

VOLUME A07 MACHINE 4381- -0011647 MODEL M02 SYSTEM 0000JYP MCDE

SCHEG SHIP 00/00/00

LOGIC TYPE -0- SYSTEMS DIAGRAMS

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VOLUME A07 MACHINE 4381- -0011647 MODEL M02 SYSTEM 0000JYP MODE

SCHED SHIP 00/00/00

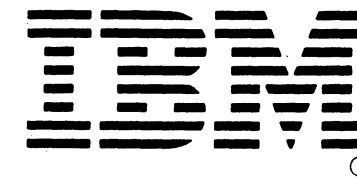
LOGIC TYPE -0- SYSTEMS DIAGRAMS

DOC COUNTER

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TOTAL PART NUMBERS THIS VOLUME

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Maintenance Information

S/N	S/N	S/N	S/N	S/N	S/N	S/N	S/N
MI	MI	MI	MI	MI	MI	MI	MI
MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION	MAINTENANCE INFORMATION
SAFETY INDEX TERMS/ABBREVIATIONS INTRODUCTION START PU REPAIR CHNL REPAIR MSS REPAIR END OF REPAIR	PWR REPAIR (HWS AND MBC)	PWR REPAIR (PROC) PR 1001 THRU PR 13 XX	PWR REPAIR (PROC) PR 1401 THRU PR 18 XX	PWR REPAIR (PROC) PR 1901 THRU PR 5001	SERVICE AIDS	LOCATIONS TOOLS REMOVAL/REPLACEMENT PREVENTIVE MAINTENANCE DIAGNOSTICS LOGS SYSTEM TEST INSTALLATION SAFETY INSP	CONSOLE FUNCTIONS MESSAGES
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Processor
Maintenance Information

Seq GA005	PN 0446140 Pg 1 of 2	EC A02214 15 SEP 83	EC A02220 06 JUN 84			
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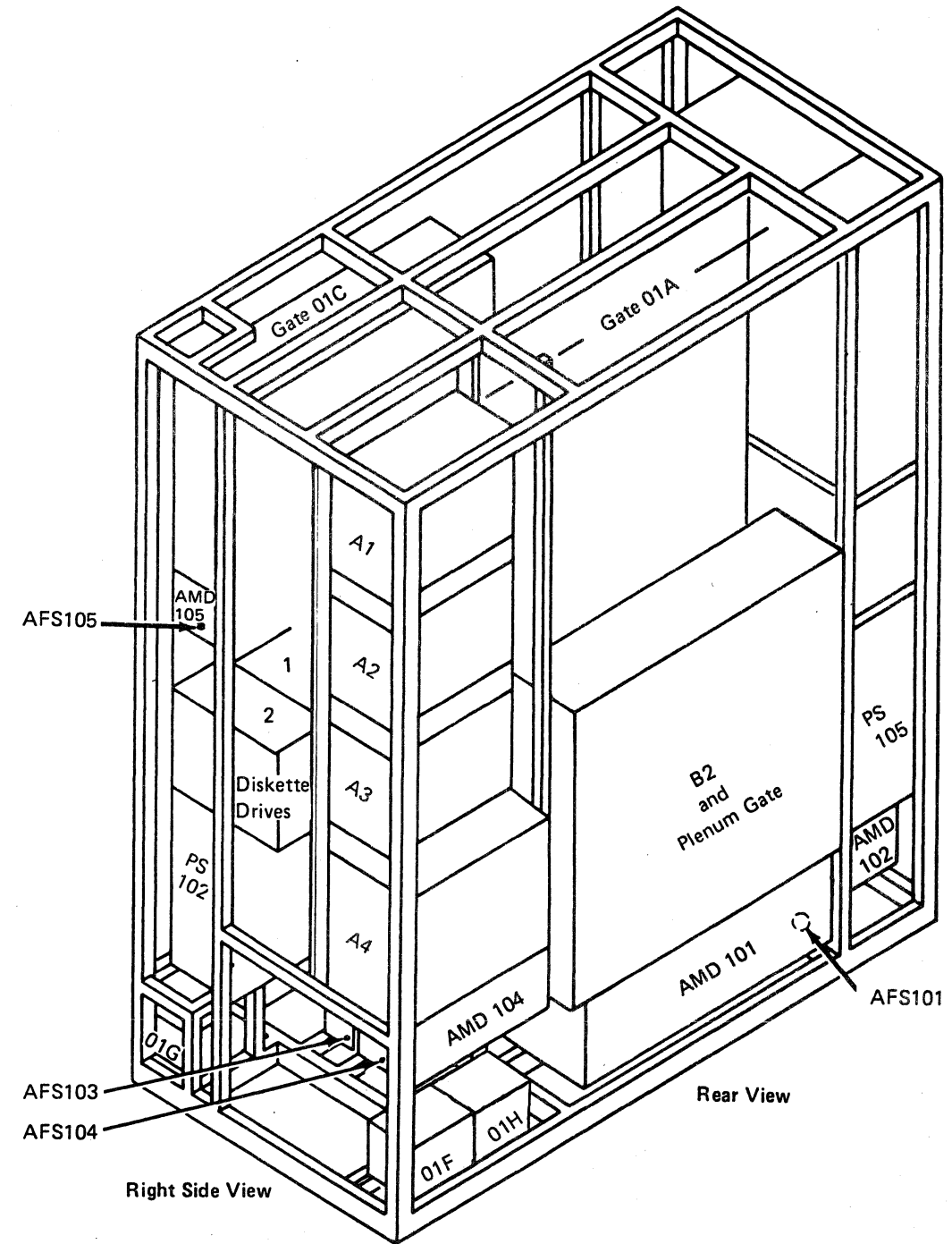
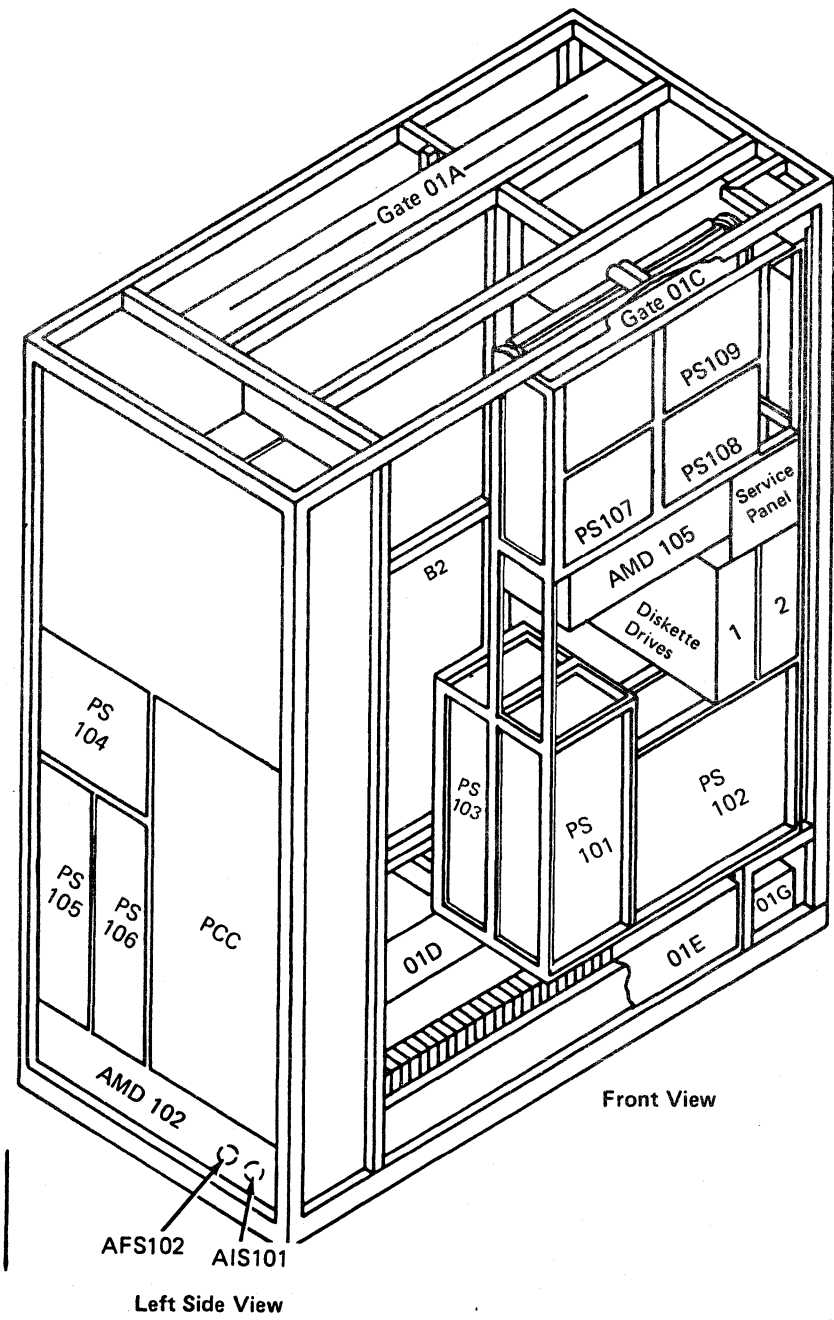
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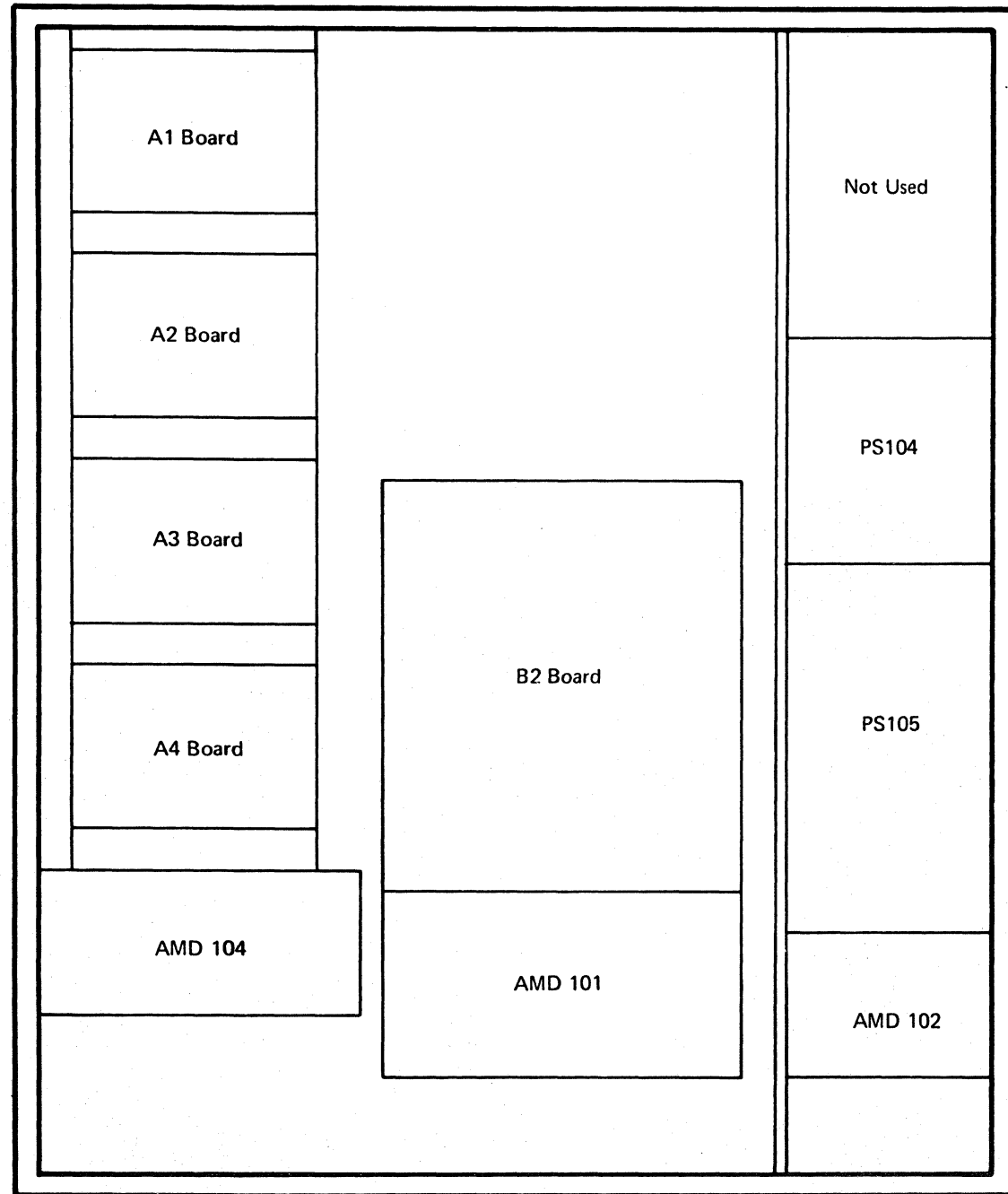


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Gate 01A

LOC 003

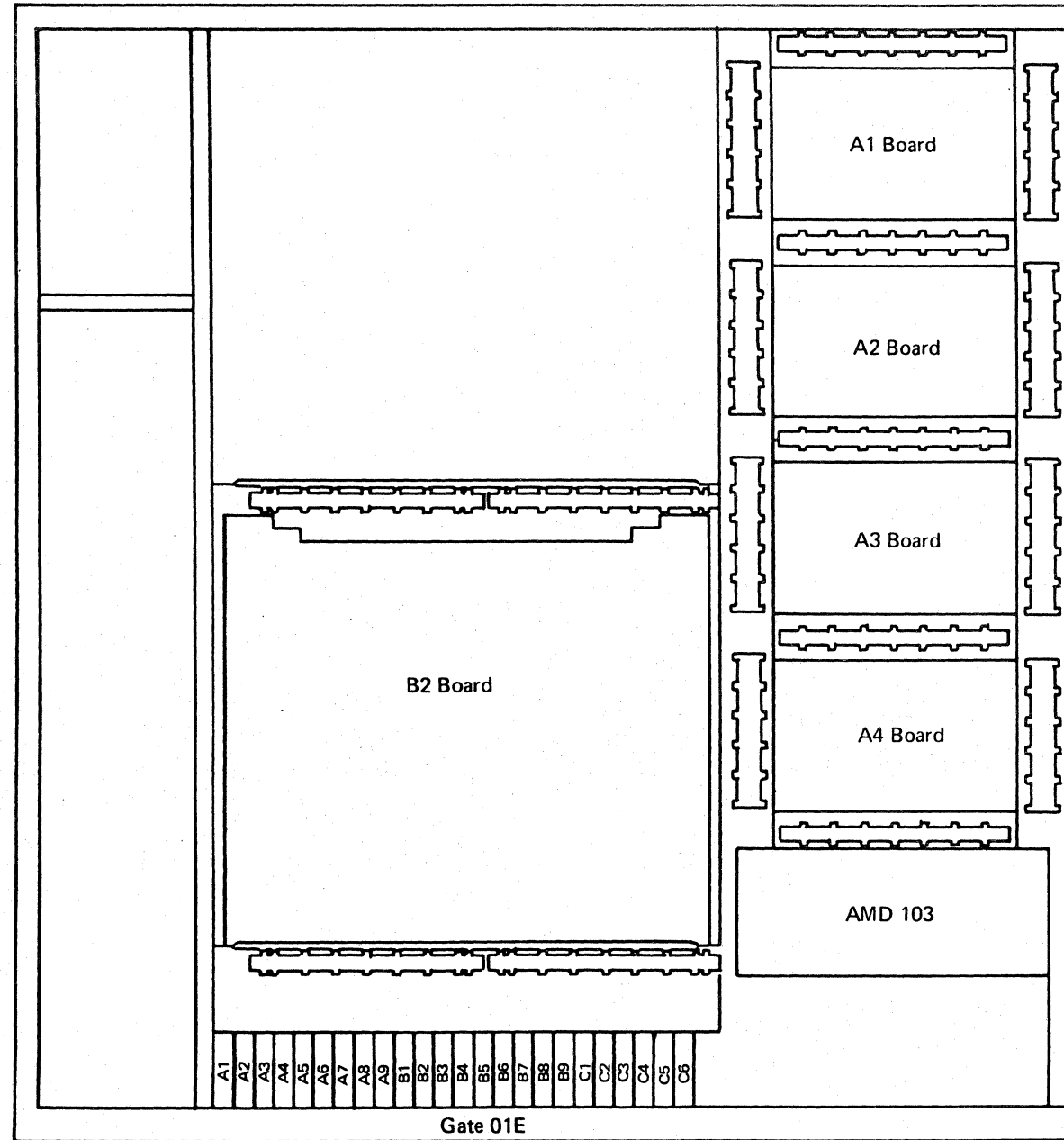
Rear View



LOC 003

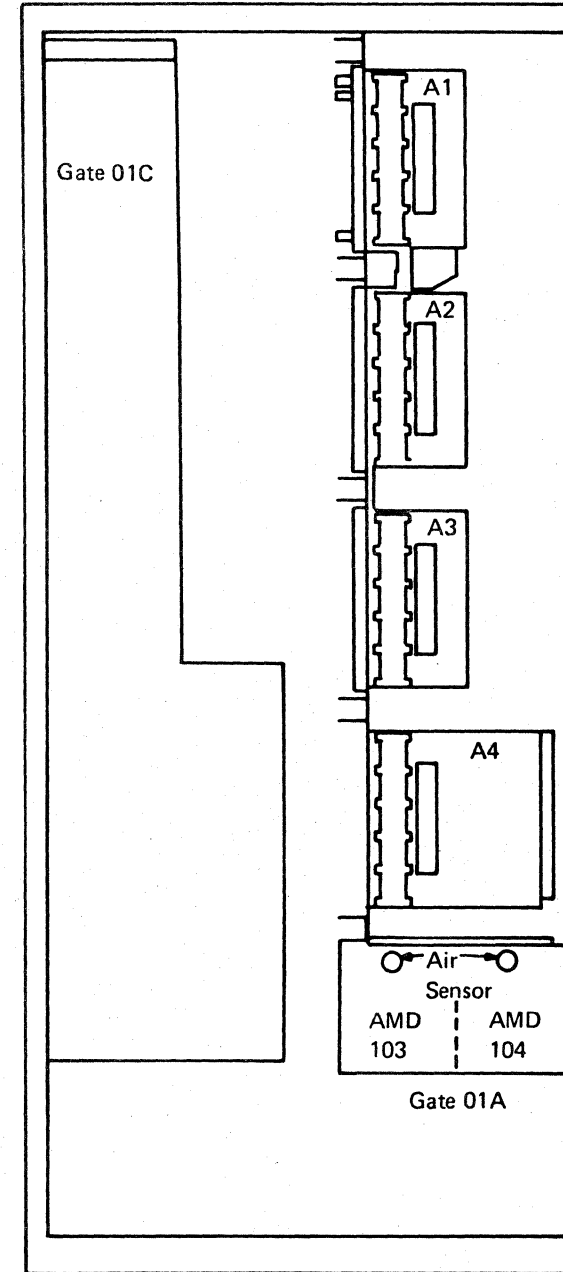
Gate 01A

Front View



(Behind Gate 01C)

Right-Side View



Seq GA015	PN 0446143 Pg 2 of 2	EC A02214 15 SEP 83				
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Board 01A-A1

Functional Locations

Channel To Channel Adapter (CTCA)

Card Locations:

CTCA X B2
CTCA Y C2

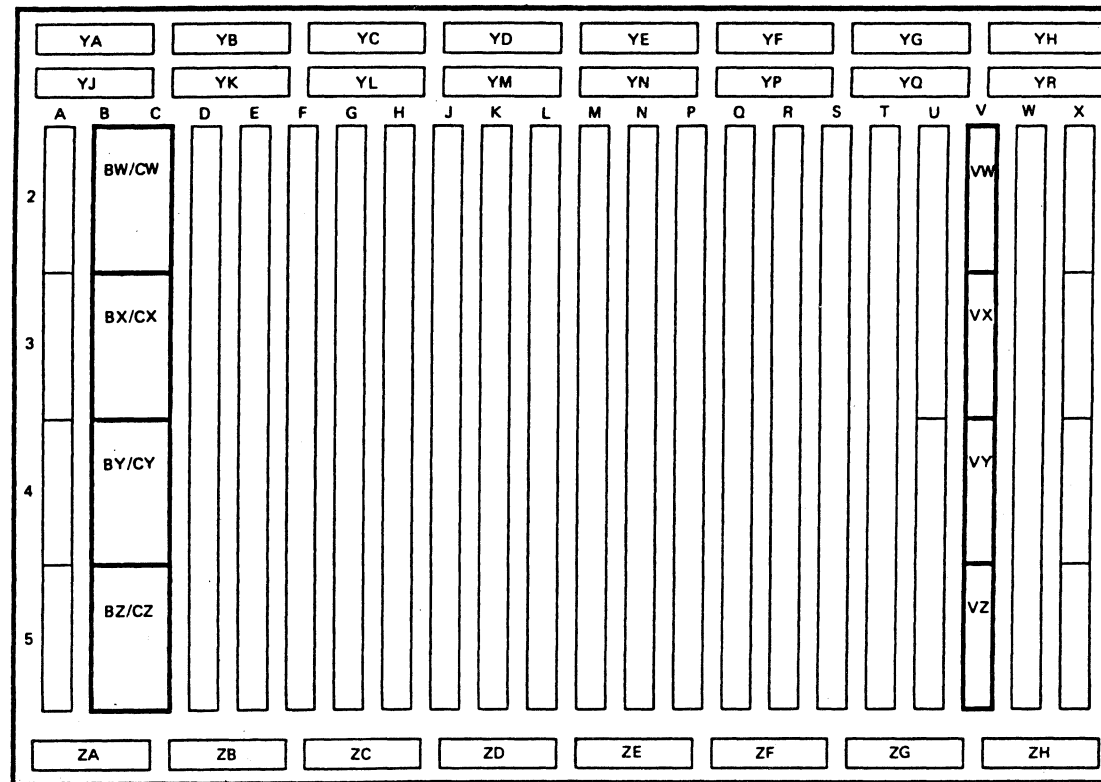
Maintenance Bias Control (MBC)

Card Locations:

Reset Card U2
MBC V2

Card Plug Positions

- A2 X Bus I/O Cable
- A3 X Tag I/O Cable
- A4 Y Bus I/O Cable
- A5 Y Tag I/O Cable
- B2 CTCA X
- C2 CTCA Y
- D2 Spare
- E2 Spare
- F2 Spare
- G2 Spare
- H2 Spare
- J2 Spare
- K2 Spare
- L2 Spare
- M2 Spare
- N2 Spare
- P2 Spare
- Q2 Spare
- R2 Spare
- S2 Spare
- T2 Spare
- U2 Reset Card
- V2 MBC Card
- W2 Terminator Card
- X2 PPC Cable
- X3 Service Panel Cable
- X4 Service Panel Cable
- X5 Operator Control Panel



Note: Highlighted areas show the locations of Top Card Crossover (TCC) Connectors.

Top Card Connectors

Position	Part Number
BW/CW	8645658
BX/CX	8645658
BY/CY	8645658
BZ/CZ	8645658
VW	8645678
VX	8645678
VY	8645678
VZ	8645678

Cable Plug Positions

- YA Channel X Bus I/O
- YB Channel X Tag I/O
- YC Spare
- YD Spare
- YE Spare
- YF Spare
- YG PS101 Control
- YH Airflow Sensor (AFS)/PS102
- YJ Spare
- YK Spare
- YL Spare
- YM Power Control Lines and MBC
- YN Reset and T Lines
- YP Spare
- YQ Spare
- YR Spare
- ZA Channel Y Bus I/O
- ZB Channel Y Tag I/O
- ZC CTCA Voltage Sense to/from PCC
- ZD Spare
- ZE Spare
- ZF Volt Sense to MBC
- ZG Spare
- ZH Spare

Board 01A-A2

Functional Locations

Diskette Drive Adapter (DDA)

Card Locations:

Diskette Drive 1 K2
Diskette Drive 2 L2

Cable Locations:

Diskette Drive 1 ZD
Diskette Drive 2 ZF

Device Cluster Adapter (DCA)

Card Locations:

Q2, R2

Cable Locations:

Ports YN

Latch Display Card

Card Location:

G4

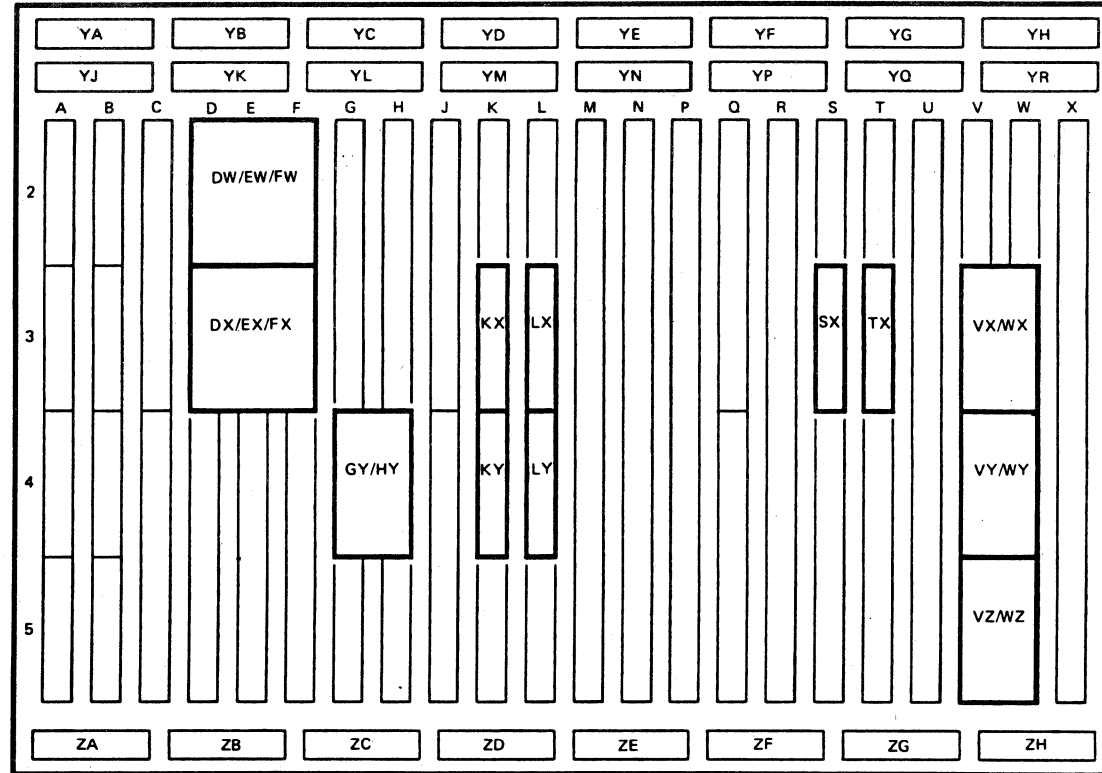
Local Channel Adapter (LCA)

Card Locations:

LCA 1 V2
LCA 2 X2
LCA 4 W2

Cable Locations:

LCA from CH/SP YQ
LCA to CH/SP YR
LCA Tailgate ZG
LCA Tailgate ZH



Power Control Adapter (PCA)

Card Locations:

PC Isolation C2
PC Isolation C4
PC Sense D2
PC Sense E2
PC Interface F2

Cable Locations:

A2,A3,A4,A5,
B2,B3,B4,B5

Remote Support Facility Adapter (RSF)

Card Locations:

P2,Q4

Cable Locations:

ZE

Serial Number Card

Card Locations:

F4

Support Bus Adapter (SBA)

Card Locations:

SBA 1 T2
Convert Card U2

Cable Locations:

YE,YF,YG,YH

Support Processor (SP) and Support Processor Storage (SPS) (Volume 0)

Card Locations:

H2

Support Processor Storage (SPS) (Volume 1)

Card Location:

J2

Top Card Connectors

Position	Part Number
DW/EW/FW	8645778
DX/EX/FX	8645779
GY/HY	8645777
KX,LX,KY,LY,SX,TX	8645776
VX/WX,VY/WY,VZ/WZ	8645777

Card Plug Positions

- A2 PCA Cable
- A3 PCA Cable
- A4 PCA Cable
- A5 PCA Cable
- B2 PCA Cable
- B3 Spare Digitals Term
- B4 Not Used
- B5 PCA Cable
- C2 PC Isolation Card
- C4 PC Isolation Card
- D2 PC Sense
- E2 PC Sense
- F2 PC Interface
- F4 Serial Read Card
- G4 Latch Display Card
- H2 Support Processor
- J2 Support Processor Storage
- K2 DDA 1
- L2 DDA 2
- M2 Reserved
- N2 Reserved
- P2 Common Communication Adapter (RSF)
- Q2 DCA
- Q4 38LS (RSF)
- R2 DCA
- T2 SBA 1
- U2 Convert Card
- V2 LCA 1
- W2 LCA 4
- X2 LCA 2

Cable Plug Positions

- YA MBC
- YB Reset
- YC Volt Convert to PC
- YD Volt Sense
- YE SBA EXT
- YF SBA EXT
- YG SBA EXT Processor
- YH Spare
- YJ Volt Sense
- YK Spare
- YL Spare
- YM Spare
- YN DCA
- YP SPA Spare
- YQ LCA from CH/SP
- YR LCA to CH/SP
- ZA Spare
- ZB Spare
- ZC SP Display/Service Panel
- ZD DDA 1
- ZE RSF
- ZF DDA 2
- ZG LCA Tailgate
- ZH LCA Tailgate

Board 01A-A3

Functional Locations

IFA Channel Cards

Card Locations:

Channel 0	K2
Channel 1	E2
Channel 2	F2
Channel 3	G2
Channel 4	H2
Channel 5	J2
Channel 6	P2
Channel 7	Q2
Channel 8	R2
Channel 9	S2
Channel A	T2
Channel B	U2

Scan Cards

Card Locations:

Channel 0-5	N2
Channel 6-B	N4

Oscillator Card

Card Location:

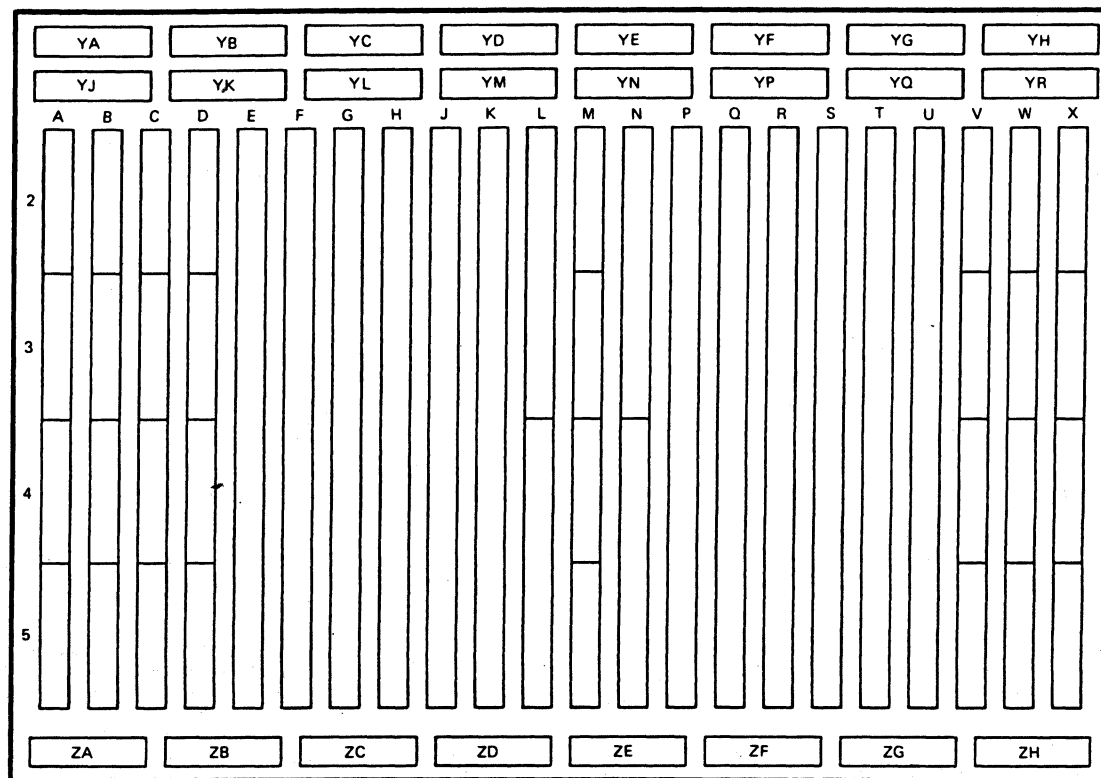
L2

Time of Day Clock (TODC) Card *

Card Location:

L4

* TODC is a RPQ only



Cable Plug Positions

YA	Spare	ZE	Channel 6 Bus/Tag In
YB	Channel to Channel	ZF	Channel 7 Bus/Tag In
YC	Probe Points	ZG	Channel 8 Bus/Tag In
YD	Oscillator	ZH	Channel 9 Bus/Tag In
YE	Oscillator		
YF	Oscillator		
YG	Probe Points		
YH	Power Sense		
YJ	Channel 3 Bus/Tag Out		
YK	Channel 4 Bus/Tag Out		
YL	Channel 5 Bus/Tag Out		
YM	Channel 0 Bus/Tag Out		
YN	Channel 6 Bus/Tag Out		
YP	Channel 7 Bus/Tag Out		
YQ	Channel 8 Bus/Tag Out		
YR	Channel 9 Bus/Tag Out		
ZA	Channel 3 Bus/Tag In		
ZB	Channel 4 Bus/Tag In		
ZC	Channel 5 Bus/Tag In		
ZD	Channel 0 Bus/Tag In		

Card Plug Positions

A2	Spare
A3	Special
A4	IPU Oscillator
A5	TODC
B2	Channel 2 Bus/Tag Out
B3	Channel 1 Bus/Tag Out
B4	Channel 1 Bus/Tag In
B5	Channel 2 Bus/Tag In
C2	Channel Control 3,4,5
C3	Channel Control 3,4,5
C4	Channel Control 3,4,5
C5	Channel Control 3,4,5
D2	Channel Control 0,1,2
D3	Channel Control 0,1,2
D4	Channel Control 0,1,2
D5	Channel Control 0,1,2
E2	Channel 1
F2	Channel 2
G2	Channel 3
H2	Channel 4
J2	Channel 5
K2	Channel 0
L2	Oscillator
L4	TODC
M2	Reserved
N2	Scan Channel 0-5
N4	Scan Channel 6-B
P2	Channel 6
Q2	Channel 7
R2	Channel 8
S2	Channel 9
T2	Channel A
U2	Channel B
V2	Channel Control 6,7,8
V3	Channel Control 6,7,8
V4	Channel Control 6,7,8
V5	Channel Control 6,7,8
W2	Channel Control 9,A,B
W3	Channel Control 9,A,B
W4	Channel Control 9,A,B
W5	Channel Control 9,A,B
X2	Channel A Bus/Tag Out
X3	Channel B Bus/Tag Out
X4	Channel B Bus/Tag In
X5	Channel A Bus/Tag In

Board 01A-A4 (Source 1)

Functional Locations

Storage Cards

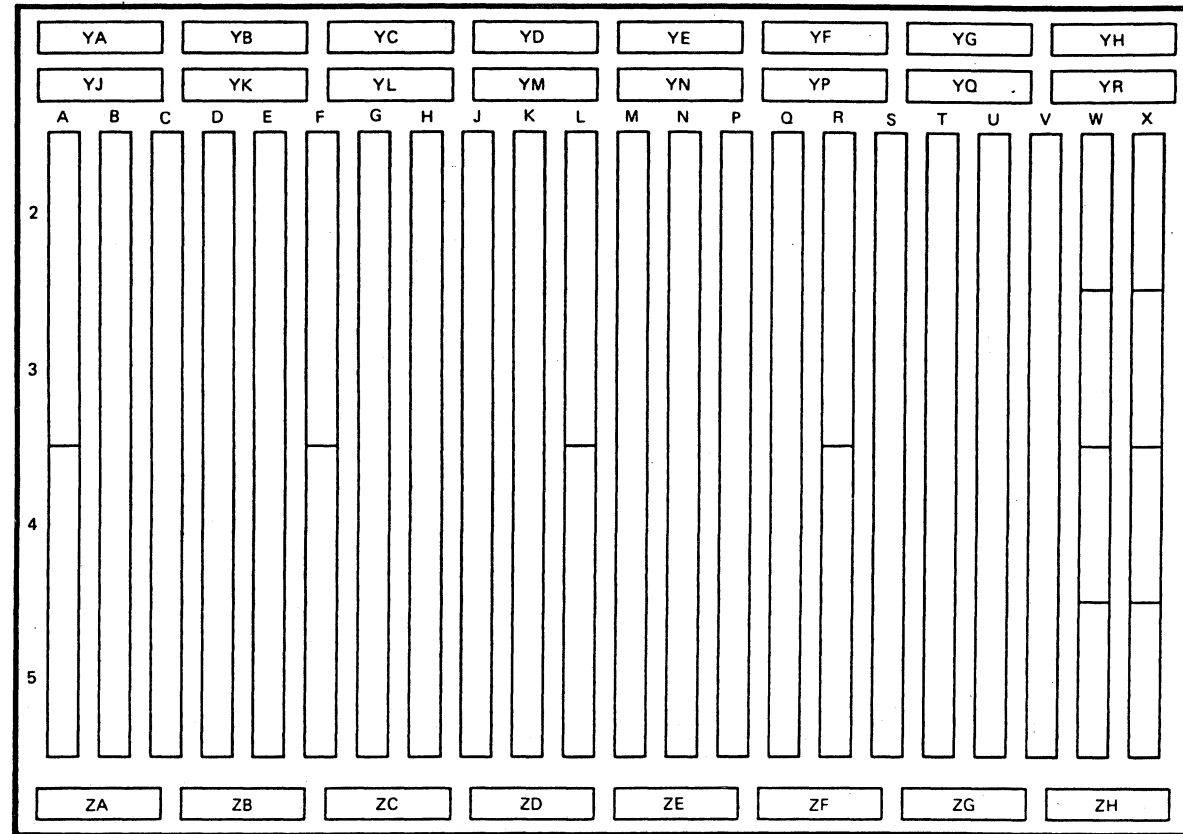
Card Locations:

4 Megabytes 0-3	W2
4 Megabytes 4-7	R2
4 Megabytes 8-11	K2
4 Megabytes 12-15	E2
8 Megabytes 0-3	V2
8 Megabytes 4-7	Q2
8 Megabytes 8-11	J2
8 Megabytes 12-15	D2
12 Megabytes 0-3	U2
12 Megabytes 4-7	P2
12 Megabytes 8-11	H2
12 Megabytes 12-15	C2
16 Megabytes 0-3	T2
16 Megabytes 4-7	N2
16 Megabytes 8-11	G2
16 Megabytes 12-15	B2

Terminator Cards

Card Locations:

A2,A4,F2,F4,M2,M4,S2,S4.



Cable Plug Positions

YA	Spare
YB	Spare
YC	Spare
YD	BSM Control
YE	BSM Control
YF	BSM Control
YG	BSM Control
YH	Spare
YJ	Spare
YK	Spare
YL	BSM Control
YM	BSM Control
YN	BSM Data Bytes 6/7
YP	BSM Data Bytes 4/5
YQ	BSM Data Bytes 2/3
YR	BSM Data Bytes 0/1
ZA	Power
ZB	Spare
ZC	Spare
ZD	Spare
ZE	Spare
ZF	Spare
ZG	Spare

Card Plug Positions

A2	Terminator Card (Odd)
A4	Terminator Card (Odd)
B2	Storage Bytes 12-15 (16 megabytes)
C2	Storage Bytes 12-15 (12 megabytes)
D2	Storage Bytes 12-15 (8 megabytes)
E2	Storage Bytes 12-15 (4 megabytes)
F2	Terminator Card (Odd)
F4	Terminator Card (Odd)
G2	Storage Bytes 8-11 (16 megabytes)
H2	Storage Bytes 8-11 (12 megabytes)
J2	Storage Bytes 8-11 (8 megabytes)
K2	Storage Bytes 8-11 (4 megabytes)
L2	Clock
M2	Terminator Card (Even)
M4	Terminator Card (Even)
N2	Storage Bytes 4-7 (16 megabytes)
P2	Storage Bytes 4-7 (12 megabytes)
Q2	Storage Bytes 4-7 (8 megabytes)
R2	Storage Bytes 4-7 (4 megabytes)
S2	Terminator Card (Even)
S4	Terminator Card (Even)
T2	Storage Bytes 0-3 (16 megabytes)
U2	Storage Bytes 0-3 (12 megabytes)
V2	Storage Bytes 0-3 (8 megabytes)
W2	Storage Bytes 0-3 (4 megabytes)
X2	BSM Data Bytes 8/9
X3	BSM Data Bytes 10/11
X4	BSM Data Bytes 12/13
X5	BSM Data Bytes 14/15

Board 01A-A4 (Source 2)

Functional Locations

Storage Cards

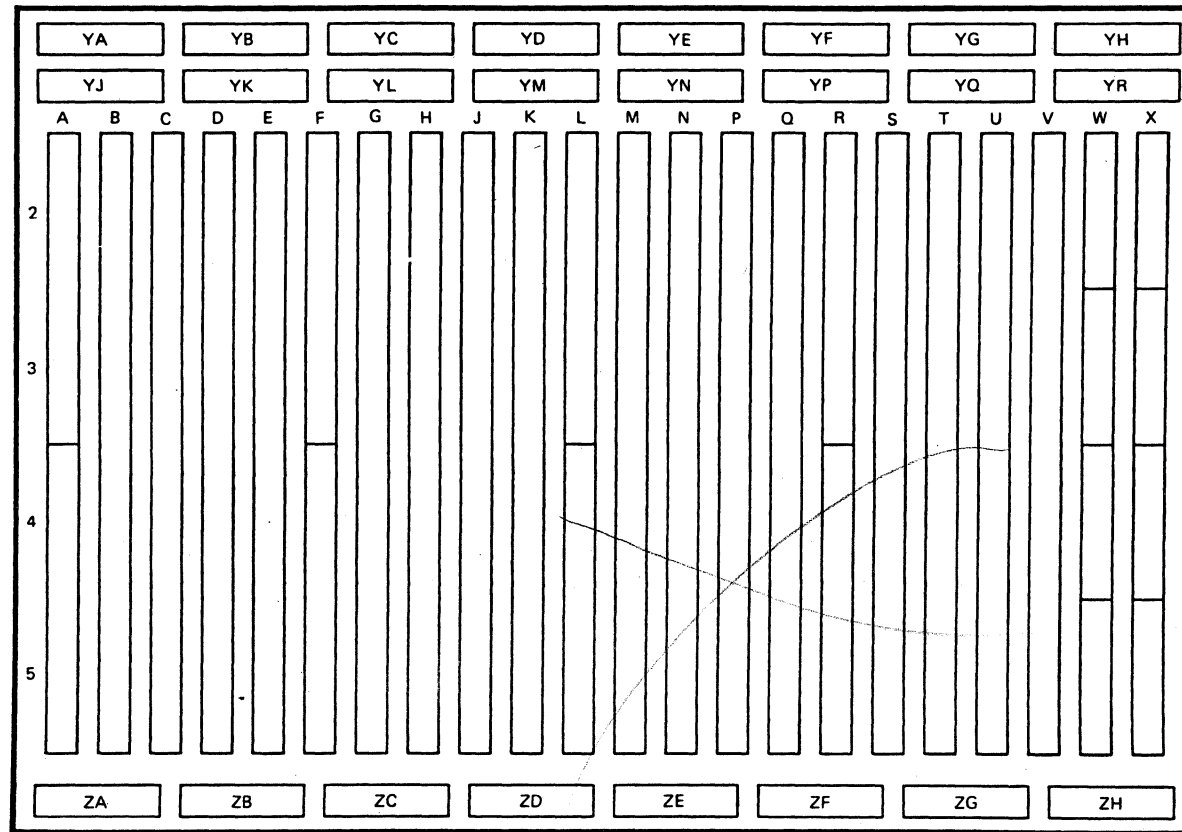
Card Locations:

4 Megabytes 0-3	V2
4 Megabytes 4-7	Q2
4 Megabytes 8-11	K2
4 Megabytes 12-15	E2
8 Megabytes 0-3	U2
8 Megabytes 4-7	P2
8 Megabytes 8-11	J2
8 Megabytes 12-15	D2
12 Megabytes 0-3	T2
12 Megabytes 4-7	N2
12 Megabytes 8-11	H2
12 Megabytes 12-15	C2
16 Megabytes 0-3	S2
16 Megabytes 4-7	M2
16 Megabytes 8-11	G2
16 Megabytes 12-15	B2

Terminator Cards

Card Locations:

A2,A4,F2,F4,L2,L4,R2,R4.



