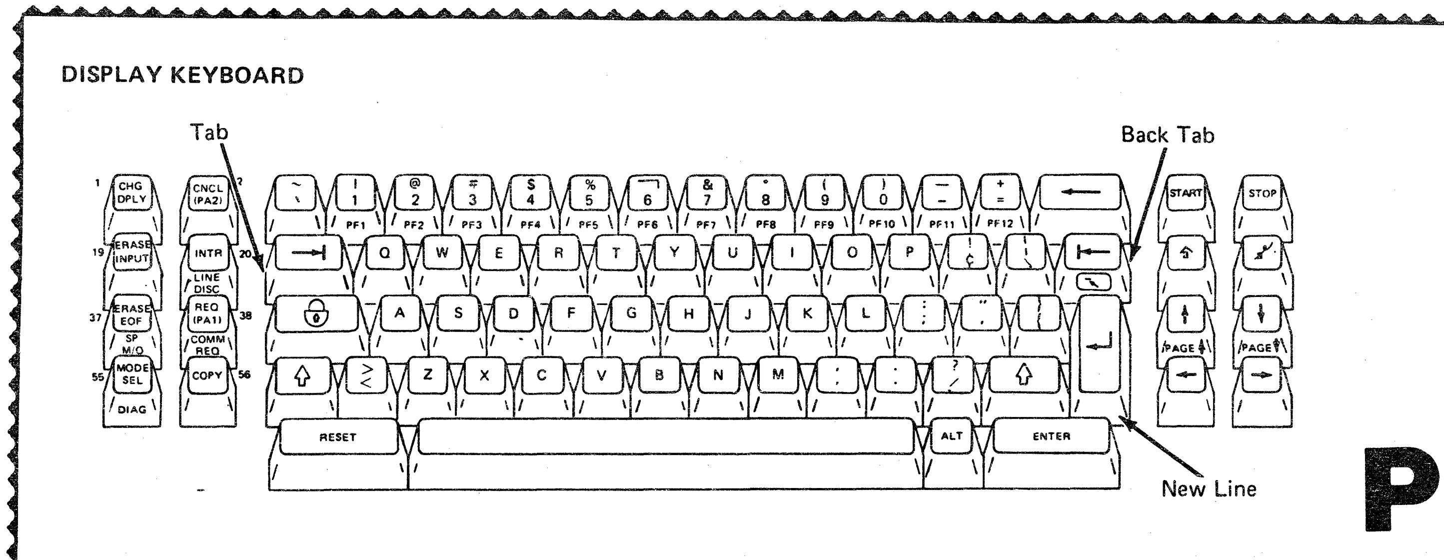
   Press ENTER.

   The DL (delay) and PW (pulse width) values for GRPxx are brought down to the selection line (as shown here):

   SELECTION: U22ADJUSTxx= xxxx

   GRP number — xx; *DL value* — first xx after =; *PW value* — last xx

   Key in the new DL and PW value(s) and press ENTER.



HOW TO ADJUST THE CLOCK GRPS

Notes:

- *For groups 11 and 12, the value of PW (pulse width) must be greater than or equal to the value of DL (delay).*
- *For groups 13 through 64 the value of DL must be greater than or equal to the value of PW.*

1. Set VERT MODE to CH1 and connect CH1 probe to 01A-A1C2B28 (-1.5 volts).

2. Adjust CH1 vertical POSITION so the CH1 trace is along the horizontal center line of the scope.
   Disconnect the CH1 probe.

3. Set VERT MODE to CH2 and connect CH2 probe to 01A-A1C2B28 (-1.5 volts).
   Adjust CH2 vertical POSITION so the CH2 trace is along the horizontal center line of the scope.

4. Set VERT MODE to CH1 and vary the DM44 Δ TIME control to display 0000.

5. Connect the CH1 probe to 01A-A1G2C08 (reference pulse).

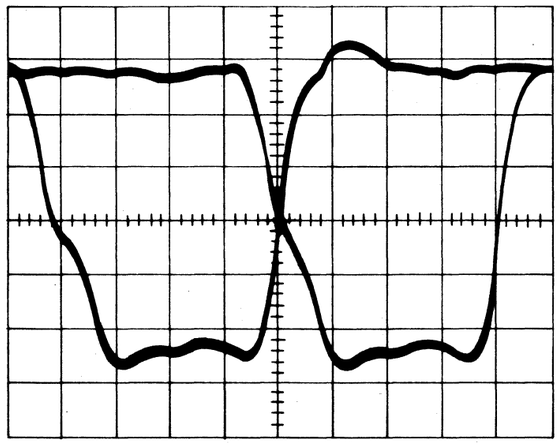
6. Adjust the A TRIGGER LEVEL control (larger knob) until a stable sweep is obtained.
   Vary the horizontal FINE/POSITION control (larger knob) to position the second minus-going signal near the center of the scope.

7. Set the DM44 Δ TIME control to display approximately 0215.

8. Vary the DM44 Δ TIME control until the rising and falling edges cross the horizontal center line at the same point (see the example on this page). This point does not have to be at the exact vertical center line of the scope.
   If the DM44 digital display is between 0207 and 0223, go to step 10.

9. If the DM44 digital display is less than 0207, decrease the GRP12 value for PW by one and repeat step 8.
   If the DM44 digital display is greater than 0223, increase the GRP12 value for PW by one and repeat step 8.

10. Set VERT MODE to ALT.



How To Adjust the Clock GRPs - Step 8.

Note: *To save time, you do not need to position the two traces at the exact vertical center of the scope -- anywhere close to the vertical center is acceptable.*

HOW TO ADJUST THE CLOCK GRPS (continued)

11. Connect the CH2 probe to 01A-A1Q2B60 (GRP41 EVEN CLOCK).

12. Set the DM44 Δ TIME control to display approximately 0000.

13. Vary the DM44 Δ TIME control until the falling edges of both pulses cross the horizontal center line at the same point (see the example on this page).
    If the DM44 display is between -0008 and 0008, go to step 15.

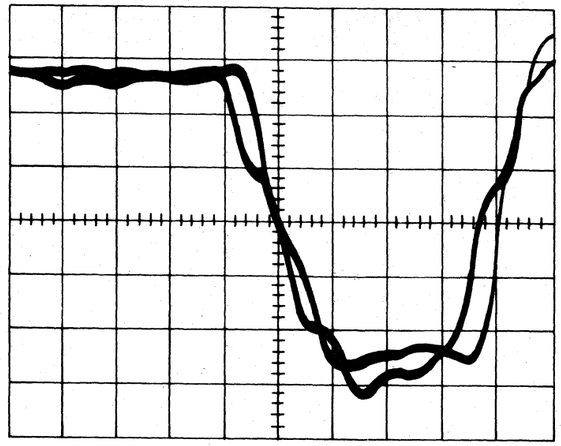
14. If the DM44 digital display is less than -0008, increase the PW value of the GRP being probed and repeat step 13.
    If the DM44 digital display is greater than 0008, decrease the PW value of the GRP being probed and repeat step 13.

15. Set the DM44 Δ TIME control to display approximately 0215.

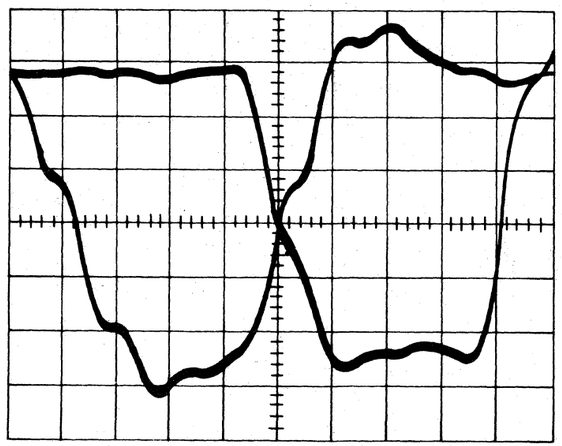
16. Vary the DM44 Δ TIME control until the CH2 rising edge and the CH1 falling edge cross the horizontal center line at the same point (see the example on this page).
    If the DM44 digital display is between 0207 and 0223, record the DL and PW values (see "Even Clock Group Test Points") and go to step 18.

17. If the DM44 digital display is less than 0207, increase by one the DL value of the GRP being probed, and repeat step 16.
    If the DM44 digital display is greater than 0223, decrease by one the DL value of the GRP being probed, and repeat step 16.

18. Connect the CH2 probe to the next GRP (see "Even Clock Group Test Points") and repeat steps 12 through 17.
    Do this for all the remaining GRPs in the even clock group.



How To Adjust the Clock GRPs - Step 13.



How To Adjust the Clock GRPs - Step 16.

NOTES:
PW = Falling edge CH1 to falling edge CH2 (-0008 to 0008)
DL = Falling edge CH1 to rising edge CH2 (0207 to 0223)

GRP Numbers	CH2 Probe Points	Old Values DL	Old Values PW	New Values * DL	New Values * PW
41	01A-A1 Q2B60				
42	U2D51				
43	N2C29				
44	E2B26				
53	C2A21				
54	01A-A1 B2C21				
16	01A-B1 B2B35				
34	B2C26				
35	K2B50				
36	M2B29				
46	U2B54				
63	N2C58				
64	01A-B1 Q2A62				

EVEN CLOCK GROUP TEST POINTS (used in steps 11-18)

* *For groups 11 and 12, the value of PW (pulse width) must be greater than or equal to the value of DL (delay).*

For groups 13 through 64 the value of DL must be greater than or equal to the value of PW.

HOW TO ADJUST THE CLOCK GRPS (continued)

19. Connect the CH2 probe to 01A-A1G2B45 (GRP11 ODD CLOCK).

20. Set the DM44 Δ TIME control to display approximately 0300.

21. Vary the DM44 Δ TIME control until the falling edges of both pulses cross the horizontal center line at the same point (see the example on this page).
    If the DM44 display is between 0292 and 0308, go to step 23.

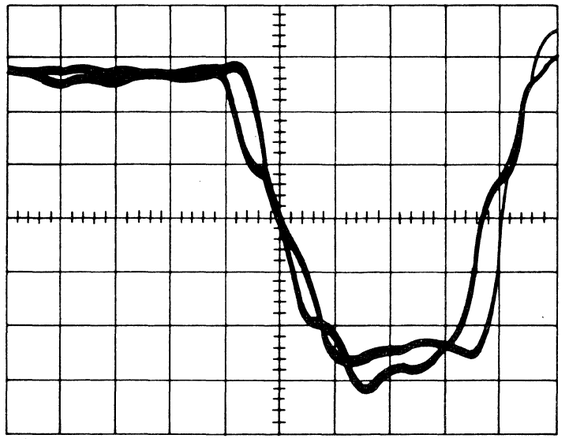
22. If the DM44 digital display is less than 0292, increase the PW value of the GRP being probed and repeat step 21.
    If the DM44 digital display is greater than 0308, decrease the PW value of the GRP being probed and repeat step 21.

23. Set the DM44 Δ TIME control to display approximately 0515.

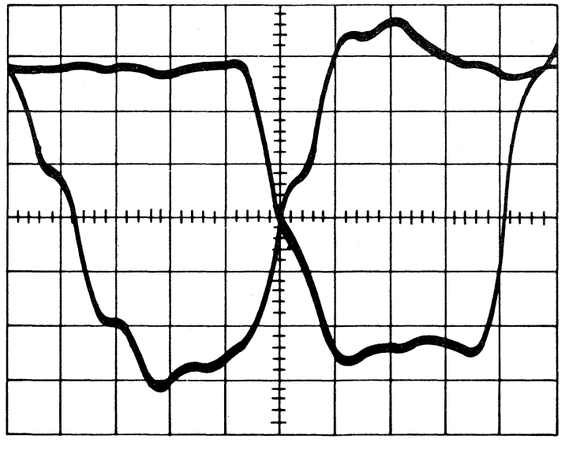
24. Vary the DM44 Δ TIME control until the CH2 rising edge and the CH1 falling edge cross the horizontal center line at the same point (see the example on this page).
    If the DM44 digital display is between 0507 and 0523, record the DL and PW values (see "Odd Clock Group Test Points") and go to step 26.

25. If the DM44 digital display is less than 0507, increase by one the DL value of the GRP being probed, and repeat step 24.
    If the DM44 digital display is greater than 0523, decrease by one the DL value of the GRP being probed, and repeat step 24.

26. Connect the CH2 probe to the next GRP (see "Odd Clock Group Test Points") and repeat steps 20 through 25. Do this for all the remaining GRPs in the odd clock group.



How To Adjust the Clock GRPs - Step 21.



How To Adjust the Clock GRPs - Step 24.

NOTES:
PW = Falling edge CH1 to falling edge CH2 (0292 to 0308)
DL = Falling edge CH1 to rising edge CH2 (0507 to 0523)

GRP Numbers	CH2 Probe Points		Old Values DL	Old Values PW	New Values * DL	New Values * PW
11	01A-A1	G2B45				
23		N2B24				
25		Q2A11				
26		R2B05				
31		C2A14				
32		G2B19				
51		G2B21				
52	01A-A1	B2B36				
14	01A-B1	E2C42				
21		E2D53				
22		E2A51				
24		K2B11				
45		U2D59				
55		N2A56				
61		M2B56				
62	01A-B1	P2C23				

ODD CLOCK GROUP TEST POINTS (used in steps 19-26)

* *For groups 11 and 12, the value of PW (pulse width) must be greater than or equal to the value of DL (delay).*

For groups 13 through 64 the value of DL must be greater than or equal to the value of PW.

DISKETTE CLOCK VALUE UPDATE

This procedure describes the method to update the FUNCT and DIAG4 diskettes with the new values.

Note: *This procedure is valid only after the clock adjust procedure has been done.*

1. Key in QVU22UPDATE and press ENTER.
2. Copy the screen and keep for future reference.
3. Exchange the FUNCT diskette with the DIAG4 diskette.

   Note: *Only the FUNCT, backup FUNCT, and DIAG4 diskettes have the clock values stored on them.*
4. Key in QVU22UPDATE and press ENTER.
5. Key in QCM and press ENTER.
6. Key in QVW2B and press ENTER.
7. Key in QVY22 and press ENTER.
8. Compare the values now displayed with the values saved in step 2. Also compare these values with those recorded in the Even and Odd Clock Group Test Point tables (obtained during the clock adjustment procedure). If the values are the same, key in QCM and press ENTER.
9. If the values in step 8 are not the same, determine which diskette is incorrectly updated and correct it.
10. Exchange the DIAG4 diskette with the backup FUNCT diskette and repeat steps 4 to 9.

CLOCK ADJUSTMENT TEST

After adjusting the clock, run the clock basic diagnostics and then the MSMDs.

Clock Basic Diagnostics Run Procedure

1. Install the DIAG1 diskette.
2. Press and hold the ALT key, and press the DIAG key.
3. Select the B option [SELECTED DIAGNOSTIC(S) MODE] from the Diagnostic Mode General Selection screen.
4. When the system responds with ENTER TEST NAME(S), key in test ID: D120-D1F8 and press ENTER.

MSMD Run Procedure

1. Install the DIAG4 Diskette.
2. Press and hold the ALT key, and press the DIAG key.
3. Select the G option (RUNALL MSMDs) from the Diagnostic Mode General Selection screen and press ENTER.

SERVICE AIDS

CONTENTS

PREVENTIVE MAINTENANCE

Item	Preventive Maintenance	Frequency
Filters	Examine the filters for dust accumulation and vacuum as necessary. Replace filters that do not pass light after vacuuming.	12 months or less as the environment requires

Filters are located on the inside of the front and rear covers of frame 01, 02, and 03.

Frame 01 four filters
Frame 02 two filters
Frame 03 two filters

Filter part 8483343

Spring part 307984

VOLUME 1

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SEQ001	5666444						
SEQ005	5666445						
SEQ011A		5666446					
SEQ011B			5666454				
SEQ011C				2676000			
SEQ011D						2676001	
SEQ1T1	5666246						
SEQ1T2	5666247						
SEQ1T3	5666248						
SEQ101E							8632900
SEQ101F					2676460		
SEQ102E							8632901
SEQ102F					2676461		
SEQ103E							d8632902
SEQ104E							d8632903
SEQ2T0	5666249						
SEQ202	8633136						
SEQ205	8632905						
SEQ207	8632925						
SEQ210	8632906						
SEQ211	8633137						
SEQ212	8632927						
SEQ214	8632917						
SEQ220	8632908						
SEQ230	8632907						
SEQ231	8633138						
SEQ232	8632991						
SEQ233	8632992						
SEQ234	8632993						
SEQ235	8632994						
SEQ237	8632914						
SEQ238	8632915						
SEQ239	8632926						
SEQ241	8632995						
SEQ242	8632996						
SEQ243	8632997						
SEQ244	8632998						
SEQ245	8632959						
SEQ246	8633140						
SEQ250	8632922						
SEQ255	8632923						
SEQ260	8632960						
SEQ290	5666226						

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SEQ3AA	5666447						
SEQ3T0	5666250						
SEQ304A		8633008					
SEQ304B			4109271				
SEQ304C				2676016			
SEQ304D						2676055	
SEQ306A		8633009					
SEQ306B			4109272				
SEQ306C				2676017			
SEQ306D						2676056	
SEQ308A		8633010					
SEQ308B			4109273				
SEQ308C				2676018			
SEQ308D						2676057	
SEQ309D						2676058	
SEQ310	8632952						
SEQ311D						2676059	
SEQ314A		8632931					
SEQ314B			4109274				
SEQ314C				2676019			
SEQ315C				2676020			
SEQ316A		8632932					
SEQ316B			4109275				
SEQ316C				2676021			
SEQ316D						2676060	
SEQ317D						2676061	
SEQ318A		8632933					
SEQ318B			4109276				
SEQ318C				2676022			
SEQ318D						2676062	
SEQ320A		8632934					
SEQ320B			4109277				

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Page Number	B/M 4432864	B/M 4432845	B/M 4432846	B/M 4154511	B/M 4230664	B/M 4154512	B/M 4230699
SEQ320C				2676023			
SEQ320D						2676063	
SEQ322A		8632935					
SEQ322B			4109278				
SEQ322C				2676024			
SEQ322D						2676064	
SEQ324A		8632936					
SEQ324B			4109279				
SEQ324C				2676025			
SEQ324D						2676065	
SEQ326B			4109280				
SEQ328B			4109281				
SEQ330A		8632937					
SEQ330B			4109282				
SEQ330C				2676026			
SEQ331C				2676027			
SEQ332B			4109283				
SEQ332C				2676028			
SEQ333A		8632938					
SEQ333C				2676029			
SEQ334B			4109284				
SEQ334C				2676030			
SEQ336A		8632939					
SEQ336B			4109285				
SEQ336C				2676031			
SEQ336D						2676066	
SEQ338B			4109286				
SEQ339A		8632940					
SEQ339C				2676032			
SEQ339D						2676067	
SEQ340B			4109287				
SEQ340C				2676033			
SEQ342A		8632941					
SEQ342B			4109288				
SEQ342C				2676034			

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SEQ342D						2676068	
SEQ344B			4109289				
SEQ346A		8632942					
SEQ346B			4109290				
SEQ346C				2676035			
SEQ346D						2676069	
SEQ348A		8632943					
SEQ348B			4109291				
SEQ348C				2676036			
SEQ348D						2676070	
SEQ350A		8632944					
SEQ350B			4109292				
SEQ350C				2676037			
SEQ350D						2676071	
SEQ351D						2676072	
SEQ352A		8632945					
SEQ352C				2676038			
SEQ352D						2676073	
SEQ354B			4109293				
SEQ356A		8633011					
SEQ356B			4109294				
SEQ356C				2676039			
SEQ356D						2676074	
SEQ358A		8632947					
SEQ358C				2676040			
SEQ360A		8632948					
SEQ360B			4109295				
SEQ360C				2676041			
SEQ362A		8632949					
SEQ362C				2676042			
SEQ363C				2676043			
SEQ364A		8632950					
SEQ364B			4109296				

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SEQ364C				2676044			
SEQ364D						d2676075	
SEQ365C				2676045			
SEQ366A		8632951					
SEQ366B			4109297				
SEQ366C				2676046			
SEQ366D						2676076	
SEQ370	8632978						
SEQ372	8633141						
SEQ376	8633142						
SEQ378	8633143						
SEQ380	8633144						
SEQ384	8633145						
SEQ386	8633146						
SEQ388	8633147						
SEQ390	8633148						
SEQ392	8633149						
SEQ395	8632953						
SEQ398	4109240						

VOLUME 3

Page Number	B/M 4432864	B/M 4432845	B/M 4432846	B/M 4154511	B/M 4230664	B/M 4154512	B/M 4230699
SEQ4AA	5666448						
SEQ4T0	5666251						
SEQ400E							2676098
SEQ400F					2676080		
SEQ460C				d2676081			
SEQ460D						d2676084	
SEQ460E							2676096
SEQ461E							2676097
SEQ470B			d4109216				
SEQ471B			d4109217				
SEQ480A		d8632955					
SEQ480C				d2676083			
SEQ480D						d2676085	
SEQ481A		d4109215					
SEQ5T0	5666252						
SEQ500A		d8632956					
SEQ500B			d5666272				
SEQ501A		d4109212					
SEQ501B			d5666273				
SEQ502A		d4109213					
SEQ502B			d5666318				
SEQ503E							8632963
SEQ503F					2676082		
SEQ504A		d8632958					
SEQ504B			d5666319				
SEQ504E							2676099
SEQ504F					2676086		
SEQ505E							8632962
SEQ505F					2676087		
SEQ506E							d4109214
SEQ511E							4109219
SEQ511F					2676088		

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Page Number	B/M 4432864	B/M 4432845	B/M 4432846	B/M 4154511	B/M 4230664	B/M 4154512	B/M 4230699
SEQ600E							8632965
SEQ600F					2676089		
SEQ606E							4109218
SEQ606F					2676090		
SEQ8T0	5666253						
SEQ801E							8632966
SEQ801F					2676091		
SEQ802E							8632969
SEQ802F					2676092		
SEQ803E							8632970
SEQ803F					2676093		
SEQ9T0	5666254						
SEQ901E							8632972
SEQ901F					2676473		
SEQ901B			d2676470				
SEQ902A		d8632973					
SEQ902B			d2676471				
SEQ903A		d8632981					
SEQ903B			d2676472				
SEQ904	8632982						
SEQ906	8632976						
SEQ907	8632977						

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10 00T	5666255						
10 005	5666449						
10 015	5666450						
10 025	5666239						
10 035a		5666240					
10 035b			5666236				
10 035c				2676200			
10 035d						2676231	
10 045a		5666241					
10 045b			5666237				
10 045c				2676201			
10 045d						2676232	
10 055a		5666242					
10 055b			5666238				
10 055c				2676202			
10 055d						2676233	
10 061	5666230						
10 065	5666243						
10 075	5666224						
11 00T	5666256						
11 005	5666283						
11 015	5666284						
11 025	5666285						
12 00T	5666257						
12 005a		5666286					
12 005b			5666274				
12 005c				2676210			
12 005d						2676213	
12 015	5666287						
12 025	5666288						
12 035	5666289						
12 035b			d5666426				
12 043a		5666245					
12 043b			5666233				
12 043c				2676211			
12 043d						2676214	
12 045	5666290						
12 055	5666291						
12 057d						2676215	

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12 063d						2676216	
12 065a		5666292					
12 065b			5666234				
12 065c				2676227			
12 069d						2676217	
12 075a		5666293					
12 075b			5666235				
12 075c				2676228			
12 075d						2676218	
12 081d						2676219	
12 085	5666294						
12 095b			5666427				
12 095c				2676212			
13 00T	5666258						
13 005b			d5666331				
13 005e							5666276
13 005f					2676220		
13 015b			d5666422				
13 015e							5666277
13 015f					2676221		
13 025b			d5666423				
13 025e							5666278
13 025f					2676222		
13 035b			d5666424				
13 035e							5666279
13 035f					2676223		
13 045b			d5666442				
13 045e							5666280
13 045f					2676224		
13 055b			d5666443				
13 055e							d5666281
13 055f					d2676225		
13 065b			d5666458				
13 065e							d5666282
13 065f					d2676226		

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14 00T	5666259						
14 001	5666334						
14 003	5666432						
14 005	5666406						
14 007	5666407						
14 009	5666408						
14 011	5666409						
14 013	5666410						
14 015e							5666431
14 015f					2676235		
14 025e							5666335
14 025f					2676418		
14 035	5666336						
14 065	d5666340						
14 075	5666337						
14 079	5666338						
14 081	5666339						
14 095	5666348						
14 105a		5666228					
14 105b			5666229				
14 105f					2676260		
14 105d						d2676234	
14 115	5666341						
14 205	5666342						
14 215	5666343						
14 223	2676247						
14 225	5666344						
14 235	5666345						
14 241	5666419						

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14 325	d5666349						
14 325	2676246						
14 335	d5666418						
14 405	5666347						
14 425	5666433						
14 505	5666412						
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14 525	5666414						
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14 555	5666417						
14 565	2676261						
14 605e							2676229
14 605f					2676262		
14 615	2676230						
14 619	2676263						
14 625	2676248						
14 635e							2676419
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14 705	2676236						
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20 005	5666160						
20 015	5666161						
20 025a		5666162					
20 025b			5666208				
20 025c				2676300			
20 025d						2676330	
20 035a		5666163					
20 035b			5666405				
20 035c				2676318			
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20 045	5666164						
20 055a		5666165					
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20 065	5666166						
20 075a		5666167					
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20 075c				2676314			
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20 085a		5666168					
20 085b			5666210				
20 085c				2676301			
20 085d						2676334	
20 095a		5666169					
20 095b			5666211				
20 095c				2676302			
20 095d						2676335	
20 105a		5666170					
20 105b			5666212				
20 105c				2676303			
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20 115	5666171						
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20 155b			5666213				
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20 165a		5666176					
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20 165c				2676305			
20 165d						2676338	
20 175a		5666177					
20 175b			5666421				
20 175c				2676320			
20 175d						2676339	
20 185a		5666178					
20 185b			5666215				
20 185c				2676306			
20 185d						2676340	
20 191b			5666216				
20 191c				2676307			
20 195a		5666179					
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20 195c				2676308			
20 195d						2676341	
20 205a		5666180					
20 205b			5666218				
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20 211a		5666201					
20 211b			5666219				
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20 211d						2676343	
20 215a		5666181					
20 215b			5666220				
20 215c				2676310			
20 215d						2676344	
20 225a		5666182					
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20 235a		5666183					
20 235b			5666222				
20 235c				2676316			
20 235d						2676346	
20 241a		5666203					
20 241b			5666204				
20 241c				2676322			
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20 245a		5666184					
20 245b			5666223				
20 245c				2676312			
20 245d						2676347	
20 255	5666185						
20 265	5666186						
20 275	5666187						
20 285	5666188						
20 295	5666189						
20 305	5666190						
20 315	5666191						
20 325	5666192						
20 335a		5666193					
20 335b			5666244				
20 335c				2676317			
20 335d						2676348	
20 345	5666194						
20 355	5666195						
20 365	5666196						
20 375	5666197						
20 385a		5666198					
20 385b			5666225				
20 385c				2676313			
20 385d						2676349	
20 395	5666199						
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20 415a		5666202					
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20 415c				2676321			
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30 025	5666231						
32 00T	5666262						
32 005	5666232						
32 005b			d5666428				
34 00T	5666263						
34 005	5666295						
34 025a		5666296					
34 025b			5666271				
34 025c				2676400			
34 025d						2676403	
34 055a		5666297					
34 055b			5666429				
34 055f					2676401		
34 055d						d2676404	
34 075	5666298						
34 105	5666299						
36 00T	5666264						
36 005	5666300						
36 015	5666301						
36 015b			d5666310				
36 025e							5666302
36 025f					2676406		
36 035e							5666303
36 035f					2676407		
36 045	5666304						
36 045b			d5666311				
36 055	5666305						
36 065a		5666306					
36 065b			5666312				
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38 00T	5666265						
38 005	5666313						
38 015	5666314						
38 025	5666315						
38 035	5666316						
38 045	5666317						
40 00T	5666266						
40 005	5666320						
40 015e							5666321
40 015f					2676408		
40 025	5666322						
40 035	5666323						
40 055	5666324						
40 085	5666325						
40 095	5666326						
40 105	5666327						
40 115	5666328						
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42 00T	5666267						
42 005	5666332						
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44 015e							5666350
44 015f					2676421		
44 025	5666351						
44 035	5666352						
44 045	5666353						
44 051	2676422						
44 055	5666354						
44 071	2676423						
44 075	5666355						
44 085	5666356						
44 115	5666358						
44 125	d5666359						
44 135	5666360						
44 155	5666361						
44 165	5666362						
44 175	5666363						
44 185e							5666364
44 185f					2676455		
44 187	2676425						
44 191e							2676417
44 191f					2676456		
44 195e							5666365
44 195f					2676457		
44 215e							5666366
44 215f					5666357		
44 235e							5666367
44 235f					2676459		
44 245e							5666368
44 255	5666369						
44 265	5666370						
44 275e							5666371
44 275f					5666399		
44 285	5666372						
44 295e							5666373
44 295f					2676409		
44 305e							5666374
44 305f					2676355		
44 315e							5666375
44 315f					2676430		
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44 355	5666379						
44 365	5666380						
44 375	5666381						
44 395e							5666382
44 395f					2676433		
44 403					2676434		
44 405	5666383						
44 407					2676435		
44 409	2676436						
44 413					2676437		
44 415	5666384						
44 417					2676438		
44 425e							5666385
44 425f					2676410		
44 427					2676440		
44 429	2676441						
44 435	5666386						
44 443					2676442		
44 445	5666387						
44 449e							2676444
44 449f					2676443		
44 453e							2676445
44 453f					5666205		
44 457e							2676447
44 457f					2676446		
44 463e							2676448
44 463f					5666206		
44 495	5666388						
44 501e							2676450
44 501f					2676449		
44 515e							5666389
44 515f					2676427		
44 517					2676451		
44 519	2676452						
44 521e							5666390
44 521f					2676453		
44 525e							2676411
44 525f					2676412		
44 535	5666391						
44 545e							5666392
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44 565e							5666394
44 565f					2676415		
44 575e							5666395
44 575f					2676458		
44 585	5666396						
44 595	5666397						
44 605	5666398						
44 607e							2676454
44 607f					2676428		
44 615	5666400						
44 635e							5666401
44 635f					2676424		
44 655e							5666402
44 655f					2676426		
44 675e							5666403
44 675f					2676429		
44 695e							5666404
44 695f					2676416		
46 00T	5666269						
46 005	5666420						
46 005b			d5666434				
48 00T	5666270						
48 005	5666435						
48 015	5666436						
48 025a		5666437					
48 025b			5666455				
48 025c				2676480			
48 025d						2676496	
48 035a		5666438					
48 035b			5666456				
48 035c				2676481			
48 035d						2676497	
48 045a		5666439					
48 045b			5666457				
48 045c				2676482			
48 047d						2676498	
48 049b			2676491				
48 049c				2676483			
48 051	2676490						
48 055	5666440						
48 065	5666441						
49 005	5666425						

SYSTEM CONFIGURATION (QFS)

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

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

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

To select the System Configuration screen from the Configuration screen:

1. Place the CE MODE switch ON.
2. Key S next to F on the SELECTION line.
3. Press ENTER. System Configuration screen is displayed.

To update the configuration record:

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

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

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

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

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

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

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


```
                    *SYSTEM CONFIGURATION*

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

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

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

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

SELECTION: S                             ==>

                                    4341
```

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

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

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

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

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

Press ENTER.

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

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

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

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

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

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

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

Power Group:

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

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

Press ENTER.

Return to General Selection (Q)

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

Return to Prog Sys (Z)

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

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

4341 Model Group 2

MODULE TRANSFER (QFM)

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

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

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

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

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

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

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

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

                                                      4341
```

To invoke the Module Transfer screen:

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

1. Place the CE MODE switch ON if you have not already done so. If you have not, you must select the Configuration screen first.
2. Key M on the SELECTION line.
3. Press ENTER.
4. After the Module Transfer screen is displayed, move the cursor to the module(s) that you do not want to transfer and place an __ next to that module. Ensure that an X is next to the module(s) that you do want transferred.
5. Press ENTER. The status area displays an S beside those modules which you have selected.

   Note: *If an error occurs, INVP is displayed instead of S.*
6. Key STARTL or STARTD next to the M on the SELECTION line, depending upon the type of transfer you wish to do.

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

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

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

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

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

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

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

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

Status Area Codes

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

Notes:

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

UCW ASSIGNMENT

General Information

A channel directs the flow of information between main storage and various types of I/O devices under the control of a channel facility, which functions independently of the processor program. This permits the processor program to resume processing after initiating an I/O operation.

The channel facility required to sustain a single I/O operation is called a *subchannel*. A subchannel requires internal storage, called a *Unit Control Word (UCW)*, for recording the addresses, count, and any status and control information.

For each device attached to the 4341, there is a device address and an associated UCW. This information is entered into a channel directory (one for each channel) which is stored in auxiliary storage. Each channel directory has 256 entries. Each device entered into the directory has an address specified by a channel designation (c) and a two-character unit designation (uu).

A channel directory entry contains:

- An indication whether or not a UCW is assigned to the associated device address (UNA = unassigned).
- The reference number (REF) of the UCW assigned.
- An indication whether the UCW is shared or unshared (SHR = shared).
- An indication whether the device associated with this entry can operate in selector (SEL), byte-multiplexer (BYT), block-multiplexer (BLK), or data streaming (DST) mode.

Directory information can be displayed by either the UCW Directory (QDUC) screen or the Expanded UCW Directory (QDUE) screen.

Each channel has a local storage area for processing a UCW. When an operation requires using the information in a UCW, that UCW is read from auxiliary storage into local storage. The operation specified by the subchannel is then performed, and the UCW is updated and returned to auxiliary storage. The UCW carries a running record of the operation for the I/O device assigned.

The UCW assignment process is critical to the efficient operation of the processor. Change information to the UCW Directory is provided by personnel responsible for system configuration. System programmers or system analysts configure the Input/Output devices and control units for optimum operation. Poor device assignments can affect processor performance. Reserve addresses for I/O equipment expected; early address definition provides easier installation and testing when these devices are installed.


```
  *DISPLAY/ALTER*
G GENERAL REGISTERS
C CONTROL REGISTERS                    *UCW/DEVICE DIRECTORY TASKS*
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY                      U CHANGE UCW DIRECTORY
V VIRTUAL STORAGE
M REAL STORAGE                     C DISPLAY UCW DIRECTORY
T TRACE AREA
S BLOCK SAVE AREA                  E DISPLAY EXPANDED UCW DIRECTORY
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: U                                ==>

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```

UCW/Device Directory Tasks (QDU) Screen

UCW Assignment Procedure

The following screens are used for the UCW Assignment procedure:

- UCW/Device Directory Tasks (QDU) - displays the options available to perform the UCW assignment or modification procedure.
- Change UCW Directory (QDUU) - is used to modify the UCW directory by adding or deleting UCW addresses, or to modify the type of UCW address in the directory.
- Display UCW Directory (QDUC) - is used to verify changes made while using the UCW Assignment procedure. Device addresses are displayed as assigned (for example: 301-305).
- Display Expanded UCW Directory (QDUE) - is used to verify changes made while using the UCW Assignment procedure. Device addresses are displayed individually. The Hex field is used by engineering.

To perform a UCW Assignment:

1. Press MODE SEL key. General Selection (Q) screen is displayed.
2. Key QDU next to SELECTION.
3. Press ENTER. UCW/Device Directory Tasks screen is displayed.

Note: *From this screen, you can select the Change UCW Directory (QDUU) screen to modify the UCW Directory or select one of the directory (QDUC or QDUE) screens to verify any changes.*

Device Assignment

Notes:

- *Before making a UCW assignment, refer to the "UCW Assignment Table" for correct device information.*
- *The paging keys are not applicable for this function.*
- *If the characteristics of a device must be changed, first remove (unassign) the UCW for that device address, and then perform a new assignment with proper characteristics. See "Device Assignment Change."*

To perform a UCW/Device assignment from the Change UCW Directory (QDUU) screen:

1. Key U next to SELECTION: U.
2. Press ENTER. Change UCW Directory screen is displayed.
3. Key the following next to UU on the SELECTION line:
   a. CXX = Device address or beginning device address range.
      Notes:
      - *Sixteen addresses (0F0 through 0FF) are reserved for locally attached devices and for internal functions. To assign or unassign these devices, use the Program Load (QL) function.*
      - *With three channels installed, the addresses can range from 000-2FF, and with six channels installed, from 000-5FF.*
      - *If two ranges of shared UCW devices are adjacent, they must be assigned at different times (a different entry); otherwise, the same reference number is assigned to both ranges. However, for unshared devices, a range over many control units can be assigned at one time.*
   b. -CYY = Ending device address range (optional).
   c. CHAR.CODE = Characteristic of the device(s) being assigned (device dependent).
      Notes:
      - *Any characteristic(s) required after the address replaces the default characteristic. The default assigns the device to a byte- or block-multiplexer UCW.*
      - *The following characteristic codes can be assigned to the address(s):*

CHAR.CODE	*Display*	*Characteristic*
L	*SEL*	*Selector device on block-multiplexer channel*
S	*SHR*	*Shared UCW*
D	*DST*	*Data streaming mode*
X	*UNA*	*No device assigned or removes device*

      - *An invalid channel configuration entry displays INV in the characteristics field.*

```
  *DISPLAY/ALTER*                        *CHANGE UCW DIRECTORY*
G GENERAL REGISTERS
C CONTROL REGISTERS            FORMAT: CXX -CYY CHAR.CODES
F FLOATING POINT REGISTERS              CXX = STARTING DEVICE ADDRESS
P CURRENT PSW                          -CYY = ENDING DEVICE ADDRESS (OPTIONAL)
K STORAGE KEY
V VIRTUAL STORAGE                       CHANNEL: 0-BYTE   1-BLOCK   2-BLOCK
M REAL STORAGE                                   3-BLOCK  4-BLOCK   5-BLOCK
T TRACE AREA
S BLOCK SAVE AREA                       CHAR.CODES (OPTIONAL, ANY ORDER)
A AUXILIARY STORAGE                        S SHARED UCW
U UCW/DEVICE DIRECTORY                     L SELECTOR MODE -BLOCK ONLY
L LOCAL STORAGE                            D DATA STREAMING MODE -BLOCK ONLY
X EXTERNAL REGISTERS
W SP STORAGE                               X REMOVE DEVICES
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION            .ONE ENTRY MUST COVER ALL ADDRS FOR ANY CTL UNIT
Z RETURN TO PROG SYS           .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UU 380-387 SL                        ==>

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```

Change UCW Directory (QDUU) Screen

4. Press ENTER. SELECTION COMPLETE message is displayed. Directory is updated and device(s) are assigned.
   Note: *The routine only changes the diskette holding the directories, not the UCWs in auxiliary storage. This requires a processor re-IML (QLM).*
5. Key QLM next to SELECTION.
6. Press ENTER. A processor IML is performed and auxiliary storage is updated.
7. Update the backup diskette. For updating a diskette, see Volume 13/16, Section 14, "Module Transfer (QFM)."
8. Verify changes made by using the section titled "UCW Verification."

Device Assignment Change

To change a device assignment from the Change UCW Directory (QDUU) screen:

1. Key U next to SELECTION: U.
2. Press ENTER. Change UCW Directory screen is displayed.
3. Key the following next to UU on the SELECTION line:
   a. CXX = Device address or beginning device address range.
   b. -CYY = Ending device address range (optional).
   c. X = Characteristic code to remove (unassign) device(S).
4. Press ENTER. SELECTION COMPLETE message is displayed. Device(s) are removed (unassigned).
5. Perform the new UCW assignment. See "Device Assignment."

UCW Verification

The UCW Directory (QDUC) or the Expanded UCW Directory (QDUE) screens are used to display the present device assignment or to verify any changes made to the directory. The directory screens display the UCWs as currently stored on the diskette. When verifying the directory, use either screen. The UCW Directory (QDUC) screen displays device addresses as assigned (for example: 301-305). The Expanded UCW Directory (QDUE) screen displays device addresses individually.

UCW Directory

To select the UCW Directory screen from the UCW/Device Directory Tasks screen:

1. Key C and a three-digit device address (000-5FF) next to SELECTION: U.

   Note: *The default address is zero.*

2. Press ENTER. The UCW Directory screen is displayed.

Notes:

- *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*
- *This screen cannot be altered.*

Expanded UCW Directory

To select the Expanded UCW Directory screen from the UCW/Device Directory Tasks screen:

1. Place CE MODE switch on.
2. Key E and a three-digit device address (000-5FF) next to SELECTION: U.

   Note: *The default address is zero.*

3. Press ENTER. The Expanded UCW Directory screen is displayed.

Notes:

- *The message MORE, PRESS ENTER appears if there is more data than can be displayed on one page.*
- *This screen cannot be altered.*

```
  *DISPLAY/ALTER*                    *DISPLAY UCW DIRECTORY*
G GENERAL REGISTERS              CXX-CYY  REF      CHARACTERISTICS
C CONTROL REGISTERS              000      010      BYT,SHR
F FLOATING POINT REGISTERS       301-305  011      BLK,SHR
P CURRENT PSW                    306-30F  012      BLK,SHR
K STORAGE KEY                    310-31F  013-022  SEL,DST
V VIRTUAL STORAGE
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS          .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UC                                ==>