Cable Plug Positions

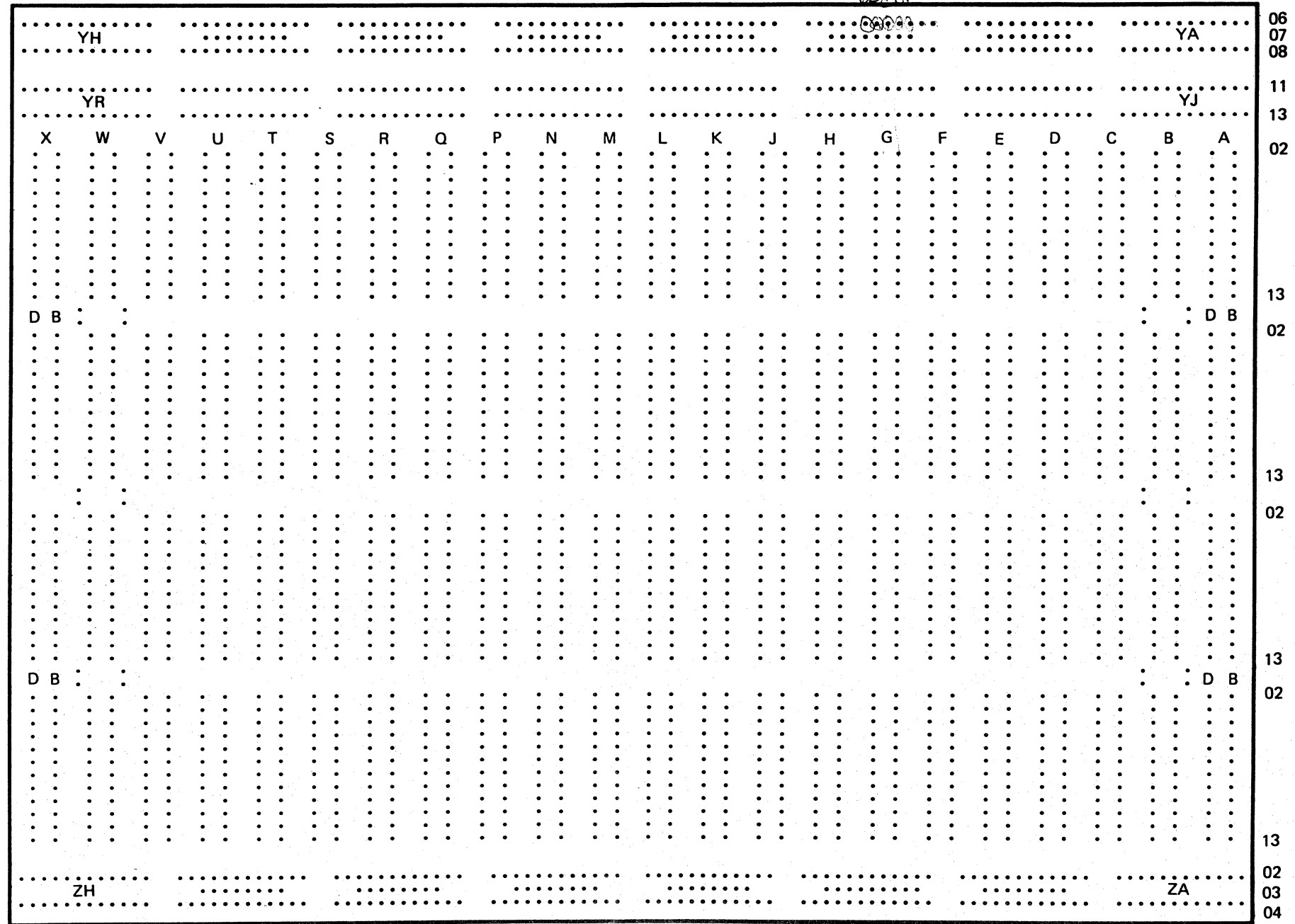
YA	Spare
YB	Spare
YC	Spare
YD	BSM Control
YE	BSM Control
YF	BSM Control
YG	BSM Control
YH	Spare
YJ	Spare
YK	Spare
YL	BSM Control
YM	BSM Control
YN	BSM Data Bytes 6/7
YP	BSM Data Bytes 4/5
YQ	BSM Data Bytes 2/3
YR	BSM Data Bytes 0/1
ZA	Power
ZB	Spare
ZC	Spare
ZD	Spare
ZE	Spare
ZF	Spare
ZG	Spare

Card Plug Positions

A2	Terminator Card (Odd)
A4	Terminator Card (Odd)
B2	Storage Bytes 12-15 (16 megabytes)
C2	Storage Bytes 12-15 (12 megabytes)
D2	Storage Bytes 12-15 (8 megabytes)
E2	Storage Bytes 12-15 (4 megabytes)
F2	Terminator Card (Odd)
F4	Terminator Card (Odd)
G2	Storage Bytes 8-11 (16 megabytes)
H2	Storage Bytes 8-11 (12 megabytes)
J2	Storage Bytes 8-11 (8 megabytes)
K2	Storage Bytes 8-11 (4 megabytes)
L2	Terminator Card (Even)
L4	Terminator Card (Even)

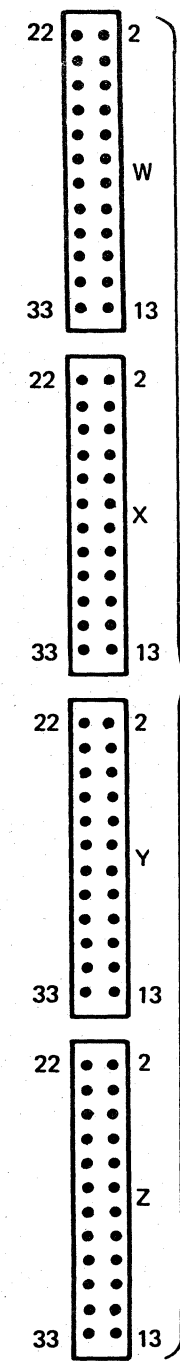
M2	Storage Bytes 4-7 (16 megabytes)
N2	Storage Bytes 4-7 (12 megabytes)
P2	Storage Bytes 4-7 (8 megabytes)
Q2	Storage Bytes 4-7 (4 megabytes)
R2	Terminator Card (Even)
R4	Terminator Card (Even)
S2	Storage Bytes 0-3 (16 megabytes)
T2	Storage Bytes 0-3 (12 megabytes)
U2	Storage Bytes 0-3 (8 megabytes)
V2	Storage Bytes 0-3 (4 megabytes)
W2	Spare
W3	Spare
W4	Spare
W5	Spare
X2	BSM Data Bytes 8/9
X3	BSM Data Bytes 10/11
X4	BSM Data Bytes 12/13
X5	BSM Data Bytes 14/15

Seq GA025	PN 0446145 Pg 3 of 3	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84	
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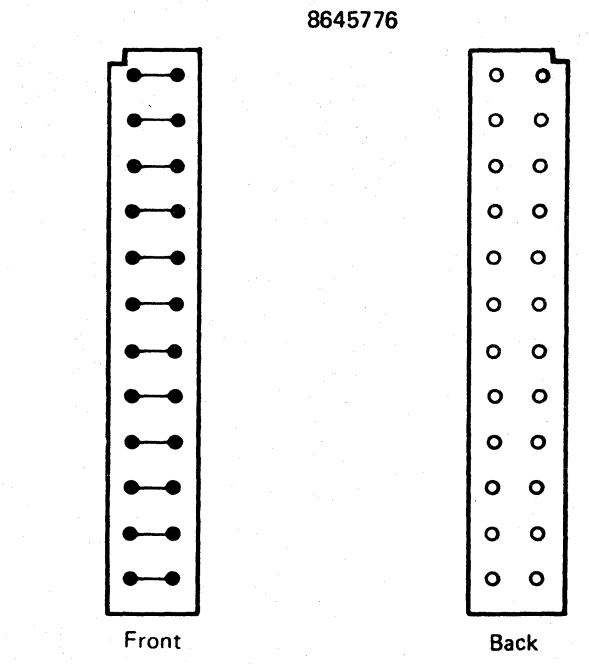
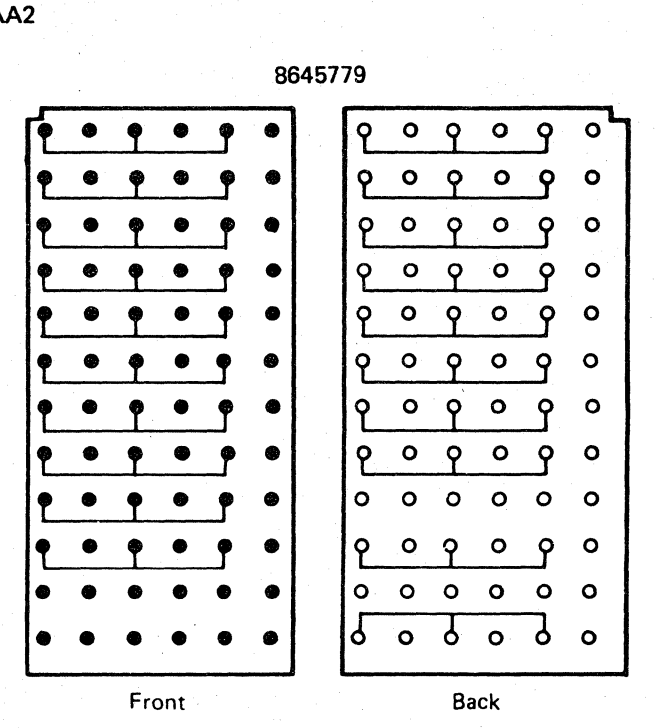
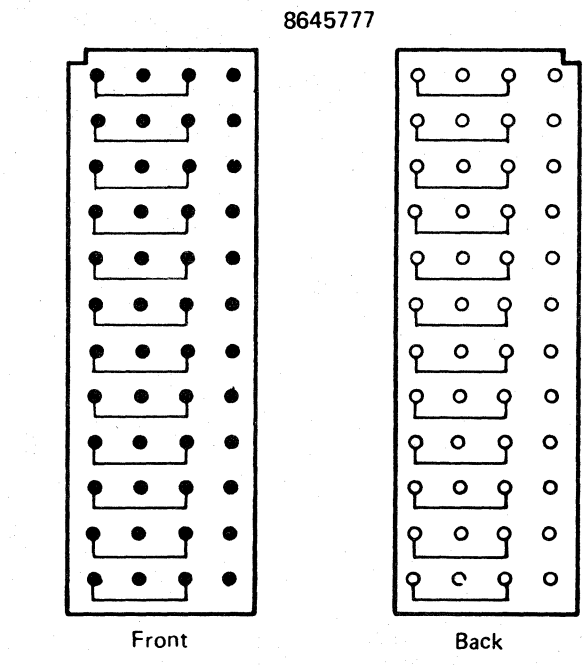
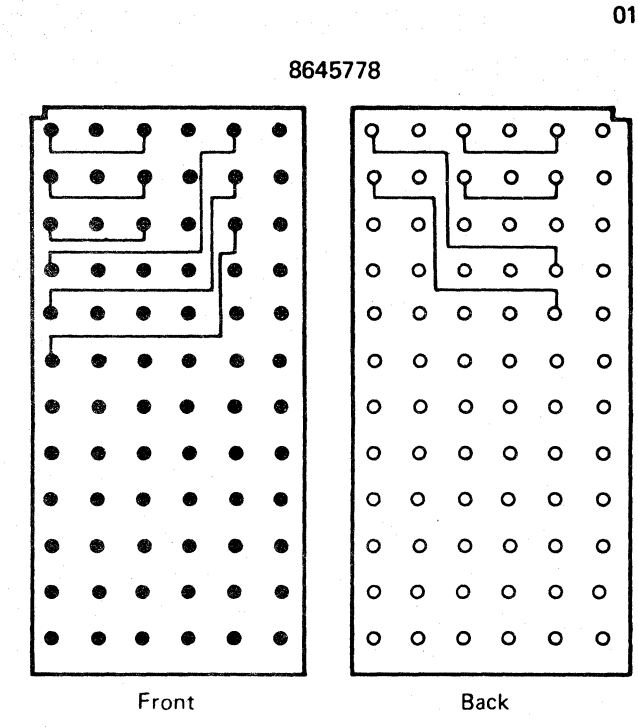
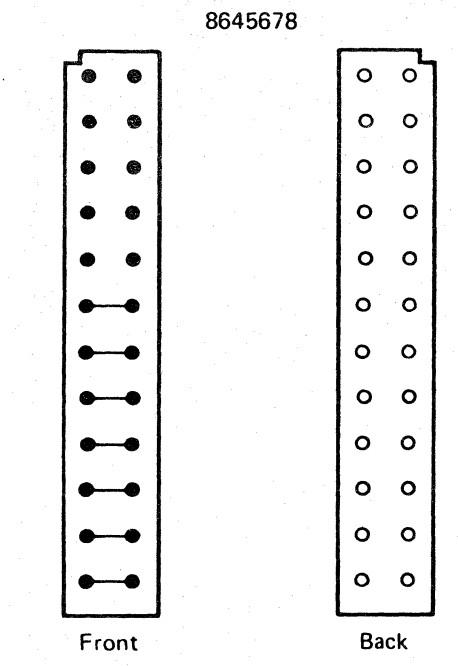
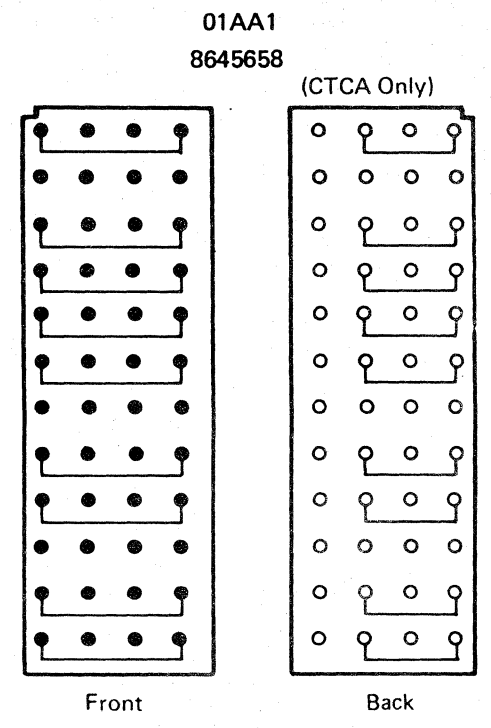


Top Card Crossover (TCC) Connectors

Pin Numbering



Component Side



Board 01AB2

Functional Locations

Arithmetic Logic Unit (ALU)

Module Location:

HE

Cache

Module Locations:

- Cache 0/1 MA
- Cache 2/3 ME
- Cache 4/5 RA
- Cache 6/7 RE

Channels

Module Locations:

- Channel Controls RN
- Channel Interface 0-5 RS
- Channel Interface 6-11 VN

Channel Data Buffer (CDB)

Module Location:

DA

CREG

Module Locations:

- CREG 0 DN
- CREG 1 HS
- CREG 2 DJ
- CREG 3 MS

Clock

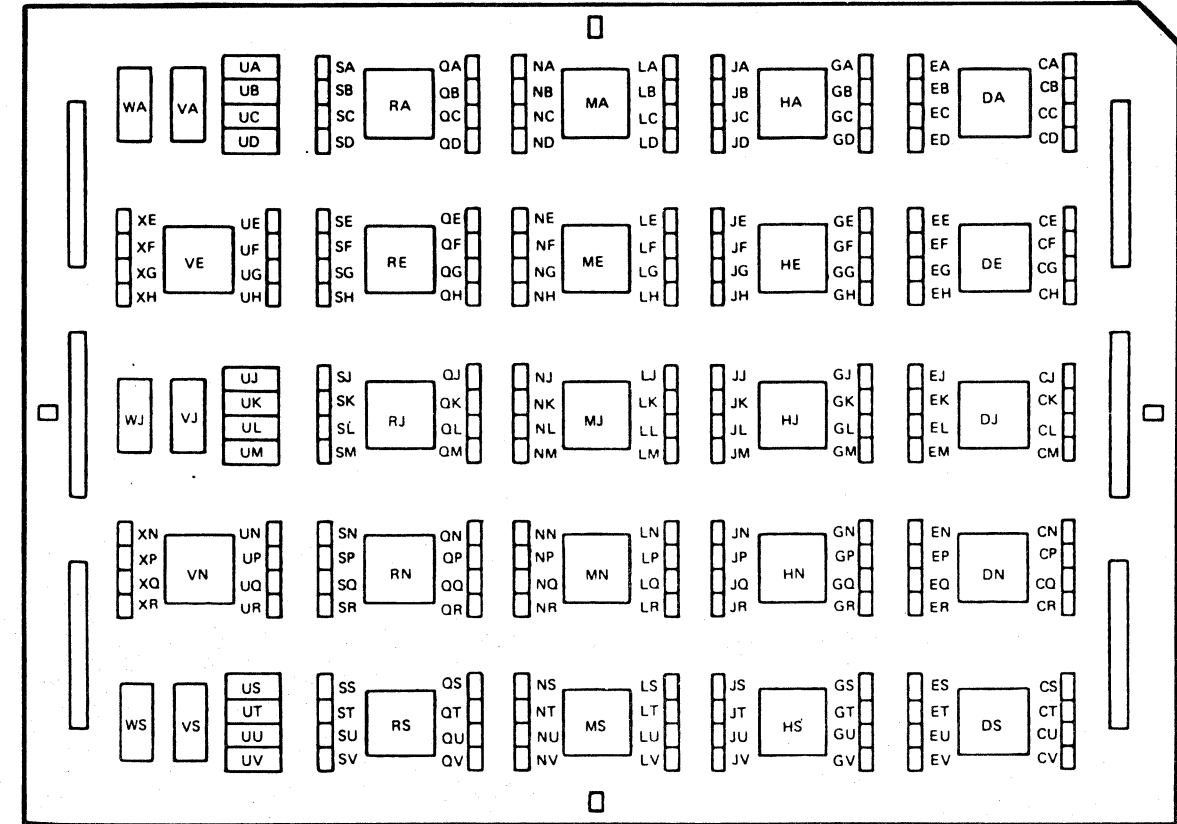
Module Location:

MJ

Control Storage (CS) Control

Module Location:

DS



Module Side

Directory Lookaside Table (DLAT) TLB

Module Location:

MN

Error Checking and Correction 1 (ECC 1)

Module Location:

RJ

Error Checking and Correction 2 (ECC 2)

Module Location:

VE

Keys

Module Locations:

HN

Local Storage External (LS EXT)

Module Location:

HJ

Processing Unit Storage Address Register (PUSAR)

Module Location:

DE

Shifter

Module Location:

HA

Module Plug Positions

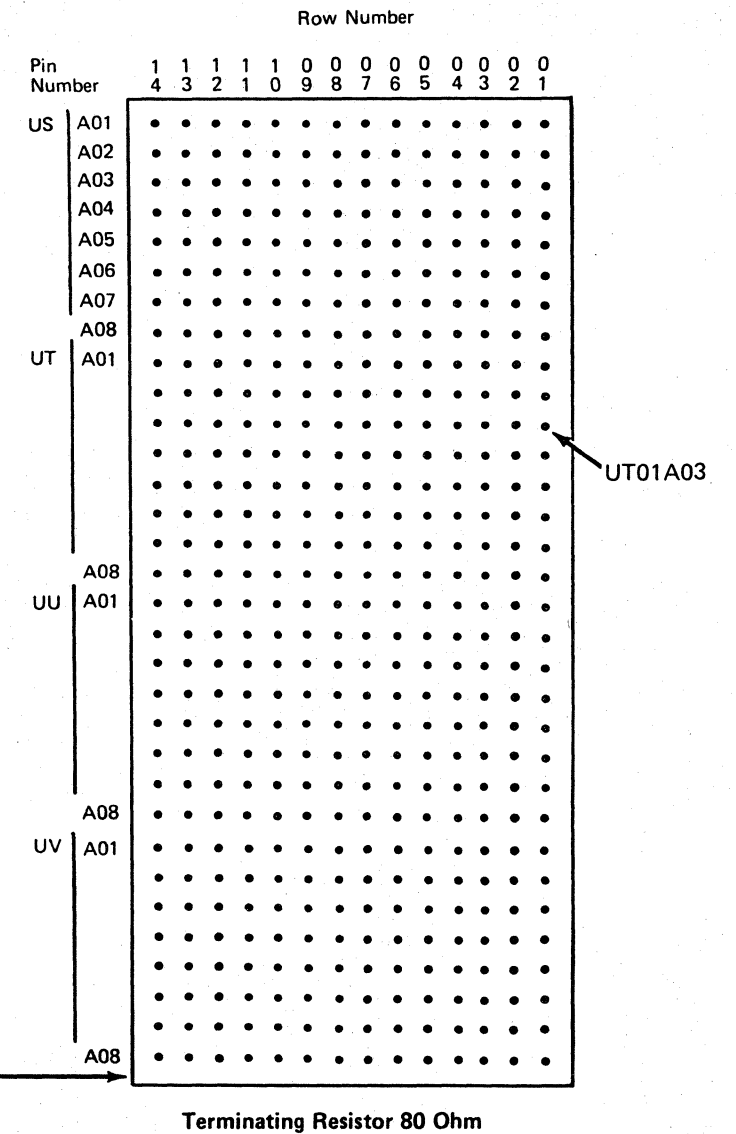
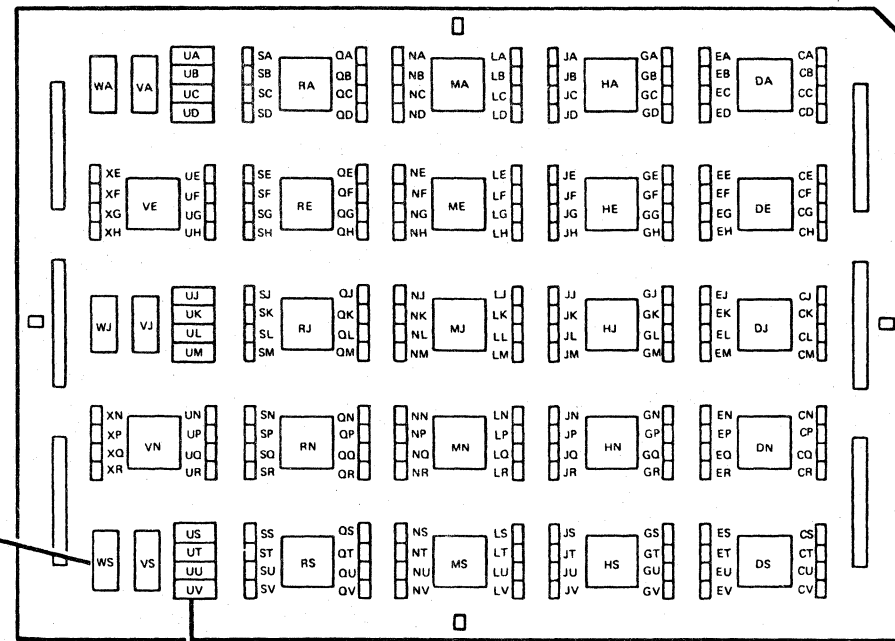
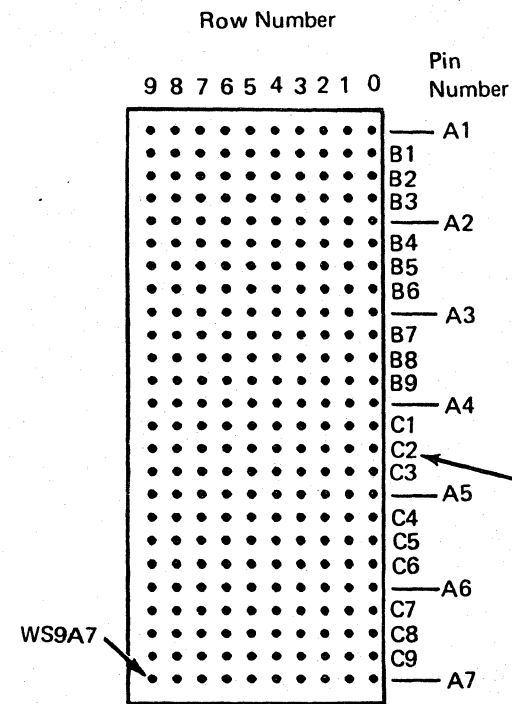
- DA CDB
- DE PUSAR
- DJ CREG 2
- DN CREG 0
- DS CS Control
- HA Shifter
- HE ALU
- HJ LS EXT
- HN Keys
- HS CREG 1
- MA Cache 0/1
- ME Cache 2/3
- MJ Clock
- MN DLAT/DIR
- MS CREG 3
- RA Cache 4/5
- RE Cache 6/7
- RJ ECC 1
- RN Channel Control
- RS Channel Interface 0/5
- VE ECC 2
- VN Channel Interface 6/11

A4L2
also A4L2

Cable Plug Positions

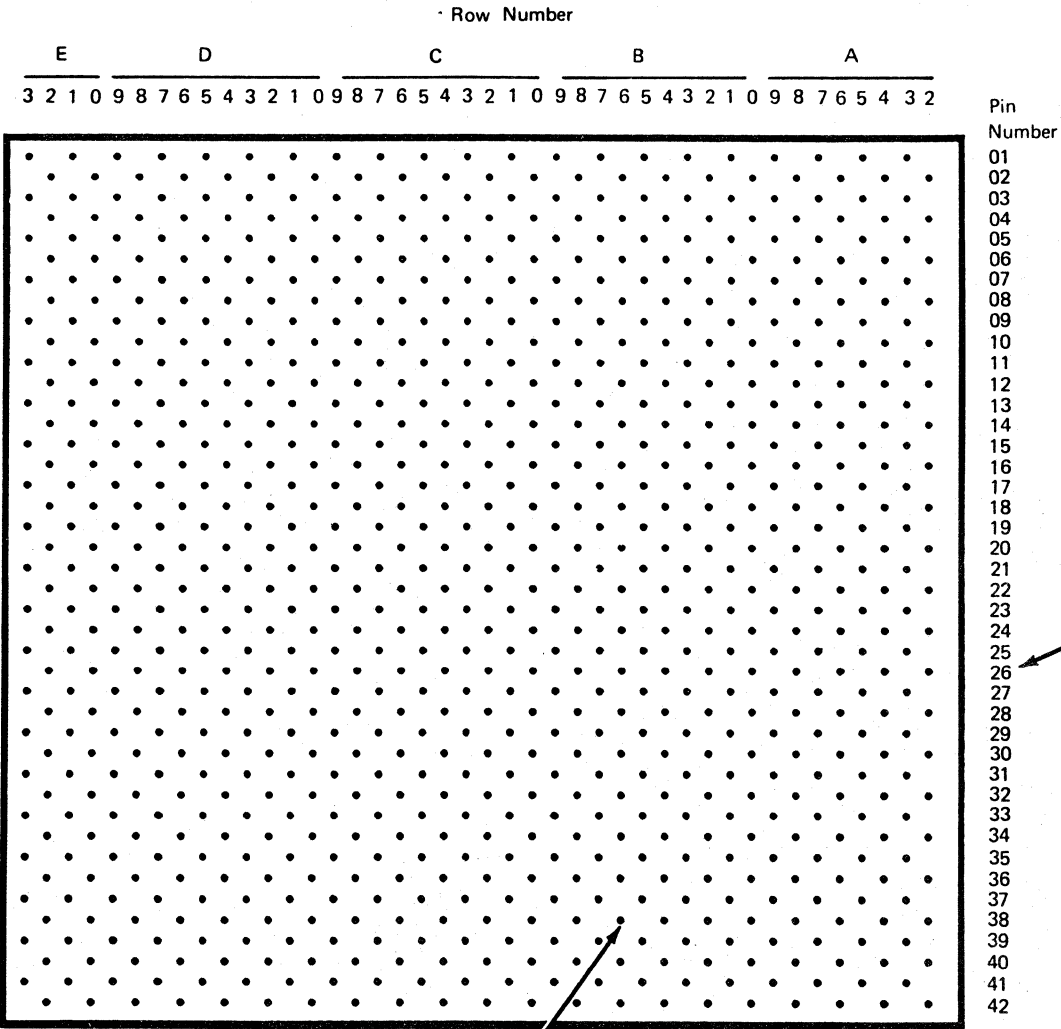
- VA
- VJ
- VS
- WA
- WJ
- WS

Board 01AB2 Resistor and I/O Signal Pin Layout



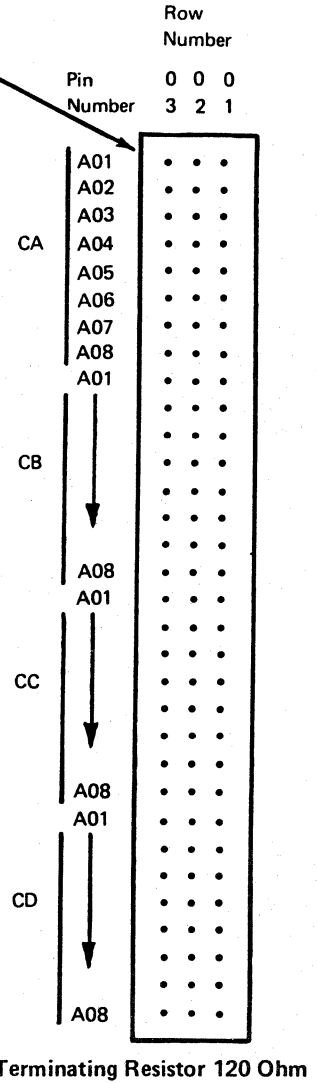
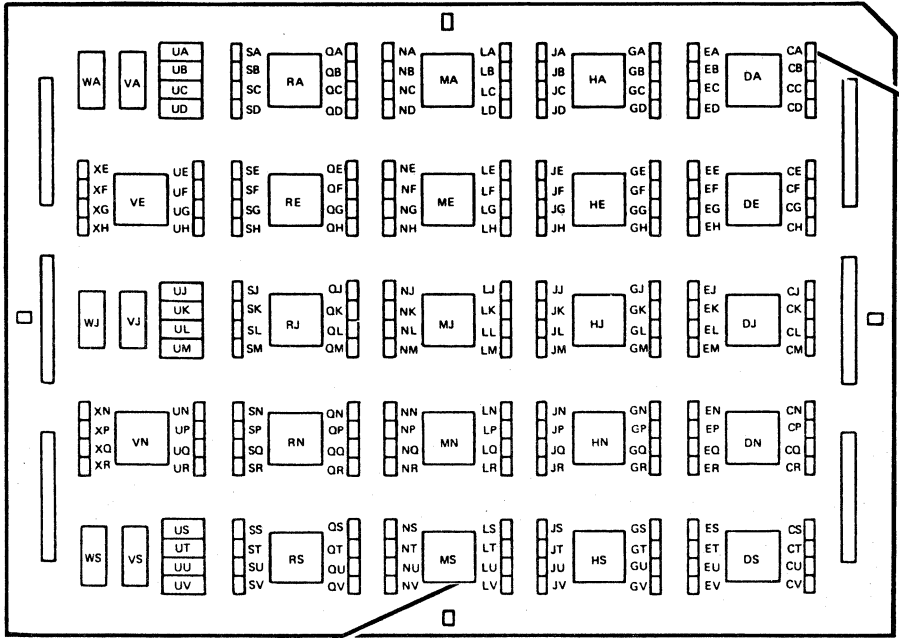
Seq GA035	PN 0446147 Pg 2 of 2	EC A02214 15 SEP 83				
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Board 01AB2 Module Pin Layout

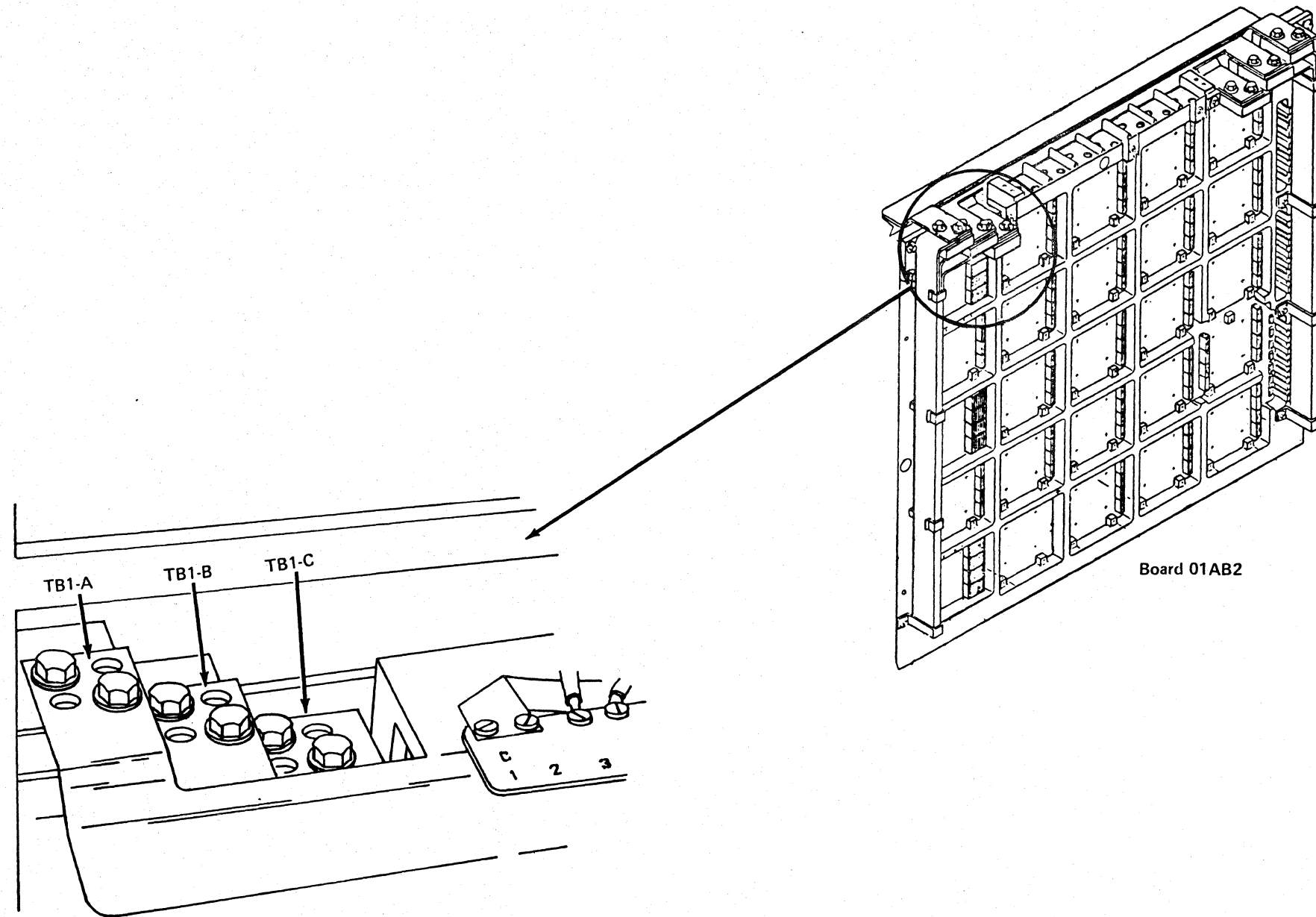


Module MS Example

MSB638

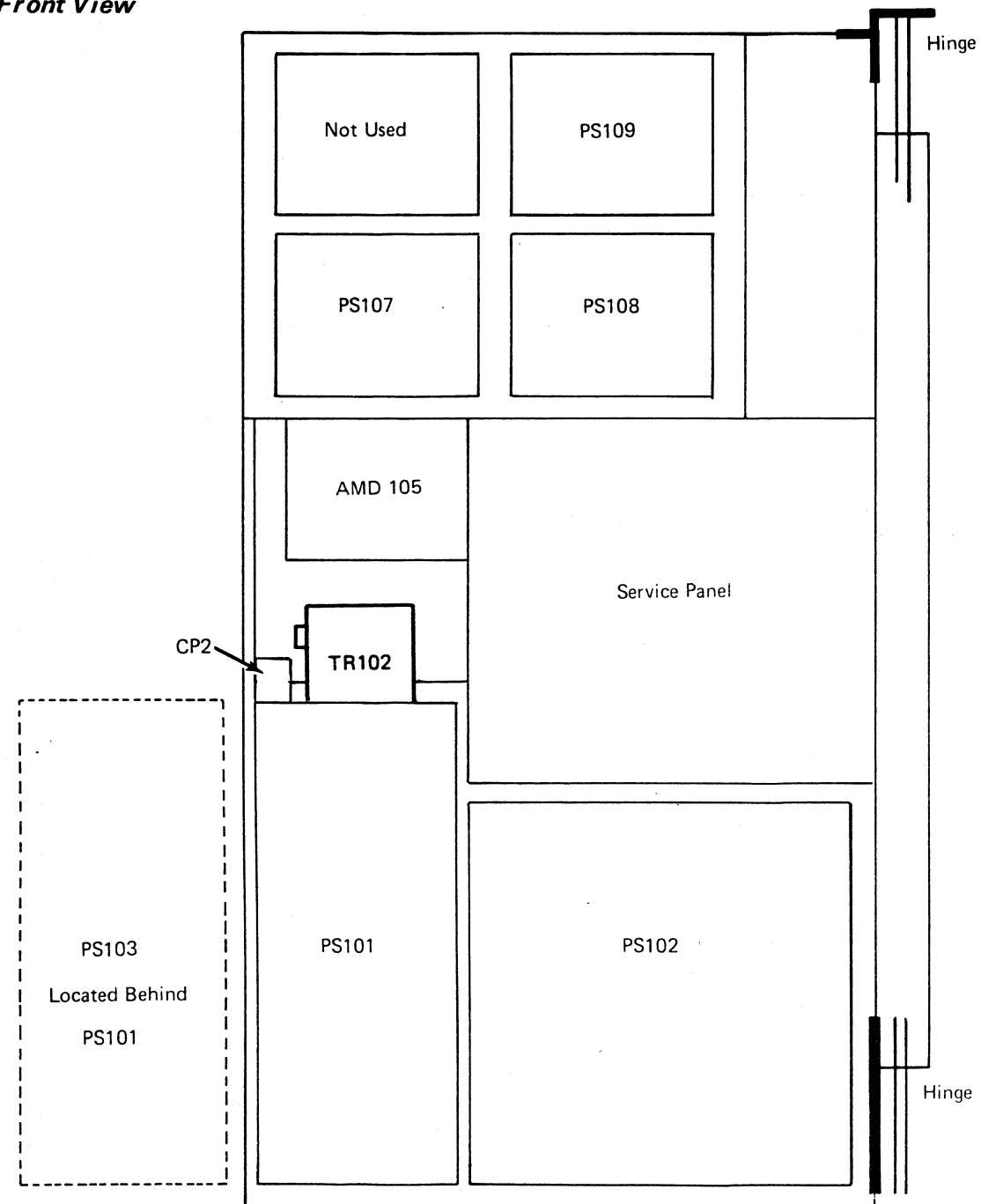


Board 01AB2 Terminals

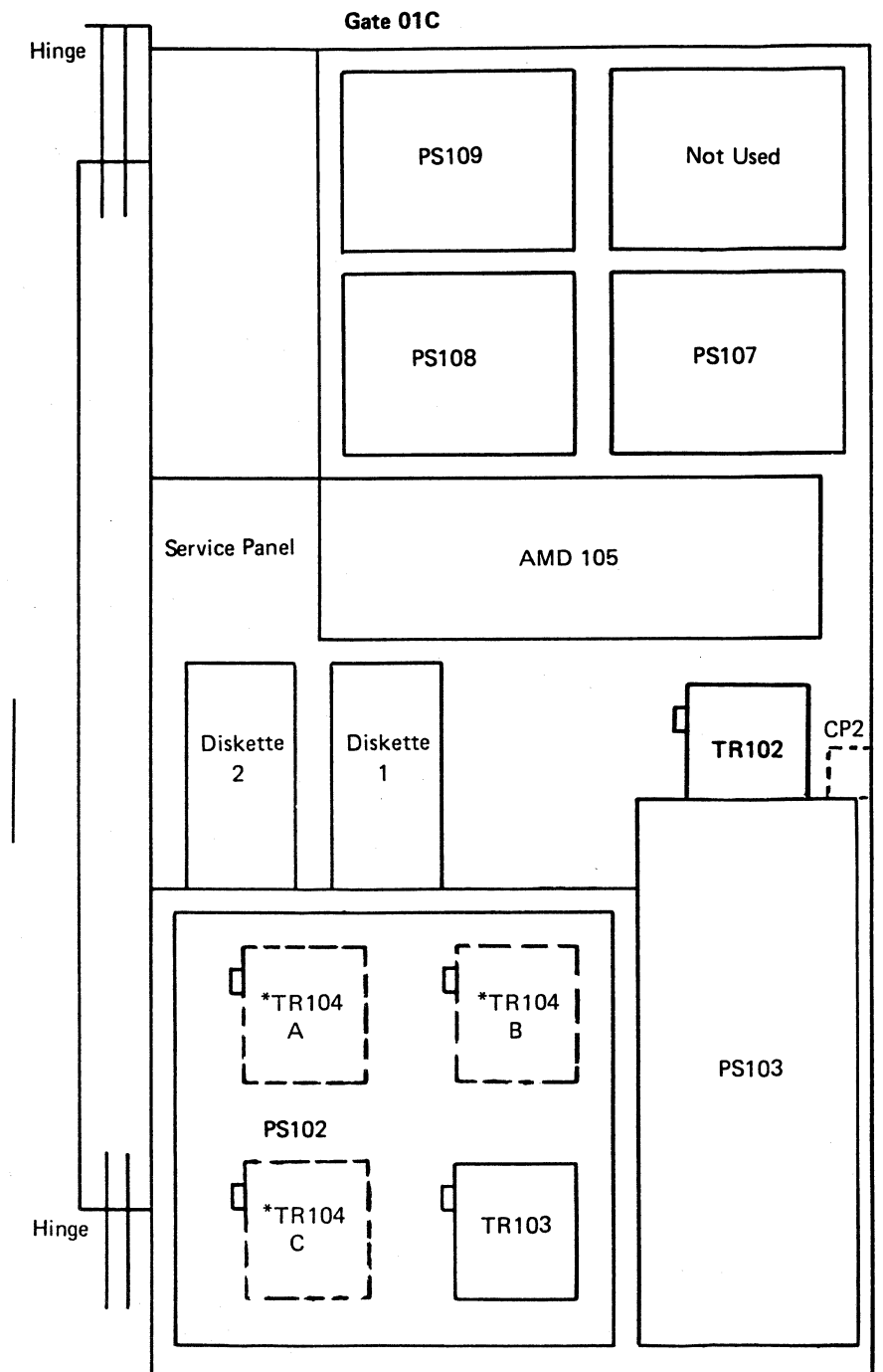


Seq GA040	PN 0446148 Pg 2 of 2	EC A02214 15 SEP 83				
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Front View

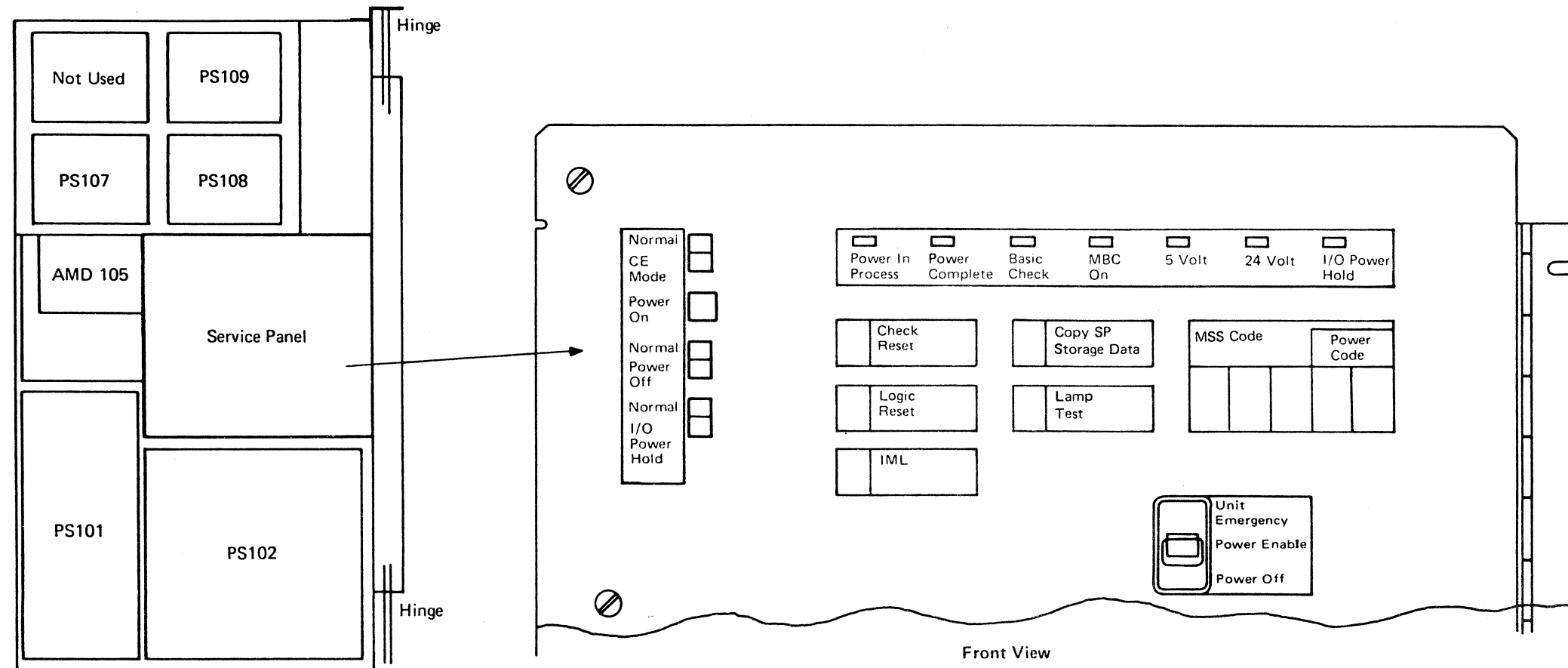
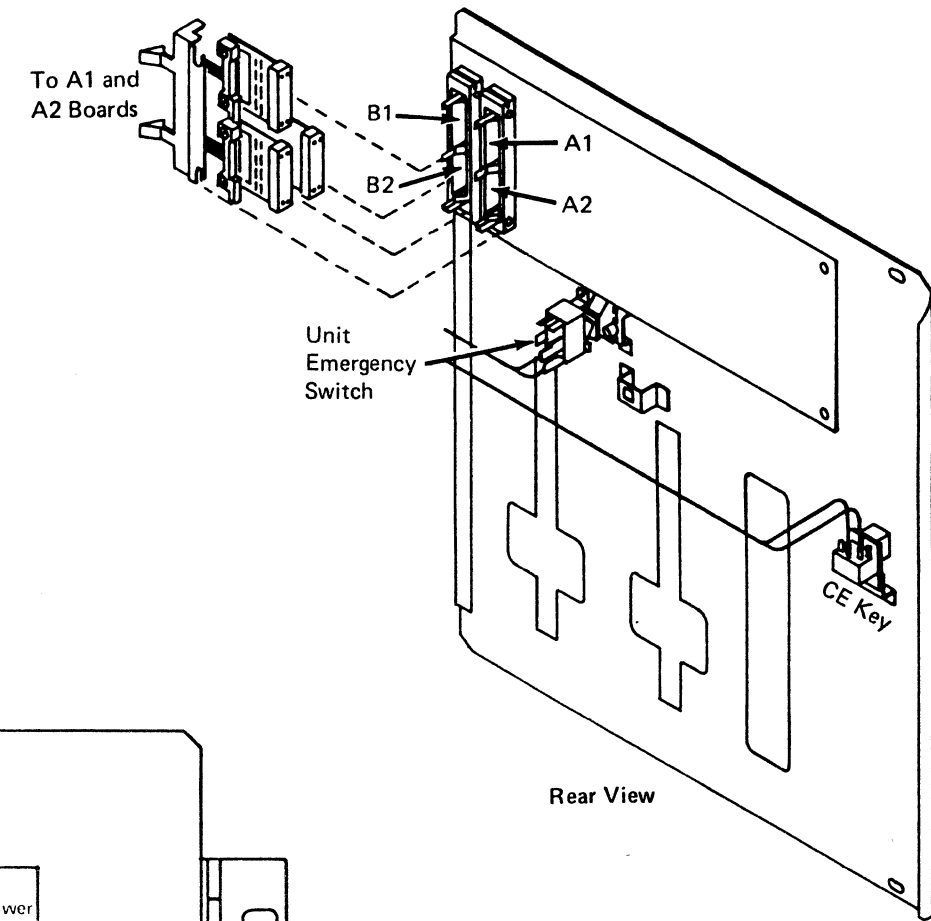


Rear View



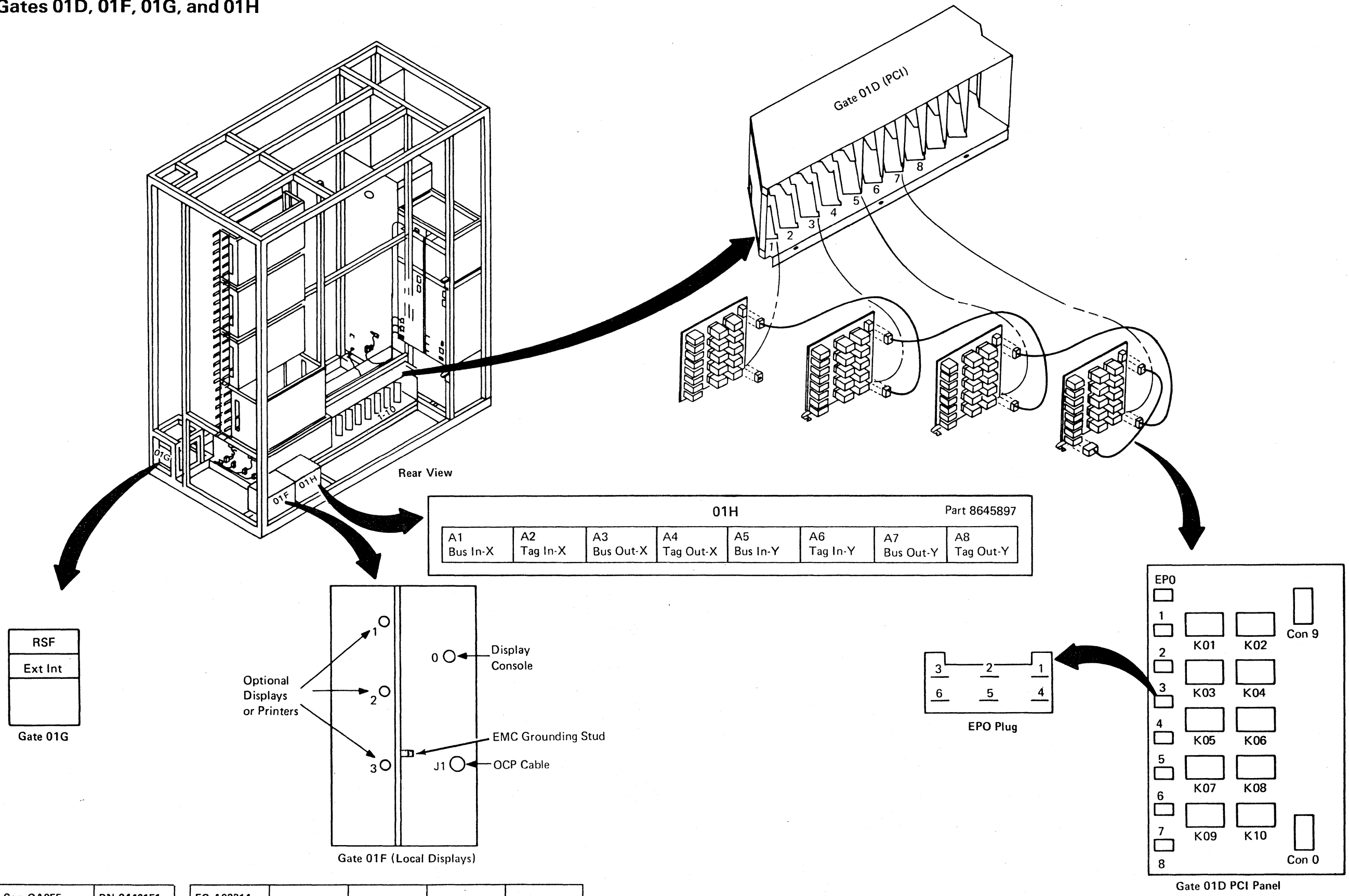
*TR104A, B, C, and CP2.
Only on all 50 Hz and 60 Hz Japan machines.

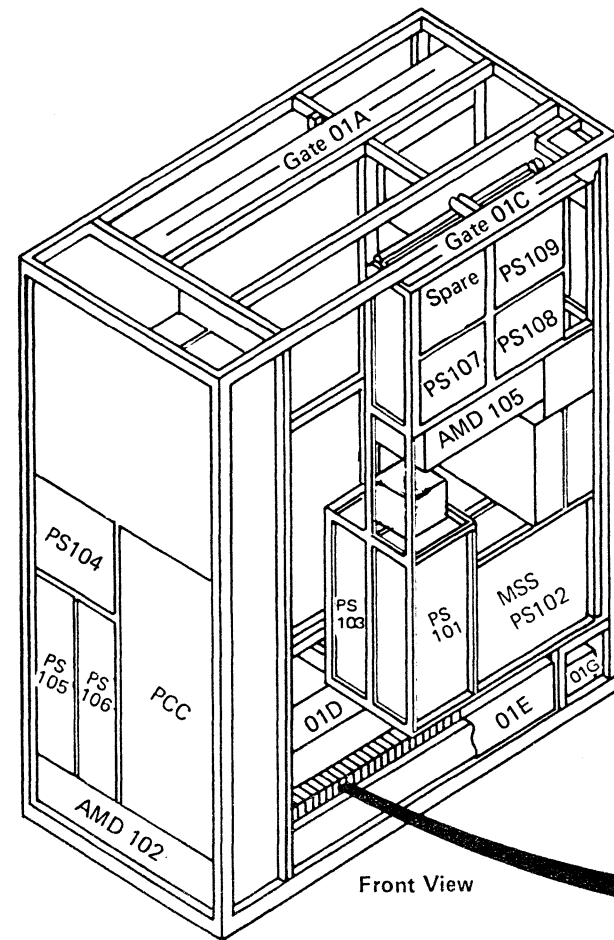
Seq GA045	PN 0446149 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84		
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Gate 01C Front View

Gates 01D, 01F, 01G, and 01H





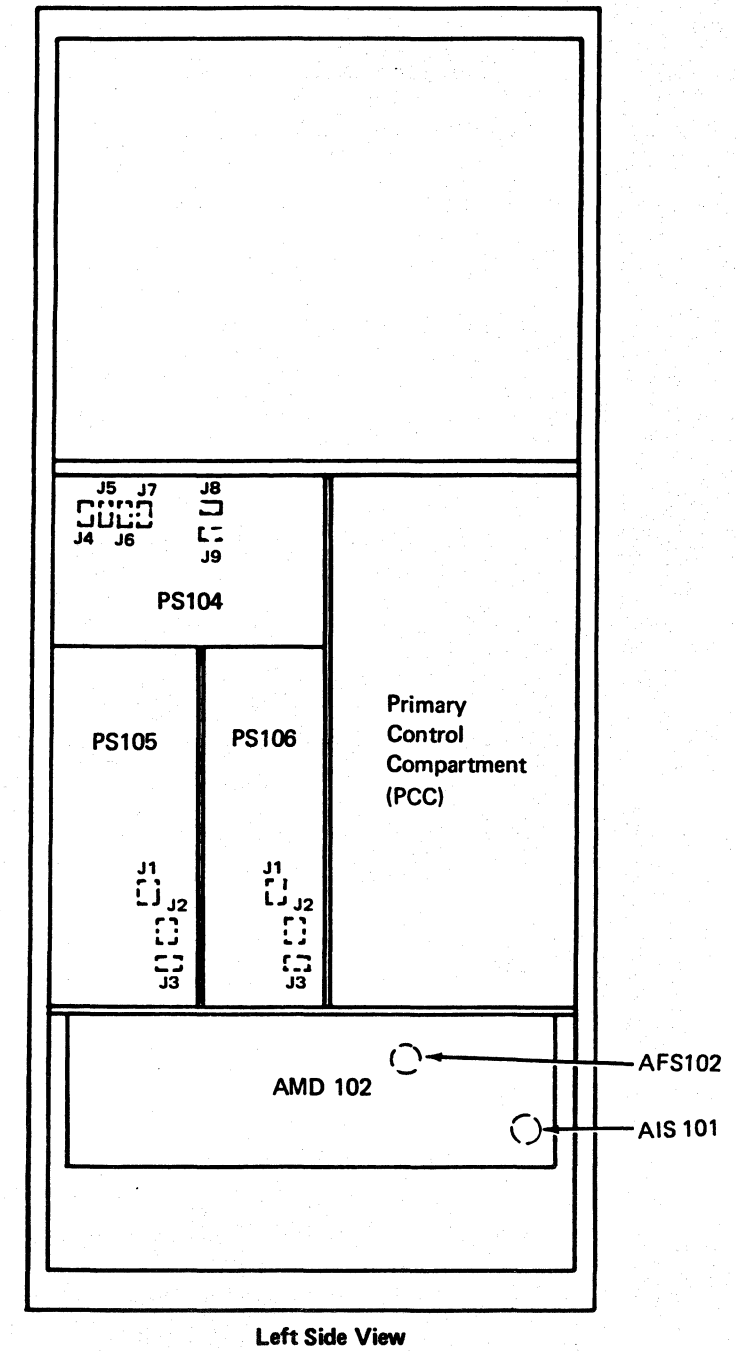
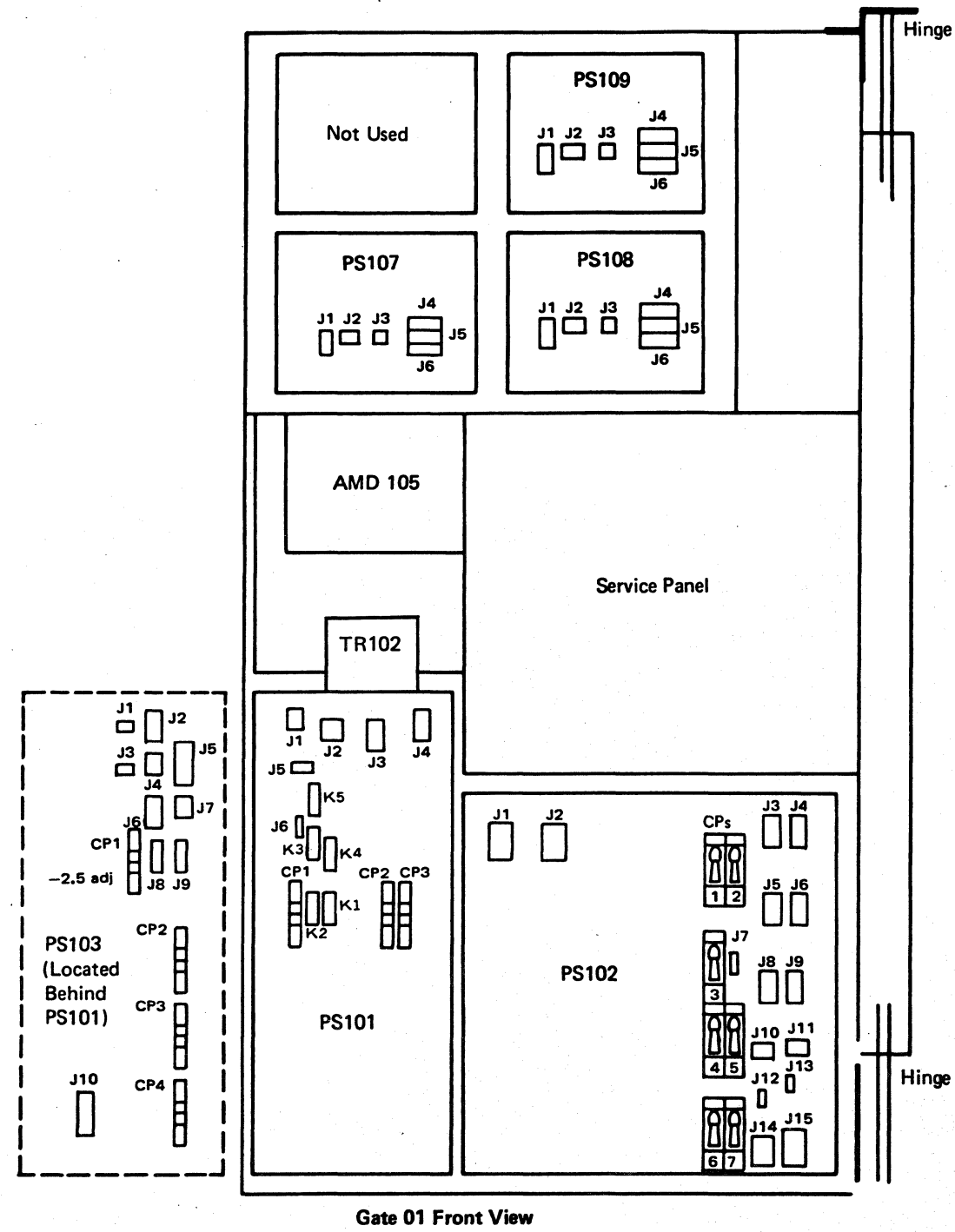
Channel Interface/Tag-Bus Cable Pins

Tag	Pin	Bus
Operational In	B03	P Out
Address In	B05	1 Out
Spare	B06	Spare
Select In	B08	3 Out
Address Out	B10	5 Out
Suppress Out	B12	7 Out
Spare	D02	Mark Out P
Status In	D04	0 Out
Service In	D06	2 Out
Select Out	D09	4 Out
Command Out	D11	6 Out
Service Out	D13	Mark Out 0/1 (Mark Out)
Clock Out	G03	P In
Meter In	G05	Spare
Spare	G06	1 In
Data In	G08	3 In
Data Out	G10	5 In
Hold Out	G12	7 In
Spare	J02	Mark In P
Status In	J04	0 In
Request In	J06	2 In
Holly Sync	J09	4 In
Disconnect In	J11	6 In
Operational Out	J13	Mark In 0/1 (Mark In)

All unlisted pins are shields.

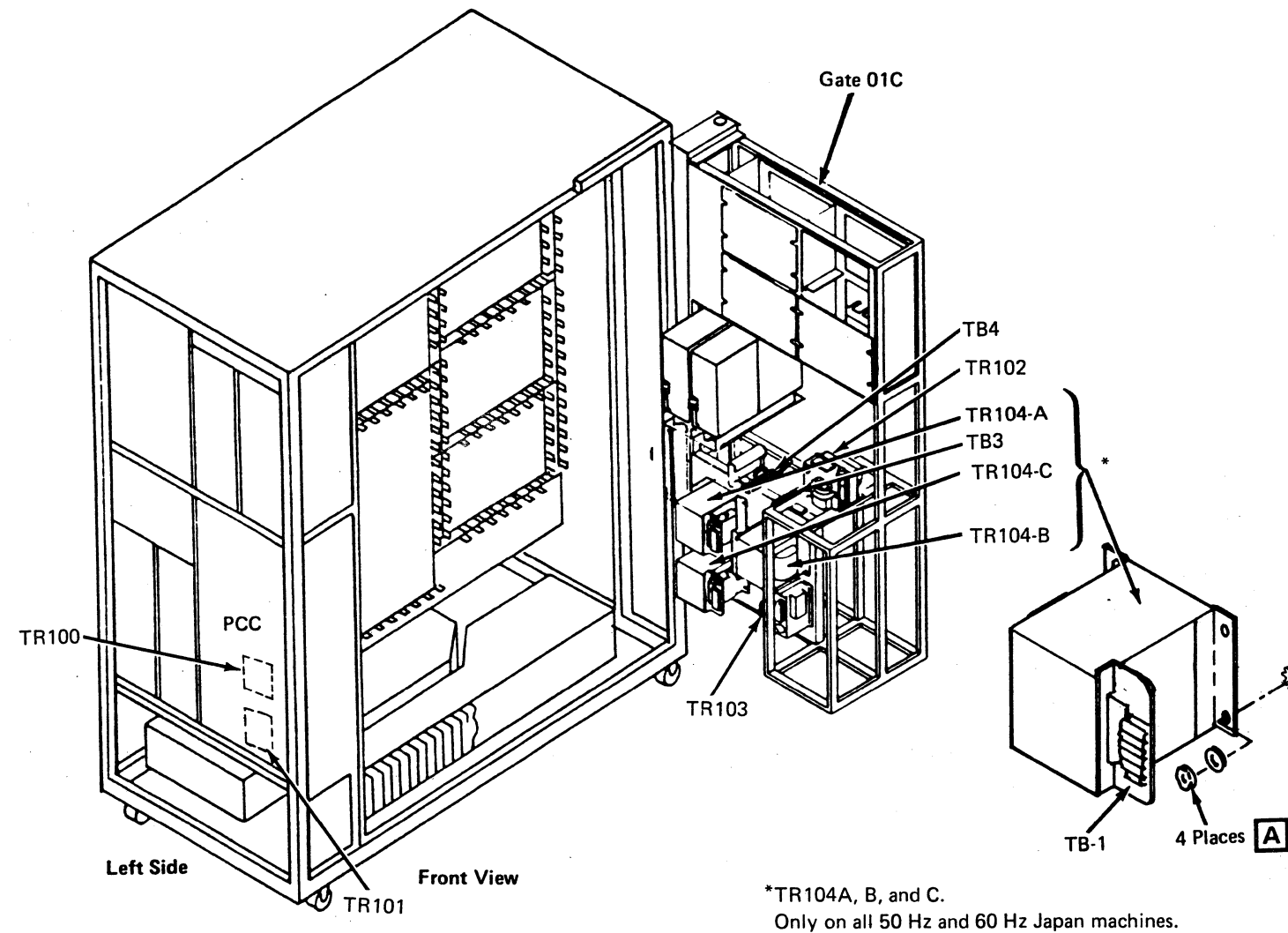
Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel A	Channel B												
A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6
Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag

Gate 01E (Channel Interface)



Seq GA065	PN 0446153 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84
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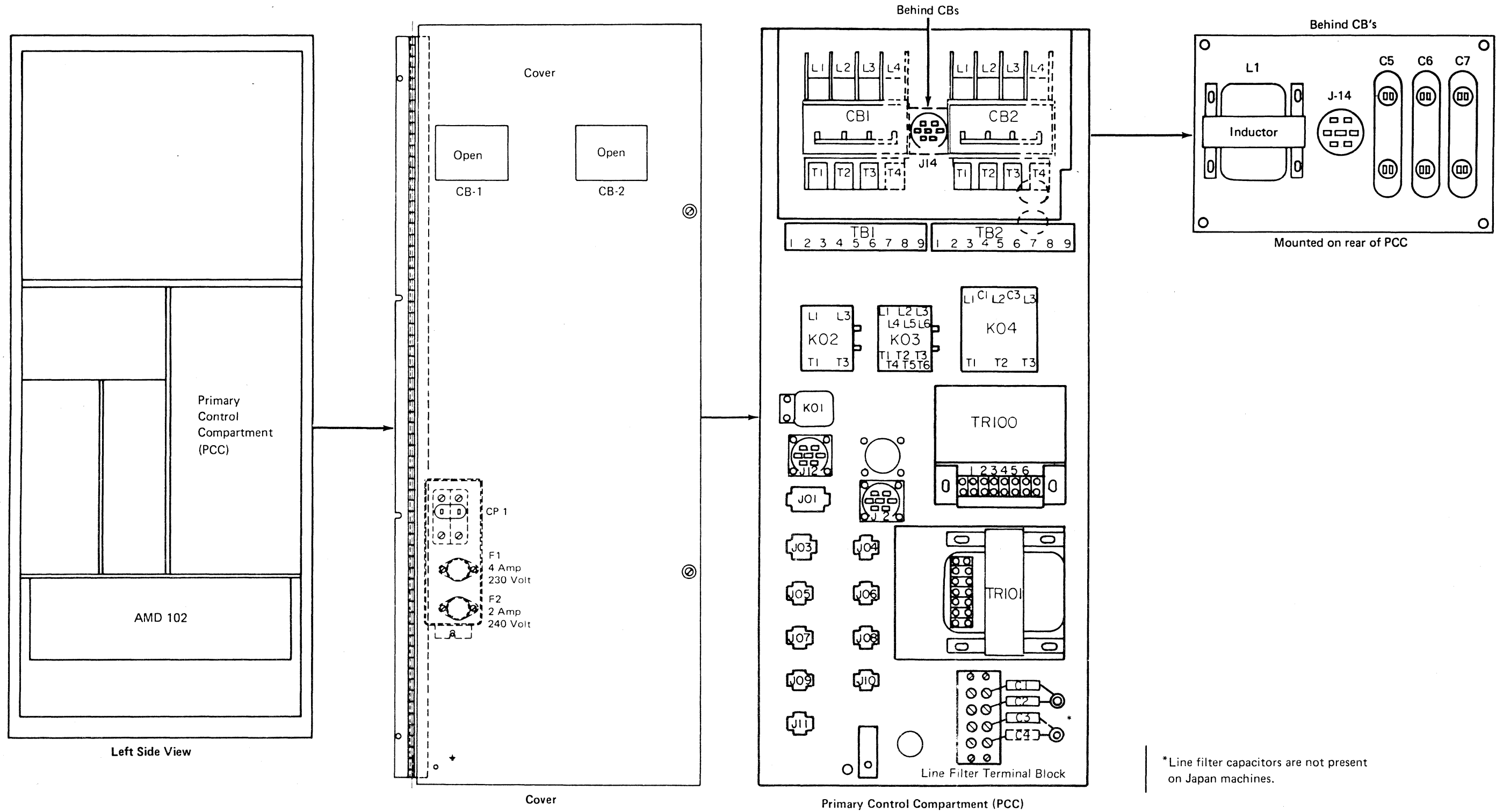
Transformers



Seq GA070	PN 0446154 Pg 1 of 1	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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Primary Control Compartment (PCC)

LOC 037

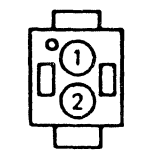


*Line filter capacitors are not present on Japan machines.

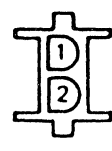
Seq GA075	PN 0446155 Pg 1 of 1	EC A02214 15 SEP 83	EC A02217 10 JAN 84			
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LOC 037

Connectors

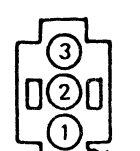


Plug
(Wiring Side)

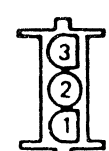


Jack
(Pin Side)

2-Pin

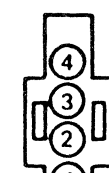


Plug
(Wiring Side)



Jack
(Pin Side)

3-Pin

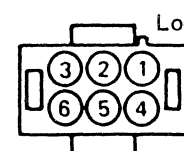


Plug
(Wiring Side)

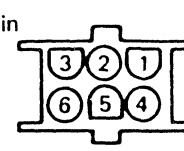


Jack
(Pin Side)

4-Pin

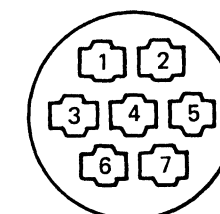


Plug
(Wiring Side)



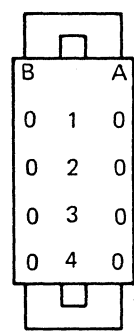
Jack
(Pin Side)

6-Pin

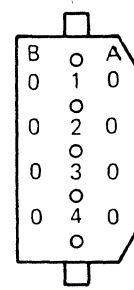


Jack
(Pin Side)

7-Pin

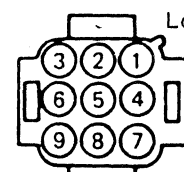


Plug
(Wiring Side)

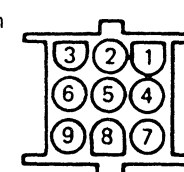


Jack
(Pin Side)

8-Pin

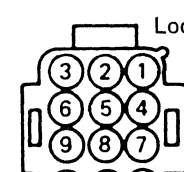


Plug
(Wiring Side)

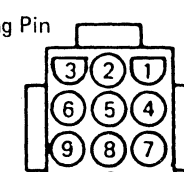


Jack
(Pin Side)

9-Pin

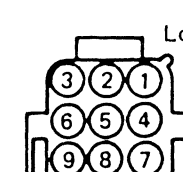


Plug
(Wiring Side)

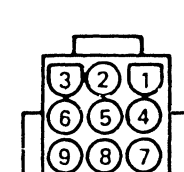


Jack
(Pin Side)

12-Pin

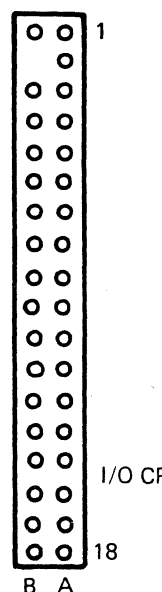


Plug
(Wiring Side)

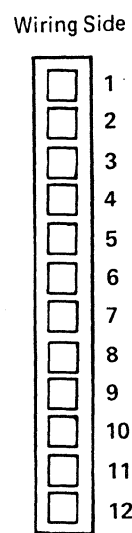


Jack
(Pin Side)

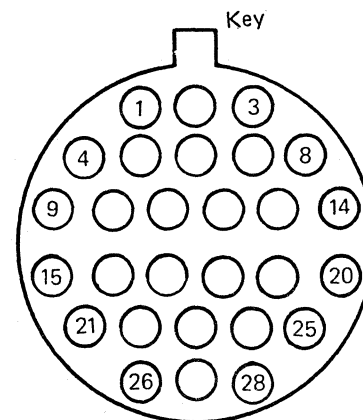
15-Pin



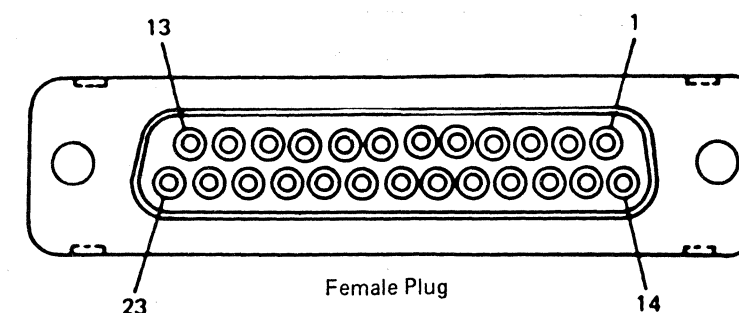
Diskette
2 x 18-Position
Edge Connector



12-Position
Edge Connector

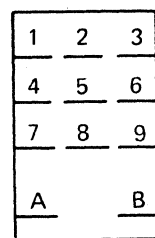


OCP Jack (Pin Side)

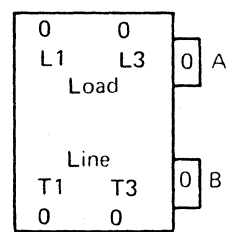


Female Plug
OCP Connector (located
in keyboard housing)

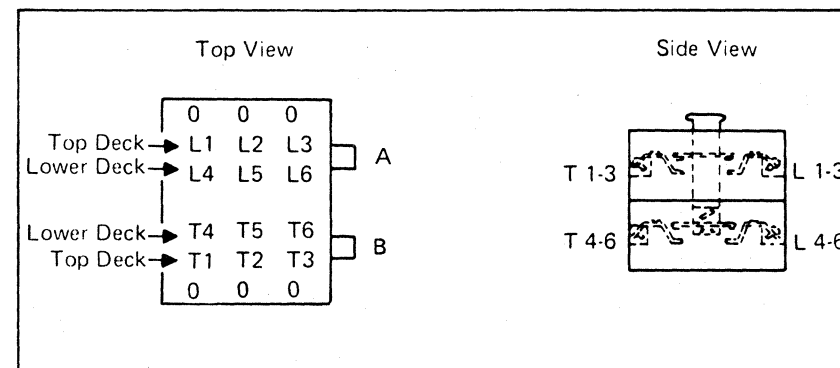
Relays and Circuit Protectors (CPs)



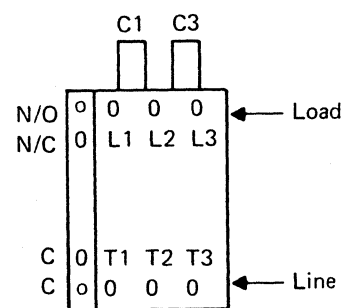
PCC K1
(Pin Side)



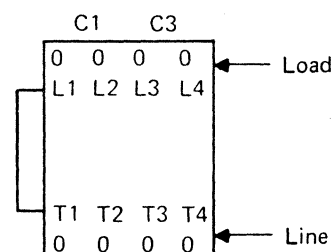
PCC K2



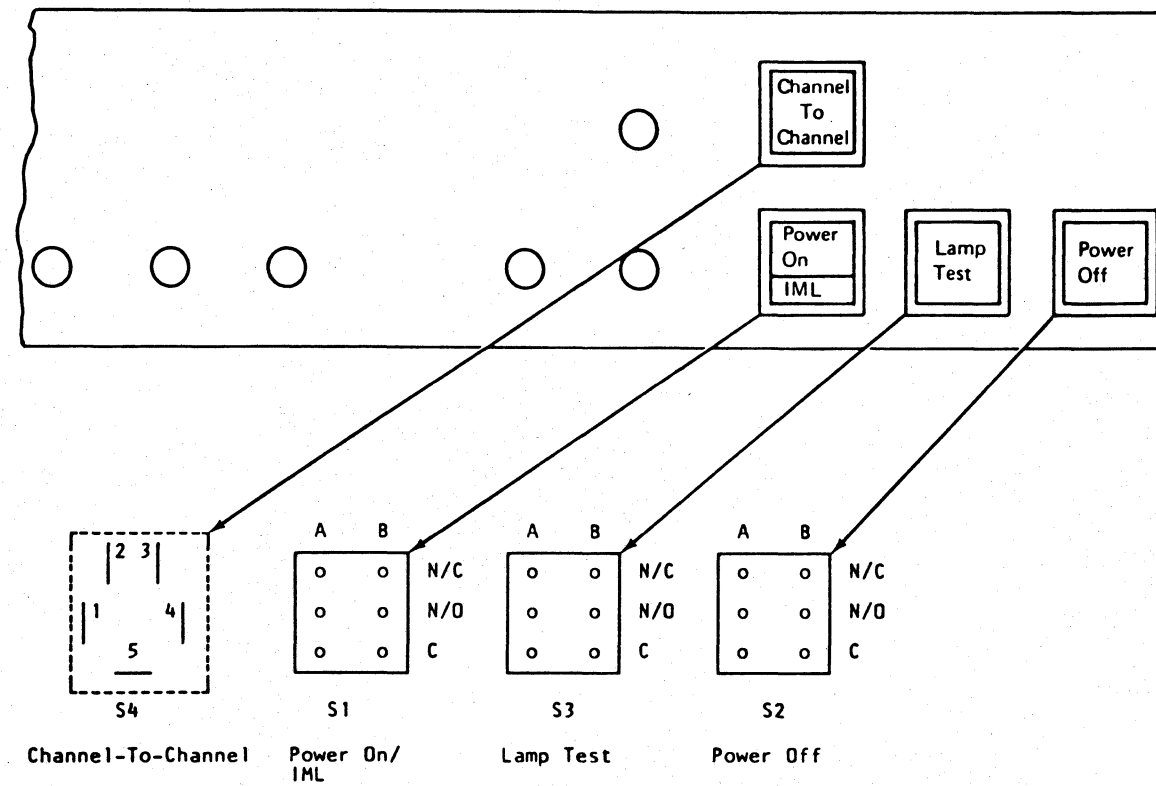
PCC K3



PCC K4 (Three Pole)



PCC K4 (Four Pole)



Tools

Contents

Maintenance Tools List TOOLS 001

Tool Figures TOOLS 002

Actuation Tool TOOLS 011

Continuity Checker TOOLS 012

Module Pin Aligner TOOLS 021

Maintenance Tools List

The following tools are used to maintain the 4381 Processor.

Tool Description	Part Number	Figure Page
Actuation Tool (I/O Cables)	2360092	TOOLS 002
Actuation Tool (Boards 01A-A1 to 01A-A4)	4134750	TOOLS 002
Cable Probe Adapter	2360408	TOOLS 002
Card Container	1310730	TOOLS 002
Continuity Checker		
• Continuity checker	453587	TOOLS 002/012
• Adapter	453954	TOOLS 012
• Battery 1.35V	453119	TOOLS 012
• Battery 2.8V	453120	TOOLS 012
• Extension	5500731	TOOLS 012
• Lamp	5353889	TOOLS 012
I/O Signal Cable Unlatch Tool	2360349	TOOLS 002
Lighted Magnifier	452642	TOOLS 007
Modular Jack Test Adapter	6339647	TOOLS 007
Module Pin Aligner	2360424	TOOLS 007/021
Module Pin Alignment Template	5665902	TOOLS 007
MCM Probe Kit Assembly		
• MCM Probe Kit	9990129	TOOLS 007
• Probe Mask	9953923	TOOLS 007
• Probe Assembly	401064	TOOLS 007
Tektronix* 2465 Oscilloscope or equivalent	6428882	TOOLS 008
Torque Wrench for Power Bus	5665903	TOOLS 008
1/4 to 3/8 Drive Adapter	2337141	TOOLS 008

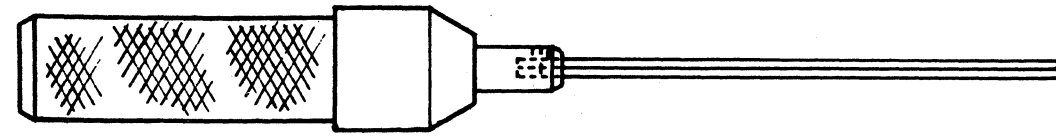
* Trademark of Tektronix Inc.