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```

UCW Directory (QDUC) Screen

```
  *DISPLAY/ALTER*                    *DISPLAY UCW DIRECTORY*
G GENERAL REGISTERS              CXX-CYY  REF      CHARACTERISTICS    HEX
C CONTROL REGISTERS              300      00C      UNA                0310
F FLOATING POINT REGISTERS       301      011      BLK,SHR            0472
P CURRENT PSW                    302      011      BLK,SHR            0472
K STORAGE KEY                    303      011      BLK,SHR            0472
V VIRTUAL STORAGE                304      011      BLK,SHR            0472
M REAL STORAGE                   305      011      BLK,SHR            0472
T TRACE AREA                     306      012      BLK,SHR            04B2
S BLOCK SAVE AREA                307      012      BLK,SHR            04B2
A AUXILIARY STORAGE              308      012      BLK,SHR            04B2
U UCW/DEVICE DIRECTORY           309      012      BLK,SHR            04B2
L LOCAL STORAGE                  30A      012      BLK,SHR            04B2
X EXTERNAL REGISTERS             30B      012      BLK,SHR            04B2
W SP STORAGE                     30C      012      BLK,SHR            04B2
D CONSOLE DISK FILE              30D      012      BLK,SHR            04B2
= HEX CALCULATOR                 30E      012      BLK,SHR            04B2
Q GENERAL SELECTION              30F      012      BLK,SHR            04B2
Z RETURN TO PROG SYS          .PU-IML REQUIRED AFTER CHANGES -USE LOAD SCREEN
SELECTION: UE300                             ==> MORE, PRESS ENTER

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```

Expanded UCW Directory (QDUE) Screen

Return to General Selection (Q)

To return to the General Selection (Q) screen from any UCW Assignment screen:

1. Key Q next to SELECTION.
2. Press ENTER. General Selection (Q) screen is displayed.

Return to Prog Sys (Z)

To return to the Prog Sys (Z) screen from any UCW Assignment screen:

1. Key Z next to SELECTION.
2. Press ENTER. Prog Sys (Z) screen is displayed.

UCW Assignment Table

This table illustrates the most commonly used assignments. For additional information, refer to the applicable system library document.

Note: *The channel-to-channel (CTCA) feature has a unshared UCW.*

Devices	CHAR.CODE Entry: Channel Byte	CHAR.CODE Entry: Channel Block	Notes
Direct Access Storage Units			
2314*-2312,2313,2318,2319	-	LS	
2835*-2305	-	NE	
2841*-2311	-	LS	
3540	NE	NE	
3830*-3330,3333,3340,3344,3350	-	NE	
3880*-With Speed Matching Buffer #6550	-		
-3330,3340,3344,3350,3370,3375,3380	-	NE or D	4,5
3880*-Without Speed Matching Buffer #6550	-		
-3330,3340,3344,3350,3370,3375	-	NE or D	4,5
-3380 (Channel 1 or 2)	-	D	4
Magnetic Tape I/O			
2403,2404	-	LS	
2415	-	LS	
2803*-2401,2402,2420	-	LS	
2804*-2401,2402	-	LS	
3411	-	LS	
3411*-3410	-	LS	
3803*-3420	-	LS	
Punched Card I/O and Printers			
1442	NE	NE	→ 1
1443	NE	NE	
2501,2520	NE	NE	
2821*-1403,2540	NE	NE	→ 2
3203	NE	NE	
3811*-3211	NE	NE	
3505,3525	NE	NE	
3800	NE	NE	
Display and Console Printers			
2250	NE	L	2
2840*-2250	S	LS	1
3258*-3251,3255	-	S	
3272*-3277,3284,3286,3287,3288	S	S	→ 2,6
3274 1B and 1D	S	S	
-3268,3277,3278,3279,3286,	S	S	
-3287,3288,3284,3289	S	S	
3274 1A* Unshared UCW	NE	NE	
-3268,3277,3278,3279,3286,	NE	NE	
-3287,3288,3284,3289	NE	NE	
3791*-3277,3284,3286,3287,3288,3793	NE	NE	
Data Security Device			
3848	-	NE or D	4
Magnetic Character and Optical Readers			
1255	NE	L	1
1287,1288	NE	NE	1
1419	NE	NE	1,3
3881,3886	NE	NE	
3890	NE	NE	1
3895	NE	NE	

* Device is a Control unit

Devices	CHAR.CODE Entry: Channel Byte	CHAR.CODE Entry: Channel Block	Notes
Communication/Data Aquisition/Process Control			
2701	NE	-	
2715*-2791,2793	NE	-	
3704	NE	-	
3705 CA1	NE	-	
3705 CA2 and CA3	NE	NE	2
3705 CA4	NE	NE	1
Paper Tape I/O			
2822*-2671	NE	NE	
2826*-1017,1018	NE	-	
Mass Storage System			
3850/51	NE	NE	
Auxilary Processor			
3838-With Feature #4850	-	D	4
3838-Without Feature #4850	-	NE	
Audio Response			
7770	NE	-	

* Device is a Control unit

Characteristic Code (CHAR.CODE) Entries:

- \- Invalid selection, do not use.
- **NE** No Entry - defaults to an unshared channel.
- **S** Device requires a shared UCW.
- **L** Device requires a block-multiplexer channel to work in selector mode.
- **D** Control unit operating in data streaming mode.

Notes:

1. *Preferred attachment is a byte-multiplexer channel.*
2. *Preferred attachment is a block-multiplexer channel.*
3. *The number of 1419 devices per byte-multiplexer channel is limited. Consult your system engineer.*
4. *When CHAR.CODE D is selected, ensure that the control unit is properly set up for operating in data streaming mode. Follow necessary control unit guidelines and/or procedures.*
5. *For Model Group 1, 10, or 11 do not attach a 3880 control unit to channel 5. Attach a 3880 to channel 1 or 2.*
6. *Assign only one UCW for each 3272 or 3274 control unit.*

Channel Configuration

The configuration for the channels is:

Channel 0 Byte Multiplexer (BYT)
Channel 1 Block Multiplexer (BLK)
Channel 2 Block Multiplexer (BLK)
Channel 3 Block Multiplexer (BLK)
Channel 4 Block Multiplexer (BLK) (see note)
Channel 5 Block Multiplexer (BLK)

Note: *If configured on the System Configuration (QFS) screen, channel 4 can operate as a byte-multiplexer (BYT) channel.*

Assignment Examples

SELECTION:

UU CXX
Device CXX assigned as unshared UCW.

UU CXX-CYY
Devices CXX through CYY assigned as unshared UCW.

UU CXX-CYY S
Devices CXX through CYY assigned as shared UCW.

UU CXX-CYY L
Devices CXX through CYY assigned to selector mode.

UU CXX-CYY SL
Devices CXX through CYY assigned as shared UCW to selector mode.

UU CXX-CYY D
Devices CXX through CYY assigned to data streaming mode.

UU CXX-CYY X
Devices CXX through CYY removed (unassigned).

Note: *CXX and CYY are in the form of channel designation (c) and a two-character unit designation (uu).*

DISKETTE EC UPDATE PROCEDURE

Perform this procedure when installing an EC to the processor. Four diskettes are updated when an EC is installed:

- Two FUNCT diskettes
- DIAG4 diskette
- 4341 Processor Unit Analysis Diskette.

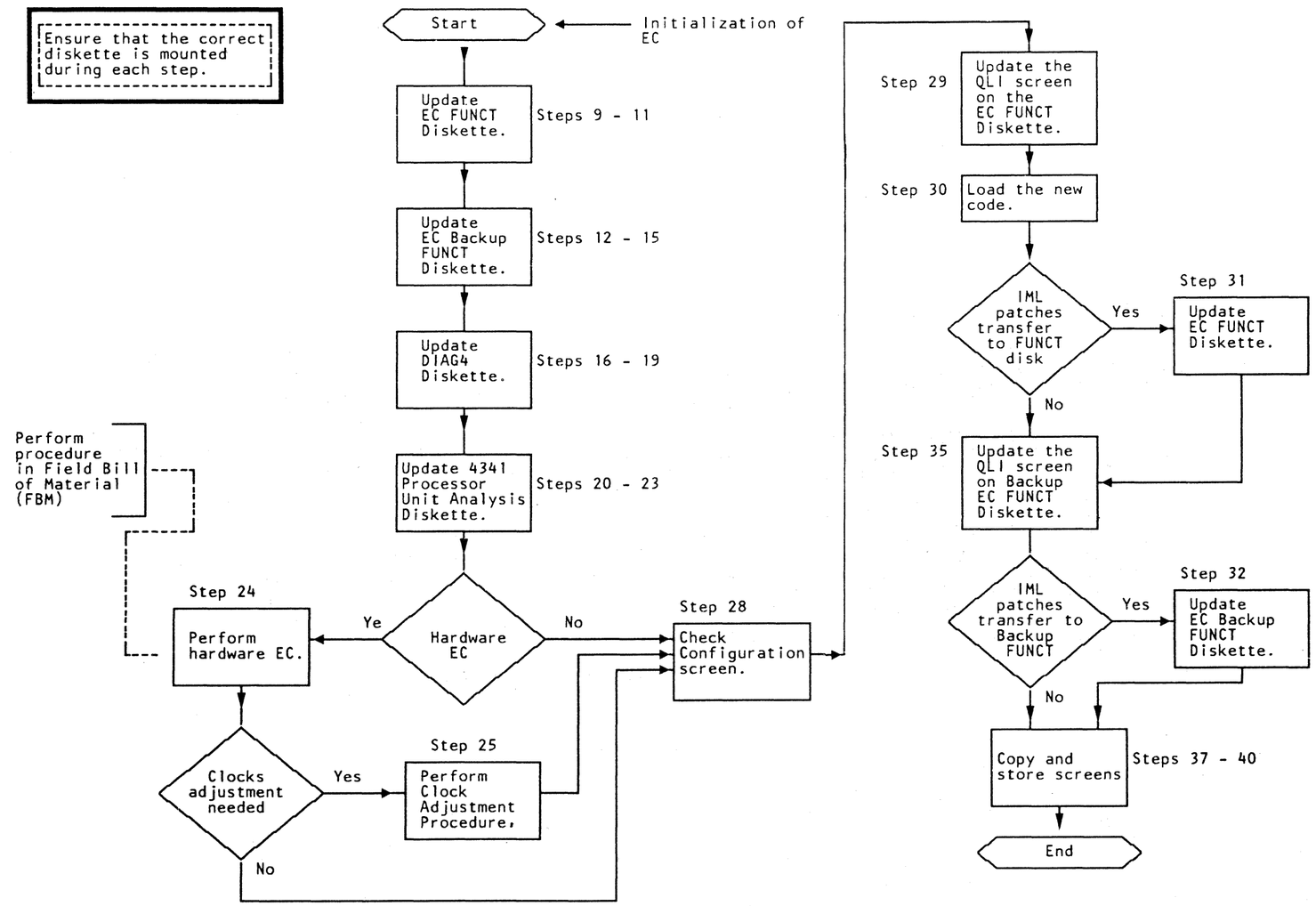
When performing this procedure, note the following:

- The first FUNCT diskette mounted for EC update is referred to as the EC FUNCT diskette.
- The other FUNCT diskette for EC update is referred to as the *backup* EC FUNCT diskette.

Ensure that you can distinguish between the two EC FUNCT diskettes without marking on them. Be sure that the correct diskette is mounted during each step.

Before starting the procedure, review "Diskette EC Update Flowchart."

DISKETTE EC UPDATE FLOWCHART



Model Groups 1 and 2

EC 379814 02Oct82 EC 379837 28Jun82	PN 5666337 1 of 3	14 075

1. Open front and side covers of frame 01.
2. Open gate 01A.

CAUTION
Observe label on gate 01A before closing it.

3. Mount the diskette the customer is using in the diskette drive.
   - In this procedure, the diskette mounted during this step is referred to as the **FROM** disk or the **ORIGINAL** disk.
4. Put **CE MODE** switch to **NORMAL** position.
5. Press **Power On/IML** key.

   Note: *If the processor does not IML when the* **Power On/IML** *key is pressed, key in* **QLM**.
6. Put **CE MODE** switch to **ON**.
   - The General Selection screen is displayed.
7. Display the Program Load screen by keying in *QL* and pressing **ENTER**; then:
   - Record all mode and assist status.
8. Display the Module Transfer Screen.
   - Key in *QFM*, press **ENTER**, and then note the following:
     - *X*: Selects a modules for transfer.
     - __ (underscore): Selects the modules *not* for transfer.

******Update EC FUNCT Diskette******

9. Select *all* modules for transfer:
   - All module are automatically selected for transfer.
   - An __ (underscore) next to a module stops it from being transferred.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the diskette already mounted.*
c. *The* **TO** *disk is the EC FUNCT diskette.*

10. Transfer the selected modules from the **FROM** disk to storage:
    - Key *STARTL* next to *SELECTION: M*, and then press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER**.
      - Transfers modules from the **FROM** disk.
11. Transfer the modules to the EC FUNCT diskette:
    - Swap the **FROM** disk with the EC FUNCT diskette (**TO** disk) and press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.

******Update Backup EC FUNCT Diskette******

12. Mount the FUNCT diskette used in step 3 (**ORIGINAL** disk), and press **ENTER**.
    - Resets for other module transfers.
13. Select *all* modules for transfer:
    - All modules are automatically selected for transfer.
    - An __ (underscore) next to a module stops it from being transferred.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the diskette already mounted.*
c. *The* **TO** *disk is the backup EC FUNCT diskette.*

14. Transfer the selected modules from the **FROM** disk to storage:
    - Key *STARTL* next to *SELECTION: M*, and then press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER**.
      - Transfers modules from the **FROM** disk.
15. Transfer the modules to the backup EC FUNCT diskette:
    - Swap the **FROM** disk with the backup EC FUNCT diskette (**TO** disk) and press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.

******Update DIAG4 Diskette******

16. Mount the FUNCT diskette used in step 3 (**ORIGINAL** disk) and press **ENTER**.
    - Resets for other module transfers.
17. Select only modules *(8001-8004)* and *(0001-20A0)* for transfer:
    - All modules are automatically selected for transfer.
    - Enter an __ (underscore) next to the modules you do *not* want to transfer.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the diskette already mounted.*
c. *The* **TO** *disk is the DIAG4 diskette.*

18. Transfer the modules selected in step 17 to storage:
    - Key *STARTL* next to *SELECTION: M* and press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER**.
      - Transfers modules from the **FROM** disk.
19. Transfer the selected modules to the DIAG4 diskette:
    - Swap the mounted diskette (**FROM** disk) with the DIAG4 diskette (**TO** disk), and press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.

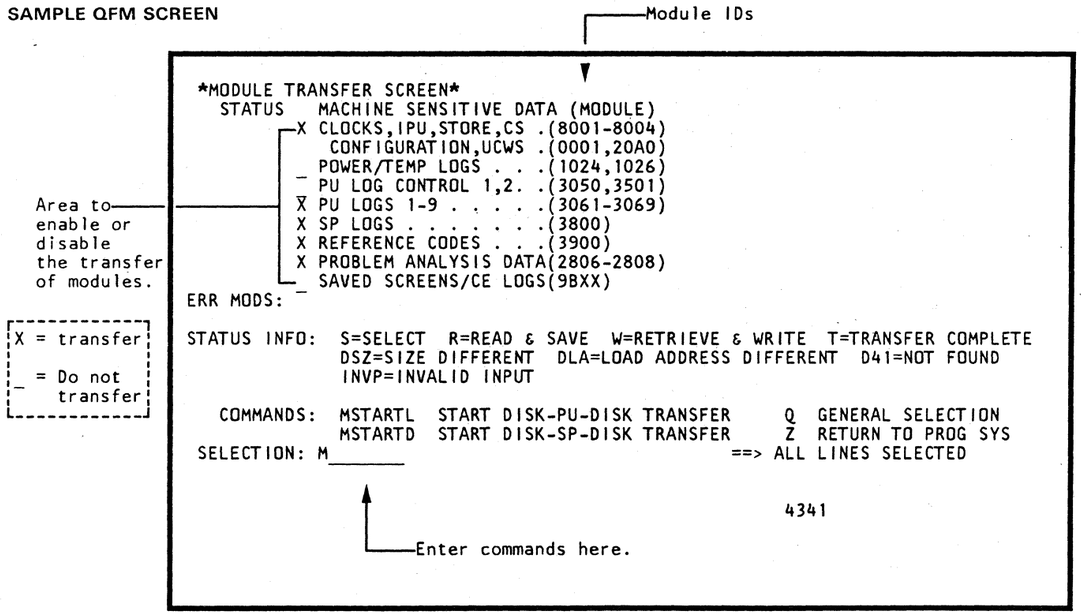
Note: *If the processor does not have a 4341 Processor Unit Analysis Diskette, continue with step 24.*

******Update 4341 Processor Unit Analysis Diskette******

20. Mount the FUNCT diskette used in step 3 (**ORIGINAL** disk), and press **ENTER**.
    - Resets for other module transfers.
21. Select only modules *(8001-8004)* and *(0001-20A0)* for transfer:
    - All modules are automatically selected for transfer.
    - Enter an __ (underscore) next to the modules you do *not* want to transfer.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the diskette already mounted.*
c. *The* **TO** *disk is the 4341 Processor Unit Analysis diskette.*

SAMPLE QFM SCREEN



Note: *This is a typical example of a QFM screen. For the QFM screen that reflects the microcode EC level of the machine, see "Console Functions."*

22. Transfer the modules selected in step 21 to storage:
    - Key *STARTL* next to *SELECTION: M* and press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER**.
      - Transfers modules from the **FROM** disk.
23. Transfer the selected modules to the 4341 Processor Unit Analysis diskette:
    - Swap the mounted diskette (**FROM** disk) with the 4341 Processor Unit Analysis diskette (**TO** disk), and press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.

******Remaining Procedure Continues******

24. If you have a hardware EC, perform it at this time, and then continue with this procedure. For hardware EC, see field bill of material (FBM). If you do *not* have a hardware EC, continue with step 26.
25. If you need to do clock adjustments, perform "Clock Adjustment Procedure." For clock adjustment requirement, see field bill of material. If you do *not* need to adjust the clocks, continue with next step.
26. Mount the EC FUNCT diskette.
27. Put **CE MODE** switch to **ON**.
    - Display the General Selection screen.
28. Display the System Configuration screen by keying in *QFS* and pressing **ENTER**.
    - Verify that **ALL** fields on the System Configuration screen are correct.
    - Make any corrections or updates.
29. Display the Program Load screen by keying in *QL* and pressing **ENTER**; then:
    a. Display the *MODE-ASSIST SELECTION* screen by keying in */* and pressing **ENTER**.
    b. Update this screen with the status recorded in step 7.
    c. Key in *QLM* and press **ENTER** to record the updates on the diskette.
30. Reset the 4341 Processor to load the new code:
    a. Press the **Power Off** key.
    b. Put **CE MODE** switch to **NORMAL**.
    c. Press the **Power On/IML** key.

    Note: *If IML is not active on Program Load screen, enter* **QLM**.
31. If you have any IML patches to transfer to the EC FUNCT diskette:

    Note: *If you do not have IML patches to transfer, continue with the next step.*

    a. Obtain the record that contains the names of the IML patches.
       - This record is kept by the CE who normally services the machine.
    b. Press **MODE/SEL** key.
       - Displays General Selection screen.
    c. Key in QBK*patchname* and press **ENTER**.
       - *Patchname* is one of the IML patchnames contained on the record mentioned in step *a*.
    d. Follow the screen messages:
       - The **FROM** disk is the diskette used in step *3*.
       - The **TO** disk is the EC FUNCT diskette.
    e. Repeat steps *c* through *d* for any additional IML patches you need to copy to the EC FUNCT diskette.
32. If any IML patches need to be activated during the IML process:

    Note: *If no IML patches need to be activated, continue with next step.*

    a. Key in *QBM* and press **ENTER.**
    b. Enter the first IML patchname of a processor IML set in the coreload field.
33. Mount the backup EC FUNCT diskette.
34. Press **MODE SEL**.
    - Displays the General Selection screen.
35. Display the Program Load screen by keying in *QL* and pressing **ENTER**; then:
    a. Display the *MODE-ASSIST SELECTION* screen by keying in */* and pressing **ENTER**.
    b. Update this screen with the status recorded in step 7.
    c. Key in *QLM* and press **ENTER** to record the updates on the diskette.
36. If you have any IML patches to transfer to the backup EC FUNCT diskette:

    Note: *This step should be performed if step 31 is performed. If you do not have any IML patch transfers, continue with next step.*

    a. Obtain the record that contains the names of the IML patches.
       - This record is kept by the CE who normally services the machine.
    b. Press **MODE/SEL** key.
       - Displays General Selection screen.
    c. Key in QBK*patchname* and press **ENTER**.
       - *Patchname* is one of the IML patchnames contained on the record mentioned in step *a*.
    d. Follow the screen messages:
       - The **FROM** disk is the diskette used in step *3*.
       - The **TO** disk is the backup EC FUNCT diskette.
    e. Repeat steps *c* through *d* for any additional IML patches you need to copy to the backup EC FUNCT diskette, and then continue.

    Note: *If no IML patches need to be activated, continue with next step.*

    f. Key in *QBM* and press **ENTER.**
    g. Enter the first IML patchname of a processor IML set in the coreload field.

Note: *The following screen copies should replace the screen copies in front of* **Volume 30**. *For details of the copy options, see "Screen Copy Options" in this service aid section, page 14 625.*

37. Display and copy the System Configuration screen:
    - Key in *QFS*, press **ENTER**, and then copy the screen.
38. Display and copy the Program Load screen:
    - Key in *QL*, press **ENTER**, and then copy the screen.
39. Display and copy the UCW Directories Display screen:
    - Key in *QDUC*, press *ENTER*, and then copy the screen.
40. Display and copy the Clock Ring screen:
    - Key in *QCM* and press **ENTER**.
    - Key in *QVW2B* and press **ENTER**.
    - Key in *QVY22*, press **ENTER**, and then copy the screen.
41. This procedure is now complete.

DISKETTE RECOVERY PROCEDURE

The purpose of this procedure is:

- To update a new DIAG4 diskette (if the one at the customer account is damaged).
- To update a 4341 Processor Unit Analysis Diskette (if the one at the customer account is damaged).
- To update the backup FUNCT diskette with any retrievable error logs (if the main FUNCT diskette was damaged).

If the FUNCT diskette is damaged:

- Use this procedure to update the backup FUNCT diskette.
- Order a new FUNCT diskette to ensure that two working FUNCT diskettes are at the computer installation.

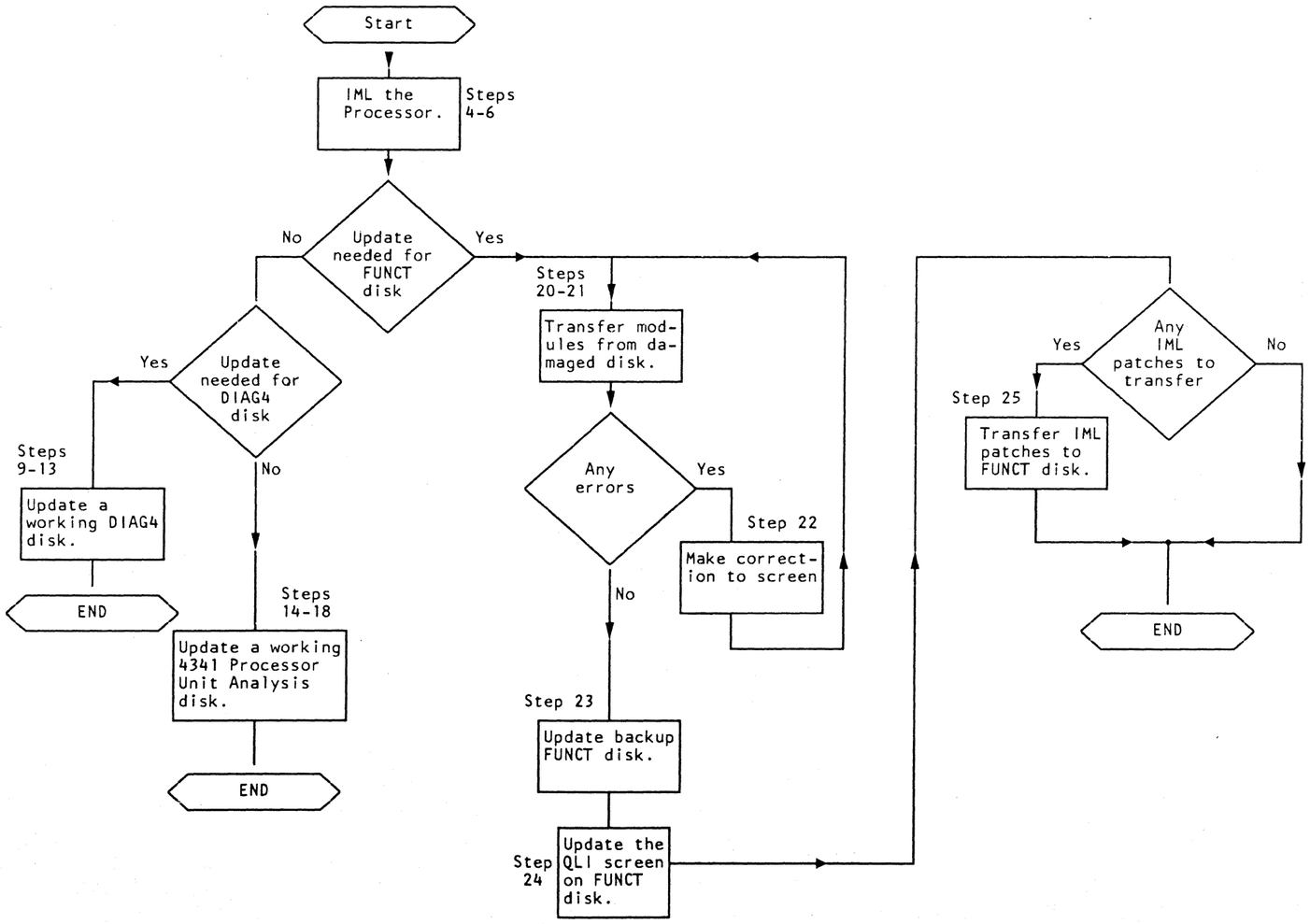
When you receive the new FUNCT diskette, update it by performing steps 1 through 11 of the "Diskette EC Update Procedure," page 14 075.

Note: *When you update the new FUNCT diskette, use the diskette updated in this procedure as the* **FROM** *disk.*

Ensure that the correct diskette is mounted during each step of this procedure.

Before starting the procedure, review "Diskette Recovery Flowchart."

DISKETTE RECOVERY FLOWCHART



1. Power off.
2. Open front and side covers of frame 01.
3. Open gate 01A.

Caution:
Observe label on gate 01A before closing it.

4. Mount the FUNCT diskette.

   Note: *If the FUNCT diskette used by the customer is damaged, mount the backup FUNCT diskette.*

5. Position **CE MODE** switch to **NORMAL**.
6. Press Power **On/IML** key.

   Note: *If the processor did not IML when the power was activated, enter* **QLM**.

7. Put **CE MODE** switch to **ON**.
   - The General Selection screen is displayed.
8. Perform the following for the specified diskette:
   - For DIAG4, perform steps 9-13.
   - For 4341 Processor Unit Analysis Diskette, perform steps 14-18.
   - For the backup FUNCT diskette, perform steps 19-26.

****Update DIAG4 Diskette****

9. Display the Module Transfer screen:
   - Key in *QFM* and press **ENTER**.
   - *X*: Selects a modules for transfer.
   - __ (underscore): Selects the modules *not* for transfer.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the diskette already mounted.*
c. *The* **TO** *disk is the new DIAG4 diskette.*

10. Select only modules *(8001-8004)* and *(0001-20A0)* for transfer:
    - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
      - Ensure that an __ (underscore) is next to the modules you do *not* want to transfer.
    - For machines at microcode EC levels 154321 or 866867 or 856091 or higher:
      - All modules are automatically selected for transfer.
      - Enter an __ (underscore) next to the modules you do *not* want to transfer.

11. Transfer the modules selected in step 10 to storage:
    - Key *STARTL* next to *SELECTION: M* and press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER** again.
      - Transfers modules from the **FROM** disk.
12. Transfer the selected modules to the DIAG4 diskette:
    - Swap the **FROM** disk with the **TO** disk; then press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.
      - Mount the **ORIGINAL** disk.
13. DIAG4 diskette update is complete.
    - Return the processor to the customer.

Note: *If the processor does not have a 4341 Processor Unit Analysis Diskette, continue with step 19.*

****Update 4341 Processor Unit Analysis Diskette****

14. Display the Module Transfer screen:
    - Key in *QFM* and press **ENTER**.
    - *X*: Selects a modules for transfer.
    - __ (underscore): Selects the modules *not* for transfer.

Notes:

a. *Observe all screen messages.*

b. *The* **FROM** *disk is the diskette already mounted.*

c. *The* **TO** *disk is the new 4341 Processor Unit Analysis diskette.*

15. Select only modules *(8001-8004)* and *(0001-20A0)* for transfer:
    - All modules are automatically selected for transfer.
    - Enter an __ (underscore) next to the modules you do *not* want to transfer.
16. Transfer the modules selected in step 15 to storage:
    - Key *STARTL* next to *SELECTION: M* and press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER**.
      - Transfers modules from the **FROM** disk.
17. Transfer the selected modules to the 4341 Processor Unit Analysis diskette:
    - Swap the **FROM** disk with the **TO** disk; then press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.
18. This diskette update is complete.
    - Return the processor to the customer.

****Update backup FUNCT Diskette****

19. Display the Module Transfer screen:
    - Key in *QFM* and press **ENTER**.
20. Select *all* modules for transfer:
    - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
      - Be sure that an __ (underscore) is next to the modules you do *not* want to transfer.
    - For machines at microcode EC levels 154321 or 866867 or 856091 or higher:
      - All modules are automatically selected for transfer.
      - Enter an __ (underscore) next to the modules you do *not* want to transfer.

Notes:

a. *Observe all screen messages.*

b. *The* **FROM** *disk is the damaged FUNCT disk.*

c. The **TO** disk is the backup FUNCT diskette.

21. Transfer the selected modules from the damaged FUNCT diskette to storage:
    - Key *STARTL* next to *SELECTION: M*, and then press **ENTER**.
      - Processes the *STARTL* command.
      - Displays the message: Mount **FROM** disk.
    - Mount the **FROM** disk, and then press **ENTER** again.
      - Transfers modules from the **FROM** disk.
22. If there are no errors, continue with next step. If there are errors:
    a. List the modules that fail.
    b. Mount the backup FUNCT diskette.
    c. Press **MODE SEL** key.
       - Resets for other module transfer options.
    d. Key in *QFM* and press **ENTER**;
       - Displays the Module Transfer screen.
    e. Replace the *X* with a __ next to each module that fails.
    f. Go back to step 21.

Note: *The* **TO** *disk is the backup FUNCT diskette.*

23. Transfer the selected modules to the backup FUNCT diskette:
    - Swap the **FROM** disk with the **TO** disk, and then press **ENTER**.
      - Final message asks you to put in the **ORIGINAL** disk.
      - The **ORIGINAL** is the backup FUNCT disk that is already mounted.
    - Press **ENTER**.
24. Display the Program Load screen by keying in *QL* and pressing **ENTER**; then:
    a. Display the *MODE-ASSIST SELECTION* screen by keying in *I* and pressing **ENTER**.
    b. Obtain input from the customer and/or *Volume 30* on how the mode and assist were assigned.
    c. Update the screen based this input.
    d. Key in *QLM* and press **ENTER** to record the updates on the diskette.

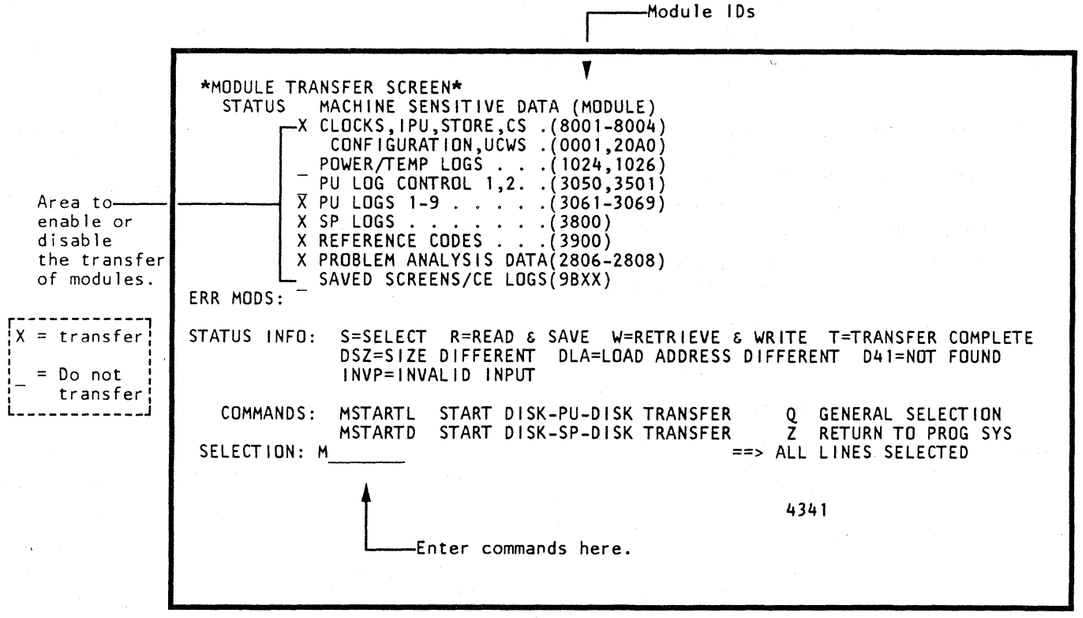
Note *If you do not have IML patches to transfer, the procedure is complete.*

25. If you have any IML patches to transfer from the damaged FUNCT diskette to the backup FUNCT diskette:
    a. Obtain the record that contains the names of the IML patches.
       - This record is kept by the CE who normally services the machine.
    b. Press **MODE/SEL** key.
       - Displays General Selection screen.
    c. Key in QBK*patchname* and press **ENTER**.
       - *Patchname* is one of the IML patchnames contains on the record mentioned in step a.
    d. Follow the screen messages:
       - The **FROM** disk is the damaged FUNCT disk.
       - The **TO** disk is the backup FUNCT diskette.
    e. Repeat steps *c* through *d* for any additional IML patches you need to copy to the backup FUNCT diskette.

Note: *If no IML patches need to be activated, this procedure is complete. Return the processor to the customer.*

26. If any IML patches need to be activated during the IML process:
    a. Perform one of the following:
       - For machines at microcode EC levels of 154322 or 856092 or 866867 or lower:
         - Key in *QBP* and press **ENTER**.
       - For machines at microcode EC levels of 154323 or 856093 or 866868 or higher:
         - Key in *QBM* and press **ENTER**.
    b. Enter the first IML patchname of a processor IML set in the coreload field.

SAMPLE QFM SCREEN



Note: *This is a typical example of a QFM screen. For the QFM screen that reflects the microcode EC level of the machine, see "Console Functions."*

DISKETTE DATA RECOVER PROCEDURE (For Two Damaged FUNCT Diskettes)

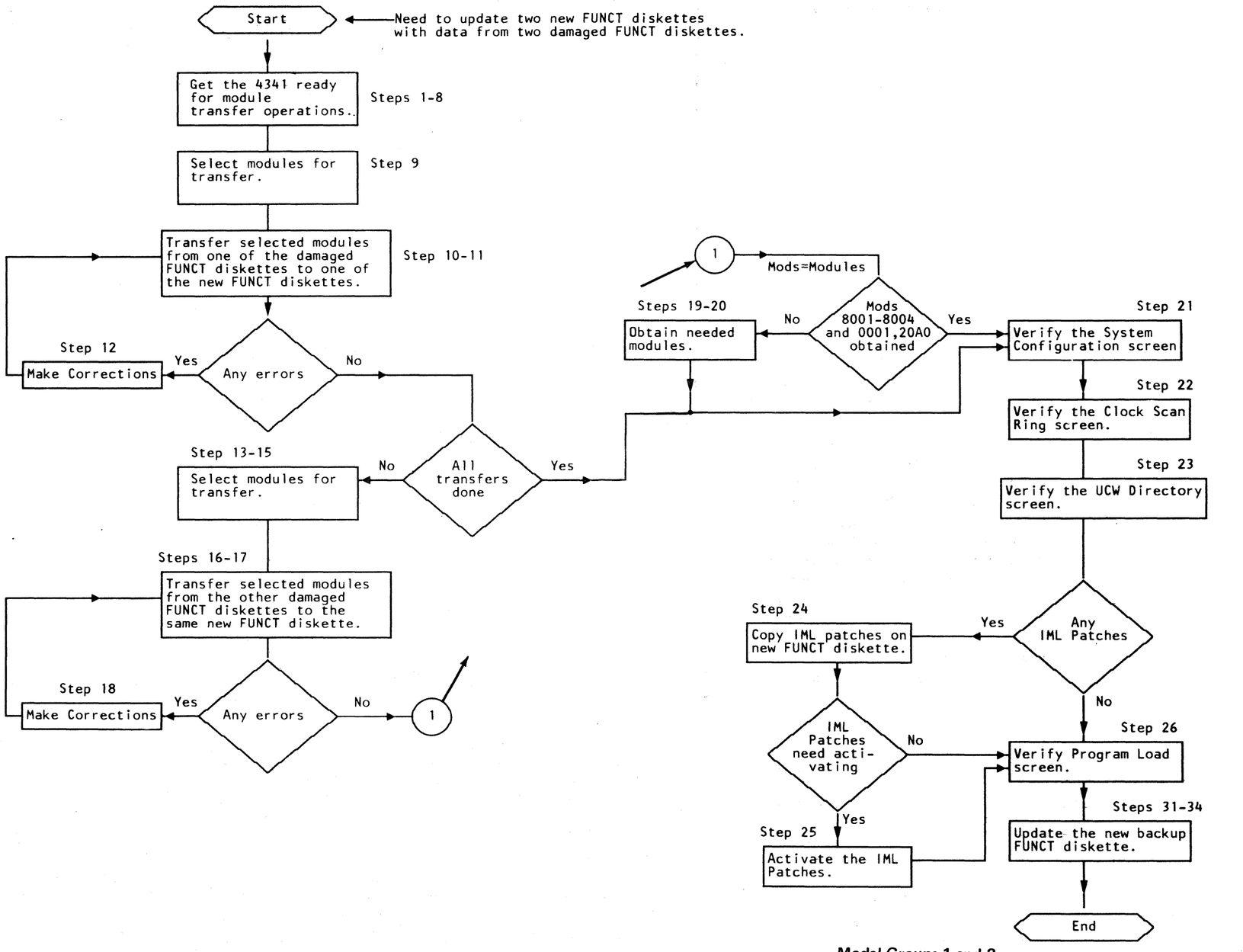
The purpose of this procedure is:

- To update two newly ordered FUNCT diskettes with clock, configuration, and UCW data.
- To recover as much data (logs) as possible from the two FUNCT diskettes that were damaged.

Ensure that the correct diskette is mounted during each step.

Review the "Diskette Data Recovery Flowchart" before starting this procedure that starts on the following page.

DISKETTE DATA RECOVERY FLOWCHART



Model Groups 1 and 2

EC 379798 06Jun80 EC 379817 06Mar81	PN 5666339 1 of 3	14 081

1. Power off.
2. Open front and side covers of frame 01.
3. Open gate 01A.

CAUTION
Observe label on gate 01A before closing it.

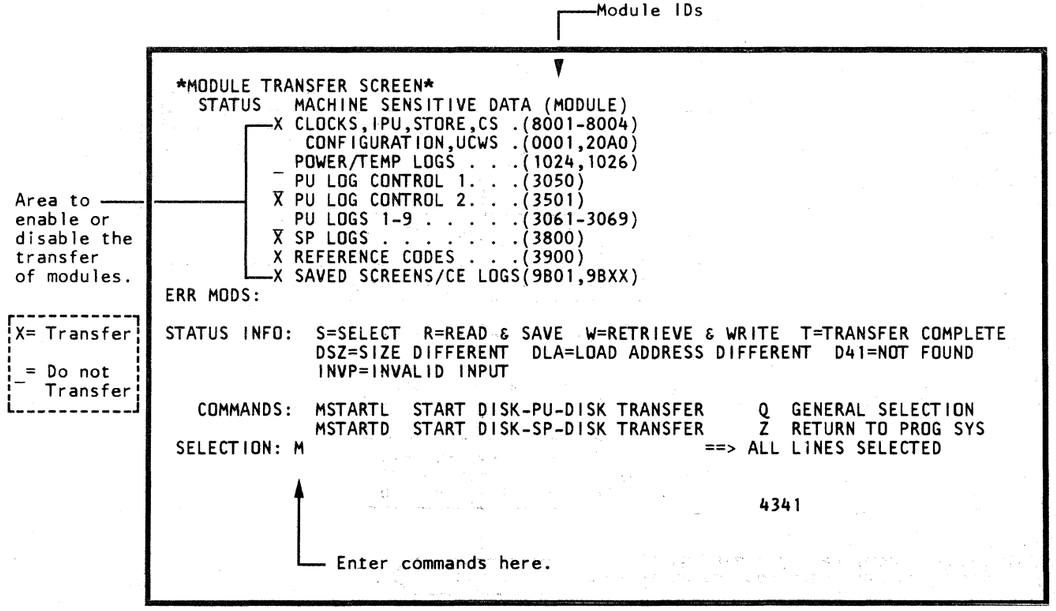
4. Mount one of the new FUNCT diskettes.
   - The diskette mounted during this step is referred to as the **TO** disk or the **ORIGINAL** disk until directed differently.

   Note: *You will be directed when to use the other FUNCT diskette (referred to as the new backup FUNCT diskette).*
5. Put **CE MODE** switch to **ON** position.
6. Press **Power on/IML** key.
7. Press **MODE SEL** key:
   - Displays the General Selection screen.
8. Display the Module Transfer screen:
   - Key in *QFM* and press **ENTER**.
     - *X*: Selects a modules for transfer.
     - __ (underscore): Selects the modules *not* for transfer.
9. Select *all* modules for transfer:
   - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
     - Ensure that an __ (underscore) is next to the modules you do *not* want to transfer.
   - For machines at microcode EC levels of 154321 or 866867 or 856092 or higher:
     - All modules are automatically selected for transfer.
     - Enter an __ (underscore) next to the modules you do *not* want to transfer.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is one of the damaged FUNCT diskettes.*
c. *The* **TO** *disk is the new FUNCT diskette used in step 4.*
d. *Do not use the second damaged FUNCT diskette until directed.*

10. Transfer the selected modules from one of the damaged FUNCT diskettes to a buffer:
    - Key *STARTD* next to *SELECTION: M*, and then press **ENTER**.
      - Processes the *STARTD* command.
      - Displays the message: Mount **FROM** disk.
    - Mount one of the damaged FUNCT diskettes, and then press **ENTER** again.
      - Transfers modules from the **FROM** disk.
11. Transfer the selected modules to the **TO** diskette:
    - Swap between the **FROM** disk and the **TO** disk as directed by the screen messages.
      - Final message asks you to put in the **ORIGINAL** disk.
12. If there are no errors, continue with the next step; if there are errors:
    a. List the modules that caused an error.
    b. List the modules that were successfully transferred.
    c. Mount the new FUNCT diskette (**TO** disk).
    d. Press **MODE SEL**.
    e. Key in *QFM* and press **ENTER**.
       - Displays the Module Transfer screen.
    f. Put a __ at:
       - Modules that fail.
       - Modules already transferred.
    g. Go back to step 10.

SAMPLE QFM SCREEN



This is a typical example of a QFM screen. For the QFM screen that reflects the microcode EC level of a specific machine, see "Console Functions."

13. List the modules you could not obtain from the first damaged FUNCT diskette. If you have recieved all necessary modules, go to step 21 and continue.
14. Mount same diskette used in step 4 (**ORIGINAL** disk), and press **ENTER**.
    - Resets the transfer function for another transfer setup.
15. Select the modules from your list for transfer:
    - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
      - Ensure that an __ (underscore) is next to the modules you do *not* want to transfer.
    - For machines at microcode EC levels of 154321 or 866867 or 856092 or higher:
      - All modules are automatically selected for transfer.
      - Enter an __ (underscore) next to the modules you do *not* want to transfer.
16. Transfer the selected modules from the second damaged FUNCT diskettes:
    - Mount the second damaged FUNCT diskettes.
    - Key *STARTD* next to *SELECTION: M*, and then press **ENTER**.
    - Press **ENTER** again.

Notes:
a. *Observe all screen messages.*
b. *The* **FROM** *disk is the damaged diskette already mounted.*
c. *The* **TO** *disk is the same FUNCT diskette used in step 4.*

17. Transfer the selected modules to the **TO** disk:
    - Swap the mounted diskette (**FROM** disk) with the first new FUNCT diskette (**TO** disk) and press **ENTER.**
    - Swap between the **FROM** disk and the **TO** disk as directed by the screen messages.
      - Final message asks you to put in the **ORIGINAL** disk.
18. If there are no errors, continue with the next step; if there are errors:
    a. List the modules that caused an error.
    b. List the modules that were successfully transferred.
    c. Mount the new FUNCT diskette (**TO** disk).
    d. Press **MODE SEL**.
    e. Key in *QFM* and press **ENTER.**
    f. Put a __ at:
       - Modules that fail.
       - Modules already transferred.
    g. Go back to step 16.
19. Mount the same FUNCT disk used in step 4 (**ORIGINAL** disk) and press **ENTER**.

20. If you obtained modules *(8001-8004)* and *(0001,20A0)*, continue with next step. If you were not able to obtain modules *(8001-8004)* and *(0001,20A0)*:
    a. Select only modules *(8001-8004)* and *(0001-20A0)* for transfer:
        - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
            - Ensure that an __ (underscore) is next to the modules you do *not* want to transfer.
        - For machines at microcode EC levels of 154321 or 866867 or 856092, or higher:
            - All modules are automatically selected for transfer.
            - Enter an __ (underscore) next to the modules you do *not* want to transfer.

        Notes:
        - *Observe all screen messages.*
        - *The* **FROM** *disk is the DIAG4 diskette.*
        - *The* **TO** *disk is the FUNCT diskette used in step 4.*

    b. Transfer the selected modules:
        - Key *STARTD* next to *SELECTION: M* and press **ENTER**.
            - Processes the *STARTD* command.
            - Displays the message: Mount **FROM** disk.
        - Mount the DIAG4 diskette.
        - Press **ENTER** again.
            - Transfers modules from the **FROM** disk.
    c. Transfer the selected modules to the new FUNCT diskette:
        - Swap the **FROM** disk with the **TO** disk; then press **ENTER**.
        - Swap between the **FROM** disk and the **TO** disk as directed by the screen messages.
            - Final message asks you to put in the **ORIGINAL** disk.

21. Display and verify the System Configuration screen:
    a. Press **MODE SEL**.
        - Displays the General Selection screen.
    b. Key in *QFS* to display the System Configuration screen.
    c. Compare the screen with its hard copy in *Volume 30*.
        - Make any necessary updates.

22. Display and verify the clock scan rings:
    a. Key in *QMW* and press **ENTER**.
        - Displays the *Partial Power Up/Down screen.*
    b. Enter *00* in each of the two input areas, and then press **Enter**.
        - Powers up the processor.
    c. Press **MODE SEL** key.
        - Displays General Selection screen.
    d. Key in *QCM* and press **ENTER**.
    e. Key in *QVW2B* and press **ENTER**.
    f. Key in *Y22* and press **ENTER**.
    g. Compare the clock scan ring screen with the hard copy in *Volume 30*.
        - Make any necessary updates.

23. Display and verify the UCW Directory screen:
    a. Key in *QDUC* and press **ENTER**.
    b. Compare the screen with the hard copy in *Volume 30*.
        - Make any necessary updates.

24. If you have any IML patches to transfer from the damaged FUNCT diskette to the updated FUNCT diskette:

Note *If you do not have IML patches to transfer, continue with step 26.*

    a. Obtain the record that contains the names of the IML patches;
        - This record is kept by the CE who usually services the machine.
    b. Press **MODE/SEL** key;
        - Displays General Selection screen.
    c. Key in QBK*patchname* and press **ENTER**.
        - *Patchname* is one of the IML patchnames contain on the record mentioned in step *a*.
    d. Follow the screen messages:
        - The **FROM** disk is the damaged FUNCT disk.
        - The **TO** disk is the updated FUNCT diskette.
    e. Repeat steps *c* through *d* for any additional IML patches you need to copy to the updated FUNCT diskette.

25. If any IML patches need to be activated during the IML process:

Note: *If no IML patches need to be activated, continue with next step.*

    a. Perform one of the following:
        - For machines at microcode EC levels of 154322 or 856092 or 866867 or lower:
            - Key in *QBP* and press **ENTER**.
        - For machines at microcode EC levels of 154323 or 856093 or 866868 or higher:
            - Key in *QBM* and press **ENTER**.
    b. Enter the first IML patchname of a processor IML set in the coreload field.

26. Display and verify the Program Load screen:
    a. Key in *QL* and press **ENTER**.
    b. Compare *all* screen fields with the hard copy in *Volume 30*.
        - Make any necessary updates.

27. Power off.

28. Put **CE MODE** switch to **NORMAL**.

29. Press **Power On/IML**.

Note: *If IML is not active on Program Load screen, enter* **QLM**.

30. Put **CE MODE** switch to **ON**.

31. Display the Module Transfer screen:
    - Key in *QFM* and press **ENTER**.

32. Select *all* modules for transfer:
    - To select modules for machines at microcode EC 154320 or lower, replace the __ with an *X*.
        - Ensure that an __ (underscore) is next to the modules you do *not* want to transfer.
    - For machines at microcode EC levels of 154321 or 866867 or 856092 or higher:
        - All modules are automatically selected for transfer.
        - Enter an __ (underscore) next to the modules you do *not* want to transfer.

33. Transfer the selected modules from the updated FUNCT diskette:
    - Key *STARTL* next to *SELECTION: M*, and then press **ENTER**.
    - Press **ENTER** again.

    Notes:
    - *Observe all screen messages.*
    - *The* **FROM** *disk is the updated FUNCT diskette.*
    - *The* **TO** *disk is the new backup FUNCT diskette.*

34. Transfer the modules to the new backup FUNCT diskette:
    - Swap the mounted diskette (**FROM** disk), with the new backup FUNCT diskette (**TO** disk).
    - Press **ENTER**.
    - Final message asks you to put in the **ORIGINAL** disk.
    - Mount the diskette used in step 4.

This procedure in now complete.

EREP (Failing Storage Address)

The EREP print-out for the 4300 Processors is not for maintence purposes. The data can be used to analyze operating conditions of the machine.

The data on the EREP print-out has the same interpretation as past machines; except for the *Failing Storage Address* area. Depending on the mode of operation, the address can be real or virual (in relation to a physical location on the machine). To verify the real storage address:

- Display the **QECD** screen.
  (See *PU Directory Display* in volumn 18.)
- Compare.....
  TIME - xx xx xx
  as shown on the EREP print-out with.....
  TODC EQUIVALENT
  xx/xxx xx:xx:xx
  on the **QECD** screen.
- The real address is under the heading.....
  STORAGE ERROR

Note: *Any record past the ninth can not be related to the current QECD screen.*

01A GATE-CARD LAYOUT

Board A1

Channel Hardware, Instruction Processor

Interface Controller Section
Location: B2

Channel Data Buffer Section
Locations: C2, D2, and E2

Channel Control Section
Location: C2

Shift Circuits
Locations: D2, E2, L2, and M2

ALU/Local Storage/Data Flow Registers
Locations: R2, S2, T2, and U2

External Registers
Locations: F2, P2, and Q2
Note: *External Registers are also located in other cards.*

Clocks
Locations: G2, H2, and K2

Storage Addressing and Update Registers
Location: N2

Board B1

Instruction Processor, Main Storage and Controls

Control Storage
Locations: B2 through F2

Array Control
Locations: G2, J2, and K2

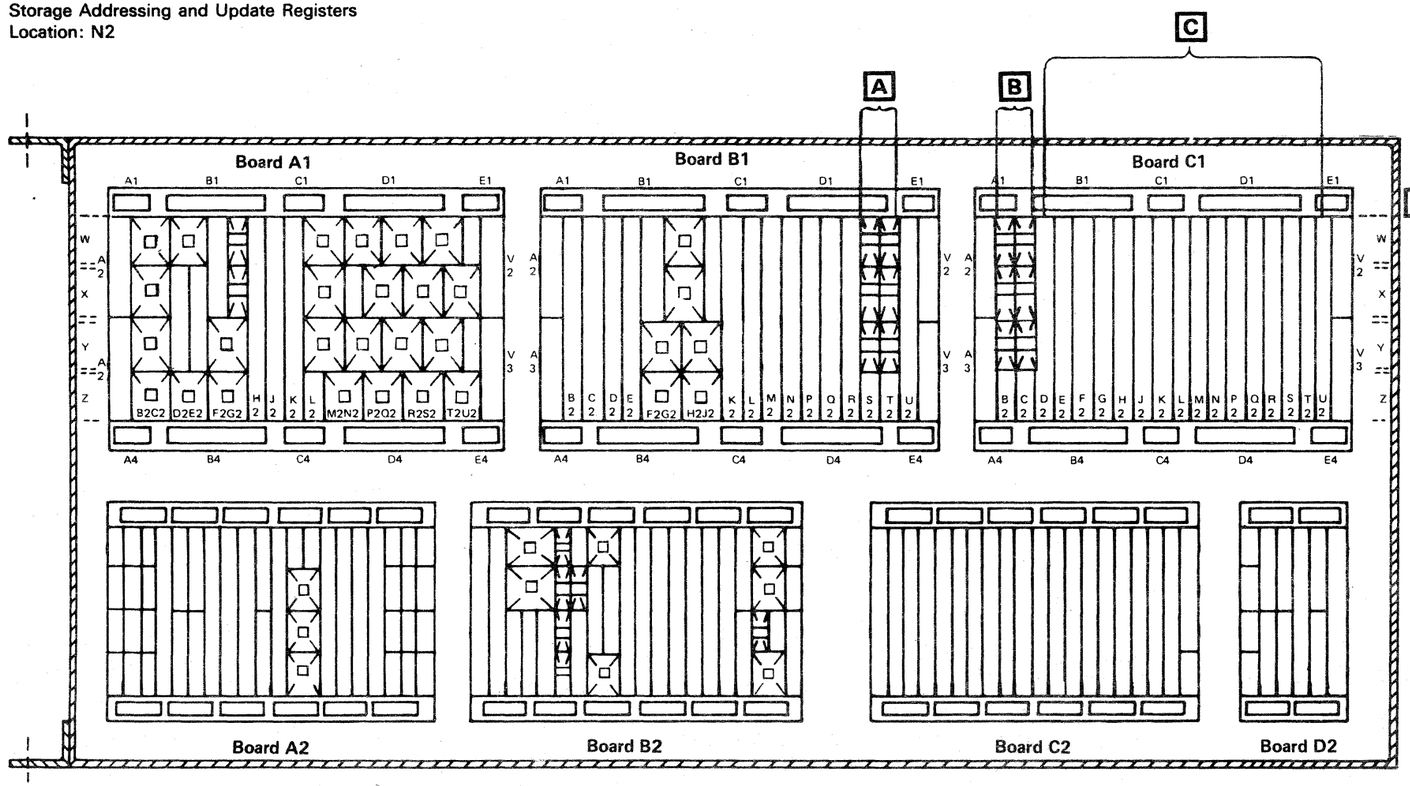
High-Speed Buffer Section
Locations: M2 though Q2

Main Storage hardware
Locations: S2 and T2

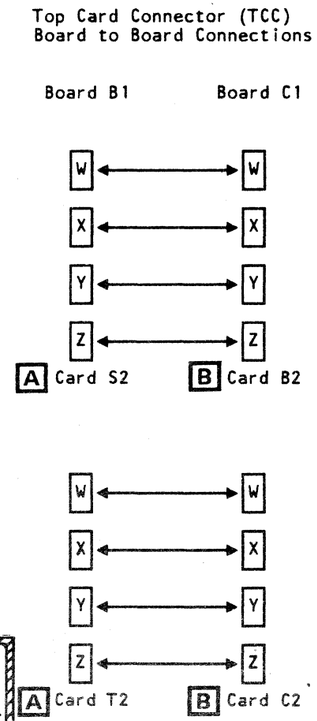
Storage Addresses and Controls Section
Location: H2, J2, K2, G2, and U2

Board C1

Main Storage (BSM)
Locations: B2 through U2



Top Card Connector (TCC)
Board to Board Connections

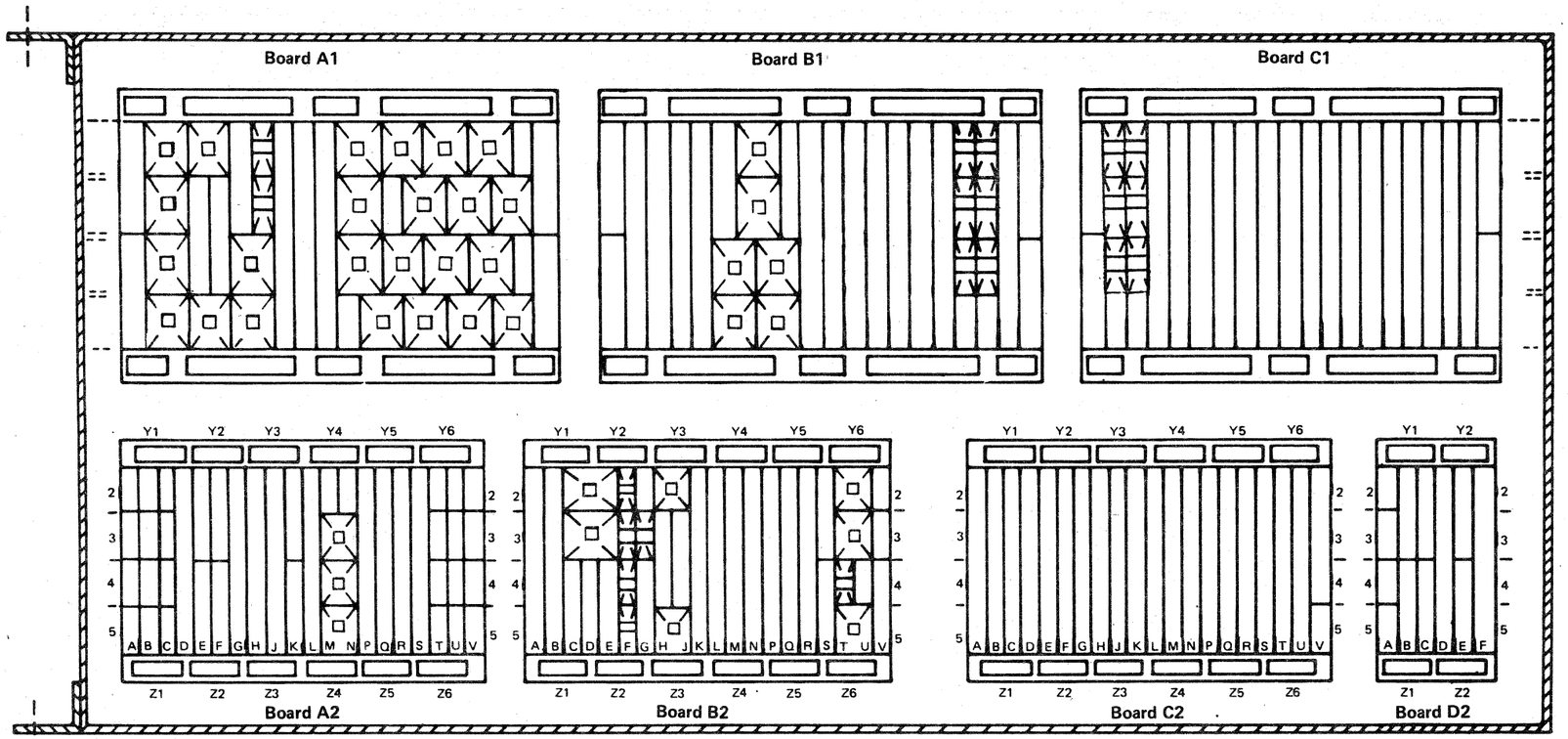


C STORAGE ARRAY CARDS LOCATION CHART

Note: *Cards located in positions B2 through U2 are affected by the storage size and the power group code of the machine. See System Configuration screen (QFS) for the storage size and power group code that applies to the machine; then use this chart for specific card locations.*

Power Group Code	Storage Size	Card Locations
21	2 M	01AC1G2, L2, Q2, and U2.
21	4 M	01AC1F2, G2, K2, L2, P2, Q2, T2, and U2.
21	8 M	01AC1D2 through U2.
22	2 M	01AC1G2, L2, Q2, and U2.
22	4 M	01AC1F2, G2, K2, L2 P2, Q2, T2, and U2.
22	8 M	01AC1D2 through U2.
23	4 M	01AC1G2, L2, Q2, and U2.
23	8 M	01AC1F2, G2, K2, L2, P2, Q2, T2, and U2.
23	12 M	01AC1E2, F2, G2, J2, K2, L2, N2, P2, Q2, S2, T2, and U2.
23	16 M	01AC1D2 through U2.
24	4 M	01AC1G2, L2, Q2, and U2.
24	8 M	01AC1F2, G2, K2, L2, P2, Q2, T2, and U2.
24	12 M	01AC1E2, F2, G2, J2, K2, L2, N2, P2, Q2, S2, T2, and U2.
24	16 M	01AC1D2 through U2.

Notes:
1. *For details of boards A2 through D2, see page 14 106f.*
2. *For part numbers of top card connectors, see the decal on the cover of board 01AB1.*



Board A2

Channel Hardware, Maintenance and Support Subsystem

Channel Interface Adapters
Locations: D2, E2, F2, Q2, R2, and S2
Note: *For card-to-channel association, see "Channel Hardware."*

Scan Card
Location: J2

CTCA Card
Location: J4

Note: *This card comes with the optional CTCA Feature. More details are in this service aids section, page 14 317, "OCP to CTCA Interconnections."*

Local Channel Adapter
Locations: M2, N2, and P2

RSF Adapter
Locations: B4, K4, and L2

Board B2

Maintenance and Support Subsystem

Support Bus Adapter
Location: G2

Support Processor Storage
Locations: L2 and M2 (for 32K cards)
or
Location: L2 (for 64K card)

Support Control Logic Adapter
Location: F2

Diskette Drive Adapter
Locations: T2 and U2

Support Processor
Locations: H2, J2, and K2

Power Controller Adapter
Locations: C2, D2, and E2

Device Cluster Adapter
Locations: R2 and S2

Serial Number Card
Location: S4

Board C2

Spare

Board D2

Hardwire Sequence

Hardwire Sequence
Locations: B2, C2, C4, D2, and E2

BOARD SIGNAL LEVELS

Board	Valid Up Level	Valid Down Level	Probe Point	Net Name (see note below)	Figure
01A-A1	+2.4 to +5.5	+0.6 to 0.0	G2B56	ABA02AA14	A
	-1.17 to -0.57	-1.83 to -2.3	C2A16	RAAAAAA66(P)	B
	-0.08 to +0.08	-0.9 to -1.4	M2A52	LAAABCA1(P)	C
	+1.7 to +5.5	+0.7 to 0.0	F2C20	ABA02AC1(0)	D
01A-A2	+2.4 to +5.5	+0.6 to 0.0	D2P11	A1AAAAA80	A
	+3.16 to +5.10	+0.15 to 0.0	D2B02	A1AAAAA30(0)	E
	-0.08 to +0.08	-0.9 to -1.4	D2G02	A1AAAAA40(0)	C
01A-B1	+2.4 to +5.5	+0.6 to 0.0	H2A04	ABC00HA14	A
	-0.08 to +0.08	-0.9 to -1.4	J2D49 U2D03*	XAAACAA00(0) U8AAAAA32*	C
	-1.17 to -0.57	-1.83 to -2.3	J2D51 U2C64*	XAAAAAA00(0) U8AABBA42*	B
01A-B2 01A-D2	+2.5 to +5.5 (Call your support center for exceptions to these levels)	+0.8 to 0.0	L2B13		F
01A-C1 (Mdl Gp 2 only)	-0.08 to +0.08	-0.9 to -1.4	B2A48	ABE00AD12	C
	-1.17 to -0.57	-1.83 to -2.3	B2B27	B9AAAAA06(0)	B

* Model Group 2 only

Note that other probe points and net names besides those given here are available to you.

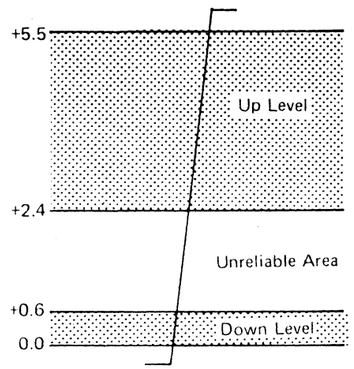


Figure A

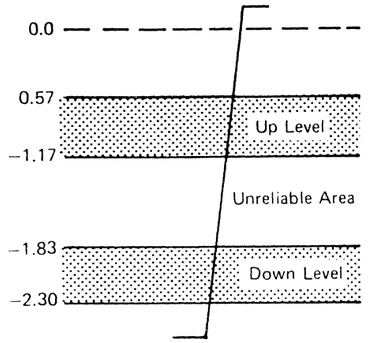


Figure B

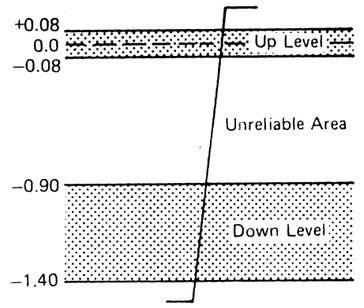


Figure C

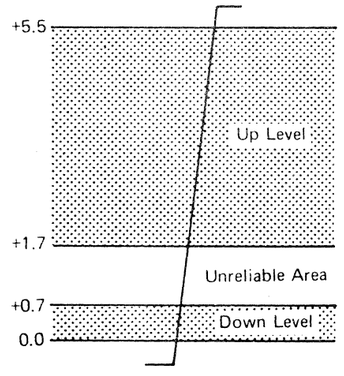


Figure D

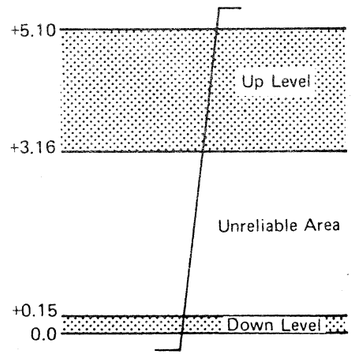


Figure E

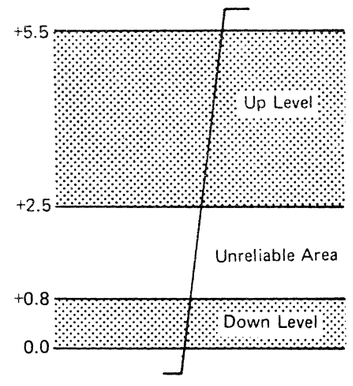
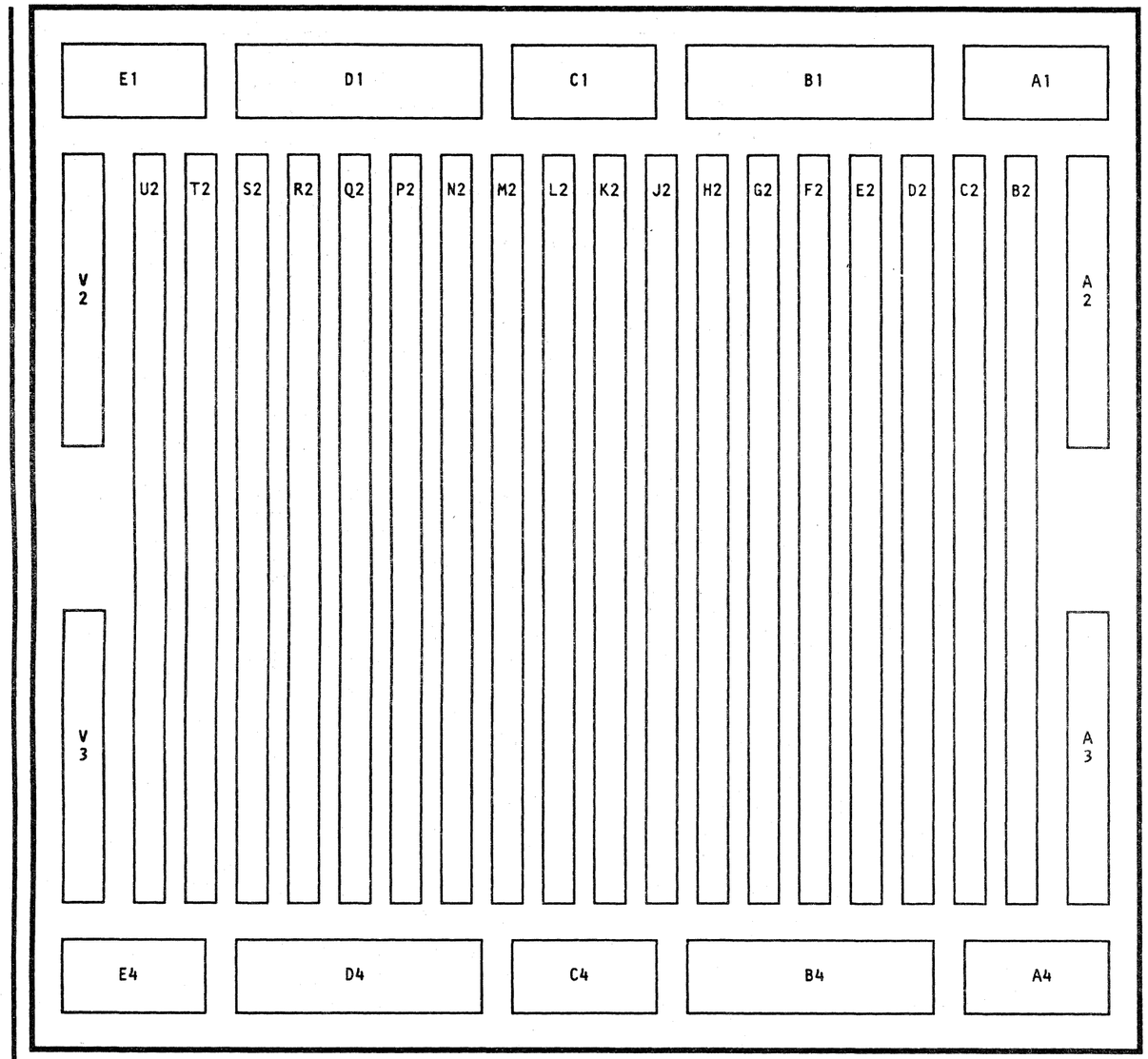


Figure F

o o o

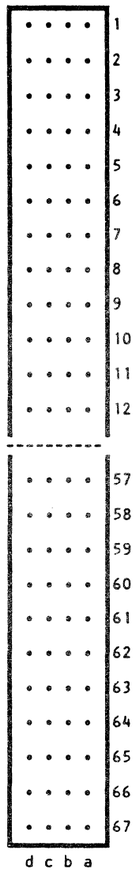
LOGIC BOARD PIN NUMBERING

BOARDS 01AA1, B1, and C1 (IF INSTALLED)

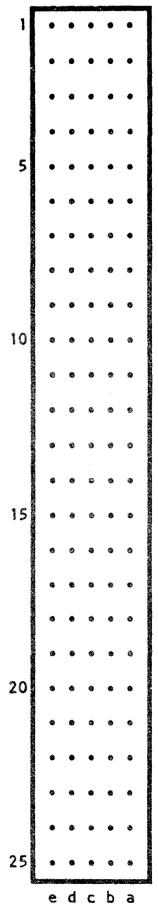


Pin Side

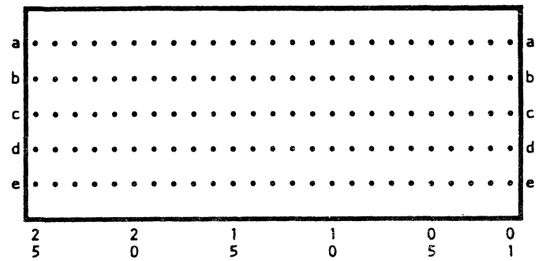
PIN NUMBERS B2 to U2



PIN NUMBERS A2,A3 V2,V3

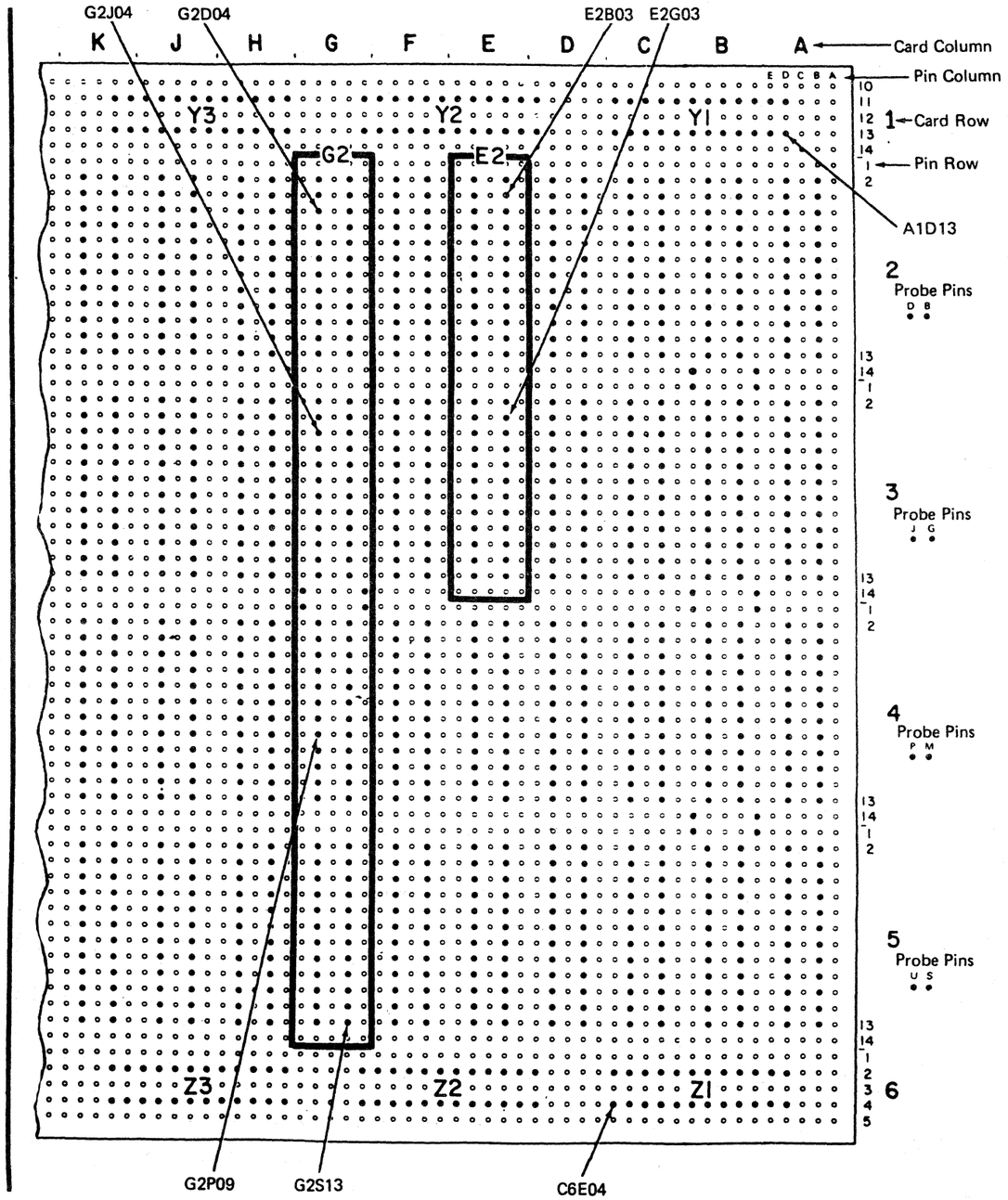


PIN NUMBERS FOR B1, D1, B4 and D4.



LOGIC BOARD PIN NUMBERING (CONTINUED)

BOARDS 01AA2, B2, C2 (IF INSTALLED), D2, and 03AA1



Model Groups 1 and 2

EC 379814 02Oct81	PN 2676323	14 114
	2 of 2	

PROCESSOR UNIT SERVICE AIDS

INTERMITTENT OR SOFT ERRORS

If you are having intermittent errors or the customer is reporting excessive soft errors (retriable machine checks), the following hints may help to determine the problem.

1. Display the processing unit directory log by entering QECD in CE mode. The log contains the eight most recent machine checks plus the last unrecoverable machine check. Successful retries with the same reference code UU fields indicate a possible problem. Record the reference code any duplicate reference codes.

2. Press **MODE SEL**; and when the General Selection screen is displayed, enter *QEI* and press **ENTER**.

3. Enter the reference code recorded in step 1. If a FRU list is displayed, you may want to invoke the support structure for advice on replacing FRU's to fix the problem.

4. The hardstop option may also be used by entering *QKS*. Hardstop will stop the processor immediately on a machine check with no retry and no reference code. The error latch is set and can be displayed via the QVK screen. In some cases the first error is the most likely; however, some errors may generate a second reference code that can hide the real problem. Enter *QKN* and press **START** key to return to normal after a hardstop.

CSAR TRACE

A copy of the QVAB screen (CSAR trace) can be helpful in diagnosing intermittent failures.

How to Activate CSAR Trace

1. Key QBAQVASAVE.
2. Press ENTER.

The trace remains active until:
Machine is powered off or
diagnostics are run or
the QFS screen is changed.

How to Display CSAR Trace

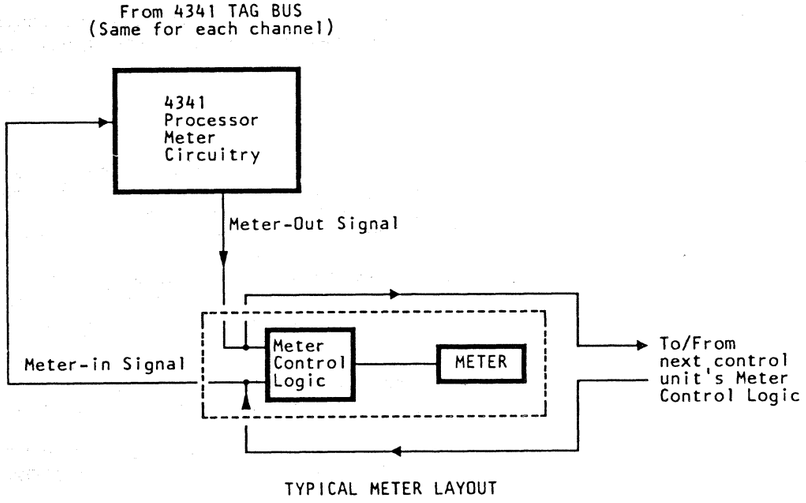
1. Key QECD to display PU logout directory.
2. Key needed log ID nnnn.
3. After log ID, key A.
4. Press ENTER.

Warning: Saving the QVAB screen extends retry logging time. This may cause overruns.

METERING SERVICE PROCEDURE

This procedure provides the wiring diagrams to be used with **MAP 6600** to service metering problems.

- The open keys in *Figure 1* indicate voltage points that are referenced from MAP 6600.
- *Figures 2, 3, 4, and 5* give more wiring detail of cards shown in *Figure 1*.
- For bus/tag pin numbering, see "Gate 01E (Channel Interface)," in the Locations section of this volume.



TYPICAL METER LAYOUT

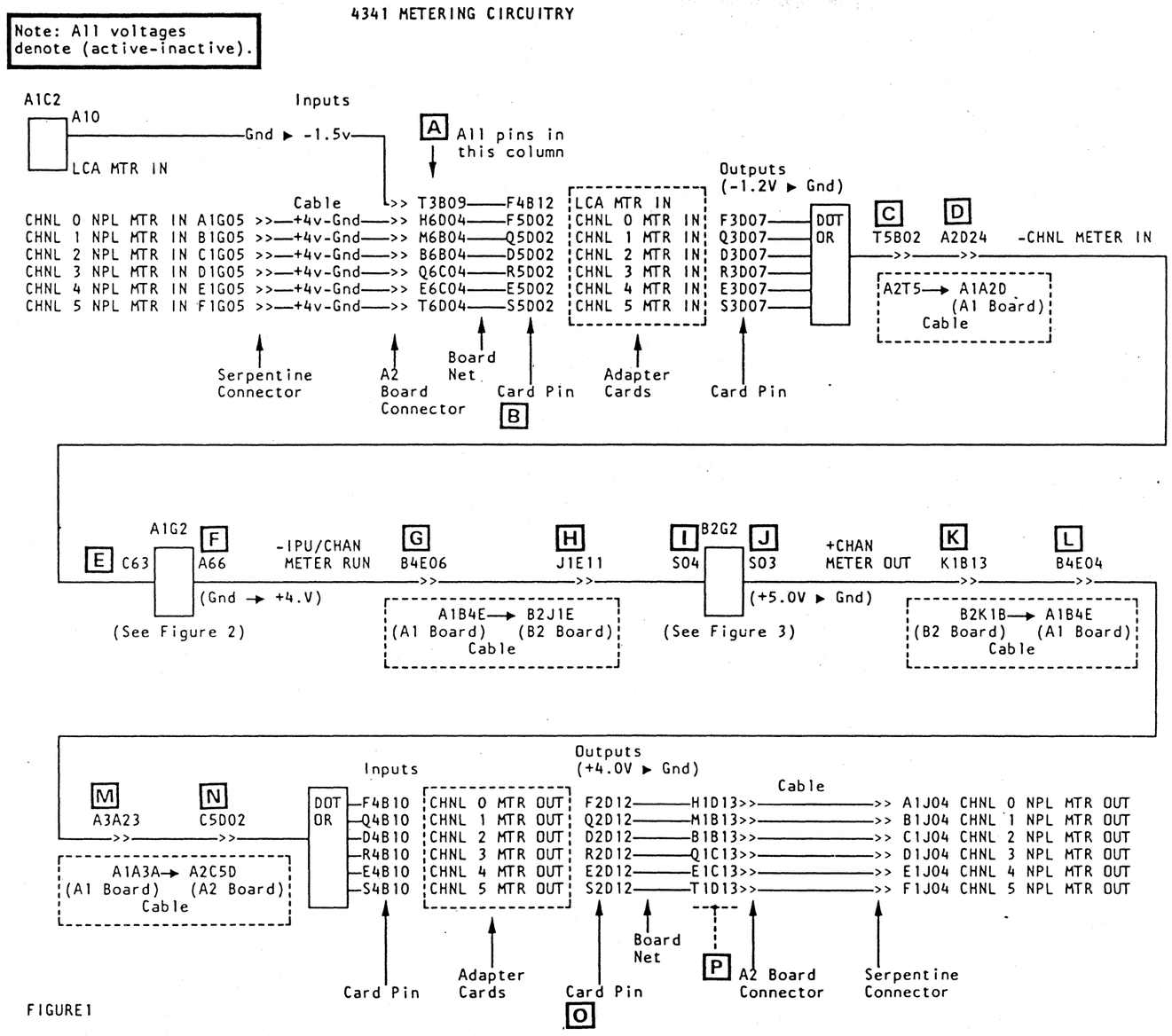


FIGURE1

CARD 01AA1G2

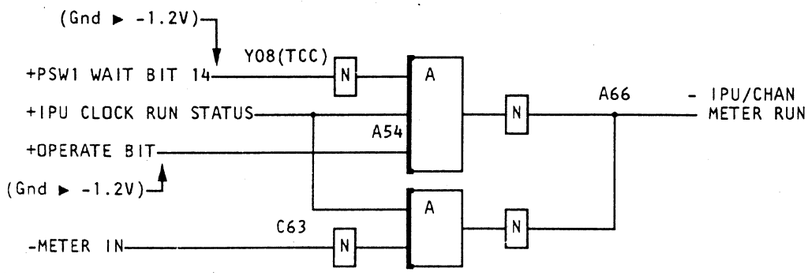


FIGURE2

SUPPORT BUS ADAPTER CARD 01AB2G2

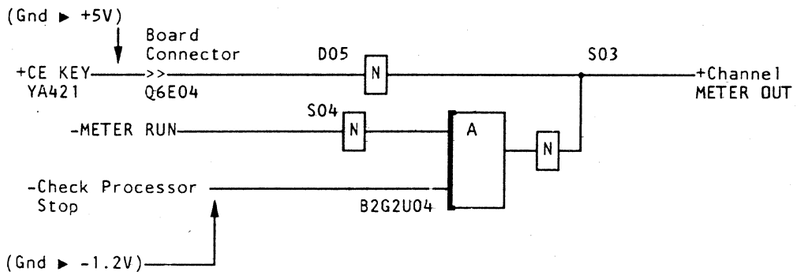


FIGURE3

CHANNEL 0 INTERFACE ADAPTER CARD

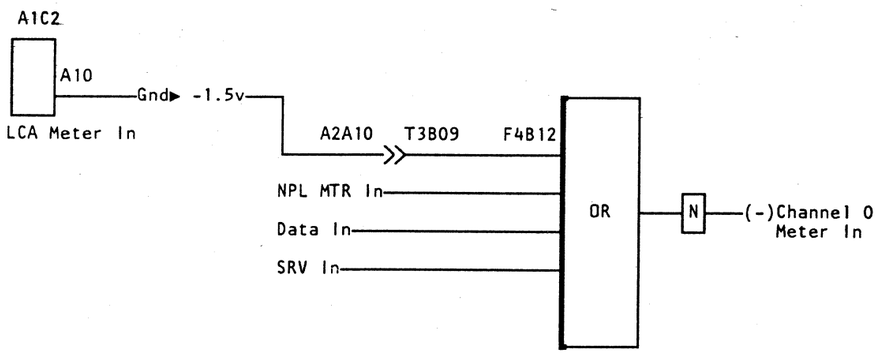


FIGURE 4

CHANNELS 1 THROUGH 5 INTERFACE ADAPTER CARD

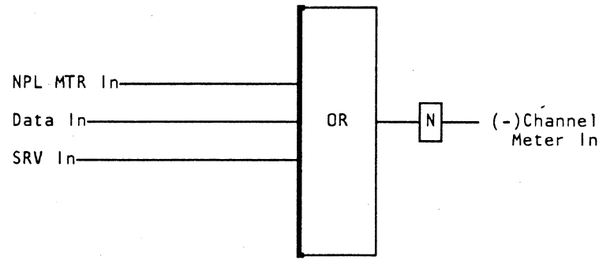


FIGURE 5

CHANNEL SERVICE AIDS

IFCC LOG

IFCC log data (16 bytes) is:

- Stored in auxiliary storage when an IFCC is sensed.
  - The address depends on the channel ID and the operating mode — S/370 or VSE. When in VSE mode, the address also depends on storage size.
  - If more than one IFCC occurs on a channel, only the data for the first and last occurrence is saved.
- Cleared during IML.
- Displayed by entering: QDAxxxx
  (xxxx is the storage location as shown below.)

Q D A x x x x

	First log	Last log (See Note.)
S/370	1 6	
VSE (2 meg)	2 6	
VSE (4 meg)	2 E	
VSE (8 meg)	3 E	
Ch. 0	0 0	1 0
Ch. 1	2 0	3 0
Ch. 2	4 0	5 0
Ch. 3	6 0	7 0
Ch. 4	8 0	9 0
Ch. 5	A 0	B 0

Note: *If only one IFCC has occurred on a channel, nothing is stored at the last log location.*

Byte:

0	1	2	3	4	5	6	7
INDIRO	IOADDR	CATNUM	-- Engineering use only --				

Byte:

8	9	A	B	C	D	E	F
BUS IN	TAGOUT	BUSOUT	TAG IN	------ Spare ------			

Byte 0: INDIRO

Bits 1-3 indicate a channel local storage ID as follows:

x111 (7) - Channel 0
x010 (2) - Channel 1
x011 (3) - Channel 2
x100 (4) - Channel 3
x101 (5) - Channel 4
x110 (6) - Channel 5

To display a channel LS, enter: QDLn
(n = channel LS ID as shown in parenthesis above.)

Byte 1: IOADDR

Bits 0-3 = Control unit address
Bits 4-7 = Device address (See Note.)

Note: *Channel 0 device addresses F0 through FF are used by the microprogram when addressing devices via the LCA. For definitions, see the following chart.*

Addr. in Byte 1	Definition
F2	Device attached to port 0 on the 01F gate.
F3	Device attached to port 1 on the 01F gate.
F4	Device attached to port 2 on the 01F gate.
F5	Device attached to port 3 on the 01F gate.
F6	SP to processing unit communications.
F7	Processing unit to SP communications.
FF	The LCA sent 'disconnect in' to channel 0.

Byte 2: CATNUM

For definitions, see "Catalog Numbers" in this section.

Byte 9: TAGOUT

Bit 0 = 1
1 = Address Out
2 = Command Out
3 = Data Out
4 = Service Out
5 = Suppress Out
6 = Op Out
7 = Select Out

Byte B: TAG IN

Bit 0 = Request In
1 = Op In
2 = Disconnect In
3 = Address In
4 = Select In
5 = Status In
6 = Service or Data In
7 = Command Out/Service Out/Data Out

Catalog Numbers

Following are complete lists of catalog numbers. The first list shows the general category into which the catalog numbers fall. The second list gives a description of the reason for the catalog number. For more information, invoke your support structure.

Range	*Category*
00-1F	Interface Sequencing
20-3F	Microcode Timeouts
40-5F	Interface Malfunctions
60-7F	Microcode Detected Hardware Malfunctions
80-8F	Instruction Processing Errors (architecture)
90-9F	Instruction Processing Errors (configuration dependent)
A0-BF	Interrupt Processing
C0-DF	Special Sequences
E0-FF	Support Processor

Catalog Numbers and Descriptions

Catalog Numbers	*Descriptions*
00	Reserved for reset state of catalog number.
02	Select-in received during initial selection for an I/O operation.
04 IFCC	During initial selection, the address received either was not the same as the address sent or was out of parity.
06 IFCC	Disconnect-in was received before the end of initial selection. (The connected control unit cannot finish the operation.)
08 IFCC	Disconnect-in was received before ending status. (The connected control unit cannot finish the operation.)
0A IFCC	No response was received when the channel issued select-out to request-in. The expected response was either an op-in/address-in sequence (a device was found) or a select-in tag (a device was not found).
0C IFCC	An interface line (except for request-in) was active after the channel released the device.
0E IFCC	After select-in was received, an interface line (except for request-in) remained active. (The indicated device may not be valid.)
10 CDC	An *Any Check* (see Note 1) condition was detected at data end time (sequence count 11 or 91).
20 CCC	A timeout occurred while trying to gain control of the block-multiplexer channel.
22 CCC	A timeout occurred while waiting for initial selection status. (Bit 3 in the CHACMD Reg is on.)
24 CCC	A timeout occurred while waiting to gain control of the byte-multiplexer channel.
26 CCC	A timeout occurred while waiting for initial selection status for an Internal Test I/O.
28 CCC	A timeout occurred while trying to gain control of a channel during a selector operation.
40 IFCC	Select-in (address not found) was received during a command chaining sequence. (Select-in should not come up; the same device should be selected.)
42 CDC or IFCC	A bus-in parity check or *Any Check* (see Note 1) was sensed at initial selection status-in time.
44 IFCC	During initial selection, a tag line was either active or not active at the wrong time.
46	A check occurred during command chaining. The chaining operation is ended.
48 CDC or IFCC	A bus-in parity check or *Any Check* (see Note 1) was sensed at ending status time.
4A CDC or IFCC	A bus-in parity check or *Any Check* (see Note 1) was sensed after the *Load Loop* (see Note 2).
4C	A load trap occurred for a device which does not have a valid directory element.
4E IFCC	A device that requires a shared UCW caused a load trap while another device was using the UCW.
60 CCC	The channel detected an invalid command or an invalid command/sequence count combination.
6A IFCC	A disconnect-in was received while the channel was polling. (The address indicated may not be valid.)
6E	No function was in the CHACMDR upon entry in the Asynchronous Command Completion Trap.
6F IFCC	A bus-in parity check was sensed at address-in time of initial selection.
80	The CCW specified by the CAW is not on a doubleword boundary.
82	Bits 4-7 of the CAW are not zeros.
84	Data end occurred with an error (program check, protection check, or wrong length record).
86	When a load occurred, a check condition from previous processing was detected.
90	Bad status was received during an IPL.
94	Channel specified by I/O instruction is not installed on the system.
96	The UCW directory element for the addressed device has the valid bit off. Possible reasons for this are: • The device has not yet been validated by the customer engineer. • The addressed device is attached via the support processor.
98	An IPL was issued to an MSS device.
9C	Test Channel - Channel specified is not installed on the system.
9F	Store Channel ID - Channel specified is not installed on the system.
A1	Channel (n) interrupt was due to a logout pending.
A4	Channel (n) interrupt required an Internal Test I/O.
A5	PCI interrupt not reported. Wait for ending status queue.
A6	An asynchronous status interrupt occurred for an MSS device.
C0	A partial UCW fetch to IPU direct local storage storage was required to determine the subchannel state.
C2 IFCC	Command chaining was broken due to a short-busy sequence.
C3	A short-busy sequence occurred during the initial selection sequence.
C4	A device on the byte-multiplexer channel requested a data transfer when it was not expected. (The first such request is not an error condition.)
C6 IFCC	A request for data was received on a byte-multiplexer channel when it was not expected.
C8 IFCC	A request for data was received on a block-multiplexer channel when it was not expected.
CA	Status-in without device-end received while in the load loop (see Note 2). A command chain or a command retry sequence is indicated.
CC	Ending status without device-end received. A command chain or a command retry sequence is indicated.
CE	Nonzero status was received at initial selection time, and did not contain device end.
D0	A halt operation was requested.
D2	An interface disconnect has been performed.
D6 CCC	A channel control check occurred because of a machine check.
E0	A halt operation was attempted while a SIO was queued. The halt operation is queued.
E2	A SIO/TIO was issued to an MSS device while an immediate command was being completed. The SIO/TIO has been queued for re-issue.
E4	One of the following invalid SP command procedures has caused the channel to be unloaded: • A Signal Processor command (SIGP) was in process while another was trying to start. • An invalid TIO (CMD 00) is about to be transferred to the support processor. The TIO (CMD 00) is canceled.
E6	An interface disconnect has occurred for a queued halt operation for an MSS device.
E8 IFCC	Select-in was received during initial selection for a support processor device (address not found).

Note 1: *Any Check* may be:
1. Wrong Length Record (No SLI flag)
2. Program or Protection Check
3. Chaining Check
4. Channel Data Check

Note 2: *Load Loop* is the standard request-in, op-in sequence.

Model Groups 1 and 2

LOOP PROCEDURE FOR TIO/SIO

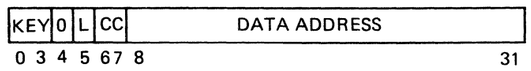
The following program can be used to loop I/O for scoping. This program can be entered as a block by use of the Block Function. The block can be saved on the diskette and invoked by using block function commands described in *Volume 18* under *Console Functions*. The block screen contains all the commands necessary to Edit and run the block.

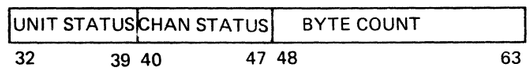
```
01 DO.01.TEST
02 QOI
03 KEY.START.01
04 QDM000=0004000000000400
05 QDM048=00000500
06 QDM070=0002000000FCCECE
07 QDM078=0004000000000400
08 QDM400=9D000CUU47700410
09 QDM408=9C000CUU47F00400
0A QDM410=9104004447800400
0B QDM418=8000007582000070
0C QDM500=0400060020000018
0D QDP0=0004000000000400
0E QON
0F NOP.PUSH.START.KEY.TO.START
10 NOP.CUU.AT.402.AND.40A.
11 NOP.CCW.AT.500.
12 END.XXXX.I.YOURNAME.DATE
```

This block stores the necessary information in main storage to loop a specified I/O device as specified by the CUU in locations 402 and 40A. These locations can be changed to specify any device desired.

Locations 400 through 40F contain the TIO/SIO loop. Location 410 does a Test Under Mask for the logout pending bit and falls through to location 418 if the bit is on. Location 418 sets the system mask to allow interrupts and store a CSW. System mask bits FC allow I/O interrupts for every channel at location 75. The mask can be modified to allow interrupts on only one channel. Location 70 is the wait PSW and location 78 is I/O new PSW. The CCW is located at location 500. Lines 0F through 11 are NOP comment lines to describe block run procedures.

Channel Status Word





BIT	BIT
5 Logout Pending	40 Program Ctrld Interruption
32 Attention	41 Incorrect Length
33 Status Modifier	42 Program Check
34 Control Unit End	43 Protection Check
35 Busy	44 Channel Data Check
36 Channel End	45 Channel Control Check
37 Device End	46 Interface Control Check
38 Unit Check	47 Chaining Check
39 Unit Exception	

INTERFACE CONTROL CHECK (IFCC) SAVE BLOCKS

This service aid contains a description and procedure for using two IFCC save blocks;

- IFCC Save Block **(A)**
- IFCC Save Block **(B)**

Each block is dependent on the microcode EC level of the machine on which it is used.

When intermittent interface control check (IFCC) errors are suspected, the IFCC save block should be used to save IFCC data in the IFCC save area of the FUNCT diskette.

Notes:

- *Processor performance is affected during the process of saving IFCC data.*
- *When the processor is IMLed, all IFCC data in the PSW and I/O trace buffer and in auxiliary storage is cleared.*

IFCC SAVE BLOCK (A) DESCRIPTION

- This block applies to any machine at microcode EC levels **154322** or **866867** or lower.
- This block stores unformatted IFCC data in the block diskette save area (of the FUNCT diskette) from auxiliary storage.
- Unformatted IFCC data is stored in auxiliary storage for all 4341 processors when an IFCC occurs. However, this data should be used only for machines at microcode EC levels 154322, 866867, or lower.
- This block is designed to save IFCC data for a specific channel. The format of lines 04 through 09 depends on the channel and the mode of operation.

How To Use

To use this block, it must be installed on the FUNCT diskette as described:

(1) Review "IFCC Save Block (A) Example," "IFCC Save Block (A) Format," and then return.

(2) Perform sequence **3**, steps 1 through 6 of the "Patch Installation," page 14 609.

How To Display

To display the unformatted IFCC data:

(1) Ensure the **CE MODE** switch is in the **ON** position.

(2) Press the **MODE SEL** key.

(3) Key in *QDS*.
- Displays the unformatted IFCC data.

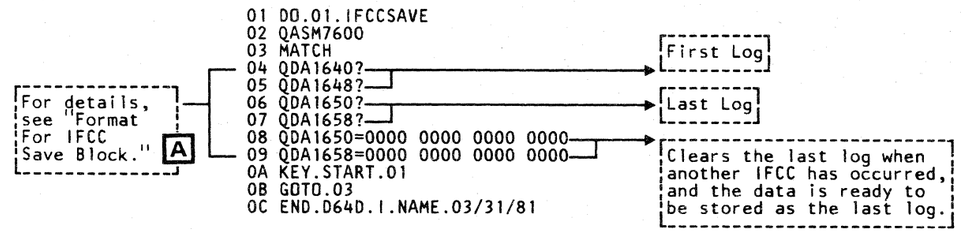
How To Deactivate

To deactivate this block:

(1) Key in *QBUIFCCSAVE*.

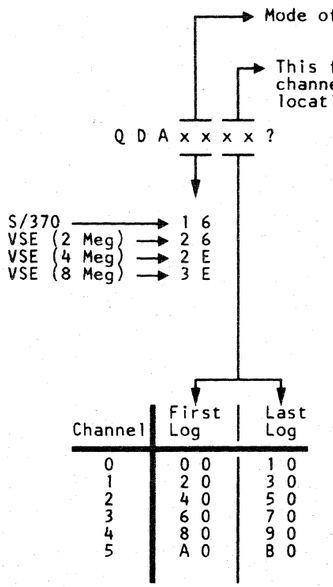
IFCC Save Block (A) Example

This example is formatted for channel 2 and S/370 mode.



FORMAT FOR IFCC SAVE BLOCK (A) (Lines 04 through 09)

A



Channel	First Log	Last Log
0	0 0	1 0
1	2 0	3 0
2	4 0	5 0
3	6 0	7 0
4	8 0	9 0
5	A 0	B 0

IFCC SAVE BLOCK (B) DESCRIPTION

- This block is already installed on machines at any of the following microcode EC levels: 154323, 866868, 856093, or higher.

  01 DO.01.IFCCSAVE
  02 QASM97D4
  03 MATCH
  04 QDTS
  05 KEY.START.01
  06 GOTO.03

- This block can not be used on machines that are not in the range of microcode EC levels specified.
- This block stores formatted IFCC data in the IFCC diskette save area (of the FUNCT diskette) from the PSW and I/O Trace buffer.
- This block saves the IFCC data for all channels and modes of operation.

How To Use

To use this block:

(1) Key in *QBAIFCCSAVE* and press **ENTER**.
- This command activates and places the block in match-wait status, waiting for an IFCC to occur.

How To Display

To display the formatted IFCC data:

(1) Press **MODE SEL**.

(2) Key in *QDTF* and press **ENTER**.
- Displays the formatted IFCC data.

How To Deactivate

To deactivate this block:

(1) Key in *QBDIFCCSAVE*.

INTERFACE CONTROL CHECK (IFCC) TRACE

Beginning with microcode EC levels 154322 (Model Group 1) and 856091 (Model Group 2), the trace function (previously selected from the QLI screen) is always active. IFCC trace is also available beginning with these EC levels.

IFCC trace does NOT require a selection from the Compare/Trace (QA) screen. Other trace functions (such as CSW and I/O instruction) still require a selection from the QA screen.

IFCC information is stored in the 4K trace buffer when an IFCC occurs. This buffer is displayed on the PSW and I/O trace screen (QDTP) in either normal or CE mode. IFCC information in the trace buffer includes:

- Device address
- Channel status word (CSW)
- Bus and tag line status
- Catalog number and message

IFCC Trace Example

(To display, enter: QDTP)

```
  *DISPLAY/ALTER*                    PSW & I/O TRACE                    PAGE 00
G GENERAL REGISTERS
C CONTROL REGISTERS          CSW       IFCC  DEV=323   CSW=3000 0200 0002 0029
F FLOATING POINT REGISTERS         BUSIN=21 BUSOUT=11  CN=0C  ENG=35 33 06 5F 47
P CURRENT PSW                      TAGIN=  REQ OPL DIS ADR SEL STA SRV/DAT
K STORAGE KEY                      TAGOUT= ADR CMD DAT SRV SUP OPL SEL
V VIRTUAL STORAGE                  INTERFACE CLEANUP TIMEOUT
M REAL STORAGE
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE
= HEX CALCULATOR
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: TP
```

```
Notes:

1. In addition to IFCC trace entries (as shown above),
   the buffer may contain PSW and I/O trace entries
   when selections are made from the Compare/Trace
   screen (QA).

2. The trace buffer size is 4K. To display additional
   buffer information, press and hold the ALT key and
   press the 'Page Up' key.
```

Device Address (DEV)

The device address, indicated in the *DEV* field, is the channel and unit address (cuu) of the device that was active when the IFCC occurred.

Channel Status Word (CSW)

The CSW indicates channel and unit status at the time the IFCC occurred.

Engineering Data (ENG)

The five bytes of data labeled *ENG* are for engineering use.

How to Display the IFCC Trace

The PSW and I/O trace buffer (which includes IFCC trace) is contained in 4K of auxiliary storage. To display the buffer, enter: QDTP

See the "IFCC Trace Example." Only one trace entry is shown, but many entries are possible. The entry displayed at the top of the screen is the most recent. To display possible additional entries, press and hold the ALT key and press the Page Up key. See Note.

Note: *In addition to IFCC trace entries, PSW and I/O trace entries may also be displayed on this screen. This is possible when selections are made from the Compare/Trace screen (QA).*

Bus and Tag Line Status

The data labeled *BUSIN* and *BUSOUT* indicates bus line status at the time the IFCC occurred.

Tag line status is indicated by the labels *TAGIN* and *TAGOUT*. The tag lines that were active at the time the IFCC occurred are intensified on the display screen.

Catalog Number (CN) and Message

The catalog number, labeled *CN*, is a coded indication of the reason for the IFCC.

The message text displayed on the last line of the IFCC entry is a short description of the reason for the IFCC. For a complete description, see "IFCC Catalog Numbers."

IFCC Catalog Numbers and Descriptions

All channel failures sensed by channel microcode are assigned a catalog number (CN) that provides a coded description of the failure. Only those channel failures that result in interface control check (IFCC) are described here. (For a complete list, see "Catalog Numbers" in this section.)

04 ADR MISMATCH OR P-CHK AT ISS

During initial selection, the address received either was not the same as the address sent or was out of parity.

06 DIS-IN DURING ISS STA-IN

Disconnect-in was received before the end of initial selection. (The connected control unit cannot finish the operation.)

08 DIS-IN AT DATA END

Disconnect-in was received before ending status. (The connected control unit cannot finish the operation.)

0A SEL-IN OR OPL-IN, ADR-IN TIMEOUT

No response was received when the channel issued select-out to a request-in. The expected response was either an op-in/address-in sequence (a device was found) or a select-in tag (a device was not found).

0C INTERFACE CLEANUP TIMEOUT

An interface line (except for request-in) was active after the channel released the device.

0E INVALID TAG SEQUENCE AT INTERFACE POLLING

After select-in was received, an interface line (except for request-in) remained active. (The indicated device address may not be valid.)

40 SEL-IN DURING COMMAND CHAINING

Select-in (address not found) was received during a command chaining sequence. (Select-in should not come up; the same device should be selected.)

42 P-CHK AT ISS STA-IN

A bus-in parity check or *Any Check* (see Note 1) was sensed at initial selection status-in time.

44 INTERFACE TIMEOUT DURING ISS

During initial selection, a tag line was either active or not active at the wrong time.

48 P-CHK AT END STATUS TIME

A bus-in parity check or *Any Check* (see Note 1) was sensed at ending status time.

4A STA-IN HAD P-CHK AFTER REQ-IN SEQ

A bus-in parity check or *Any Check* (see Note 1) was sensed after the *Load Loop* (see Note 2).

4E 2ND DEV NEEDS SHARED UCW BEFORE 1ST FINISHED

A device that requires a shared UCW caused a load trap while another device was using the UCW.

6A DIS-IN DURING CHANNEL IDLE LOOP

Disconnect-in was received while the channel was polling. (The indicated address may not be valid.)

6F P-CHK DURING ADR-IN COMPARE DURING ISS

A bus-in parity check was sensed at address-in time of initial selection.

C2 SHORT-BUSY SEQUENCE DURING COMMAND CHAINING ISS

Command chaining was broken due to a short-busy sequence.

C6 DATA REQUEST AFTER STOP-DATA GIVEN

A request for data was received on a byte-multiplexer channel when it was not expected.

C8 UNEXPECTED DATA REQUEST ON BLOCK CHANNEL

A request for data was received on a block-multiplexer channel when it was not expected.

E8 SEL-IN DURING ISS FOR SP DEVICE

Select-in was received during initial selection for a support processor device (address not found).

Note 1: *Any Check* may be:
1. Wrong Length Record (No SLI flag)
2. Program or Protection Check
3. Chaining Check
4. Channel Data Check

Note 2: *Load Loop* is the standard request-in, op-in sequence.

CHANNEL FAILURE ISOLATION

Use the following failure isolation procedure when the Channel Wrap Test indicates a failure.

1. Ensure that the machine power is on.
2. Install the DIAG4 diskette and set the CE MODE switch to ON.
3. Press and hold the ALT key, and press the DIAG key.
4. Select option B (selected diagnostics mode) from the Diagnostics Mode General Selection screen.
5. Enter test ID: M7 (In about two minutes the Special Channel Tests Selection screen is displayed.)
6. Key in 02 and press ENTER.

   After you have selected the CWT (02) test, detailed run instructions and available options are displayed to aid you in running the tests.
7. Use the point-to-point drawing on this page to scope the failing line for a signal swing of 0.0 to +3.5 volts. If you are not able to isolate the failure, invoke your support structure.

   - Be aware that the signal starts at the adapter card, travels across the board net, out its related Yx connector (card side), through its attached cable to the tailgate, and then through the wrap tool.

     The signal then returns from the tailgate, through a cable to the board and through its related Zx connector (card side), and across the board net to the adapter card input pin.

01A A2 Board to Tailgate Cable (See Note 2)

01A A2 x2 (Card) (See Note 1) Adapter Card	Board Net	Channel Being Tested CH 0	CH 1	CH 2	CH 3	CH 4	Ch 5	Cable Net	01E x2 (Bus) Connector (See Notes 3, 5)
		Board Connector Position and Board Pins Y3	Y4	Y1	Y5	Y2	Y6		
Bus-Out									
BIT 0 B02	——>	H1D11	M1B11	B1B11	Q1C11	E1C11	T1D11	——>	D04
BIT 1 B03	——>	J1A11	M1D11	B1D11	Q1E11	E1E11	U1A11	——>	B05
BIT 2 B04	——>	J1C11	N1A11	C1A11	R1B11	F1B11	U1C11	——>	D06
BIT 3 B05	——>	J1E11	N1C11	C1C11	R1D11	F1D11	U1E11	——>	B08
BIT 4 B07	——>	K1B11	N1E11	C1E11	S1A11	G1A11	V1B11	——>	D09
BIT 5 B08	——>	K1A13	N1D13	C1D13	R1E13	F1E13	V1A13	——>	B10
BIT 6 B09	——>	J1D13	N1B13	C1B13	R1C13	F1C13	U1D13	——>	D11
BIT 7 B10	——>	J1B13	M1E13	B1E13	R1A13	F1A13	U1B13	——>	B12
BIT P B12	——>	H1A11	L1D11	A1D11	P1E11	D1E11	T1A11	——>	B03
Bus-In		Z3	Z4	Z1	Z5	Z2	Z6		
BIT P S12	<——	H6A02	L6D02	A6D02	P6E02	D6E02	T6A02	<——	G03
BIT 7 S10	<——	J6B04	M6E04	B6E04	R6A04	F6A04	U6B04	<——	G12
BIT 6 S09	<——	J6D04	N6B04	C6B04	R6C04	F6C04	U6D04	<——	J11
BIT 5 S08	<——	K6A04	N6D04	C6D04	R6E04	F6E04	V6A04	<——	G10
BIT 4 S07	<——	K6B02	N6E02	C6E02	S6A02	G6A02	V6B02	<——	J09
BIT 3 S05	<——	J6E02	N6C02	C6C02	R6D02	F6D02	U6E02	<——	G08
BIT 2 S04	<——	J6C02	N6A02	C6A02	R6B02	F6B02	U6C02	<——	J06
BIT 1 S03	<——	J6A02	M6D02	B6D02	Q6E02	E6E02	U6A02	<——	G05
BIT 0 S02	<——	H6D02	M6B02	B6B02	Q6C02	E6C02	T6D02	<——	J04
MARK-IN U13	<——	B2B04	B2D03	B2B02	C2D03	C2B02	C2B04	<——	J13 ——>(Note 4)
Tag-Out		Y3	Y4	Y1	Y5	Y2	Y6		01E x1 (Tag) Connector (See Notes 3, 5)
OPERATIONAL D02	——>	H1B11	L1E11	A1E11	Q1A11	E1A11	T1B11	——>	J13
SERVICE D04	——>	H1E11	M1C11	B1C11	Q1D11	E1D11	T1E11	——>	D13
COMMAND D05	——>	J1D11	N1B11	C1B11	R1C11	F1C11	U1D11	——>	D11
ADDRESS D06	——>	H1E13	M1C13	B1C13	Q1D13	E1D13	T1E13	——>	B10
HOLD D07	——>	K1B13	N1E13	C1E13	S1A13	G1A13	V1B13	——>	G12
DATA D09	——>	J1C13	N1A13	C1A13	R1B13	F1B13	U1C13	——>	G10
SUPPRESS D10	——>	H1C13	M1A13	B1A13	Q1B13	E1B13	T1C13	——>	B12
SELECT D11	——>	H1A13	L1D13	A1D13	P1E13	D1E13	T1A13	——>	D09
METER D12	——>	H1D13	M1B13	B1B13	Q1C13	E1C13	T1D13	——>	J04
Tag-In		Z3	Z4	Z1	Z5	Z2	Z6		
METER U02	<——	H6D04	M6B04	B6B04	Q6C04	E6C04	T6D04	<——	G05
SELECT U05	<——	H6A04	L6D04	A6D04	P6E04	D6E04	T6A04	<——	B08
REQUEST U10	<——	K6B04	N6E04	C6E04	S6A04	G6A04	V6B04	<——	J06
DATA U12	<——	J6C04	N6A04	C6A04	R6B04	F6B04	U6C04	<——	G08
DISCONNECT U11	<——	H6C04	M6A04	B6A04	Q6B04	E6B04	T6C04	<——	J11
ADDRESS U09	<——	H6E04	M6C04	B6C04	Q6D04	E6D04	T6E04	<——	B05
STATUS U04	<——	J6D02	N6B02	C6B02	R6C02	F6C02	U6D02	<——	D04
SERVICE U07	<——	H6E02	M6C02	B6C02	Q6D02	E6D02	T6E02	<——	D06
OPERATIONAL U06	<——	H6B02	L6E02	A6E02	Q6A02	E6A02	T6B02	<——	B03
		CH 0	CH 1	CH 2	CH 3	CH 4	Ch 5		

Bus Wrap Tool PN 8483772

Tag Wrap Tool PN 8483773

1. The adapter card pins shown are the same for each channel.

   To locate the adapter card for the channel being tested, use the following chart.

Channel	0	1	2	3	4	5
x2(Card)	F2	Q2	D2	R2	E2	S2

2. Select a vertical column of pins under the channel number of the channel being tested.
3. 01E gate connector pins shown are the same for each channel.

   To plug the wrap tool in the proper 01E gate connector for the channel being tested, use the following chart.

01E Tailgate

x1(Tag)	A1	B1	C1	D1	E1	F1
x2(Bus)	A2	B2	C2	D2	E2	F2
Channel	0	1	2	3	4	5

4. The Mark-In line is not tested.
5. For Bus/Tag pin numbering, see "Gate 01E (Channel Interface)" in the Locations section of this volume.

INTERFACE ADAPTER (IFA) CARD

```
                        D   B
+ NPL OP OUT            • 2 •      + NPL BUS OUT 0
+ 5.0                   •   •                    1
+ NPL SRV. OUT          •   •                    2
      CMD  OUT          •   •                    3
      ADR  OUT          •   •      - 4.25
      HOLD OUT          •   •      + NPL BUS OUT 4
GND                     x   •                    5
+ NPL DATA OUT          •   •                    6
      SUPR OUT          •   •                    7
      SEL  OUT          •   •      + 6.0
      MTR  OUT          •   •      + NPL BUS OUT P
                        •13 •      - 1.5

                        J   G
                        •   •      - CHAN DATA BIT 0
+ 5.0                   •   •                    1
- SIG 0                 •   •                    2
- SIG 1                 •   •                    3
- PARITY GOOD           •   •      ----
- CHAN MTR IN           •   •                    4
GND                     x   •                    5
- CTL IN 0              •   •                    6
         1              •   •                    7
         2              •   •      + 6.0
         3              •   •      - CHAN DATA BIT P
- DATA MODE             •   •      - 1.5

                        P   M
  PWR SEQ INHIB         •   •      - AC (STOP)
+ 5.0                   •   •      - XFER OK 0
- ODD GATE              •   •      - XFER OK 1
  TAG SENSE             •   •      - SCAN MODE
  DATA SENSE            •   •      ----
  STATUS SENSE          •   •      - SUPR DATA 1
GND                     x   •      - HALT ADAPTER
- IFA CHECK STOP        •   •      - INPUT MODE
+ LCA OP IN             •   •      + CHAN MTR OUT
- SS MONITOR            •   •      + 6.0
+ IN DIRECTION          •   •      + LCA MTR IN
- SUPR DATA 0           •   •      - 1.5