Seq GB005	PN 0446159 Pg 1 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84		
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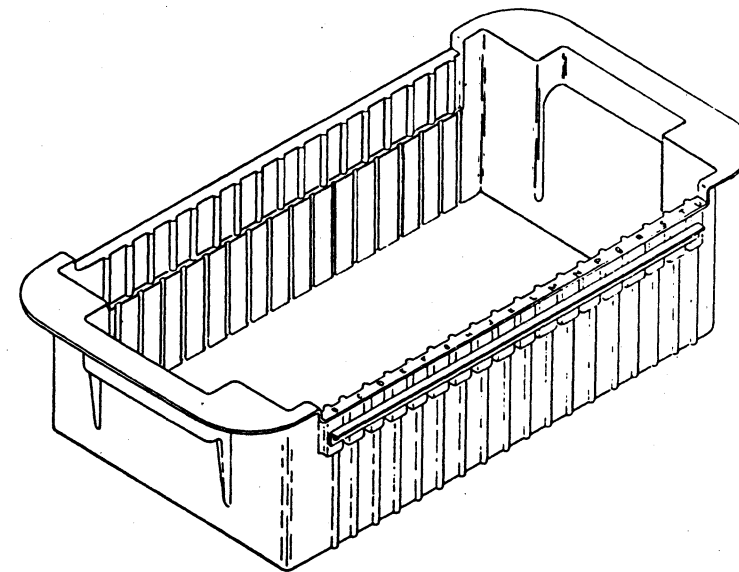
Tool Figures

TOOLS 002

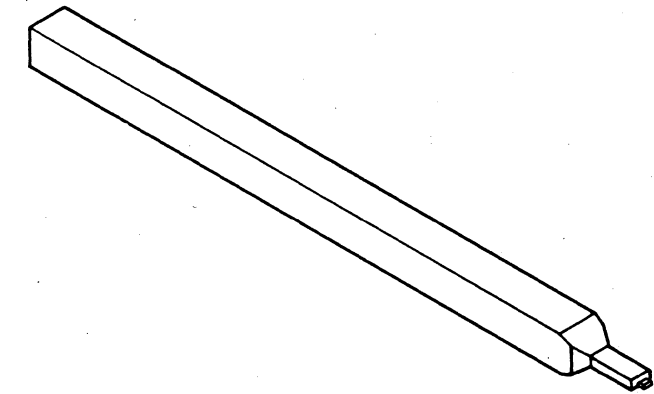
Actuation Tool (Part 2360092)



Card Container (Part 1310730)



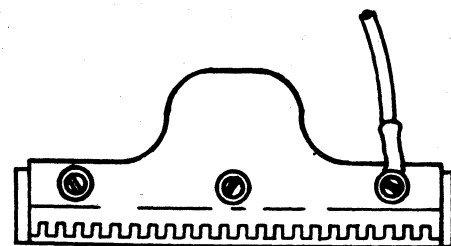
I/O Signal Cable Unlatch Tool (Part 2360349)



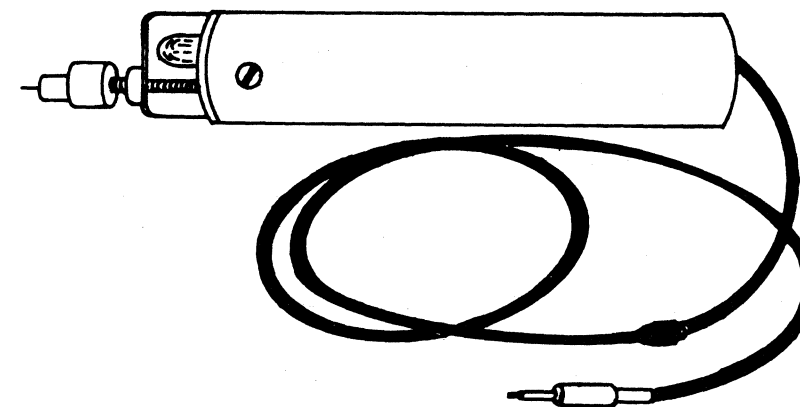
Actuation Tool (Part 4134750)



Cable Probe Adapter (Part 2360408)



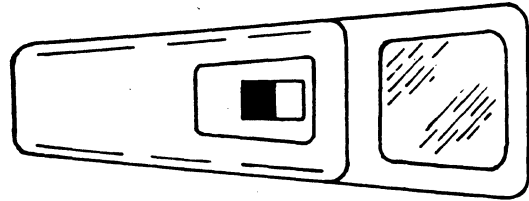
Continuity Checker (Part 453587)



Seq GB005	PN 0446159 Pg 2 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84		
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TOOLS 002

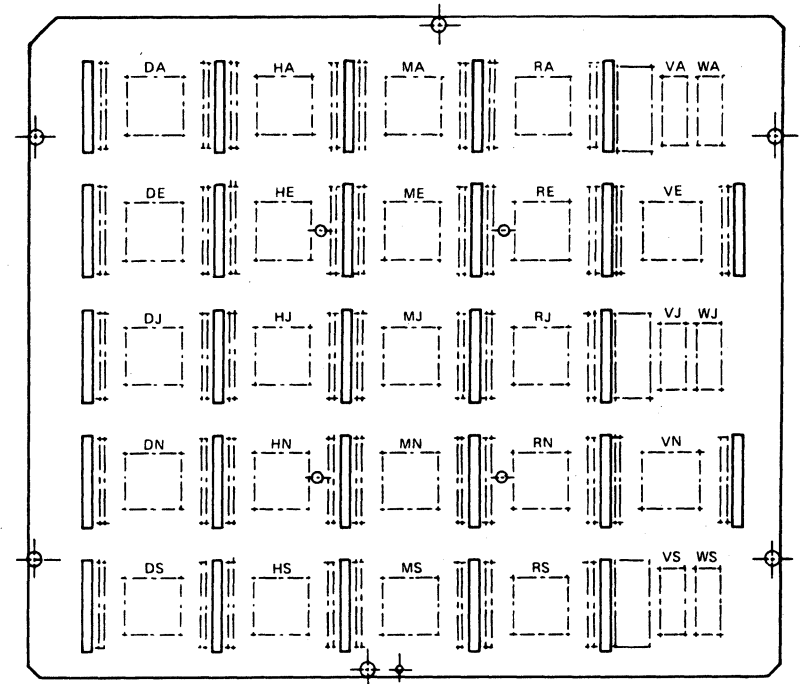
Lighted Magnifier (Part 452642)



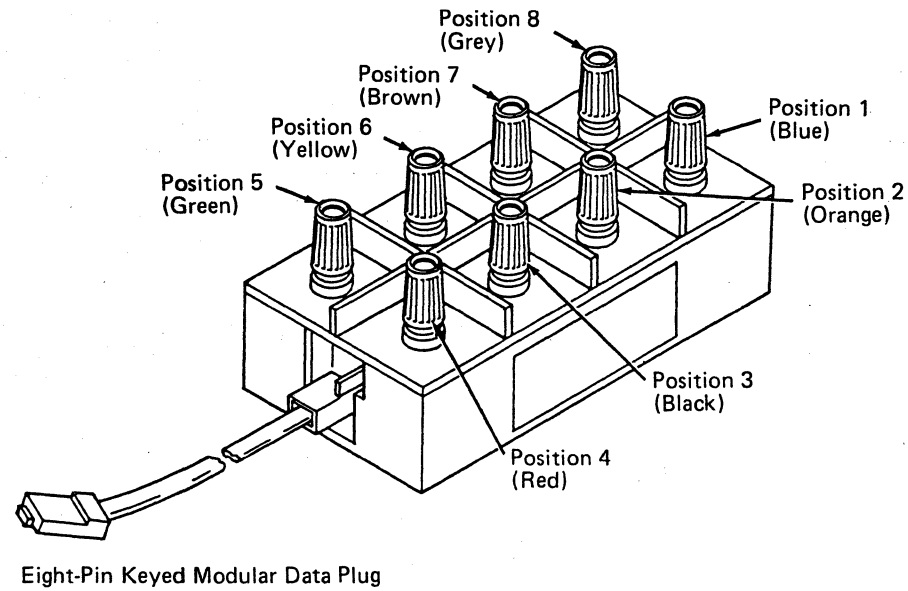
Module Pin Aligner (Part 2360424)



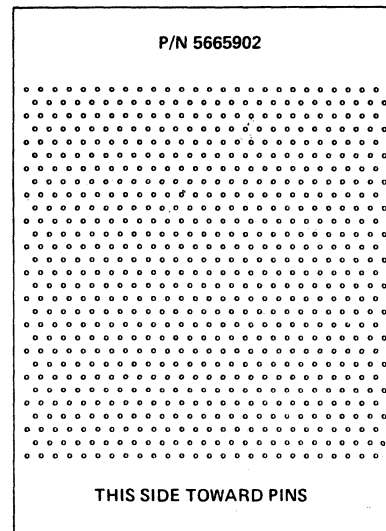
Probe Mask (Part 9953923)



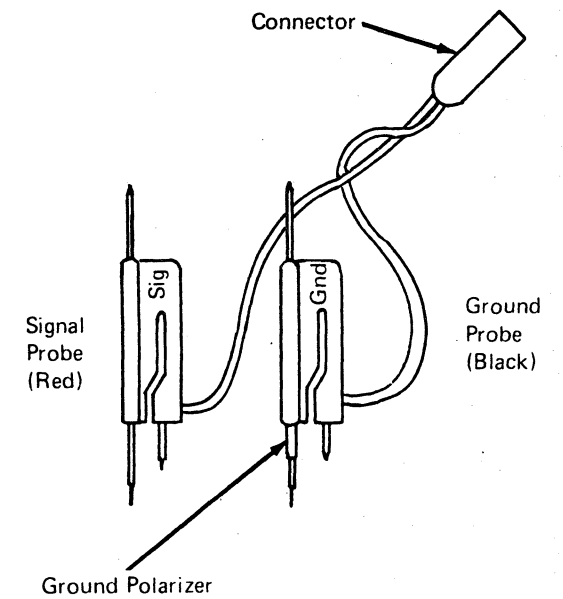
Modular Jack Test Adapter (Part 6339647)



Module Pin Template (Part 5665902)

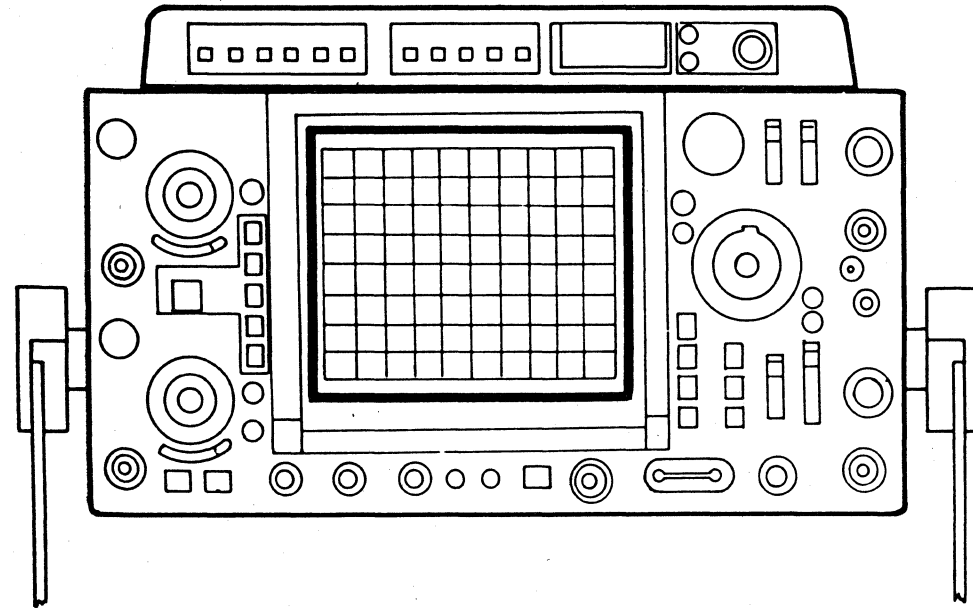


Probe Mask Probe Assembly (Part 401064)

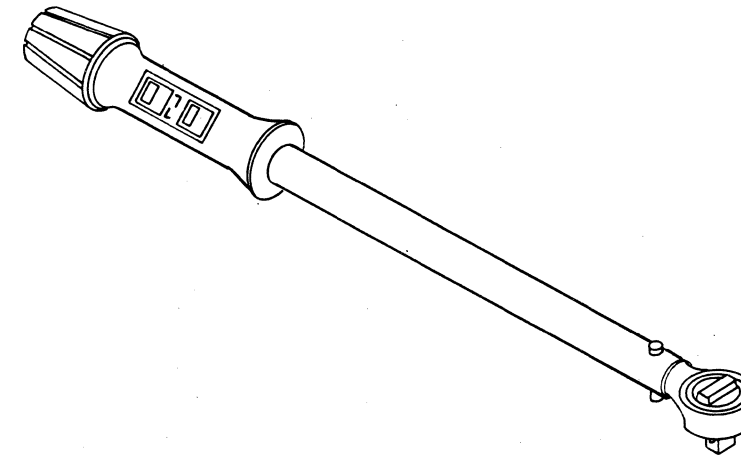


Seq GB010	PN 0446160 Pg 1 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84		
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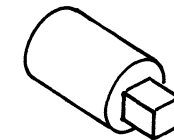
Tektronix 2465 Oscilloscope (Part 6428882 or equivalent)



Torque Wrench (Part 5665903)



1/4 to 3/8 Drive Adapter (Part 2337141)



Seq GB010	PN 0446160 Pg 2 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84		
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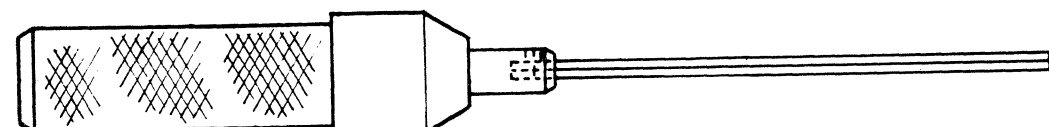
Actuation Tools

This actuation tool (part 2360092) is used to remove and replace I/O signal cables groupers. It is a hand-operated tool with a preset torque setting when turned in a clockwise direction. Torque control is needed to prevent damage to the screw threads and inserts.

Note: The part number for the blade of the actuation tool is 2360093.

Operation

Ensure the tip of the tool is seated in the socket head screw to be removed or replaced. When tightening the screw, turn the tool in a clockwise direction 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.



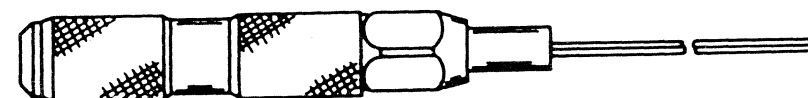
(Part 2360092)

This actuation tool (part 4134750) is used to torque the horizontal cable retention bars and mounting screws for the card cages on boards 01A-A1 through 01A-A4. It is a hand-operated tool with a preset torque setting when turned in a clockwise direction. Torque control is needed to prevent damage to the screw threads, inserts, and boards.

Note: The part number for the blade of the actuation tool is 4138537.

Operation

Ensure the tip of tool is seated in the socket head screw to be removed or replaced. When tightening the screw, turn the tool in a clockwise direction 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.



(Part 4134750)

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Continuity Checker

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 to a flexible lead with a 6-32 threaded stud extending 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 convenient checkpoint. Probe with the threaded rod (with probe tip) protruding from the other end of the continuity checker.

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

Maintenance

Maintenance consists of replacement of the following:

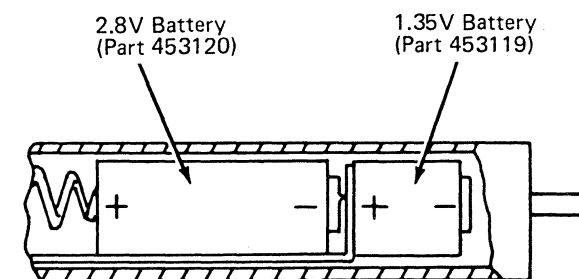
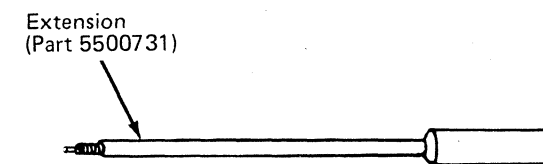
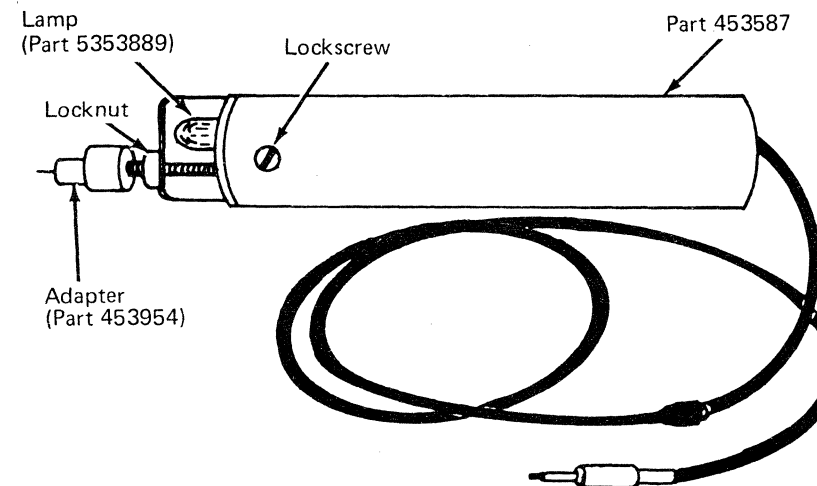
- 1.35V battery (part 453119)
- 2.8V battery (part 453120)
- Indicator lamp (part 5353889)

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 defective batteries (observe the polarity). Reverse this procedure for reassembly.

Lamp Replacement

Disassemble the tool as in the "Battery Replacement" procedure. Loosen the locknut, and remove the circuit card assembly from the plastic lens. Remove the defective lamp. Remove the lens cap from the new lamp, and insert in the circuit card assembly.



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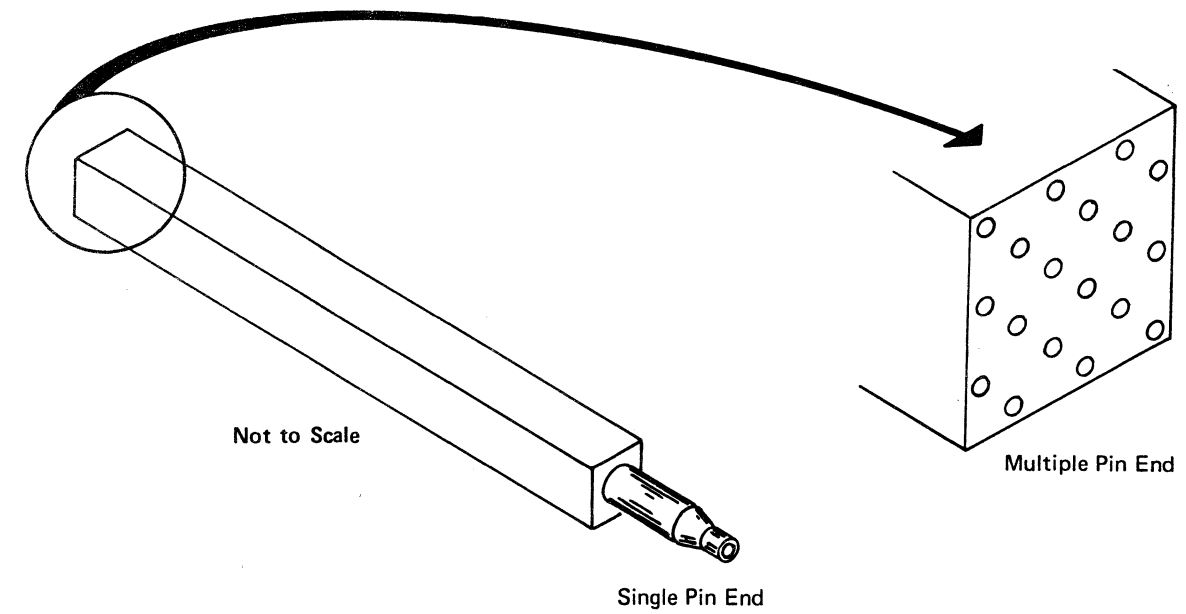
Module Pin Aligner

Warning: A module can be destroyed by touching the pins because of ESD (Electrostatic Discharge). Always wear the wrist band when handling a module.

Pins may become bent on the module so that it cannot be installed properly without causing severe damage to the system. To ensure against this potential damage, the pins must be straightened so that the alignment between them and the spring connectors is maintained for a smooth insertion.

Note: Do not attempt to straighten a pin that is bent more than the distance to the next row of pins or equivalent. A tool, as shown, is provided for aligning these pins. One end of the tool is for straightening a single pin and the other end is for straightening multiple pins.

As an aid in observing the spring connectors, use the Lighted Magnifier (part 452642). A visual inspection must be made by sighting down the row of pins. Any pins in question should be checked with the multiple end of the tool to ensure alignment. **Never install a module before checking the pin alignment.**



(Part 2360424)

Seq GB020	PN 0446162 Pg 1 of 1	EC A02214 15 SEP 83	EC A02217 10 JAN 84			
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Removals and Replacements

Contents

Boards 01AA1 to 01AA4..... REM 003

LSI Cards..... REM 004

Board 01AB2..... REM 011
 Removal..... REM 011
 Replacement..... REM 012

64 MM Pluggable Module..... REM 017

Pluggable Terminator Resistor..... REM 018

Decoupling Capacitor (C-PAC)..... REM 021

I/O Signal and Flat Cables..... REM 022
 I/O Signal Cables..... REM 022
 Flat Cables..... REM 022

Power Supply 101..... REM 031

Power Supply 102..... REM 032

Power Supply 103..... REM 041

Power Supply 104..... REM 042

Power Supply 105..... REM 051

Power Supply 106..... REM 052

Power Supply 107..... REM 061

Power Supply 108..... REM 062

Power Supply 109..... REM 071

Transformer 100..... REM 075

Transformer 101..... REM 076

Transformer 102..... REM 085

Transformer 103..... REM 086

Transformer 104..... REM 093

Air Moving Device 101..... REM 095

Air Moving Device 102..... REM 096

Air Moving Device 103..... REM 105

Air Moving Device 104..... REM 106

Air Moving Device 105..... REM 115

Service Panel..... REM 117

Diskette Drive..... REM 118

Boards 01AA1 to 01AA4

Tools required:

Card Container (part 1310730)

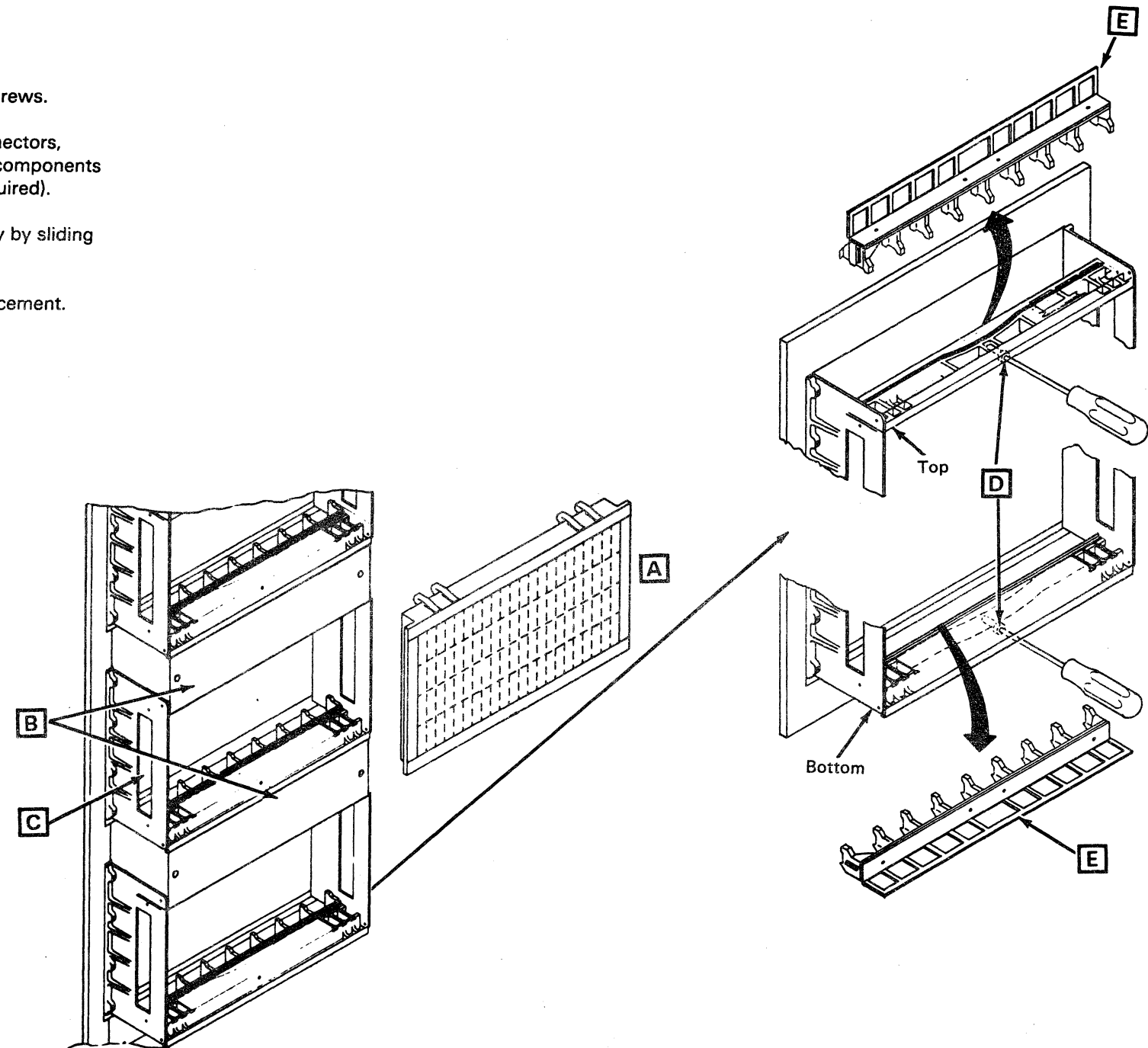
Actuation Tool (part 4134750)

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame.
5. Determine board to be removed, and remove the card cover **A**.

Warning: A module can be destroyed by touching the card contacts and/or the exposed module pins on the back of a card. Whenever handling a card, be extremely careful not to touch the card contacts or module pins before discharging yourself to ground.

6. Compare the part number and EC level of the old board to the new board. Verify that you have the correct board for replacement.
7. Ensure that the cards and connectors are labeled for proper repositioning before they are removed from the board assembly.
8. Remove top card crossover connectors if applicable.
9. Remove the cards from the board, and place in card container (part 1310730).
10. Remove air baffle(s) **B**.
11. Loosen cable opening cover screws **C**, slide the cover out of the way, and retighten the screws.
12. Loosen leaf spring torque screws **D** using the actuation tool (part 4134750) until all tension has been removed.

13. Remove upper and lower cable retainer brackets **E**.
14. Remove I/O cable connectors.
15. Open front cover of frame.
16. Open gate 01C.
17. Remove the 18 board mounting screws.
18. Remove all voltage crossover connectors, minibus connectors, and discrete components from pin side of board (label if required).
19. Remove board and guide assembly by sliding the assembly towards you.
20. Reverse procedure for board replacement.



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LSI Cards

1. Press Power Off on the operator control panel.

Note: Locate the Primary Control Compartment (PCC), and place CB1 in the OFF position before removing 01A-A1 cards.

2. Open left side cover of frame.

Warning: A module can be destroyed by touching the card contacts or module pins before discharging yourself to ground.

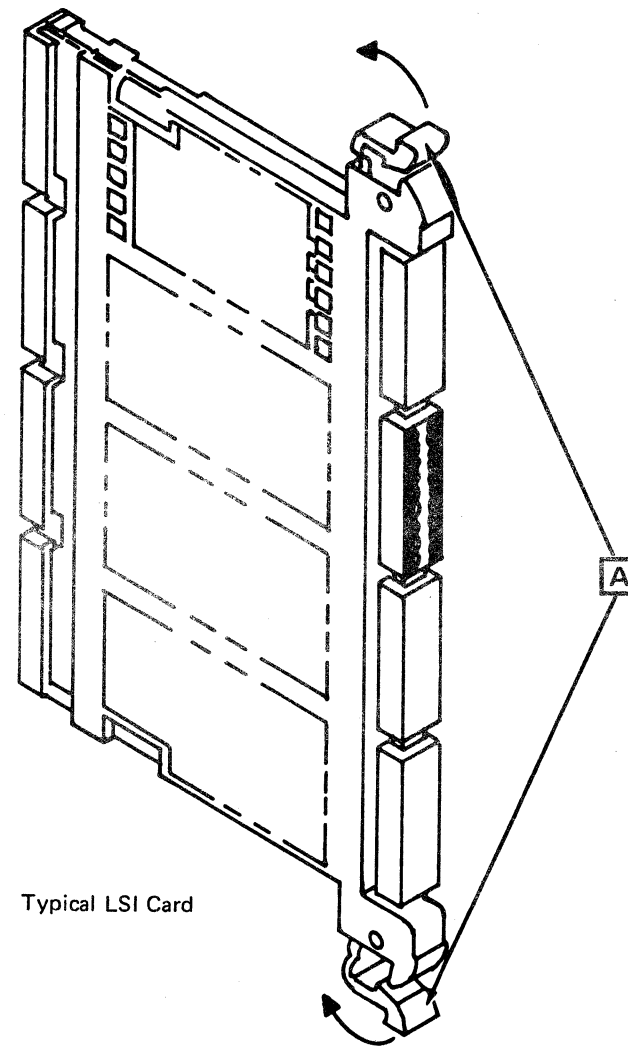
3. Remove board card cover.

4. Determine card to be removed.

5. To remove, unlock and rotate the extractor levers **A** at the same time until the card disengages.

6. To replace, open both extractor levers fully. Insert the card guide into the slotted guide grooves (card components to the right). Apply firm finger pressure to the card holder to ensure proper seating. After reseating, press firmly on the indicated surface of the extractor levers and rotate at the same time until latched.

7. Install card assembly and cover.



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Board 01A-B2

CAUTION

The board weighs about 36 kg (80 lb). Two persons are required to remove and install the board.

Tools Required:

Torque Tool for Cable Grouper (part 2360092)

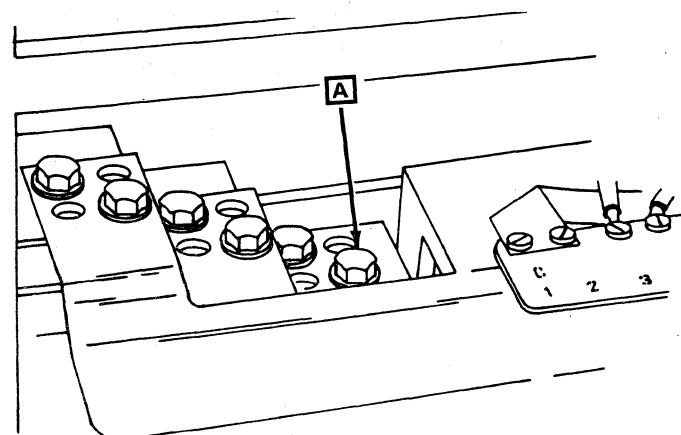
1/4 to 3/8 Drive Adapter (part 2337141)

Torque Tool for Commoning Bus (part 5665903)

ESD-Kit.

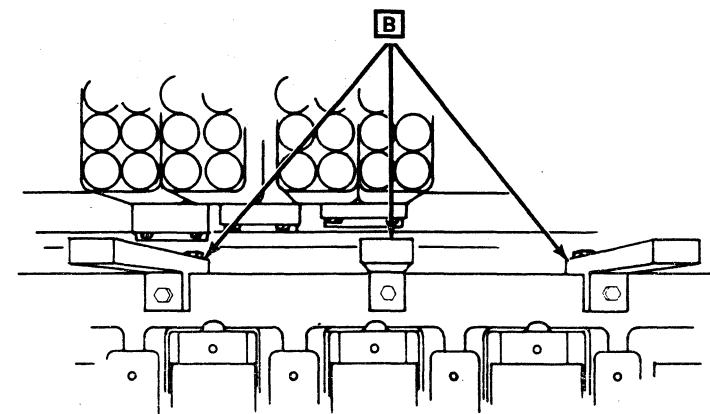
Removal

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear frame cover.
5. Loosen one screw, and open B2 plenum.
6. Remove all cable groupers starting with the bottom positions and work towards the top.
7. Open the new board shipping container.
8. Locate and remove the ESD jumper cables and the wrist band from the ESD Kit.



9. Connect the ESD jumper cable between the new board and the machine frame.
10. Remove the new board from the shipping container, and place it on the floor (handles down) near the processor.
11. Remove the module guard located at the bottom of the board assembly **C**, and install it on the the board that is to be removed.
12. Remove the upper bus safety shield.
13. Remove the 12 commoning bus screws at the board terminal blocks **A** left and right side.
14. Using a quarter-inch drive socket set, remove the six screws holding the commoning bus and distribution bus terminal block **B**.
15. Remove the terminal block; be careful not to drop the block.
16. Open front frame cover.

Note: There may only be three screws holding the terminal block on later versions of this board.

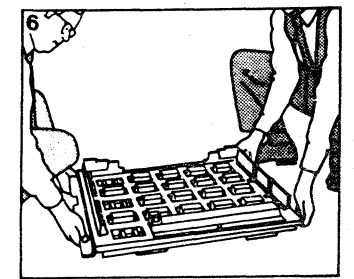
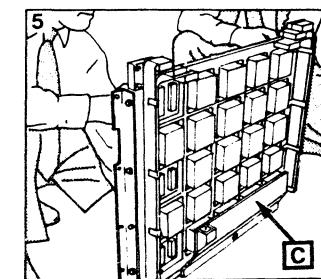
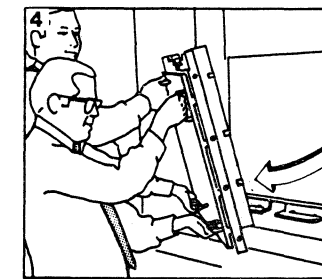
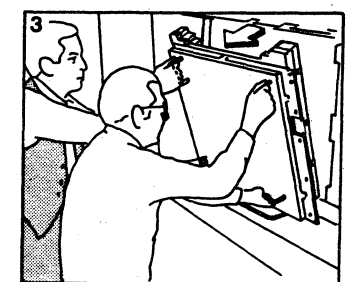
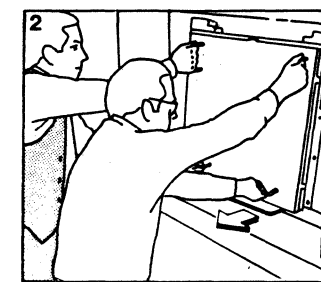
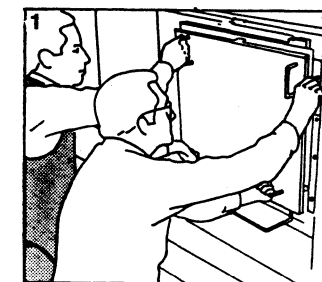


17. Open gate 01C.
18. Remove the three connectors (J1, J2, and J3) from PS106.
19. Remove the ground wire located at the top right corner of the board.
20. Remove the eight board mounting screws (captive screws), leaving the top two screws for last.
21. As the last two screws are removed, pull out the base of the board and set it on the lower support ledge of the frame.
22. Remove the board assembly by swinging the right side away from the frame first. Then remove the board assembly, and place it on the floor (handles down).
23. Attach the 15 foot ESD cable from the new board to the old board.

Note: Before removing the board, ensure that you have work space large enough for two boards.

24. Measure the resistance of the wrist band. If the resistance measured is less than 1 megohm or greater than 1.15 megohm, replace the wrist band.
25. Fasten the ESD wrist band to the wrist of the person who will be transferring the modules from the old board to the new board.
26. Transfer the modules at this time, and ensure that they are properly plugged.
27. Remove the ESD strap jumper, the 15 foot ESD cable, the ESD wrist band, and store them in their proper locations.
28. Remove the module guard from the old board assembly, and install it on the new board assembly.

Note: For the correct module removal procedure, see page REM 017.



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Replacement

1. To install the board, first lift and rest the board assembly on the lower support ledge in front of the opening with the bottom of the board assembly against the lip of the support ledge.
2. Slide the board assembly to the extreme left of the frame, aligning the board bus terminal block tabs with the commoning bus tabs.
3. With the board in this position, tilt the top of the board assembly inward against the frame, aligning the board bus terminal block tabs with the commoning bus tabs.
4. In a continuous motion, lift the board assembly against the commoning bus until the bottom of the board assembly clears the main support ledge. Position the bottom edge of the board assembly against the machine frame.
5. Install the eight board mounting screws, finger tight only.
6. Remove the module guard from the new board assembly, install them on the old board assembly, and pack it in the shipping container.
7. Install all cable groupers starting at the top of the board.
8. Install the 12 commoning bus screws. (Align board if necessary by shifting the board to the right or to the left to align the distribution bus to the commoning bus.)
9. Tighten the 12 screws. All screws must be torqued at SR 27 ±4 Newton meter (240 ±35 in. lbs).
10. Reattach the terminal block with six screws. Put in the surface screws first and then the top screws.
11. Install the bus and the board grounding straps.
12. Install the safety shield.
13. Close and tighten B2 plenum.
14. Close frame cover.
15. Go to wire side of board and torque the eight board mounting screws to SR 12 ±2 Newton meter (106 ±18 in. lbs).
16. Reinstall connectors J1, J2, and J3 into PS106.
17. Place CB1 and CB2 to the ON position. Press Power On/IML on the OCP.
18. Run the MSS diagnostics and PU diagnostics Option V test.

Note: There may only be three screws holding the terminal block on later versions of this board.

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64 MM Pluggable Module

Tools required:

Module Pin Aligner (part 2360424)

Module Pin Alignment Template (part 5665902)

ESD Kit.

1. Press Power Off on the operator control panel unless directed otherwise by a repair procedure.
2. Open left side cover of the machine.
3. Open rear cover of the machine.
4. Open B2 plenum by loosening one screw.

Warning: A module can be destroyed by touching the pins because of Electrostatic Discharge (ESD). Never touch the pins of a module unless you are wearing a wrist band.

5. Remove the wrist band and the ESD cable from the ESD kit.
6. Measure the resistance of the wrist band cable. If the resistance measured is less than 1 megohm or greater than 1.15 megohm, replace the wrist band.
7. Plug the wrist band and the ESD cable into the B2 plenum latch bracket.
8. Fasten the ESD wrist band to the wrist of the person who will be removing and replacing the modules.
9. If the new module is in a black plastic container, attach the ESD cable to the container.
10. Determine which pluggable module is to be removed.
11. Grasp the two bail-retaining latches **A** located near the top and on both sides of the module assembly.

12. Squeeze both latches toward each other, and hold them in that position while pulling the actuator bail **B** outward with your finger. The actuator bail is now in a free state (approximately 20 degrees play).

13. Apply additional downward force on the bail actuator to drive the module free of the spring connectors.

Note: The module must be held in this position until it is removed.

14. Carefully, remove the module clear of the module site, and immediately place it into its protective container.

15. Ensure that the new module pins are in alignment by using the Module Pin Alignment Template (part 5665902).

Note: Do not attempt to straighten any module pin that is bent more than the distance to the next row, or equivalent. Doing this may cause the pin to break off during module insertion. Pins bent less than this distance may be straightened using the pin aligner (part 2360424).

16. Carefully, place module in position, and hold in position until next step.

17. While holding module in position, slowly but steadily push the bail actuator in until it hits the stop.

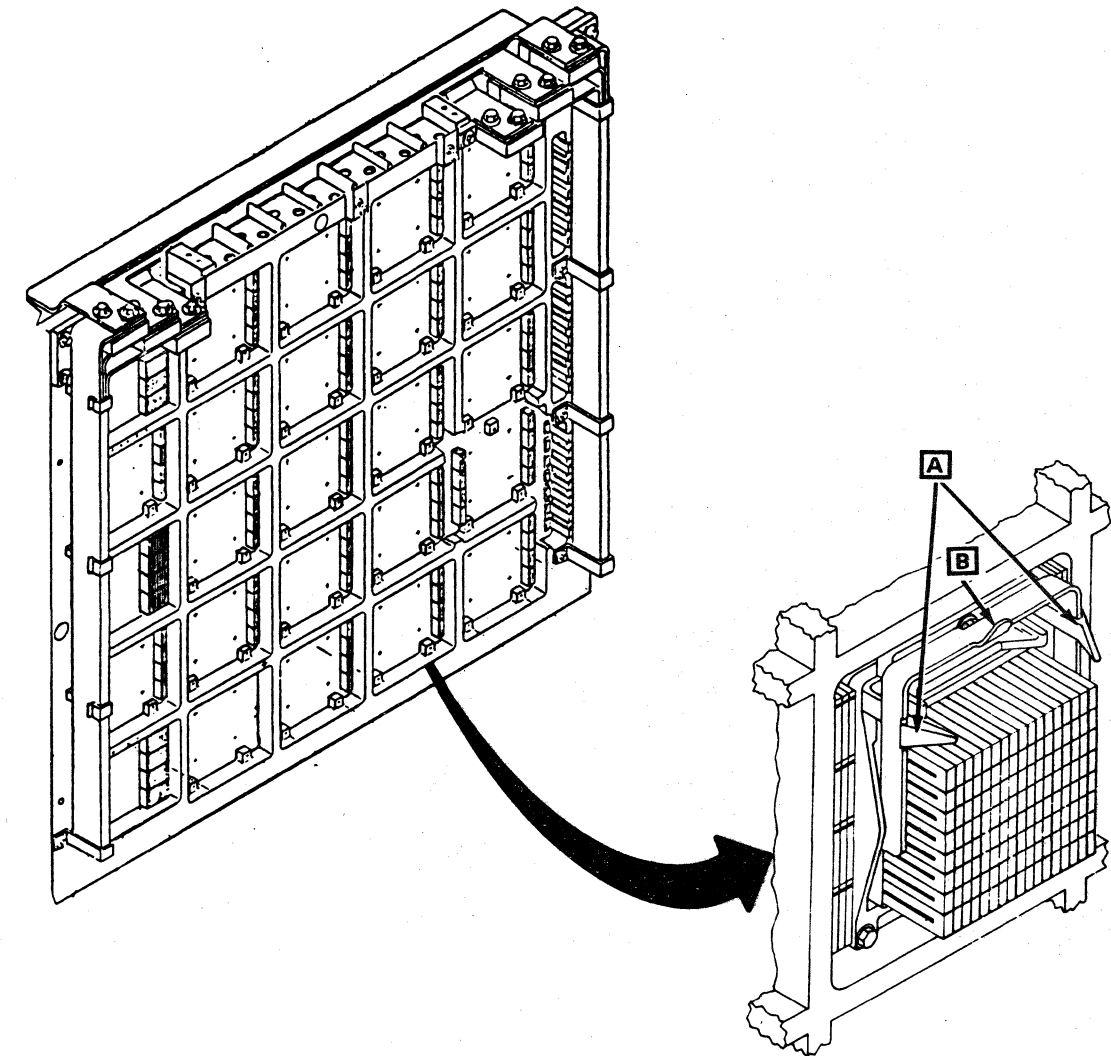
18. The two bail-retaining latches, located near the top and on both sides of the module assembly, should be in a latched position and holding the bail actuator.

19. To ensure the module is properly seated, squeeze the two bail-retaining latches **A** toward each other and pull the bail actuator **B** with your finger until the bail actuator is in a free state.

20. Grasp the module and try to move it. If the module is securely in place, reactivate the bail actuator. If the module is loose, go back to step 12.

21. Close the B2 plenum, and tighten the screw.

22. Remove the wrist band and ESD cable and store them in the ESD kit.



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Pluggable Terminator Resistor

Tool Required:

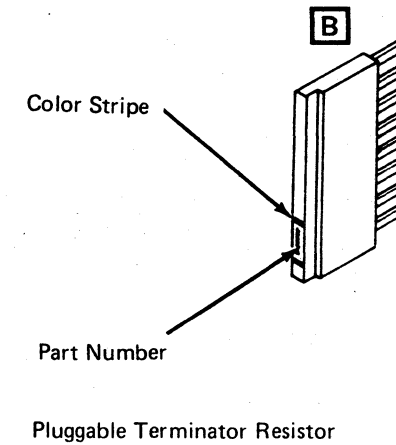
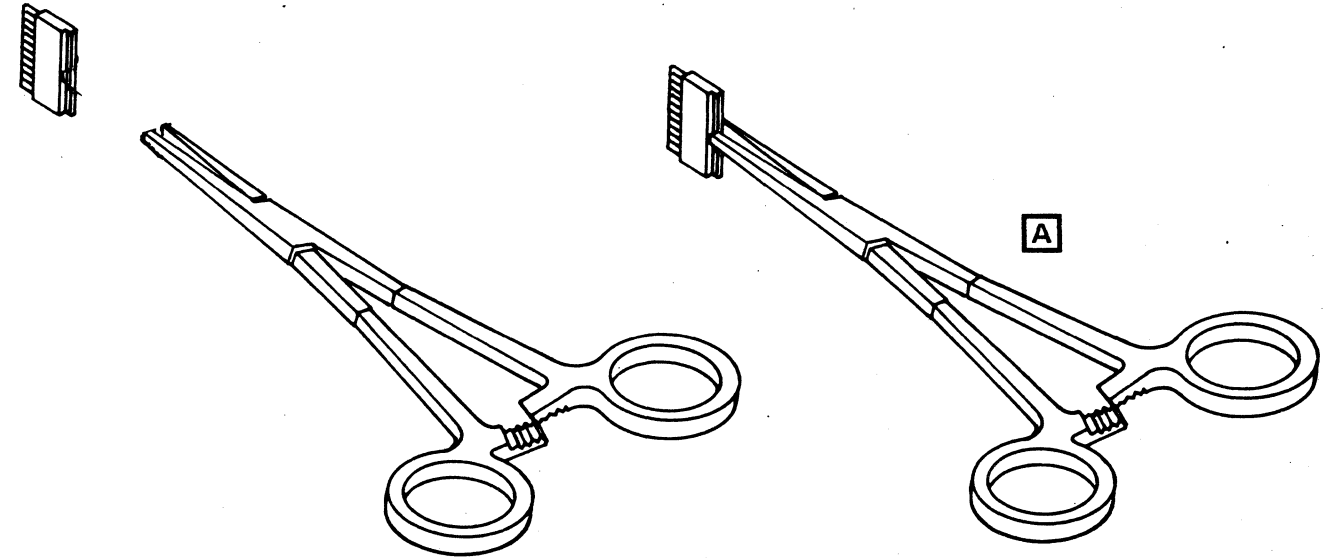
Scissor Clamp (part 9900233).

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Open rear frame cover.
4. Loosen one screw, and open B2 plenum.
5. Remove retention cover(s) from terminator resistor section.
6. Place scissor clamp (part 9900233) in center of terminator resistor (TR) and pull straight out **A**.

Warning: The spring housing is not fastened to the board. To prevent the spring housing from falling off the board, do not remove more than one row of TRs at a time.

7. Reverse procedure for terminator resistor replacement.

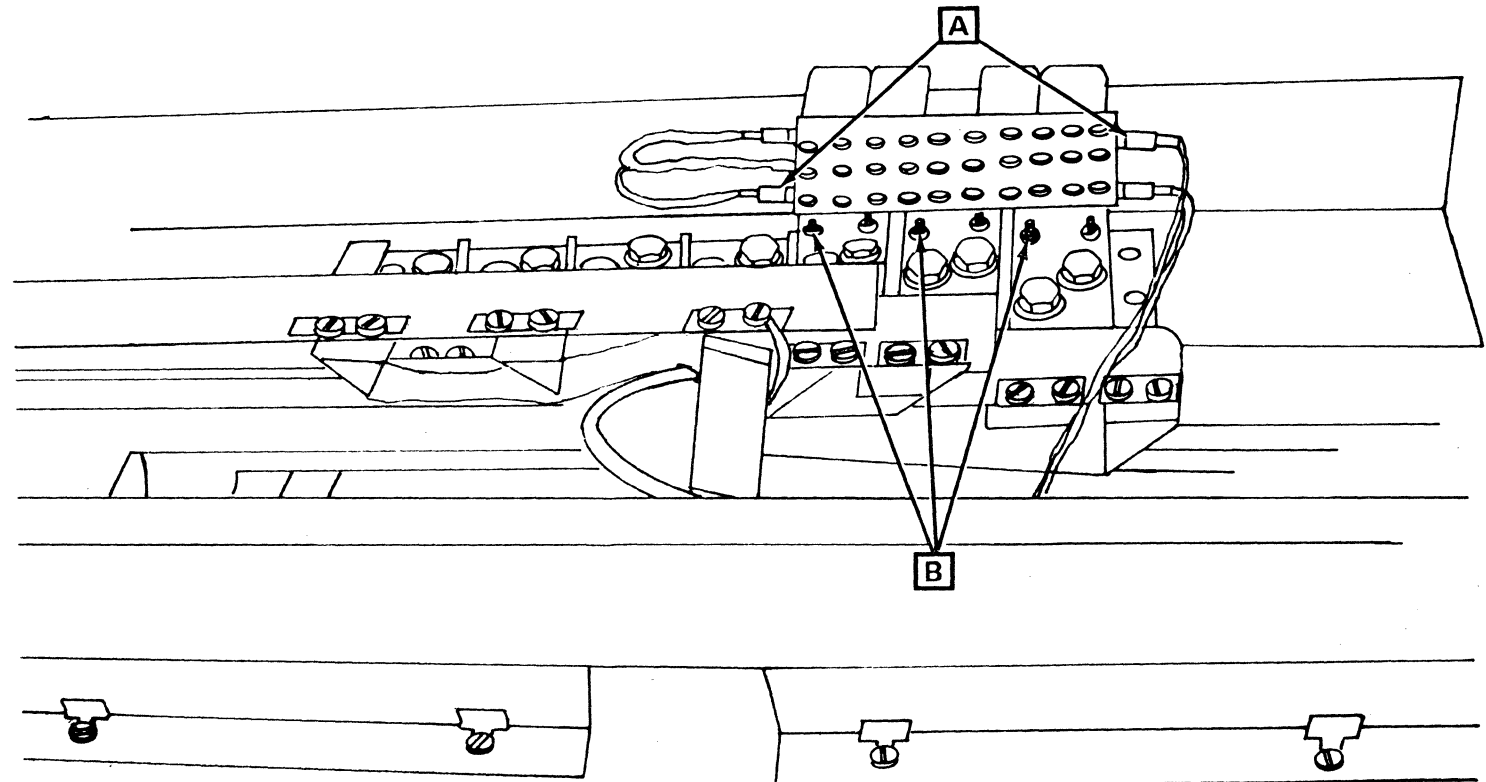
Note: When replacing TRs, ensure that the replacement resistor has the same colored part number as the resistor that was removed. The two resistors that can be used are (part 4481673) black in color and (part 4481674) red in color shown at **B**.



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Decoupling Capacitor (C-PAC)

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame.
5. Open B2 plenum by loosening one screw.
6. Locate bus bars on top of board B2.
7. Unplug four wires **A** that are fasten to the C-PAC assembly.
8. Remove the six screws and washers **B** that fasten the C-PAC assembly to bus bars A, B, and C.
9. Remove C-PAC assembly.
10. Reverse procedure for C-PAC replacement.



I/O Signal and Flat Cables

I/O Signal Cables

Tools Required:

Torque Tool for Cable Grouper (part 2360092)

Cable Unlatch Tool (part 2360349)

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear frame cover.
5. Open B2 plenum by loosening one screw.
6. Determine which cable grouper assembly is to be removed.
7. Remove grouper assembly.
8. Determine which 18-PAC is defective.
9. Orient the grouper housing so that one end of the housing is facing towards you.
10. Grasp cable unlatch tool (part 2360349), and position it so that the narrow end of the tool is parallel to the slot openings as shown at **A**.
11. The front end of the tool has a recessed ledge that seats against the slot ribs.

Note: With the 18-PAC cable positioned for either end, rotate the tool 180 degrees so that the recessed ledge of the tool is away from the side wall of the housing and the straight side of the tool is against the side wall.

12. Place the tip of the tool on top of the latch arm protruding out of the housing.

Warning: To prevent damage to the slot ribs, do not use excessive force when moving the latch arm.

13. Holding the tool with the tip resting on top of the latch arm, push the tool straight in until the recessed ledge of the tool comes in contact with the slot rib as shown at **B**.

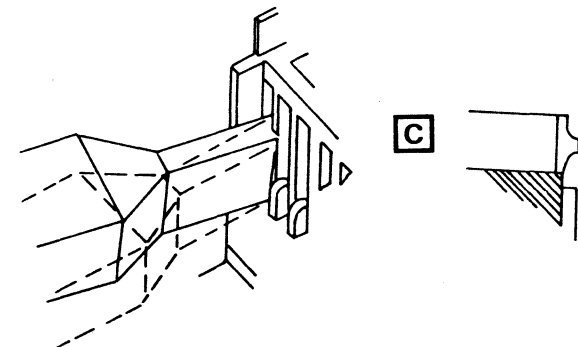
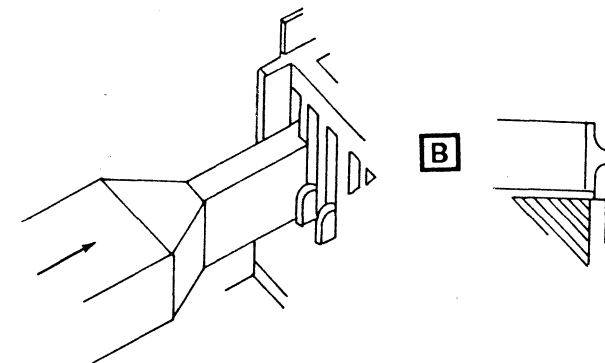
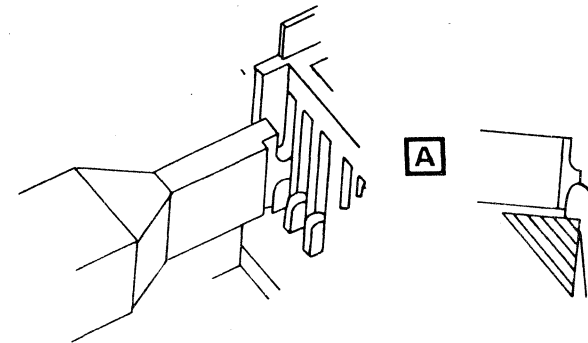
14. While holding the tool in this position, press the working end of the tool down slowly moving the latch arm down below the latching shelf surface as shown at **C**.

15. Repeat this same procedure for the other end of the 18-PAC cable.

16. Grasp all the trilead cables attached to the 18-PAC to be removed, and gently pull on the cables to remove the 18-PAC.

Note: Do not unlatch and remove more than one 18-PAC cable assembly at a time.

17. Remove enough cable retainers to permit tracing with fingers of cables into the cable channel.
18. Ensure that you have the correct cables connected to the affected circuit cards. Use cutting pliers to cut the cables in the channel at both ends.
19. Place replacement cable on top of pile in cable raceway, and replace cable retainers.
20. Reconnect both ends of replacement cable into grouper.



Flat Cables

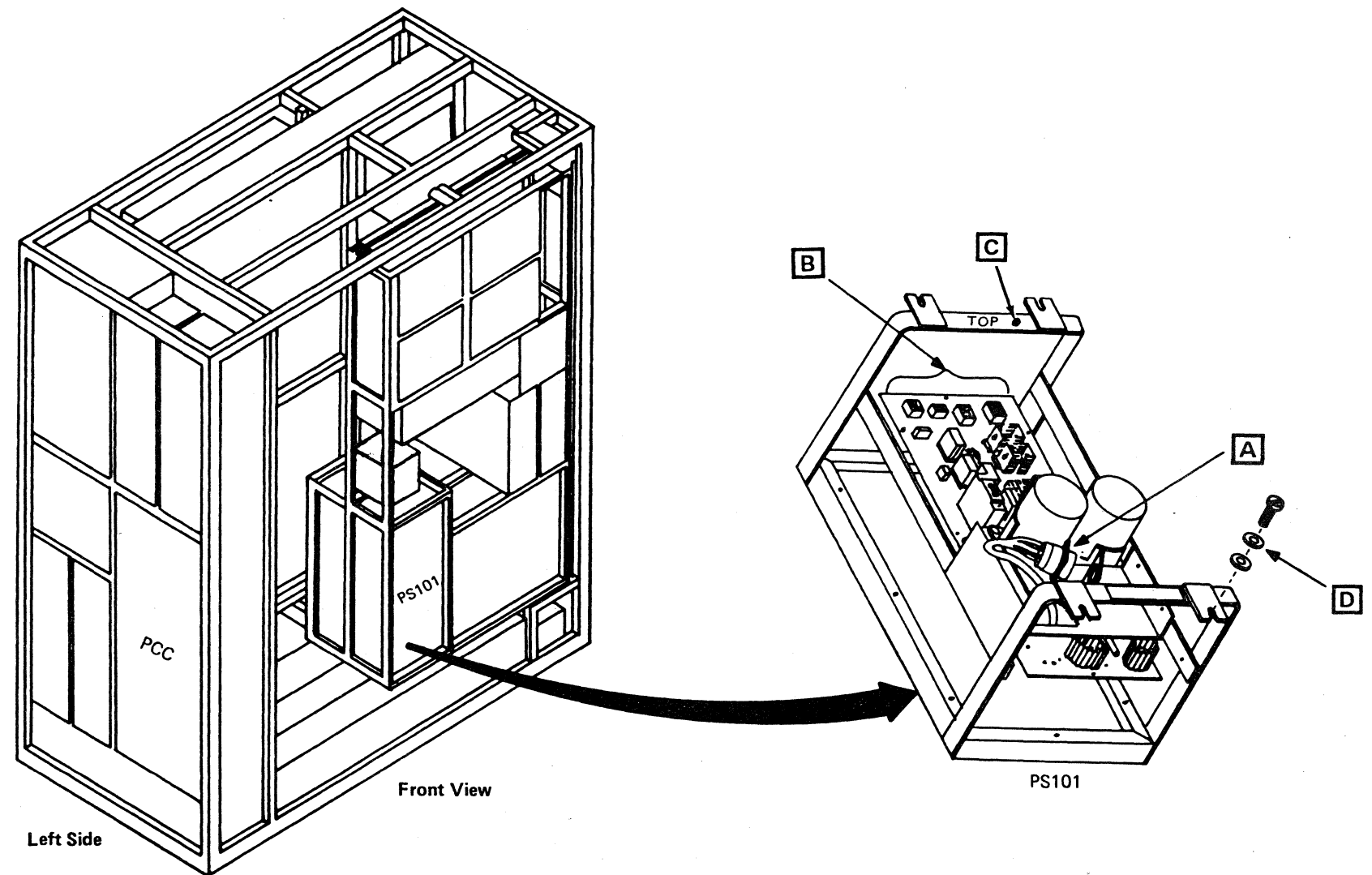
Tool required if boards 01AA1 through 01AA4 are affected:

Actuation Tool (part 4134750)

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Determine which cable assembly is to be removed.
5. Remove enough cable retainers to permit tracing with fingers of cables into the cable channel.
6. Ensure that you have the correct cables connected to the affected circuit cards. Use cutting pliers to cut the cables in the channel at both ends.
7. Place replacement cable on top of pile in cable raceway, and replace cable retainers.
8. Reconnect both ends of replacement cable into position.

Power Supply 101

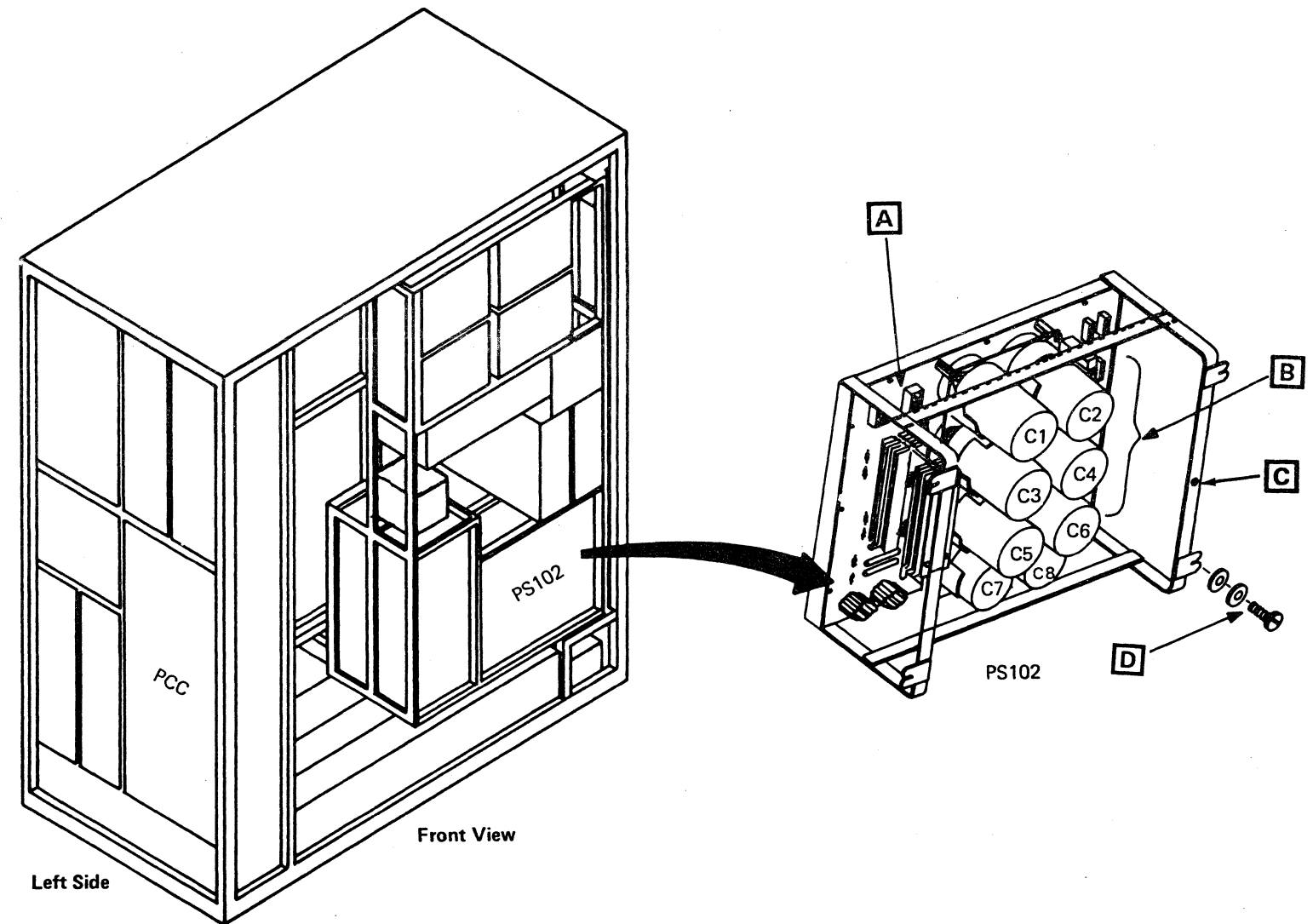
1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover, and locate PS101.
5. Remove the front safety shield.
6. Disconnect P07 **A**.
7. Disconnect cables at **B**.
8. Disconnect ground wire **C**.
9. Remove the four mounting screws, washers, and lock washers **D**.
10. Carefully pull PS101 from frame.
11. Reverse procedure for PS101 replacement.



Seq GC030	PN 0446169 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Power Supply 102

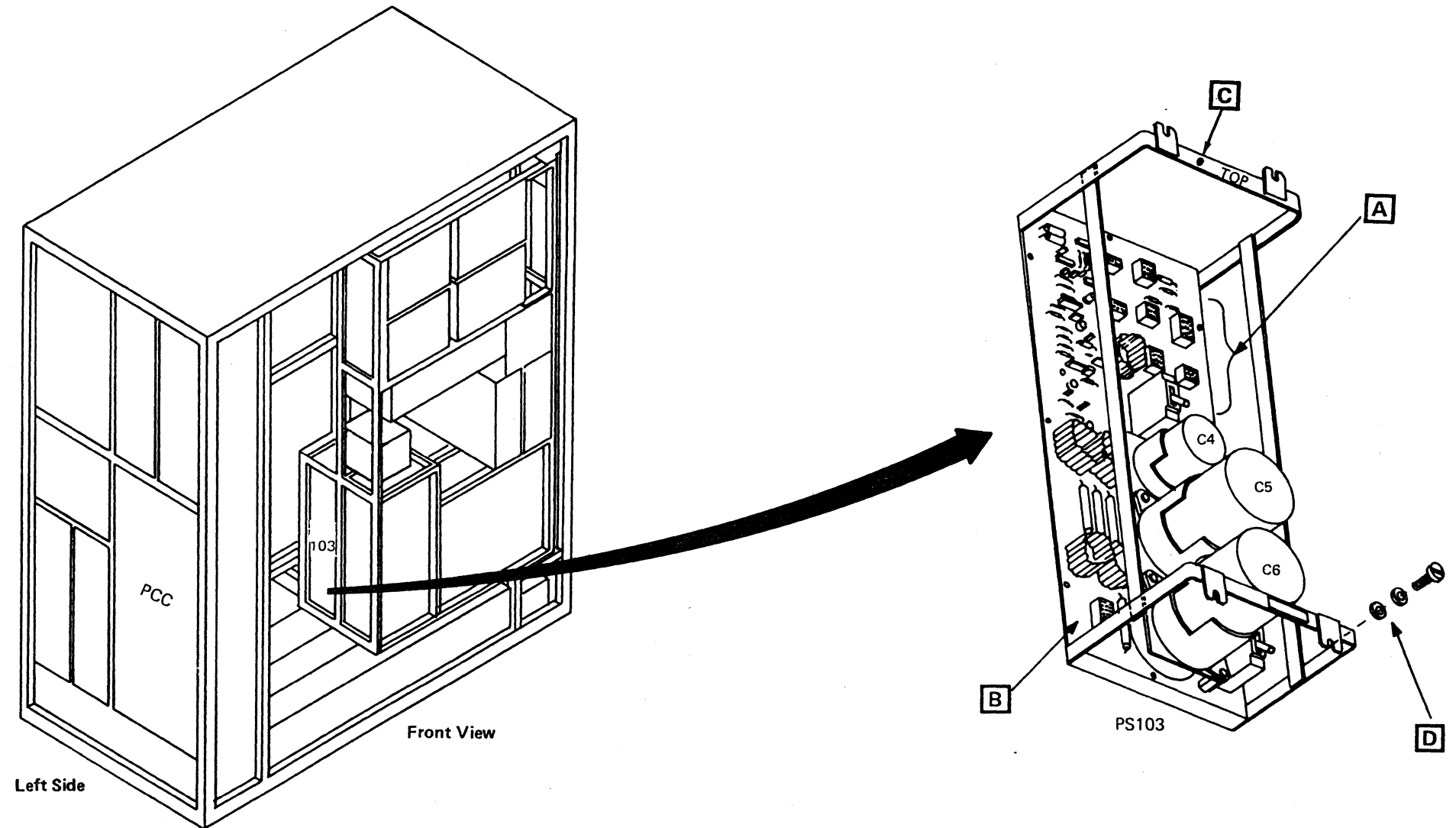
1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover, and locate PS102.
5. Disconnect cables at **A** and **B**.
6. Disconnect ground wire **C**.
7. Remove the four mounting screws, washers, and lock washers **D**.
8. Carefully pull PS102 from frame.
9. Reverse procedure for PS102 replacement.



Seq GC030	PN 0446169 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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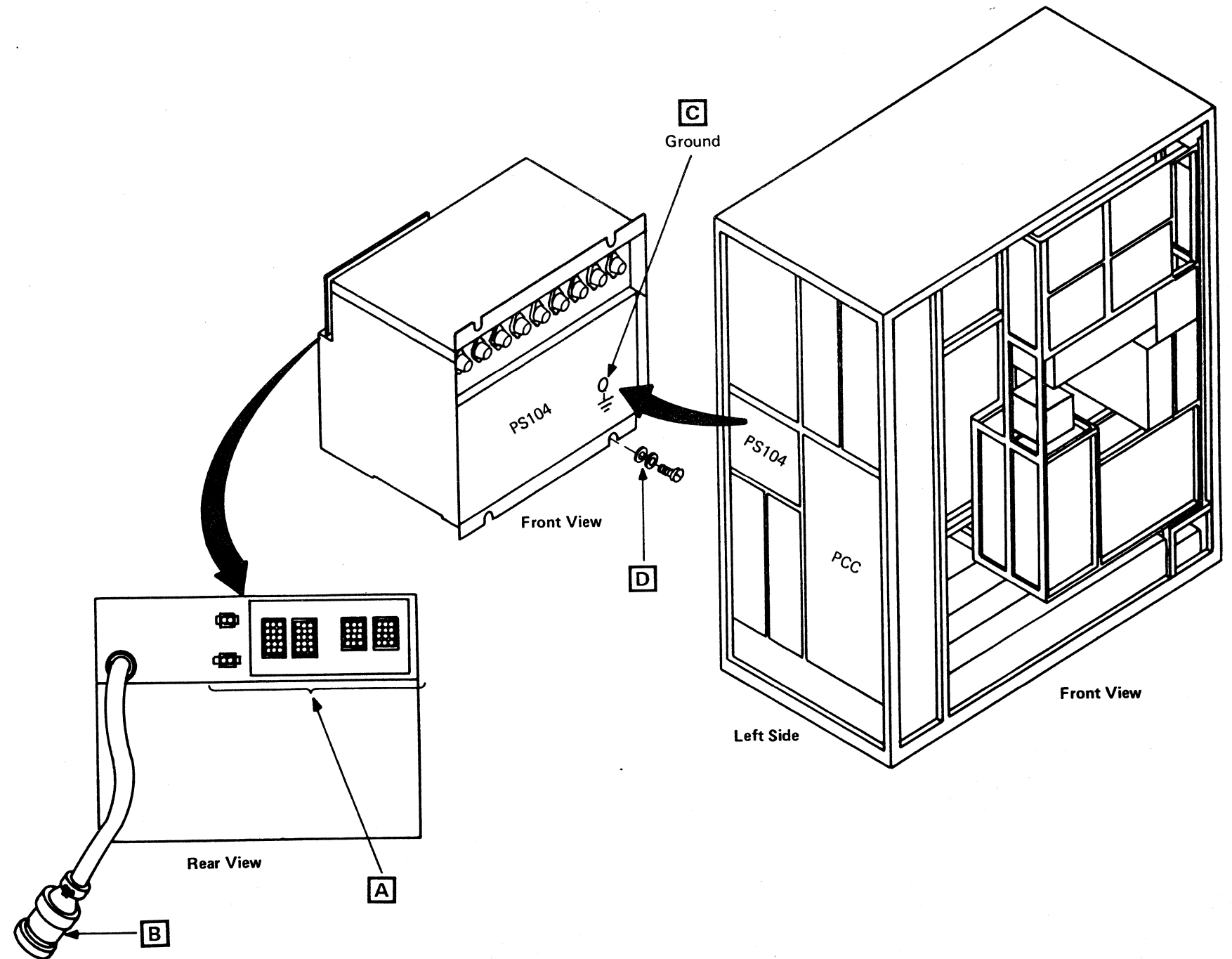
Power Supply 103

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame.
5. Open gate 01C, and locate PS103 on rear of gate.
6. Disconnect cables at **A**.
7. Disconnect cable P10 **B**.
8. Disconnect ground wire **C**.
9. Remove the four mounting screws, washers, and lock washers **D**.
10. Carefully pull PS103 from frame.
11. Reverse procedure for PS103 replacement.



Power Supply 104

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame, and locate rear of PS104.
5. Disconnect cables at **A**.
6. Disconnect cable J14 **B** at the rear of PCC box.
7. Locate front of PS104 on left side of frame.
8. Disconnect ground wire **C**.
9. Remove the four mounting screws, washers, and lock washers **D**.
10. Carefully pull PS104 from frame.
11. Reverse procedure for PS104 replacement.



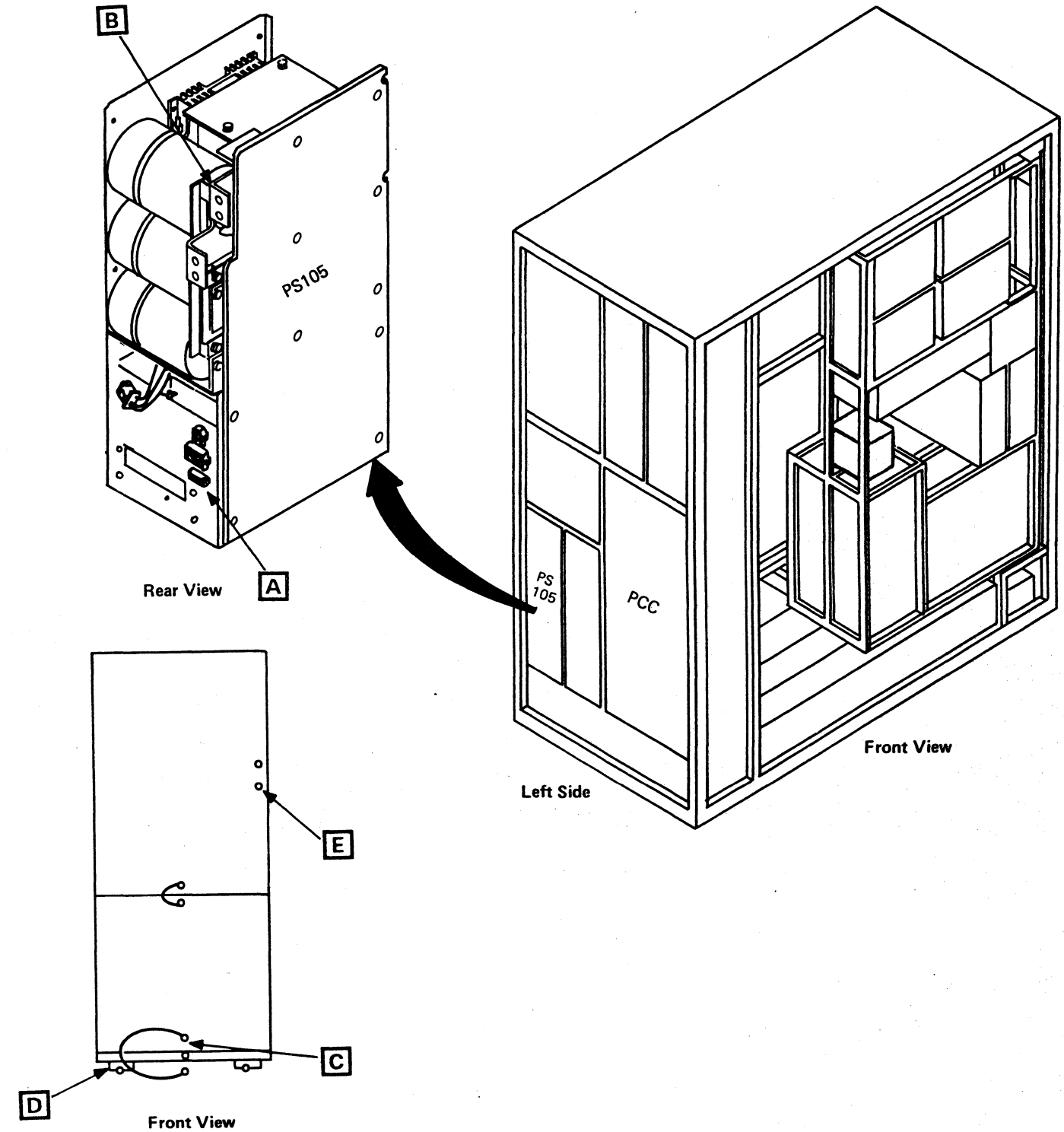
Power Supply 105

Tools Required:

1/4 to 3/8 Drive Adapter (part 2337141)

Torque Tool for Commoning Bus (part 5665903).

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame.
5. Open B2 plenum to gain access to the rear of PS105.
6. Remove plastic safety shield.
7. Disconnect cables at **A**.
8. Remove two voltage bus bars secured at **B**.
9. Locate front of PS105 on left side of frame.
10. Remove ground wire **C**.
11. Remove the two mounting screws, washers, and lock washers **D**.
12. Remove screw, lock washer, and nut **E**.
13. Carefully pull PS105 from frame.
14. Reverse procedure for PS105 replacement.
15. Torque the voltage bus bar screws shown at **B** to 27 ± 4 Newton meter (240 ± 35 in. lbs), using the torque wrench (part 5665903) and the 1/4 to 3/8 adapter (part 2337141).
16. For the correct current settings, refer to Volume A03, "Current Settings" on page PR 1024.5.



Seq GC040	PN 0446171 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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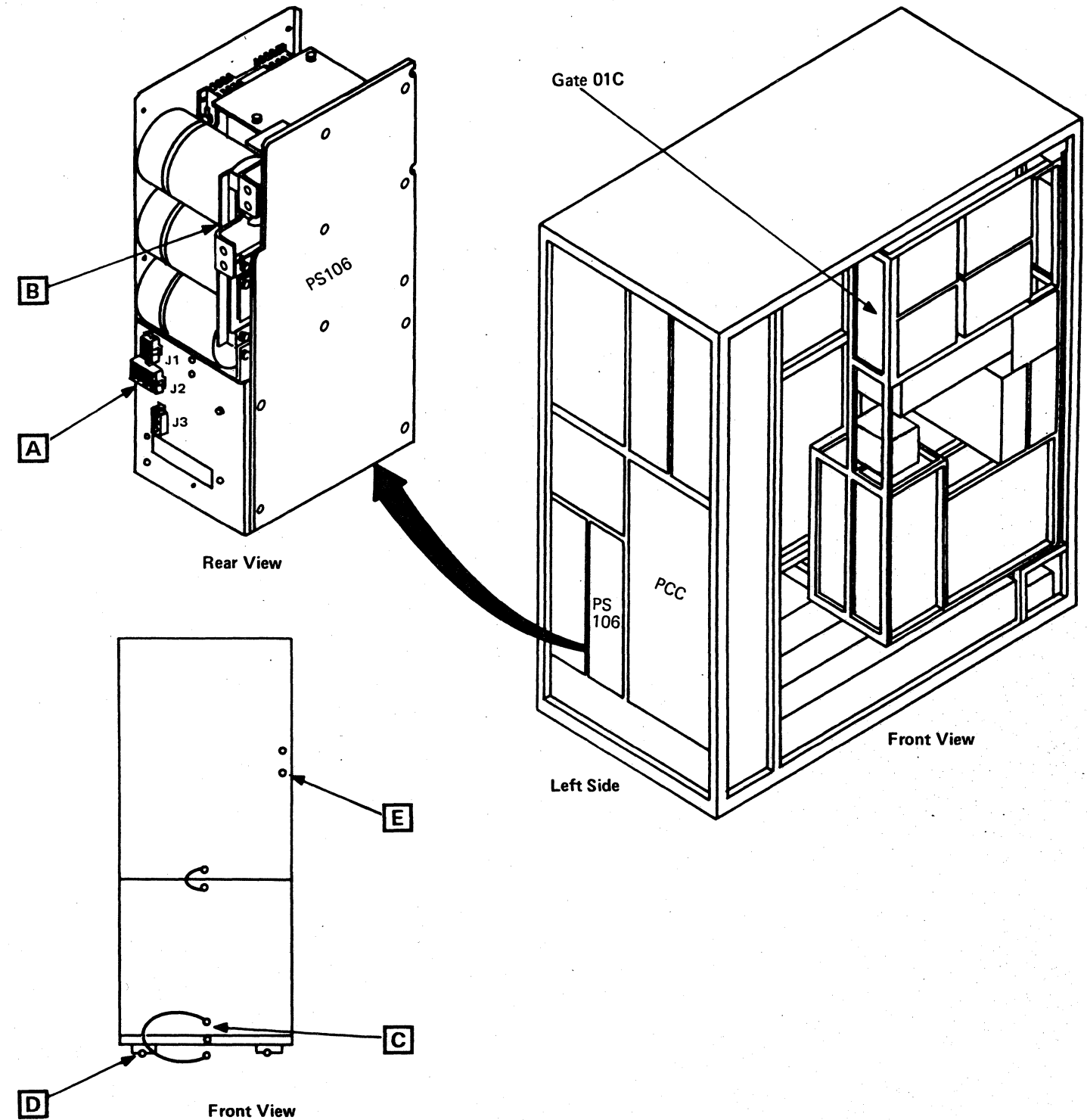
Power Supply 106

Tools Required:

1/4 to 3/8 Drive Adapter (part 2337141)

Torque Tool for Commoning Bus (part 5665903).

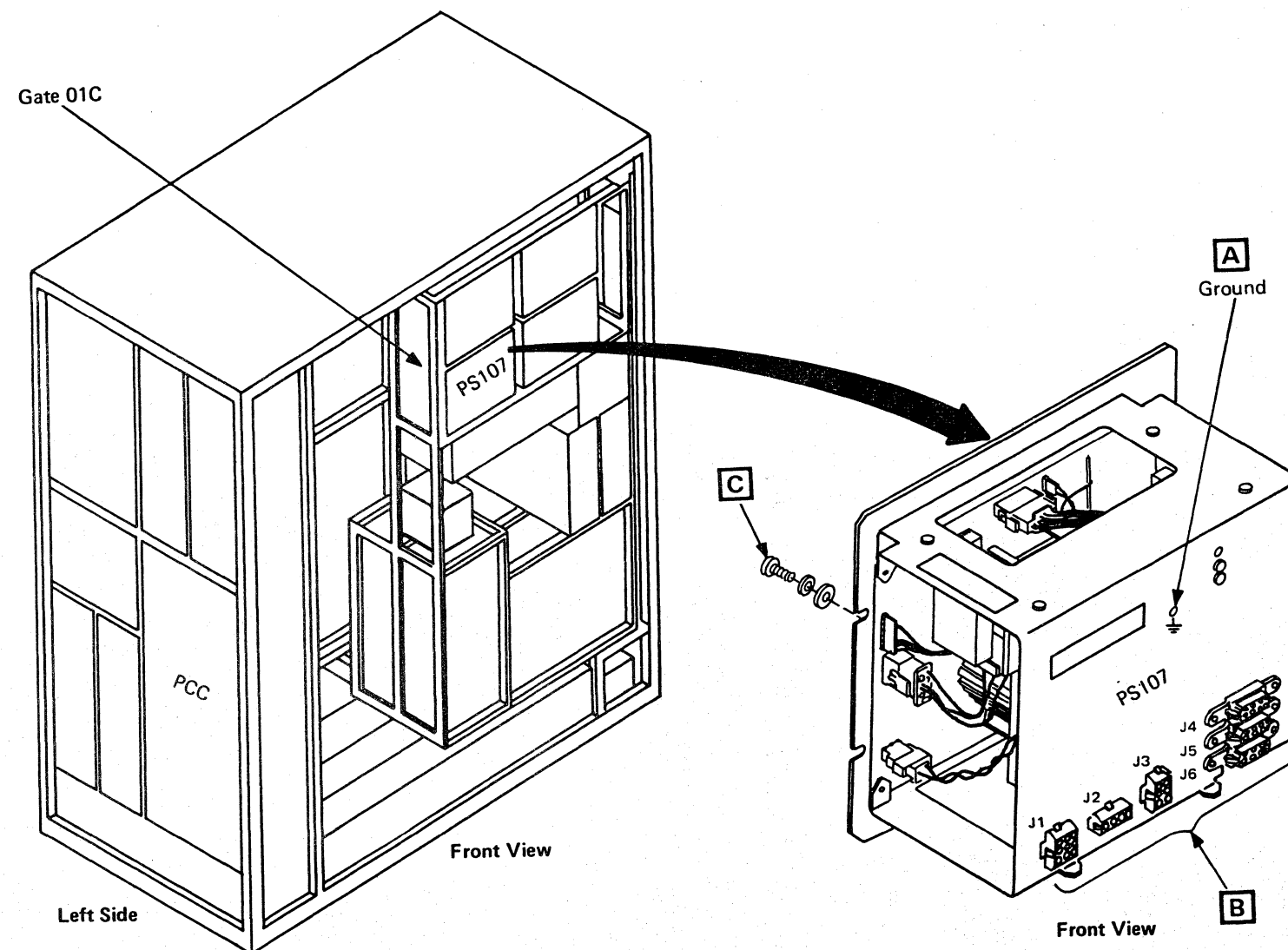
1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover.
5. Open gate 01C, and locate rear of PS106.
6. Remove cables at **A**.
7. Open rear cover of frame.
8. Open B2 plenum to gain access to the rear of PS106.
9. Remove two voltage bus bars secured at **B**.
10. Locate front of PS106 on left side of frame.
11. Remove ground wire **C**.
12. Remove the two mounting screws, washers, and lock washers **D**.
13. Remove screw, lock washer, and nut **E**.
14. Carefully pull PS106 from frame.
15. Reverse procedure for PS106 replacement.
16. Torque the voltage bus bar screws shown at **B** to 27 ±4 Newton meter (240 ±35 in. lbs), using the torque wrench (part 5665903) and the 1/4 to 3/8 adapter (part 2337141).
17. For the correct current settings, refer to Volume A03, "Current Settings" on page PR 1024.5.



Seq GC040	PN 0446171 Pg 2 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84		
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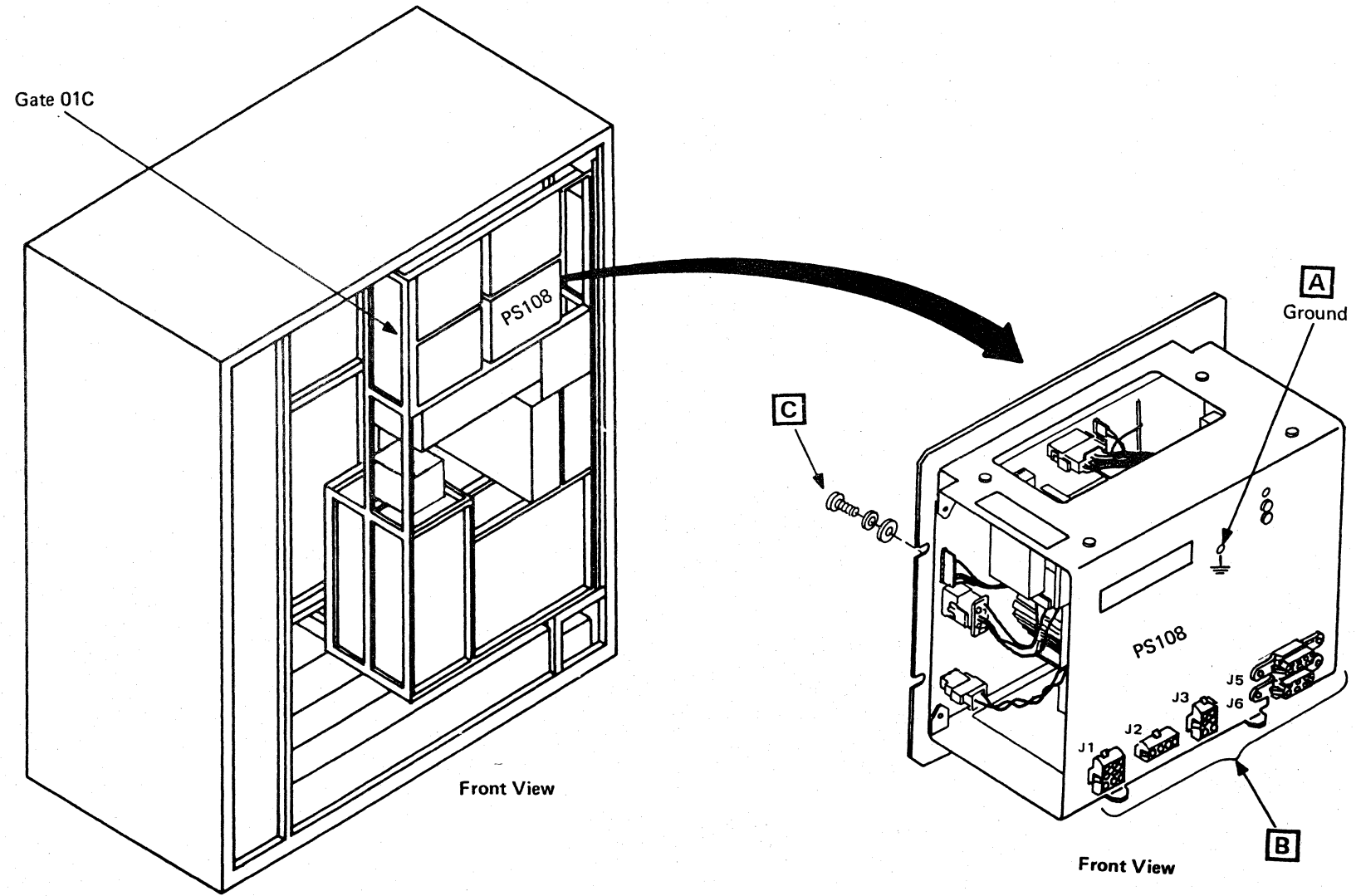
Power Supply 107

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame, and locate the front of PS107.
5. Disconnect ground wire **A**.
6. Disconnect cables at **B**.
7. Open gate 01C, and locate rear of PS107.
8. Remove the four mounting screws, washers, and lock washers **C**.
9. Carefully pull PS107 from frame.
10. Reverse procedure for PS107 replacement.



Power Supply 108

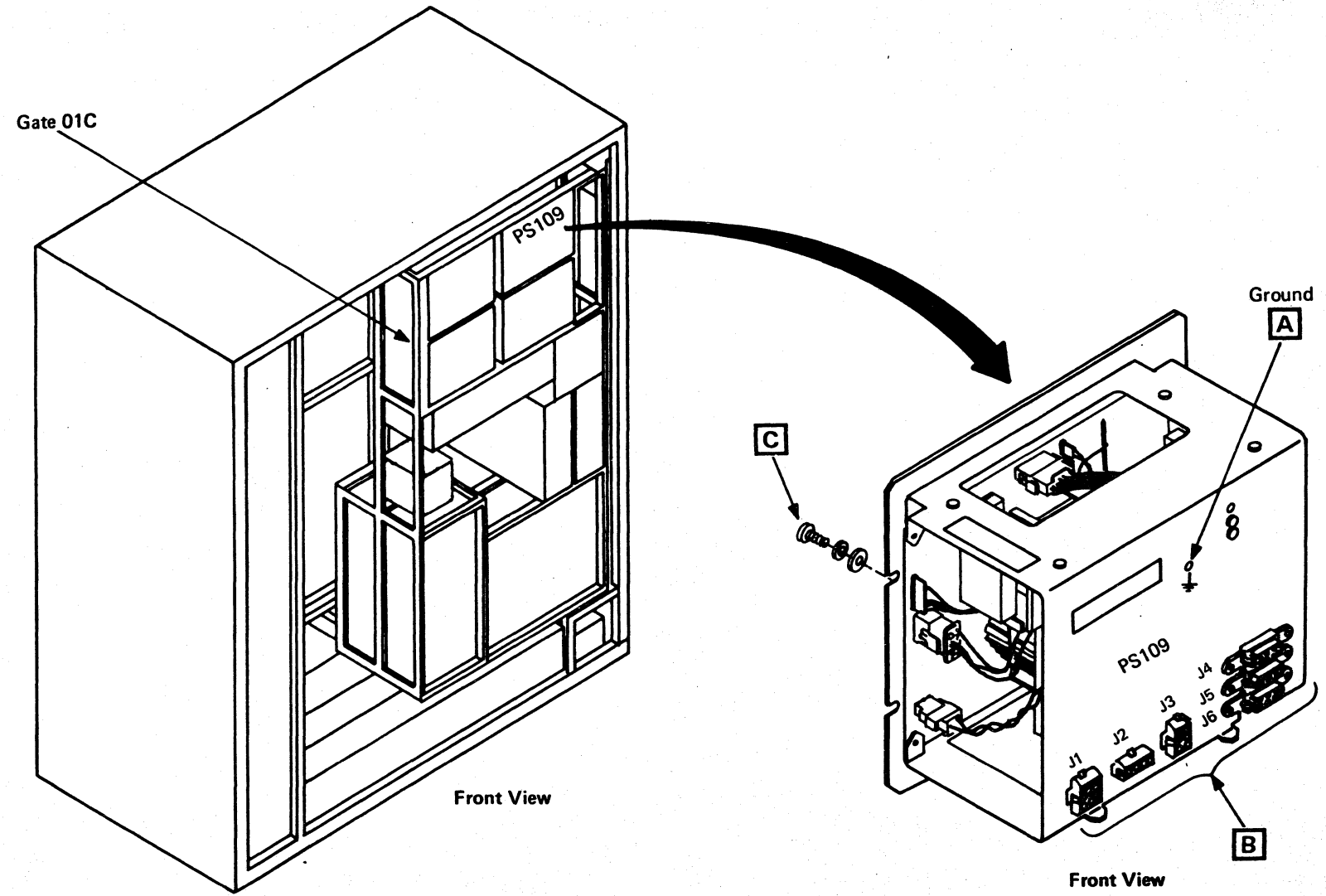
1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame, and locate front of PS108.
5. Disconnect ground wire **A**.
6. Disconnect cables at **B**.
7. Open gate 01C, and locate rear of PS108.
8. Remove the four mounting screws, washers, and lock washers **C**.
9. Carefully pull PS108 from frame.
10. Reverse procedure for PS108 replacement.