                        U   S
+ NPL MTR IN            •   •      + NPL BUS IN 0
+ 5.0                   •   •                   1
+ NPL STATUS IN         •   •                   2
      SEL IN            •   •                   3
      OP IN             •   •      - 4.25
      SRV IN            •   •      + NPL BUS IN 4
GND                     x   •                   5
+ NPL ADR IN            •   •                   6
      REQ IN            •   •                   7
      DISC IN           •   •      + 6.0
      DATA IN           •   •      + NPL BUS IN P
      MARK IN           •   •      - 1.5
```

Card Loc.	Board 01AA2 D	E	F	Q	R	S
CH No.	2	4	0	1	3	5

The following board pins are jumpered as indicated for a processor with the basic three channel configuration:

01AA2 - R2G12 to R2G13
01AA2 - E2G12 to E2G13
01AA2 - S2G12 to S2G13

TIO SINGLE CYCLE PROCEDURE

Procedure To Single Cycle TIO:

Note: *The question mark (?) in steps 2, 3, 4, 5, and 6, indicate channel numbers.*

1. Set machine to microstep.
   Key in *QOM* and press **ENTER**.
2. Set CH?CMD Reg to 20.
   Key in *QVH?2820*, and press **ENTER**.
3. Set sequence count to 00.
   Key in *QVH?070000000000000000* and press **ENTER**.
4. Clear residual data from CHCCAR1 and 2.
   - Key in *QVH?0900000000* and press **ENTER**, and then
   - Key in *QVH?1100000000* and press **ENTER**,
5. Set CH?CMD Ready Latch to 1.
   Key in *QVH?311* and press **ENTER**.
6. Set CH?SYNC0 to device address, (example: 0E).
   Key in *QVH?12UU* and press **ENTER**.
7. Start single cycle.
   Press **START** key and then press **ENTER** key.
   - Monitor the Tag and Bus lines.
   - After pressing the **START** and **ENTER** keys several times, the Tag and Bus lines change.

CHANNEL LOCAL STORAGE LAYOUT (QVALn) OR (QDLn)

		0	2	4	6		0	2	4	6
US:UNIT STATUS	n0	00 00	00 00	00 00	00 00	n1	00 00	00 00	00 00	00 00
BIT 0 ATTENTION										
1 STATUS MODIFIER		US	CS	CSW	KEY CCW ADDR		LOGIC DEVADR	CH SWT	UCW STAT	
2 CONTROL UNIT END				COUNT						
3 BUSY										
4 CHANNEL END	n2	00 00	00 00	00 00	00 00	n3	00 00	00 00	00 00	00 00
5 DEVICE END										
6 UNIT CHECK		I/O ADR	RETRY CCW ADR		CCW WORK COUNT					
7 UNIT EXCEPTION										
CS:CHANNEL STATUS	n4	00 00	00 00	00 00	00 00	n5	00 00	00 00	00 00	00 00
BIT 0 PCI										
1 WRONG LENGTH RECORD		CCW FLAG	CCW COUNT				LIMIT LOGOUT	CHNL DATA	PRIM STAT	
2 PROGRAM CHECK										
3 PROTECTION CK										
4 DATA CHECK	n6	00 00	00 00	00 00	00 00	n7	00 00	00 00	00 00	00 00
5 CHNL CONTROL CK										
6 CHNL INTERFACE CK								SEC. STAT		IDAW ADDR
7 CHAINING CHECK										
CCW FLAG	n8	00 00	00 00	00 00	00 00	n9	00 00	00 00	00 00	00 00
BIT 0 CHAIN DATA										
1 CMD CHAIN				SEQ FLAG	UCW ADDR					
2 SLI										
3 SKIP										
4 PCI	nA	00 00	00 00	00 00	00 00	nB	00 00	00 00	00 00	00 00
5 IDA										
							CATA LOG#			UCW ORIG.
SEQFLAG:SEQUENCE FLAG										
BIT 0 BURST MODE MARK										
1 POLL CTRL REQUEST	nC	00 00	00 00	00 00	00 00	nB	00 00	00 00	00 00	00 00
2 LOGOUT PENDING										
3 CAI										
4,5,6,7										
0 0 0 1 SIO										
1 0 1 1 TIO	nE	00 00	00 00	00 00	00 00	nF	00 00	00 00	00 00	00 00
1 1 0 0 CLEAR I/O										
0 1 0 1 HIO										
0 1 1 0 H DEV										
0 1 1 1 IPL or SP SIO										

UCW STATUS:
BIT 0 UCW ACTIVE
1 UCW ON PCI QUEUE
2 UCW ON NORMAL QUE.
3 SEC. STATUS EXPECTED
4 DATA EXPECTED
5 DCC RECONNECT EXPECTED
6 PRIM.STATUS EXPECTED
7 DELAY DISCONNECT

CHSWT:CHANSWIT
BIT 0 PRIM STAT VALID
1 SEC STAT VALID

LIMIT CHNL LOGOUT DATA
SEE LCL CHART

PRIM STAT:PRIMARY STATUS

SEC.STAT:SECONDARY STATUS

CATALOG#:
SEE CATALOG NUMBER CHART.

NOTE:
DISPLAY QVALn or QDLn:

CHNL	n
0	7
1	2
2	3
3	4
4	5
5	6

LIMITED CHANNEL LOGOUT BIT DEFINITIONS

Note: Limited Channel Logout (LCL) is at hex address B0-B3.
To display the LCL: Key in QDMB0 and press ENTER.

BIT	DEFINITION
0	When a channel or interface control check occurs, the channel posts an LCL and sets this bit to a zero (0). Bit 0 = (0) = LCL stored in bytes (B0-B3) Bit 0 = (1) = LCL not stored (reset state)
1-3	Identity of the storage control unit (SCU) through which storage references were directed when an error was detected. When only one path exists between the channel and storage, the storage control unit has the identity of the processing unit.
4-7	Detect fields, identify the type of unit that detected the error. At least one bit is present in this field, and multiple bits may be set when more than one unit detects the error. Bit 4 = CPU Bit 5 = Channel Bit 6 = Main Storage Control Bit 7 = Main Storage
8-12	Source field indicates the most likely source of error. Normaily only one bit is present in this field. When interunit communication cannot be resolved to a single unit, such as when the interface between units is at fault, multiple bits may be set in this field. If detect and source fields indicate different units, the interface between them can also be considered as suspect. Bit 8 = CPU Bit 9 = Channel Bit 10 = Main Storage Control Bit 11 = Main Storage Bit 12 = Control Unit
13	Reserved--Stored zero
14	Reserved--Stored zero
15	Reserved--Stored zero

BIT	DEFINITION
16-23	Field validity flags indicate the validity of the information stored in the designated fields. When the contents stored is correct, the validity bit is one. When the contents stored is unpredictable, the validity bit is zero. Validity bits for non-stored fields are meaningless. The fields designated are: Bit 16 - Not used by 4341 Bit 17 = Reserved--Stored zero Bit 18 = Reserved--Stored zero Bit 19 = Sequence Code Bit 20 = Unit Status Bit 21 = Command Address and Key Bit 22 = Channel Address Bit 23 = Device address
24-25	Type of termination that has occurred is indicated by these two bits. This encoded field has meaning only when a channel control check or interface control check is indicated in the CSW. When neither of these two checks is indicated, no termination has been forced by the channel. 00 = Interface disconnect 01 = Stop, stack, or normal termination 10 = Selective Reset 11 = System Reset
26-27	Reserved--Stored zero
28	I/O error-alert bit when set to one indicates that the limited channel logout resulted from the signaling of I/O error alert on the I/O interface by the indicated unit. This signal indicates that the control unit has detected a malfunction that prevents it from communicating properly with the channel. The channel in response, performs a malfunction reset and sets t e interface control check.

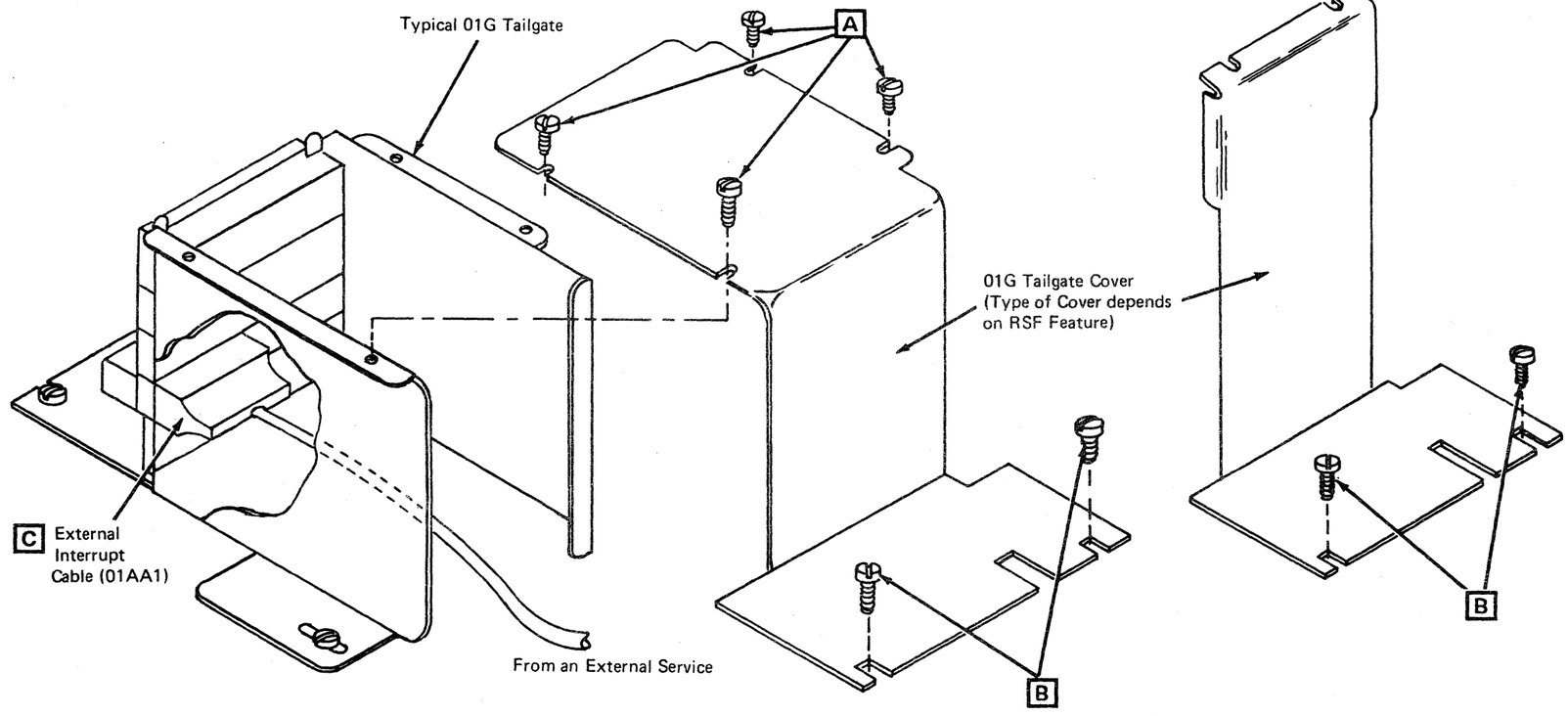
BIT	DEFINITION
29-31	Sequence count identifies the I/O sequence in progress at the time of error. It is meaningless if stored during the execution of HALT I/O or HALT DEVICE. For all cases, the channel program address, if validity stored and if nonzero, is the address of the current CCW + 8. The sequence code assignments are: 000 A channel detected error occurred during the execution of a TEST I/O or CLEAR I/O instruction. 001 Command-out with a nonzero command byte on bus-out has been sent by the channel, but device status has not yet been analyzed by the channel. This code is set with a command-out response to address-in during initial selection. 010 The command has been accepted by the device, but no data has been transferred. This code is set by a service-out or command-out response to status-in during an initial selection sequence, if the status is either channel-end alone, channel-end and device-end, or channel-end, device-end, and status modifier, or all zeros. 011 At least one byte of data has been transferred over the interface. This code is set with a service-out response to service-in and, when appropriate, may be used when the channel is in an idle or polling state. 100 The command in the current CCW has either not yet been sent to the device or else was sent but not accepted by the device. This code is set when one of the following conditions occurs: 1. When the command address is updated during command chaining or a START I/O

BIT	DEFINITION
29-31	Continued 2. When service-out or command-out is raised in response to status-in during initial selection sequence with the status on bus-in including attention, control unit end, unit exception, busy, status modifier (without channel-end and devien-end), or device-end (without channel-end). 3. When a short, control-unit-busy sequence is signaled. 4. When command retry is signaled. 5. When the channel issues a TEST I/O command rather than the command in the current CCW. 101 The command has been accepted but data transfer is unpredictable. This code applies from the time a device comes on the interface until the time it is determined that a new sequence code applies. It may be used when a channel goes into the polling or idle state and it is impossible to determine that code 2 or 3 applies. It may also be used at other times when a channel cannot distinguish between code 2 or 3. 110 Reserved 111 Reserved

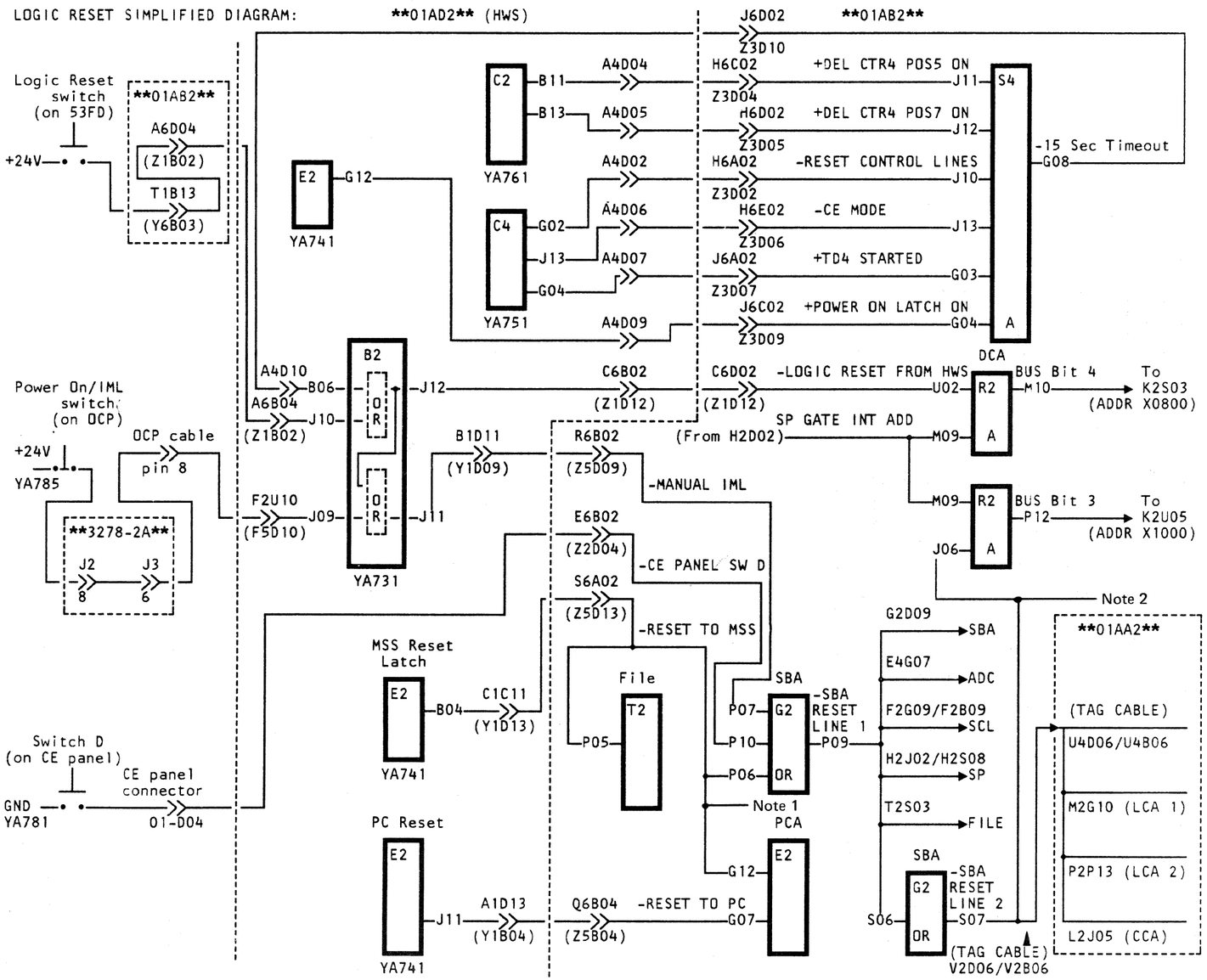
CONNECT EXTERNAL INTERRUPT CABLE

Note: *This procedure is designed for use with the* Installation Manual.

1. Locate 01G tailgate; see *Installation Manual*, page 48 020, Figure 1.
2. Remove 01G tailgate cover by removing screws [A] and [B].
3. Connect external interrupt cable [C] in 01GA1 as shown.
4. Reinstall 01G tailgate cover.
5. Return to *Installation Manual,* page 48 070, step 14.0.



LOGIC RESET



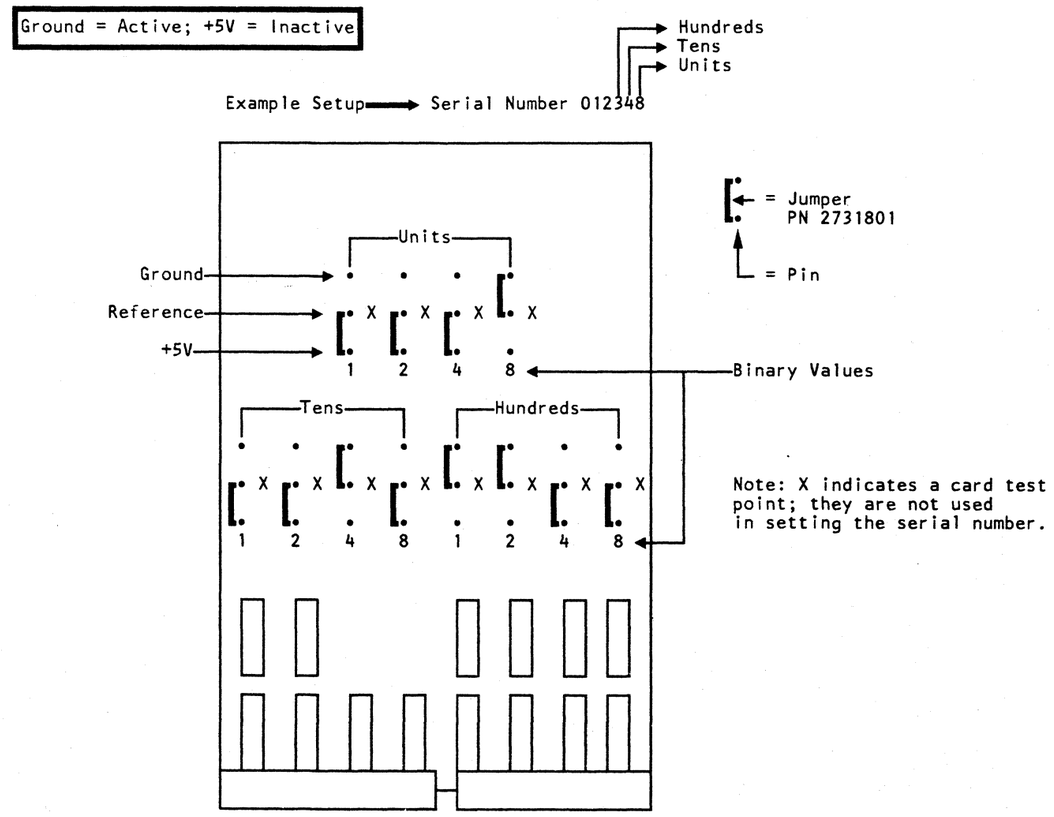
Note 1: To L2S13 on machines with cards in L2 and M2.

Note 2: To L2S13 on machines with no card in M2.

SERIAL NUMBER CARD

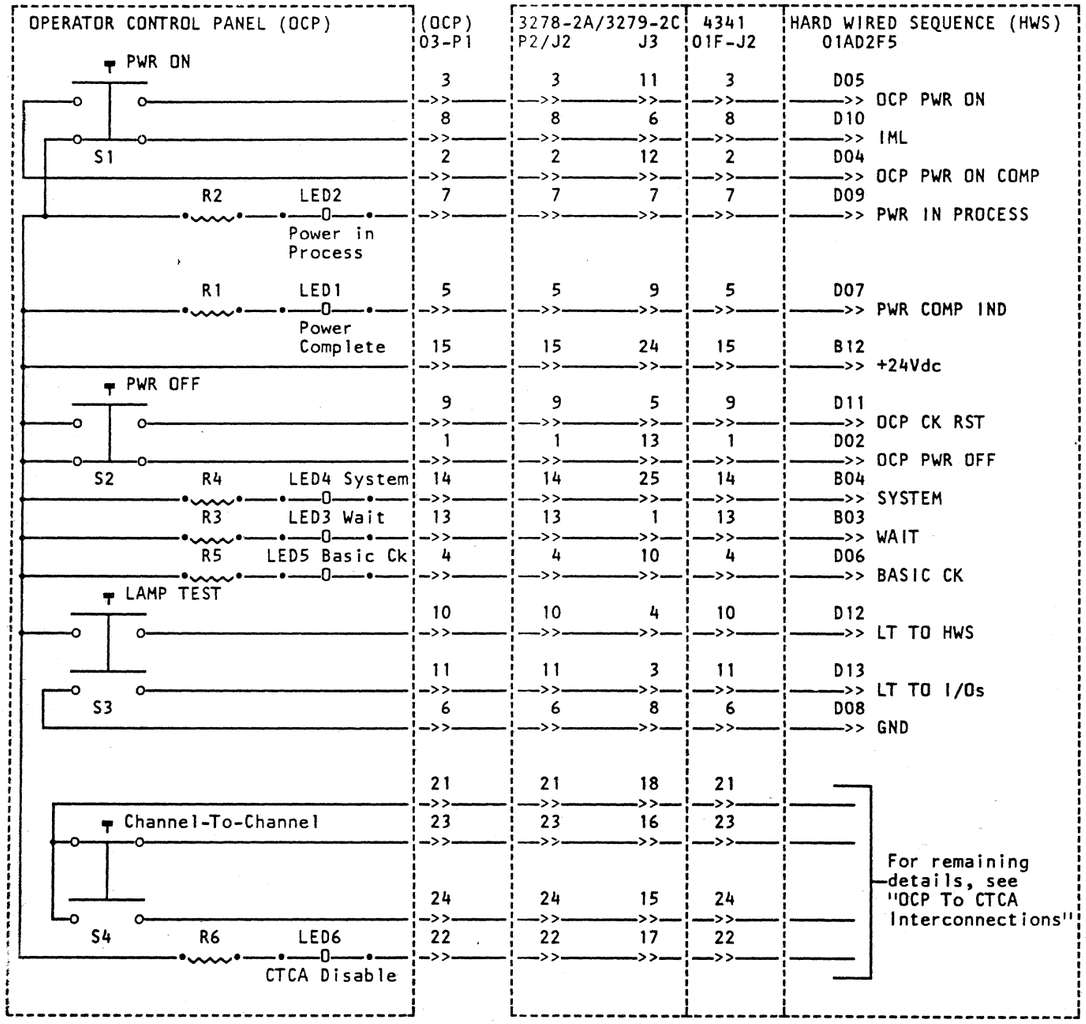
The serial number card (location 01AB2S4) is replaced only when there is indication that the card has failed. The new serial number card must be set with the last three digits of the machine serial number. This is done by setting the card exactly like the one being replaced.

The following is an example of how to setup a serial number card.

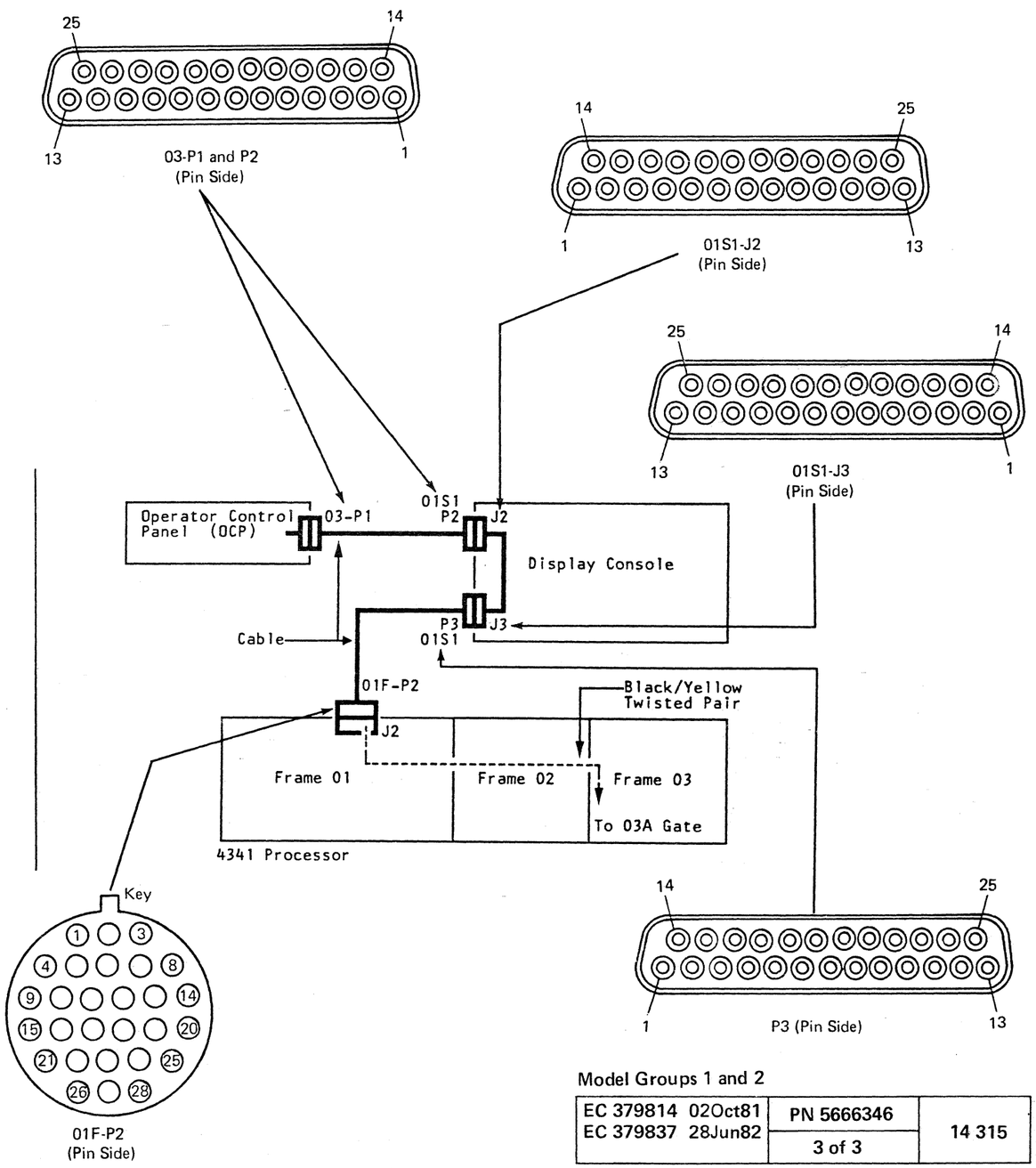


SERIAL NUMBER CARD
Location: 01AB2S4

OCP TO HWS INTERCONNECTIONS



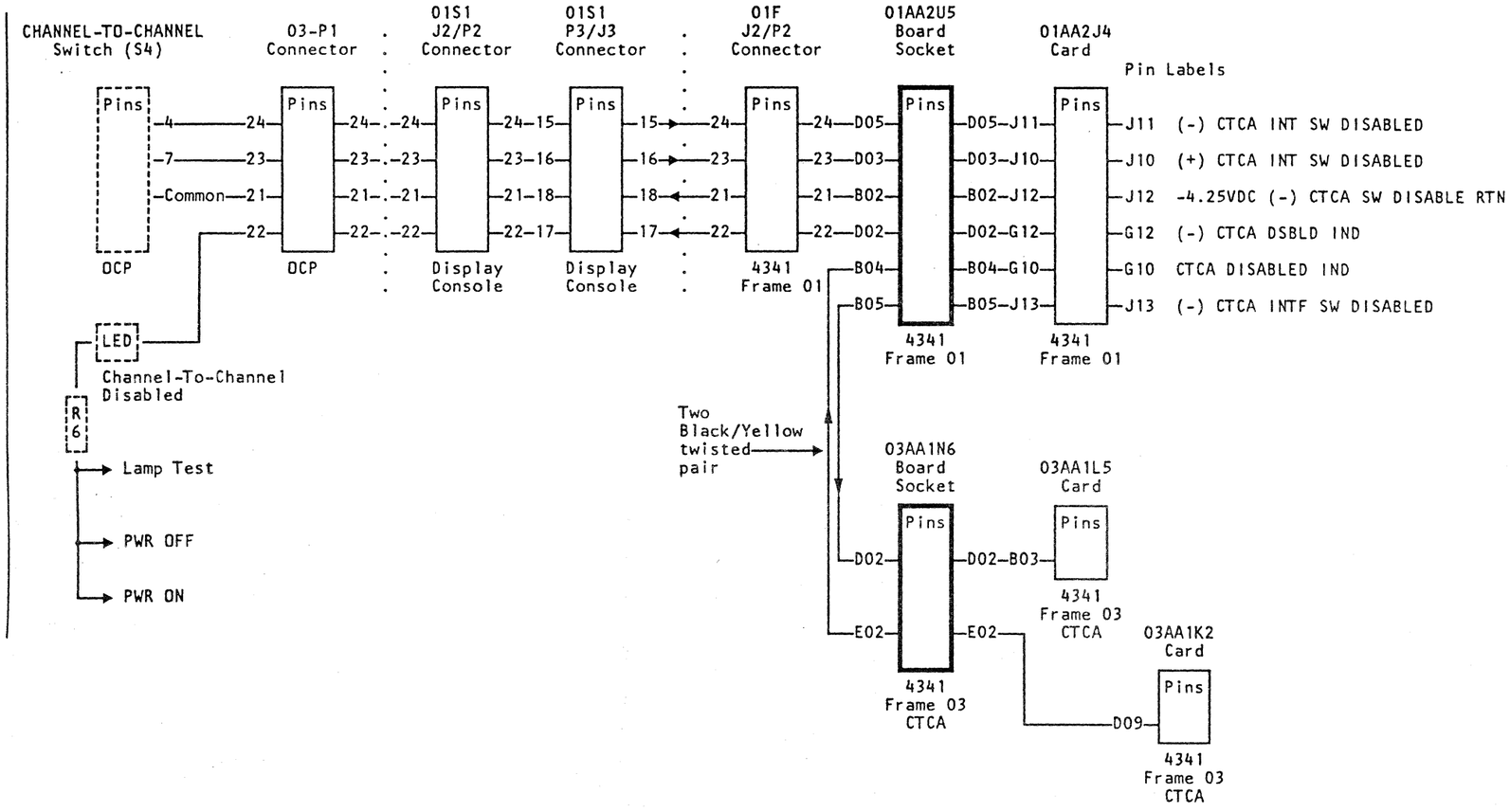
OCP TO 4341 CABLE ROUTE



Model Groups 1 and 2

EC 379814 02Oct81 EC 379837 28Jun82	PN 5666346 3 of 3	14 315

OCP TO CTCA INTERCONNECTIONS



LOGIC LEVELS FOR J4 CARD-PINS

01AA2J4J11 = LED On (-4.25vdc) — (+.5vdc) LED OFF

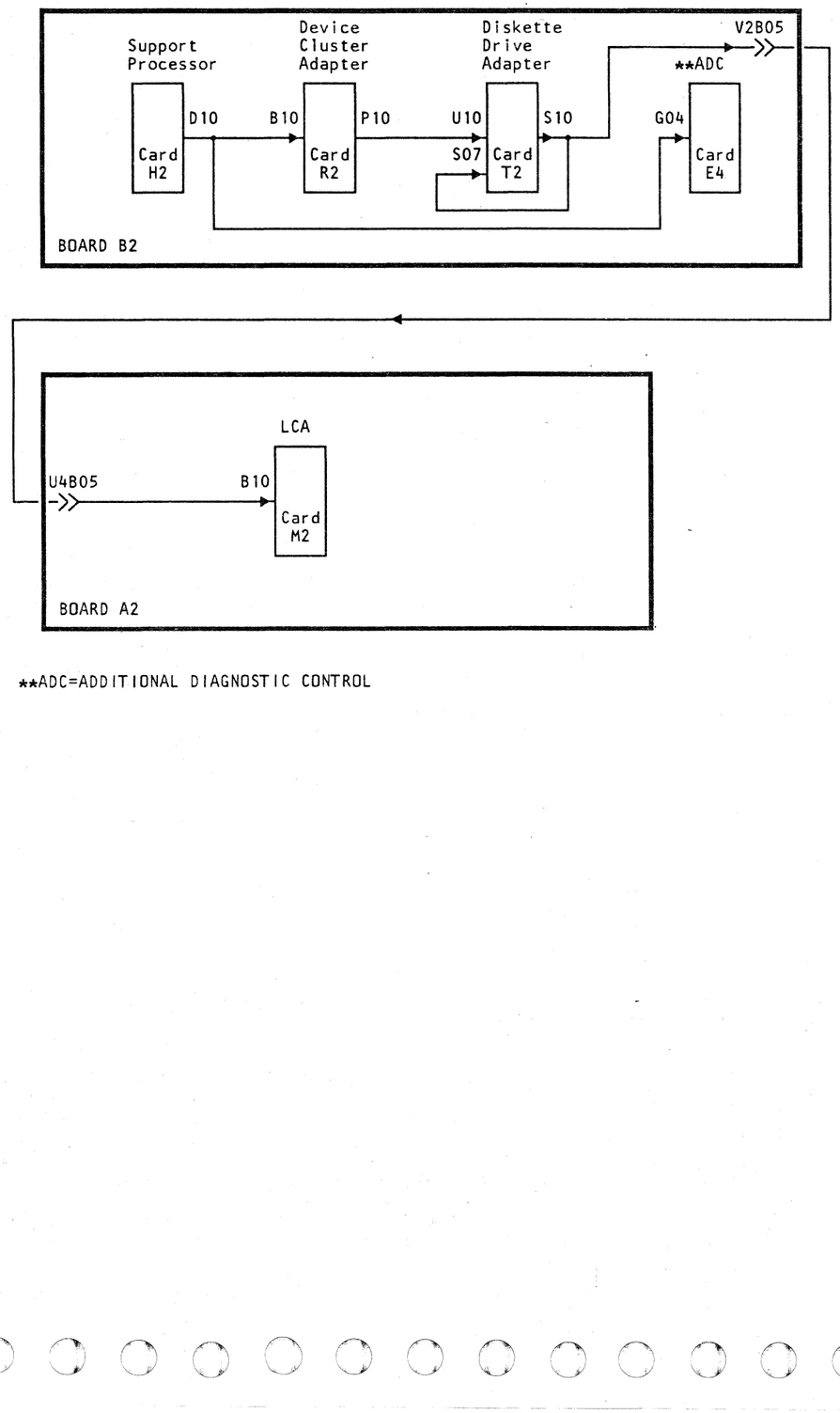
01AA2J4J10 = LED On (+.5vdc) — (-4.25vdc) LED OFF

01AA2J4G12 = LED On (+.7vdc) — (-4.25vdc) LED OFF

01AA2J4G10 = LED On (-.3vdc) — (+.5vdc) LED OFF

01AA2J4J13 = LED On (-.3vdc) — (+.5vdc) LED OFF

BURST MODE CONTROL DIAGRAM



**ADC=ADDITIONAL DIAGNOSTIC CONTROL

BASIC CHECK LIGHT

The Basic Check light, on both the operator control panel (OCP) and the CE panel, normally indicates:

- The CE MODE switch is set to ON.
- A power sequence is not complete.
- The support processor (SP) cannot communicate with the console display.
- An SP reset failed.

In addition, unusual conditions (such as low line voltage, frequent EMC hits, or SP microcode errors) can cause the Basic Check light to turn on.

For aid in diagnosing and repairing problems indicated by the Basic Check light, see the "Basic Check Light Conditions" chart shown on this page. As shown in the chart, some Basic Check light conditions are identified by SP stop words. To display stop words, see the following information.

How to Display Stop Words

A stop word is a two-byte SP storage address displayed at the CE panel. To display a stop word:

1. Press SP switches A and C together and then release. This clears the display.
2. Press and hold SP switch B to display the high-order byte.
3. Press and hold SP switches A and B together to display the low-order byte.

For more information, see "Stop Words" in the "Diagnostic Information" section.

Basic Check Light Conditions:

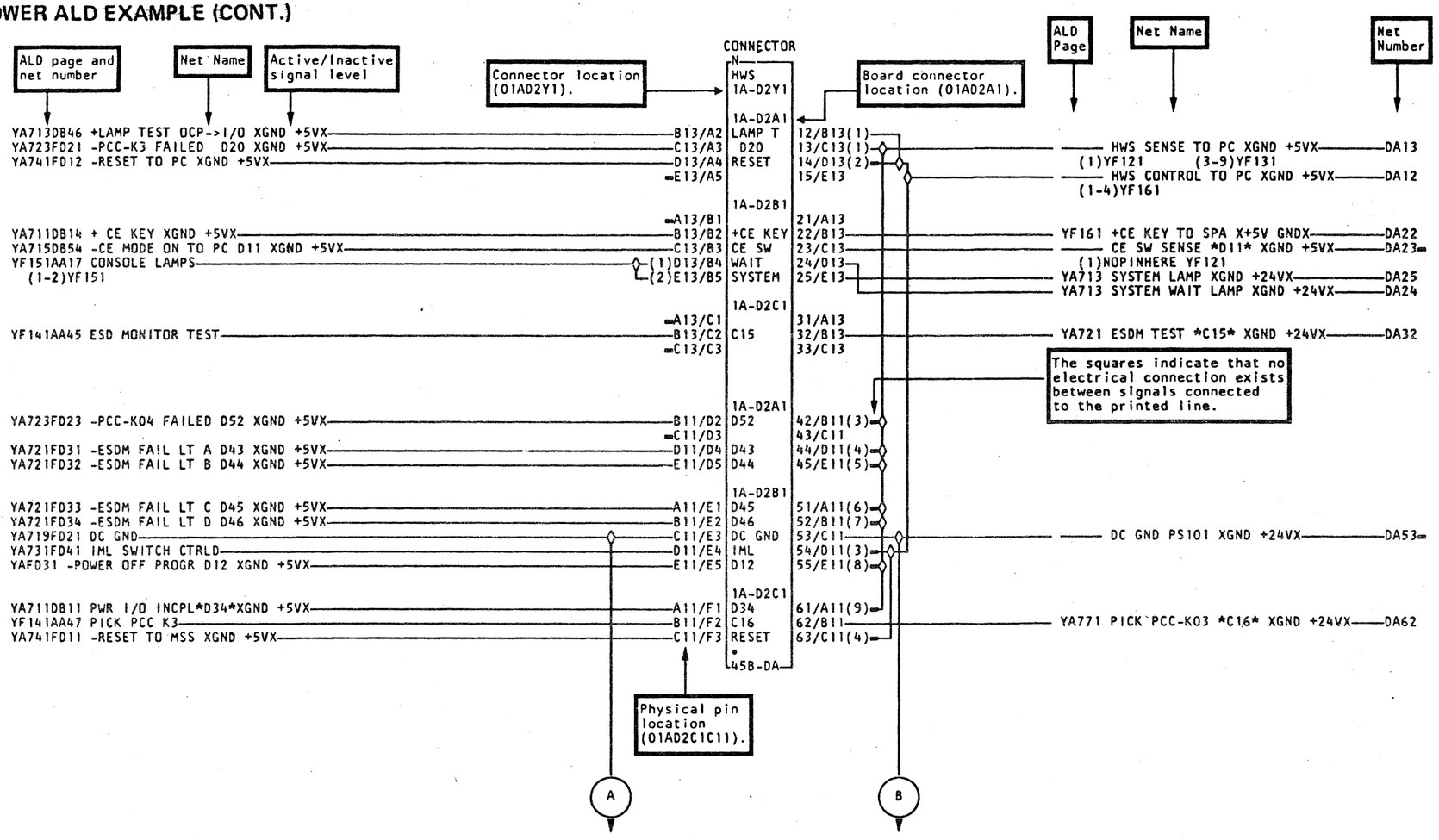
BASIC CHECK CONDITION	DESCRIPTION	REPAIR ACTION
The CE MODE switch is set to ON.	The BASIC CHECK light is normally turned on when the CE MODE switch (on the CE panel) is set to ON.	Set the CE MODE switch to NORMAL.
A power sequence is not complete.	The BASIC CHECK and POWER IN PROCESS indicators are on with one of the following: • A hardwired sequence (HWS) failure is indicated when one or more POWER FAIL indicators (on the CE panel) is on. • A processing unit power failure is indicated when a reference code with a UU field of '1x' and an S field of 'E' (UUrrrriS) is displayed on the console display.	If you cannot repair the problem using the MAPs (such as when it is intermittent), invoke your support structure.
The SP cannot communicate with the console display.	When the SP cannot communicate with the console display during an SP IML, the microcode waits one minute and then turns on the BASIC CHECK light and loops at address x'16DC' (See "How to Display Stop Words."). After an SP IML, if the SP cannot communicate with the console display, the microcode turns on the BASIC CHECK light and goes into a wait. No stop word is displayed.	1. Ensure that the coaxial cable from port 0 to the console display is securely attached. If possible, replace it. 2. The console display may be failing. If possible, swap it with another unit or replace cards. 3. Replace these cards on the 01AB2 board: R2, S2, and E2. (Ensure that R2 is P/N 6835933 or later.)
An SP reset failed.	Failure to reset the LCA results in turning on the BASIC CHECK light and looping at address x'16E8' (See "How to Display Stop Words."). Depending on what failed to reset, other stop words are possible. If the problem is intermittent, the BASIC CHECK light may be reset and processing will continue.	If you cannot repair the problem using the MAPs (such as when it is intermittent), invoke your support structure.
Unusual conditions.	Other conditions, such as low line voltage, frequent EMC hits, or SP microcode errors, can result in turning on the BASIC CHECK light.	Check that: 1. Line voltage is within the ranges specified in the "IBM 4300 Processor Installation Manual - Physical Planning", GA24-3667. 2. EMC logging is disabled. (Display the QK screen.) 3. All available microcode patches are installed. • If you cannot perform the checks above (such as when the system is hung), invoke your support structure.

POWER SERVICE AIDS

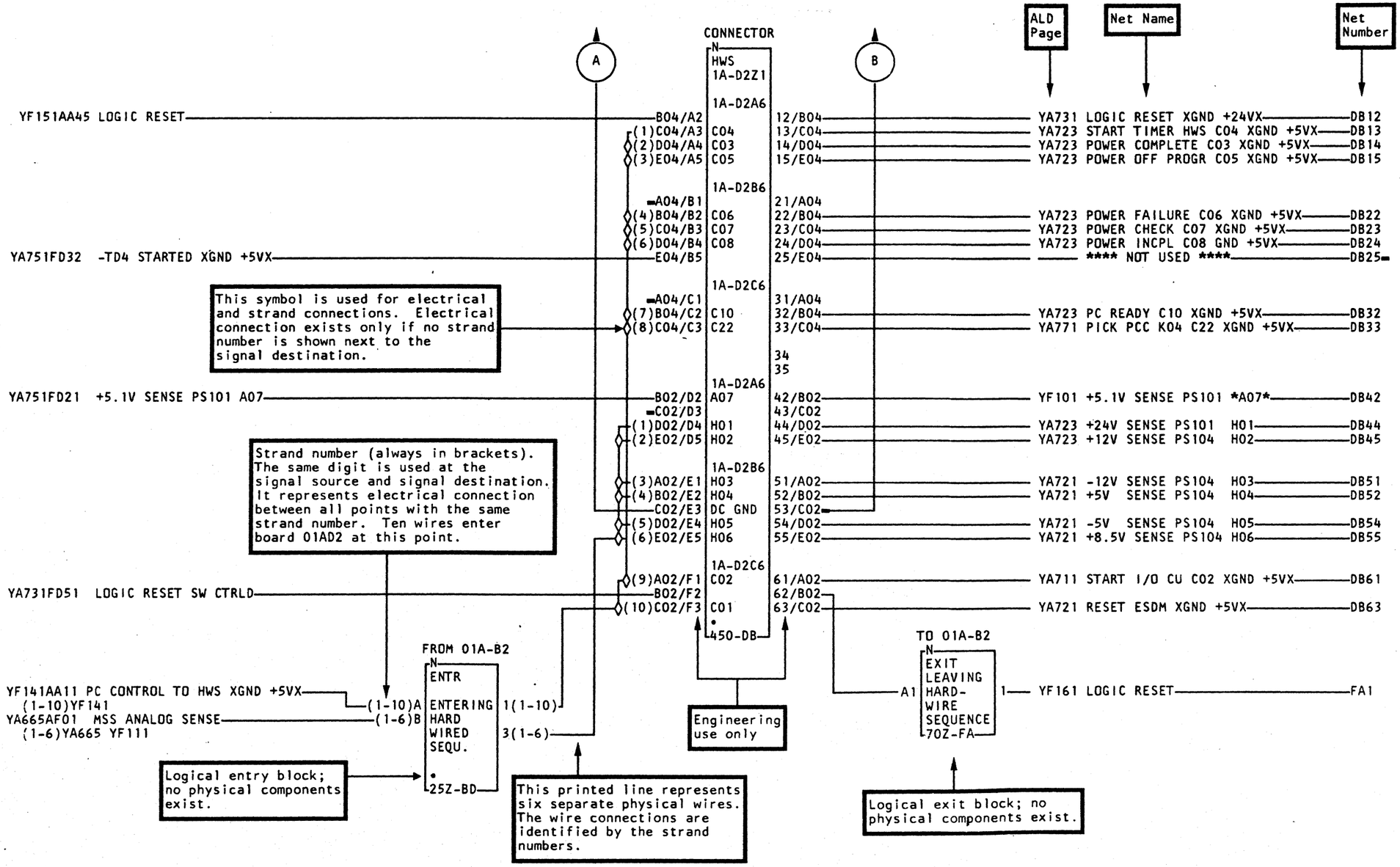
POWER ALD EXAMPLE

The power ALDs use some new symbols and printing formats. The main difference is that multiple wires are represented by a single line with strand numbers. Detailed information is shown on the next pages.

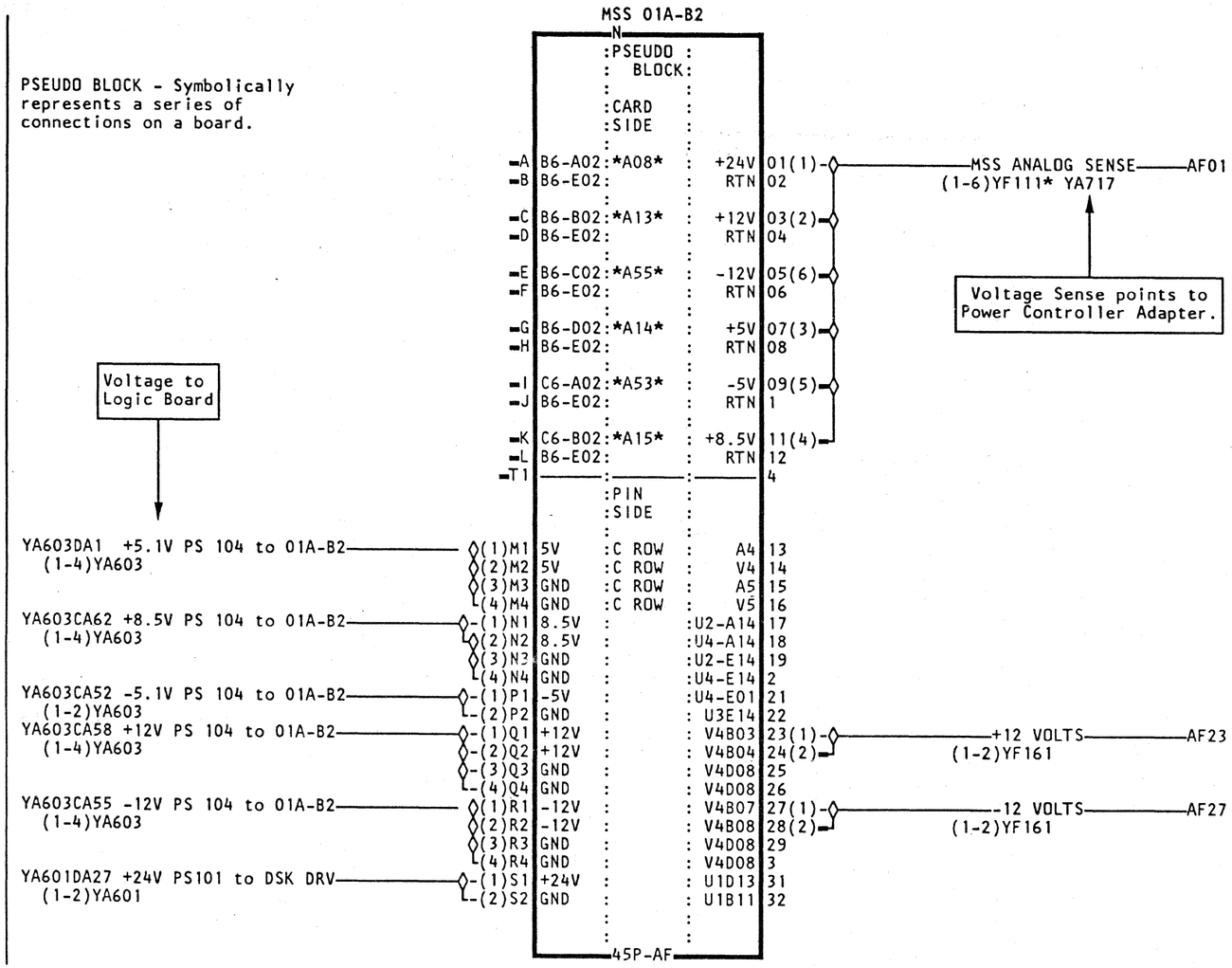
POWER ALD EXAMPLE (CONT.)



POWER ALD EXAMPLE (CONT.)



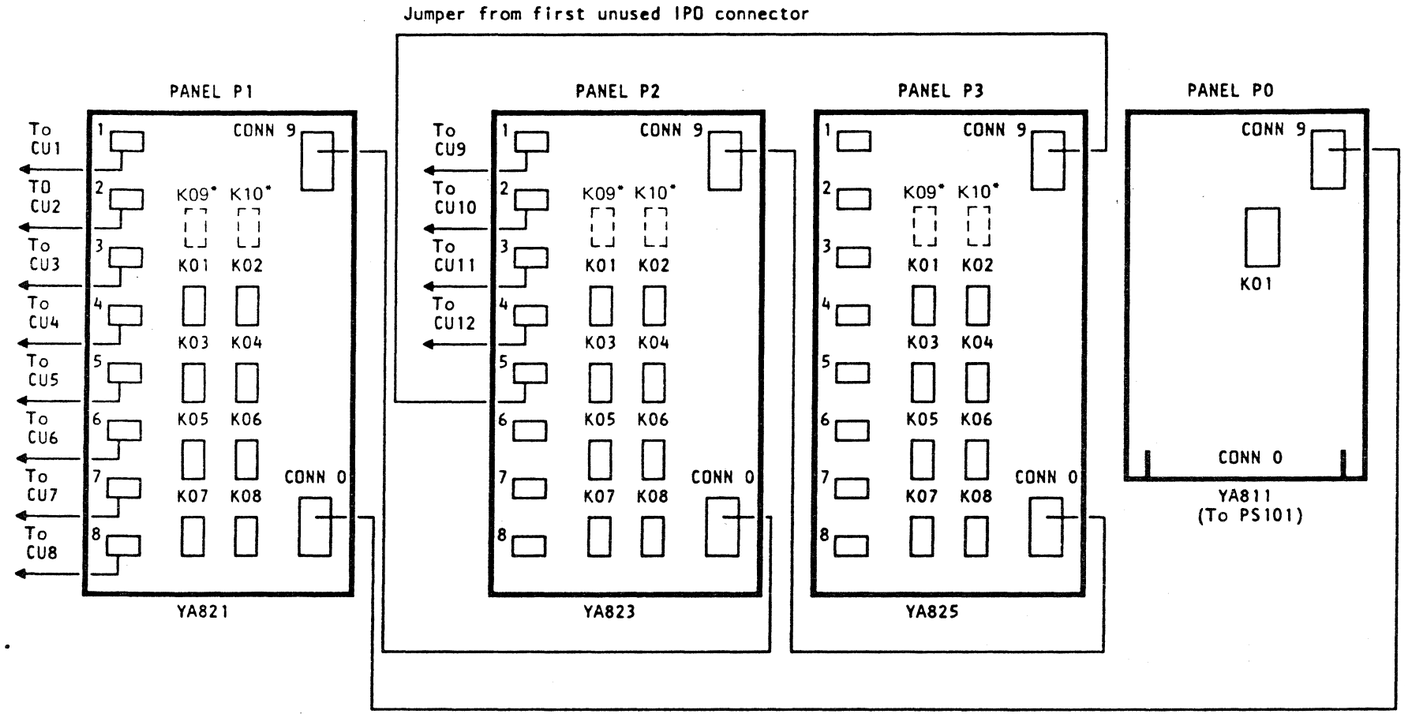
POWER ALD EXAMPLE (CONT.)

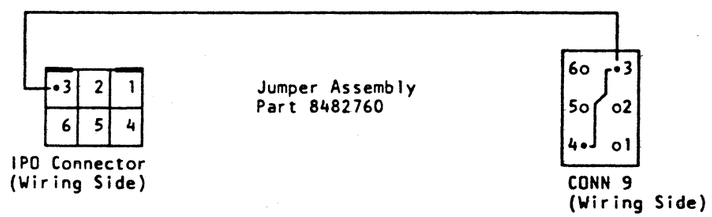


Model Groups 1 and 2

EC 379594 10Mar80 EC 379814 02Oct81	PN 5666347 4 of 4	14 420

STANDARD POWER INTERFACE (SPI)

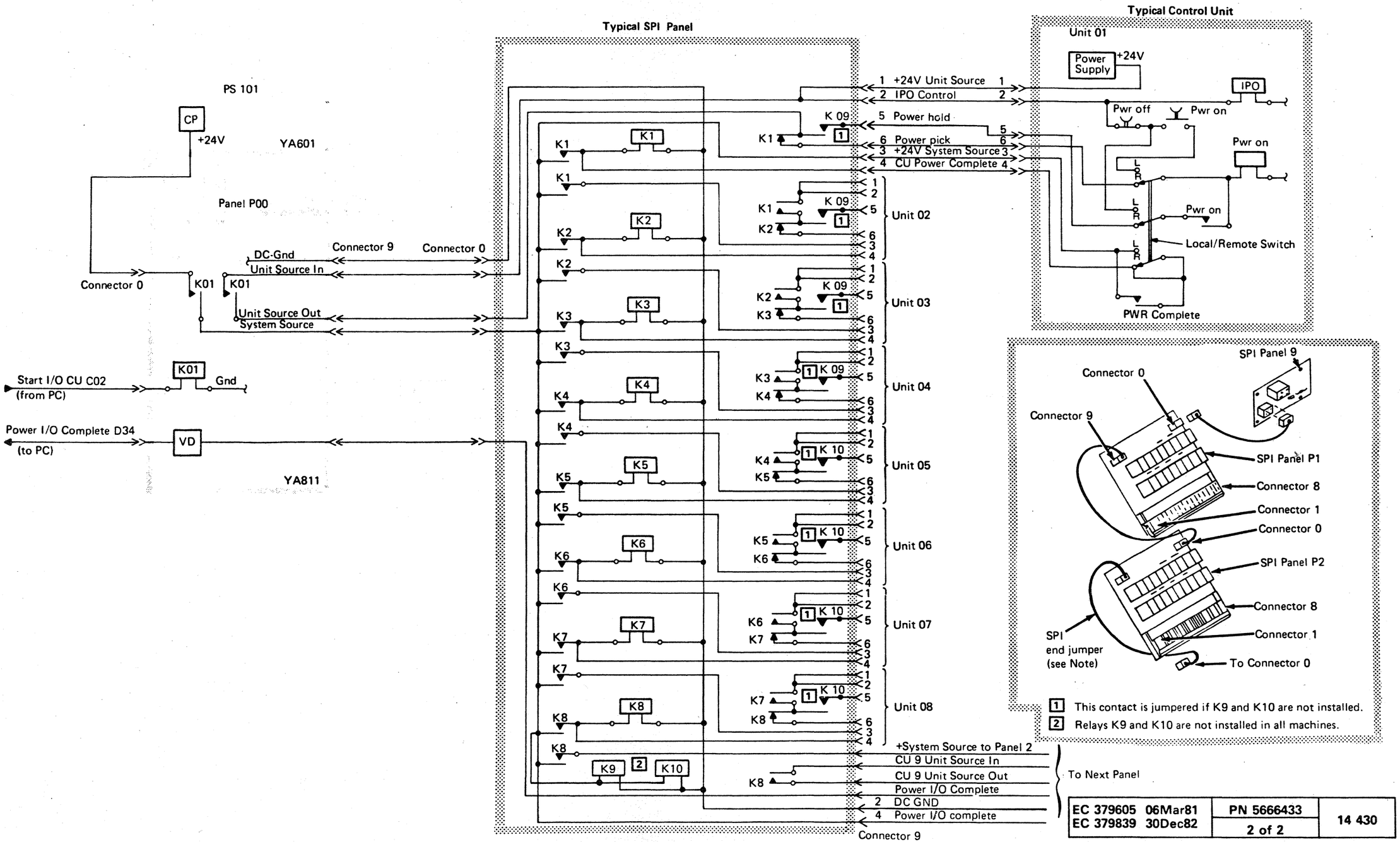




Model Groups 1 and 2

EC 379605 06Mar81 EC 379839 30Dec82	PN 5666433 1 of 2	14 425

STANDARD POWER INTERFACE (SPI)



EC 379605 06Mar81 EC 379839 30Dec82	PN 5666433 2 of 2	14 430

REMOTE SUPPORT FACILITY SERVICE AIDS

REMOTE DATA BANK INVOKE PROCEDURE

Introduction

The Remote Support Facility (RSF) allows linking the operator console, through a switched network, to a support center or to a data bank system (if available) for diagnostic assistance. The RSF is for service usage, and is not meant to be used as a teleprocessing port. The Remote Operator Console Facility (ROCF) is for customer use. (ROCF is an extension of RSF.) For additional detail, see *Volume 18*, "Console Functions," "Remote Operator Console Facility (QFB)."

Warning: The Remote Data Bank (RDB) cannot be invoked if using the Remote Operator Console Facility (ROCF); and the ROCF cannot be used if the RDB is invoked.

If the maintenance package does not successfully resolve a problem, the on-site service personnel can invoke a data bank operation (if a data bank system is available) for additional diagnostic information. The RSF also enables a remote specialist to assist on-site service personnel in problem resolution by observing and initiating functional operations of the 4341. The RSF permits remote operation of all system functions except those requiring manual intervention (power on/off, IML, initial I/O control, etc.).

Remote Support Facility Keys

Two keys on the 4341 operator console keyboard are dedicated to the RSF:

1. Communications Request (COMM REQ) Key - This key initiates voice or terminal communication between an on-site service representative and a remote specialist. Initiating a communications request can be done by either the on-site service representative or the remote specialist.

2. Line Disconnect (LINE DISC) Key -
   This key can be used to stop RSF initialization. It can also be used to disconnect the data link.

Data Bank Mode

If the maintenance package does not successfully resolve a problem, the on-site service personnel can invoke a data bank operation (if a data bank system is available) for additional diagnostic information.

In Remote Data Bank (RDB) mode, the 4341 console operates as a data bank system terminal. For details concerning the use of RDB mode, see your support structure.

Data Bank Invoke Procedures

To establish a data bank connection:

1. Ensure that the 4341 has the required hardware installed. The hardware consists of two cards. Information on the type of cards, and card setups is in the *Installation Procedures* in volume 18.

Note:

- *If you install the cards, run the diagnostics (MSS option diagnostics, selection E0) before proceeding.*
- *Also ensure that a coupler and dataphone are available.*

2. Set the NORMAL/CE switch to CE MODE and stop the IPU (QOM).
3. Select the General Select screen:
   a. Key in Q next to SELECTION.
   b. Press the ENTER key.
4. Select the System Configuration screen:
   a. Key in QFS next to SELECTION.
   b. Press the ENTER key.
   c. Write the EC and REA levels on paper for later reference.
5. Select the RDB Initialization screen:
   a. Key in QFD.
   b. Press the ENTER key.
   - MACHINE TYPE - The data in this field is supplied by the microcode.
   - MACHINE SERIAL NO. - The data in this field is supplied by the microcode.
   - EXTERNAL MODEM INSTALLED - You supply this data.

   You must enter the proper response (N for internal modem; Y for external modem) depending on the hardware configuration. The default answer is N.
6. Put the correct response into the input field of the screen.
7. Press ENTER.

   Note: *The LINE DISC key is now functional.*
8. Invoke your support structure.

Data Bank Operations

Follow the instructions in your support structure.

Data Bank Disconnect Procedures

Follow the instructions in your support structure.

Data Bank Mode Restrictions

1. The following 4341 operator console system function keys are NOT supported in RDB mode:

START	CHG DPLY
STOP	SPM/O
INTR	MODE SEL
COMM REQ	DIAG
**PAGE UP	PAGE DOWN

** *The (PAGE UP) key transfers patches to diskettes for machines at any of the following microcode EC levels:* **154323, 856093, 866868** *or above.*

2. After the Data Bank mode is terminated, the state of the 4341 is unpredictable. SP reset, re-IML, or re-IPL is necessary, depending on the state of the 4341 at that time.

Remote Console Support

For Remote Console Support, invoke your support structure.

Model Groups 1 and 2

EC 379602 15Sep80 EC 379815 12Nov81	PN 5666412	14 505
	1 of 1	

REMOTE SUPPORT FACILITY (RSF) DIAGNOSTICS

EIA ADAPTER TEST (Cable Part 8482930)

Note: *To perform this diagnostics, ensure:*

- *The machine microcode level precedes* **Microcode EC 154319**.
- *DIAG4 Disk is mounted,*
- **POWER ON/IML** *was pressed,*
- *The MSS DIAGOSTIC TEST OPTION SELECT screen is displayed.*

This test, as illustrated to the right, includes:

1. D0 Adapter Diagnostic test; which isolates a failing EIA card.
2. D0 Cable Wrap Diagnostic test; which isolates the failing RSF cable (part 8482930).

The procedure is:

*****D0 Adapter Diagnostic*****

1. Key in D0 and press ENTER.

Note: *A sucessful test run is indicated when the* **TEST xx RUNNING** *message is cleared.*

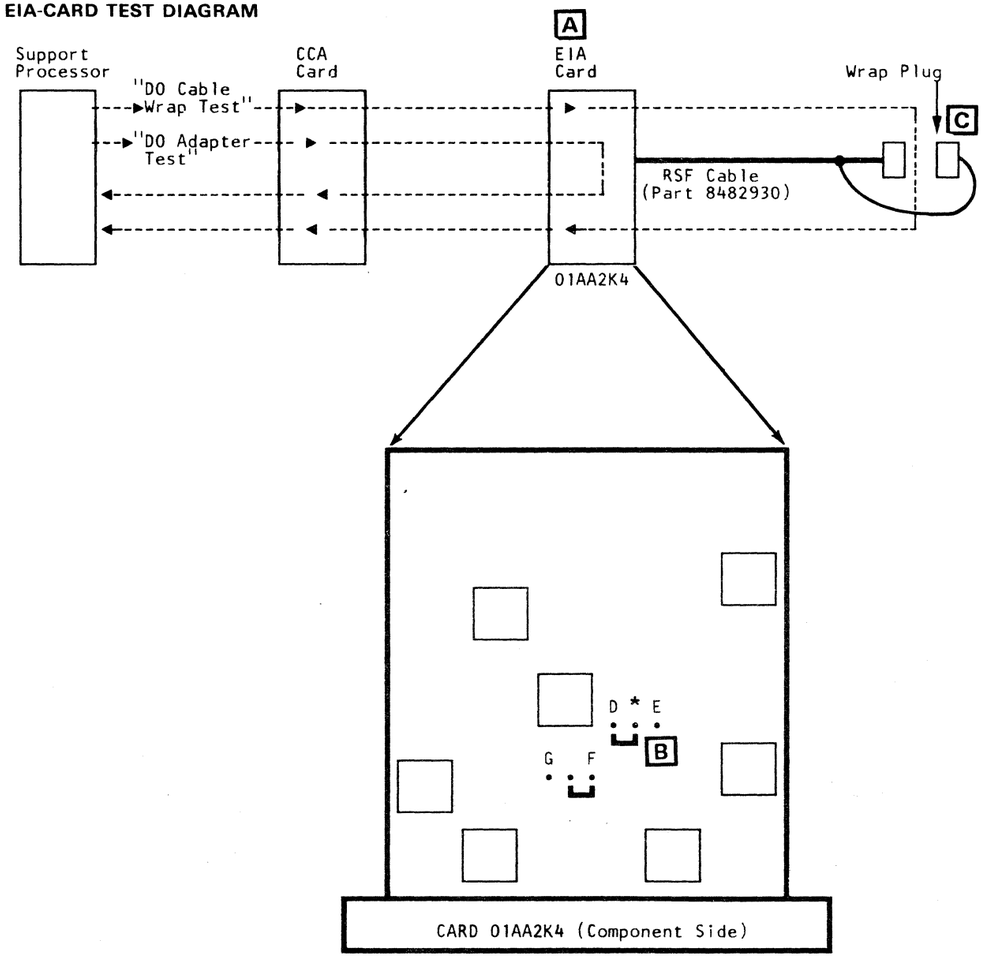
*****D0 Cable Wrap Diagnostic*****

2. Press POWER OFF on OCP.
3. Remove card 01AA2K4 [A].
4. Move jumper [B] from D-* to *-E.
5. Place card [A] back to its postion.
6. Connect wrap plug [C] to end of cable.
7. Press POWER ON/IML on the OCP.
8. Key in D0 and press ENTER.
   Wrap test now runs.

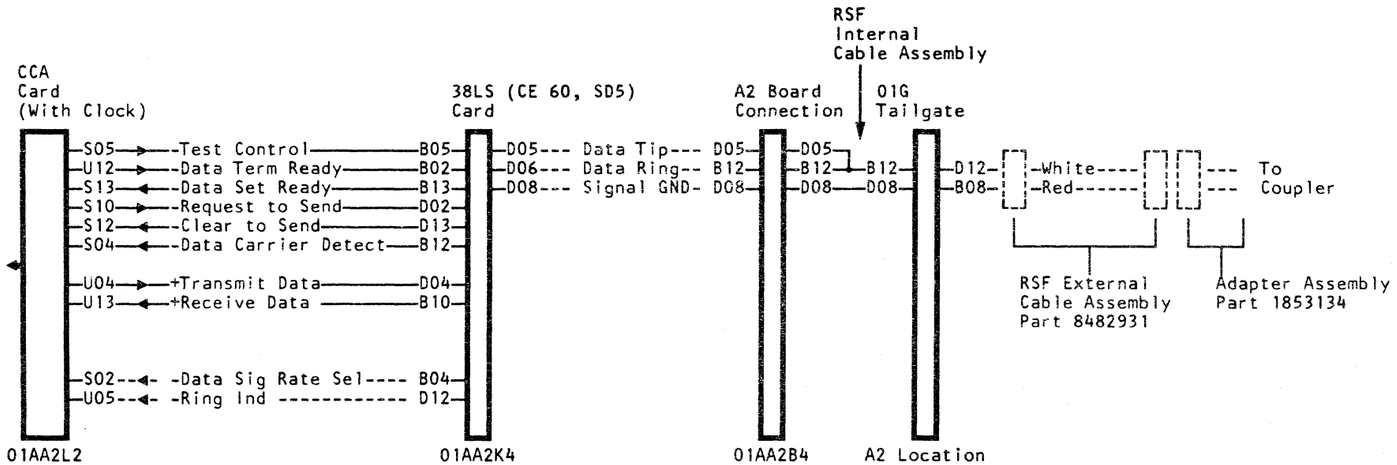
Note: *A sucessful test run is indicated when the* **TEST xx RUNNING** *message is cleared.*

9. Move jumper [B] back to D-* position.
10. Remove wrap plug from end of cable, and connect the cable plug back in telephone connector.
11. Return to the document that lead you here.

EIA-CARD TEST DIAGRAM

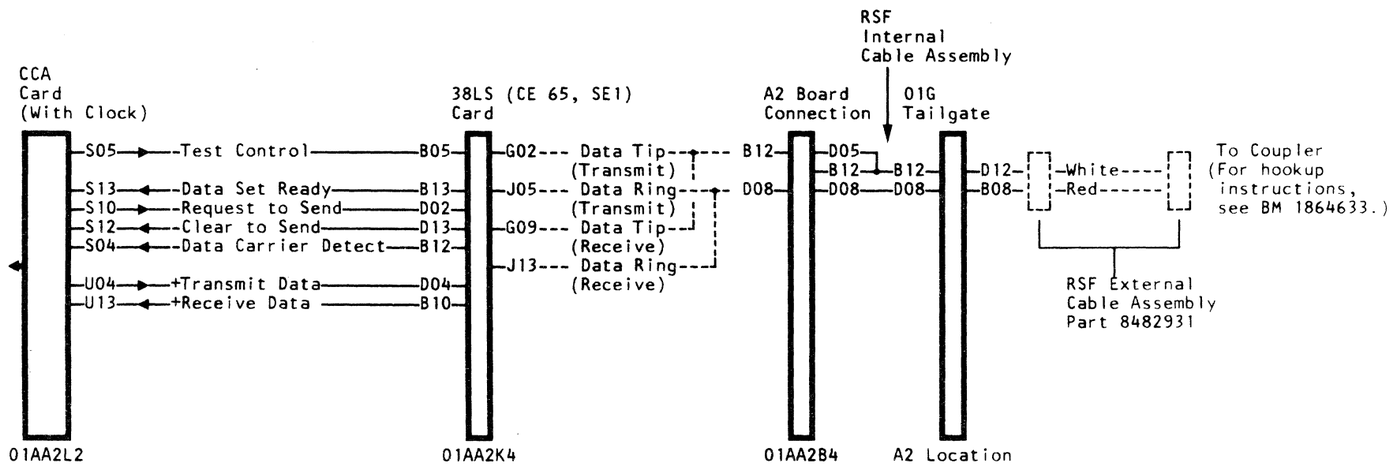


38LS/(U.S.A. and CANADA) CONFIGURATION (External Cable Part 8482931)



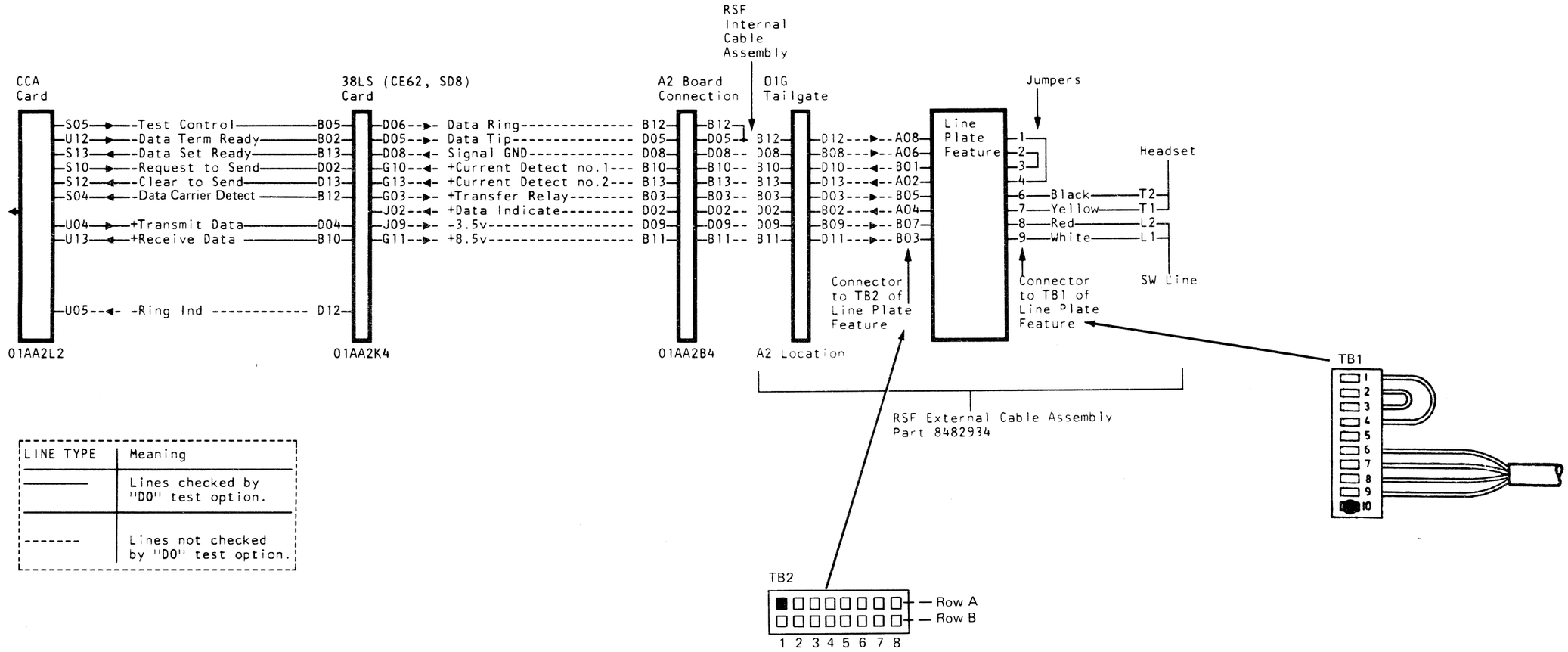
Line Type	Meaning
———	These lines are checked during the "DO" option test.
-----	These lines are not check during the "DO" option test.

38LS/(JAPAN) CONFIGURATION
(External Cable Part 8482931)



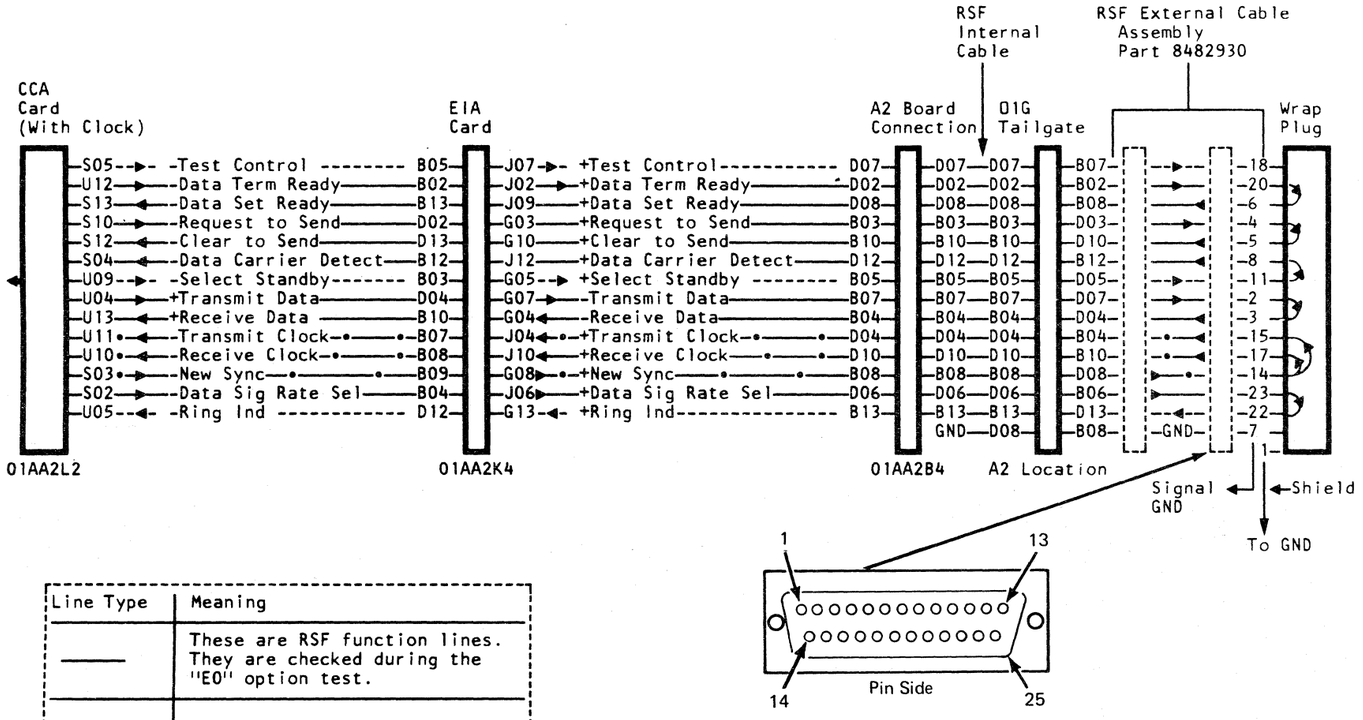
Line Type	Meaning
———	These lines are checked during the "DO" option test.
-----	These lines are not check during the "DO" option test.

LINE PLATE CONFIGURATION
(External Cable Part 8482934)



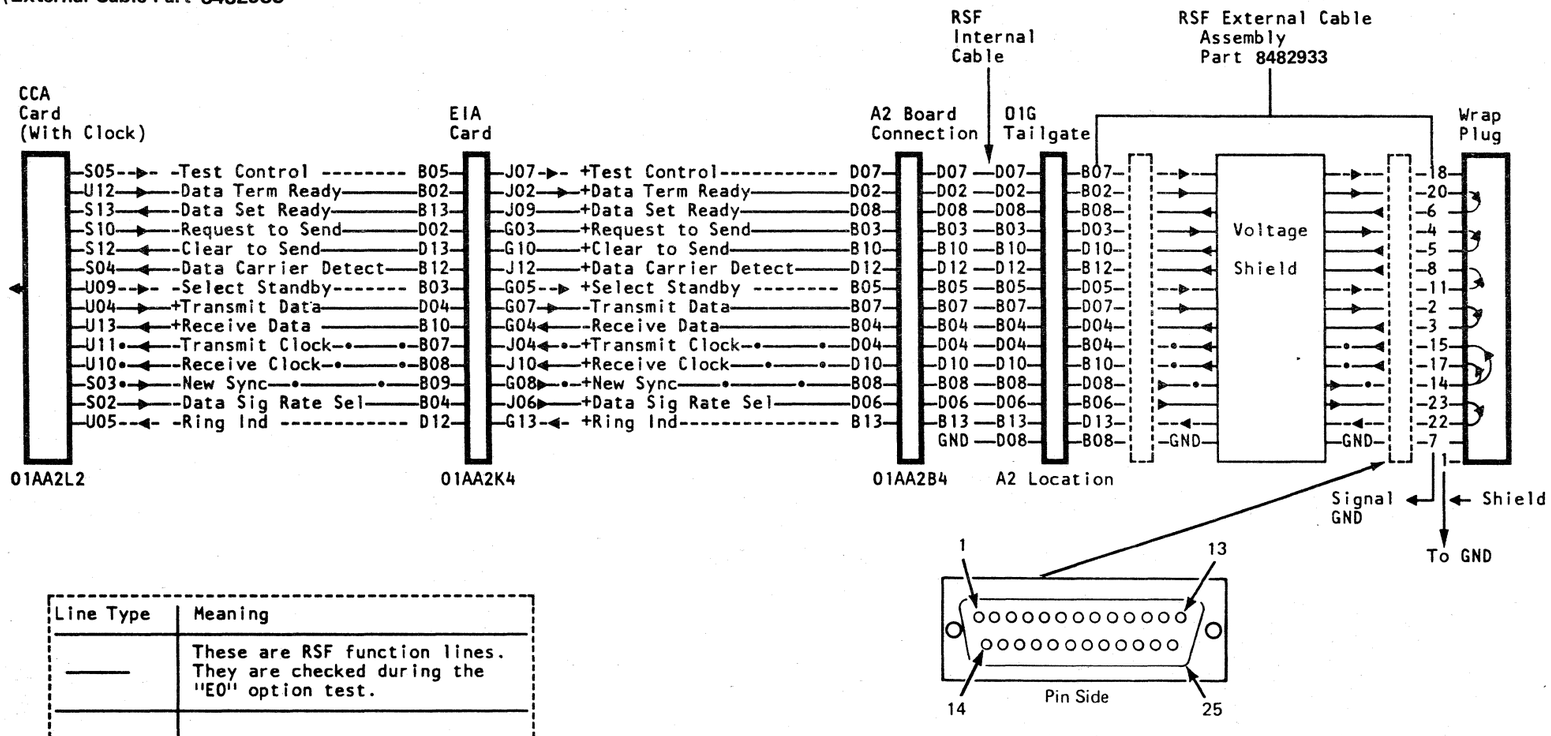
LINE TYPE	Meaning
———	Lines checked by "DO" test option.
-------	Lines not checked by "DO" test option.

EIA ADAPTER CONFIGURATION
(External Cable Part 8482930)



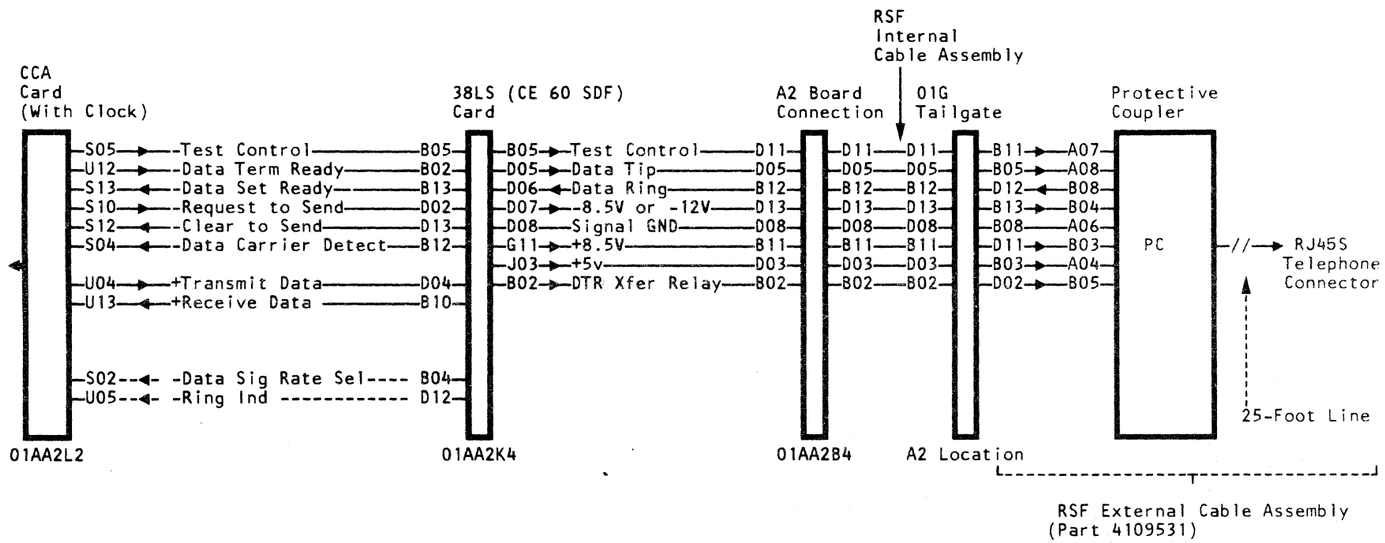
Line Type	Meaning
———	These are RSF function lines. They are checked during the "E0" option test.
-----	These lines are used by the diagnostic function only.
—•—•—	These lines are not used by the 4341 Processor.

EIA ADAPTER CONFIGURATION
(External Cable Part 8482933



Line Type	Meaning
———	These are RSF function lines. They are checked during the "E0" option test.
-----	These lines are used by the diagnostic function only.
—•—•—	These lines are not used by the 4341 Processor.

PROTECTIVE COUPLER CONFIGURATION
(External Cable Part 4109531)



Line Type	Meaning
———	These lines are checked during the "DO" option test.
-----	These lines are not check during the "DO" option test.

CONSOLE FUNCTIONS SERVICE AIDS

PATCH INSTALLATION AND UPDATE PROCEDURE

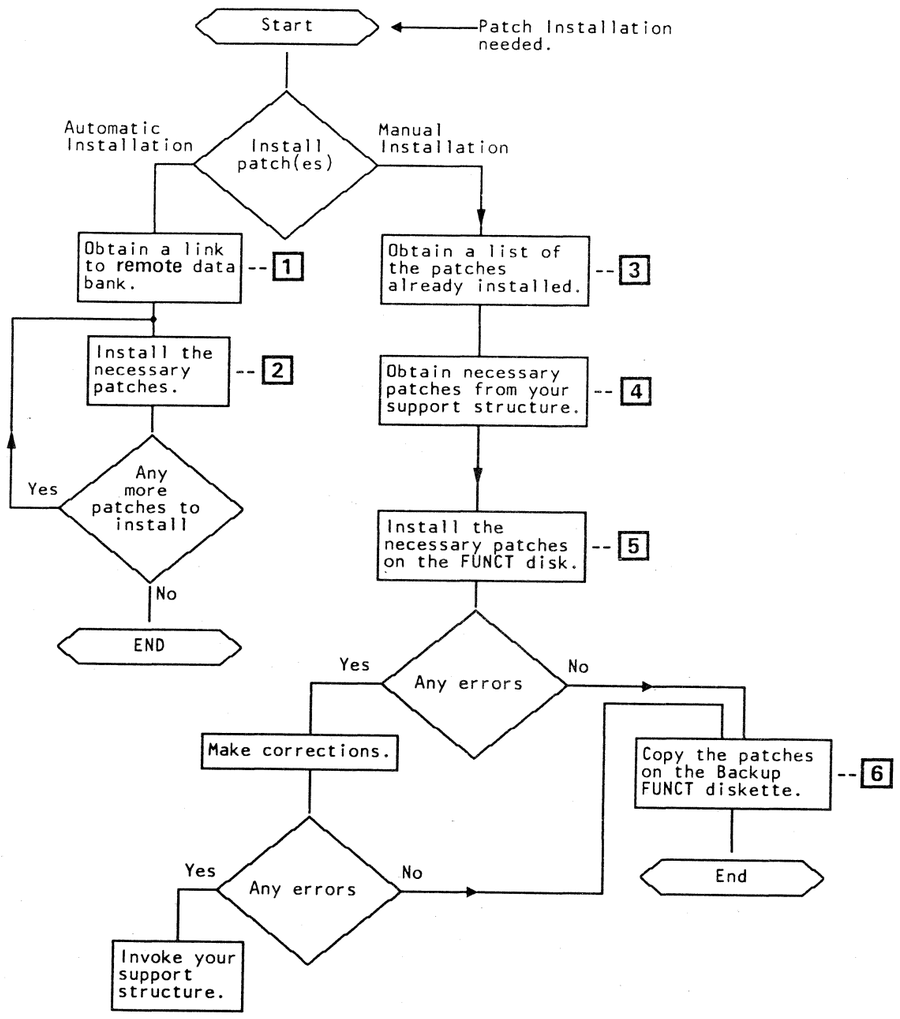
A patch is a set of commands that enables you to modify the diskette for special applications or to fix a problem.

This procedure should be used to install patches as a result of field detected problems for machines at any of the following microcode EC levels: 154323, 856093, 866868 or higher.

Patches can be automatically transferred to the diskette by using the remote support facility (RSF) or by entering the patch manually.

The "Patch Installation Flowchart" illustrates the procedure and the numbers direct you to step sequences in the procedure. The flowchart should be reviewed before starting.

PATCH INSTALLATION FLOW CHART



AUTOMATIC PATCH INSTALLATION

Sequences [1] and [2] can be performed only if the remote support facility is installed and a remote data bank is available.

[1] *****Obtain Necessary Patches***

1. Set **CE MODE** switch to **ON**.
2. Press **POWER ON/IML**.
3. Key in *QFS* to display the System Configuration screen.
4. Record the EC, REA, and serial numbers of the machine.
   - Use this data while attached to the remote data bank to identify the correct patches for the machine.
5. Invoke your support structure for RSF initialization.

[2] *****Patch Installation***

Note: *To perform the following steps, ensure that the machine has the remote support facility installed.*

1. Locate the patch you need.
2. Verify, activate, and install the patch on the diskette as follow:
   a. Insert the diskette you want to update.

      Note: *If a FUNCT diskette is updated during this procedure, ensure that* **both** *FUNCT diskettes are updated.*

   b. Press and hold down the **ALT** key; then press the **PAGE UP** key.
   c. Release both keys.
      - Cursor is positioned at the *END* line (line 13). For reference see "Patch Sample" on the following page.
   d. Enter your first initial, last name, month, date, and year in the indicated fields on the END line; then press ENTER. **Warning: Unpredictable error(s) occur if patch does not apply to your EC/REA level of diskette.**
      - Patch update action begins.
      - The patch is verified, activated, and permanently installed on the diskette.
   e. Observe and follow screen messages.
      - If the patch is already installed on the inserted diskette, a message indicates that the patch is active.
      - When the patch installation action is complete, the following message is displayed:

        PATCH IS ACTIVE
        PRESS ENTER TO CONTINUE
3. Repeat steps 1 and 2 of sequence [2] for any additional patch transfers to all diskettes that need to be updated during this procedure.

MANUAL PATCH INSTALLATION

The following sequences should be performed for manual patch installations for any of the following microcode EC levels: 154323, 856093, 866868, or higher.

3 *****Obtain Patch List*****

1. Set **CE MODE** switch to **ON**.
2. Press **POWER ON/IML**.
3. Key in *QBTP* and press **ENTER**.
   - Displays the patch list.
4. Make a copy of the patch names.
   - Use this data while communicating with your support structure to identify the patches for the machine.

4 *****Obtain Necessary Patches*****

1. Key in *QFS* to display the System Configuration screen.
2. Record the EC, REA, and serial numbers of the machine.
   - Use this data while attached to the remote data bank to identify the correct patches for the machine.
3. Invoke your support structure to get the patches needed; then return.

5 *****Patch Installation*****

1. Key in *QBFpatchname* and press **ENTER**:
   - The patchname is on line 01 **A** of the patch you copied.
     For reference, see "Patch Sample."
2. Enter the patch data (from line 01 through 13) exactly as it appears on the copy.
   - Press **ENTER** after you enter each line.
     - This checks the syntax of the line.

     Note: *If an error is found, the cursor is positioned under the error.*
3. Enter an *s* in any edit command input area **B**; and then press **ENTER**:
   - The cursor is positioned at the *END* line **C**.
4. Enter your first initial, last name, month, and day in the indicated fields on the *END* line **C**.
5. Press *ENTER*:
   - The patch is verified, activated, and permanently installed on the diskette.
6. Observe and follow screen messages:
   - When the patch installation action is complete, the following message is displayed:

     PATCH IS ACTIVE
     PRESS ENTER TO CONTINUE
   - The *PATCH LIST (QBTP)* screen is displayed when **ENTER** in pressed.
     - ACTIVE should appear next to the name of the patch you just entered.

   Note: *If the screen message reads* **WGN: CHECK ERROR***:*
   - *The patch may be copied wrongly from the support system (if it was hand copied).*
   - *The patch may be entered wrongly.*
     - Return to step 2 of sequence **5** to make correction.
   - *The CRC* **D** *may be in error.*
     - Return to step 2 of sequence **5** to make correction.
   - *The patch may be in error.*
   - *The patch may not be for your diskette EC/REA level.*

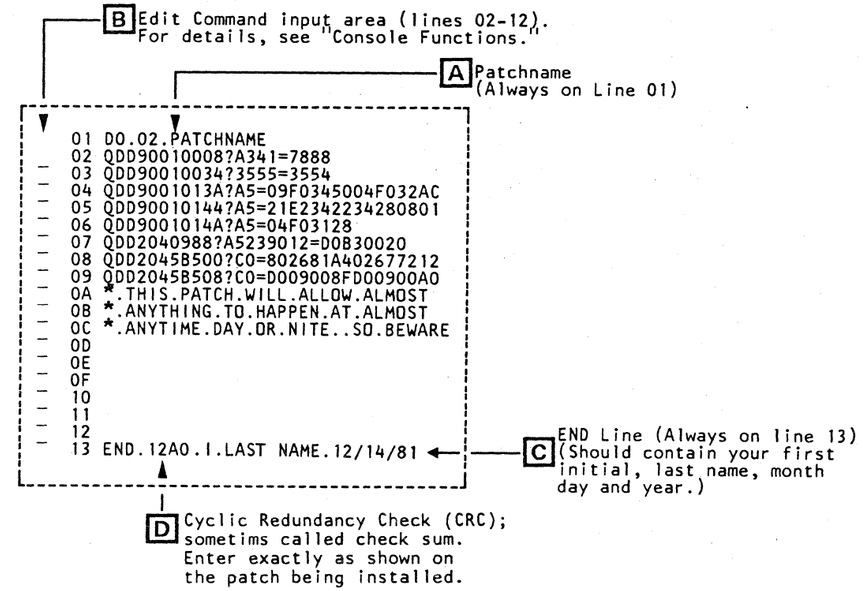
   If you are unable to correct the problem, **invoke your support structure.**
7. Repeat steps 1 through 6 of sequence **5** for each patch installation; then continue.

6 *****Patch Copy to Backup Disk*****

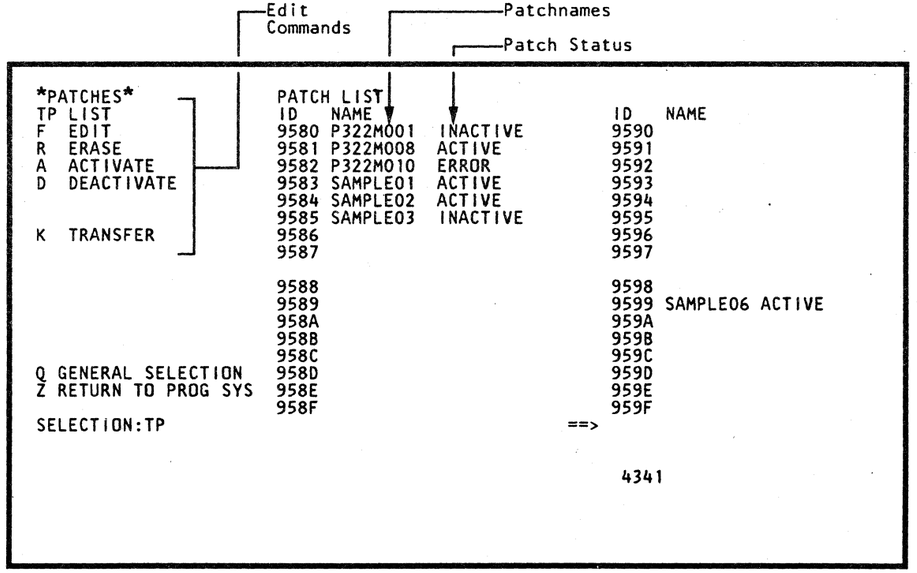
1. Record the patch names to be copied on the backup FUNCT Diskette.
2. Key in *QBKpatchname* and press **ENTER**.
   - Patchname is one of the names you recorded.
3. Follow the prompting messages on the screen.

   Note: *The* **TO** *disk is the backup FUNCT diskette; the* **FROM** *disk is the diskette that contains the patches.*
4. Key in *QBApatchname* and press **ENTER**.
   - Patchname is one of the names you recorded.
   - This command verifies, activates, and places the patch in the active status.
5. Repeat steps 1 through 4 of sequence **6** for each patch to be transferred to the backup FUNCT diskette.

SAMPLE PATCH



SAMPLE QBTP SCREEN



I/O AND CHANNEL TRACE PROCEDURE

This trace procedure is a system problem determination tool for 4341 Processors.

The trace function stores the results of the trace operations in a 4K buffer in auxiliary storage. The results of a trace operation can be displayed on the *QDTP* screen. A description of the data on the QDTP screen is on page 44 300 of *Volume 18*. System performance impact is very small.

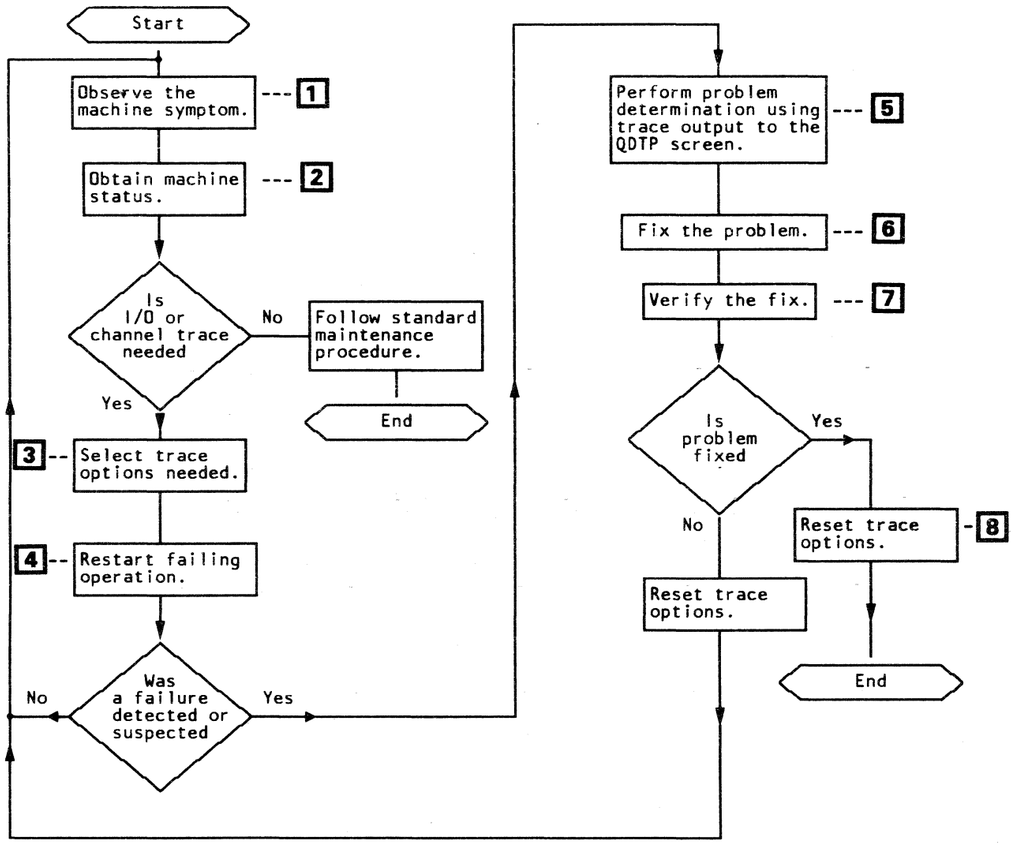
Note: *The IFCC trace function is available for machines at any of the following microcode EC levels:* **154322, 856092, 866867, or higher**. *No manual intervention is needed to activate this function. For details, see "Interface Control Check (IFCC) Trace," page 14 223.*

This procedure explains the use of I/O and Channel tracing and is sensitive to microcode EC updates. The following pages apply to the microcode EC levels indicated:

- **154322 or lower**: 14 616 through 14 618.
- **154323 or higher**: 14 619 through 14 621.
- **856XXX**: 14 619 through 14 621.
- **866XXX**: 14 619 through 14 621.

I/O AND CHANNEL TRACE FLOW CHART

This flowchart shows the basic format for performing the I/O and channel trace procedure as outlined in the example.



********Trace set-up********

Note: *Do the following steps before doing any trace functions for a machine with a microcode EC level up to 154322.*

1. Set **CE MODE** switch to **ON**.
2. For microcode levels up to **154321**, activate the trace assist from the Program Load screen:
   a. Key in *QLI* and press **ENTER**.
      - Displays the Mode-Assist (QLI) screen.
   b. Key in *nn* and press **ENTER**.
      - *nn* = The trace selection number indicated on the Mode-Assist (QLI) screen.
3. IML the processor:
   - Key in *M* and press **ENTER**.
4. Set the accumulate mode. (This enables multiple trace functions to be performed.)
   - When *IML COMPLETE* is indicated, key in *QA+* and press **ENTER**.

*******Procedure*******

Note: *The numbers in this procedure direct you to the same sequence of steps in the "I/O and Channel Trace Flowchart," page 14 615, and "I/O and Channel Trace Example,"* pages 14 617 and 14 618.

1 Observe the machine symptoms.
This is based on the condition of the system when you reached the customer site.

2 Obtain machine status.
This is based on information you obtain from the system.

3 Select the trace options needed and set accumulate mode on.

- This is based on the symptoms, status, and/or experienced with the type of problem.

4 Restart the operation that fails or perform an IML.

5 Perform problem determination.

- Key in *QDTP* to display the trace dump.
- Analyze the results.

  For description of trace output, see page 44 300.

6 Fix the problem.

7 Verify the fix.

8 Reset the trace function.
- Key in *QAN*.
- Key in *QLIR* to reset the assist on the Program Load screen.
- Key in *QLM* to IML the processor.

Return the system to the customer.

Some of the most used options available for I/O and channel tracing are:

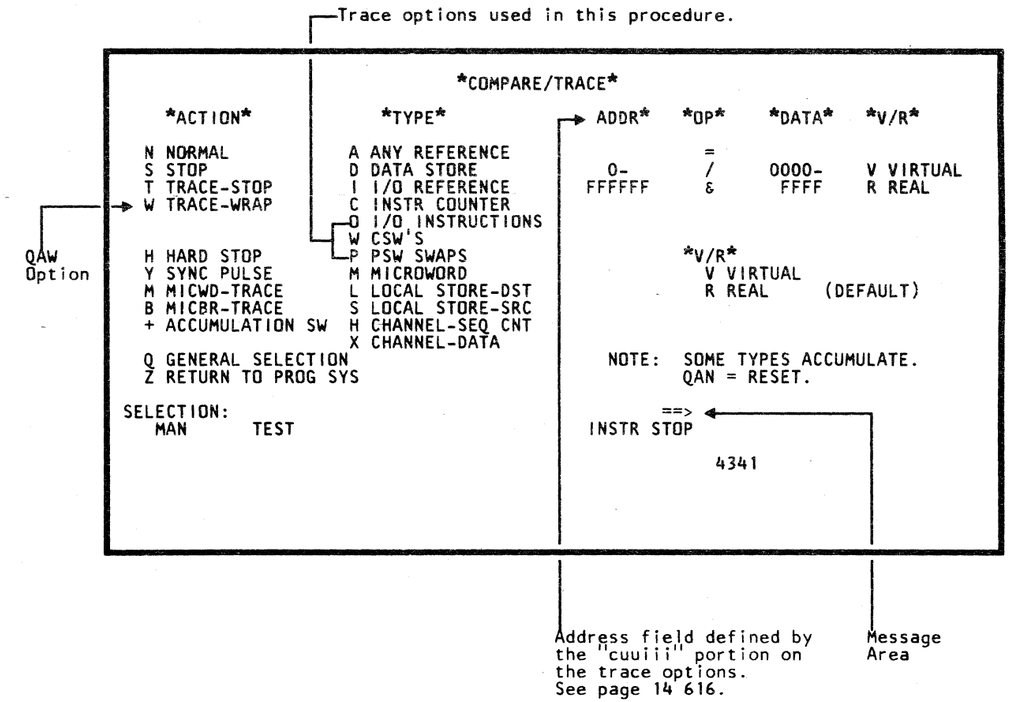
- *QAWP* — This option activates the PSW-swap trace function.
- *QAWW* — This option activates the CSW-store trace function for all channels and devices.
- *QAWWc..* — This option activates the CSW-store trace function for a specific channel.
  - **c** = any channel number on the system.
- *QAWO* — This option activates the I/O-instruction trace function for all channels and devices on the system.
- *QAWOc..* — This option activates the I/O-instruction trace function for all devices on a specific channel.
  - **c** = any channel number on the system.
- *QAWOcuu* — This option activate the I/O-instruction trace function for a specific device on a specific channel.
  - **c** = any channel number on the system.
  - **uu** = the hex address (00-FF) of the device you want to trace.
- *QAWOc..iii* — This option activates the I/O-instruction trace function for a specific instruction on all devices on a specific channel.
  - **c** = any channel number on the system.
  - **iii** = three letters of an I/O instruction as shown in the "I/O Instruction Chart."
- *QAWOcuuiii* — This option activates the trace function for a specific instruction, on a specific device, on a specific channel.
  - **c** = any channel number on the system.
  - **uu** = the hex address (00-FF) of the device you want to trace.
  - **iii** = three letters of an I/O instruction as shown in the "I/O Instruction Chart."

I/O INSTRUCTION CHART

iii	Instruction Type
CIO	Clear I/O
HDV	Halt Device
SIO	Start I/O
TIO	Test I/O
HIO	Halt I/O
TCH	Test Channel

More detailed options available for PSW and CSW tracing are on page 44 225 of *Volume 18*.

SAMPLE QA SCREEN



I/O and Channel Trace Example

This example shows you how to set and control I/O and channel trace functions. You may need the help of your support structure to analyze the output of the trace function.

1 *******Symptom*******

- The system is in *wait state.*

2 *******Machine Status*******

- Customer was IPLed on device 380 with output to channel 0.
- The Current PSW screen W indicates the *wait bit* W is set.
- A possible channel or I/O problem is present.

3 *******Trace Options Selected*********

1. Key in *QA+* and press **ENTER**.
2. Key in *QAWO0..* and press **ENTER**.
3. Key in *QAWO380* and press **ENTER**.
4. Key in *QAWW* and press **ENTER**.
5. Key in *QAWP* and press **ENTER**.

A description of these options is on page 14 616.

4 *******Restart Failing Operation*********

1. Key in *QLP* and press **ENTER**.
   Activates the trace functions specified.

   Note: *This is only one of the ways to activate the trace. The object is to activate the operation that you want to trace.*

SAMPLE QDP SCREEN