Seq GC045	PN 0446172 Pg 2 of 2	EC A02214 15 SEP 83				
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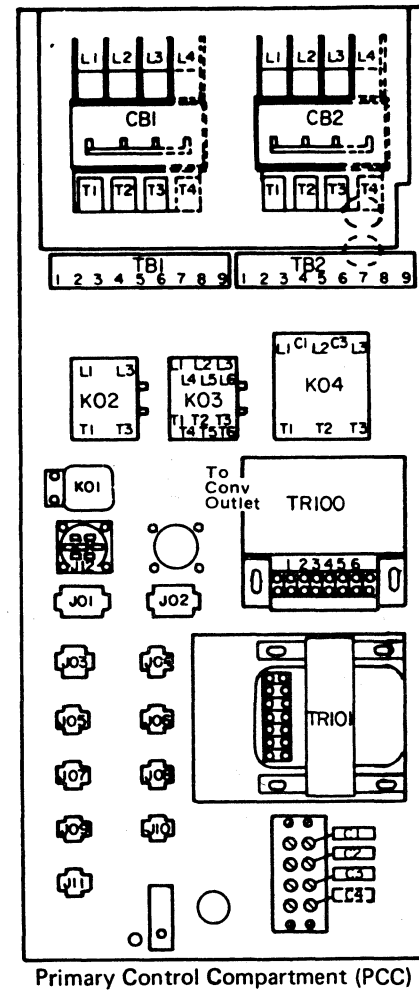
Power Supply 109

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame, and locate front of PS109.
5. Disconnect ground wire **A**.
6. Disconnect cables at **B**.
7. Open gate 01C, and locate rear of PS109.
8. Remove the four mounting screws, washers, and lock washers **C**.
9. Carefully pull PS109 from frame.
10. Reverse procedure for PS109 replacement.

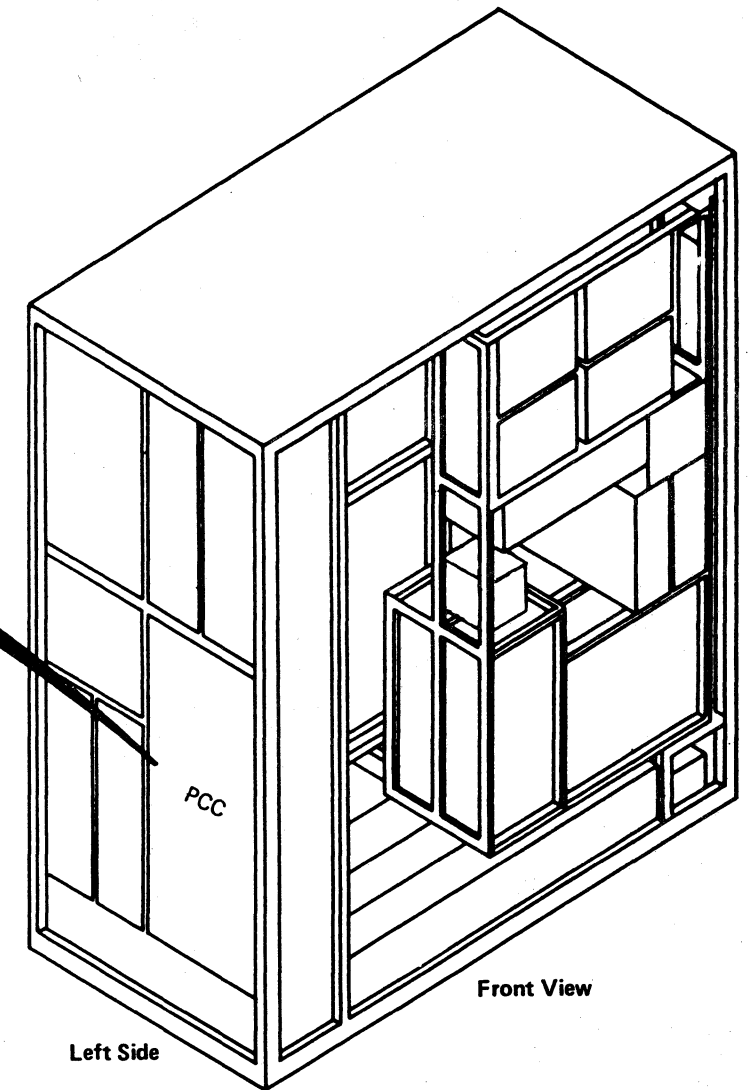
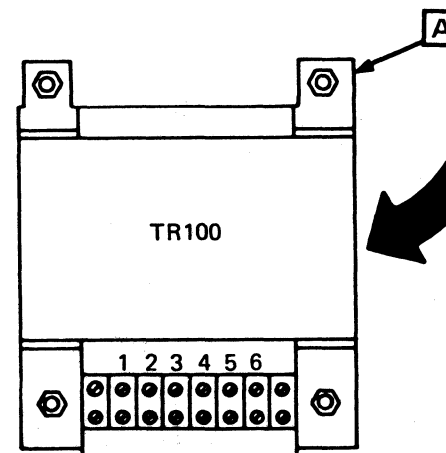


Transformer 100

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open PCC door, and locate TR100.
5. Remove ground wire.
6. Remove input wires on TB1.
7. Remove four mounting nuts **A**.
8. Carefully pull TR100 from frame.
9. Reverse procedure for TR100 replacement.



Primary Control Compartment (PCC)



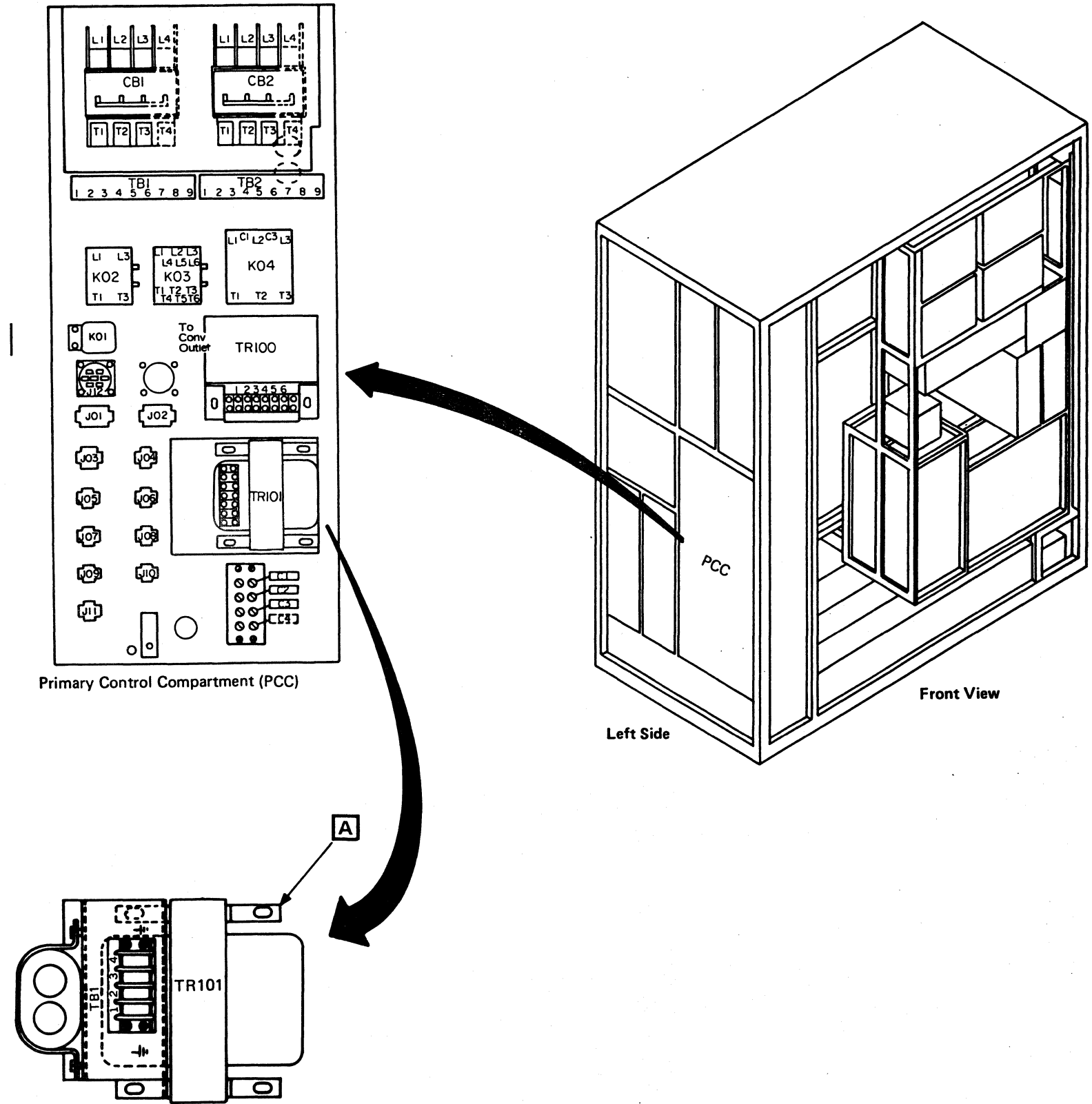
Left Side

Front View

Seq GC055	PN 0446174 Pg 1 of 2	EC A02214 15 SEP 83	EC A02219 29 FEB 84			
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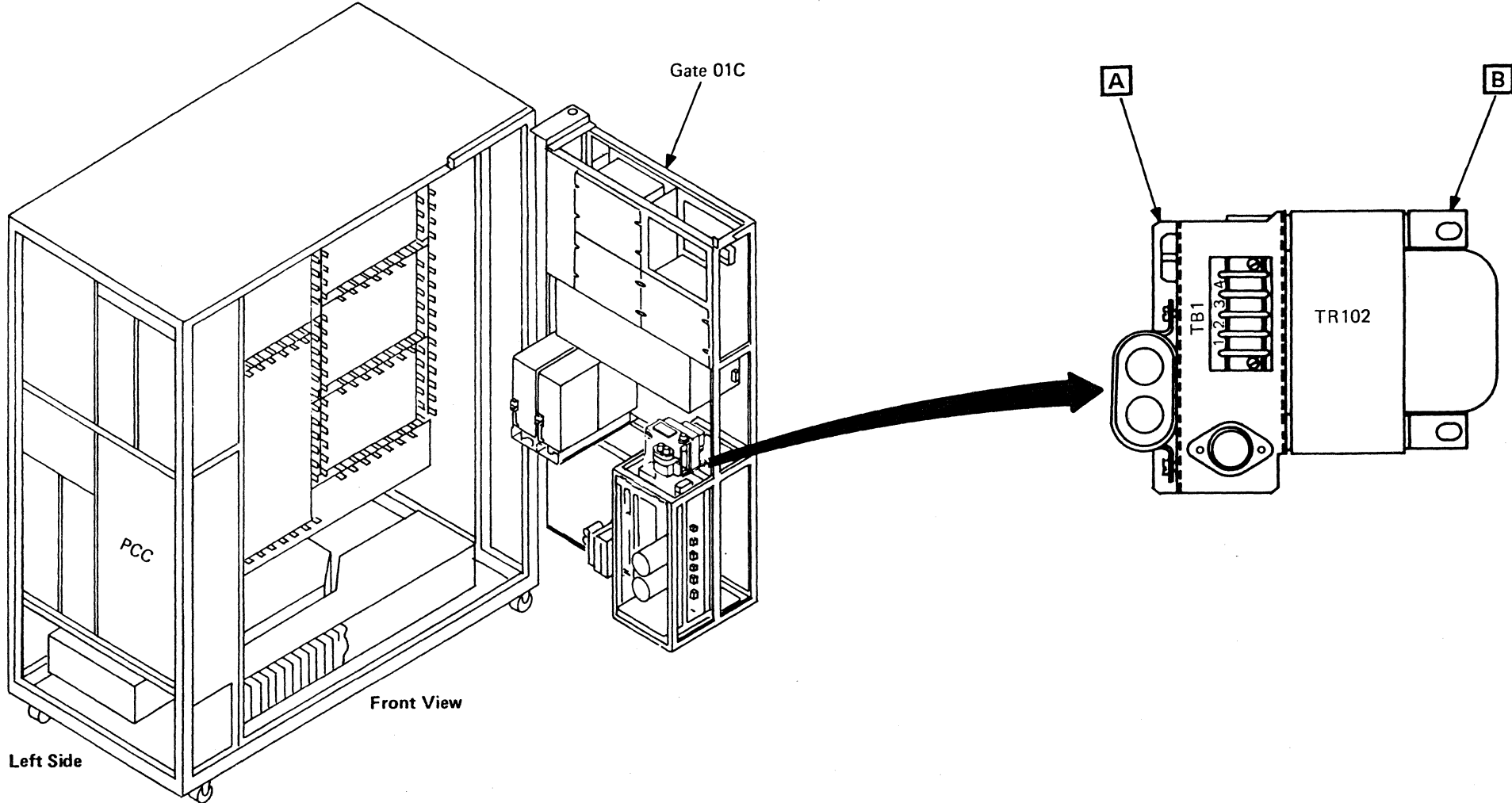
Transformer 101

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open PCC door, and locate TR101.
5. Remove ground wire.
6. Remove input wires on TB1 .
7. Disconnect plug J02.
8. Remove the four mounting nuts **A** .
9. Carefully pull TR101 from frame.
10. Reverse procedure for TR101 replacement.



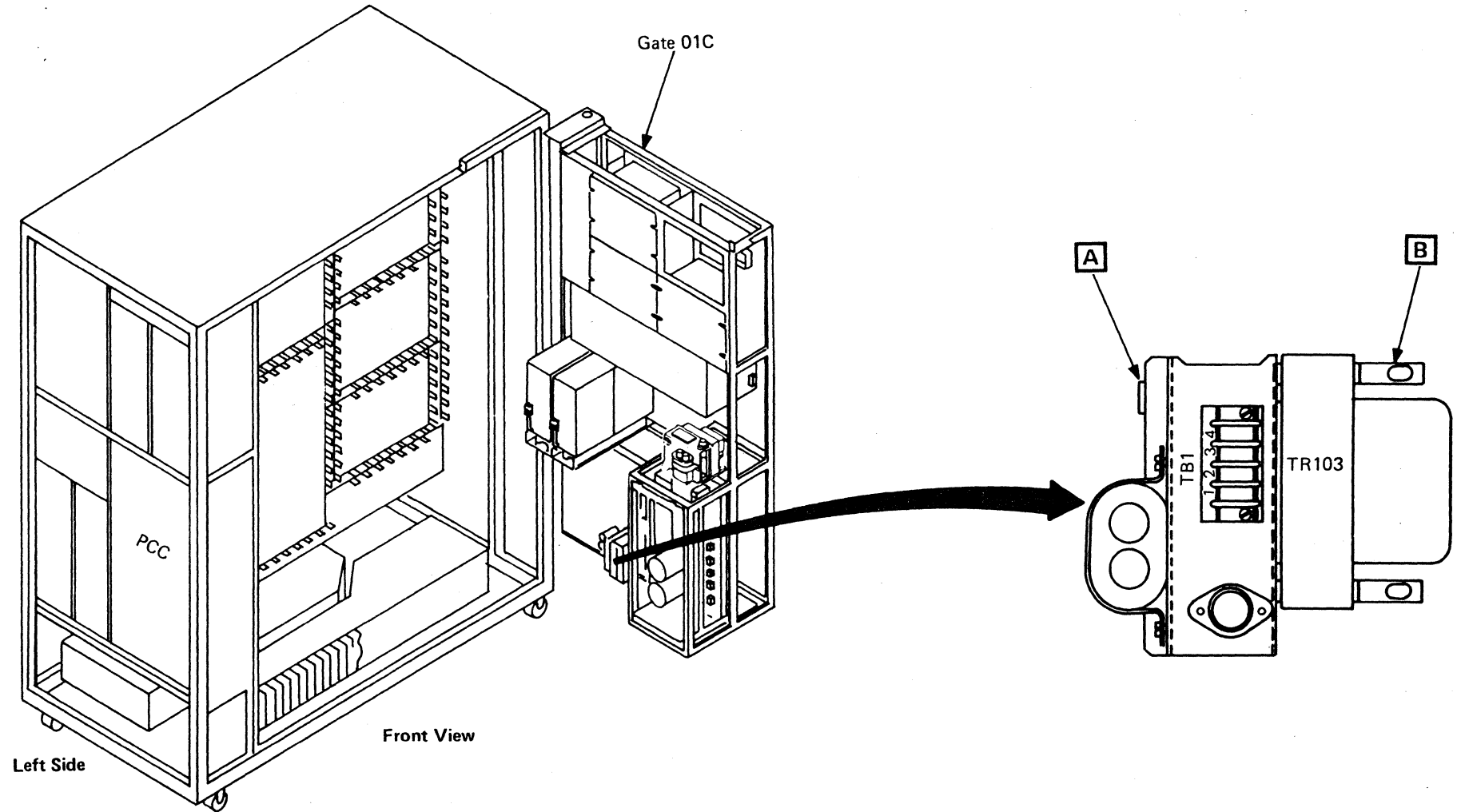
Transformer 102

- 1. Press Power Off on the operator control panel.
- 2. Open left side cover of frame.
- 3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
- 4. Open front cover of frame.
- 5. Open gate 01C, and locate TR102 on rear of gate.
- 6. Disconnect P01 **A**.
- 7. Disconnect cables P01 and P02 at J01 and J02 of PS102.
- 8. Remove the four mounting nuts **B**.
- 9. Carefully pull TR102 from frame.
- 10. Reverse procedure for TR102 replacement.



Transformer 103

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame.
5. Open gate 01C, and locate TR103 on rear of gate.
6. Disconnect P01 at **A**.
7. Disconnect P10 at J10 of PS103.
8. Remove the four mounting nuts **B**.
9. Carefully pull TR103 from frame.
10. Reverse procedure for TR103 replacement.



Seq GC060	PN 0446175 Pg 2 of 2	EC A02214 15 SEP 83				
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Transformer 104

All 50 Hz and Japan 60 Hz only.

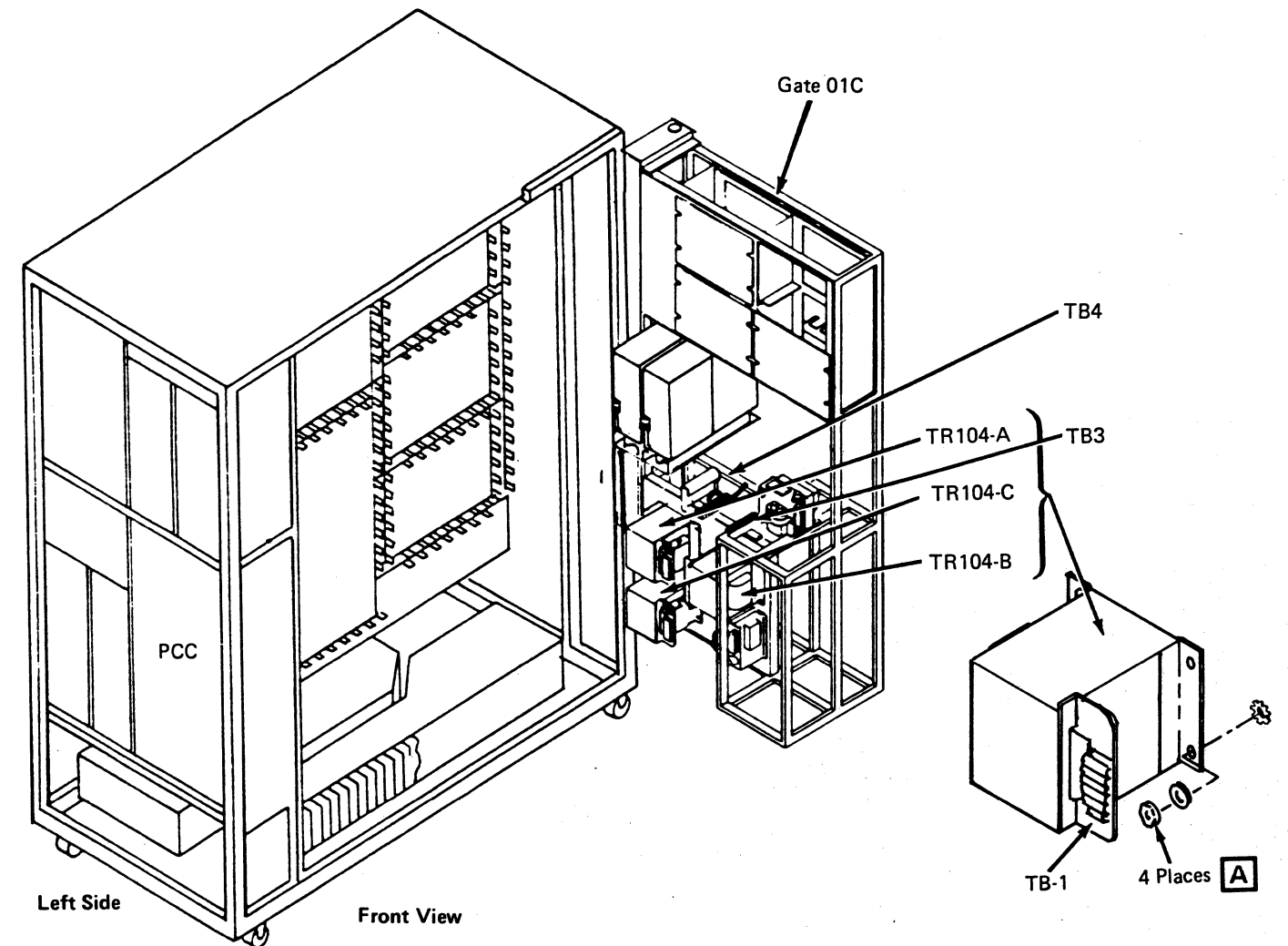
CAUTION

TR 104-A, B, and C each weigh 25 kg (55 lb).
Obtain aid before removing or replacing.

1. Press Power Off on the operator control panel.
2. Open left side cover.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover.
5. Open gate 01C, and locate TR104-A, B, or C on rear of gate.
6. Determine the transformer to be removed (A, B, or C).

Note: Label all wires before removing TB screws.

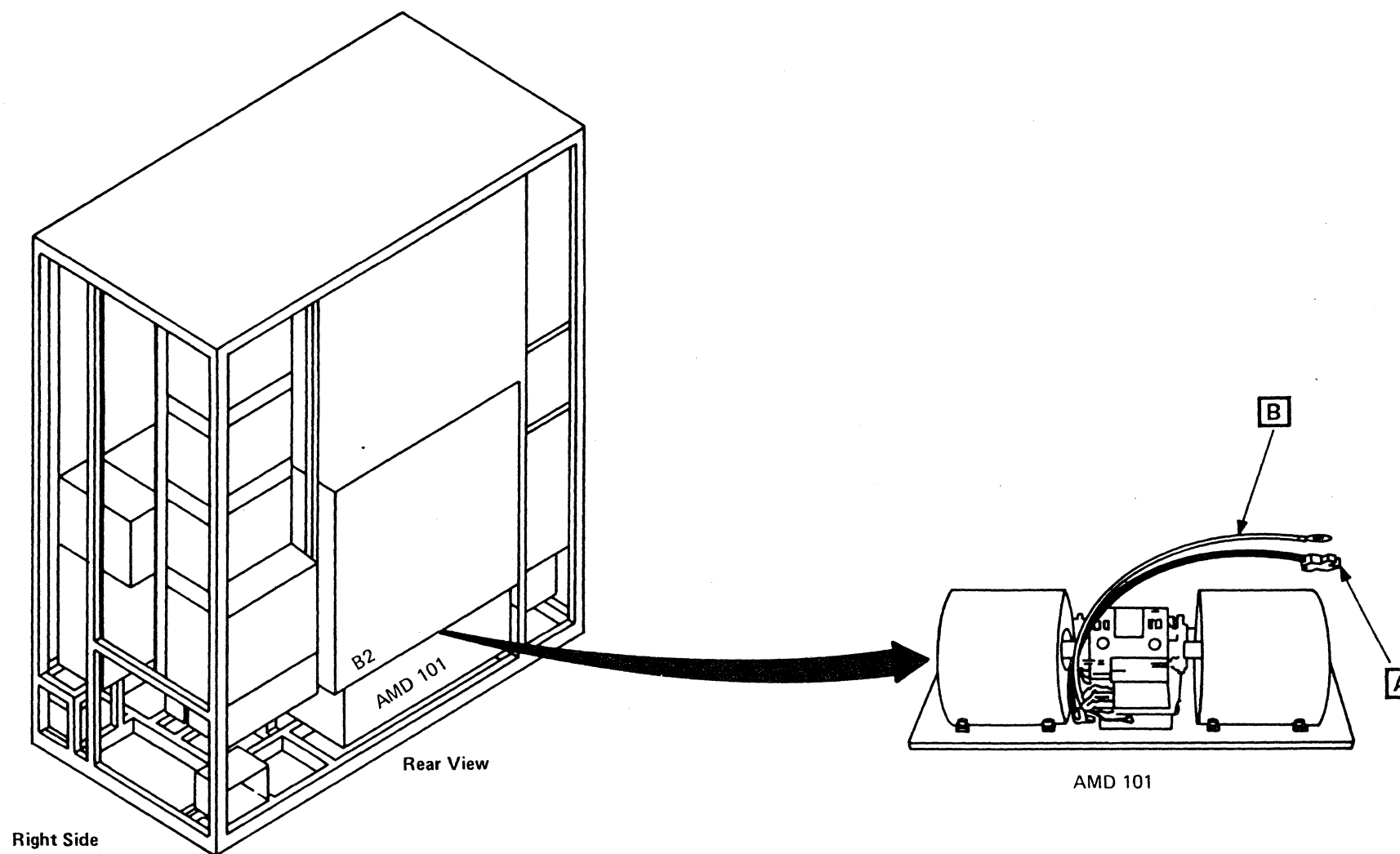
7. Disconnect TB-1 wires 1, 3, and 5 of the transformer to be removed. For the correct line voltage wiring sequence, refer to Volume C01, page YA081.
8. Locate and disconnect TB-4 wires running from the transformer to TB-4.
9. Cut the nylon cable tie wraps, and route the two wires back to the transformer area.
10. Remove the four mounting nuts **A**.
11. Carefully pull the transformer away from the frame.
12. Reverse procedure for TR104-A, B, or C replacement.



Seq GC065	PN 0446176 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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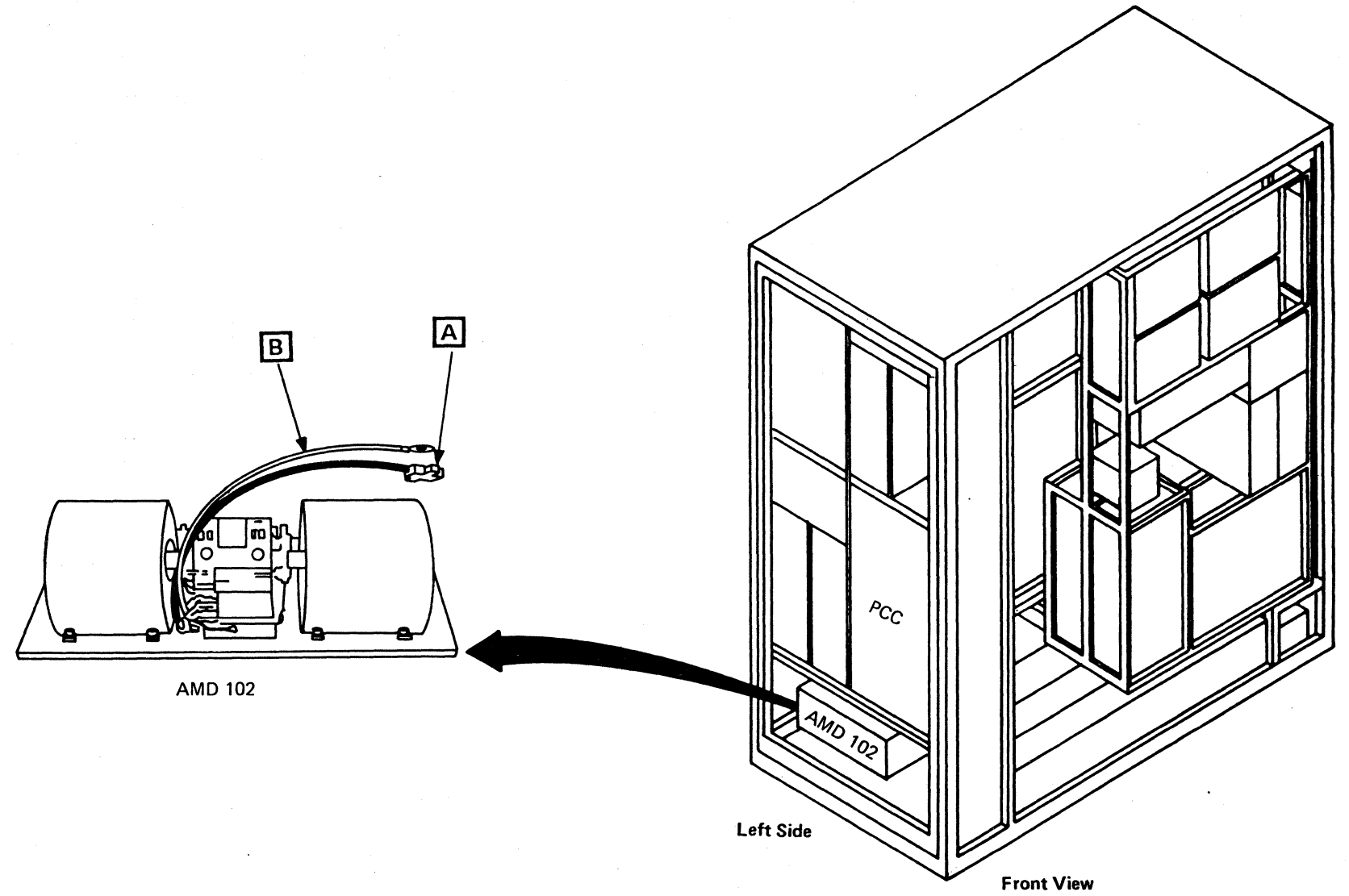
Air Moving Device 101

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame, and locate AMD 101.
5. Loosen the four cover mounting screws, and remove the cover.
6. Disconnect cable **A**.
7. Disconnect ground wire **B**.
8. Pull AMD 101 from frame.
9. Reverse procedure for AMD 101 replacement.



Air Moving Device 102

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open left side cover of frame, and locate AMD 102.
5. Loosen the four cover mounting screws, and remove the cover.
6. Disconnect cable **A**.
7. Disconnect ground wire **B**.
8. Pull AMD 102 from frame.
9. Reverse procedure for AMD 102 replacement.



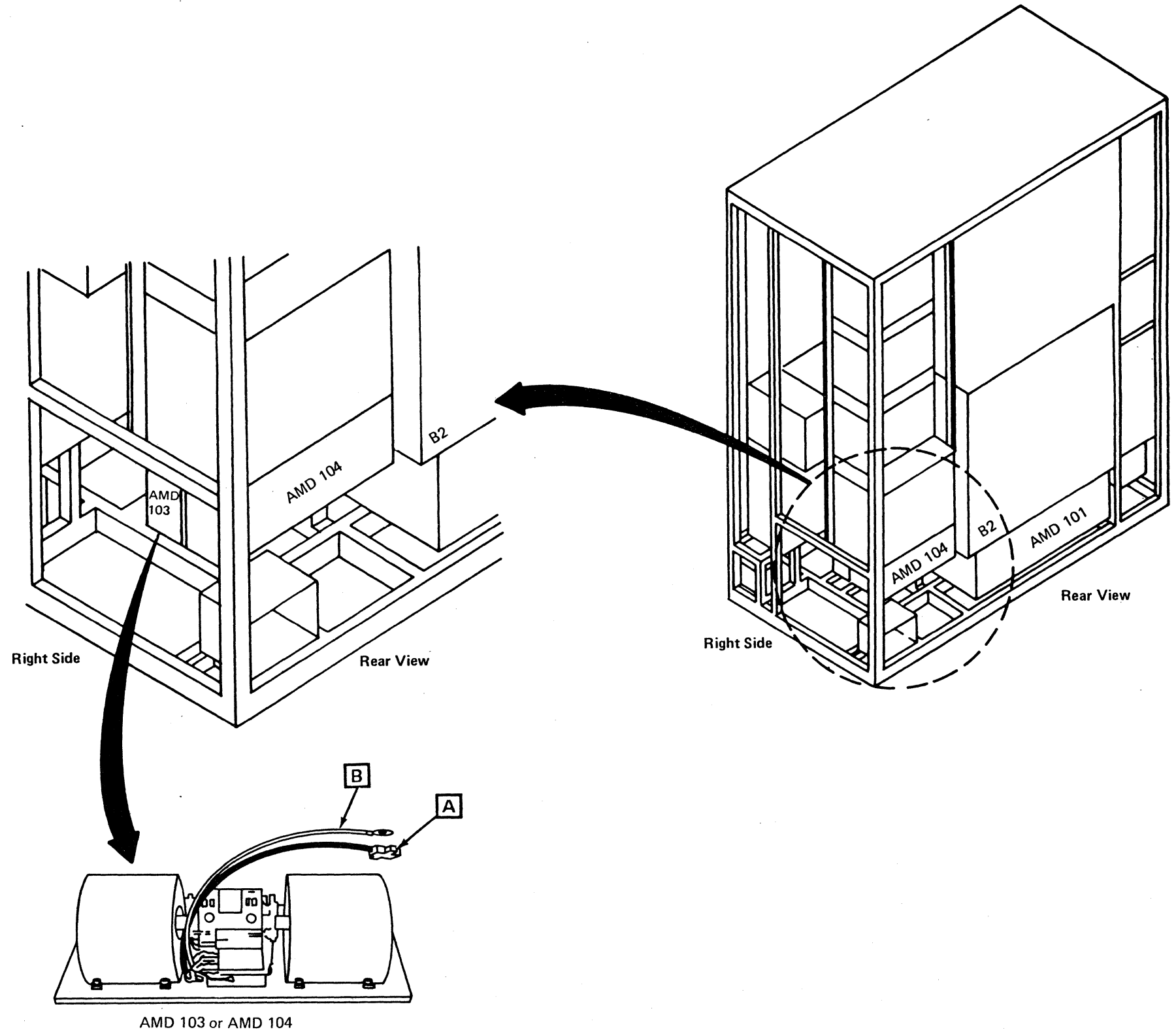
Seq GC070	PN 0446177 Pg 2 of 2	EC A02214 15 SEP 83					
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Air Moving Device 103

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.

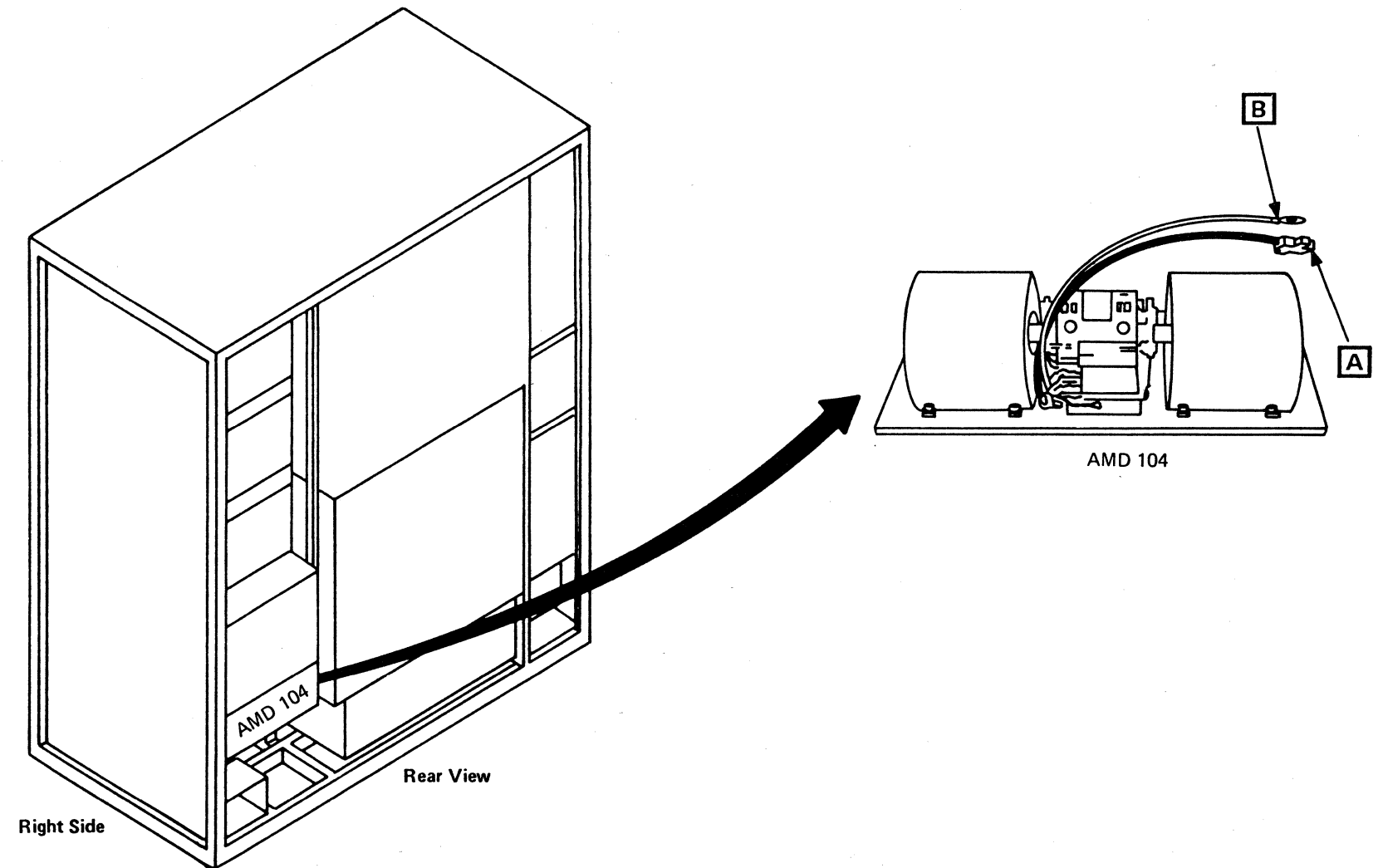
Note: AMD 104 must be removed before AMD 103.

4. Open rear cover of frame, and locate AMD 103 (AMD 103 is located behind AMD 104).
5. Loosen the four cover mounting screws, and remove the cover.
6. Disconnect cable **A** of AMD 104.
7. Disconnect ground wire **B** from AMD 104.
8. Pull AMD 104 from frame.
9. Disconnect cable **A** of AMD 103.
10. Disconnect ground wire **B** from AMD 103.
11. Pull AMD 103 from frame.
12. Reverse procedure for AMD 103 replacement.
13. Reinstall AMD 104.



Air Moving Device 104

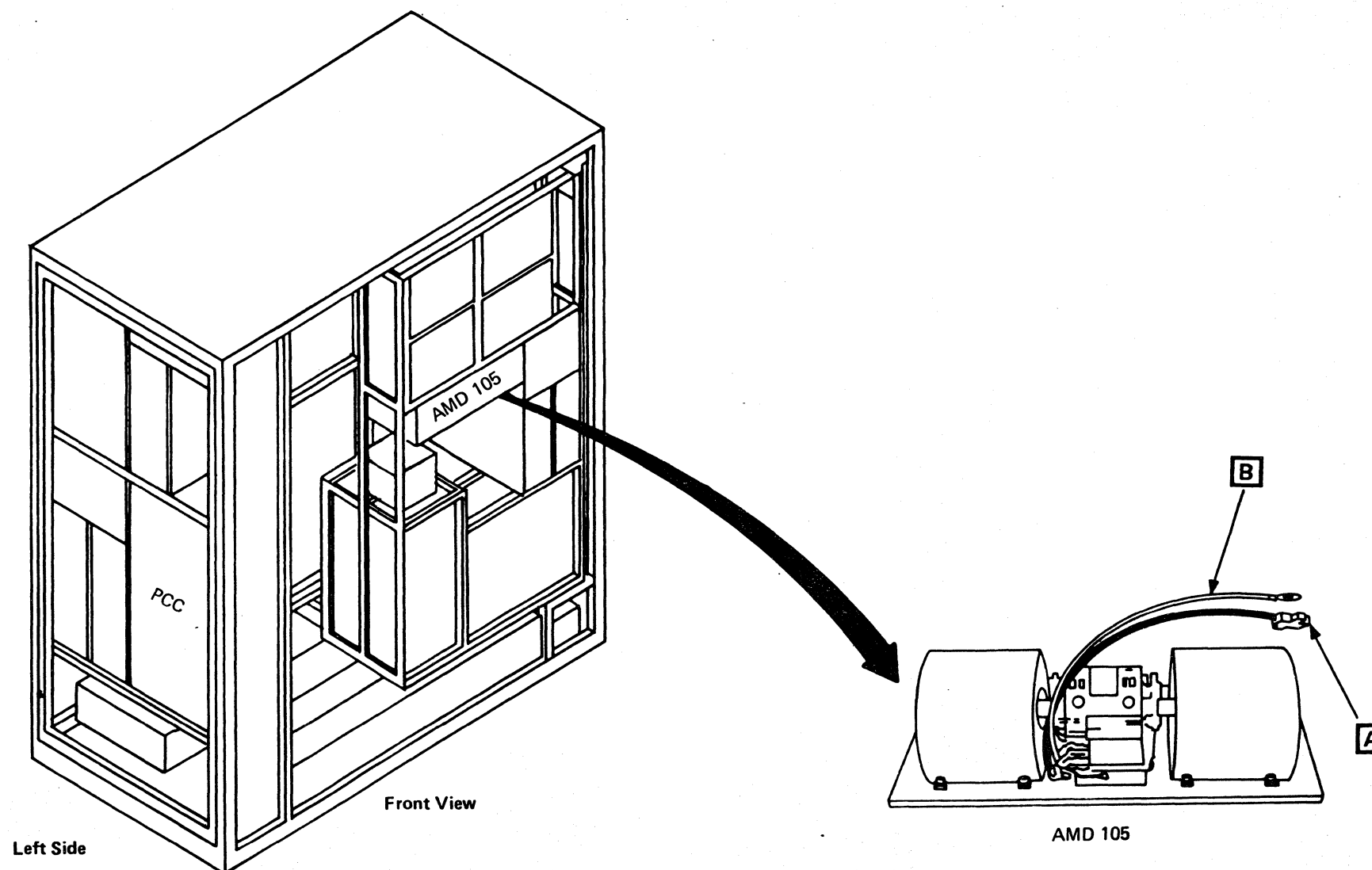
1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open rear cover of frame, and locate AMD 104.
5. Loosen the four cover mounting screws, and remove the cover.
6. Disconnect cable **A**.
7. Disconnect ground wire **B**.
8. Pull AMD 104 from frame.
9. Reverse procedure for AMD 104 replacement.



Seq GC075	PN 0446178 Pg 2 of 2	EC A02214 15 SEP 83				
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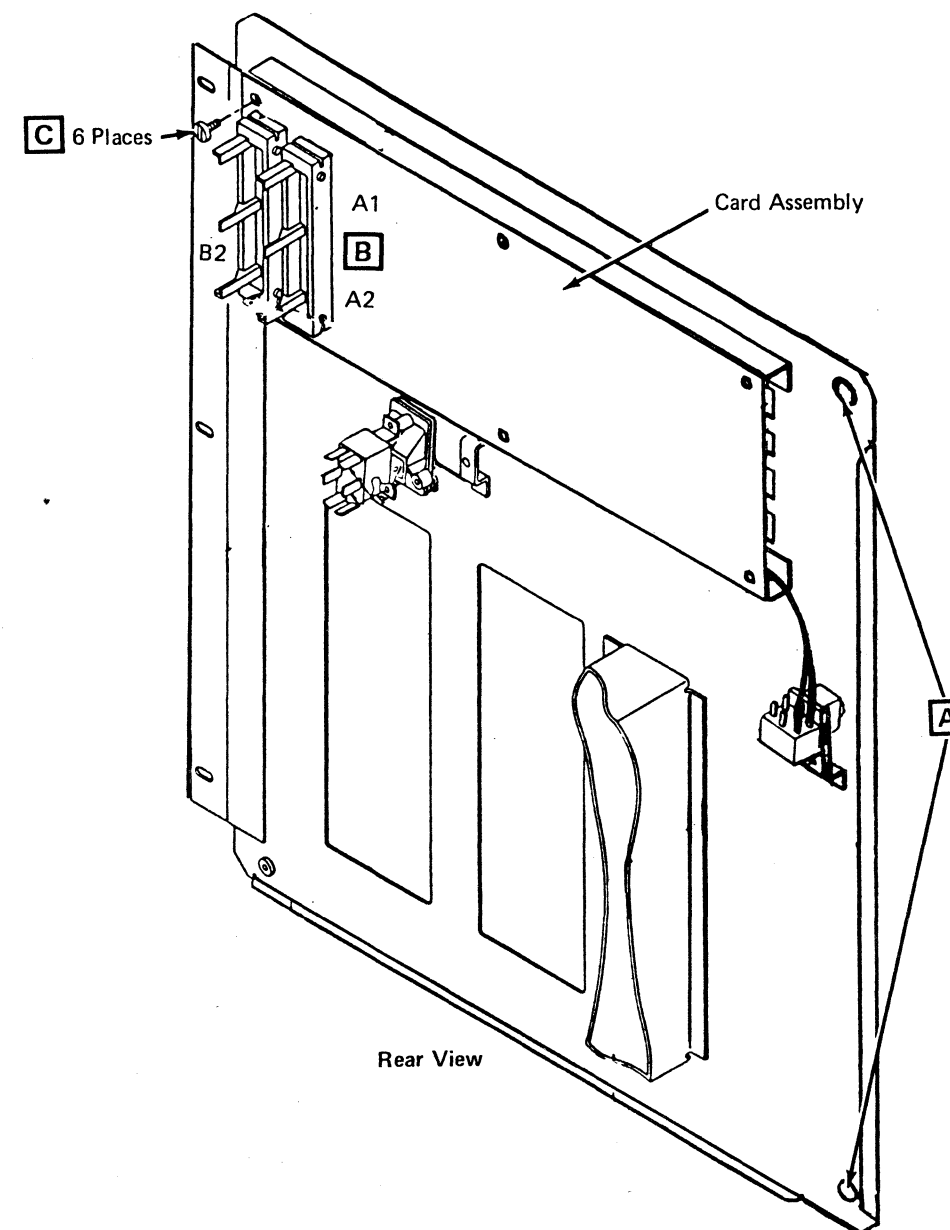
Air Moving Device 105

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame.
5. Open service panel to gain access to front of AMD 105.
6. Loosen the four cover mounting screws, and remove the cover.
7. Disconnect cable **A**.
8. Disconnect ground wire **B**.
9. Pull AMD 105 from frame.
10. Reverse procedure for AMD 105 replacement.



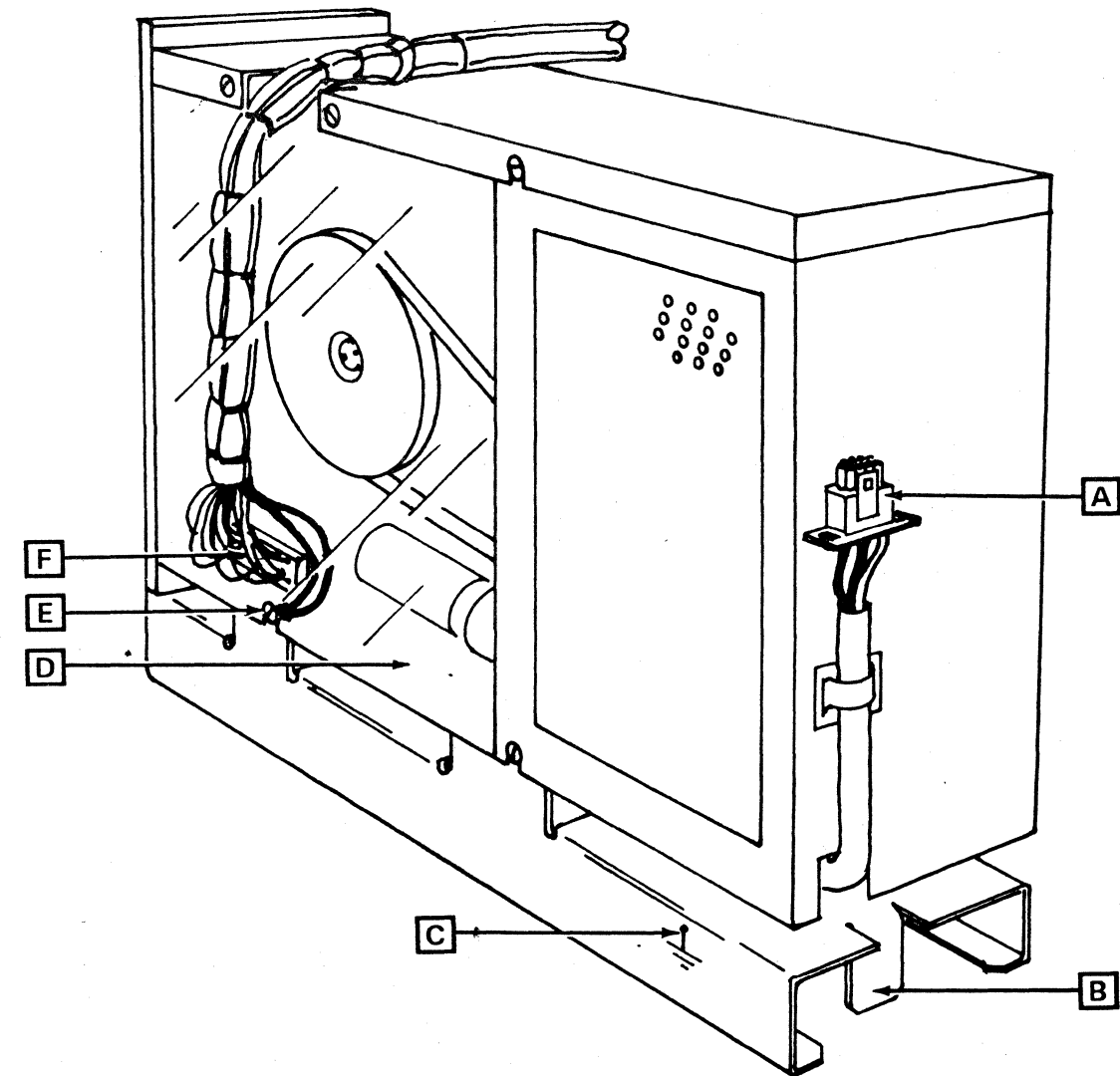
Service Panel

1. Press Power Off at the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame.
5. Loosen the two screws located at **A** (top and bottom left side of the service panel).
6. Swing open the panel.
7. Disconnect the CE key switch wires.
8. Remove connectors A1, A2, and B2 located at **B** (rear of the service panel).
9. Remove six card assembly holding screws shown at **C**.
10. Reverse procedure for service panel replacement.



Diskette Drive

1. Press Power Off on the operator control panel.
2. Open left side cover of frame.
3. Locate the Primary Control Compartment (PCC), and place CB1 and CB2 in the OFF position.
4. Open front cover of frame.
5. Open 01C gate, and locate rear of diskette to be removed.
6. Disconnect power plug **A** from the diskette.
7. Remove stop bracket at rear of diskette base **B**.
8. Disconnect ground wire **C**.
9. Go to front of gate 01C, and open service panel door (two screws).
10. Slide diskette forward, and remove the right side plastic shield **D** which covers the circuit card on right side of unit. (Loosen three screws.)
11. Remove two shielded ground wires **E**.
12. Disconnect signal cable **F** from bottom of circuit card.
13. Pull diskette unit out from the rear.
14. Reverse procedure for diskette replacement.



Seq GC085	PN 0446180 Pg 2 of 2	EC A02214 15 SEP 83				
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Preventive Maintenance

Air Filters

Examine the air filters for dust accumulation and vacuum as necessary. Replace filters that do not pass light after vacuuming.

This procedure should be performed on a annual basis or as the environment requires.

The following filters and their locations are contained in the processor:

Part Number	Location
8645605	AMD 101
8645606	AMD 102
8645607	AMD 103 and 104
8645608	AMD 105
8645609	Left side cover

Diagnostics

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 Optional MSS Diagnostics DIAG 005
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Introduction

This section contains information on processor diagnostics only. For information on System Test/4381, System Test/4381XA, or 4300-FRIEND, see "System Test" in this volume. For channel-to-channel adapter feature tests, see Volume A06, "Service Aids."

The processor has a Maintenance and Support Subsystem (MSS), a Processing Unit (PU), and a power section.

Maintenance and Support Subsystem (MSS)

The MSS consists of a Support Processor (SP) and the following device adapters:

- Device Cluster Adapter (DCA) that controls the system console displays and printers
- Diskette Drive Adapters (DDA) that control the diskette drives
- Remote Support Facility (RSF)
- Service Panel
- Power Controller Adapter (PCA) that controls power to the processing unit
- Support Bus Adapter (SBA) that communicates with the processing unit
- Local Channel Adapter (LCA).

Processing Unit (PU)

- Contains the main storage and arithmetic units for execution of customer programs.
- Communicates with the system's I/O devices through the I/O channels.

Diagnostic programs are used with the Repair Procedures in Volumes A01 through A05 to isolate failures and verify repairs in all the areas outlined above.

Some of the MSS diagnostics are resident in the read-only portion of MSS storage. All other diagnostics are loaded from the diskette drives. The MSS diagnostics and the processing unit Basic diagnostics run in SP control storage. The remaining diagnostics are loaded into processing unit control storage and run under control of the Machine Speed Microdiagnostic (MSMD) Monitor program.

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Diagnostic Summary

MSS

Basic and Extended MSS Diagnostics

- Located in support processor Read-Only Storage (ROS) and the DIAG1 diskette.
- Tests basic support processor and adapter operations.
- Run in support processor storage.
- Start automatically after the support processor is powered up.
- Indicate failures with five-digit MSS Codes displayed on the service panel or reference codes displayed on the console.

For more information, see page DIAG 040.

Optional MSS Diagnostics

- Located on the DIAG1 diskette.
- Supply additional testing for the support processor and adapters.
- Run in support processor storage.
- Can be selected after the Extended MSS diagnostics complete if the DIAG1 diskette is installed in diskette drive 1.
- Indicate failures by reference codes and repair screens.

For more information, see page DIAG 070.

Diskette Analysis Test

- Located on FUNC1 diskette.
- Tests any of the system diskettes for unreadable records.

For more information, see page DIAG 100.

Processing Unit

Processing Unit Basic Diagnostics

- Located on FUNC2 and DIAG1 diskettes.
- Test hardware path to ensure MSMDs can be started. These are on FUNC2.
- Test some processing unit hardware that cannot be fully tested by the MSMDs. These are on DIAG1.
- Run in support processor storage.
- Can be selected from the Diagnostic Mode PU Diagnostic Selection screen after the processing unit is powered up.
- Indicate failures by reference codes.

For more information, see page DIAG 110.

Machine Speed Microdiagnostics (MSMDs)

- Located on the FUNC2 diskette.
- Test most of the processing unit hardware.
- Run in processing unit control storage.
- Can be selected from the Diagnostic Mode PU Diagnostic Selection screen after the processing unit is powered up.
- Indicate failures by reference codes.

For more information, see page DIAG 115.

Special Channel Interface Diagnostics

- Located on DIAG1 diskette.
- Test channel receivers, drivers, and interface cables.
- Run in processing unit control storage.
- Can be selected from the Diagnostic Mode PU Diagnostic Selection screen by using the selected diagnostics mode option.
- Indicate failures by error screens on the console.

For more information, see page DIAG 135.

Diagnostics by Diskette

FUNC2

MSS Basics

- I/O Bus Test
- DCA and Console Display Test

PCA Tests

- Routine 0 Tests 1 through 8
- Routine 1 Tests 1, 3, 4, 6, and 8

PU Basics

- D001 through D049 Scan rings
- D050 through D099 Clock maintenance commands
- D100 through D199 Clock Basics
- D200 through D299 PU, Control storage maintenance commands
- D300 through D399 PU
- D400 through D499 Control storage
- D500 through D599 Channels
- D600 through D7FF Storage

MSMDs

- Storage Load 1 PU data flow, branch, shifter
- Storage Load 2 SAR, cache, addressing, DLAT
- Storage Load 3 Main storage, swap buffer
- Storage Load 4 Data buffer, traps, externals
- Storage Load 5 I-cycles, retry

DIAG1

MSS Basics and Extended

- I/O Bus Test
- Diskette Test 1
- Diskette Test 2
- Additional SP Storage Test
- DCA and Console Display Test

MSS Optional

- Option 90 Service Panel
- Option A0 DDA/Diskettes
- Option CE Console printers/displays
- Option D0 RSF
- Option E0 RSF wrap

PU Basics

- D801 through D849 Scan rings
- D850 through D899 Clock maintenance commands
- D900 through D999 Clock Basics
- DA00 through DA99 PU, Control storage maintenance commands
- DB00 through DB99 PU
- DC00 through DC99 Control storage
- DD00 through DD99 Channels
- DE00 through DEFF Storage

MSMD Storage Load 7

Channel Interface Diagnostics

Overview of the Maintenance Package

The following are used by the processor to analyze problems:

- Retry
- Error Log Analysis (ELA)
- Reconfiguration
- Problem Analysis (PA)
- Processing Unit Analysis (PUA)
- Repair Procedures.

A brief description of each item follows:

Retry

The retry routine runs in the support processor when a processing unit hardware failure occurs. It reads out the PU scan ring latches and stores them on the diskette, calls the ELA routines, determines if reconfiguration is needed, and if the failing operation can be tried again.

Error Log Analysis (ELA)

The ELA routines use the PU scan ring values to generate a reference code, reference code extension, and FRU list.

Reconfiguration

Special backup hardware and microcode have been added to some areas of the processor to be used if the primary hardware fails. These areas include:

- Cache
- Channel data buffer
- Control storage
- Multiply function (Model Group 2 only)
- Swap buffer.

In addition, sections of main and key storage can be flagged as bad so they are not used by the customer's program. If main storage, key storage, the multiply function, or multiple areas of cache are reconfigured, the system runs in a degraded mode and the customer is advised to place a call for service. The reconfiguration of the other areas does not cause a loss of system performance and does not cause the diagnostics to fail.

Warning: Do not swap FRUs between locations in cache or in the swap buffer. This can cause reconfiguration data to be invalid. Follow the PU Repair Procedures for exchanging FRUs in these locations.

Problem Analysis (PA)

Special analysis routines are sent with the processor so the customer can:

- Do initial problem determination
- Run Processing Unit Analysis (PUA)
- Send error logout information to a remote support center
- Display program, channel, and I/O status data stored when a failure occurred.

If a hardware failure occurs, Problem Analysis allows the customer to call in the part numbers of the FRUs that are the probable cause of the failure.

The service representative uses Problem Analysis to find the location of FRUs to be exchanged and to display information recorded when the customer did Problem Analysis.

Processing Unit Analysis (PUA)

Processing Unit Analysis can be run by the customer as a part of Problem Analysis (PA Option 3). The diagnostics are:

- PU Basics D001 to D7FF (FUNC2 diskette)
- MSMD storage loads 1 to 5.

If a failure is detected by the PUA diagnostics, the customer is given a PA log number (PAxx) and the part numbers of the most probable failing FRUs.

Repair Procedures

Volumes A01 through A05 contain procedures for you to follow when repairing a failure on the processor. Begin all repairs at "START Repair Procedure" in Volume A01.

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MSS, Power, and Reference Codes

MSS and Power Codes

The service panel has a five-digit display used by the support processor to display error conditions until the MSS is powered up and the path to the system console is tested by MSS Basic and Extended diagnostics. If an error is detected in the power-up or power-down sequence, the error condition is displayed in the last two digits of the service panel. If an error is detected by the MSS Basic or Extended diagnostics or while the customer's program is running, all five digits display the error. The two-digit power codes and the five-digit MSS codes are used as entries to the Repair Procedures.

Note: With no error on the system, the service panel displays the present SP storage address.

MSS Codes

0Exxx or 0Fxxx	SP error detected by ROS diagnostics
8001x	I/O bus error
815xx	Error on diskette drive 1
816xx or 817xx	MSS error while functional code is running
818xx or 81Fxx	Error on diskette drive 1
82xxx	MSS error while functional code is running
835xx	Error on diskette drive while reading diagnostics
88xxx or 89xxx	DCA or console display errors

Reference Codes

Reference codes show that an error was detected either during normal machine operation or while a diagnostic was running.

Reference codes are eight-character (hex) numbers with a format of: UU RRRR IS.

Where:

- UU Defines the area of failure.
- RRRR Gives specific failure information; it does not have a fixed format.
- I Specifies the reference code source.
- S Gives status information.

An eight-digit extension field can be added to the reference code to provide information on failing FRUs. The extension field does not have a fixed format.

IS Codes

Indicator (I) field (bits 0 through 3 of IS)

- 0 Power monitor
- 1 SP check handler
- 2 Any SP CAC or access method
- 3 Processing unit IML routine
- 4 Error logging or retry routine
- 5 Processing unit microcode
- 6 Any other SP microcode
- 8 Basic diagnostics
- 9 MSMD diagnostics
- A Error Log Analysis (ELA)
- B Power failure analysis
- C Test Case Monitor (TCM)
- D MSMD monitor
- F MSS diagnostics

Status (S) field (bits 4 through 7 of IS)

- Bit 4 = 1 FRU identified
- Bit 5 = 1 Log available
- Bit 6 = 1 Irrecoverable error
- Bit 7 Reserved

UU Codes

- 1x Power problem
 - 11 Processing unit power
 - 14 Channel-to-channel adapter power
 - 17 I/O power interface
 - 1D Digital sensor failure
 - 1F Undefined power problem

4x through 9x and FD Processing Unit

- 4x Storage
- 50 Control storage
- 59 PU
- 5D Clocks
- 60 Channels
- 70 Storage controller
- 71 Storage controller (Model Group 1 only)
- FD Support Bus Adapter (SBA)

Ex System problem

- EC SP microcode
- ED LCA or channel 0
- EE Processing unit microcode

Fx Maintenance and Support Subsystem (MSS)

- F0 Support Processor (SP)
- F1 Support processor storage
- F2 Local Channel Adapter (LCA)
- F4 Diskette Drive Adapter (DDA)
- F5 Diskette drive
- F6 Power Controller Adapter (PCA)
- F8 Device Cluster Adapter (DCA)
- F9 Display console and keyboard
- FD Support Bus Adapter (SBA)
- FE Common Communications Adapter (CCA)

Maintenance and Support Subsystem (MSS) Diagnostics

MSS diagnostics are the primary method for isolating failures in the MSS.

The diagnostics for the MSS are:

- Basic and Extended
- Optional.

Basic and Extended MSS diagnostics

Basic and Extended MSS diagnostics are in SP ROS and on the DIAG1 diskette. They are run automatically when the processor is powered up or re-IMLed.

Errors detected while running Basic or Extended MSS diagnostics are indicated either by MSS codes displayed on the service panel or by reference codes displayed on the system console. MSS codes are five-digit codes displayed on the service panel and used for entry to the Repair Procedures. The MSS codes are used to indicate errors until the operation of the MSS and the path to the system console are tested.

Basic MSS Test Descriptions

Test	Description	MSS Code
SP Basic Test	Read from SP ROS; tests SP logic.	0Fxxx, 0Exxx
I/O Bus Test	Read from SP ROS; tests the SP bus. Failures cause two instruction loops.	8001x
Diskette Tests 1	Read from SP ROS; tests diskette drive status and diskette drive ready.	8150x
Diskette Test 2	Read from diskette; checks diskette drive operation.	8180x, 8181x
DCA and Console Display	Checks basic operation of DCA and console display.	88x0x
DCA and Console Display Test 91	Tests write instruction to console attached to port 0. Note: 89101 is displayed if the console is not powered up.	8910x
DCA and Console Display Tests 92 through 96	Test additional DCA and console display operations.	8920x - 8960x

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Running MSS Basic and Extended Diagnostics

To run the MSS Basic and Extended diagnostics:

1. Set the CE Mode switch to Normal.
2. Set the I/O Power Hold switch to I/O Power Hold.
3. Set the Power Off switch to Power Off.
4. Install DIAG1 into diskette drive 1.
5. Reset the Power Off switch to Normal, and press Power On. Basic and Extended MSS diagnostics run after power up.

Notes:

1. After MSS diagnostics start running, the first visual indication is the MSS Diagnostic Test Option Selection screen with the message: BASIC MSS DIAGNOSTICS COMPLETED. If this screen does not appear within 30 seconds, a failure occurred in the MSS Basic diagnostics and an MSS Code is displayed on the service panel. The second visual indication is the addition of the message: MSS EXTENDED DIAGNOSTICS COMPLETED. A failure in the MSS Extended diagnostics results in a Repair Action screen that gives the reference code, a list of possible failing FRUs, a sequence of repair steps, and a reference to the Repair Procedures.
2. If the MSS Diagnostic Test Option Selection screen is displayed but input from the keyboard is not accepted, suspect a DCA or console keyboard problem.
3. If you run the Extended MSS diagnostics with power on the processing unit, an SBA test failure can occur.
4. Successful end of the Basic and Extended diagnostics is indicated by the message: EXTENDED DIAGNOSTICS COMPLETED.
5. If you suspect problems with the power controller adapter, use the FUNC1 diskette with the procedure outlined on page DIAG 060.

6. While looping the Basic and Extended MSS diagnostics (Option FF on the MSS Diagnostic Option Selection screen), the console goes blank during the ROS diagnostics. If the screen remains blank, look for an MSS Code on the service panel.

Looping MSS Basic and Extended Diagnostics

To loop the MSS Basic and Extended diagnostics:

1. Set the I/O Power Hold switch to I/O Power Hold.
2. Set the CE switch to Normal.
3. Set the Power Off switch to Power Off.
4. Install DIAG1 in diskette drive 1.
5. Reset the Power Off switch to Normal, and press Power On. Basic and Extended MSS diagnostics run one time, and the MSS Diagnostic Option screen is displayed.
6. If you want to loop all the MSS Basic and Extended diagnostics, key in FF and press ENTER.
7. If you want to loop a single MSS Extended diagnostic, key in TEST/RTN ID and press ENTER. For a list of test and routine numbers, see "Extended MSS Diagnostics by UU Codes" on page DIAG 040.

Example: 11 will loop one of the SP storage tests.
8. To end a looping test, press Power On/IML.

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Basic Diagnostic MSS Codes

Routines from SP ROS

Test SP logic.

MSS Code	Error Description
0E00x - 0E05x	SP branching error
0E06x - 0E0Cx	SP error on control instruction
0E0Dx - 0E13x	SP logic error
0E14x - 0E18x	SP storage addressing error
0E1Ax - 0E21x	SP ROS error
0E22x - 0E25x	SP logic error
0E26x - 0E29x	SP branching error
0E3Fx	SP arithmetic error
0E48x	SP register addressing error
0E56x - 0E6Bx	SP logic error
0E7Bx - 0E81x	SP branching error
0E94x - 0EB4x	SP storage addressing error
0EB9x - 0EBCx	SP storage error
0EC1x	SP cache error
0F80x - 0FC0x	SP branching error

I/O Bus Test

The SP bus is tested using the DCA card. If a failure is detected, the failing data is written to the bus repeatedly.

MSS Code	Error Description
80011	SP bus error (data = 0202 0000)
80012	SP bus error (data = 0206 B6B6)
80013	SP bus error (data = 0204 A55A)
80014	SP bus error (data = 0204 FFFF)
80015	SP bus error (data = 0200 0000)
80016	SP bus error (data = FFFF FFFF)

Diskette Drive Test 1

Tests diskette drive 1 reset, basic status, and ready.

MSS Code	Error Description
81502	Adapter check on read basic status
81504	Drive not ready in 20 seconds
81505	Basic status wrong after reset
8150A	Drive dropped ready
81513	Timeout when DDA addressed; SP enters two step loop
81523	Parity error when DDA addressed; SP enters two step loop

Diskette Test 2

Reads track 2 loader from side 0, track 0. Loads records 1 and 2 into SP storage address 0638.

MSS Code	Error Description
81801	Adapter check on seek
81802	Adapter detected error on read ID
81803	Not at track 0 after seek
8180A	Dropped ready after seek
8180C	No interrupt after read ID from track 0
8180F	No interrupt after read record
81810	Record not found on read data
81811	Data CRC error on read
81812	Drive error after read data
81820	No interrupt on seek
81F12	Data CRC error
81F20	Seek error
81F21	No interrupt seek or read record
81F29	Wrong status after seek

Additional SP Storage Test

Loads tests from tracks 3 and 4 into the first 32K and tests for storage parity errors.

MSS Code	Error Description
83501	Timeout waiting for diskette
83502	SP storage MC/PC while loading
83503	External MC/PC error
8350A	Diskette drive dropped ready
8350C	Wrong status after diskette operation
83512	CRC error on read
83520	Seek error

DCA and Console Display Tests

- Test 81 Tests adapter reset command
- Test 82 Tests load and read cycle steal byte.
- Test 83 Tests set and read basic status.
- Test 84 Tests reset adapter.
- Test 85 Tests invalid command.
- Test 86 Tests set/reset basic status.
- Test 87 Tests set/reset extended status.
- Test 88 Tests write/read control latches.
- Test 89 Tests start cycle steal.
- Test 8A Tests that start cycle steal not started with enable off.
- Test 8B Tests read to port 0.
- Test 8C Tests restart DCA.
- Test 8D Tests load, read, and reset byte counter.
- Test 8E Tests address register and controls.
- Test 8F Tests poll counter stepping.
- Test 90 Tests timer stepping.
- Test 91 Tests write to port 0. If no terminal is attached and powered up, DCA testing is terminated.
- Test 92 Tests block poll.
- Test 93 Tests clear command to terminal.
- Test 94 Tests setting/resetting over 63 counter.
- Test 95 Tests byte counter.
- Test 96 Exit routine for DCA diagnostics.

MSS Code	Error Description
88101	MC/PC error on reset
88102	Basic status bits not reset
88103	Basic status bits not reset
88201	Read cycle steal control byte error
88202	Cycle steal control byte not all ones after load
88203	Cycle steal control byte not all ones after load
88301	Reset basic status did not reset correct bits
88302	Read basic status error
88303	Read basic status error
88304	Set basic status did not set correct bits
88305	Read basic status error
88306	No DCA interrupt received
88401	Reset adapter did not reset status bits
88402	Reset adapter did not reset interrupt from DCA
88501	MC/PC register wrong at test start
88502	Invalid command did not set MC/PC in SP
88503	Invalid command did not set MC/PC in adapter
88601	All basic status bits off after reset except DCA active
88602	All basic status bits off after reset except stop poll
88603	DCA active not on after read/reset
88604	DCA active was reset on read/reset
88701	Extended status not set correctly
88702	Extended status not reset correctly
88703	Extended status not correct
88801	Read command not all zeros
88802	Write did not set status bits
88803	Control latches not reset by reset adapter
88901	Incorrect status after start cycle steal command
88902	Incorrect command queue start cycle steal command
88A01	Incorrect basic status after start cycle steal command
88A02	Cycle steal control byte wrong
88A03	Command queue wrong
88B01	Basic status wrong
88B02	Basic status not reset
88C01	Cycle steal control byte wrong
88C02	Basic status wrong
88D01	Byte counter not set to ones
88D02	Keyboard queue 2 wrong
88E01	Basic and extended status wrong
88E02	Device address wrong
88E03	Error queue wrong

MSS Code	Error Description
88F01	Diagnostic data wrong
88F02	Poll counter bits not set
88F03	Poll counter bits not reset
89001	Basic status bit not reset
89101	Stop poll or DCA active not on
89102	No power on response from port 0 display
89103	Status wrong on write command
89104	No power on reset in status
89105	Cycle steal pointer wrong for keyboard queue
89201	Extended status wrong
89202	Poll timeout data wrong
89203	Error queue pointer not updated
89301	Basic status wrong
89302	Wrong data in status queue
89401	Basic status wrong after looping 63 times
89402	Basic status wrong after looping 64 times
89403	Basic status wrong after read/reset
89404	Status change after loading cycle steal control bytes
89405	Read/reset basic status failed to reset all bits
89501	Basic status wrong after start cycle steal
89502	Received status wrong
89503	Received data wrong (one byte)
89504	More than two data bytes received
89505	Data queue pointer not updated
89506	Received data wrong (six bytes)
89507	More than six bytes received
89508	Data queue pointer not updated
89601	MC/PC set from DCA

Extended MSS Diagnostics by UU Codes

UU Code	Area Tested	Test ID	Routine ID
F0	Support Processor	0	1 to 6
F1	Support Processor Storage	1	1 to 6
FD	Support Bus Adapter	2	1 to 7
F2	Local Channel Adapter	3	1 to F
		4	1 to 5
F6	Power Controller Adapter	8	1 and 2

Example of Reference Code from MSS Extended Diagnostics

Test and routine ID (SP storage test routine 2) 12
 Reference code (UU RRRR IS) F1 12xx F8
 UU code from table above _____
 Error information _____
 F8 indicates MSS diagnostics _____

Extended MSS Diagnostics by Test ID

Test	Description
Test 0 Routine 1	Tests level switching of the support processor. Reference codes are: FO 0101 F8 Control write to common mask failure FO 0102 F8 Failed switching to level 1 FO 0103 F8 Failed switching to level 2 FO 0104 F8 Failed switching to level 3 FO 0105 F8 Failed switching to level 4 FO 0106 F8 Failed switching to level 5 FO 0107 F8 Failed switching to level 6 FO 0108 F8 Failed switching to level 7 FO 0109 F8 Failed switching to level 0 FO 010A F8 Control read/write PSC failed FO 010B F8 PSC bits wrong FO 010C F8 Write next level failed FO 010E F8 PIRR or common mask wrong
Test 0 Routine 2	Invalid instruction recognition. Reference codes are: FO 0201 F8 No MC with invalid instruction FO 0202 F8 No MC with invalid I/O address FO 0203 F8 MC/PC bits do not set/reset correctly FO 0204 F8 Low byte parity check failed
Test 0 Routine 3	Test parity recognition. FO 0301 F8 Wrong parity
Test 0 Routine 4	Tests storage from X'00400' to X'OFFF' for parity and data compare. To determine the failing location if an error occurs: 1. Key in G and press ENTER. A reference code of FO 04xx F8 is displayed. 2. Key in G and press ENTER. A reference code of FO 04yy F8 is displayed. Where xx is the high-order storage address and yy is the low-order storage address. Reference codes are: FO 0401 F8 Data miscompare FO 0402 F8 Parity check (0E000 to OFFF) FO 0403 F8 Parity check (00400 to OFFF)

Test	Description
Test 0 Routine 5	Tests register space. Reference codes are: FO 0501 F8 Data miscompare FO 0502 F8 Storage parity check
Test 0 Routine 6	Tests storage addressing (0E000 to 0F000). Reference codes are: FO 0601 F8 Data miscompare FO 0602 F8 MC/PC while reading
Test 1 Routine 1	Writes into and reads out of the second 64K storage card. To determine location if an error occurs: 1. Key in G and press ENTER. A reference code of FO 04xx F8 is displayed. 2. Key in G and press ENTER. A reference code of FO 04yy F8 is displayed. Where xx is the high-order storage address and yy is the low-order storage address. Reference codes are: F1 1101 F8 Data miscompare F1 1102 F8 Storage parity check
Test 1 Routine 2	Tests addressing in second 64K card. Reference codes are: F1 1201 F8 Data miscompare F1 1202 F8 Storage parity error
Test 1 Routine 3	Stores and executes instructions in X'10000' to X'1FFFF'. Reference codes are: F1 1301 F8 Sum incorrect F1 1302 F8 Machine check
Test 1 Routine 4	Tests SP storage in virtual mode. Reference codes are: F1 1401 F8 Data miscompare F1 1402 F8 Storage parity check

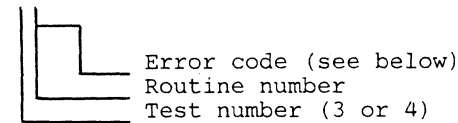
Test	Description
Test 1 Routine 5	Tests level 0 DLAT and translation tables in virtual mode. Reference codes are: F1 1501 F8 MC/PC error on routine entry F1 1502 F8 MC/PC error during routine F1 1509 F8 Error before address X'09xxx' F1 150E F8 Error before address X'0Exxx' F1 1515 F8 Error before address X'15xxx' F1 1518 F8 Error before address X'18xxx'
Test 1 Routine 6	Tests instruction DLAT during level switching in virtual. Reference codes are: F1 16x0 F8 Wrong DLAT for level x. F1 16yz F8 Wrong level switch. y is present level; z is the desired level.
Test 2 Routine 1	Tests SBA reset and checks basic status. Reference codes are: FD 2101 F8 Basic status not reset FD 2121 F8 MC/PC timeout on reset FD 2122 F8 MC/PC parity error on reset FD 2171 F8 MC/PC timeout on read status FD 2172 F8 MC/PC parity error on read status
Test 2 Routine 2	Tests commands to SBA of reset adapter, reset status, and set status. Reference codes are: FD 2201 F8 Set status failed (even bits) FD 2202 F8 Reset status failed (even bits) FD 2203 F8 Set status failed (odd bits) FD 2204 F8 Reset status failed (odd bits) FD 2205 F8 Reset adapter failed (all bits) FD 2241 F8 MC/PC timeout on reset status FD 2242 F8 MC/PC parity error on reset status FD 2261 F8 MC/PC timeout on set status FD 2262 F8 Parity error on set status

Test	Description
Test 2 Routine 3	Tests shift data and read data commands to the SBA. Reference codes are: FD 2301 F8 Data error on shift 5 FD 2302 F8 Control error on shift 5 FD 2303 F8 Failed PIRR to level 1 on data delay FD 2304 F8 MC/PC on data delay FD 2305 F8 False IORR FD 2306 F8 PIRR to level 0 on data delay fails FD 231x F8 x=shift count (1-8), shift register error FD 2381 F8 MC/PC timeout error FD 2382 F8 MC/PC parity error FD 2391 F8 MC/PC parity error FD 2392 F8 MC/PC timeout error
Test 2 Routine 4	Tests shift data with inverted parity to SBA. Reference codes are: FD 2401 F8 Shift data bad FD 2402 F8 Control register data bad FD 24C1 F8 MC/PC timeout error FD 24C2 F8 MC/PC timeout error
Test 2 Routine 5	Tests shift data without parity command to the SBA. Reference codes are: FD 2501 F8 Shift data error FD 2502 F8 Control register data bad FD 25A1 F8 MC/PC timeout error FD 25A2 F8 MC/PC parity error
Test 2 Routine 6	Tests write control to SBA. Note: Reference codes FD 2802 F8 or FD 2E02 F8 are normal if routine is looped. Other reference codes are: FD 2601 F8 Control error on data write FD 2602 F8 Control register data error FD 2603 F8 Status error after two control commands FD 26E1 F8 MC/PC timeout error FD 26E2 F8 MC/PC parity error

Test	Description
Test 2 Routine 7	Tests SBA timer interrupt (level 1). Reference codes are: FD 2701 F8 Failed to set basic status bit 7 FD 2702 F8 Failed to set IORR bit 1 FD 2703 F8 Failed to reset IORR bit 1 FD 2704 F8 Interrupt in 250 msec after reset FD 2705 F8 SBA interrupt with enable bit reset FD 27x0 F8 x=IORR; interrupt not at level 1
Test 3 Routines 1 to F and Test 4 Routines 1 to 5	Test LCA over the support processor bus. Note: Reference code F2 3144 F8 can occur if the PU is powered up or the LCA was enabled before. Reference codes are: F2 3144 F8 S/370 interface not disabled F2 3155 F8 S/370 interface bit disabled F2 4F11 F8 LCA hang in level 0 F2 4F15 F8 LCA hang in level 0 F2 RRRR F8 See below for RRRR values.

Error Codes for Tests 3 and 4

F2 RRRR F8



Error codes:

yy	Description
01	No I/O interrupt
02	Unexpected I/O interrupt
03	Set interrupt pending failed
04	No I/O interrupt
05	No expected machine check
06	MC/PC when not expected
07	SP write timeout
08	SP read timeout
09	SP read buffer overflow
10 to 1F	Command rejected (10 retries)
20 to 2C	Status not as expected
30 to 33	Command reject on I/O interrupt
40	I/O interrupt did not occur
55	LCA is disabled

Test	Description
Test 8 Routines 1 and 2	Tests basic PCA communication. Reference codes are: F6 81xx F8 F6 82xx F8 F6 828x F8 Sense card 1 failure F6 829x F8 Sense card 1 failure F6 82Ax F8 Sense card 2 failure F6 82Bx F8 Sense card 2 failure F6 82F1 F8 Timeout on read sense F6 82F2 F8 Support processor parity check
Diskette Loader Tracks 5 and 6	Load optional diagnostics, parity check upper 32K of storage. Reference codes are: Diskette Drive 1 F5 1B01 F8 Diskette drive 1 timeout F5 1B03 F8 Support processor check F5 1B0A F8 Diskette drive 1 not ready F5 1B0C F8 Bad status F5 1B12 F8 Data read error F5 1B15 F8 No error bypass F5 1B20 F8 Seek error F1 1C01 F8 Storage error F1 1C02 F8 Storage error on cycle steal F1 1C15 F8 No error bypass F5 1D01 F8 Timeout diskette drive 1 F5 1D0A F8 Diskette drive 1 not ready F5 1D0C F8 Wrong status F5 1D12 F8 CRC errors F5 1D15 F8 No error bypass Diskette Drive 2 F5 1B81 F8 Diskette drive 2 timeout F5 1B83 F8 Support processor check F5 1B8A F8 Diskette drive 2 not ready F5 1B8C F8 Bad status F5 1B92 F8 Data read error F5 1B95 F8 No error bypass F5 1BA0 F8 Seek error F5 1D15 F8 No error bypass F5 1D81 F8 Timeout diskette drive 2 F5 1D8A F8 Diskette drive 2 not ready F5 1D8C F8 Wrong status F5 1D92 F8 CRC errors

MSS Repair Action Screens

When an error is detected during the MSS Extended or Optional diagnostics, a Repair Action screen is displayed as a guide for the repair. The Repair Action screen lists suspected FRUs and gives a Repair Procedure reference to be used if the repair is not successful. The Repair Action screens are:

Reference Code	Option	Repair Action	Notes
F0xxxxF8	FF	Reseat or exchange the following: 01AA2 H2 Support Processor	
F1xxxxF8	FF	Reseat or exchange the following: 01AA2 J2 Support processor storage 01AA2 H2 Support processor	
F8xxxxF8	CE	Reseat or exchange the following: 01AA2 Q2 DCA 01AA2 R2 DCA Note: F8Cx03F8 is a normal reference code if no device is attached to port x.	Cable goes to ports 0 through 3 on 01F gate
F5xx0AF8	A0	Go to "MSS Repair" on page MSS 001	Check diskette cover
F5xxxxF8	A0	Go to "MSS Repair" on page MSS 001	
FDxxxxF8	FF	Reseat or exchange the following: 01AA2 T2 SBA 01AA2 U2 Converter	
F2xxxxF8	FF	Reseat or exchange the following: 01AA2 V2 LCA 01AA2 W2 LCA 01AA2 Y2 LCA	
F6xxxxF8	FF	Reseat or exchange the following: 01AA2 D2 PCA 01AA2 E2 PCA 01AA2 F2 PCA	Verify jumpers on D2 and E2
FExxxxF8	D0	Reseat or exchange the following: 01AA2 P2 RSF 01AA2 Q4 RSF	

Running the Power Controller Adapter (PCA) Tests Manually

The diagnostics for the PCA are on the FUNC1 diskette and are run after the MSS diagnostics when the processor is IMLed. If a failure occurs, a reference code is displayed.

To run the PCA tests manually:

1. Set the I/O Power Hold switch to Normal.
2. Set the CE Mode switch to CE Mode.
3. Set the Power Off switch to Power Off.
4. Install FUNC1 in diskette drive 1.
5. Reset the Power Off switch to Normal, and press Power On.
6. When the Partial Power screen appears, move the cursor to the COMMAND field, key in QWP, and press ENTER. The PCA tests run.

Note: After running the PCA routines, the MSS must be powered off and powered on again before any MSS diagnostics are run because of the special reset used for the PCA.

PCA Diagnostic Reference Codes

Reference Code	FRUs	Description
F6 0101 FA to F6 0103 FA	01A A2F2	Latch modules cannot be reset.
F6 0201 FA to F6 0204 FA	01A A2F2,D2	Sense card 2 latch modules cannot be reset.
F6 0301 FA to F6 0313 FA	01A A2D2,E2,F2	Latch module, byte address, or data bits bad.
F6 0401 FA to F6 0410 FA	01A A2D2,F2	Sense card 2 address bad.
F6 0501 FA to F6 0504 FA	01A A2E2	Data bits for sense card 1 cannot be set.
F6 0601 FA	01A A2F2	Sense card 2 latch module data bits bad.
F6 0701 FA to F6 0704 FA	01A A2F2,E2,D2	Test sense bytes.
F6 0801 FA to F6 0808 FA	01A A2F2,E2,D2	Read digital sense bytes.
F6 0901 FA to F6 0908 FA	01A A2F2,E2,D2	Sense bytes not equal to FF.
F6 1101 FA to F6 1106 FA	01A A2D2,E2	DAC not within 25% of MSS reference voltage.
F6 1301 FA to F6 1305 FA	01A A2D2,E2	DAC do not compare equal.
F6 1401 FA	01A A2D2,E2	Interrupt byte is bad.
F6 1601 FA to F6 1607 FA	01A A2D2,E2	Timeout circuit does not reset the control latches.
F6 1801 FA	01A A2F4	Serial number is wrong.

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Optional MSS Diagnostics

Optional MSS diagnostics are on the DIAG1 diskette and give additional testing for:

- Service panel
- Diskette drives
- Device Cluster Adapter (DCA)
- Optional printers and displays
- RSF.

While the Optional MSS diagnostics are running, any errors detected are indicated by Repair Action screens that guide you in the repair of the problem.

Running Optional MSS Diagnostics

1. Set the CE Mode switch to Normal.
2. Set the I/O Power Hold switch to I/O Power Hold.
3. Set the Power Off switch to Power Off.
4. Install DIAG1 in diskette drive 1.
5. Reset the Power Off switch to Normal, and press Power On. Basic and Extended MSS diagnostics run after power up.
6. Key in the selected option from the MSS Optional Diagnostic Selection screen, and press ENTER.

For additional information on running the MSS Optional diagnostics, refer to the flowchart and notes on page DIAG 075.