```
  *DISPLAY/ALTER*                          A CURRENT PSW
G GENERAL REGISTERS
C CONTROL REGISTERS                        FE02 0000 8000 0EDB
F FLOATING POINT REGISTERS                          B
P CURRENT PSW
K STORAGE KEY                    BC: CHNLMSK.E
V VIRTUAL STORAGE                EC:  R    TIE  PSW.KEY CMWP  ILC CC   PROG.MASK
M REAL STORAGE                        1111 1110   0000   0010  10   0     0000
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY             INSTRUCTION ADDRESS: 000EDB
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE                ADDRESS IN HEXADECIMAL
= HEX CALCULATOR                   OTHER DATA IN BINARY
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: PO                                ==>
   MAN WAIT TEST           370  TIMER: ON  INSTR STOP  DATA: 8017 R ADDR: 000EDB
                                ADDR-COMP: TRWR TYPE: ALLIOP  ADDR: 380
                                                  4341

9473 9473
```

I/O and Channel Trace Example (Continued)

5 *****Problem determination*****

1. When a failure is detected or suspected, press **STOP**, **MODE SEL**, and key in *QDTP*.
2. The *PSW and I/O TRACE* **C** screen is now displayed.
   If you press and hold **ALT** and press **Page up**, any additional trace screens are displayed.
3. The *CC* value of 3 **D** indicates the device 01F is not available to the system.

6 *****Problem Fix*****

1. Display the Program Load screen.
   - Key in *QL* and press **ENTER**.
     - The CONSOLE ADDR **E** is in error.
2. Key in *T001F* and press **ENTER**.
     - Changes the CONSOLE ADDR **E** to *01F*.

7 *****Verification of Fix*****

1. Perform an IPL.
   - Key in *P* and press **ENTER**.
     - If system indicates no error, problem is fixed. Continue with next step-sequence.
     - If system does indicate an error, continue with next step-sequence, and then follow standard maintenance procedures.

8 *****Trace Termination*****

1. Reset the trace functions.
   - Key in *QAN* and press **ENTER**.
2. Reset the assist on the Program Load screen.
   - Key in *QLIR* and press **ENTER**.
   - Key in *QLM* and press **ENTER**.
     - IMLs the processor.

SAMPLE QDTP SCREEN

```
  *DISPLAY/ALTER*               [C] PSW & I/O TRACE                     PAGE 00
G GENERAL REGISTERS               TYPE    CC DEV  INT/CAW/CNT    OLD PSW/CCW/CSW
C CONTROL REGISTERS             OPS TIO  3  01F
F FLOATING POINT REGISTERS      OPS TIO  0  380
P CURRENT PSW                   OPS TIO  1  380  0000 0001      0000 0168 0C00 0000
K STORAGE KEY                   OPS TIO  2  380  0000 007B
V VIRTUAL STORAGE               OPS SIO  0  380  0000 0160      0200 0080 0000 0050
M REAL STORAGE                  OPS TIO  0  380
T TRACE AREA                    OPS TIO  1  380  0000 0001      0000 0168 0C00 0000
S BLOCK SAVE AREA               OPS TIO  2  380  0000 0082
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY          OPS SIO  0  380  0000 0160      0200 0080 0000 0050
L LOCAL STORAGE                 OPS TIO  0  380
X EXTERNAL REGISTERS            OPS TIO  1  380  0000 0001      0000 0168 0C00 0000
W SP STORAGE                    OPS TIO  2  380  0000 0081
D CONSOLE DISK FILE             OPS SIO  0  380  0000 0160      0200 0080 0000 0050
= HEX CALCULATOR                OPS TIO  0  380
Q GENERAL SELECTION             OPS TIO  1  380  0000 0001      0000 0168 0C00 0000
Z RETURN TO PROG SYS            OPS TIO     380  0000 0074
SELECTION: TP00                                     ==>
                              370 TIMER: ON INSTR STOP  DATA:8017 R ADDR: 000EDB
                                     ADDR-COMP: TRWR TYPE: ALLIOP ADDR: 0..
                                                 4341
```

00= The trace area page number.

This sample QDTP screen applies to machines with a microcode EC level of **154321 or lower**.

SAMPLE QDTP SCREEN

```
  *DISPLAY/ALTER*               [C] PSW & I/O TRACE                           PAGE 00
G GENERAL REGISTERS             OPS TIO   CC=3 DEV=01F   CNT=0023 2A4D
C CONTROL REGISTERS             OPS TIO   CC=0 DEV=380
F FLOATING POINT REGISTERS      OPS TIO   CC=1 DEV=380   CSW=0000 0168 0C00 0000
P CURRENT PSW                   OPS TIO   CC=2 DEV=380   CNT=0000 007B
K STORAGE KEY                   OPS SIO   CC=0 DEV=380   CCW=0200 00B0 0000 0050
V VIRTUAL STORAGE                                        CAW=0000 0160
M REAL STORAGE                  OPS TIO   CC=0 DEV=380
T TRACE AREA                    OPS TIO   CC=1 DEV=380   CSW=0000 0168 0C00 0000
S BLOCK SAVE AREA               OPS TIO   CC=2 DEV=380   CNT=0000 0082
A AUXILIARY STORAGE             OPS SIO   CC=0 DEV=380   CCW=0200 00B0 0000 0050
U UCW/DEVICE DIRECTORY                                   CAW=0000 0160
L LOCAL STORAGE                 OPS TIO   CC=0 DEV=380
X EXTERNAL REGISTERS            OPS TIO   CC=1 DEV=380   CSW=0000 0168 0C00 0000
W SP STORAGE                    OPS TIO   CC=2 DEV=380   CNT=0000 0081
D CONSOLE DISK FILE             OPS SIO   CC=0 DEV=380   CCW=0200 00B0 0000 0050
= HEX CALCULATOR                                         CAW=0000 0160
Q GENERAL SELECTION             OPS TIO   CC=0 DEV=380
Z RETURN TO PROG SYS            OPS TIO   CC=1 DEV=380   CSW=0000 0168 0C00 0000
SELECTION: TP00                                   ==>

                                                         4341
```

00= The trace area page number.

This sample QDTP screen applies to machines with a microcode EC level of **154322 or higher**.

SAMPLE QL SCREEN

```
                              *PROGRAM LOAD*

PERFORM IML: M                V1  CS  TEST        PERFORM IPL: P
                              V2  MS  DATA
MODE-ASSIST MENU: I           V3  MS  ADDR        IPL UNIT ADDR: U 380
                              V4  SCOPE LP
*MODE*                        S  SAVE STG         RESET TYPE: R1 LOAD CLEAR
S/370                         Y  NO CS LD                     R2 LOAD NORMAL
*ASSISTS*
(NONE)                                            CONSOLE MODE: N1 PTR/KYBD
                                                                N2 DISPLAY
                                                                              [E]
                                                  CONSOLE ADDR: T0 010  T2 DSC
IML AT POWER-ON: X1 YES                                         T1 DSC  H3 DSC
                 X2 NO                            COPY KEY DEV: K3

STATUS  IPL COMPLETE                                Q GENERAL SELECTION
                                                    Z RETURN TO PROG SYS

SELECTION:                                      ==>
   MAN WAIT TEST          370 TIMER: ON  INSTR STOP   DATA: 8017 R ADDR: 000EDB
                                 ADDR COMP:  TRWR TYPE: ALLIOP  ADDR: 0..
                                                4341
```

*****Procedure*****

The pages that follow should *only* be used for machines at any of the following microcode EC levels:

- **154323 or higher**
- **856XXX**
- **866XXX**.

Note: *The numbers in this procedure direct you to the same sequence of steps in the "I/O and Channel Trace Flowchart" page 14 615, and "I/O and Channel Trace Example,"* pages 14 620 and 14 621.

1 Observe the machine symptoms.
This is based on the condition of the system when you reached the customer site.

2 Obtain machine status.
This is based on information you obtain from the system.

3 Select the trace options needed.

- This is based on the symptoms, status, and/or experienced with the type of problem.

4 Restart the operation that fails or perform an IML.

5 Perform problem determination.

- Key in *QDTP* to display the trace dump.
- Analyze the results.

  For description of trace output, see page 44 300.

6 Fix the problem.

7 Verify the fix.

8 Reset the trace function.
- Key in *QAN*.

Return the system to the customer.

Sample Trace Control (QDTC) Screen

```
  *DISPLAY/ALTER*                    * PSW TRACE CONTROLS *
G GENERAL REGISTERS          ALL:  LOAD I/O  MCK  PCK  SVC  EXT  VM
C CONTROL REGISTERS          _      Y   N    N    Y    Y    N    N
F FLOATING POINT REGISTERS
P CURRENT PSW                       * I/O TRACE CONTROLS *
K STORAGE KEY                    CHANNEL     UNIT     CSW      OPS
V VIRTUAL STORAGE                   0          1F       N       SIO
M REAL STORAGE
T TRACE AREA           Y = YES/ALL
S BLOCK SAVE AREA      N = NO/NONE  1          91       N       SIO
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY OPS = CIO    2          Y        Y       Y
L LOCAL STORAGE              HDV
X EXTERNAL REGISTERS         SIO    3          80       N       HIO
W SP STORAGE                 TIO
D CONSOLE DISK FILE          HIO    4          N        N       N
= HEX CALCULATOR             TCH
Q GENERAL SELECTION                 5          N        N       N
Z RETURN TO PROG SYS
SELECTION: TC                          ==>
                                    INSTR STOP
                                        4341
```

Input parameters. These parameters are used to direct the actions outlined by this Trace Control screen.

I/O INSTRUCTION CHART

OPS	Instruction Type
CIO	Clear I/O
HDV	Halt Device
SIO	Start I/O
TIO	Test I/O
HIO	Halt I/O
TCH	Test Channel

I/O TRACE CONTROLS DEFINITIONS

CHANNEL Defines the channel being addressed for tracing.

UNIT Defines the unit(s) to be traced.
- A "Y" in this column activates a trace for all units on the specified channel.
- A "N" blocks all trace functions to all units on the specified channel.
- A two-digit hex address can also be entered in this column to specify a specific device (unit) to be traced.

CSW Channel Status Word, CSW-Swap functions.
- A "Y" in this column activates the CSW-Swap trace function on channel and unit(s) specified.
- A "N" blocks all CSW-Swap tracing of the specified channel and unit(s).

OPS Defines one, all, or none of the I/O instructions defined in the OPS column and in the "I/O Instructions Chart," to be traced.

PSW TRACE CONTROLS DEFINITIONS

ALL: Defines all PSW-Swap functions to be traced.

LOAD Load PSW-Swap trace function.

I/O Input/Output PSW-Swap trace function.

MCK Machine-check PSW-Swap trace function.

PCK Program-check PSW-Swap trace function.

SVC Supervisor call PSW-Swap trace functions.

EXT External PSW-Swap trace function.

VM Virtual machine assist PSW-Swap trace function.

Note: When a "Y" is placed under the ALL:, this "Y" is replaced with a " " and a "Y" is placed under each PSW type.

I/O and Channel Trace Example

This example shows you how to set and control I/O and channel trace functions. You may need the help of your support structure to analyze the output of the trace function located on the QDTP screen.

[1] *****Symptom*****

- The system is in *wait state*.

[2] *****Machine Status*****

- Customer was IPLed on device 380 with output to channel 0.
- The Current PSW screen [A] indicates the *wait bit* [B] is set.
- A possible channel or I/O problem is present.

[3] *****Trace Options Selected*******

1. Key in *QDTC* and press **ENTER**.
   - Displays the Trace Control (QDTC) screen.
   - Refer to "Sample Trace Control (QDTC) screen" during the following steps.
   - Do not press **ENTER** until all trace selections are complete.
     - This example indicates when to press **ENTER**.
2. Activate the PSW-Swap trace functions:
   - Enter a *Y* under **ALL:** [C].
3. Activate the CSW-swap trace function for *all* channels:
   - Key a *Y* in each of the input areas of the **CSW** column [D].
4. Select *all* units on channels 0, 1, 2, 4, and 5 to be traced:
   - For each channel called out, enter a *Y* in the input area of the **UNIT** column [E].
5. Activate the I/O instruction trace for all OPS on device 80 of channel 3. Enter the following in the row next to channel 3 [F]:
   - *80* under **UNIT**.
     - Enables unit 80 on channel 3 to be traced.
   - *Y* under **OPS**.
     - Enables all the I/O instructions shown on the QDTC screen to be traced.
     - For definition of each **OPS**, see the "I/O Instruction Chart," page 14 619.
6. Activate the I/O instruction trace on all OPS for all devices of channel 0.
   Enter the following in the row next to channel 0 [G]:
   - *Y* under **OPS**.
     - Enables all the I/O instructions shown on the QDTC screen to be traced.
     - For definition of each **OPS**, see the "I/O Instruction Chart," page 14 619.

SAMPLE QDP SCREEN

```
  *DISPLAY/ALTER*                                   [A] CURRENT PSW
G GENERAL REGISTERS
C CONTROL REGISTERS                                 FE02 0000 8000 0EDB
F FLOATING POINT REGISTERS
P CURRENT PSW                                                  [B]
K STORAGE KEY                   BC: CHNLMSK.E
V VIRTUAL STORAGE               EC:  R    TIE   PSW.KEY CMWP  ILC CC    PROG.MASK
M REAL STORAGE                     1111 1110    0000    0010  10   0     0000
T TRACE AREA
S BLOCK SAVE AREA
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY             INSTRUCTION ADDRESS: 000EDB
L LOCAL STORAGE
X EXTERNAL REGISTERS
W SP STORAGE
D CONSOLE DISK FILE                ADDRESS IN HEXADECIMAL
= HEX CALCULATOR                   OTHER DATA IN BINARY
Q GENERAL SELECTION
Z RETURN TO PROG SYS
SELECTION: PO                                        ==>
   MAN WAIT TEST          370  TIMER: ON  INSTR STOP  DATA: 8017 R ADDR: 000EDB
                                    ADDR-COMP: TRWR TYPE: ALLIOP  ADDR: 380
                                                      4341

9473 9473
```

Sample Trace Control (QDTC) Screen

```
                              [C] Enter a "Y" here to trace all the PSW-swap
                                  trace functions.

  *DISPLAY/ALTER*                               * PSW TRACE CONTROLS *
G GENERAL REGISTERS                   ALL:  LOAD I/O  MCK  PCK  SVC  EXT  VM
C CONTROL REGISTERS                    -->   _     Y    Y    Y    Y    Y    Y    Y
F FLOATING POINT REGISTERS
P CURRENT PSW
K STORAGE KEY                                   * I/O TRACE CONTROLS *
V VIRTUAL STORAGE                          CHANNEL      UNIT     CSW      OPS
M REAL STORAGE                                 0          Y        Y        Y
T TRACE AREA                Y = YES/ALL   [G]
S BLOCK SAVE AREA           N = NO/NONE        1          Y        Y        N
A AUXILIARY STORAGE
U UCW/DEVICE DIRECTORY      OPS = CIO          2          Y        Y        N
L LOCAL STORAGE                   HDV
X EXTERNAL REGISTERS              SIO  [F]---> 3          80       Y        Y
W SP STORAGE                      TIO
D CONSOLE DISK FILE               HIO          4          Y        Y        N
= HEX CALCULATOR                  TCH
Q GENERAL SELECTION                            5          Y        Y        N
Z RETURN TO PROG SYS
SELECTION: TC                             ==>
                                    INSTR STOP                                [D] CSW
                                                                                  Column
                                                   4341                       [E]
                                                                              UNIT
                                                                              Column
```

7. Ensure that no I/O instructions are traced on channels 1, 2, 4, and 5:
   - For each channel specified, enter a *N* in the **OPS** column.
8. Press **ENTER**.
   - This step enters all the trace selections to the processor.

[4] *****Restart Failing Operation*******

1. Key in *QLP* and press **ENTER**.
   - Activates the trace functions specified.

Note: *This is only one of the ways to activate the trace. The object is to activate the operation that you want to trace.*

I/O and Channel Trace Example (Continued)

5 *******Problem determination*******

1. When a failure is detected or suspected, press **STOP**, **MODE SEL**, and key in *QDTP*.
2. The *PSW and I/O TRACE* **H** screen is now displayed.

   If you press and hold **ALT** and press **Page up**, any additional trace screens are displayed.
3. The *CC* value of 3 **I** indicates the device 01F is not available to the system.

6 *******Problem Fix*******

1. Display the Program Load screen.
   - Key in *QL* and press **ENTER**.
     - The CONSOLE ADDR **J** is in error.
2. Key in *T001F* and press **ENTER**.
     - Changes the CONSOLE ADDR **J** to *01F*.

7 *******Verification of Fix*******

1. Perform an IPL.
   - Key in *P* and press **ENTER**.
     - If system indicates no error, problem is fixed. Continue with next step-sequence.
     - If system does indicate an error, continue with next step-sequence, and then follow standard maintenance procedures.

8 *******Trace Termination*******

1. Reset the trace functions.
   - Key in *QAN* and press **ENTER**.

SAMPLE QDTP SCREEN

```
  *DISPLAY/ALTER*              H PSW & I/O TRACE                          PAGE 00
G GENERAL REGISTERS        OPS TIO   CC=3 DEV=01F  CNT=0023 2A4D
C CONTROL REGISTERS        OPS TIO   CC=0 DEV=380
F FLOATING POINT REGISTERS OPS TIO   CC=1 DEV=380  CSW=0000 0168 0C00 0000
P CURRENT PSW              OPS TIO   CC=2 DEV=380  CNT=0000 007B
K STORAGE KEY              OPS SIO   CC=0 DEV=380  CCW=0200 00B0 0000 0050
V VIRTUAL STORAGE                                 CAW=0000 0160
M REAL STORAGE             OPS TIO   CC=0 DEV=380
T TRACE AREA               OPS TIO   CC=1 DEV=380  CSW=0000 0168 0C00 0000
S BLOCK SAVE AREA          OPS TIO   CC=2 DEV=380  CNT=0000 0082
A AUXILIARY STORAGE        OPS SIO   CC=0 DEV=380  CCW=0200 00B0 0000 0050
U UCW/DEVICE DIRECTORY                            CAW=0000 0160
L LOCAL STORAGE            OPS TIO   CC=0 DEV=380
X EXTERNAL REGISTERS       OPS TIO   CC=1 DEV=380  CSW=0000 0168 0C00 0000
W SP STORAGE               OPS TIO   CC=2 DEV=380  CNT=0000 0081
D CONSOLE DISK FILE        OPS SIO   CC=0 DEV=380  CCW=0200 00B0 0000 0050
= HEX CALCULATOR                                  CAW=0000 0160
Q GENERAL SELECTION        OPS TIO   CC=0 DEV=380
Z RETURN TO PROG SYS       OPS TIO   CC=1 DEV=380  CSW=0000 0168 0C00 0000
SELECTION: TP00                                ==>
                                                  4341
```

00= The trace area page number.

SAMPLE QL SCREEN

```
                          *PROGRAM LOAD*

PERFORM IML: M            V1  CS  TEST        PERFORM IPL: P
                          V2  MS  DATA
MODE-ASSIST MENU: I       V3  MS  ADDR        IPL UNIT ADDR: U 380
                          V4  SCOPE LP
*MODE*                    S  SAVE STG         RESET TYPE: R1 LOAD CLEAR
S/370                     Y  NO CS LD                     R2 LOAD NORMAL
*ASSISTS*
(NONE)                                        CONSOLE MODE: N1 PTR/KYBD
                                                            N2 DISPLAY

                                              CONSOLE ADDR: T0 010  T2 DSC
IML AT POWER-ON: X1 YES                                     T1 DSC  H3 DSC
                 X2 NO                        COPY KEY DEV: K3

STATUS  IPL COMPLETE                             Q GENERAL SELECTION
                                                 Z RETURN TO PROG SYS
SELECTION:                                   ==>
   MAN WAIT TEST       370 TIMER: ON  INSTR STOP   DATA: 8017 R ADDR: 000EDB
                             ADDR COMP:  TRWR TYPE: ALLIOP  ADDR: 0..
                                           4341
```

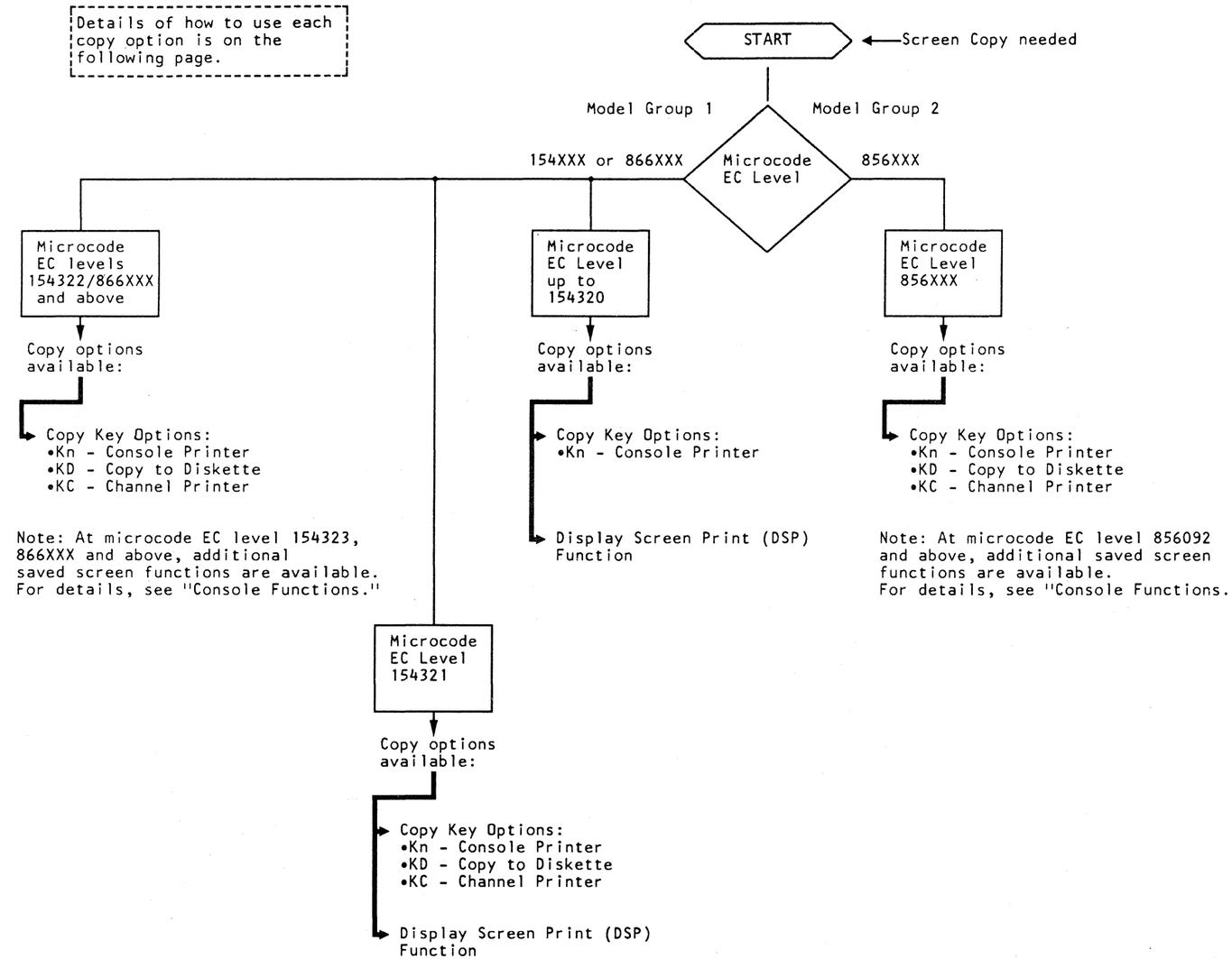
J

SCREEN COPY OPTIONS

This service aid contains the procedures to copy screens. See the "Copy Option Availability Diagram." Locate the microcode EC level of the machine, select a copy option, and then follow the appropriate procedure on the following page.

Warning: To ensure that the screen input data is not lost while copying the screen, press the *ENTER* key before pressing the *COPY* key. If you do not save the input data, it is lost when the *COPY* key is pressed.

COPY OPTION AVAILABILITY DIAGRAM



Copy Key Options

The **COPY** key can be assigned to copy on a:

- Console Printer - **K***n*.
  - *n* = 1, 2, or 3; as shown under *Console Address* on the Program Load (QL) screen.
- Diskette - **KD**
- Channel Printer - **KC***cuu*
  - *cuu* = the channel and address of the printer; (example: 00e = channel 0, address hex 0e).

Ensure that the copy option you select is available for the microcode EC level of the processor; see "Copy Option Availability Diagram," page 14 625.

Select one of the following procedures:

K*n** - *Console Printer*

1. Display the Program Load screen.
   - Key in *QL* and press **ENTER**.
2. Key in **K***n* and press **ENTER**.
   - *n* = 1, 2, or 3; as shown under *Console Address* on the Program Load (QL) screen.

The **COPY** key is now assigned to copy on the specified console printer. Normal operations can be continued without additional action.

KD** - *Diskette*

1. Set **CE MODE** switch to **ON**.
2. Display the Program Load screen.
   - Key in *QL* and press **ENTER**.
3. Key in *KD* and press **ENTER**.

The **COPY** key is now assigned to copy on a diskette. The screen copies are stored in the save area of the diskette. For information on the diskette save area, see "Saved Screen Logout (QEW)."

****Continuing Normal Operations****

1. Ensure that the FUNCT disk is mounted.
2. Set **CE MODE** switch to **NORMAL**.
3. Configure **COPY** key to console printer.

KC*cuu** - *Channel Printer*

Notes:

- *The* **KC** *option is operational when the processor has been IMLed but not IPLed.*
- *If the machine has been IPLed, a QCLEAR is needed to enable the* **KC** *option.*
- *To copy the QVY22 screen on a channel printer:*
  1. *Copy the screen to the diskette, by using the KD copy option.*
  2. *Copy the saved QVY22 screen using the QEWC option. For details, see ""Saved Screen (QEW).""*

     Note: *Machine must be re-IMLed if options QVY22 or QVU22ADJUST are used.*
- *To copy other QV (Insert/Extract) screens, perform the following steps:*
  1. *Enter QOM).*
  2. *Display the QV screen you want to copy.*
  3. *Enter QON.*
  4. *Press START key.*
  5 *Press COPY key.*

Warning: A QCLEAR alters customer data in processor storage.

1. Set **CE MODE** switch to **ON**.
2. Display the Program Load screen.
   - Key in *QL* and press **ENTER**.
3. Key in *KCcuu* and press **ENTER**.
   - *cuu* = the channel number and two-digit hex address of the printer.

The **COPY** key is now assigned to copy on the specified channel printer.

Note: *To copy a QV (Insert/Extract) screen, perform the following steps before pressing the* **COPY** *key:*

1. *Enter: QOM.*
2. *Display the QV screen you want to copy.*
3. *Enter: QON.*
4. *Press the* **START** *key.*

****Continuing Normal Operations****

1. Ensure that the FUNCT disk is mounted.
2. Set **CE MODE** switch to **NORMAL**.
3. Configure **COPY** key to console printer.

Display Screen Print (DSP) Function

The display screen print (DSP) function is a stand-alone program that is loaded into processor storage. The DSP function enables you to print the displayed screen on a channel-attached printer.

Note: *Some Power screens can not be copied by using this function.*

Messages are displayed if the printer is not ready or a printer address is entered wrongly.

DSP is available at microcode EC levels up to 154321; this function is replaced by the **KC***cuu* option at higher microcode EC levels.

Notes:

- *The DSP function is operational when the processor has been IMLed but not IPLed.*
- *If the machine has been IPLed, a QCLEAR is needed to enable the DSP function.*

Warning: A QCLEAR distroys customer data in processor storage.

****DSP Function****

1. Ensure that:
   a. The FUNCT diskette is mounted.
   b. The processor has completed a successful IML.
   c. The channel-attached printer is ready.
2. Set **CE MODE** switch to **ON**.
3. Display the screen you want to copy:

   Note: *To copy a QV (Insert/Extract) screen, perform the following steps before continuing:*

   a. Enter: QOM.
   b. Display the QV screen you want to copy.
   c. Enter: QON.
   d. Press the **START** *key.*
4. Activate the DSP function by one of the following:
   a. Key in *QICOPYcuu* and press **ENTER**.
      - *cuu* = the channel number and two-digit hex address of the printer.
   b. Press and hold the **ALT** key, and then press the **PF5** key.
      - A message is displayed requesting you to enter the channel number and address of the printer.

CE LOGS

An area for CE logs is available on the functional (FUNCT) diskette. The CE logs area is included in the Saved Screens (QEW) area.

CE logs, under the direction of MAPs, allow communicating information about repair activities on intermittent problems. When a problem is intermittent, the MAPs direct the service representative to display the CE logs to see what repair activity, if any, has been done. When a repair action cannot be verified, the MAPs direct the service representative to make a new CE log entry.

Saved Screens (QEW)

Up to four CE Log screens and saved screens can be stored in the saved screens area of the diskette. These screens are numbered in hex, 00 through 03.

Two CE logs are formatted on each CE Log screen. This allows for a possible total of eight CE logs when there are no Saved screens.

When both CE Log and Saved screens have been stored in the saved screens area, the CE Log screens are assigned to the lower-numbered saved screens locations. A new CE log entry is assigned to location 00, and previous entries are incremented by one.

For additional information, see Volume 18, Section 44, "Saved Screens (QEW)."

How to Use CE Logs

CE logs are part of the saved screens (QEW) function, and can be entered, displayed, and printed in CE mode only.

Displaying CE Log Titles

To display the Saved Screens List screen, enter: QEWT

The Saved Screens List screen (QEWT) lists titles for all stored CE Log screens and Saved screens. For an example of this screen, see the right (RH) column.

CE Log screen titles, if any, are listed under the heading "LOG TITLE." (Notice that there may be two CE log entries on each screen.) Saved screens titles, if any, are listed under the heading "CE TITLE."

Displaying CE Logs

To display a CE log, enter: QEWDxx
(xx = screen number, 00 through 03, from the Saved Screens List screen.)

Two CE logs may be displayed on each screen. For an example of a CE Log screen (QEWDxx), see the right (RH) column.

Making a New CE Log Entry

To make a new CE log entry, enter: QEWE

- If space is available in the saved screens area (less than four CE Log and Saved screens stored), a screen with two blank formatted CE logs is displayed. Key in the CE log data and press the ENTER key. This CE Log screen is stored at saved screens location 00. (Previously stored screens are moved to the next higher location.)
- If a total of four CE Log and Saved screens has already been stored, a message is displayed to indicate that the saved screens area is full. Erase (or purge) screens to make space available for the new screen.

Editing an Existing CE Log

To edit an existing CE log, enter: QEWExx (xx = CE Log screen number, 00-03). To input data move the cursor to the area to be changed. Do not press ENTER until you have completed all data entries. When you press ENTER, the edited CE Log is saved at location 00.

Note: *Pressing the the MODE SEL key or changing the command on the SELECTION line prevents saving the displayed CE log screen.*

Erasing CE Log and Saved Screens

- To erase one CE Log screen, enter: QEWRxx
  (xx = CE Log screen number, 00 - 03)

  If two CE logs are on the screen, both are erased.
- To erase all CE Log screens, enter: QEWX

  This erases CE Log screens only. Saved screens remain.
- To erase all Saved screens, enter: QEWY

  This erases Saved screens only. CE Log screens remain.

EXAMPLE: Saved Screens List Screen (QEWT)

```
*SAVED SCREENS*        ADDR RANGE (00/0E)              DATE: 80/199 19:19

 T LIST                ***** LOG TITLE *************** LOG TITLE ***********

 D DISPLAY              00   RC 669278AE
 L RE-TITLE

 E CE LOG EDIT

 R ERASE ONE           ***** CE TITLE ************************** SAVED DATE *
 X PURGE CE LOG SCRNS
 Y PURGE CE SCRNS       01   QECD                                 80/175 10:04

 F SEND TO CONS PRT
 C SEND TO CHNL PRT

 Q GENERAL SELECT
 Z RTN TO PROG SYS

SELECTION: WT00                                  ==>

                                                          4341
```

EXAMPLE: CE Log Screen (QEWDxx)

```
 LOG1: RC 669278AE          (ENTER KEYWORD SYMPTOM)       DATE: 80/10/21
SYMPTOM: Machine check and RC 669278AE.

FRUS CALLED: A1G B1K                     FRUS CHANGED: A1G

DIAGNOSTIC RESULTS/COMMENTS: Tests did not sense failure.


INCIDENT:          PROBLEM:             CE NAME j smith

 LOG2:                          (ENTER KEYWORD SYMPTOM)       DATE: YY/MM/DD
SYMPTOM:

FRUS CALLED:                             FRUS CHANGED:

DIAGNOSTIC RESULTS/COMMENTS:


INCIDENT:          PROBLEM:             CE NAME
SELECTION: WD00                                 ==>

                                                          4341
```

Printing CE Logs

CE logs can be printed on either a console printer or a channel-attached printer.

Printing CE Logs on a Console Printer

Warning: If a job is running, check the Program Load screen (QL) to ensure that the console printer is disconnected before proceeding. (When disconnected, the *H* device in the "CONSOLE ADDR" field indicates "DSC.")

- To print one CE Log screen on a console printer, enter: QEWFxx (xx = Saved Screens screen number)
- To print all CE Log screens on a console printer, enter: QEWFALL

Printing CE Logs on a Channel-Attached Printer

Warning: Do not try to print CE logs on a channel-attached printer when a job is running. Main storage must be cleared.

CE logs can be printed on a channel-attached printer after the processing unit (PU) has been IMLed and:

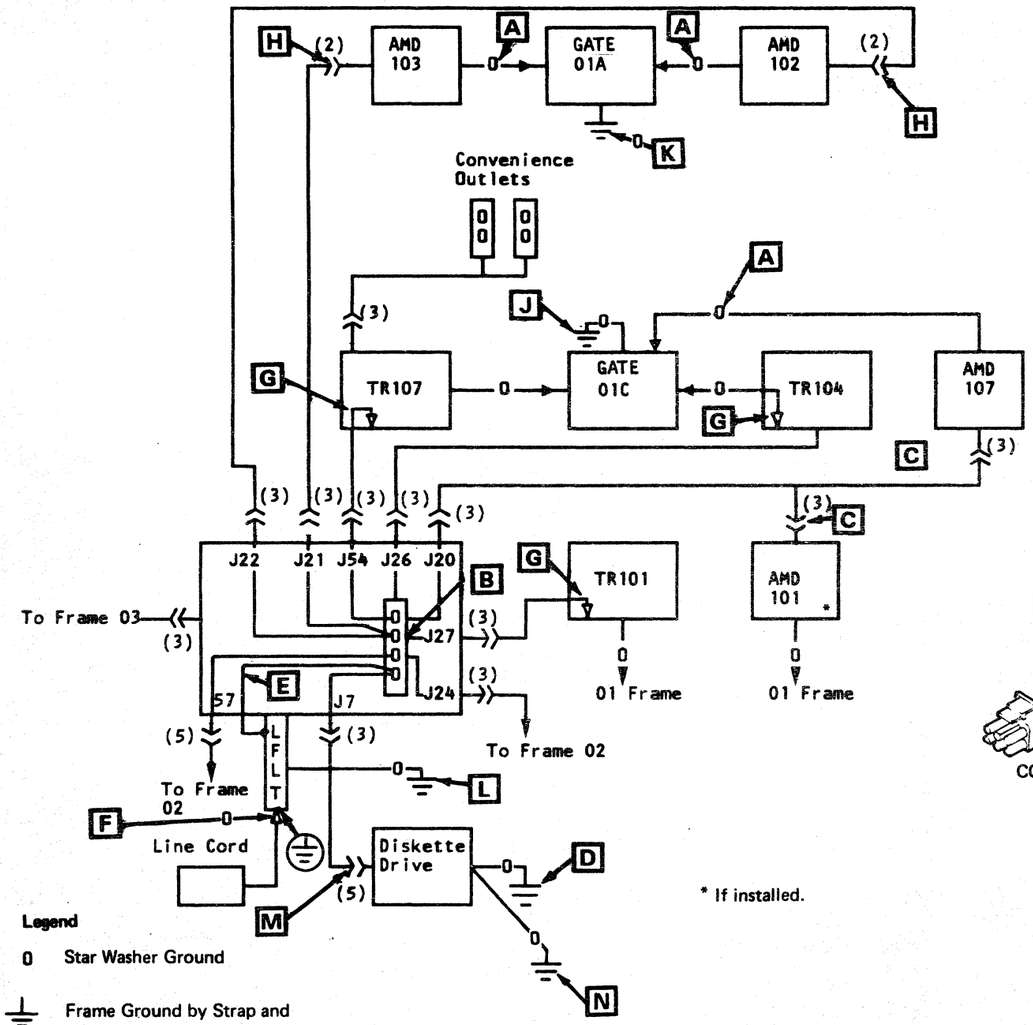
a. Before IPL, or

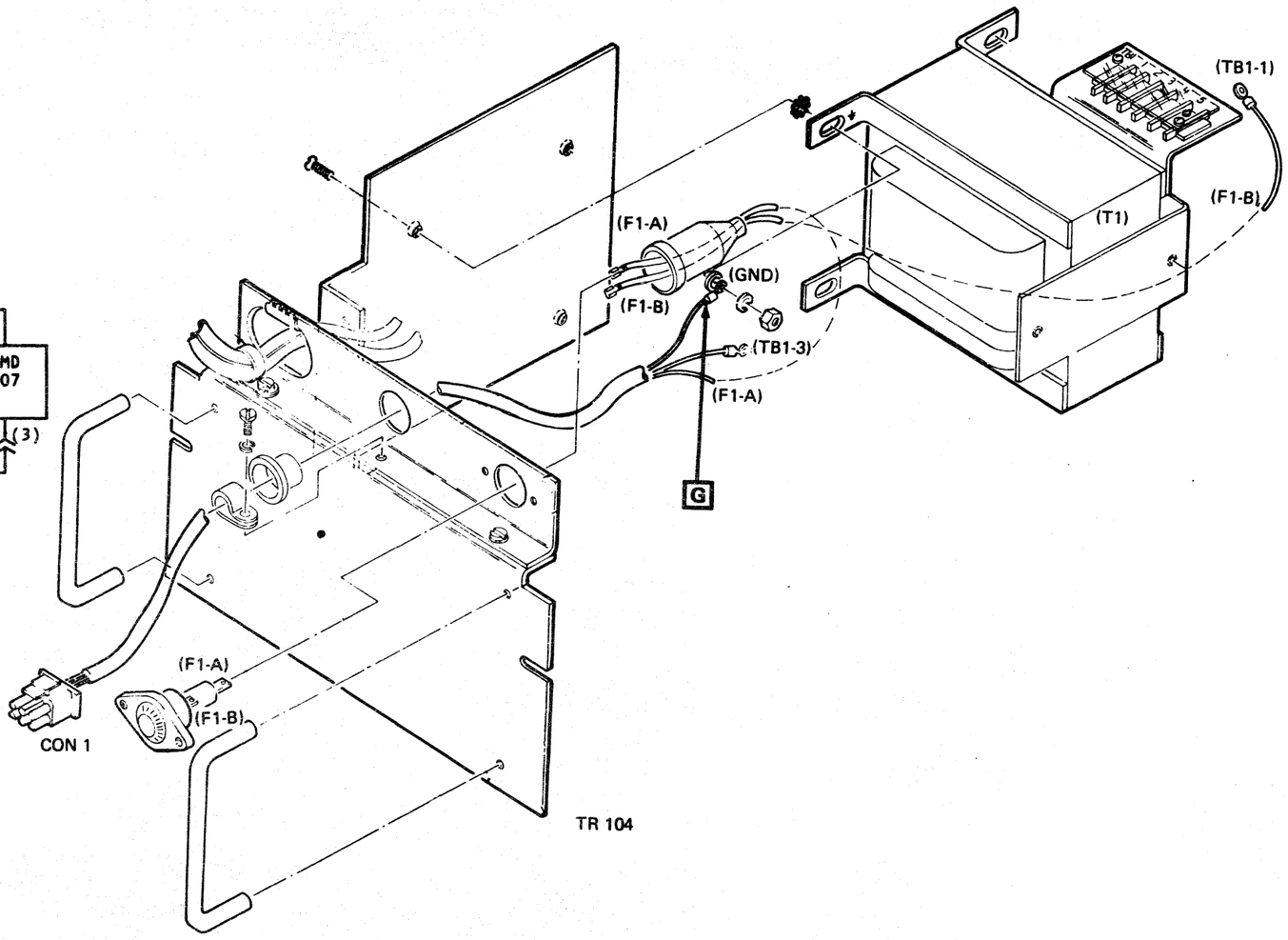
b. After IPL if main storage is first cleared by pressing the MODE SEL key and entering QCLEAR. (Do NOT do this if a job is running.)

- To print one CE Log screen on a channel-attached printer, enter: QEWCxx cuu
  xx = Saved Screens screen number
  cuu = printer address
- To print all CE Log screens on a channel-attached printer, enter: QEWCALL cuu
  cuu = printer address

GROUNDING PATHS

GROUNDING, MODEL GROUP 2, FRAME 01





TR 104

Legend

0 Star Washer Ground

Frame Ground by Strap and Star Washers

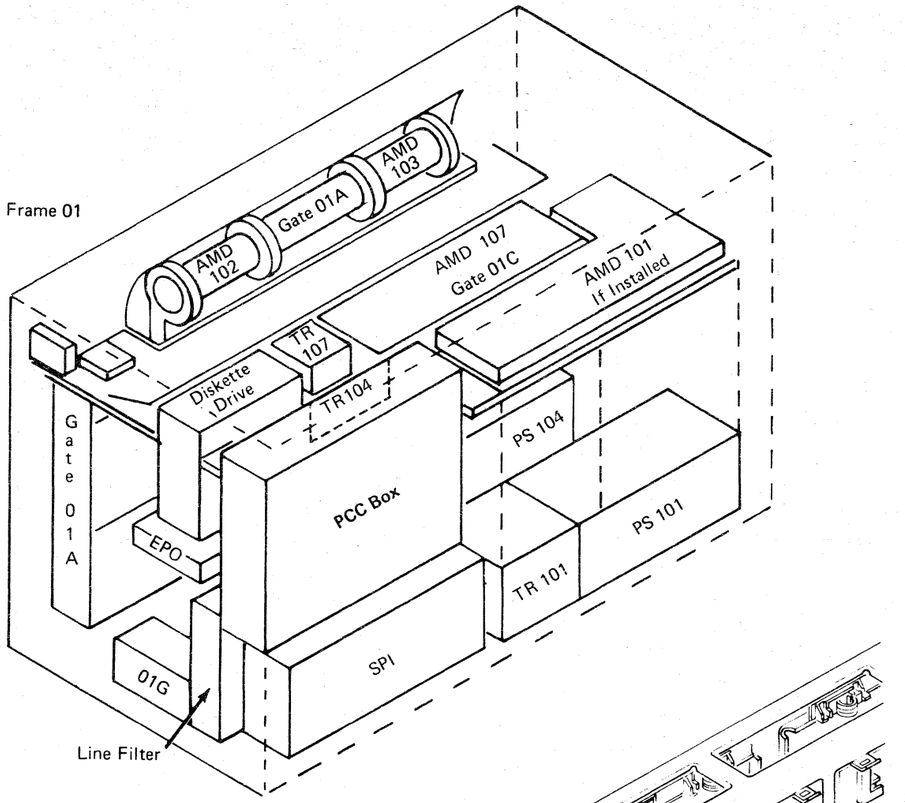
( ) Connector Pin Position

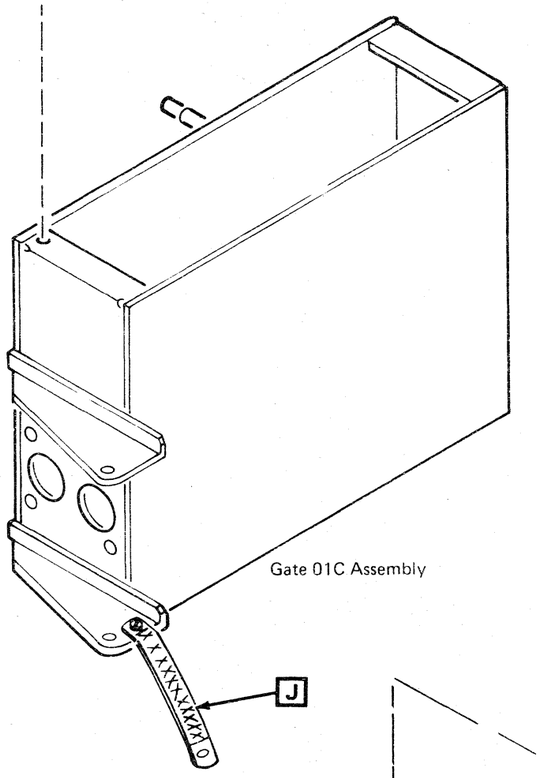
Internal Assembly Ground. (Star Washer)

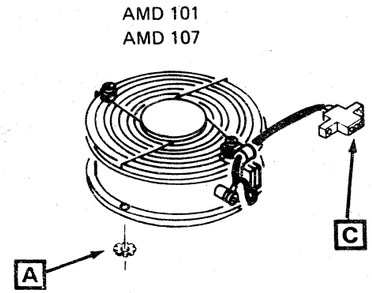
LFLT = Line Filter

Power Cord Entry Point

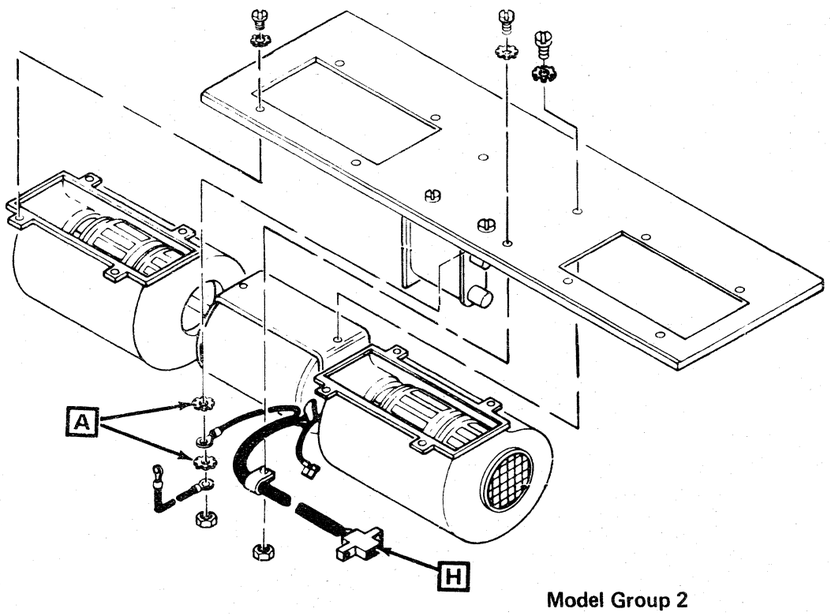
* If installed.

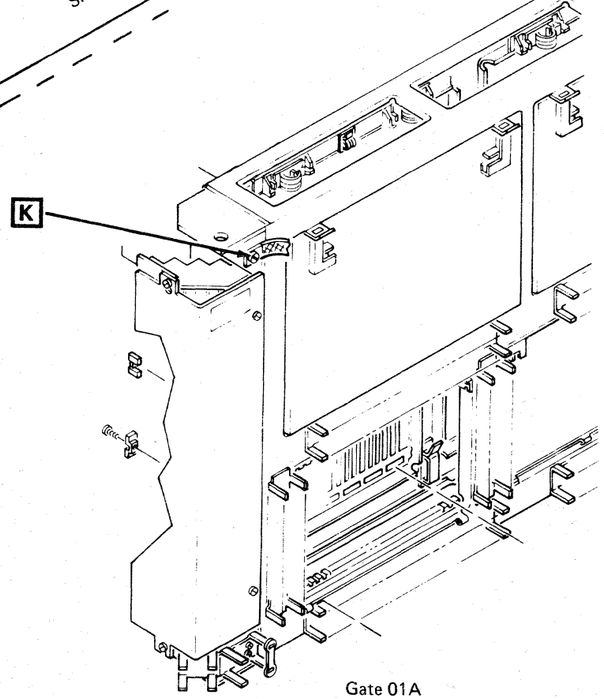






AMD 102
AMD 103



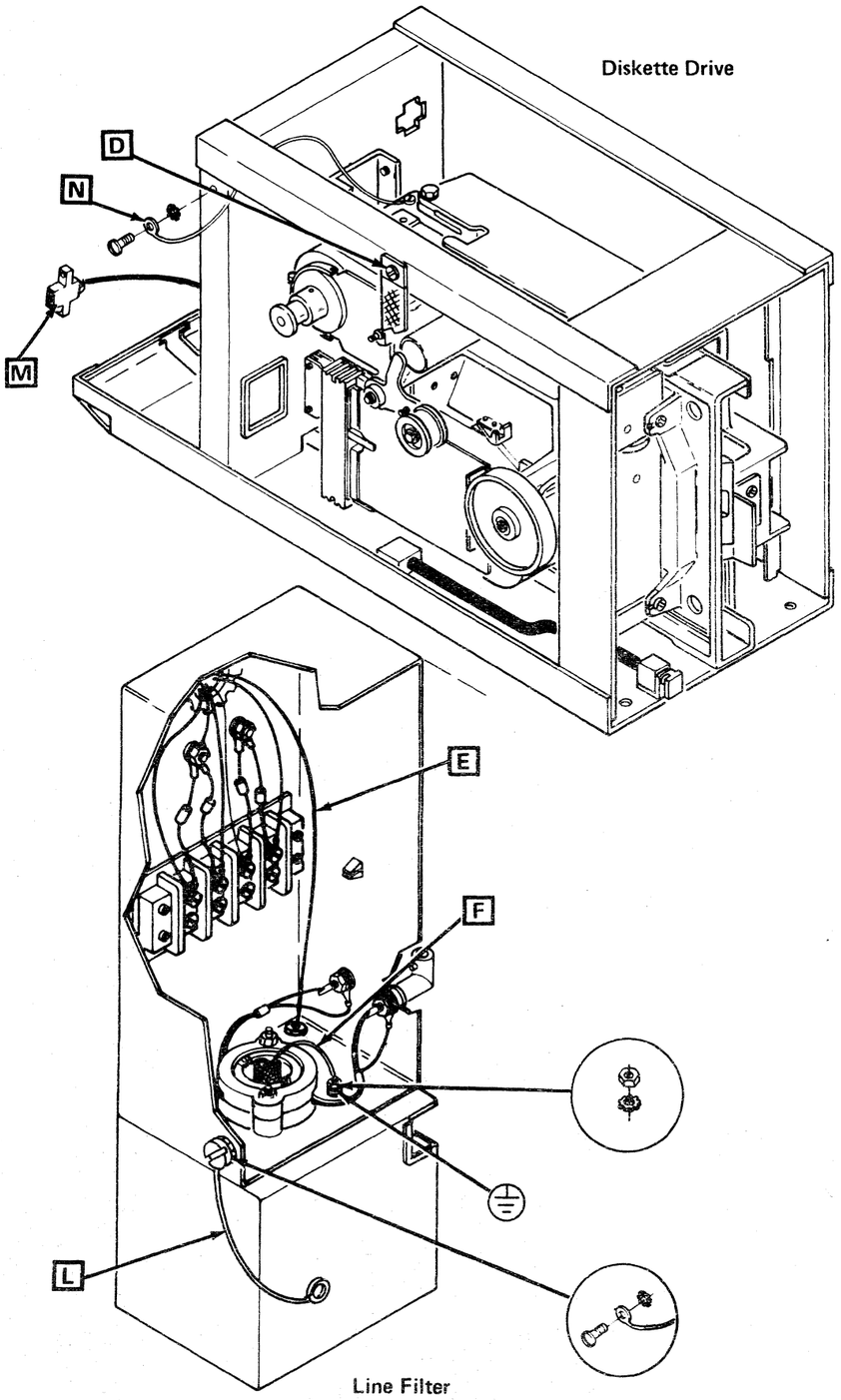


Gate 01A

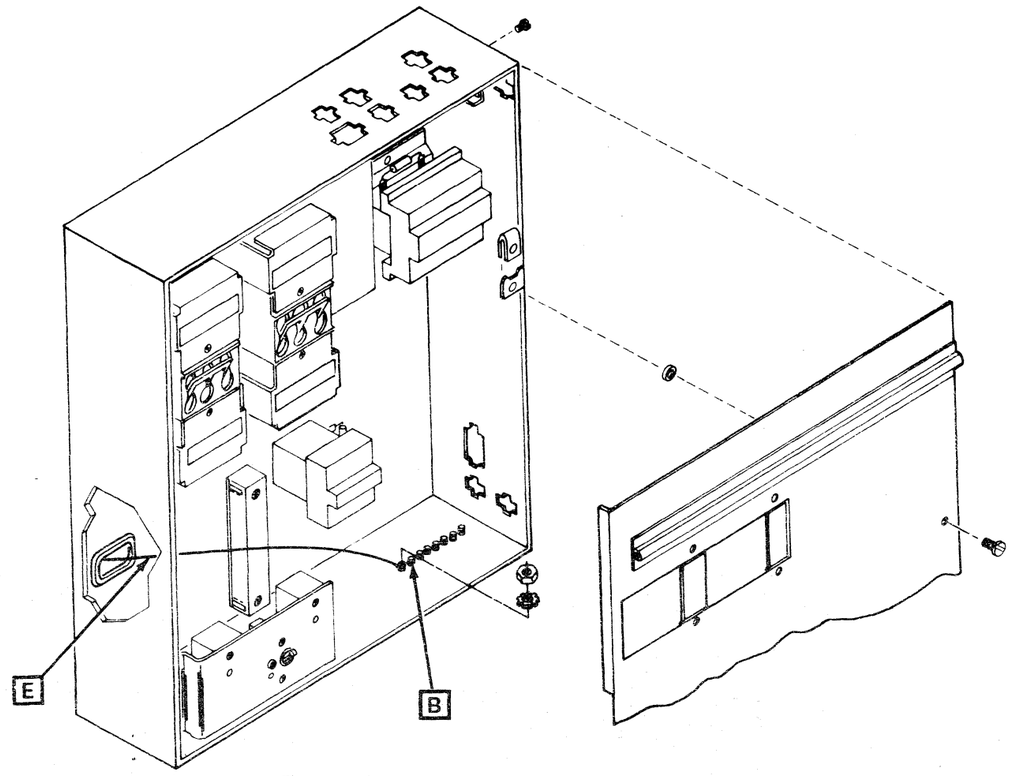
Model Group 2

EC 379605 06Mar81	PN 2676236	14 706
	2 of 3	

Diskette Drive



Line Filter

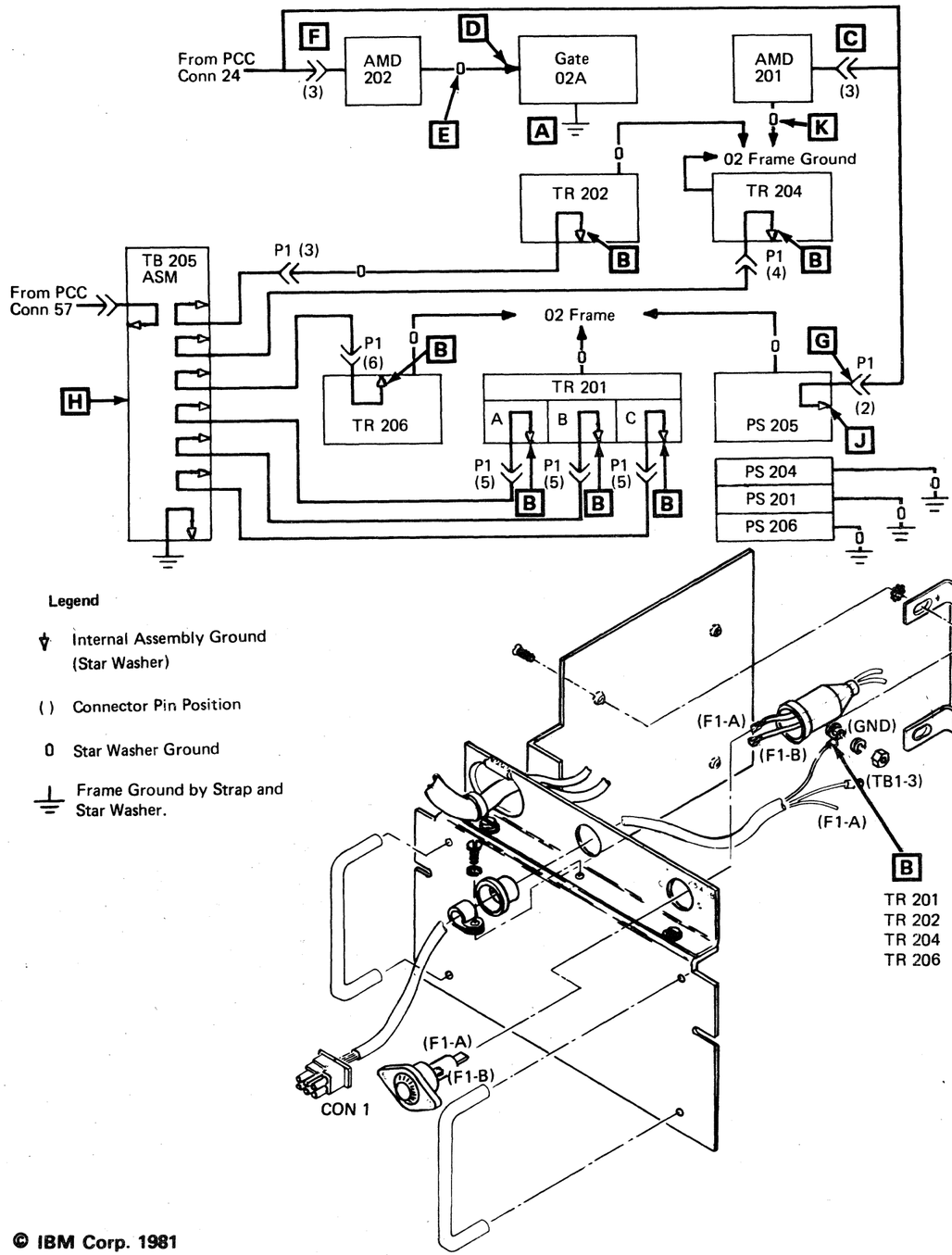


PCC Box

Model Group 2

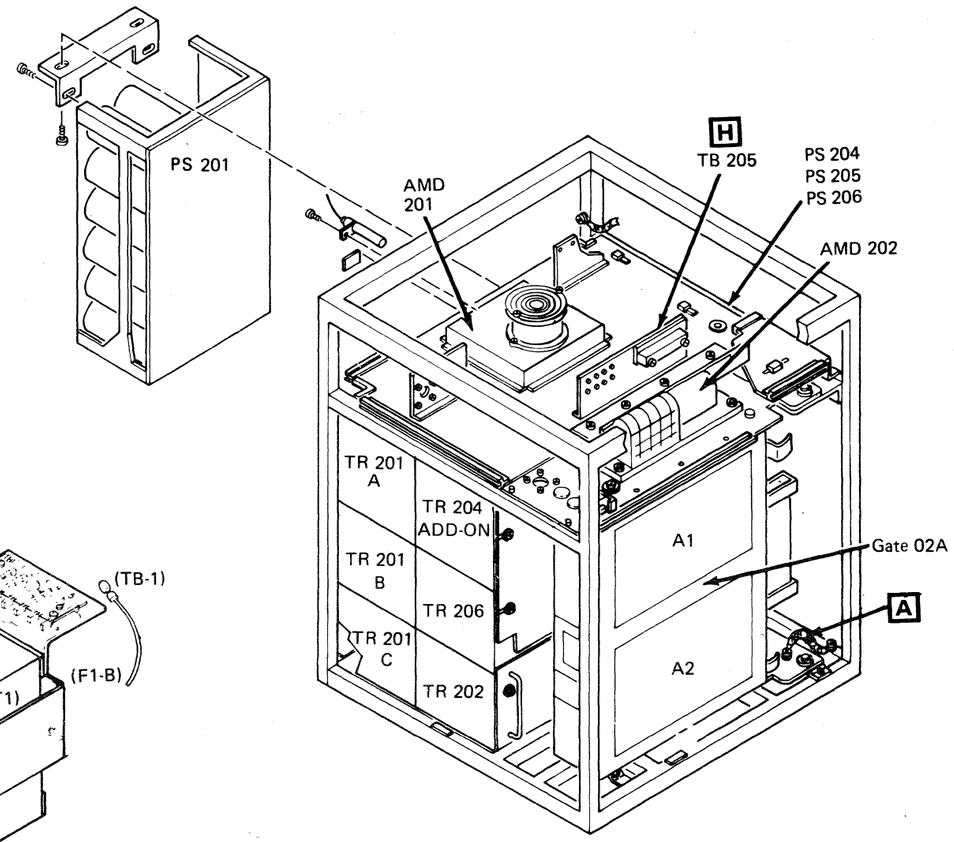
EC 379605 06Mar81	PN 2676236	14 707
	3 of 3	

GROUNDING, MODEL GROUP 2, FRAME 02 (FERRO)



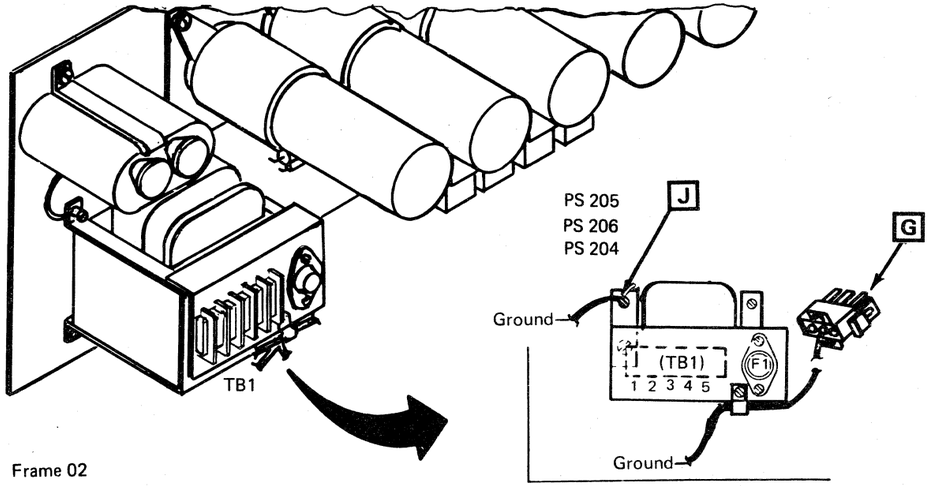
Legend

- Internal Assembly Ground (Star Washer)
- ( ) Connector Pin Position
- 0 Star Washer Ground
- Frame Ground by Strap and Star Washer.



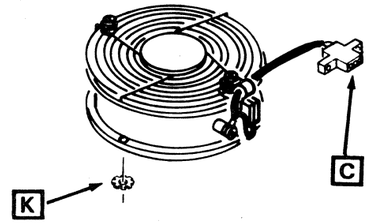
Model Group 2, Ferror Power

EC 379605 06Mar81	PN 2676237	14 715
	1 of 2	

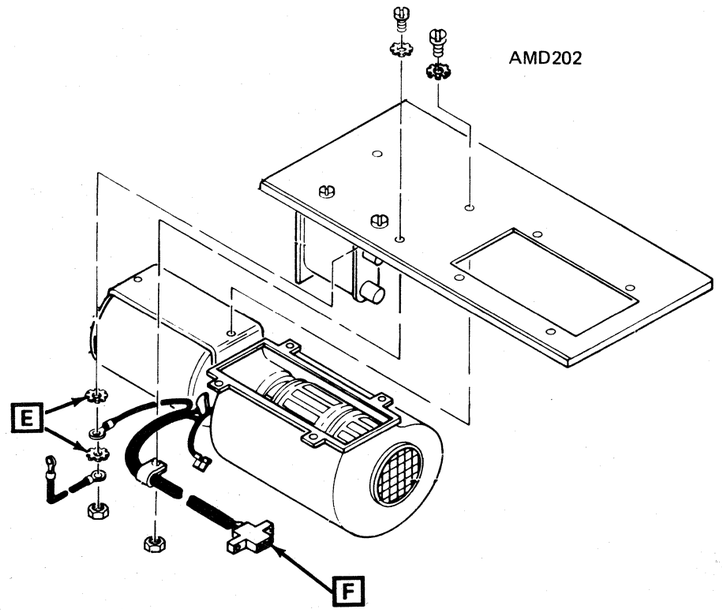


Frame 02

AMD 201



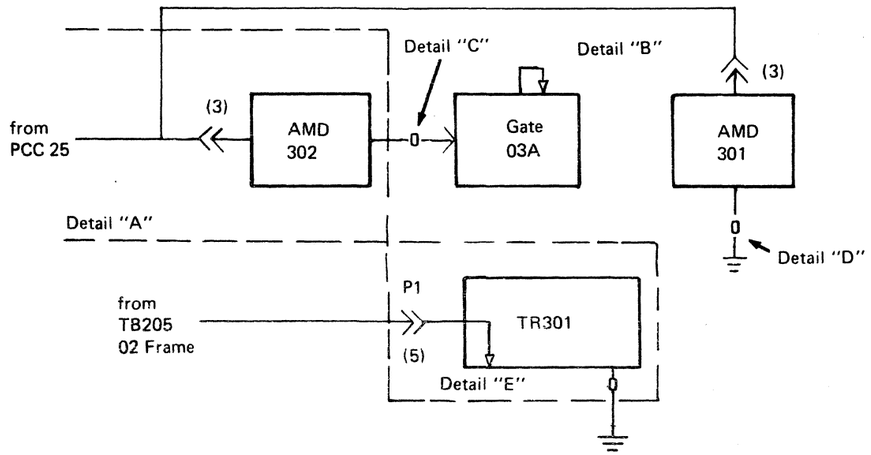
AMD202



Model Group 2, Ferror Power

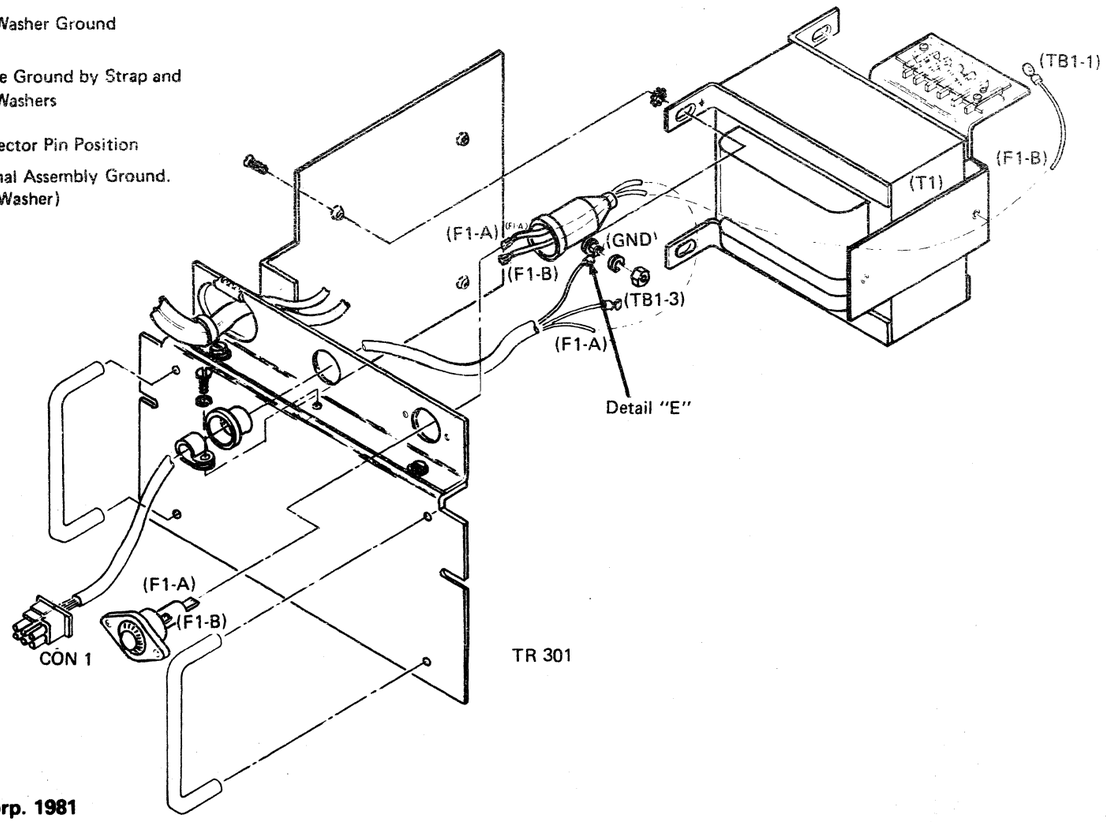
EC 379605 06Mar81	PN 2676237	14 716
	2 of 2	

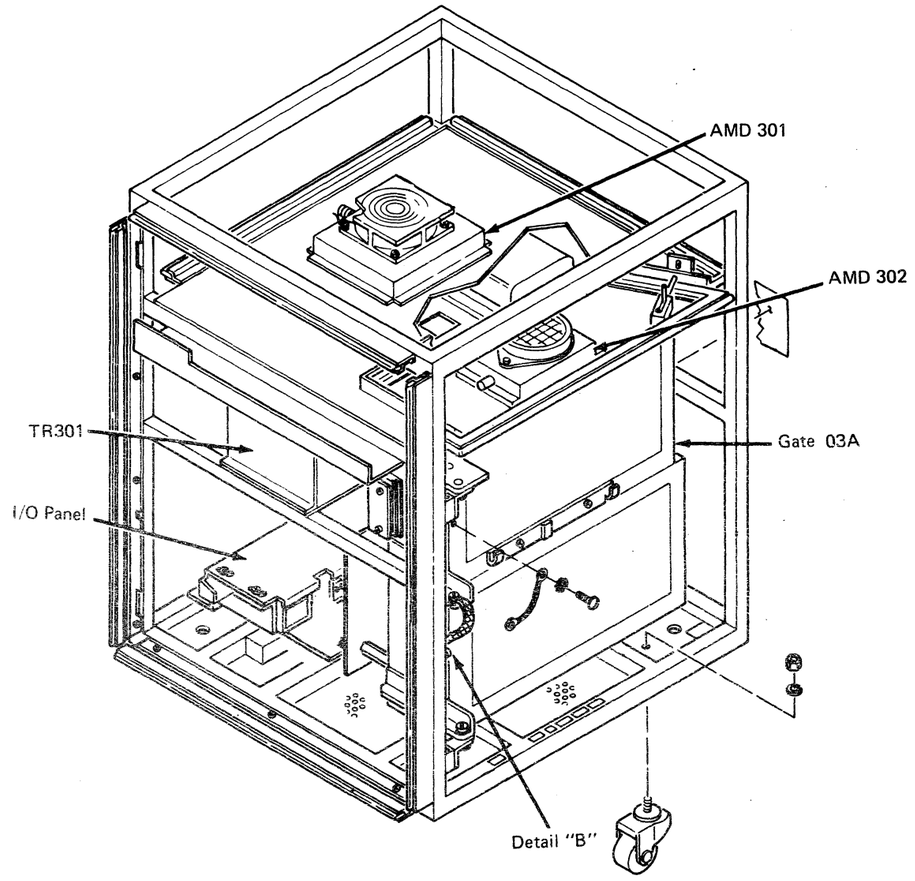
GROUNDING, FRAME 03

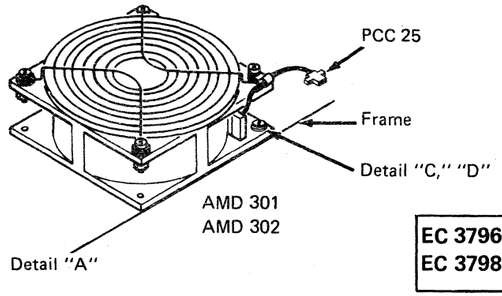


Legend

- 0 Star Washer Ground
- ⏚ Frame Ground by Strap and Star Washers
- ( ) Connector Pin Position
- ⏚ Internal Assembly Ground. (Star Washer)



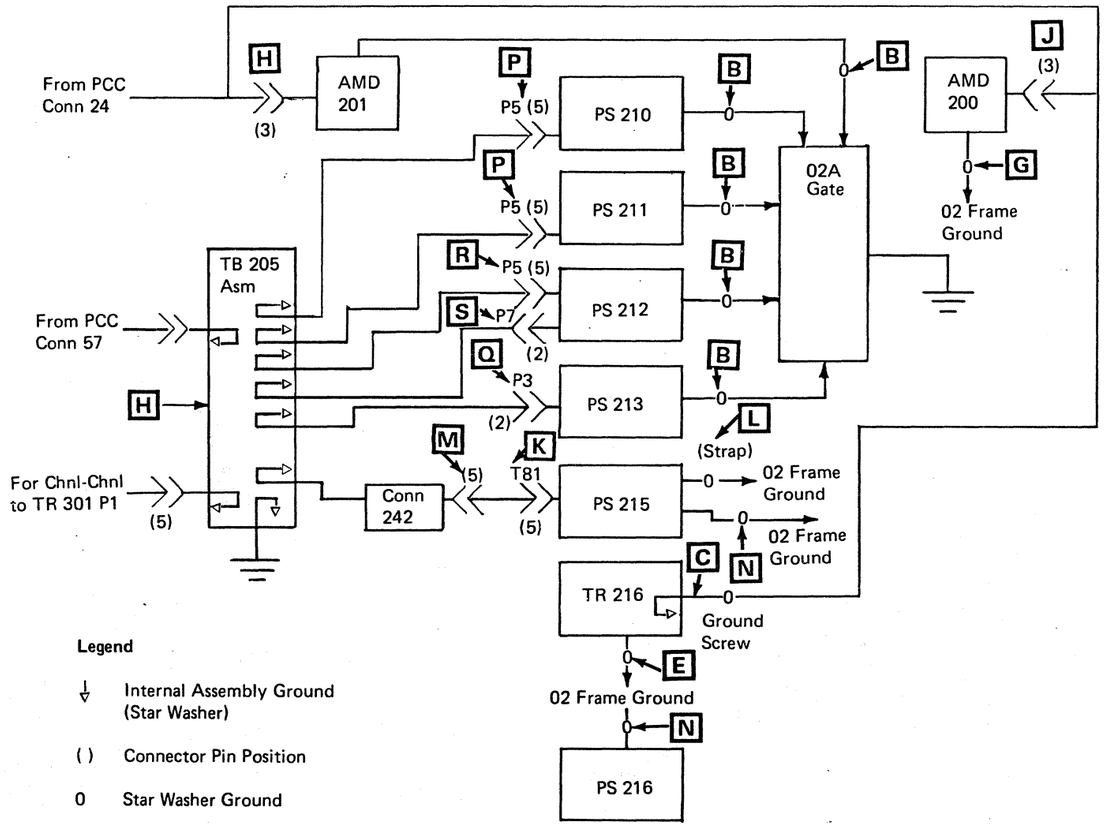




Model Groups 1 and 2

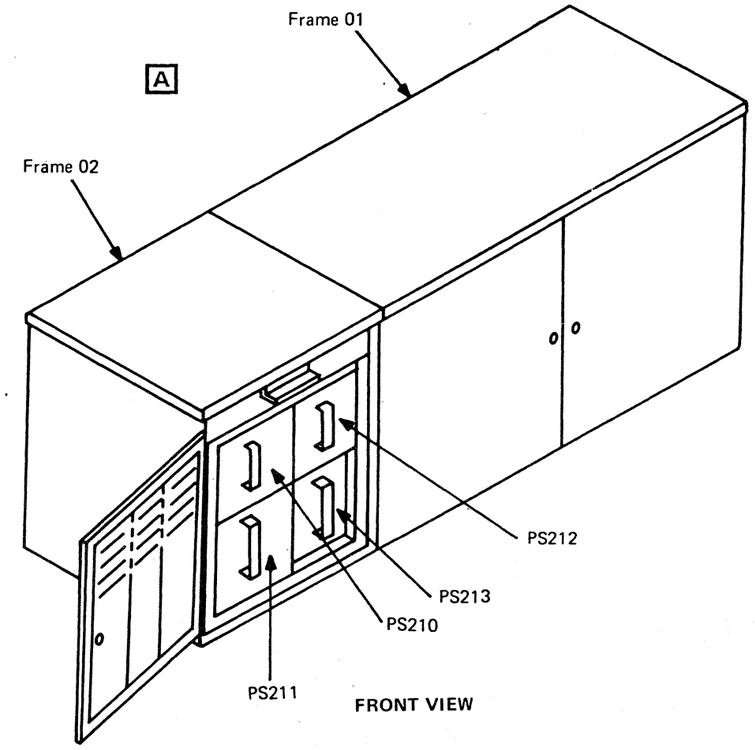
EC 379605 06Mar81 EC 379814 02Oct81	PN 2676238 1 of 1	14 725

GROUNDING, MODEL GROUP 2, FRAME 02 (SWITCHING REGS)

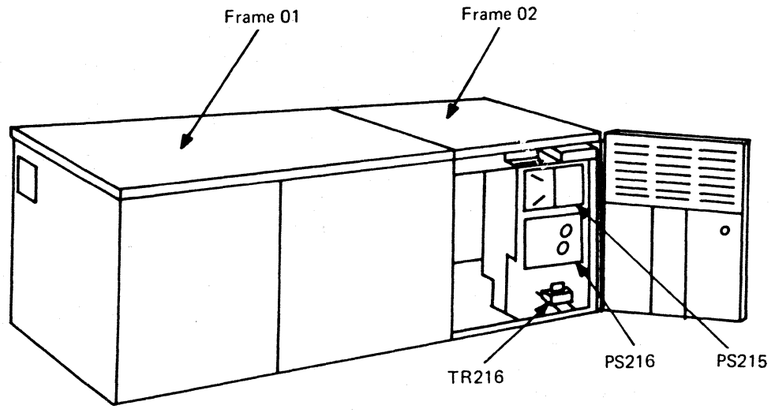


Legend

- ⏚ Internal Assembly Ground (Star Washer)
- ( ) Connector Pin Position
- 0 Star Washer Ground
- ⊥ Frame Ground by Strap and Star Washer



FRONT VIEW

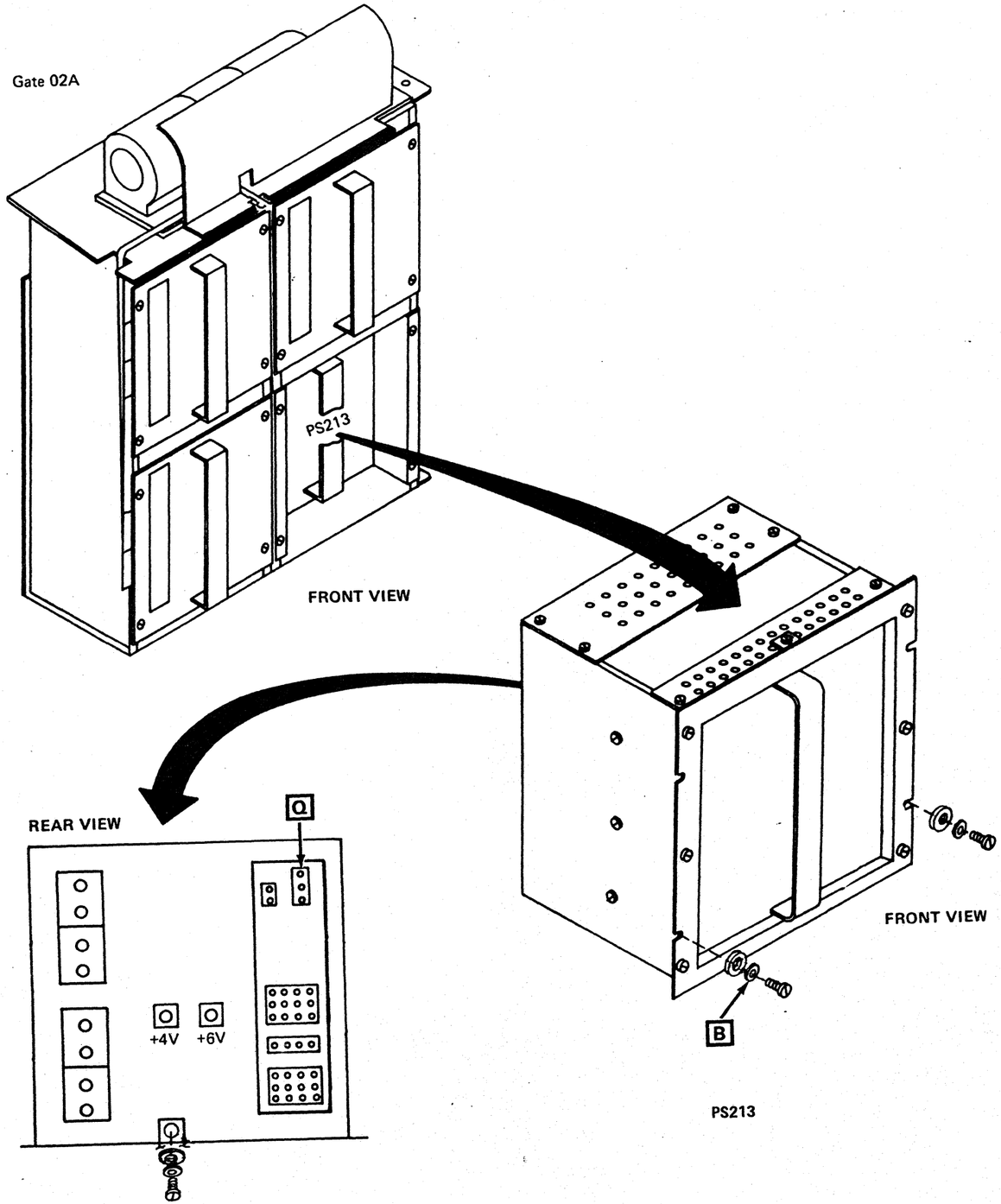


REAR VIEW

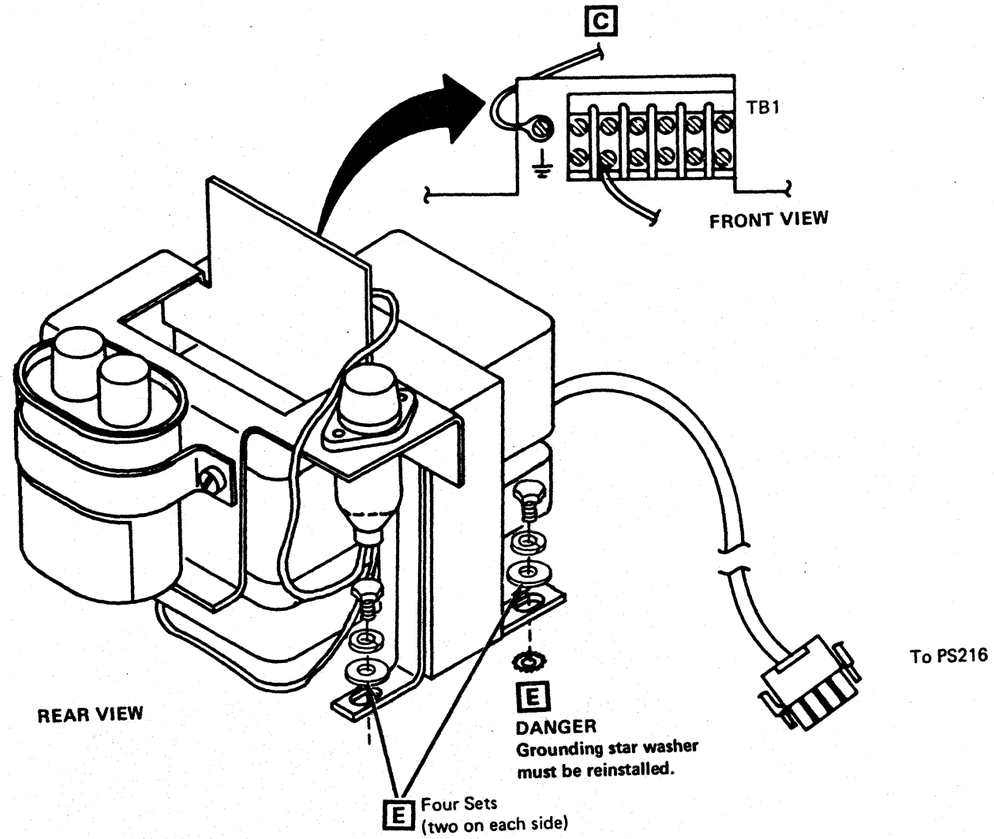
Model Group 2, Switching Regulators

EC 379819 19Jun81	PN 2676239	14 735d
	1 of 4	

Gate 02A



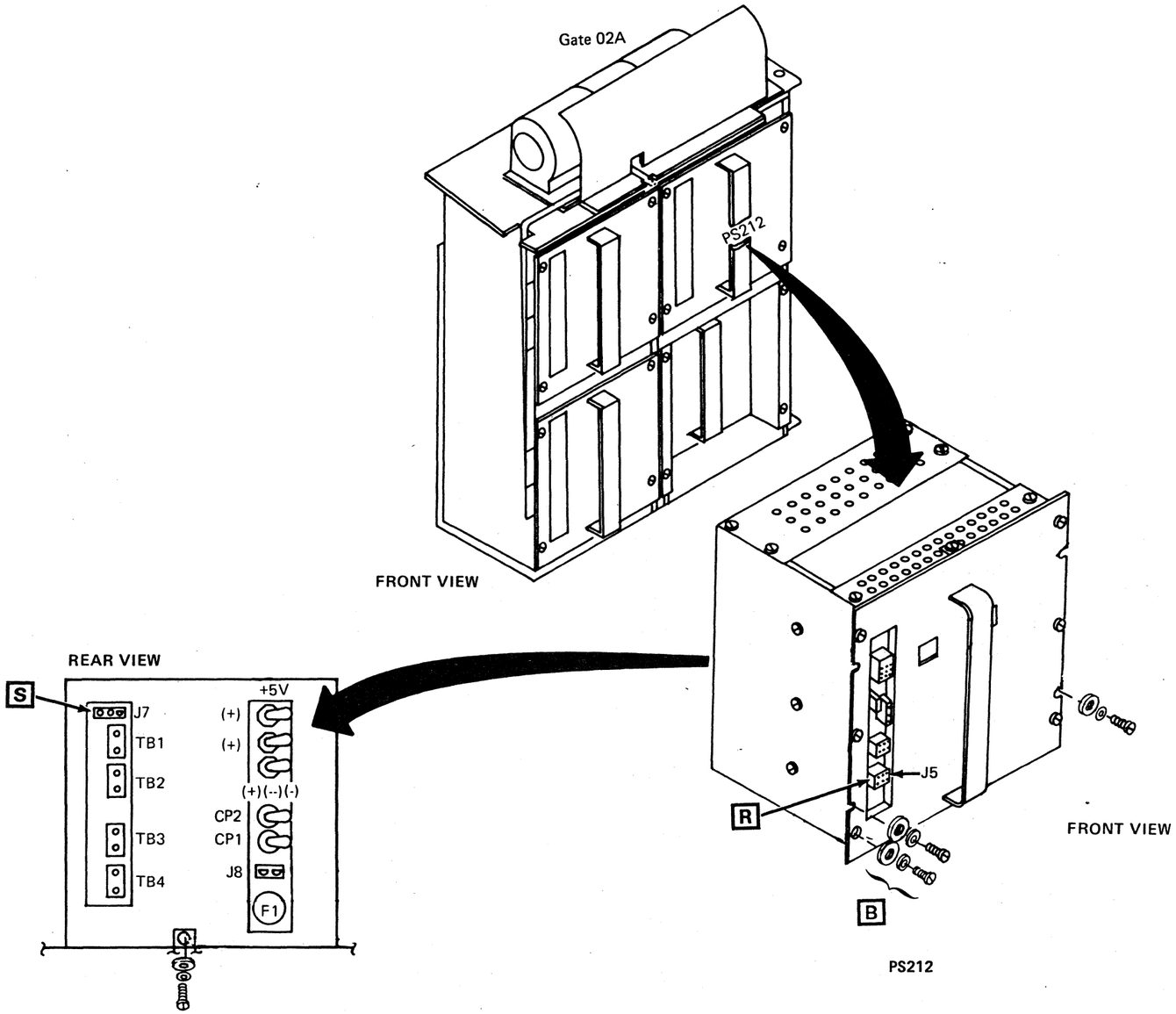
PS213

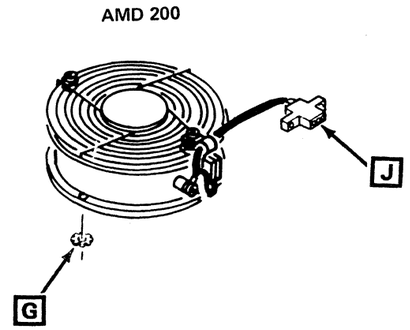


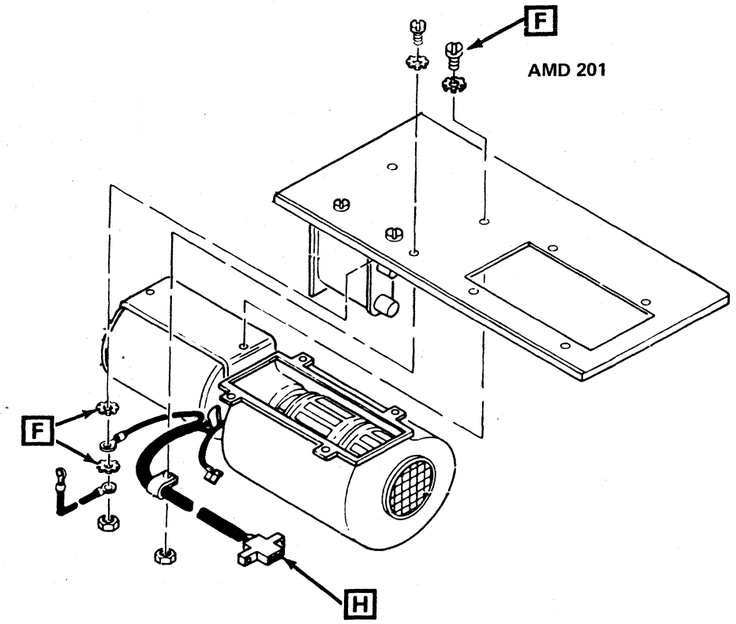
TR216

Model Group 2, Switching Regulators

EC 379819 19Jun81	PN 2676239	14 736d
	2 of 4	

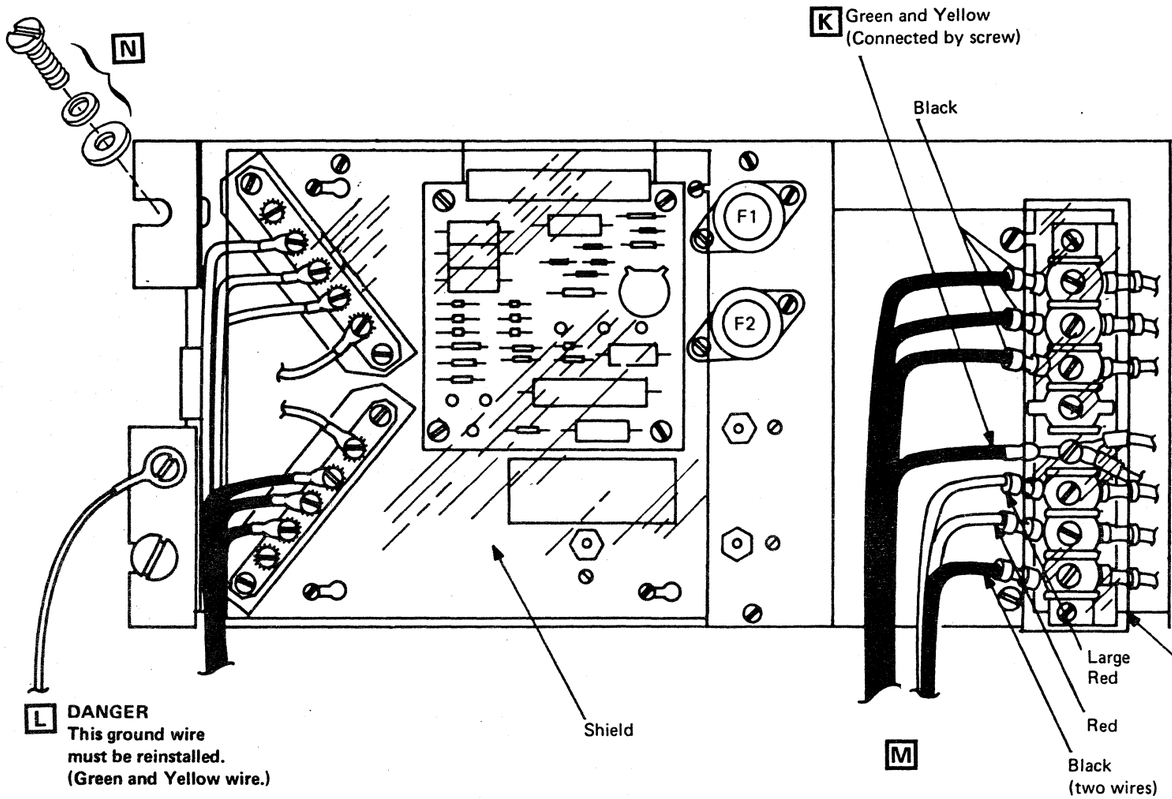


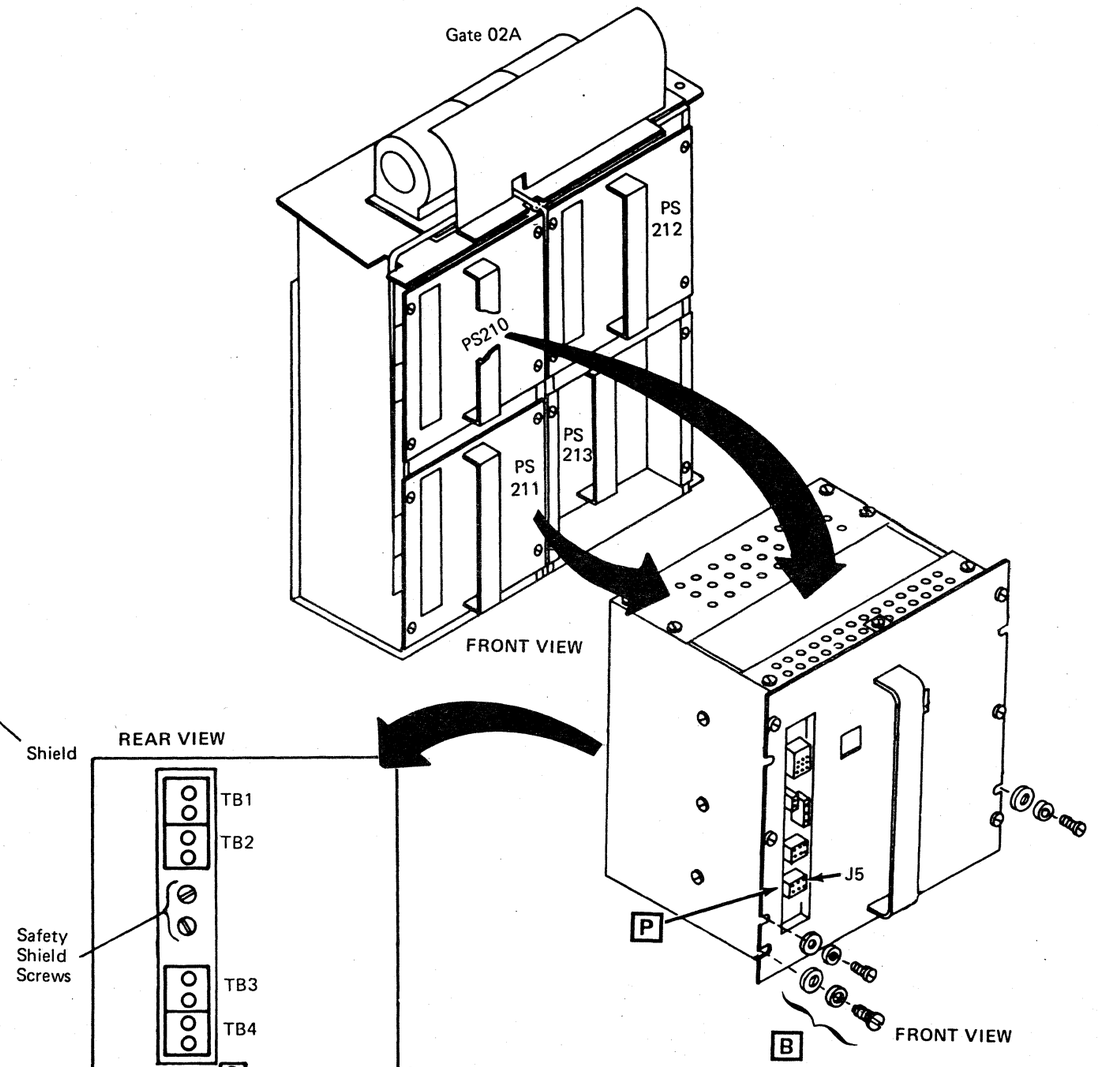




Model Group 2, Switching Regulators

EC 379819 19Jun81	PN 2676239	14 737d
	3 of 4	


N
K Green and Yellow
(Connected by screw)
Black
F1
F2
Large
Red
Red
Black
(two wires)
Shield
M
L DANGER
This ground wire
must be reinstalled.
(Green and Yellow wire.)


Gate 02A
PS
212
PS210
PS
213
PS
211
FRONT VIEW
Shield
REAR VIEW
TB1
TB2
Safety
Shield
Screws
TB3
TB4
J5
P
B
FRONT VIEW

PS210/PS211

Problem Analysis (PA)

Introduction

Problem Analysis (PA) provides the customer with tools to handle problems without involving the local service representative. This procedure collects data, determines problems, and performs selective diagnostic routines without the aid of your Support Structure. Using Problem Analysis solves problems quicker and involves a higher level of expertise sooner.

Problem Analysis also provides repair information for the service representative. It does not replace the existing maintenance package, but is used as directed by the MAPs.

This procedure involves four areas:

Problem Analysis Routine: Collects data from areas, such as storage, logs, and PSWs. The routine attempts to determine the problem, such as a hang, loop, I/O error, PU error, or programming error condition. This routine then leads you through steps to solve the problem.

Diagnostics Routine: Runs diagnostics with the aid of a special diskette. This routine attempts to identify and isolate the problem. You are then instructed to perform procedures that may require restarting or invoking the Customer Service Request routine.

Part Number Processing Routine: Identifies the failing FRU, its location, and part number.

Customer Service Request Routine: Transmits log and system data to your Support Structure. This data helps determine the solution.

Note: *This routine is applicable only when the machine has the Remote Support Facility (RSF) installed.*


```
                          *GENERAL SELECTION*

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

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

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


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

SELECTION:                                          ==>

                                                      4341
```

General Selection (Q) screen

```
                          *PROBLEM ANALYSIS*

PWR ON OK   PU-IPL ___    INTERRUPTS ___    INSTRUCTION LOOP _   CHNL OR I/O ERR _
PU-IML OK   WAIT= ____    MACHINE CHK _     MICROCODE LOOP   _   ACTIVE DEVICES  _

PA OPTIONS AVAILABLE: SELECT ONE OPTION, THEN PRESS ENTER
     1 = START PROBLEM ANALYSIS ROUTINE
     2 = START SYSTEM AGAIN (IPL OR IML/IPL)
     3 = RUN 4341 PROCESSING UNIT ANALYSIS TEST
     4 = SEND SERVICE INFORMATION (IF RSF INSTALLED)
     5 = DISPLAY DETAILED PA DATA
     6 = CUSTOMER DATA AND SECURITY CONTROL
     7 = GO TO PART NUMBER AND FRU-LIST PROGRAM
     8 = DISPLAY 4341 PROCESSING UNIT ANALYSIS FRU-LOGS
     9 = DISPLAY SERVICE TRANSMISSION HISTORY


Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _

                                                      4341
```

Problem Analysis Option screen

Invoking Problem Analysis

To invoke the Problem Analysis Option screen:

1. Press MODE SEL key. General Selection (Q) screen is displayed.
2. Key PA next to SELECTION.
3. Press ENTER. Problem Analysis Option screen is displayed.

Screen Layout

The PA selection from the General Selection (Q) screen displays the Problem Analysis Option screen. The screen shows the options available for problem analysis. This option screen is also displayed when a selected option is completed.

Lines 4 and 5 are blanked when initially invoking the PA selection. Returning to this screen after invoking Option 1 displays the system status on these lines.

Options 7 through 9 are used by the service representative and are displayed in CE mode only.

Return to General Selection (Q)

To return to the General Selection (Q) screen from any Option screen:

Note: *For Option 3, be sure that the diagnostics have been completed or been terminated, and that the functional diskette is reinstalled.*

1. Key Q next to SELECTION.
2. Press ENTER. General Selection (Q) screen is displayed.

Return to Prog Sys (Z)

To return to the Prog Sys (Z) screen from any Option screen:

Note: *For Option 3, be sure that the diagnostics have been completed or been terminated, and that the functional diskette is reinstalled.*

1. Key Z next to SELECTION.
2. Press ENTER. Prog Sys (Z) screen is displayed.

Option 1: The Start Problem Analysis Routine

The Problem Analysis Routine collects data from areas, such as storage, logs, and PSWs. The routine attempts to determine the problem, such as a hang, loop, I/O error, PU error, or programming error condition.

To invoke Option 1 from the Problem Analysis Option screen:

1. Key 1 next to SELECTION.
2. Press ENTER. Problem Analysis routine is invoked, and the Problem Analysis Routine screen is displayed.

Note: *Pressing ENTER when the Option 1 screen is displayed returns you to the Problem Analysis Option screen.*

The Option 1 screen has three fields:

Problem Field: Displays a message describing the problem.
Verify Field: Displays messages describing the problem area. This field may also display as a Warning field.
Action Field: Displays messages describing possible operator action.

If the routine identifies a problem, the screen describes the problem, identifies the area, and provides an action. If the routine does not identify a problem, the screen recommends an action.

Option 2: Start System Again (IPL or IML/IPL)

The Start System option returns you to the General Selection (Q) screen. Now you can perform a normal IPL or IML/IPL procedure.

To invoke Option 2 from the Problem Analysis Option screen:

1. Key 2 next to SELECTION.
2. Press ENTER. General Selection (Q) screen is displayed.

```
                          *PROBLEM ANALYSIS*

PWR ON ___   PU-IPL ___   INTERRUPTS ___   INSTRUCTION LOOP _   CHNL OR I/O ERR _
PU-IML ___   WAIT= ____   MACHINE CHK_     MICROCODE LOOP   _   ACTIVE DEVICES  _

PROBLEM: MESSAGE DESCRIBING PROBLEM

VERIFY : MESSAGE(S) DESCRIBING PROBLEM AREAS

ACTION : MESSAGE(S) DESCRIBING POSSIBLE OPERATOR ACTION




Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _                                    ==> MORE, PRESS ENTER
```

Option 1 Screen: Problem Analysis Routine

```
                          *PROBLEM ANALYSIS*

PWR ON OK    PU-IPL ___   INTERRUPTS ___   INSTRUCTION LOOP _   CHNL OR I/O ERR _
PU-IML OK    WAIT= ____   MACHINE CHK_     MICROCODE LOOP   _   ACTIVE DEVICES  _


 WARNING: 4341 PROCESSING UNIT ANALYSIS TEST WILL ALTER PROCESSING UNIT DATA

 ACTION   * REMOVE SYSTEM FUNCTIONAL DISKETTE

          * INSTALL 4341 PROCESSING UNIT ANALYSIS DISKETTE- PUAD,
            LOCATED IN BACK OF PA-GUIDE
          * PRESS ENTER

                OR

          * PRESS MODE-SEL KEY TO CANCEL AND RETURN TO GENERAL SELECTION SCREEN
Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _

                                                        4341
```

Option 3 Screen: 4341 Processing Unit Analysis Test

Option 3: Run 4341 Processing Unit Analysis Test

The 4341 Processing Unit Analysis Test runs diagnostics by using a special diskette. This test attempts to identify and isolate the problem by using existing machine speed microdiagnostics and selected basic diagnostics.

Warning: *Invoking the 4341 Processing Unit Analysis Test alters main storage, and requires an IML/IPL. However, a loss of customer data results.*

To invoke Option 3 from the Problem Analysis Option screen:

1. Key 3 next to SELECTION.
2. Press ENTER. The screen prompts you to install the 4341 Processing Unit Analysis diskette.

   Note: *An error code may be displayed at this time if the suspected problem has been found before running diagnostics. You have the option of continuing by entering 3 next to SELECTION and pressing ENTER or of canceling by pressing ENTER with no entry next to SELECTION.*
3. Install 4341 Processing Unit Analysis diskette.
4. Press ENTER.

The Analysis screen provides status information during the test and, upon completion, prompts you to install the functional diskette. If the diagnostics identify and isolate a problem, the Part Number and FRU List (Option 7) screen is displayed. This screen identifies the suspected FRUs. Invoking option 3 in customer mode displays suspected FRUs as an error code.

Option 4: Send Service Information

With the Send Service Information option, you can transmit data via data link to your Support Structure. Use this option when remote assistance is required to diagnose a problem.

Two screens are involved with this option. The first screen displayed is the Service Request IBM Data screen. Information on this screen is filled in by the CE at the time of installation and normally requires no updating. The second screen displayed is the Service Request and Send Service Information screen. Once completed, the screen allows the data link to your Support Structure.

To invoke Option 4 from the Problem Analysis Option screen:

1. Place CE MODE switch ON.
2. Key 4 next to SELECTION.
3. Press ENTER. Service Request IBM Data screen is displayed.
4. Verify that all fields on the screen are entered correctly. Make any necessary corrections.

   Note: *Routing Code fields are nondisplayable fields.*
5. Press ENTER. The screen is updated if any corrections were made. Service Request and Send Service Information screen is displayed.
6. Complete fields only as directed by your Support Structure. If a main store dump is to be performed, have the customer enter the password.

   Notes:
   - *A password is not required for a main store dump if the system has not been IPLed.*
   - *The START ADDRESS must be a right-justified, four-byte address.*
7. Follow Action step 1 on the screen. If you have entered valid data, the message INITIALIZING RSF LINK is displayed. Blank or invalid fields result in the error message INVALID OR INCOMPLETE INPUT, PLEASE RE-ENTER. Enter correct data and press ENTER.
8. Data transfer begins. The current configuration, patch status, any selected traces or dumps, and all logs with valid data about the machine are transmitted. Messages indicating the progress of transmission appear on line 23. When the DATA SENT OKAY message appears, the console returns to the General Selection (Q) screen or to the PROG SYS (Z) screen if the system was IPLed. Return data set to TALK mode, hang up, and record incident number.

   Note: *To cancel transmission, hold ALT key down and press LINE DISC key. General Selection (Q) screen is displayed.*
9. Key QBTP next to SELECTION.
10. Press ENTER. Patch list screen is displayed.
11. Verify the list for any patches that have been transmitted resulting from invoking this option.
12. Install any new patches. For installing a patch, see Volume 13/16, Section 14, Console Function Service Aids, "Patch Installation and Update Procedure."

```
                        *SERVICE REQUEST IBM DATA*

IBM INSTALLATION DATA:
     REGION ___  BRANCH OFFICE ___  COUNTRY ___
     CUSTOMER NAME: ____________________
     STREET.CITY.STATE: ____________________________

RSF: LINE SPEED (1=600, 2=1200 BPS) : _
     DATA BLOCK SIZE (1=256B, 2=2KB): _
     LINE PLATE INSTALLED (Y OR N)  : _  (WORLD TRADE ONLY)


TO CALL LOCAL SERVICE: _____________
PRIMARY SYSTEM:                    BACKUP SYSTEM:
     PHONE NUMBER: _____________        PHONE NUMBER: _____________
     ROUTING CODE:                      ROUTING CODE:

ACTION: FILL IN SPACES, THEN PRESS ENTER KEY.




                                                        4341
```

Option 4 Screen: Service Request IBM Data

```
              *SERVICE REQUEST AND SEND SERVICE INFORMATION*
                    4341-010015    TO CALL LOCAL SERVICE: 1-800-555-6666

PLEASE ENTER:  YOUR NAME: _____________
               TELEPHONE NUMBER: _____________ EXT _____
               PROGRAM TYPE/LEVEL: _____________
               SYSTEM STATUS (A = NOT WORKING, B = WORKING): _
               IBM SUPPORT SYSTEM (1 = PRIMARY, 2 = BACKUP): _
PROBLEM: DESCPIPTION: ____________________________________________

               SEND I/O DEVICE TRACE  (Y OR N)? _
               SEND INSTRUCTION TRACE (Y OR N)? _
               SEND MAIN STORE DUMP (01-64 KB)? __ KB   START ADDRESS _______
                  PASSWORD FOR DUMP:
               SEND MODULE ID: ____          SEND SP STG DUMP (Y OR N) _
ACTION: 1. DIAL _____________ ON RSF (CE) TELEPHONE.
           AT END OF ANSWER TONE, PUT DATA SET IN DATA MODE.
        2. AT -DATA SENT OKAY-, RETURN DATA SET TO TALK MODE.

IF ERROR: DISCONNECT RSF BY PRESSING ALT AND LINE-DISC KEYS.


                                                        4341
```

Option 4 Screen: Service Request and Send Service Information

Option 5: Display Detailed PA-Data

The Detailed PA-Data option provides up to five Detailed Status screens. This depends on what machine error is present and what information is available when Option 1 is invoked. Detailed information can be obtained in the following areas:

- PSW data: Displays PSWs and registers (for waits and machine checks).
- Instruction Loop data: Displays last 128 addresses in the suspected loop.
- Channel or I/O data: Displays status of active devices and devices with errors.
- Microcode Loop data: Displays last 32 microcode instructions executed.
- PU-IML Error Information: Displays information when a IML error is detected.

If the Start Problem Analysis Routine (Option 1) detects a problem, information is collected and written to the diskette. Option 5 is used for displaying this information. If no information is collected when performing Option 1, no Detailed Status screens are displayed, and you are returned to the Problem Analysis Option screen.

To invoke Option 5 from the Problem Analysis Option screen:

1. Key 5 next to SELECTION.
2. Press ENTER. A Detailed Status screen is displayed.

Note: *To page to another Detailed Status screen, press ENTER. If no data has been collected, you are returned to the Problem Analysis Option screen.*

```
   PA-DETAIL LOG XX         *PROBLEM ANALYSIS*      SAVED: XX/XXX XX:XX:XX
PWR ON __    PU-IPL __    INTERRUPTS ___    INSTRUCTION LOOP _    CHNL OR I/O ERR _
PU IML __    WAIT= ____   MACHINE CHK __    MICROCODE LOOP _      ACTIVE DEVICES _

PROGRAM STATUS WORDS:       C M W P INV                              C M W P INV
  CURRENT=XXXXXXXXXXXXXXXX  _ _ _ _  _       EXT OLD=XXXXXXXXXXXXXXXX _ _ _ _  _
  PGM OLD=XXXXXXXXXXXXXXXX  _ _ _ _  _       EXT NEW=XXXXXXXXXXXXXXXX _ _ _ _  _
  PGM NEW=XXXXXXXXXXXXXXXX  _ _ _ _  _       I/O OLD=XXXXXXXXXXXXXXXX _ _ _ _  _
  MCK OLD=XXXXXXXXXXXXXXXX  _ _ _ _  _       I/O NEW=XXXXXXXXXXXXXXXX _ _ _ _  _
  MCK NEW=XXXXXXXXXXXXXXXX  _ _ _ _  _      SUPV OLD=XXXXXXXXXXXXXXXX _ _ _ _  _
  IPL-PSW=XXXXXXXXXXXXXXXX  _ _ _ _  _      SUPV NEW=XXXXXXXXXXXXXXXX _ _ _ _  _
 GPR-0 XXXXXXXX  GPR-6 XXXXXXXX  GPR-C XXXXXXXX  CTL-2 XXXXXXXX  CTL-8 XXXXXXXX
 GPR-1 XXXXXXXX  GPR-7 XXXXXXXX  GPR-D XXXXXXXX  CTL-3 XXXXXXXX  CTL-9 XXXXXXXX
 GPR-2 XXXXXXXX  GPR-8 XXXXXXXX  GPR-E XXXXXXXX  CTL-4 XXXXXXXX  CTL-A XXXXXXXX
 GPR-3 XXXXXXXX  GPR-9 XXXXXXXX  GPR-F XXXXXXXX  CTL-5 XXXXXXXX  CTL-B XXXXXXXX
 GPR-4 XXXXXXXX  GPR-A XXXXXXXX  CTL-0 XXXXXXXX  CTL-6 XXXXXXXX  CTL-C XXXXXXXX
 GPR-5 XXXXXXXX  GPR-B XXXXXXXX  CTL-1 XXXXXXXX  CTL-7 XXXXXXXX  CTL-D XXXXXXXX
Q GEN SELECTION    FPR-0 XXXXXXXXXXXXXXXX FPR-4 XXXXXXXXXXXXXXXX CTL-E XXXXXXXX
Z RTN TO PGM SYS   FPR=2 XXXXXXXXXXXXXXXX FPR-6 XXXXXXXXXXXXXXXX CTL-F XXXXXXXX
 SELECTION: _                                ==> MORE, PRESS ENTER

                                                  4341
```

Option 5 Screen: Detailed PA Data--PSW Data

```
   PA-DETAIL LOG XX         *PROBLEM ANALYSIS*      SAVED: XX/XXX XX:XX:XX
PWR ON __    PU-IPL __    INTERRUPTS ___    INSTRUCTION LOOP _    CHNL OR I/O ERR _
PU IML __    WAIT= ____   MACHINE CHK __    MICROCODE LOOP _      ACTIVE DEVICES _
 CURRENT          PROGRAM INSTRUCTION LOOP, LAST 128 ADDRESSES
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
Q GEN SELECTION            XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R XXXXXX-R
Z RTN TO PGM SYS           XXXXXX-R XXXXXX-V XXXXXX-V XXXXXX-R XXXXXX-R
 SELECTION: _                                ==> MORE, PRESS ENTER

                                                  4341
```

Option 5 Screen: Detailed PA Data--Instruction Loop Data

```
  PA-DETAIL LOG XX          *PROBLEM ANALYSIS*      SAVED: XX/XXX XX:XX:XX
PWR ON __   PU-IPL __   INTERRUPTS ___   INSTRUCTION LOOP _    CHNL OR I/O ERR _
PU IML __   WAIT= ____  MACHINE CHK _    MICROCODE LOOP   _    ACTIVE DEVICES  _

CHNL IFCC DATA:     LIMITED LOG=XXXXXXXX          * ERROR DEVICES:
 CHNL NO=  X  X  X  X  X  X  X  X  X  X  X  X     * XXX XXX XXX XXX XXX XXX XXX XXX
 DEV ADR= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 CAT NUM= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 BUS OUT= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 TAG OUT= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 BUS IN = XX XX XX XX XX XX XX XX XX XX XX XX     * ACTIVE DEVICES:
 TAG IN = XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 ENG BY3= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 ENG BY4= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 ENG BY5= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 ENG BY6= XX XX XX XX XX XX XX XX XX XX XX XX     * XXX XXX XXX XXX XXX XXX XXX XXX
 ENG BY7= XX XX XX XX XX XX XX XX XX XX XX XX     * CHNL BUSY:  XXX XXX XXX XXX XXX
Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _                                  ==> MORE, PRESS ENTER

                                                     4341
```

Option 5 Screen: Detailed PA Data--Channel or I/O Data

```
  PA-DETAIL LOG XX          *PROBLEM ANALYSIS*      SAVED: XX/XXX XX:XX:XX
PWR ON __   PU IPL __   INTERRUPTS ___   INSTRUCTION LOOP _    CHNL OR I/O ERR _
PU IML __   WAIT= __    MACHINE CHK _    MICROCODE LOOP   _    ACTIVE DEVICES  _
MAIN STORE POINTERS:
ACB: XXXXXXXX        SP WORK AREA: XXXXXXXX      SP CMD VALIDITY TABLE: XXXXXXXX
PER TABLE: XXXXXXXX  CHANNEL DIRECTORY: XXXXXXXX
         PU-IML ERROR OCCURRED IN PER TABLE
         AT MAIN STORE ADDRESS XXXXXXXX
         MAIN STORE DATA WAS                    MAIN STORE DATA SHOULD BE
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
 XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX     XXXXXXXX XXXXXXXX XXXXXXXX XXXXXXXX
Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _                                  ==> MORE, PRESS ENTER

                                                     4341
```

Option 5 Screen: Detailed PA Data--PU-IML Error Data

```
  PA-DETAIL LOG XX           *PROBLEM ANALYSIS*       SAVED XX/XXX  XX:XX:XX
PWR ON __   PU IPL ___  INTERRUPTS ___   INSTRUCTION LOOP      CHNL OR I/O ERR _
PU IML __   WAIT= ___   MACHINE CHK _    MICROCODE LOOP   Y    ACTIVE DEVICES  _
MICROCODE LOOP ADDRESSES (32):     TRACE ADDRESS=
 00:XXXXXX 01:XXXXXX 02:XXXXXX 03:XXXXXX 04:XXXXXX 05:XXXXXX 06:XXXXXX 07:XXXXXX
 08:XXXXXX 09:XXXXXX 0A:XXXXXX 0B:XXXXXX 0C:XXXXXX 0D:XXXXXX 0E:XXXXXX 0F:XXXXXX
 10:XXXXXX 11:XXXXXX 12:XXXXXX 13:XXXXXX 14:XXXXXX 15:XXXXXX 16:XXXXXX 17:XXXXXX
 18:XXXXXX 19:XXXXXX 1A:XXXXXX 1B:XXXXXX 1C:XXXXXX 1D:XXXXXX 1E:XXXXXX 1F:XXXXXX
EXT REG:     CH0  CH1  CH2  CH3  CH4  CH5     PU BYTE:  00 01 02 03 04 05 06 07
 EXT.0(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.0:  XX XX XX XX XX XX XX XX
 EXT.1(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.1:  XX XX XX XX XX XX XX XX
 EXT.2(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.2:  XX XX XX XX XX XX XX XX
 EXT.3(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.3:  XX XX XX XX XX XX XX XX
 EXT.4(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.4:  XX XX XX XX XX XX XX XX
 EXT.5(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.5:  XX XX XX XX XX XX XX XX
 EXT.6(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.6:  XX XX XX XX XX XX XX XX
 EXT.7(0:1)  XXXX XXXX XXXX XXXX XXXX XXXX      EXT.7:  XX XX XX XX XX XX XX XX
Q GEN SELECTION
Z RTN TO PGM SYS
 SELECTION: _                                  ==> MORE, PRESS ENTER

                                                     4341
```

Option 5 Screen: Detailed PA Data--Microcode Loop Data

Option 6: Customer Data and Security Control

The Customer Data and Security Control option provides the customer with a means of controlling transmission of main storage data. This option also allows the customer to change the local service telephone number, the program type/level, and his telephone number and/or extension.

To invoke Option 6 from the Problem Analysis Option screen:

Note: *Any changes made to this screen must be approved by the customer.*

1. Key 6 next to SELECTION.
2. Press ENTER. The Customer Data and Security Control screen is displayed.

With this screen displayed, the local service telephone number, the program type/level, the customer telephone number, and the decision to allow main storage dumps can be changed by keying over the existing data. When the ENTER key is pressed, the changes are effective, and the DATA SAVED message is displayed.

Password Change Procedure

To change the password from the Customer Data and Security Control screen:

1. Enter the current password into the ENTER CURRENT PASSWORD field.
   Notes:
   - *The password is entered into a nondisplayable field.*
   - *The initial password when shipped is PASSWORD.*
2. Enter the new password into the ASSIGN NEW PASSWORD field.
   Note: *A minimum of one and a maximum of eight uppercase characters are required for the password.*
3. Press ENTER. PASSWORD CHANGED, RECORD NEW PASSWORD is displayed. The new password is displayed until the MODE SEL key is pressed.
   Note: *INCORRECT CURRENT PASSWORD, PLEASE RE-ENTER is displayed if the current password was entered incorrectly.*

```
                *CUSTOMER DATA AND SECURITY CONTROL*

            CUSTOMER NAME: ABC CORPORATION, INCORP.
            STREET.CITY.STATE: 924 YOUR ST. ANYWHERE, USA.

TO CALL LOCAL SERVICE: _____________

            PROGRAM TYPE/LEVEL: _____________________
            TELEPHONE NO.: _____________ EXT _____

CUSTOMER DATA AND SECURITY CONTROL (CHANGES REQUIRE CURRENT PASSWORD)

            ALLOW MAIN STORAGE DUMPS (Y OR N)?
                                ENTER CURRENT PASSWORD:
            CHANGE PASSWORD (Y OR N)?
                                ASSIGN NEW PASSWORD   : ________

ACTION: FILL IN SPACES, THEN PRESS ENTER KEY.

PRESS MODE-SEL KEY TO GO TO GENERAL SELECTION SCREEN.


                                                    4341
```

Option 6 Screen: Customer Data and Security Control

Option 7: Go to Part Number and FRU List Program

The Part Number and FRU List option displays a listing of the card locations and part numbers. The record number (PAxx, where xx = 01-FF) of the last FRU log recorded is displayed on line 20. A system reference code may also be displayed with the record number. The FRU log is a result of running the 4341 Processing Unit Analysis test (Option 3). By keying the record number next to SELECTION and pressing ENTER, the logged FRUs are intensified. The replacement order is indicated by a prefix number and an asterisk (*).

To invoke Option 7 from the Problem Analysis Option screen:

1. Place CE MODE switch ON.
2. Key 7 next to SELECTION.
3. Press ENTER. Part Number and FRU List screen is displayed.

Part Number Update Procedure

The update procedure is used only when installing ECs or sales changes. This procedure is not necessary for substitute FRUs.

To update a part number on the Part Number and FRU List screen:

1. Key card location to be changed followed by an = sign next to SELECTION (for example, A1D2=).
2. Press ENTER. Card location and current part number are displayed next to SELECTION.
3. Key new part number over the existing part number.
4. Press ENTER. The Part Number and FRU List screen is updated.
5. Press MODE SEL key. Procedure is completed and General Selection (Q) screen is displayed.

```
                    *CARD LOCATIONS AND PART NUMBERS*

   LOC PART-NUM    LOC PART-NUM    LOC PART-NUM    LOC PART-NUM    LOC PART-NUM
   A1B2 XXXXXXX    A1C2 XXXXXXX    A1D2 XXXXXXX    A1E2 XXXXXXX    A1F2 XXXXXXX
   A1G2 XXXXXXX    A1H2 XXXXXXX    A1K2 XXXXXXX    A1L2 XXXXXXX    A1M2 XXXXXXX
01*A1N2 XXXXXXX    A1P2 XXXXXXX    A1Q2 XXXXXXX    A1R2 XXXXXXX    A1S2 XXXXXXX
   A1T2 XXXXXXX 02*A1U2 XXXXXXX    A2D2 XXXXXXX    A2E2 XXXXXXX    A2F2 XXXXXXX
   A2J2 XXXXXXX    A2J4 XXXXXXX 03*A2K4 XXXXXXX    A2K4 XXXXXXX    A2L2 XXXXXXX
   A2M2 XXXXXXX    A2N2 XXXXXXX    A2P2 XXXXXXX    A2Q2 XXXXXXX    A2R2 XXXXXXX
   A2S2 XXXXXXX    B1B2 XXXXXXX    B1C2 XXXXXXX    B1D2 XXXXXXX    B1E2 XXXXXXX
   B1F2 XXXXXXX    B1G2 XXXXXXX    B1H2 XXXXXXX    B1J2 XXXXXXX    B1K2 XXXXXXX
   B1L2 XXXXXXX    B1M2 XXXXXXX    B1N2 XXXXXXX    B1P2 XXXXXXX    B1Q2 XXXXXXX
   B1R2 XXXXXXX    B1S2 XXXXXXX    B1T2 XXXXXXX    B1U2 XXXXXXX    B2B3 XXXXXXX
   B2C2 XXXXXXX    B2D2 XXXXXXX    B2E2 XXXXXXX    B2E4 XXXXXXX    B2F2 XXXXXXX
   B2G2 XXXXXXX    B2H2 XXXXXXX    B2J2 XXXXXXX    B2K2 XXXXXXX    B2L2 XXXXXXX
   B2M2 XXXXXXX    B2R2 XXXXXXX    B2S2 XXXXXXX    B2S4 XXXXXXX    B2T2 XXXXXXX
   B2U2 XXXXXXX    D1B2 XXXXXXX    B2C2 XXXXXXX    D2C4 XXXXXXX    D2D2 XXXXXXX
   D1E2 XXXXXXX    D1F2 XXXXXXX

SELECTION: PA03                                  ==> PA03  RC=EC012352
```

Option 7 Screen: Part Number and FRU List

Option 8: Display 4341 Processing Unit Analysis FRU-Logs

The 4341 Processing Unit Analysis FRU-Logs option displays the latest FRU logs that result from running the 4341 Processing Unit Analysis test.

This screen contains information about reference codes, failing diagnostic IDs, and isolated FRU locations. The isolated FRU locations may also contain information about top card and edge connectors. The FRU logs are arranged from left to right. A maximum of four logs can be displayed. The leftmost log is the most recent. A log containing all zeroes indicates no information was collected during the 4341 Processing Unit Analysis test.

To invoke Option 8 from the Problem Analysis Option screen:

1. Place CE MODE switch ON.
2. Key 8 next to SELECTION.
3. Press ENTER. The 4341 Processing Unit Analysis FRU-logs screen is displayed.

```
                    *4341 PROCESSING UNIT ANALYSIS FRU-LOGS*

LOG RECORD NUMBER    :     PA03          PA02          PA01          ----
                           ============  ============  ============  ============
SYSTEM REFERENCE CODE:     EC012352      6B1D55AE      F001802E
VERIFICATION REF CODE:     602BAC2A      9D182254      50012388      ________
    "    REF CODE EXT:     01C00000      02000000      0FCD8000      ________
                                                                    ________
FRU COUNT DISPLAY/TOT:     03/03         01/03         03/11         __/__

FAILING TEST-ID      :     CF20          E235          D321          ____
FAILING CORELOAD-ID  :     07                          03            __

VERIFICATION RESULT  :     ISOLATED      ISOLATED      ISOLATED
FRU GROUP (0-11 MAX) :     A1N2  A1U2    B2D2  B1F2    B1H2  B1F2
                           A2K4          B2C2          A1B2  A1D2    ____  ____
                                                       A1E2  A1F2    ____  ____
                                                       A1G2  A1H2    ____  ____
Q GEN SELECTION                                        B1J2  B1Q2    ____  ____
Z RTN TO PROG SYS                                      B1K2          ____
 SELECTION: _

                                        4341
```

Option 8 Screen: 4341 Processing Unit Analysis FRU Logs

Option 9: Display Service Transmission History

The Service Transmission History option displays the status of data that has been transferred to your Support Structure. This information results from running Option 4. The display contains the following information:

- Time of transfer
- Support Structure Incident number or Problem Management Record number
- Errors detected during transfer
- Log and Dump records received by your Support Structure.

To invoke Option 9 from the Problem Analysis option screen:

1. Place CE MODE switch ON.
2. Key 9 next to SELECTION.
3. Press ENTER. The Service Transmission History screen is displayed.

```
                    *SERVICE REQUEST TRANSMISSION HISTORY*
                                                  ====LOGS REC'D======  ==DUMPS=
SYS DATE REC'D   PROBLEM#   SUPPORT SYS ERRORS    PA RC PW SP PU IC IO  SP ID MS
==============   ========   ==================    == == == == == == ==  == == ==

YY/MM/DD-HH:MM   INCxxxx    NOT REGISTERED
YY/MM/DD-HH:MM   INCxxxx    SYS SPACE UNAVAIL.
YY/MM/DD-HH:MM   INCxxxx    SYS READ ONLY MODE    Y  Y                    Y  Y  Y
YY/MM/DD-HH:MM   INCxxxx    DB NOT ACCESSIBLE     Y     Y     Y     Y
YY/MM/DD-HH:MM   INCxxxx    DATA BANK FULL        Y  Y
YY/MM/DD-HH:MM   INCxxxx    SYS SPACE UNAVAIL.
YY/MM/DD-HH:MM   INCxxxx    DB NOT ACCESSIBLE     Y     Y     Y     Y
YY/MM/DD-HH:MM   INCxxxx    DB NOT ACCESSIBLE     Y     Y     Y     Y
YY/MM/DD-HH:MM   INCxxxx    SYS READ ONLY MODE    Y  Y                    Y  Y  Y

            PA=PROBLEM ANALYSIS  SP=SUPPORT PROCESSOR  IO=I/O DEVICE TRACE
            RC=REFERENCE CODE    PU=PROCESSING UNIT    ID=DISKETTE MODULE
            PW=POWER LOG         IC=INSTRUCTION TRACE  MS=MAIN STORAGE

Q GENERAL SELECTION
Z RETURN TO PROG SYS
 SELECTION: _
                                                  4341
```

Option 9 Screen: Service Transmission History

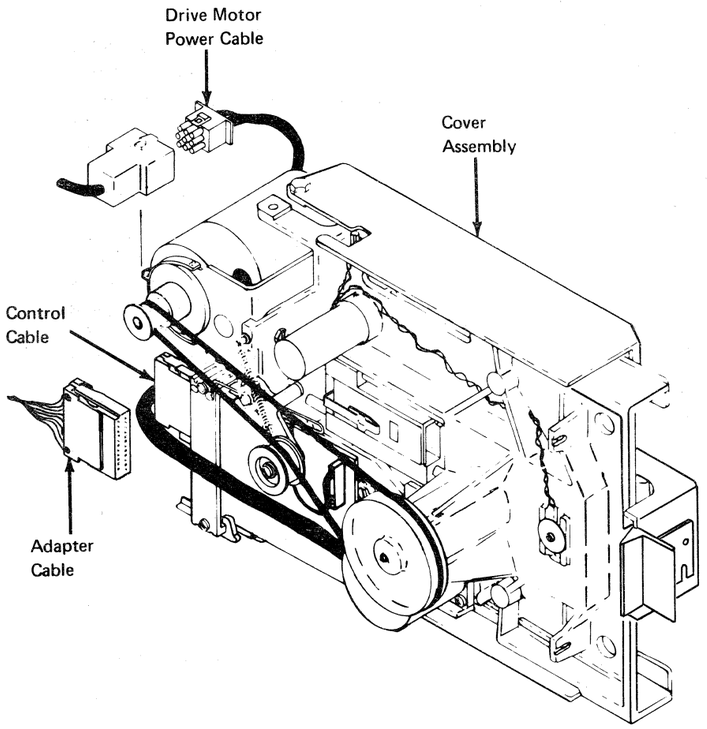
DISKETTE DRIVE 2D

CONTENTS

INTRODUCTION

GENERAL DESCRIPTION

The Diskette Drive 2D (53FD) is a direct access, read/write, data storage device. This device uses a flexible magnetic diskette for data entry, data exchange, and data storage. The 53FD can drive 1, 2, and 2D diskettes, but only 2D diskettes are used for the 4341 Processor.



MAINTENANCE

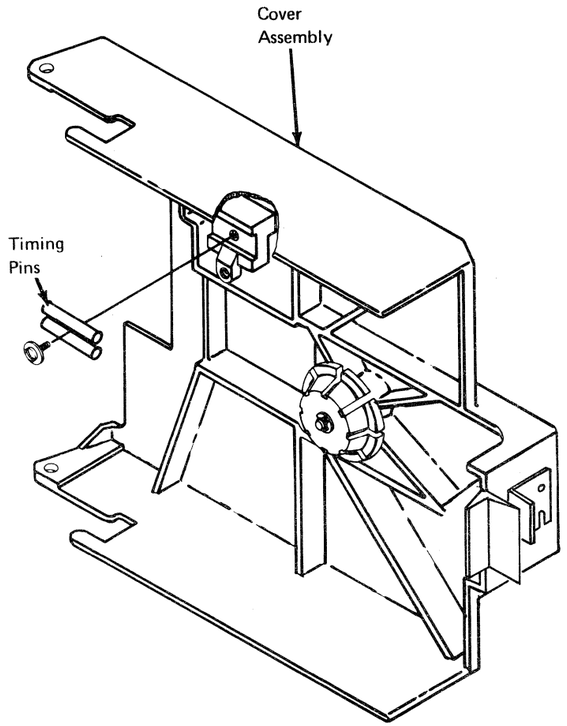
The 53FD needs no scheduled maintenance. The MAPs guide you in diagnosing diskette drive failures. The MAPs also point to maintenance procedures in this manual when an adjustment, service check, or FRU replacement is needed.

You can verify a problem offline (isolated from the 4341 processor) by using the 53FD diagnostic programs. You can verify a repair offline by using the 53FD diagnostic programs and online when you IML the 4341 Processor.

The head/carriage assembly, head timing block, and drive hub and pulley assembly are adjusted and tested at the factory. The head timing block and the drive hub and pulley assembly are not field replaceable. If the head timing block or the drive hub and pulley assembly is damaged, replace the complete 53FD.

SPECIAL TOOLS

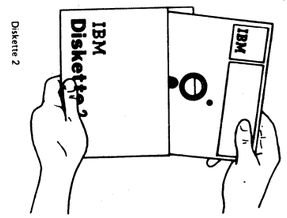
Two timing pins (part 5562019) are located inside the cover assembly. They are used to align the LED and PTX assemblies.



DISKETTE 2D

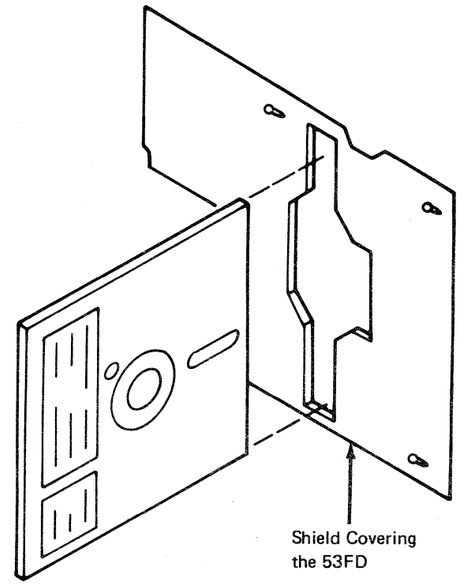
Diskette Description

The diskette 2D is a thin, flexible disk with data on both sides. Both sides of the diskette's surface are covered with magnetic recording material. The diskette is contained in a protective envelope.



Diskette Insertion

1. Open 53FD cover assembly.
2. Remove diskette from protective envelope.
3. Place diskette into 53FD.
4. Close 53FD cover assembly.

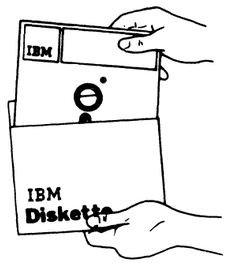


Diskette Removal

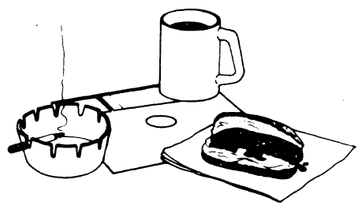
1. Open 53FD cover assembly.
2. Remove diskette.
3. Insert diskette in protective envelope.
4. Close 53FD cover assembly.

Diskette Care

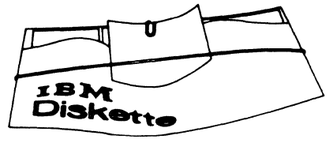
Return a diskette to its envelope when it is removed from the diskette drive.



Do not lay diskettes near smoke or other things that can cause the disk to be contaminated.

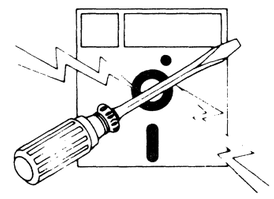


Do not use clips or rubber bands on a diskette.

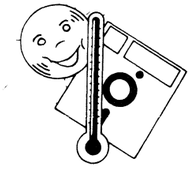


Do not touch or attempt to clean diskette surfaces. Contaminated diskettes will not work correctly.

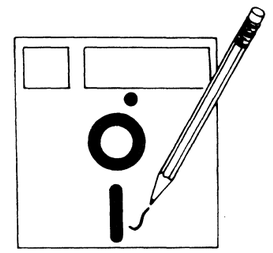
Do not place diskettes near magnetic materials. Data can be lost from a diskette exposed to a magnetic field.



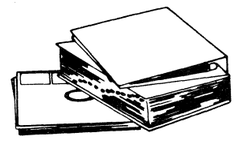
Do not expose diskettes to heat greater than 51.7° C (125°F) or direct sunlight.



Do not write outside the label area on diskettes.

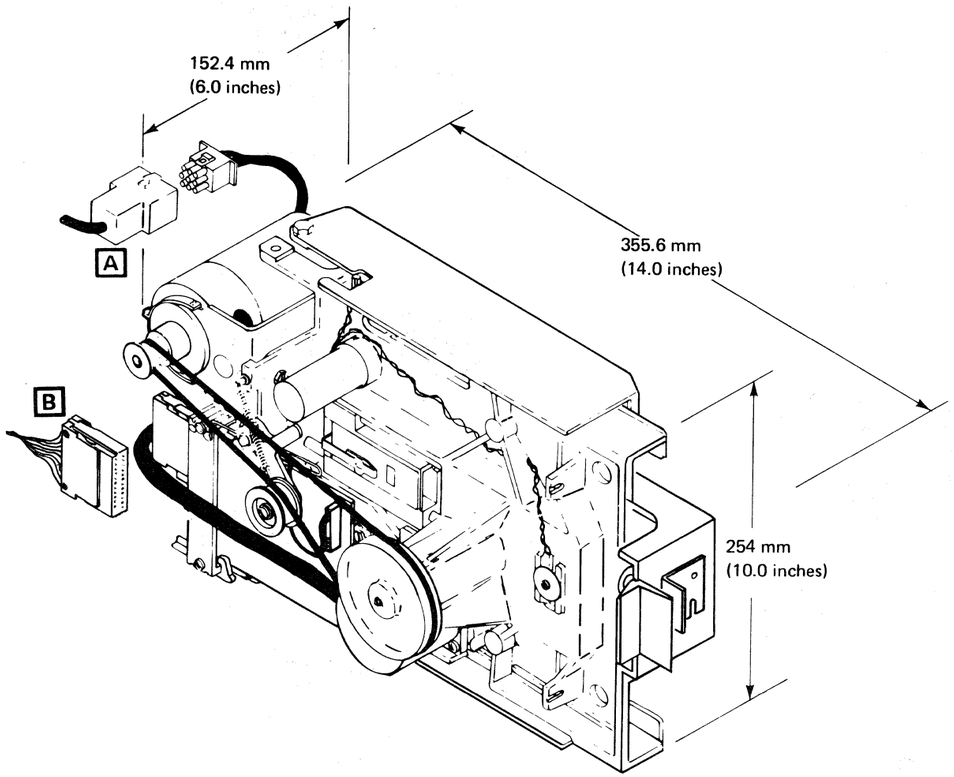


Do not place heavy books on diskettes.



MACHINE CHARACTERISTICS

PHYSICAL CHARACTERISTICS



- Weight: 5.44 kg (12 lb)
- Connecting cables: One ac power [A] ; and one signal and dc power [B] .
- Diskette speed: 360 rpm

ELECTRICAL CHARACTERISTICS

The 4341 Processor supplies the following power options to operate the 53FD:

- Logic voltage for the 53FD control card:

Logic Voltage (DC)	Maximum Operating Current	Tolerance
-5V	0.10A	±10%
+5V	0.80A	±10%
+24V	0.59A	±12%

- The following is a selection of the needed ac power:

  Note: *All ac voltage tolerances are ±10%.*

A. 60-Hz, single-phase ac power:

Input Voltage (AC)	Average Operating Current
200V	0.55A
208V	0.55A
220V	0.55A
240V	0.55A

B. 50-Hz, single-phase ac power:

Input Voltage (AC)	Average Operating Current
200V	0.55A
220V	0.55A
230V	0.55A
240V	0.55A

ENVIRONMENTAL CHARACTERISTICS

The 53FD can be stored or operated in the following temperature and humidity ranges:

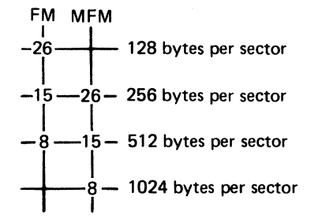
	Temperature		Relative
	Celsius	Fahrenheit	Humidity
Operate (Powered On)	10° to 40.6°	50° to 105°	8% to 80%
Store (Powered Off)	10° to 51.7°	50° to 125°	8% to 80%

FUNCTIONAL CHARACTERISTICS

Diskette data formatting gives the 53FD the following characteristics:

	Diskette 1	Diskette 2	Diskette 2D
128 Bytes per Sector	242,944*	492,544**	
256 Bytes per Sector	284,160	568,320	985,088***
512 Bytes per Sector	303,104	606,208	1,136,640
1024 Bytes per Sector			1,212,416

- Data storage space (in formatted data bytes):
- Data rate: 250,000 bits (31,250 bytes) per second (FM); 500,000 bits (62,500 bytes) per second (MFM).
- Cylinder-to-cylinder seek time: 5 ms plus 35 ms for the head/carriage assembly to stop. (The total seek time is the number of cylinders the heads moved across multiplied by 5 ms, plus 35 ms.)
- Tracks per diskette side: 77 (Cylinder 00 is the label cylinder; cylinders 01 through 76 are for data.)
- Sectors per track:



ACCESS AND RETURN OF DISKETTE DRIVE 2D ASSEMBLY

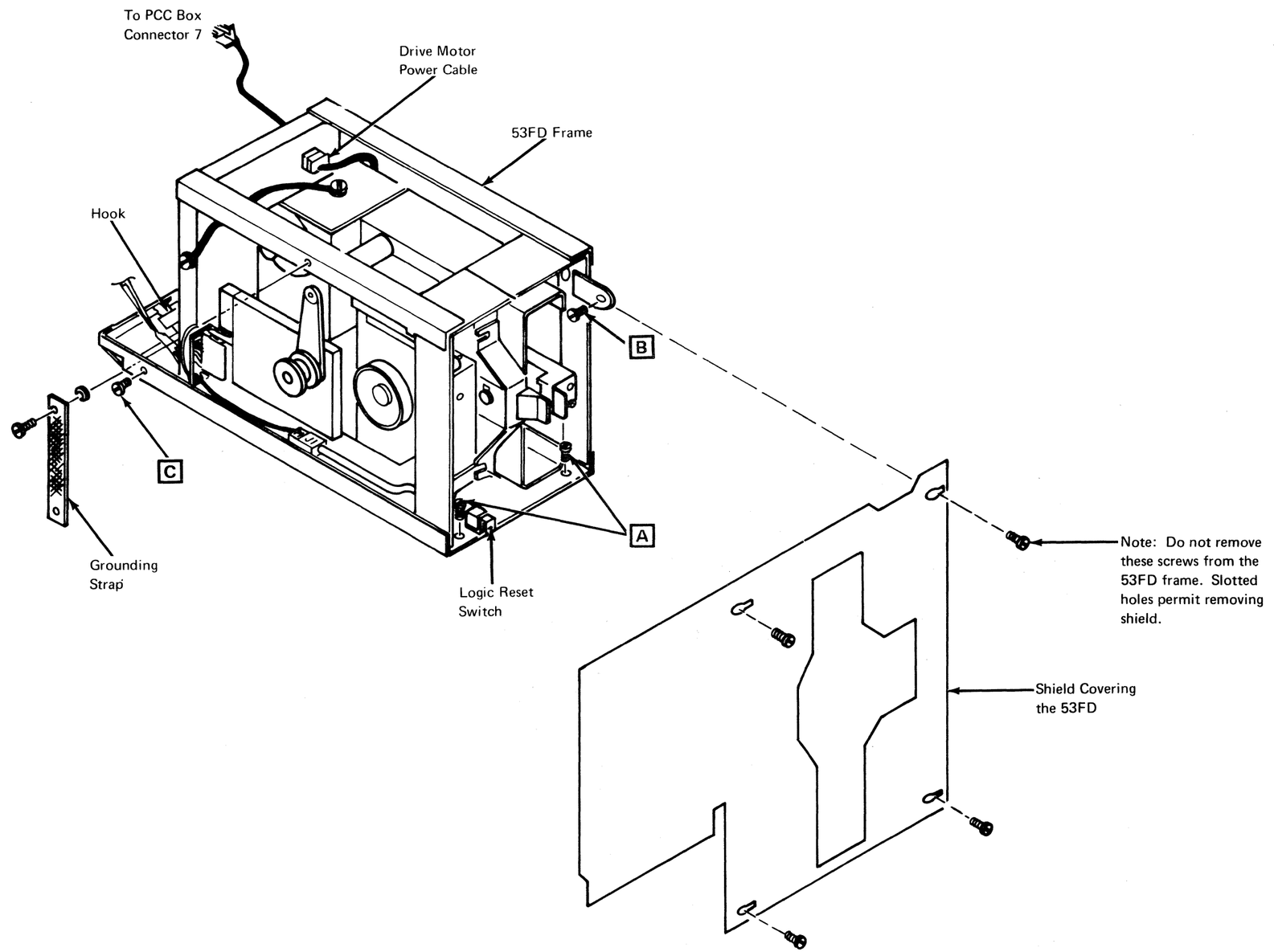
To access 53FD assembly:

1. Power off.
2. Open all covers on frame 01.
3. Remove any diskette in 53FD.
4. Open 01A gate.
5. Loosen (but do not remove) four screws holding shield covering the 53FD assembly. The shield is located at the side of frame 01.
6. Carefully remove shield from screws. (Screw holes are slotted.)
7. Remove two screws [A] from bottom front of 53FD frame.
8. Remove screw [B] from top right corner of 53FD frame.
9. Remove screw [C] from rear left side of 53FD frame.
10. Pull 53FD assembly out of frame 01 until assembly stops.
11. Return to service procedure you came from.

To return 53FD assembly to frame 01:

Caution: When pushing 53FD frame, be careful not to damage wires behind it.

1. Carefully push 53FD assembly back into frame 01 until assembly stops.
2. Replace two screws [A] to bottom front of 53FD frame.
3. Replace screw [B] to top right corner of 53FD frame.
4. Replace screw [C] to rear left side of 53FD frame.
5. Carefully place shield on four screws located on front of 53FD frame.
6. Tighten the four screws.
7. Close 01A gate.
8. Place a diskette in 53FD.
9. Close all covers on frame 01.



DISKETTE DRIVE 2D REMOVAL/REPLACEMENT

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Turn off main circuits breakers located on front of PCC box.
3. Disconnect grounding strap [A] by removing screw [B] and star washer [C] from 53FD frame.
   Note: *Be sure to replace star washer [C] to ensure good grounding.*
4. Disconnect cable [D] from connection 7 on PCC box.

Caution: When removing or replacing the adapter cable [E], be carful not to damage the pins.

5. Remove adapter cable [E] from rear of 53FD.
6. Disconnect P1 plug [F] from J1 jack.
7. Carefully lift and pull 53FD assembly out of T-shaped hook [G] located at bottom of 53FD frame. Carefully place assembly in a clean open space to continue 53FD removal.
8. Disconnect drive motor power cable cable [H] at upper rear of 53FD.
9. Disconnect drive motor grounding wire [R] from 53FD frame by removing screw and washer [S]
10. Remove 53FD from its frame by loosening four screws [J] and [L] from front and back brackets [I] and [K]. Carefully lift 53FD out of frame.

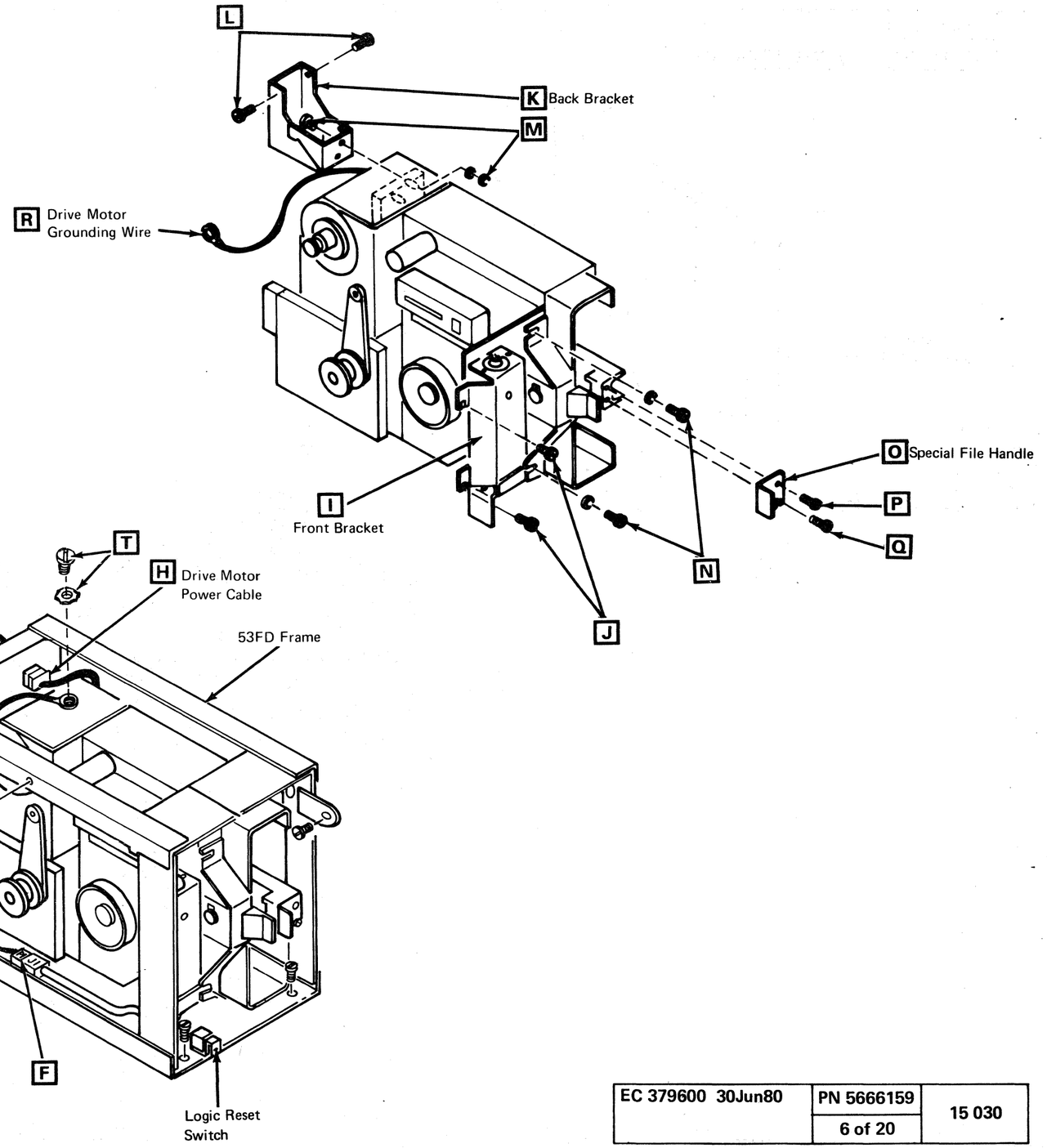
    Note: *The following items MUST be installed on the new 53FD.*

11. Remove back bracket [K] by removing screws, nuts, and washers [M] at rear of bracket.
12. Remove front bracket [I] by removing two screws and washers [N].
13. Remove special file handle [O] by loosening screw [Q] at bottom of handle and removing screw [P] at top of handle.

    Note: *When reinstalling special file handle, follow latch replacement procedure on 15 040.*

14. Remove drive motor grounding wire [R] from 53FD by removing screw and washer [T] from top of drive motor.
15. Reinstall 53FD assembly by reversing this procedure up to step 2; then return 53FD assembly to frame 01. (See procedure on 15 025.)

Caution: Before installing new 53FD to 53FD frame, remove cardboard from diskette area.



DISKETTE DRIVE 2D PARTS AND LOCATION

COVER ASSEMBLY

[A] Latch assembly
[B] Collet Assembly

The collet centers and holds the diskette against the drive hub when the cover is closed.

HEAD LOAD PARTS

[C] Solenoid
[D] Bail

The solenoid causes the bail to load the heads.

AC DRIVE PARTS

[E] Belt
[F] Drive motor
[G] Drive pulley
[H] Idler assembly

The ac drive parts turn the diskette at 360 rpm.

Note: *The idler assembly is not present on some models of the 53FD.*

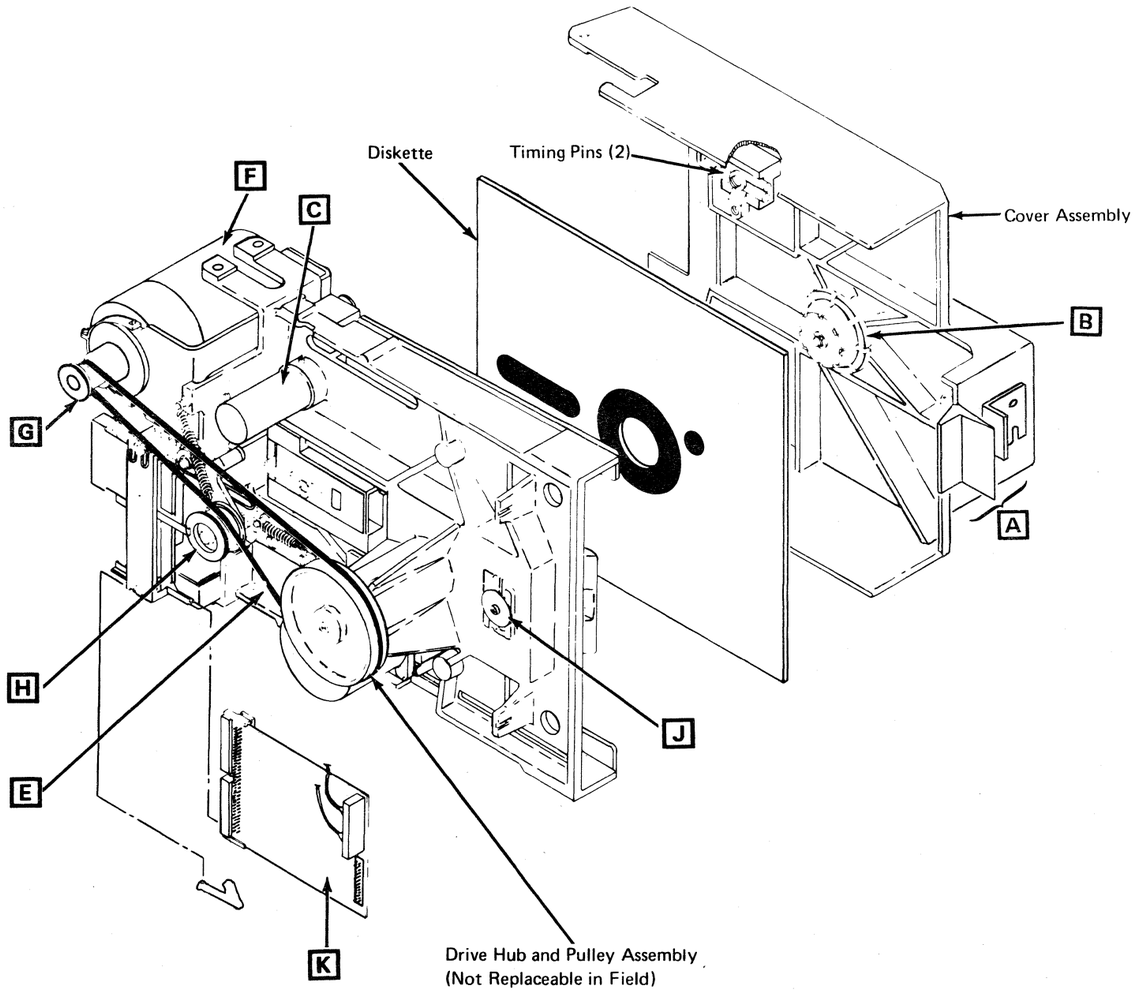
INDEX DETECTION ASSEMBLIES

[I] LED
[J] PTX

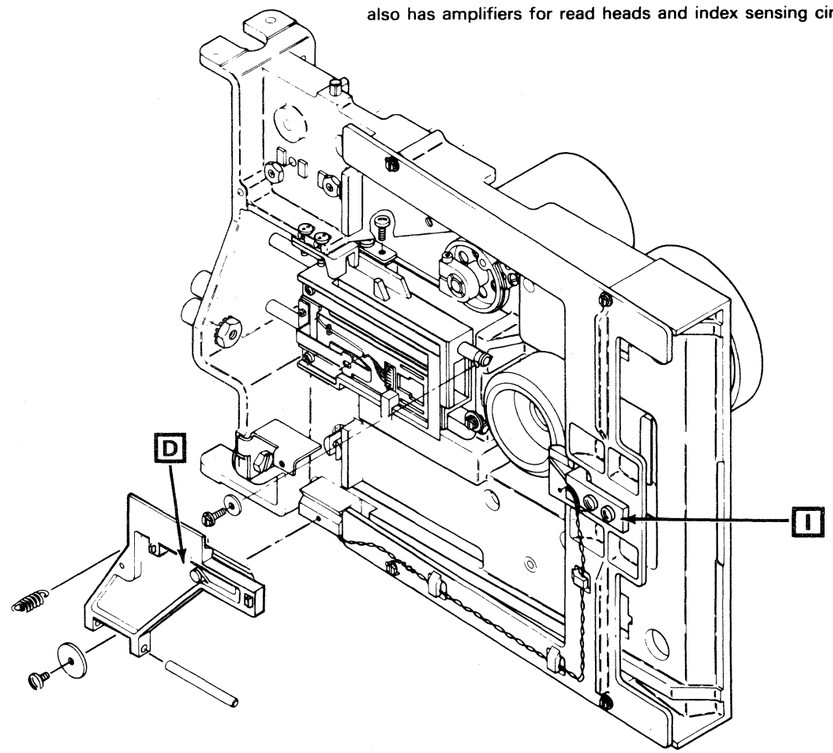
The LED (light source) and PTX (light sensing device) work together to detect the diskette index.

DISKETTE DRIVE 2D CONTROL CARD

The 53FD control card [K] has drive circuits for the stepper motor, solenoid, write, and erase functions. This control card also has amplifiers for read heads and index sensing circuits.



FRONT VIEW (Facing Front of Frame 01)



COVER ASSEMBLY

COVER REMOVAL

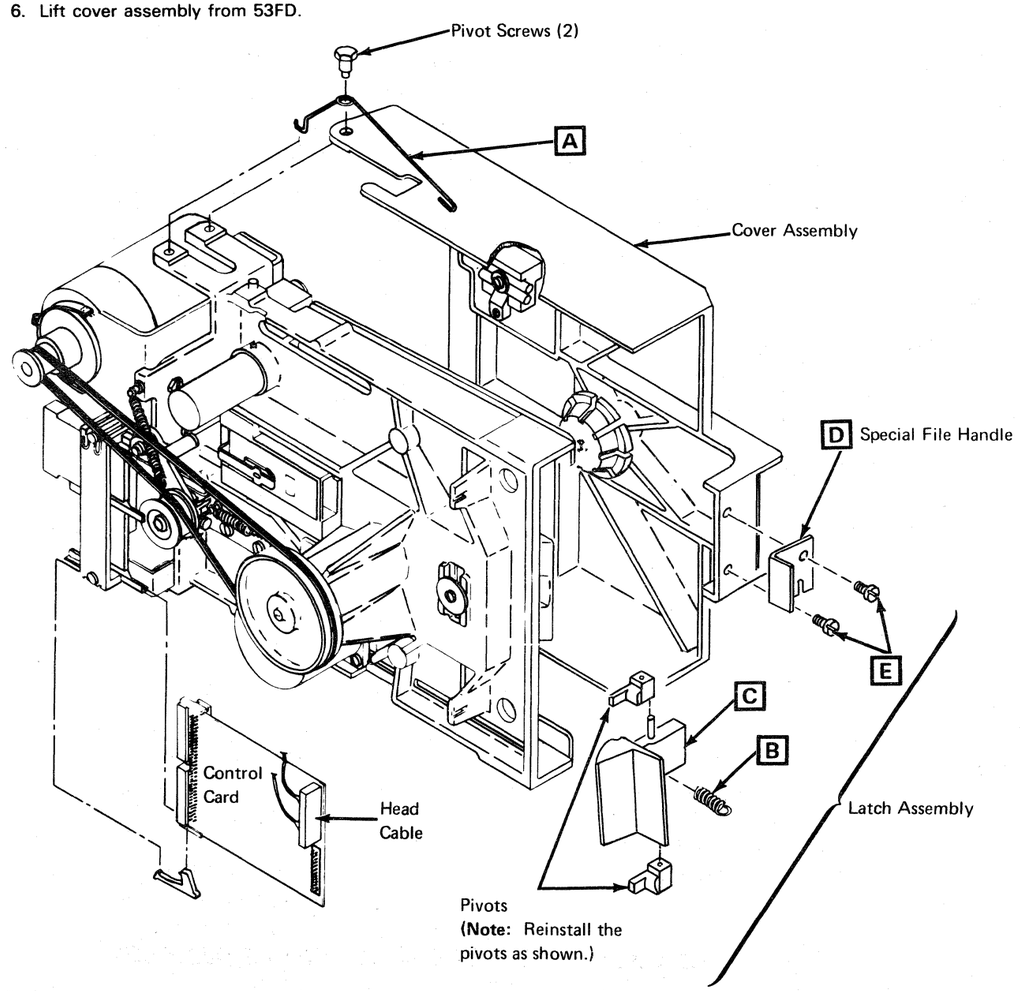
1. Access the 53FD assembly. (See procedure on 15 025.)
2. Open 53FD cover assembly.

Caution: Do not allow read/write heads to touch because this would damage them.

3. Disconnect spring [A] from cover assembly.
4. Loosen two pivot screws with a wrench.
5. While holding cover assembly, remove pivot screws.
6. Lift cover assembly from 53FD.

COVER REPLACEMENT

1. Align 53FD cover assembly with mounting holes. Then reinstall two pivot screws. (Ensure that spring [A] is installed.)
2. Tighten pivot screws with a wrench.
3. Connect spring [A] to cover assembly.
4. Close cover assembly.
5. Return 53FD assembly to frame 01. (See procedure on 15 025.)



LATCH ASSEMBLY REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove 53FD cover assembly. (See "Cover Removal.")
3. Carefully remove latch [C] special file handle [D] and two pivots, by removing two mounting screws [E]. Do not lose spring [B] or the two pivots.

LATCH ASSEMBLY REPLACEMENT

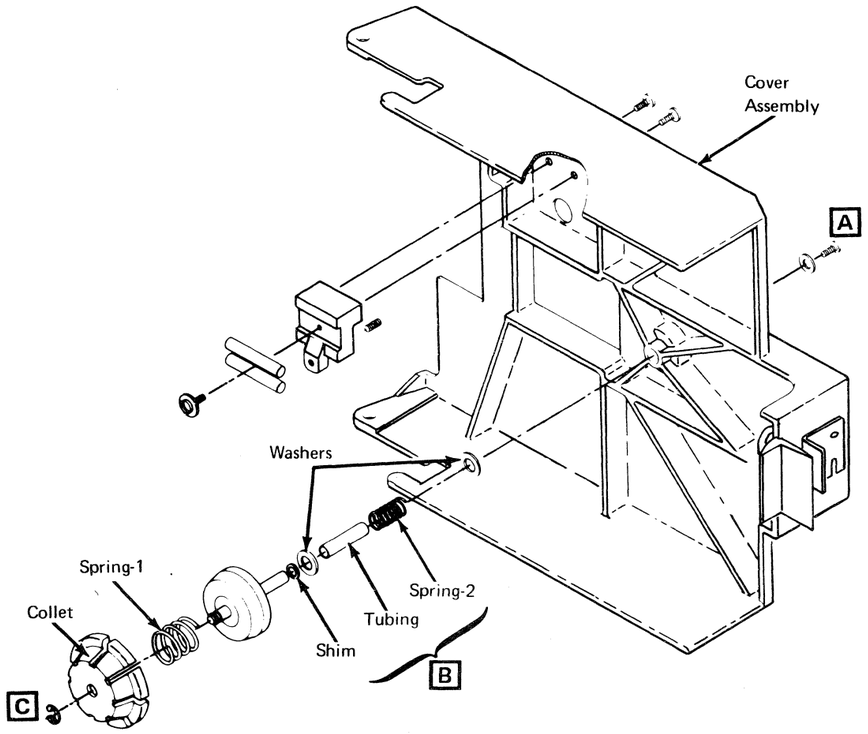
1. Place latch [C] and special file handle [D] on cover assembly. Then position the two pivots. Ensure spring [B] is reinstalled.
2. Reinstall two latch mounting screws [E].
3. Reinstall 53FD cover assembly. (See "Cover Replacement.")
4. Return 53FD assembly to frame 01. (See procedure on 15 025.)

COLLET ASSEMBLY REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove 53FD cover assembly. (See "Cover Removal.")
3. Remove clip [C], collet, and spring-1.
4. Remove mounting screw [A].
5. Remove remaining parts of collet assembly [B].
6. Inspect all parts for wear and install new parts as needed.

COLLET ASSEMBLY REPLACEMENT

1. Reinstall parts of collet assembly [B] and mounting screw [A] as shown.
3. Reinstall spring-1, collet, and clip [C].
4. Reinstall 53FD cover assembly. (See "Cover Replacement.")
5. Return 53FD assembly to frame 01. (See procedure on 15 025.)



HEAD LOAD PARTS

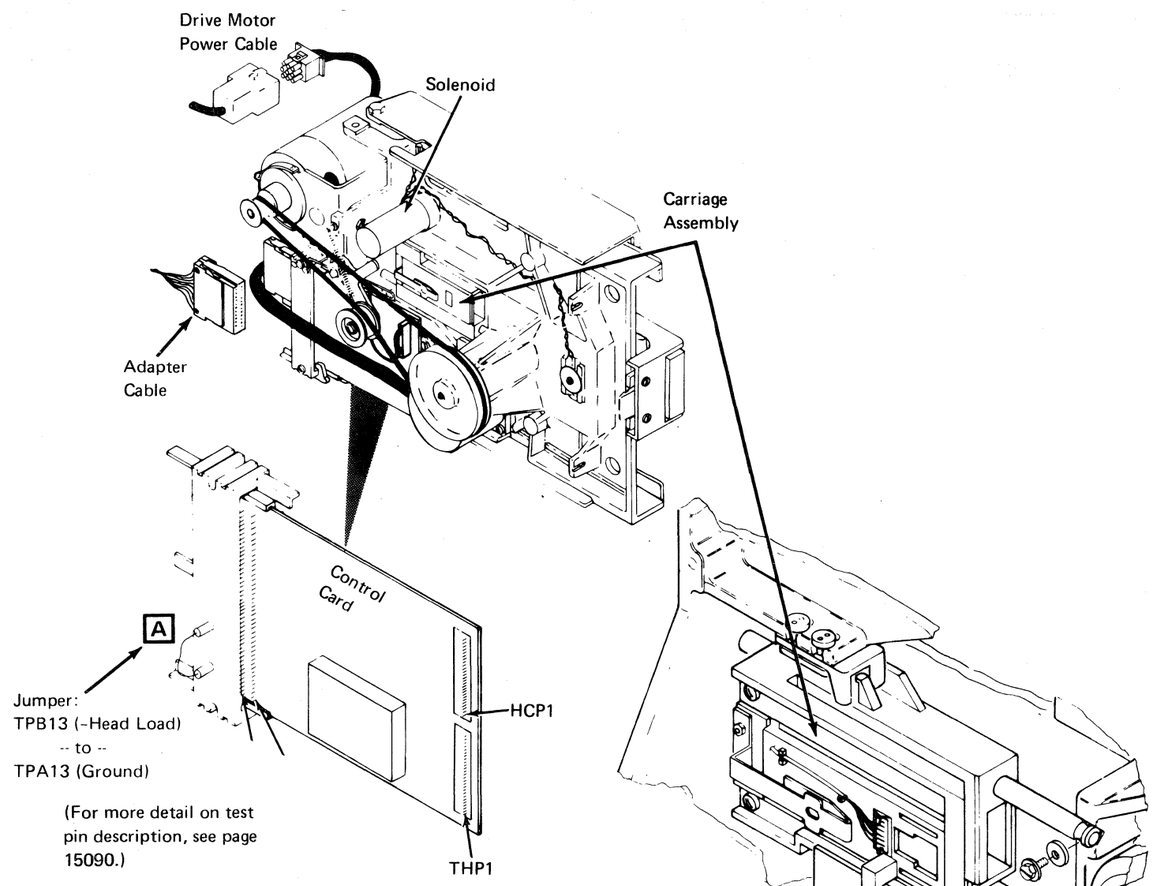
SOLENOID AND BAIL SERVICE CHECK

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect drive motor power cable.
3. Remove 53FD cover assembly. (See "Cover Removal" on 15 040.)
4. Insert a strip of clean paper between heads to prevent head surfaces from touching.

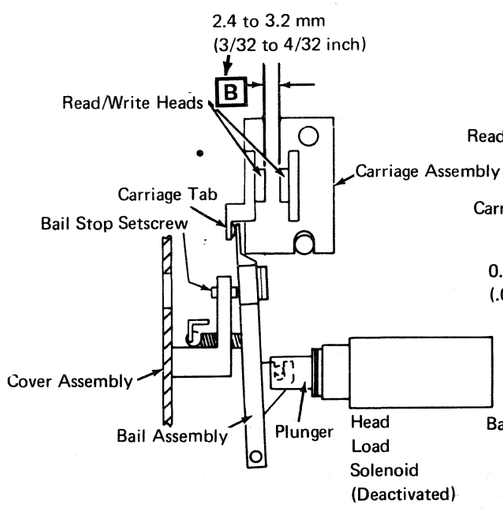
DANGER Use extreme care when you perform service while power is on.

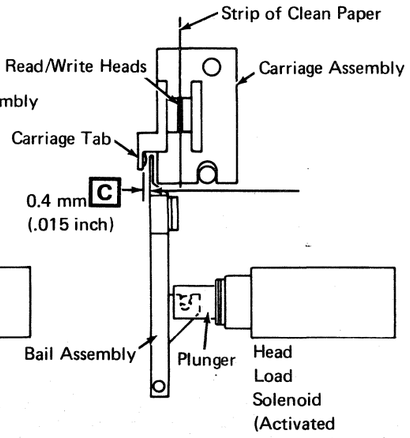
5. Power on.
6. Install a jumper [A] (TPB13 to TPA13) to activate solenoid.
7. Verify a 0.4 mm (0.015 in) gap [C] between bail and carriage arm for carriage movement (cylinder 00 to cylinder 76).
8. If gap does not meet specification, go to step 7 of "Solenoid and Bail Adjustment." If gap does meet specification, continue with step 9.
9. Power off.
10. Remove jumper [A].
11. Remove paper from between carriage heads.
12. Reinstall 53FD cover assembly. (See "Cover Replacement" on 15 040.)
13. With solenoid de-activated and cover closed, visually check for a very small gap [B] between the carriage head surfaces.

    Note: *This gap cannot be measured.*
14. If gap is not in specification, go to step 14 of "Solenoid and Bail Adjustment." If gap is in specification, continue with this procedure.
15. Connect drive motor power cable.
16. Return 53FD assembly to frame 01. (See procedure on 15 025.)



(For more detail on test pin description, see page 15090.)





SOLENOID AND BAIL ADJUSTMENT

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect drive motor power cable.
3. Remove 53FD cover assembly. (See "Cover Removal" on 15 040.)
4. Insert a strip of paper between carriage heads to prevent head surfaces from touching.

DANGER
Use extreme care when you perform service while power is on.

5. Power on.

DANGER
Solenoid case becomes hot after continuous use.

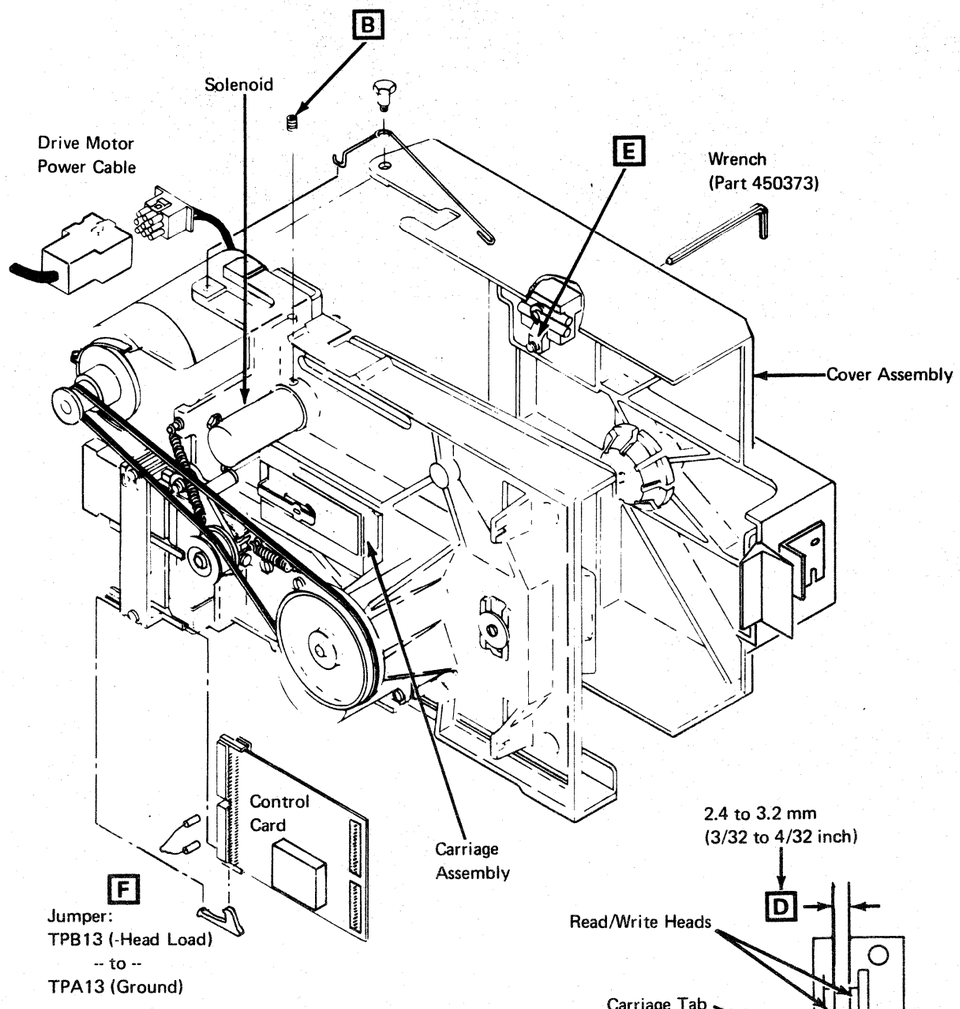
6. Install a jumper [F] to activate solenenoid.
7. Loosen solenoid locking screw [B].
8. Turn solenoid in casing and measure for a 0.4 mm (0.015 in) gap [C] between bail and carriage arm (A clockwise turn decreases the gap.)
9. If gap is not as specified for all carriage movement (cylinder 00 to cylinder 76), go back to step 7.

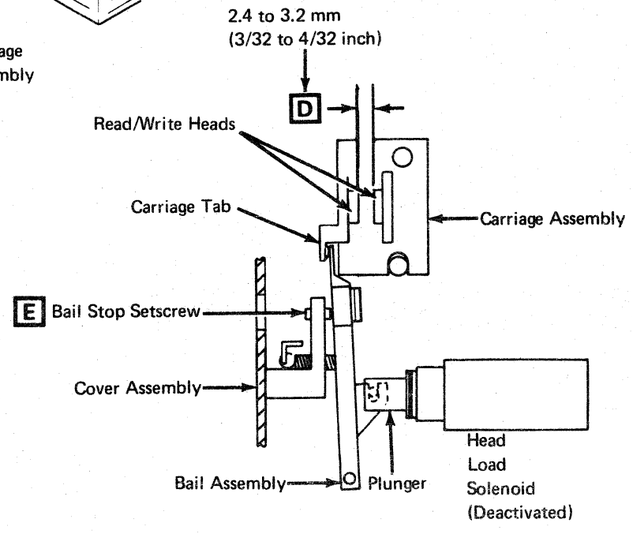
   Note: *If head carriage can not be manually moved with power on, power off, and then move the head carriage to desired cylinder position.*

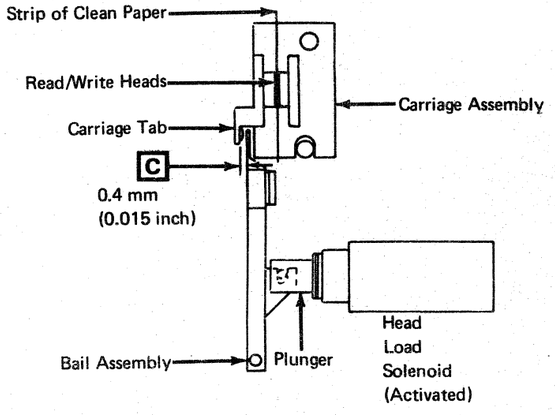
10. Tighten solenoid locking screw.
11. Check clearance between idler arm and solenoid. Adjust tap on idler arm to obtain clearance.
12. Remove jumper [F].
13. Remove paper between heads.
14. Reinstall 53FD cover assembly. (See "Cover Replacement" on 15 040.)
15. With soleniod de-activated and cover closed, visually check for a gap [D] between the carriage head surfaces.

    Note: *This gap can not be measured.*

16. If gap does not meet specifications, turn bail stop setscrew [E] clockwise until heads just touch; then turn counterclockwise one complete turn.
17. Power off.
18. Connect drive motor power cable.
19. Return 53FD assembly to frame 01. (See procedure on 15 025.)





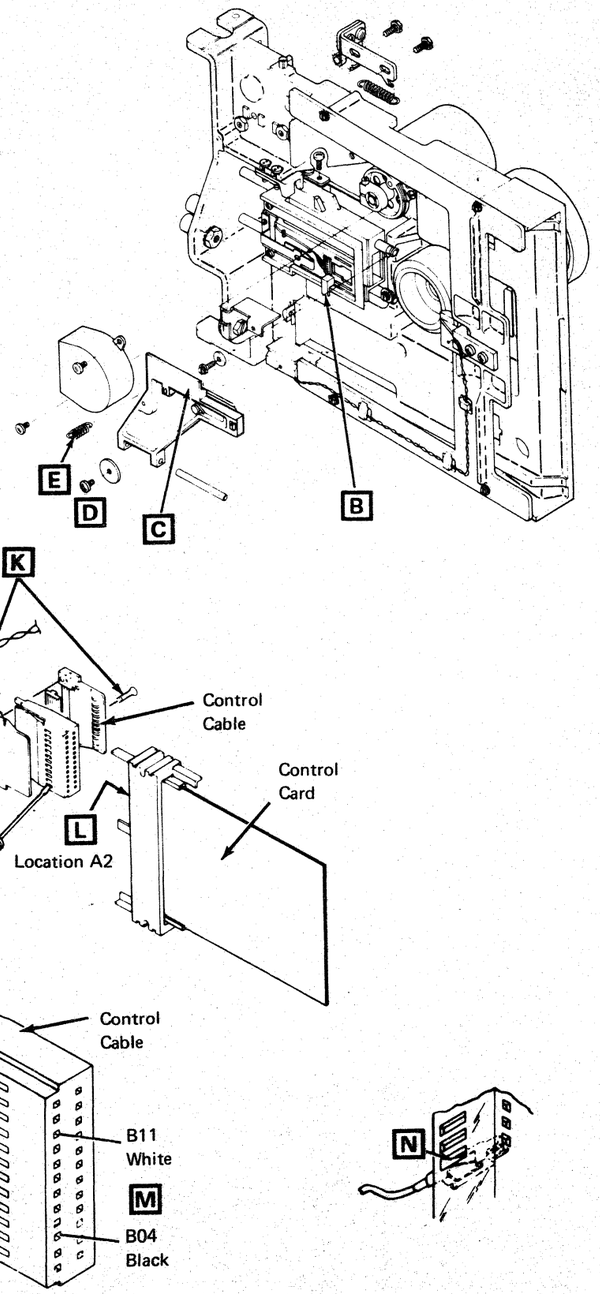


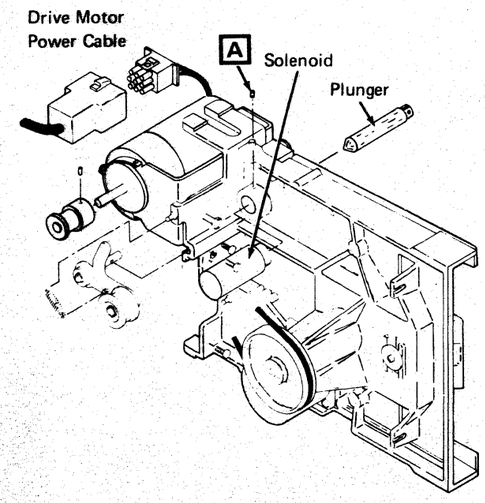
SOLENOID AND BAIL REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect drive motor power cable.
3. Remove 53FD cover assembly. (See "Cover Removal" on 15 040.)
4. Insert a clean strip of paper between carriage heads to prevent head surfaces from touching.
5. Remove bail return spring [E].

Caution: Be careful not to damage plated surface of the plunger.

6. Remove mounting screw [D] and bail [C]. (This pulls solenoid plunger out of solenoid.)
7. Disconnect 53FD control cable from location A2 [L].
8. Remove two screws [K] and connector covers.
9. Remove two solenoid leads [M] by pushing down on tabs with a small screwdriver.
10. Remove plunger from bail.
11. Loosen solenoid locking screw [A].
12. Remove solenoid by turning it counterclockwise.





SOLENOID AND BAIL REPLACEMENT

1. Install solenoid about four turns clockwise into casting.

Caution: Be careful not to damage plated surface of plunger.

2. Install plunger to bail.
3. Insert plunger into solenoid.
4. Reinstall bail and mounting screw [D]. Ensure that bail is under tab [B] of carriage arm.
5. Reinstall bail return spring [E].
6. Insert two solenoid leads [M] into 53FD control cable connector. Ensure locking taps [N] on terminals are locked in connector openings.
7. Reinstall cable connector covers and two screws [K].
8. Plug cable into location A2 [L] on the 53FD control card socket.
9. Go to step 4 of "Solenoid and Bail Adjustment" procedure on 15 055.

AC DRIVE PARTS

BELT REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Release idler tension by hand and remove drive belt.

BELT REPLACEMENT

1. Install drive belt. Ensure belt is positioned on idler as shown.
2. Return 53FD assembly to frame 01. (See procedure on 15 025.)

DRIVE MOTOR REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect drive motor power cable.
3. Disconnect drive motor grounding wire [G] from top of drive motor by removing screw and washer [H].
4. Remove drive belt; see "Belt Removal".

DANGER
Drive motor case becomes hot after continuous use.

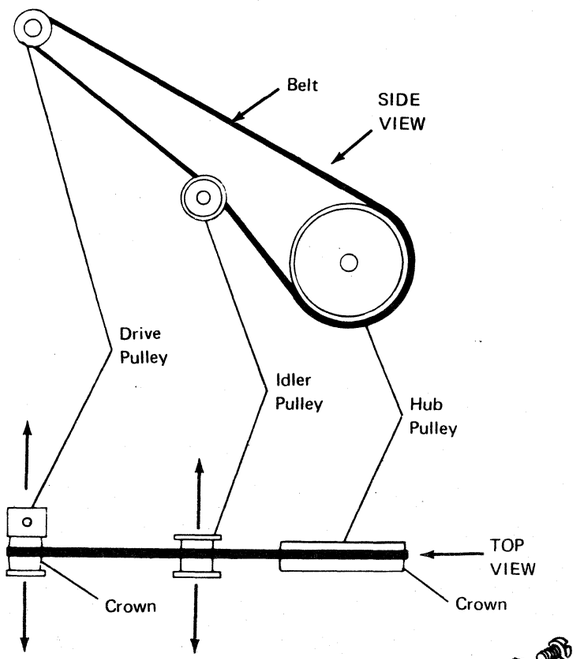
5. Loosen two drive motor bracket screws [D] and remove drive motor from two mounting brackets.
6. Loosen setscrew [C]. then remove drive pulley from drive motor shaft.

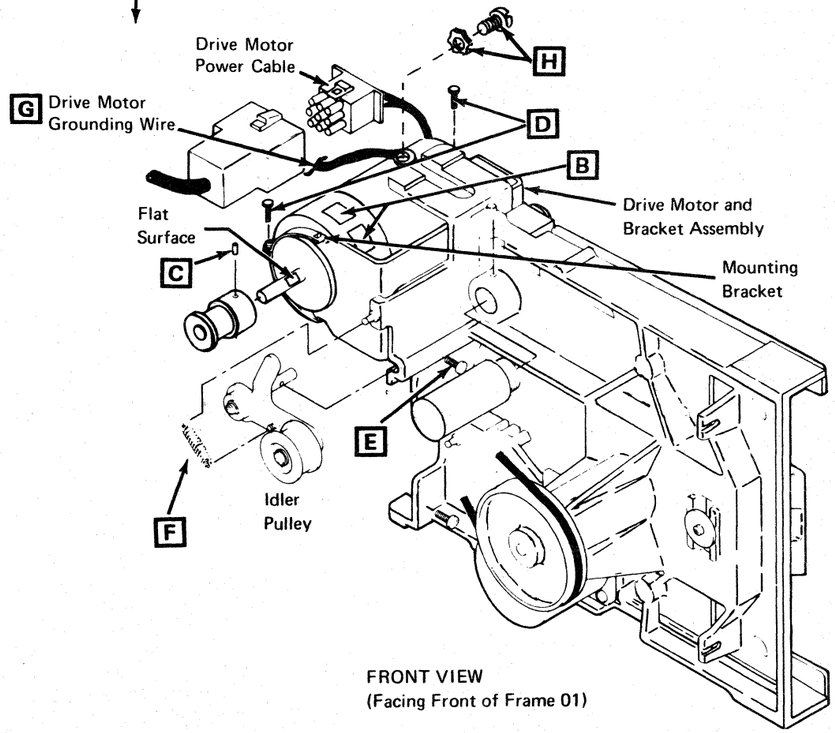
DRIVE MOTOR REPLACEMENT

1. Reinstall drive pulley on new drive motor. Ensure setscrew [C] is directly on flat surface of motor shaft. (To locate flat surface, see drawing.)

DANGER
To prevent personal injury on 60Hz motors, ensure two large holes [B] in motor case are positioned up and under bracket.

2. Install drive motor on mounting brackets and tighten bracket screws [D].
3. Install drive motor grounding wire [G] on top of drive motor with screw and washer [H].
4. Connect drive motor power cable.
5. Reinstall belt; see "Belt Replacement".
6. Return 53FD assembly to frame 01. (See procedure on 15 025.)





FRONT VIEW
(Facing Front of Frame 01)

DRIVE PULLEY REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove drive belt. (See "Belt Removal.")
3. Loosen the setscrew [C], then remove drive pulley from drive motor shaft.

DRIVE PULLEY REPLACEMENT

1. Install drive pulley on drive motor shaft with setscrew [C] directly on flat surface of shaft. (To locate flat surface, see drawing.)
2. Reinstall belt. (See "Belt Replacement.")
3. Return 53FD assembly to frame 01. (See procedure on 15 025.)

IDLER ASSEMBLY REMOVAL

Note: *The idler assembly is not present on some models of the 53FD.*

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove drive belt. (See "Belt Removal.")
3. Remove idler spring [F].
4. Remove locking screw [E] and idler assembly.

IDLER ASSEMBLY REPLACEMENT

1. Reinstall idler assembly and locking screw.
2. Reinstall idler spring [F].
3. Reinstall belt. (See "Belt Replacement.")

INDEX DETECTION ASSEMBLIES

DISKETTE SPEED SERVICE CHECK

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Insert a diskette. (Ensure 53FD cover assembly is closed.)

DANGER
Use extreme care when you perform service while power is on.

3. Power on.
4. Install a jumper [A] to activate solenoid.
5. Set up an oscilloscope as follows:

Note: *Use a Tektronix 453, 454, or a similar oscilloscope with x10 probes.*

Channel A sweep mode	Normal
Channel A level	+
Channel A coupling	DC
Channel A slope	+
Channel A source	Internal
Tripper	Normal
Mode	Channel 1
Channel 1 volts/division	1.0 V/cm
Channel 1 input	DC
Times per division	20 ms
Channel 1 probe to	+Index Test Pin ← [B]

6. Observe an index pulse width of 1.5 to 3.0 ms [E] occurring every 166.7 ± 4.2 ms [C]. Pulse amplitude should be between 2.4 and 4.2 Vdc [D].
7. Power off.
8. Remove jumper [A].
9. Remove diskette.
10. Return 53FD assembly to frame 01. (See procedure on 15 025.)

LED AND PTX ALIGNMENT

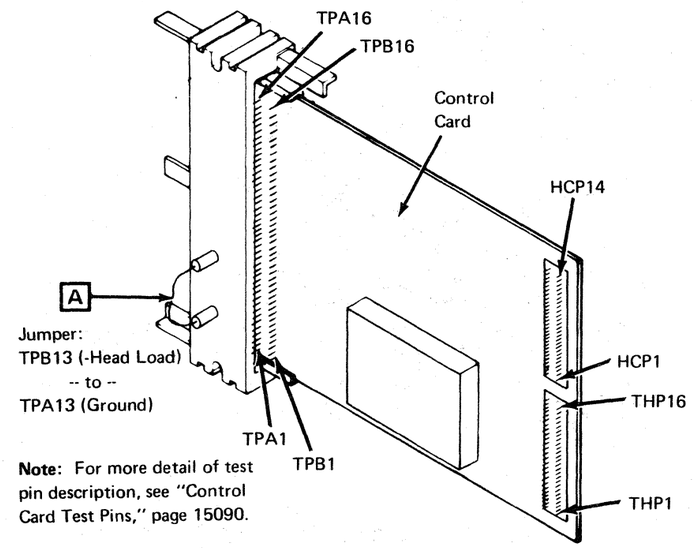
1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove 53FD cover assembly. (See "Cover Removal" on 15 040.)
3. Loosen PTX mounting screw [F].
4. Position PTX assembly against casting stop [G] (away from leads); then tighten mounting screw.
5. Loosen two LED mounting screws [J].
6. Insert two timing pins [H] through LED into PTX assembly and tighten LED mounting screws.

Note: *If you can not insert timing pins, the holes of the LED and PTX assemblies are not aligned. Loosen PTX mounting screw [F] and push the PTX assembly very slightly away from casting stop [G]. Then start from step 6 and continue. You may need to repeat this step.*

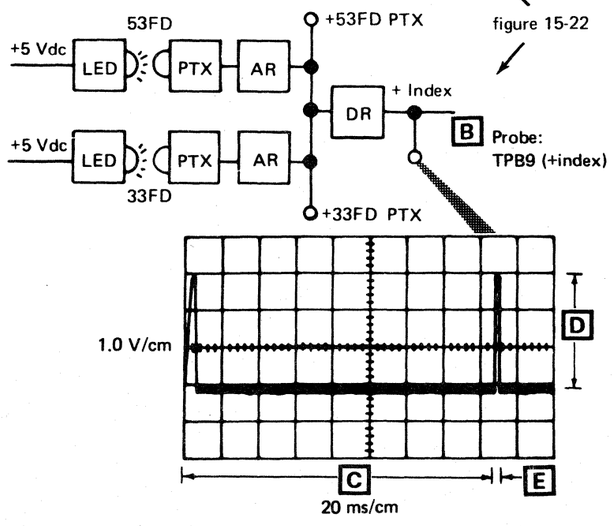
7. Remove timing pins.
8. Reinstall 53FD cover assembly. (See "Cover Replacement" on 15 040.)

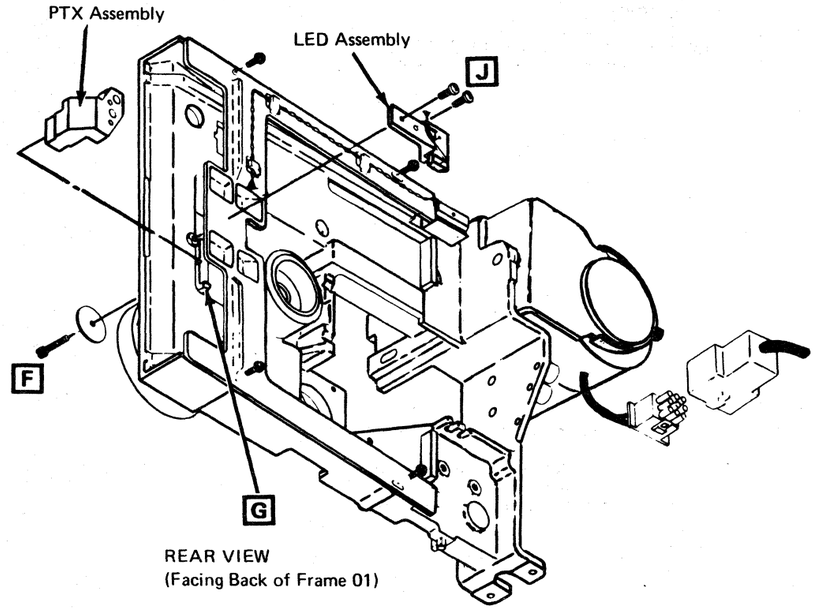
DANGER
Use extreme care when you perform service while power in on.

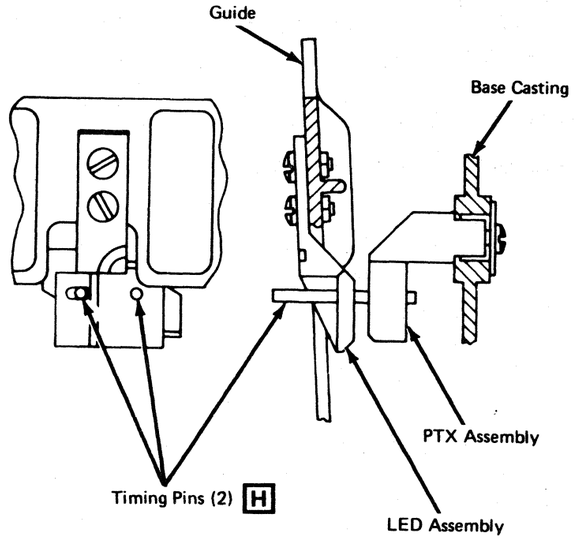
9. Power on.
10. Perform "Diskette Speed Service Check" procedure.



Note: For more detail of test pin description, see "Control Card Test Pins," page 15090.





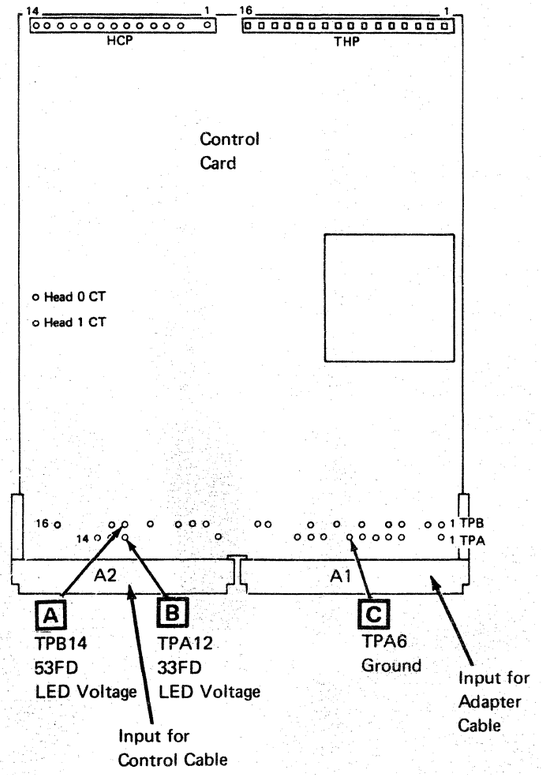


LED OUTPUT SERVICE CHECK

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Connect negative probe of a multimeter to ground test pin [C] on 53FD control card.
3. Set multimeter scale to 5 Vdc and connect positive probe to TPB14 LED voltage test pin [A].

DANGER Use extreme care when you perform service while power is on.

4. Power on.
5. Check for a voltage level between 1 and 2 Vdc.
6. Move positive probe to LED voltage at TPA12 test pin [B].
7. Check for a voltage level between 1 and 2 Vdc.
8. Power off.
9. Return 53FD assembly to frame 01. (See procedure on 15 025.)

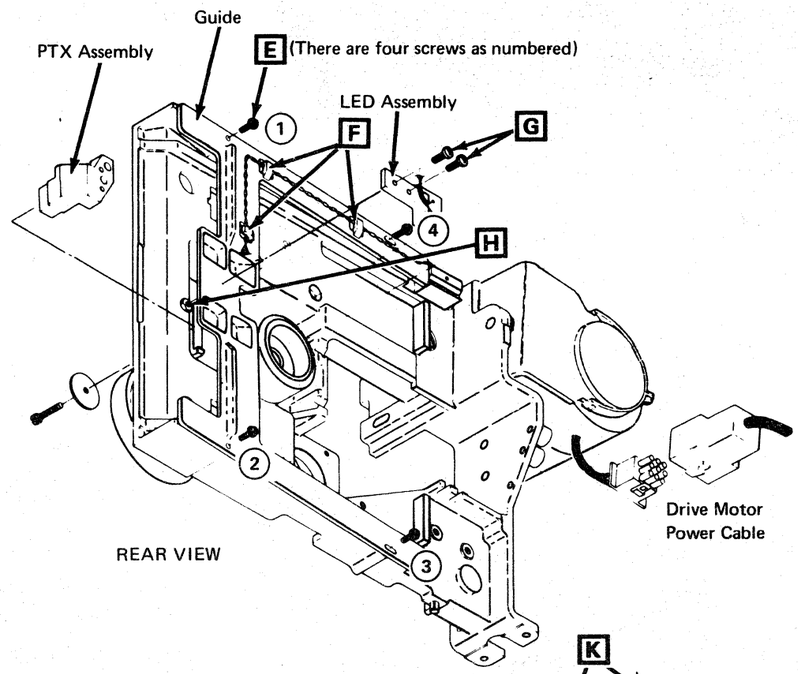


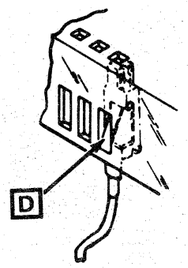
LED REMOVAL

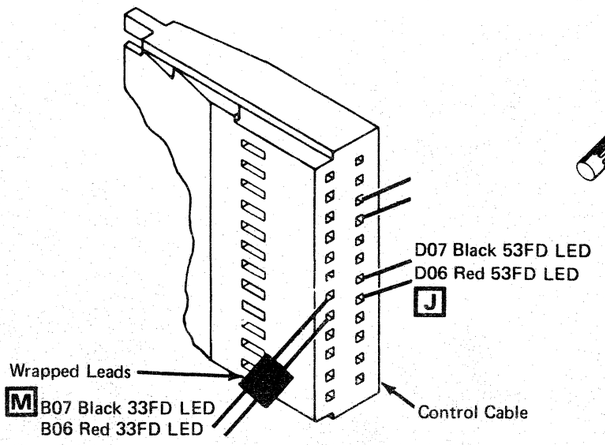
1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove 53FD cover assembly. (See "Cover Removal" on 15 040.)
3. Disconnect 53FD control cable from location A2 [L].
4. Remove two screws [K] and connector covers.
5. Remove two 33FD LED leads (wrapped pair) [M] and two 53FD LED leads [J] by pushing down on tabs with a small screwdriver.
6. Remove LED cable from three retainers [F]. (Remember cable path for replacement.)
7. Remove four guide mounting screws [E] and guide.
8. Remove two LED mounting screws [G] and nuts [H]. Then remove LED assembly.

LED REPLACEMENT

1. Install LED assembly, two mounting screws [G], and nuts [H] on guide. (Do not tighten.)
2. Reinstall guide and four mounting screws [E].
3. Follow cable path through three retainers [F] and insert two 33FD LED leads (wrapped pair) [M] and two 53FD LED leads [J] in 53FD control cable connector. Ensure tabs [D] on terminals are locked in connector openings.
4. Reinstall cable connector covers and two screws [K].
5. Plug cable in location A2 [L] of 53FD control card socket.
6. Go to "LED and PTX Alignment" procedure on 15 070.



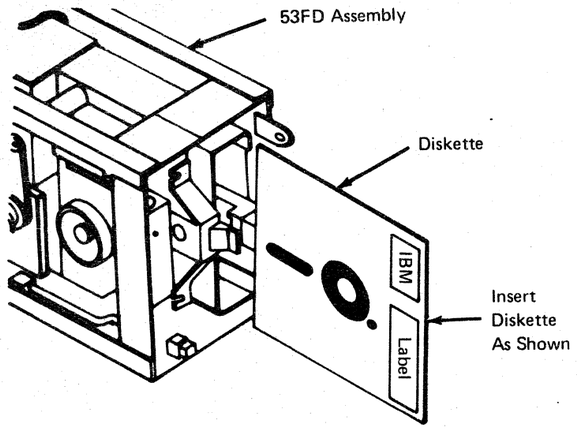




PTX AMPLIFIER SERVICE CHECK

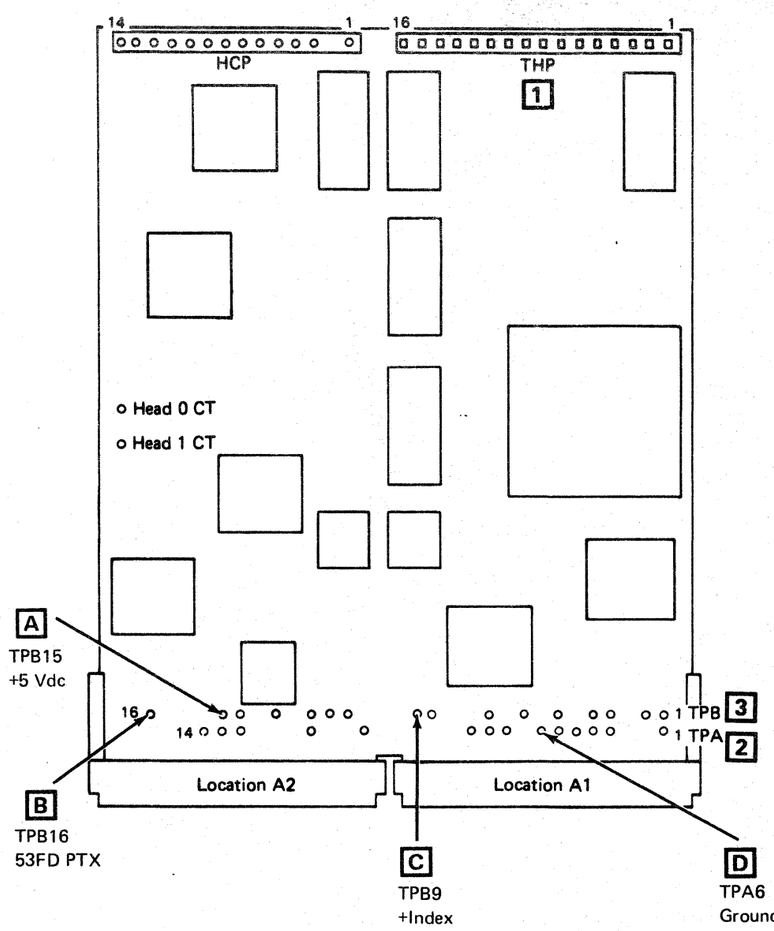
Caution: Always perform this service check with a diskette inserted backward (with label facing 01A gate), or LED light causes a wrong reading and can destroy PTX.

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect drive motor power cable.
3. Insert a diskette with lable facing 01A gate and small hole pointed toward floor. (See drawing below.) Ensure 53FD cover assembly is closed.



DANGER Use extreme care when you perform service and power is on.

4. Power on.
5. Connect positive probe of a multimeter (15 Vdc scale) to index test pin [C] on 53FD control card.
6. Connect negative probe of multimeter to ground test pin [D].
7. Check multimeter for a reading of less than 1 Vdc.
8. Install one end of a jumper to TPB16 PTX test pin [B].
9. While observing multimeter, touch other end of jumper to the +5 Vdc test pin [A] several times. Multimeter should read 2.5 Vdc or more when test pin is touched. (A wrong reading can occur first time test pin is touched.)
10. Repeat steps 8 and 9 with jumper on TPA14 PTX test pin [C].



11. Power off.
12. Remove jumper.
13. Remove diskette.
14. Connect drive motor power cable.
15. Return 53FD assembly to frame 01. (See procedure on 15 025.)

1

THP1	+Diskette Inserted
THP2	-Hd Ld Osc
THP3	+14 Vdc
THP4	Ground
THP5	Ground
THP6	+53FD Index
THP7	+33FD Index
THP8	Diff Read A
THP9	Diff Read B
THP10	-High Gain
THP11	-Align Access 0
THP12	-High Current
THP13	Preamp TP1
THP14	Preamp TP2
THP15	-High Gain A
THP16	-High Gain B

2

TPA1	+Write Data
TPA2	+Erase Gate
TPA3	+Write Gate
TPA4	+Inner Tracks
TPA5	+Select Head 1
TPA6	Ground
TPA7	+Current Enabled
TPA8	+24 Vdc
TPA9	-5 Vdc
TPA10	MC-1
TPA11	+Hd Load Solenoid
TPA12	33FD LED Voltage
TPA13	Ground
TPA14	33FD PTX

3

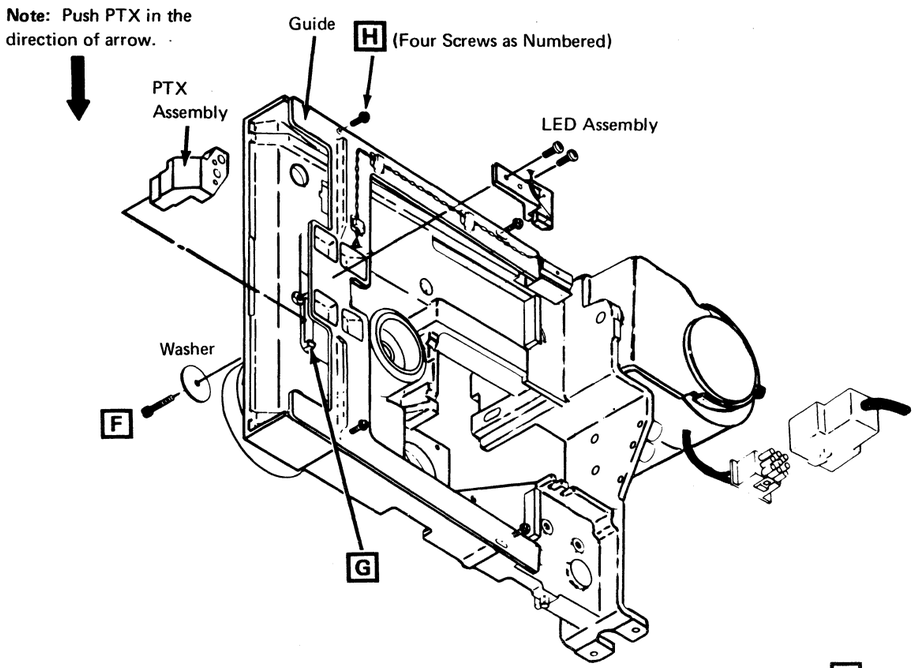
TPB1	+Access 0
TPB2	+Access 1
TPB3	+Access 2
TPB4	+Access 3
TPB5	+File Data
TPB6	+Diskette Sense
TPB7	+Head Engage
TPB8	+Switch Filter
TPB9	+Index
TPB10	MC-3
TPB11	MC-0
TPB12	MC-2
TPB13	-Head Load
TPB14	53FD LED Voltage
TPB15	+5 Vdc
TPB16	53FD PTX

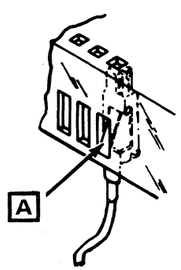
PTX REMOVAL

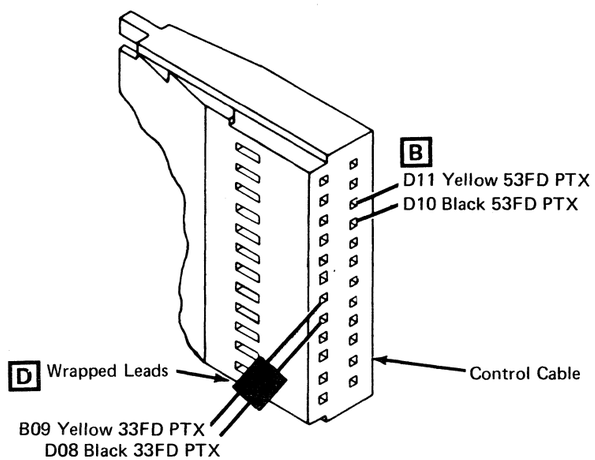
1. Access the 53FD assembly. (See procedure on 15 025.)
2. Remove 53FD cover assembly. (See procedure on 15 040.)
3. Remove four guide mounting screws [H] and guide.
4. Disconnect 53FD control cable from location A2 [E].
5. Remove two screws [C] and two connector covers.
6. Remove two 33FD PTX leads (wrapped pair) [D] and two 53FD PTX leads [B] by pushing down on tabs with a small screwdriver.
7. Remove PTX mounting screw [F] and washer.
8. Remove PTX assembly. (Remember cable path for replacement.)

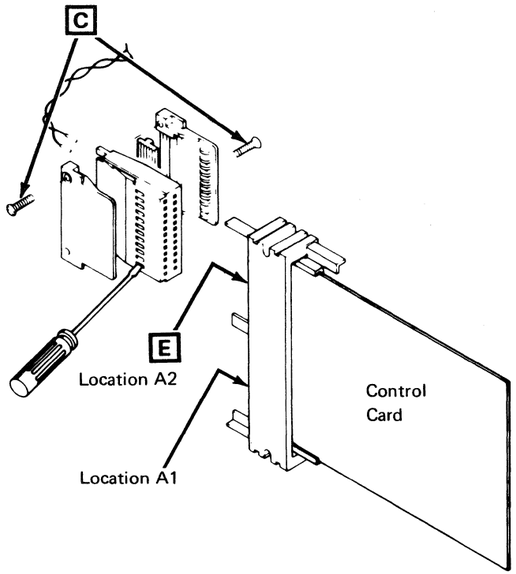
PTX REPLACEMENT

1. Install PTX assembly against casting stop [G] (see note on drawing); then reinstall screw [F] and washer.
2. Follow cable path and insert two 33FD PTX leads (twisted pair of leads) [D] and two 53FD leads [B] into 53FD control cable connector. Ensure tabs [A] on terminals are locked in connector openings.
3. Reinstall connector covers and two screws [C].
4. Plug connector into location A2 [E] of 53FD control card socket.
5. Reinstall guide and four mounting screws [H].
6. Go to LED and PTX alignment.





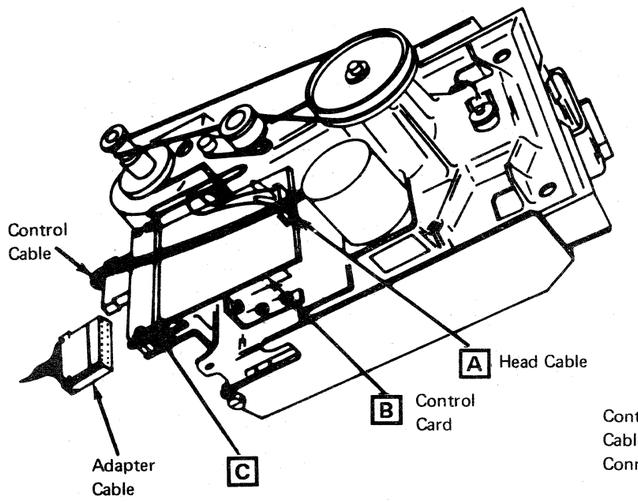




DISKETTE DRIVE 2D CONTROL CARD

CONTROL CARD REMOVAL

1. Access the 53FD assembly. (See procedure on 15 025.)
2. Disconnect head cable [A] from 53FD control card [B].
3. Remove card retainers [C].
4. Remove 53FD control card [B].

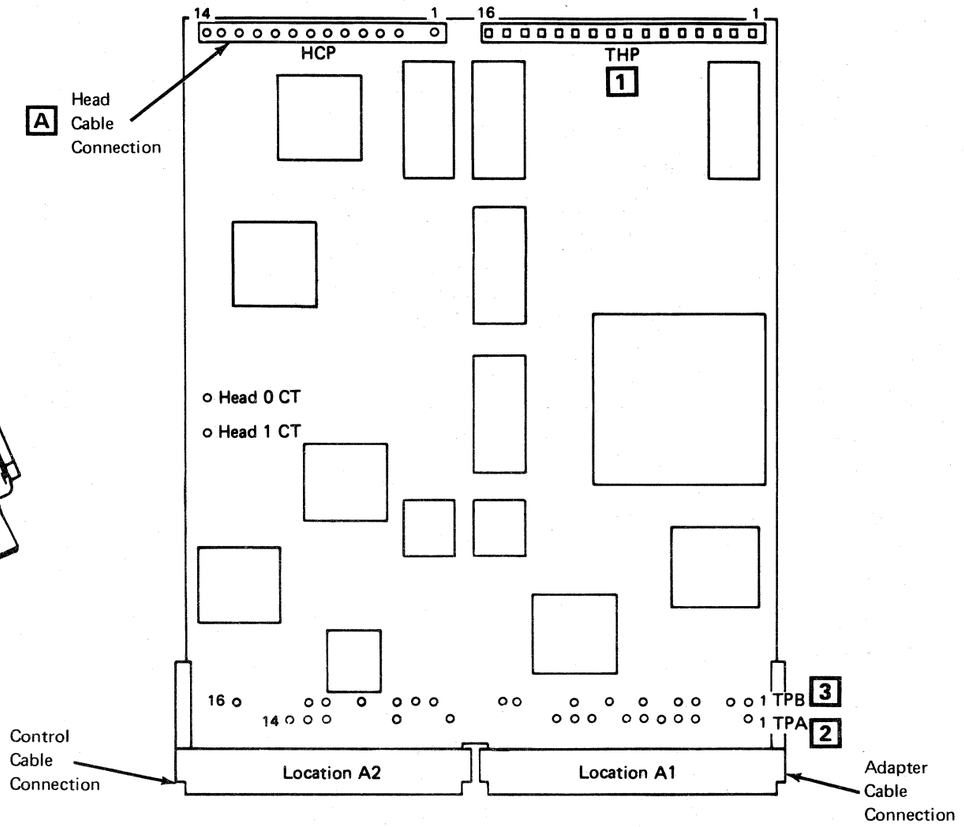


FRONT VIEW

CONTROL CARD REPLACEMENT

1. Reinstall 53FD control card [B]. Ensure card is seated in socket.
2. Reinstall card retainers [C].
3. Connect head cable [A] to 53FD control card.
4. Return 53FD assembly to frame 01. (See procedure on 15 025.)

CONTROL CARD TEST PINS



1

THP1	+Diskette Inserted
THP2	-Hd Ld Osc
THP3	+14 Vdc
THP4	Ground
THP5	Ground
THP6	+53FD Index
THP7	+33FD Index
THP8	Diff Read A
THP9	Diff Read B
THP10	-High Gain
THP11	-Align Access 0
THP12	-High Current
THP13	Preamp TP1
THP14	Preamp TP2
THP15	-High Gain A
THP16	-High Gain B

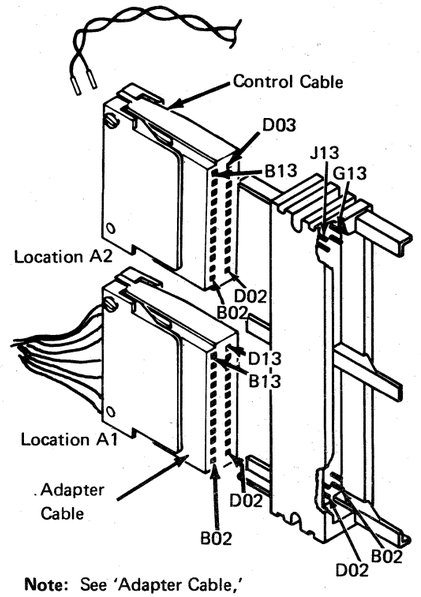
2

TPA1	+Write Data
TPA2	+Erase Gate
TPA3	+Write Gate
TPA4	+Inner Tracks
TPA5	+Select Head 1
TPA6	Ground
TPA7	+Current Enabled
TPA8	+24 Vdc
TPA9	-5 Vdc
TPA10	MC-1
TPA11	+Hd Load Solenoid
TPA12	33FD LED Voltage
TPA13	Ground
TPA14	33FD PTX

3

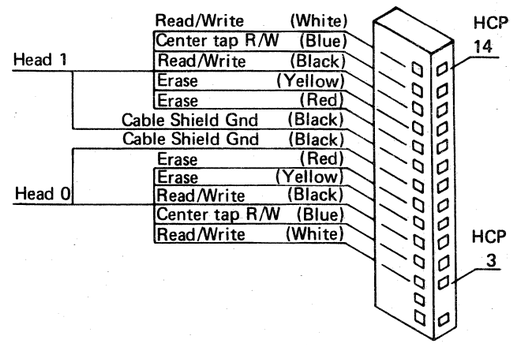
TPB1	+Access 0
TPB2	+Access 1
TPB3	+Access 2
TPB4	+Access 3
TPB5	+File Data
TPB6	+Diskette Sense
TPB7	+Head Engage
TPB8	+Switch Filter
TPB9	+Index
TPB10	MC-3
TPB11	MC-0
TPB12	MC-2
TPB13	-Head Load
TPB14	53FD LED Voltage
TPB15	+5 Vdc
TPB16	53FD.PTX

CONTROL CARD SOCKET AND CONNECTOR PINS



Note: See 'Adapter Cable,' Page 15100.

CONTROL CARD HEAD CABLE PINS



CONTROL CARD INTERCONNECTION

The signal lines between the 4341 Processor adapter connector and control are:

Access Lines 0 through 3 move read/write heads from one cylinder to the next cylinder. A pair of two or four is needed. Notice in the chart, the same pair of access pulses are repeated every four cylinders.

Cylinder Location	In → 0	1	2	3	4	5 -- 40 --	74	75	← Out 76
Access 0	1	0	0	1	1	0	1	0	1	1
Access 1	1	1	0	0	1	1	1	0	0	1
Access 2	0	1	1	0	0	1	0	1	0	0
Access 3	0	0	1	1	0	0	0	1	1	0

The four access pulses are sequenced to move the heads in (toward the drive hub) or out (away from the drive hub).

+ ***Write Data*** activates the current switches in the read/write head to record data on the diskette surfaces. This is done each time the write data signal changes.

+ ***Write Gate*** de-activates the read circuits and activates the write circuits for a write operation.

+ ***Erase Gate*** activates the erase circuits for a write operation.

+ ***Current Enabled*** is active when either the write circuits or the erase circuits are active.

+ ***Select Head 1*** selects head 1 when active.

+ ***Head Engage*** loads the read/write heads when active.

+ ***Index*** is a pulse that indicates the start of a track. It is 1.5 to 3.0 ms wide and occurs every 166.7 ms.

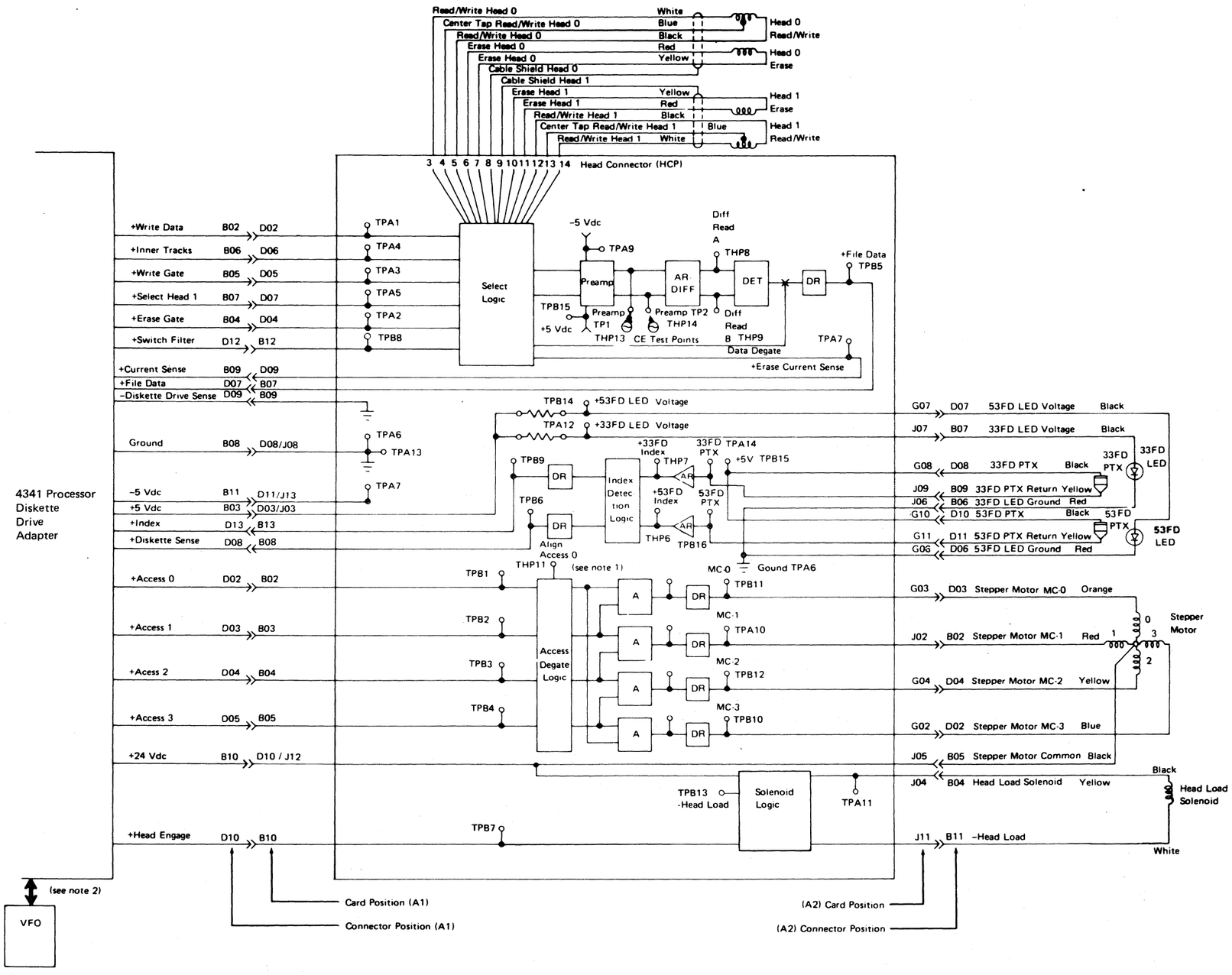
+ ***File Data*** is a series of clock and data pulses that represent the data read from the diskette.

+ ***Diskette Sense*** indicates that a 2 or 2D diskette is being used. **Note:** *2D diskettes are the only type to be used on the 4300 Processors.*

-***Diskette Drive Sense*** is normally minus indicating that the diskette drive uses 2 or 2D diskettes. **Note:** *2D diskettes are the only type to be used on the 4300 Processors.*

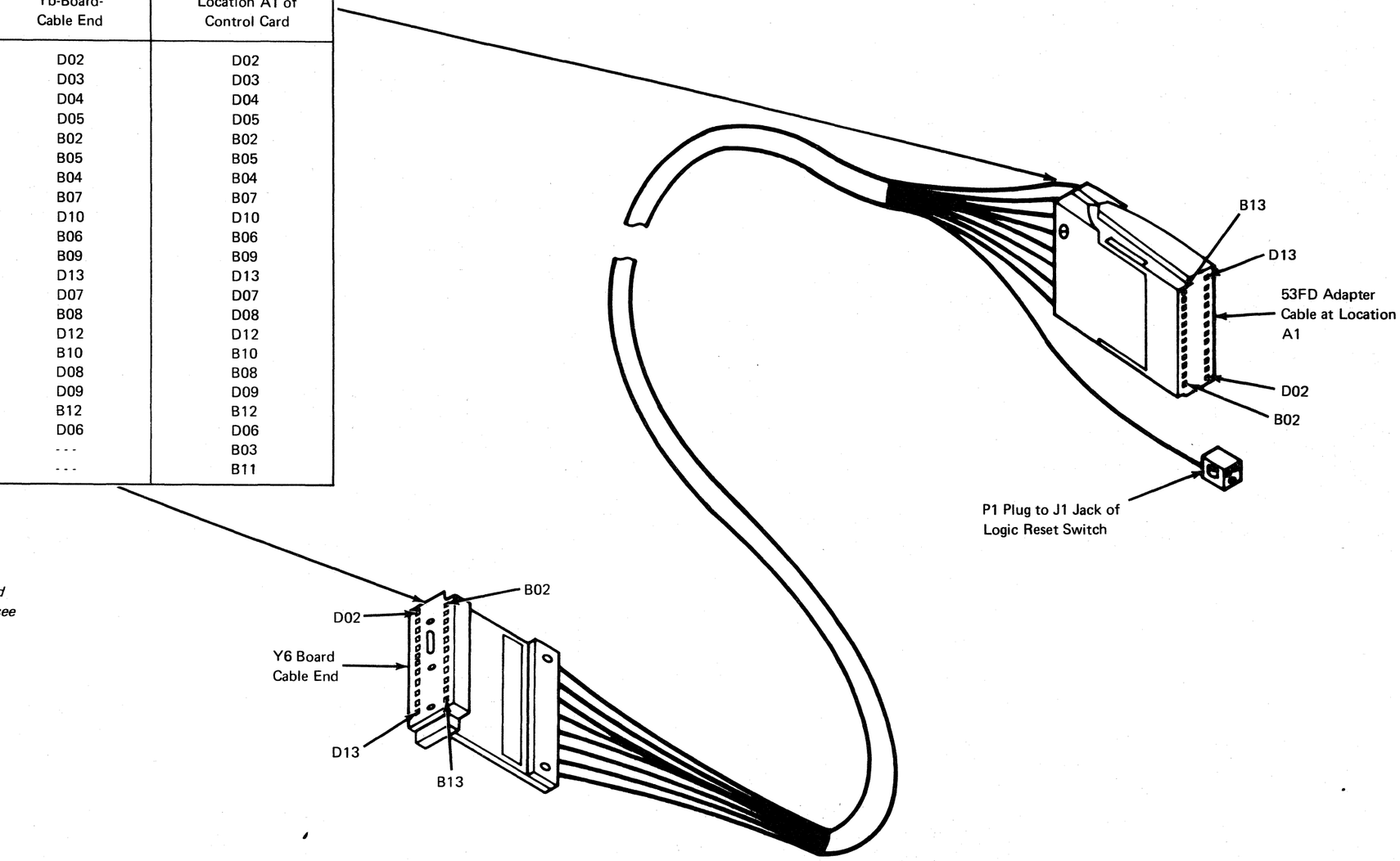
+ ***Inner Tracks*** decreases the amount of recording current beyond the center cylinders on write operations. This compensates for bit shifting beyond the center cylinders on read operations.

+ ***Switch Filter*** is used with the inner tracks line to farther compensate for bit shifting beyond cylinder 60 for MFM encoding. This line is not used on a write operation.



ADAPTER CABLE

Signal Name	Edge Connector 01AB2 Board Pins	Yb-Board-Cable End	Adapter Cable at Location A1 of Control Card
Access 0	T1-A11	D02	D02
Access 1	T1-B11	D03	D03
Access 2	T1-C11	D04	D04
Access 3	T1-D11	D05	D05
Write Data 1	T1-A13	B02	B02
Write Gate	T1-D13	B05	B05
Erase Gate	T1-C13	B04	B04
Head Sel 1	U1-A13	B07	B07
Head Engage	U1-D11	D10	D10
Inner Track	T1-E13	B06	B06
+ Erase Current Sense	U1-C13	B09	B09
+ Index	V1-B11	D13	D13
+ File Data	U1-A11	D07	D07
+ Diskette Sense	U1-B13	B08	D08
Filter Switch	V1-A11	D12	D12
+24V	U1-D13	B10	B10
Ground	U1-B11	D08	B08
- Disk Dr Sense	U1-C11	D09	D09
Spare	V1-A13	B12	B12
Spare	T1-E11	D06	D06
+5V	------	---	B03
-5V	------	---	B11



Note: *The logic reset switch is at pin B03 of the Y6 board cable end. For more information concerning this switch see Volume 13 under the heading "MSS Service Aids."*