Optional MSS Diagnostics Selection Screen

```

***** BASIC MSS DIAGNOSTICS COMPLETED *****
***** EXTENDED MSS DIAGNOSTICS COMPLETED *****

MAKE SELECTION, ENTER DESIRED OPTION:

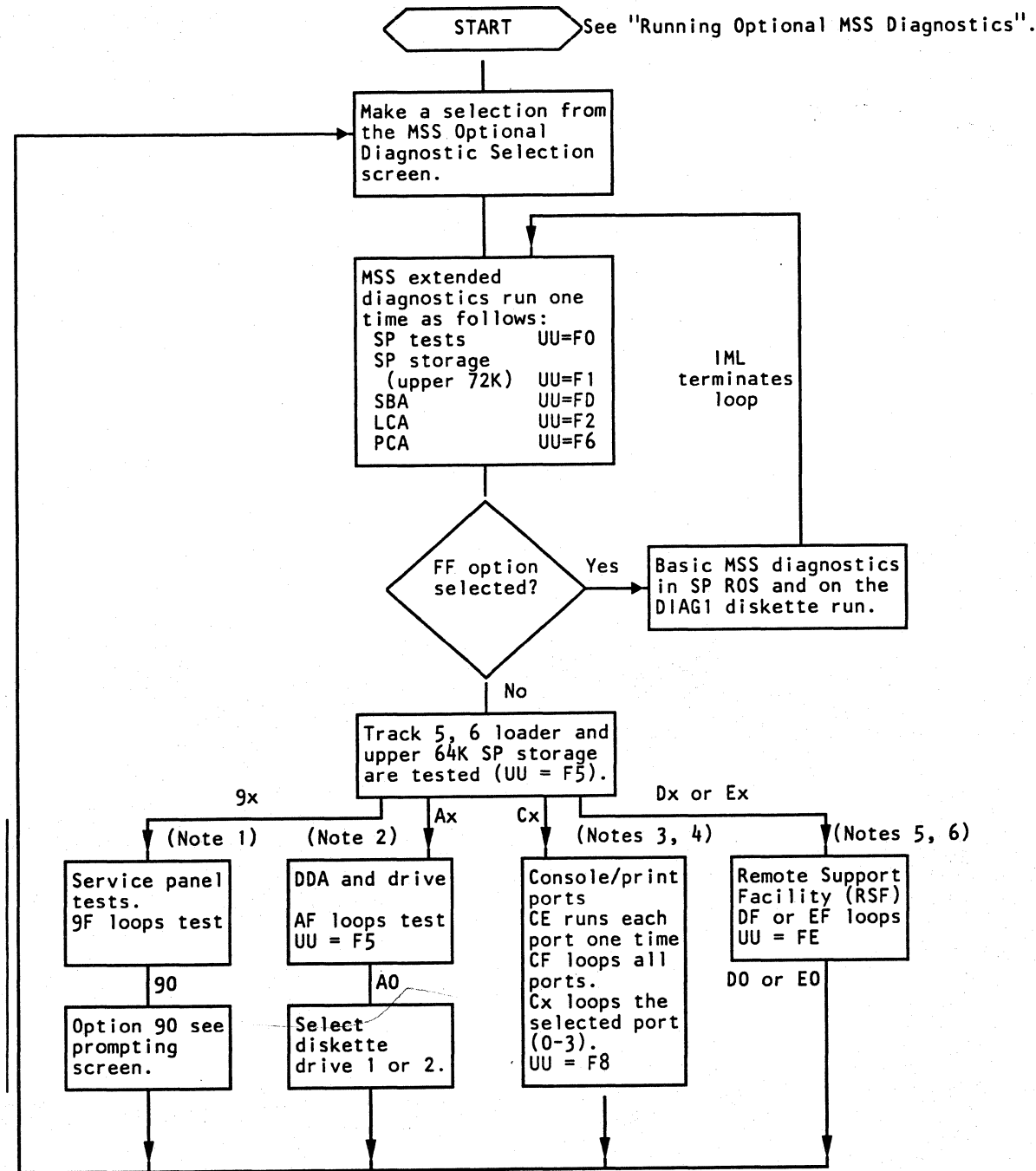
OPTIONS

(F) LOOP MSS BASIC AND EXTENDED DIAGNOSTICS
(9) RUN OPTIONAL SERVICE PANEL DIAGNOSTICS (9F=LOOP)
(A) RUN OPTIONAL DDA/DRIVE TESTS (AF=LOOP)
(C) TEST ALL CONSOLE/PRT PORTS (CF=LOOP)
(D) RUN RSF ADAPTER DIAGNOSTICS (DF=LOOP)
(E) RUN RSF CABLE WRAP TEST (EIA INTERFACE ONLY. EF=LOOP)
    NOTE: CABLE WRAP PLUG MUST BE INSTALLED

THEN PRESS ENTER:

TO TERMINATE LOOPING, PRESS IML BUTTON.
    
```

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Notes:

1. When the service panel displays 80000, press and release Logic Reset. The service panel then displays the following:

80000	87777	EEEE
81111	88888	FFFF
82222	99999	F0123
83333	AAAAA	F4567
84444	BBBBB	F89AB
85555	CCCCC	FCDEF
86666	DDDDD	

The time between displays is two to four seconds. The test is complete when FCDEF is displayed. After displaying FCDEF, the service panel continues to display the current SP storage address.

2. Place the DIAG1 diskette in the diskette drive to be tested.

3. Options C0 - C3 loop the test to the selected console (port 0 - 3). Option CF loops all consoles. Option CE tests each console one time.

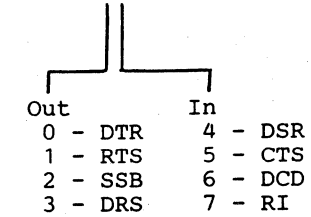
4. The reference code F8 Cx03 F8 is a normal stop if no device is attached to port ID=x or the device on port ID=x is not ready. To bypass this stop, key in G and press ENTER.

5. The D0 and DF options are for all RSF adapters. The E0 and EF options are only for the EIA interface and allow testing the cable to the external modem in wrap mode. Disconnect the EIA interface cable at the modem end, and install the wrap plug before selecting the Ex options.

6. Failures sensed by the EIA cable wrap test (Ex) are indicated by a reference code FE E0xx F8, where xx is the failing line as shown below:

5. Failures sensed by the EIA cable wrap test (Ex) are indicated by a reference code FE E0xx F8, where xx is the failing line as shown below:

FE E0EE F8 - Send or receive data (TD or RD) failure.
 FE E0FF F8 - CCA card failure.
 FE E0xx F8



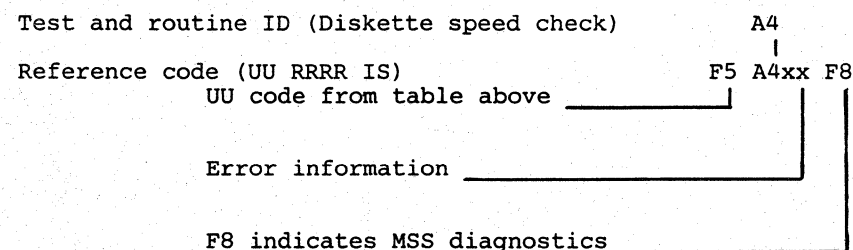
CTS Clear to send
 DCD Data carrier detect
 DRS Data rate select
 DSR Data set ready
 DTR Data terminal ready
 RI Ring indicator
 RTS Request to send
 SSB Select standby

For a wiring diagram of the EIA interface cable, see Volume A06, "Service Aids."

Optional MSS Diagnostics by UU Codes

UU Code	Area Tested	Test ID	Routine ID
F5	Diskette Drive Adapter	A	1 and 2
		B	1,6,B to E
		E	
F8	Display Console Adapter	C	1 to 3
FE	Remote Support Facility	D	1 to E
		E	1 to 5

Example of Reference Code from MSS Optional Diagnostics



MSS Optional Diagnostics by Test ID

Diskette Tests (Option A0)

Tests A and B run on the diskette drive you select. For the error code values, see "Test A and B Error Codes (xx)."

Test	Description	UU RRRR
Test A/B Routine 1	Verifies diskette adapter interrupts.	F5 B1xx
Test A Routine 2	Tests pointers and access lines.	F5 A2xx
Test A Routine 3	Verifies that CCA can detect wrong commands.	F5 A3xx
Test A Routine 4	Checks diskette speed.	F5 A4xx
Test A Routine 5	Checks that diskette head engages/disengages.	F5 A5xx
Test A/B Routine 6	Routine A selects head 0; routine B selects head 1. Checks cylinders 0-75 can be read. Verifies with read ID.	F5 A/B6xx
Test A/B Routine B	Routine A selects head 0; routine B selects head 1. Writes 256 bytes of X'FF' on cylinder 75, record 4.	F5 A/BBxx
Test A/B Routine C	Routine A selects head 0; routine B selects head 1. Writes 256 bytes of X'A50F' on cylinder 74, record 4.	F5 A/BCxx
Test A/B Routine D	Routine A selects head 0; routine B selects head 1. Writes 256 bytes of data on cylinder 8, record 1 and on cylinder 74, record 1 - then compares the data.	F5 A/BDxx
Test A/B Routine E	Routine A selects head 0; routine B selects head 1. Verifies busy and no record found can be detected.	F5 A/BExx

Test A and B Error Codes (xx)

- 00 Diskette adapter hang
- 01 MC/PC during cycle steal
- 02 MC/PC from storage
- 03 MC/PC from DDA
- 04 Write A buffer odd parity failed
- 05 Read A buffer odd parity failed
- 06 Read A buffer even parity failed
- 07 Write B buffer odd parity failed
- 08 Read B buffer odd parity failed
- 09 Read B buffer even parity failed
- 0C Diskette error check
- 0F Not valid command was not detected
- 11 Head not engaged
- 12 CRC error
- 13 Command reject
- 14 Hardware failed
- 15 Read control record failed
- 16 Busy
- 17 Busy not detected
- 18 Timeout
- 19 Record not found
- 1A Drive not ready
- 1B Wrong status
- 25 Error bypass not permitted
- 27 Head lifted too soon
- 28 Head lifted too late
- 29 Wrong head selected
- 38 MC/PC from I/O operation
- 39 Wrong level interrupt
- 3A More than 1 interrupt level
- 43 Record format wrong
- 44 Format data wrong
- 47 Head not engaged
- 51 Cylinder 0 ID or CRC error
- 53 Write format error
- 54 Record 3 not found
- 55 Wrong status on read
- 56 Diskette too fast
- 57 Diskette too slow
- 59 Write/read miscompare
- 5B Cylinder 74 or 75 not found
- 5C Cylinder 75 not found
- 5D Cylinder 8 not found
- 5E Flagged track
- 60 Wrong cylinder
- 61 Record not found failed to set
- 62 Interrupted with interrupt disabled
- 66 SP bus error
- 67 Level 5 interrupt from level 7 failed

- 80 Status register not reset
- 81 Status register not set
- 82 Channel pointer not reset
- 83 Read/write channel pointer failed
- 84 Extended status not reset
- 85 Load record count failed
- 86 Diagnostic request did not reset
- 87 Set control register failed
- 88 Read/write access failed
- Dx No interrupt received (x=diagnostic sense)

DCA Adapter Tests (Options C0-C3, CE, or CF)

For the values of the error codes (xx) in the diagnostic reference codes, see "Test C Error Codes." Test CE runs tests C0-C3 one time. Test CF loops tests C0-C3.

Test	Description	UU RRRR
Test C Routine 0	Tests console on port 0.	F8 C0xx
Test C Routine 1	Tests console or printer on port 1.	F8 C1xx
Test C Routine 2	Tests console or printer on port 2.	F8 C2xx
Test C Routine 3	Tests console or printer on port 3.	F8 C3xx

Test C Error Codes (xx)

- 01 DCA port failed
- 02 DCA port failed
- 03 No power on response
- 04 to 1C Device or DCA failure

Note: F8 Cx0E F8 is a normal stop if no device is attached to port x.

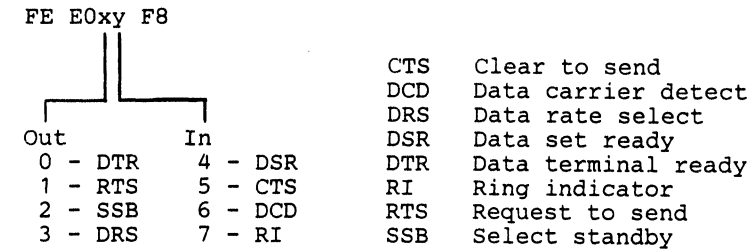
CCA Tests (Options D0 and E0)

Test	Description	UU RRRR
Test D Routine 1	Verifies CCA (RSF) commands. Reference codes are: FE D101 F8 Timeout FE D102 F8 Parity error FE D103 F8 Modem bits wrong	F8 D1xx
Test D Routine 2	Verifies not valid CCA commands set errors. FE D201 F8 Timeout FE D202 F8 MC/PC not set by invalid command FE D203 F8 Cannot reset MC/PC bits	F8 D2xx
Test D Routine 3	Verifies CCA control register reset and read. FE D301 F8 Control register wrong after reset FE D302 F8 Wrong data pattern in control register FE D303 F8 Wrong data pattern in control register FE D304 F8 Wrong control register reset FE D305 F8 Wrong control register reset	F8 D3xx
Test D Routine 4	Verifies modem control register reset and read commands. FE D401 F8 Wrong modem control register reset/read FE D402 F8 Wrong modem control register write/read FE D403 F8 Write/read test data failure FE D404 F8 Load/test control register failure	F8 D4xx
Test D Routine 5	Verifies modem status register (bits 2, 3, and 6 are not tested). FE D501 F8 Failed to set modem interrupt FE D502 F8 No DSR transition interrupt FE D503 F8 Failed to reset modem interrupt FE D504 F8 No modem interrupt on CTS transition FE D505 F8 Wrong modem status on CTS transition FE D506 F8 Failed to reset transition indicators FE D507 F8 No modem interrupt on CTS transition FE D508 F8 Failed to set CTS transition indicator FE D509 F8 Failed to reset modem interrupt FE D50A F8 Failed to set DSR transition FE D50B F8 Wrong status after set send command	F8 D5xx

Test	Description	UU RRRR
Test D Routine 6	Verifies correct interval and reset of TI in basic status. FE D601 F8 Early timer interrupt, high byte FE D602 F8 No timer interrupt, high byte FE D603 F8 Failed to reset timer interrupt FE D604 F8 Early timer interrupt, low byte FE D605 F8 No timer interrupt, low byte FE D606 F8 Failed to reset timer interrupt	F8 D6xx
Test D Routine 7	Verifies operation of timer controls. FE D701 F8 No timer interrupt, set to X'FF01' FE D702 F8 Wrong timer interrupt, set to X'0100' FE D703 F8 No interrupt, high byte set to X'80'	F8 D7xx
Test D Routine 8	Check set/reset of enable/disable bit. FE D801 F8 Failed to set enable FE D802 F8 Failed to reset enable	F8 D8xx
Test D Routine 9	Check set/reset of output request, input request, and adapter in sync bits. FE D901 F8 Adapter not in sync after transmit FE D902 F8 Adapter control register wrong FE D903 F8 Input request on after transmit FE D904 F8 Adapter not in sync after transmit FE D9Fx F8 (x=1-5) Timeout waiting for output request FE D9F6 F8 Adapter not in sync after transmit FE D9F7 F8 Unexpected status in transmit	F9 D8xx
Test D Routine A	Check that input request is stopped if receive mode is off. FE DA01 F8 Adapter in sync not on FE DA02 F8 Adapter control register wrong FE DA03 F8 Input request not on FE DAFx F8 (x=1-5) Timeout on output request FE DAF6 F8 Adapter not in sync after transmit	F8 DAxx

Test	Description	UU RRRR
Test D Routine B	Check that SDLC frame bit sets and resets FE DB01 F8 More than exception bit in status FE DB02 F8 Adapter in sync and SDLC frame not on FE DB03 F8 Control register wrong after pad transmit FE DB04 F8 Except interrupt pending not set FE DB05 F8 SDLC frame bit not set FE DB06 F8 SDLC frame bit not reset FE DBFx F8 (x=1-5) Timeout during output request FE DBF6 F8 Adapter not in sync after transmit FE DBF7 F8 Unexpected status during transmit	F8 DBxx
Test D Routine C	Check that test underrun bits set and reset. FE DCB01 F8 Failed to set underrun bit FE DCB02 F8 Failed to reset underrun bit FE DCBF7 F8 Unexpected status during transmit	F8 DCBx
Test D Routine D	Check that test overrun bits set and reset. FE DD01 F8 Failed to set overrun bit FE DD02 F8 Failed to reset overrun bit FE DDFx F8 (x=1-5) Timeout waiting for output request FE DDFy F8 (y=6-8) Adapter not in sync after transmit	F8 DDxx
Test D Routine E	Check that SDLC invalid sequence bits set and reset. FE DE01 F8 Invalid sequence with no exception bit FE DE02 F8 SDLC frame bit not on FE DE03 F8 SDLC invalid sequence not set FE DE04 F8 SDLC invalid sequence not reset FE DEFx F8 (x=1-5) Timeout on output request FE DEFy F8 (y=6-8) Adapter not in sync after transmit	F8 DExx
Test E Routine 0	Check external cable wrap (for EIA interface only). FE E0EE F8 No transmit or receive data connection FE E0FF F8 CCA card failure FE E0xy F8 Wrap in/out does not match. For x and y values, see "Test E Routine 0 Error Codes."	

Test E Routine 0 Error Codes



Test	Description	UU RRRR
Test E Routine 1	Check 15 ones recognition using SDLC. FE E101 F8 SDLC invalid sequence bit not on FE E102 F8 SDLC invalid sequence bit not reset FE E1F7 F8 Unexpected status during test	F8 E1xx
Test E Routine 2	Check repeated frame insertion. FE E201 F8 Timeout waiting for output request reset FE E202 F8 No adapter in sync or frame bits FE E2F1 F8 Unexpected status error during test	FE E2xx
Test E Routines 3 and 4	Check DDA and modem data paths in wrap mode. Routine 3 is CCA wrap, routine 4 is modem wrap. (x=3 or 4 in the following.) FE Ex01 F8 Timer interrupt before CTS FE Ex02 F8 Timer interrupt after CTS FE Ex03 F8 All data transmitted; stop receiving FE Ex04 F8 Modem status error FE Ex05 F8 Overrun/underrun FE Ex06 F8 Output request with transmit off FE Ex07 F8 Input request; no data transmitted FE Ex08 F8 Input request; last data already received FE Ex09 F8 Received data does not equal expected data FE Ex0A F8 Input request before flag in SDLC FE Ex0B F8 Basic status invalid FE Ex0C F8 Invalid exception FE Ex0D F8 SDLC frame on; adapter not in SDLC FE Ex0E F8 Data decoded as SDLC flag FE Ex0F F8 Adapter status error FE ExFF F8 Timeout on adapter interrupt FE E3FE F8 Wrong level interrupt in SP IORR FE E4FA F8 Modem wrap with DSR off	F8 ExFx
Test E Routine 5	Check if SP check is on from any preceding RSF test. FE E5xx F8 SP check (xx= SP check register).	F8 E5xx

Diskette Analysis

The Diskette Analysis test is on the FUNC1 diskette. It can be used to check any of the functional or diagnostic diskettes for unreadable records.

To run the test:

1. With the FUNC1 diskette in diskette drive 1, key in QED and press ENTER.
2. Note that a starting cylinder number (00), starting record number (01), and drive number (2) are given. Either use these default values or specify your own values for cylinder, record, and drive number.
3. Insert the diskette to be analyzed (into the diskette drive selected above).
4. Press ENTER to start the diskette analysis.

To continue the analysis if error information fills the screen, press ENTER. To cancel the analysis, press CNCL.

For an example of diskette errors, see "Diskette Analysis Test Error Display Screen." If there are more errors than one screen can display, press ENTER to display the additional error screens. For a definition of the diskette drive status bits, see "Diskette Drive Status Bits."

Diskette Drive Status Bits

Bits	Values	Meaning
0-1:	00	Good ending
	01	CRC Error
	10	Command Error
	11	Hardware Error
2-4:	000	Operation Complete
	001	Control Complete
	011	Busy
	100	Overrun/Underrun
	101	Timeout
	110	Record not found
	111	Diskette not ready
5:	1	SP Check
6:	1	Adapter enable
7:	1	Interrupt pending

Diskette Analysis Test Selection Screen

```

*ERROR DISPLAYS*          *DISKETTE ANALYSIS*

      TO START: 1) SELECT STARTING CYLINDER AND RECORD NUMBER
                  (DEFAULT IS RECORD 1 ON CYLINDER 0).
                2) SELECT DISK DRIVE FOR ANALYSIS (DEFAULT IS DRIVE 2).
                3) INSERT DISK TO BE ANALYZED INTO SELECTED DRIVE.
                4) PRESS THE ENTER KEY.

                00 STARTING CYLINDER NUMBER (00 - 4C)
                01 STARTING RECORD NUMBER (01 - 1A BACK-HEAD)
                  (81 - 9A FRONT-HEAD)
                2 TARGET DRIVE FOR ANALYSIS (1 - 2)

      TO EXIT:  1) MAKE SURE ORIGINAL DISKETTES ARE INSTALLED.
                2) SELECT ANY SCREEN.

                NOTE: ALL NUMBERS IN HEX

Q GENERAL SELECTION
Z RETURN TO PROG SYS
COMMAND: QED                      ==>
    
```

Diskette Analysis Test Error Display Screen

```

*ERROR DISPLAYS*          *DISKETTE ANALYSIS*

      LINE CYLINDER HEAD   RECORD MODULE  DEVICE
      NUMB  NUMBER        NUMBER  ID      STATUS
      0    09  FRONT     83   4351   42
      1    23  BACK      01   FFFF   42

                                     PARAMETERS ARE
                                     GIVEN IN HEX

      IF SCREEN IS FULL AND ANALYSIS IS NOT COMPLETE: PRESS ENTER
      TO CANCEL ANALYSIS: INSTALL ORIGINAL DISKETTES, PRESS CNCL KEY
      IF ANALYSIS IS COMPLETE: INSTALL ORIGINAL DISKETTES, SELECT ANY SCREEN

COMMAND: QED                      ==>
    
```

Processing Unit Diagnostics

The two types of processing unit diagnostics available for isolation of errors and verification of repairs are:

- Basics
- Machine Speed Microdiagnostics (MSMDs).

For a description of processing unit Basic diagnostics, see page DIAG 110. For a description of Machine Speed Microdiagnostics (MSMDs), see page DIAG 115.

Test Case Monitor (TCM)

The TCM is on the FUNC1 diskette. It is loaded into SP storage when any of the processing unit diagnostics are requested.

The TCM loads either Basic diagnostics into SP control storage or MSMDs into processing unit control storage. The TCM controls the execution of the Basic diagnostics.

During the processing unit Basic diagnostics and the MSMDs, the TCM controls communication between the diagnostics and the system console.

MSMD Monitor

The MSMD Monitor is on the FUNC2 diskette and is loaded by the TCM into processing unit control storage when MSMDs are to be run.

When MSMDs are running, communication to the system console is: diagnostic to MSMD Monitor to TCM to the console.

Diagnostic Mode Test Case Monitor Screen

In Field Support Center mode, the Diagnostic Mode Test Case Monitor screen is displayed whenever PU diagnostics are running. It displays prompting and error information. For an explanation of the error and prompting messages given on the Test Case Monitor screen, see "Test Case Monitor Messages" on page DIAG 200.

While PU basic diagnostics are running, the test ID is displayed in the lower left-hand corner of the Diagnostic Mode Test Case Monitor screen. For a description of processing unit basic test IDs, see "Basic Diagnostic Organization" on page DIAG 110.

Seq GE060	PN 0446195 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84		
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Basic Diagnostics

The Basic diagnostics are located on the FUNC2 and the DIAG1 diskettes. They run in SP control storage under control of the Test Case Monitor.

The Basic diagnostics test the processing unit through the support bus adapter. If errors are detected by the diagnostics, a reference code, a FRU list, and Repair Procedure references are displayed. For a description of reference codes, see "MSS, Power, and Reference Codes" on page DIAG 015.

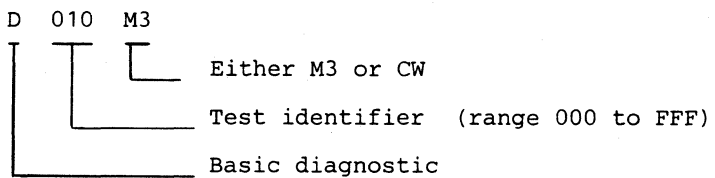
Some of the Basic diagnostics are used to ensure that the processing unit is capable of running MSMDs. These diagnostics are on FUNC2. The other Basic diagnostics test areas that the MSMDs cannot test. These diagnostics are on the DIAG1 diskette.

For information on running processing unit Basic diagnostics, see "How to Run Processing Unit Diagnostics" on page DIAG 120.

Basic Diagnostic Test IDs

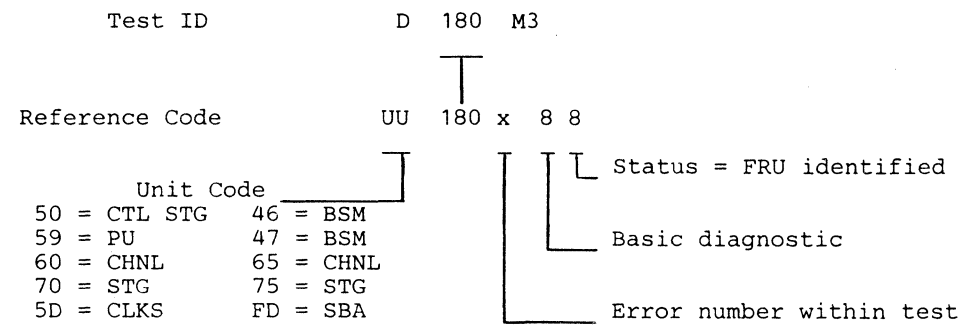
Basic diagnostic IDs are six characters long starting with a D and ending in either M3 or CW. M3 is used for Model Groups 1 and 2; CW is used only for Model Group 1.

Example:



Basic diagnostic IDs are displayed in the lower left corner of the Test Case Monitor screen while the corresponding diagnostic is running and appear in the RRRR field of a diagnostic reference code when an error is detected by the Basic diagnostics.

Example of a Basic Diagnostic Test ID and Reference Code



Basic Diagnostic Organization

Diskette	Test IDs	Area Tested
FUNC2	D001 to D049	Scan Rings
	D050 to D099	Clock maintenance commands
	D100 to D199	Clock basics
	D200 to D299	PU, control storage maintenance commands
	D300 to D399	PU
	D400 to D499	Control storage
	D500 to D599	Channels
	D600 to D7FF	Storage controller
DIAG1	D801 to D849	Scan Rings
	D850 to D899	Clock maintenance commands
	D900 to D999	Clock Basics
	DA00 to DA99	PU, Control storage maintenance commands
	DB00 to DB99	PU
	DC00 to DC99	Control storage
	DD00 to DD99	Channels
	DE00 to DEFF	Storage controller

Machine Speed Microdiagnostics (MSMDS)

MSMDS are the main tool for isolating hardware failures and verifying repairs in the processing unit. They run in processing unit control storage at machine speed. If an error is detected by the MSMDS, a reference code, FRU list, and Repair Procedure page reference are displayed.

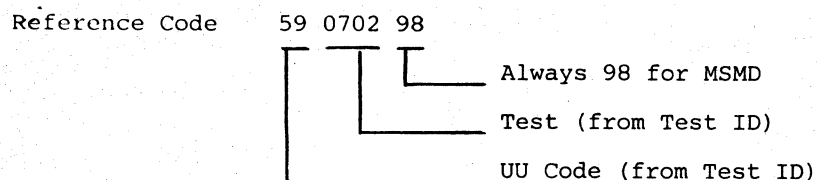
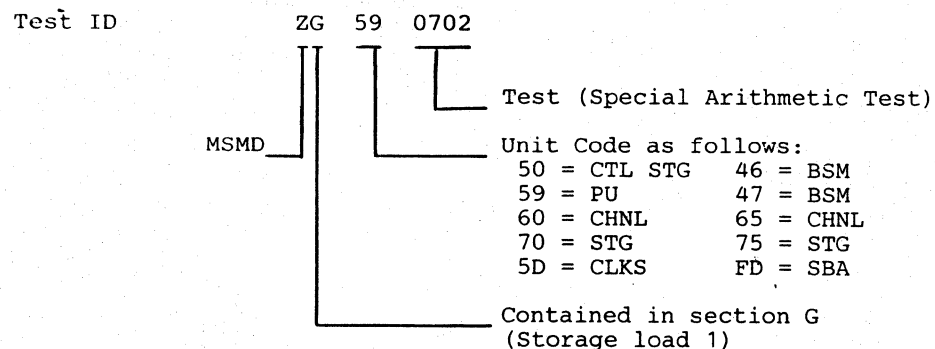
The TCM loads the MSMDS from the FUNC2 diskette into processing unit control storage where they run under the control of the MSMD Monitor. Console messages are passed from the MSMD Monitor to the TCM.

See "How to Run Processing Unit Diagnostics" on page DIAG 120.

MSMD Test IDs

MSMD test IDs are eight characters long starting with a Z and include the MSMD section ID and the UU and RRRR fields of the reference code that is displayed if a failure is detected.

Example:



MSMD Test Organization

The first five MSMD storage loads are on the FUNC2 diskette and storage load seven is on the DIAG1 diskette. Each storage load contains one or more sections and each section contains several tests.

Storage Load	Section	Section Name	Areas Tested	First Test ID of Load
1	A	ZADATA00	PU data flow 1	ZA590101
	B	ZBDATA00	PU data flow 2	
	C	ZCBRAN00	Branching	
	D	ZDSHFT00	Shifter	
	E	ZESHFT00	Spare	
	F	ZFINTMO0	Interrupt/timers	
	G	ZGIPUA00	Special arithmetic/multiplier	
2	H	ZHSTGC00	SARs, retry, cache, and keys	ZH590801
	I	ZISTGC00	ACB Traps, DLAT	
	J	ZJSTGC00	Address facilities	
3	K	ZKBSMT00	Main storage	ZK401101
	L	ZLBSMT00	Main storage	
	M	ZMBSMT00	Spare	
	N	ZNPAGE00	Swap buffer in page/out page	
4	O	ZOCHAN00	Externals, sequence counts, and traps	ZO621501
	P	ZPCHAN00	Channel SARs	
	Q	ZQCHAN00	Data buffer, store, and data mode	
	R	ZRCHAN00	LCA	
	S	ZSCHAN00	High speed data	
5	T	ZTICYC00	I-cycles	ZT592001
	U	ZUTRAP00	Traps	
	V	ZVRTRY00	Retry	
6			Reserved	
7	W	ZWCMDE00	Channel interface	ZW652301

How to Run Processing Unit Diagnostics

1. Ensure the FUNC1 diskette is installed in diskette drive 1.
2. Set the CE Mode switch to CE Mode.
3. Key in QG and press ENTER. The Diagnostic Mode PU Diagnostic Selection screen displays.
4. Key in one of the following options:
 - I to isolate a failure before exchanging FRUs
 - V to verify a repair after exchanging FRUs
 - C to run special channel diagnostics
 - T to run diagnostics after installation
 - F to run diagnostics in field support center mode.
 - R to return to the General Selection screen (Q).
5. Press ENTER.
6. Follow the prompting messages on the screen.

After running diagnostics, select option R on the Diagnostic Mode PU Diagnostic Selection screen. Diagnostic mode is ended and the General Selection screen (Q) is displayed. To return to normal operation:

1. Install FUNC1 in diskette drive 1 and FUNC2 in diskette drive 2.
2. Set the CE Mode switch to Normal.
3. Key in QL and press ENTER. The Program Load screen displays.
4. If the Program Load Screen displays IML COMPLETE, the processor is ready to continue normal operation. If IML REQUIRED displays, continue with the next step.
5. Press Power On/IML.
6. When the General Selection screen displays, key in QLM and press ENTER. This IMLs the processing unit.
7. When IML COMPLETE displays, the processor is ready to continue normal operation.

Operating Tips

1. When the processing unit Basic diagnostics are running, the test ID of the test running is displayed in the left-hand corner of the Test Case Monitor screen.
2. If you want to interrupt a diagnostic run, hold down the ALT key while pressing MODE SEL. This cancels the run, and displays the Diagnostic Mode PU Diagnostic Selection screen.

Note: Do not interrupt a diagnostic run if the message VERIFY HAS CLEANUP DO NOT INTERRUPT is displayed.
3. When the diagnostic run is complete or has ended because of an error, the Diagnostic Mode PU Diagnostic Selection screen is displayed if you press ENTER.
4. Before running the processing unit diagnostics, set the system control options on the following screens to normal:

Compare (QA Screen)
 Operation Rate (QO Screen)

For an explanation of setting the system control options, see Volume A08, "Console Functions."

```

                DIAGNOSTIC MODE
                PU DIAGNOSTIC SELECTION SCREEN
                EC xxxxxx

                I - RUN DIAGNOSTICS TO ISOLATE FAILURE BEFORE EXCHANGING FRUS
                V - RUN DIAGNOSTICS TO VERIFY REPAIR AFTER EXCHANGING FRUS
                C - RUN SPECIAL CHANNEL INTERFACE DIAGNOSTICS
                T - RUN DIAGNOSTICS FOR INSTALLATION TEST
                F - RUN DIAGNOSTICS IN FIELD SUPPORT CENTER MODE

                R - RETURN TO GENERAL SELECTION SCREEN

                COMMAND:          =====>
                OPTIONS IN EFFECT:
    
```

Option I - Isolation Mode

When you select this option, you are prompted to enter the reference code of the failure you are working on. The system error logs are checked for the reference code you entered. You have the option of changing your entry if it is not found; then you are asked if the processor is available for testing. Answer by keying in Y or N and pressing ENTER. If the processor is not available at this time, the FRU list generated by ELA at the time of failure is displayed. If the processor is available for testing, a group of diagnostics is selected and run to isolate the failure. The following sequence is used to run the tests until an error occurs:

- Basic diagnostics D001 to D7FF (FUNC2 diskette)
- MSMD storage loads 1 through 5
- Basic diagnostics D800 to DFFF (DIAG1 diskette)

Note: Not all the diagnostics are run every time. Tests are selected based on the reference code you entered.

If the diagnostics do not detect an error, the FRU list that was generated by ELA at the time of failure is displayed. If an error is detected, you are given a combined FRU list for the reference code you entered and the the diagnostic reference code. The priority of the FRUs on the FRU list is:

1. FRUs on *both* ELA and diagnostic FRU lists
2. FRUs on the diagnostic FRU list only
3. FRUs on the ELA FRU list only.

```

DIAGNOSTIC MODE
PU DIAGNOSTICS ISOLATE FAILURE OPTION
EC xxxxxx

KEY IN THE SYSTEM REFERENCE CODE AND PRESS ENTER
IF NONE IS AVAILABLE, ENTER "NONE".

COMMAND:          =====>
OPTIONS IN EFFECT: I

```

Seq GE070	PN 0446197 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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Option V - Verification Mode

When you select this option, a group of diagnostics is selected and run to verify the repair of a processing unit failure.

After you select Opt.on V, you are requested to enter either the Problem Analysis number (PAxx) or the reference code for the failure you are working on. If neither is available, enter NONE.

Example: If this option is used to test an engineering change, enter NONE.

After your PA number or reference code is correctly entered, the Diagnostic Mode PU Diagnostics Verify Repair Option screen is displayed and you are then requested to place an x next to the FRU(s) you *exchanged*. If no FRUs were exchanged, press ENTER. Example: If a card was swapped or a cable reseated, press ENTER.

The reconfiguration data is then reset to primary hardware for the FRU you replaced (if the FRU has backup hardware) and diagnostics start running in the following sequence:

- Failing test (if original symptom was a PU basic failure)
- Basic diagnostics D001 to D7FF (FUNC2 diskette)
- MSMD storage loads 1 to 5
- Basic diagnostics D800 to DFFF (DIAG1 diskette).

If errors occur during the verification test, you are directed back to the Repair Procedures. If no errors occur, you are directed to the End Repair Procedure.

Notes:

1. Do not interrupt a verification run if the message: VERIFY HAS CLEANUP DO NOT INTERRUPT is displayed. Interrupting the test can leave the wrong processor reconfiguration data and cause degraded performance.
2. If the test is accidentally interrupted:
 - Reselect the verification mode option.
 - Enter the reference code you were working with or NONE.
 - Enter the FRUs exchanged when prompted.
 - Follow the instructions on the screen.

```

DIAGNOSTIC MODE
PU DIAGNOSTICS VERIFY REPAIR OPTION
EC xxxxxx

KEY IN THE PROBLEM ANALYSIS CODE (PAxx) AND PRESS ENTER
IF NONE IS AVAILABLE, ENTER "NONE".

COMMAND:          =====>
OPTIONS IN EFFECT: V
    
```

```

DIAGNOSTIC MODE
PU DIAGNOSTICS VERIFY REPAIR OPTION
EC xxxxxx

A2 BOARD          A3 BOARD          B2 BOARD
S T V W X      E F G H J K L   N P Q R S T U
2              2              - - - - - X - -
4              4              - - - - -

                A4 BOARD
A B C D E F G H J K L M N P Q R S T U V W   - VN   - RA   - MA   - HA   - DA
                - VE   - RE   - ME   - HE   - DE
                - RJ   - MJ   - HJ   - DJ
                - RN   - MN   - HN   - DN
                - RS   - MS   - HS   - DS
2
4

COMMAND:          ==>  TYPE "X" IN INPUT FIELD(S) ASSOCIATED WITH
OPTIONS IN EFFECT:   FRU(S) JUST EXCHANGED, THEN PRESS ENTER
    
```


Option C - Channel Interface Diagnostics

The channel interface diagnostics are in storage load 7. They include:

- Mark In Test—Detects a reset failure of the Mark In bit on the channel interface.
- Channel Microcoded Device Exerciser (CMDE)—Used to diagnose channel or I/O device problems. (See page DIAG 140.)
- Cable Wrap Test (CWT)—Used to isolate channel interface adapter driver and receiver and channel cable problems. (See page DIAG 150.)

How to Run Channel Interface Tests

1. Set the CE Mode switch to CE Mode.
2. Ensure FUNC1 is installed in diskette drive 1.
3. Install DIAG1 in diskette drive 2.
4. Key in QG, and press ENTER. The Diagnostic Mode PU Diagnostic Selection screen displays.
5. Key in C, and press ENTER. The Special Channel Test Selection screen displays.
6. Make one of the following selections:
 - 01 Selects CMDE
 - 02 Selects CWT and the Mark In test
 - E Ends the channel interface tests.

*R
ENTER*

When you select one of the tests, detailed run instructions and test options are displayed to aid you in running the test.

Mark In Test

Checks for a failure to reset an active (up) level of the Mark In interface line by wrapping Mark Out to Mark In. [For tailgate pin locations, see "Bus Wrap Terminator (Part 8483772) Wiring."]

Notes:

1. The Mark In test runs automatically after the Channel Wrap test.
2. The wrap terminators must be installed on the channel being tested when running the Mark In test.
3. An open condition of the Mark In line is reported as ground.

For details on selecting CWT and the Mark In test, see "How to Run Channel Interface Tests." After the tests are selected, detailed run instructions are displayed on the screen.

Example of Mark In Test Error Screen

```

MARK-IN TEST

ERROR DETECTED

CHANNEL 0A
MARK IN IS STUCK AT GROUND

==> PRESS ENTER TO RTN TO OPTION SCREEN <==
```

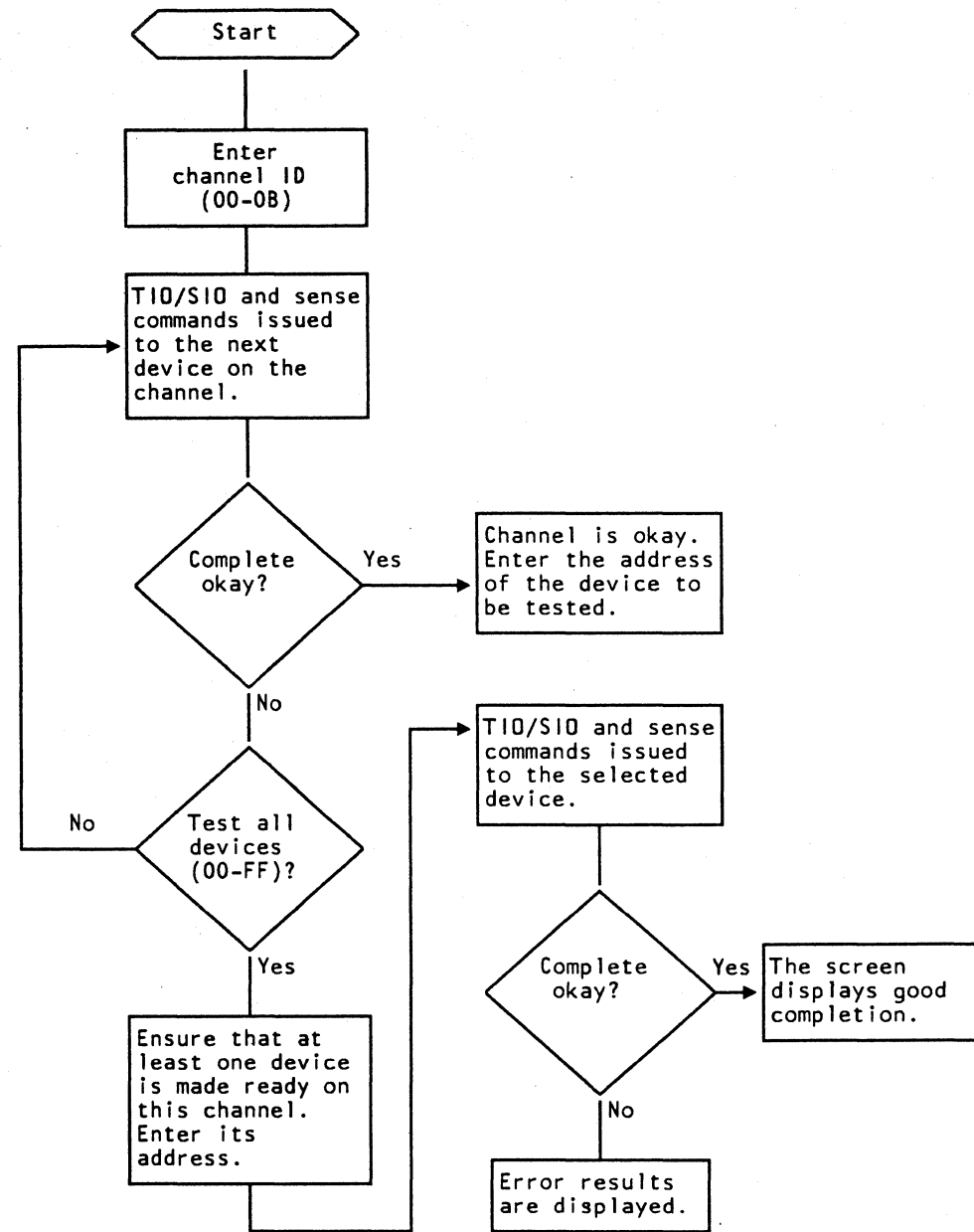
Channel Microcoded Device Exerciser (CMDE) - Normal Mode

Use the CMDE to diagnose channel or I/O device problems. If this test does not detect any errors, run System Test/4381 or System Test/4381XA to isolate the problem.

For details on how to select CMDE, see "How to Run Channel Interface Tests" on page DIAG 135. After CMDE is selected, detailed run instructions are displayed on the screen.

Normally, you will run the CMDE only under the direction of the Repair Procedures. For the operation of CMDE in this mode, see the flowchart on this page. To use CMDE this way, key in the channel address (00 to 0B) when prompted by the screen. CMDE sends a Test I/O, Start I/O, and Sense sequence to each device address on the channel until a response is received. When a device responds, CMDE requests that you ready the device you want to test and enter the address of that device (for example, 0E). CMDE then sends the Test I/O, Start I/O, and Sense sequence to that device and shows if a good response is received.

If no response is received from any device on the channel in the first Test I/O, Start I/O, and Sense sequence, you are then prompted to ready a device on the channel and enter its address. CMDE then sends the Test I/O, Start I/O, and Sense sequence to that device and shows if a good response is received.



Seq GE075	PN 0446198 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84		
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Channel Microcoded Device Exerciser (CMDE) - Support Mode

A second method for using CMDE is intended for support personnel. For the operation of CMDE in this mode, see the flowchart on this page. To use CMDE this way, key in the channel address followed by an x (for example 02x). CMDE then displays an option screen. The options on this screen let you run additional channel command sequences to devices on the channel.

Notes:

1. CMDE runs to the end for an I/O device even though the device does not have an entry in the UCW table.
2. For I/O device sense and status bit values, see "Status and Sense Bit Meanings."

Status and Sense Bit Meanings

Device (unit) Status

80	Attention
40	Status Modifier
20	Control Unit End
10	Busy
08	Channel End
04	Device End
02	Unit Check
01	Unit Exception

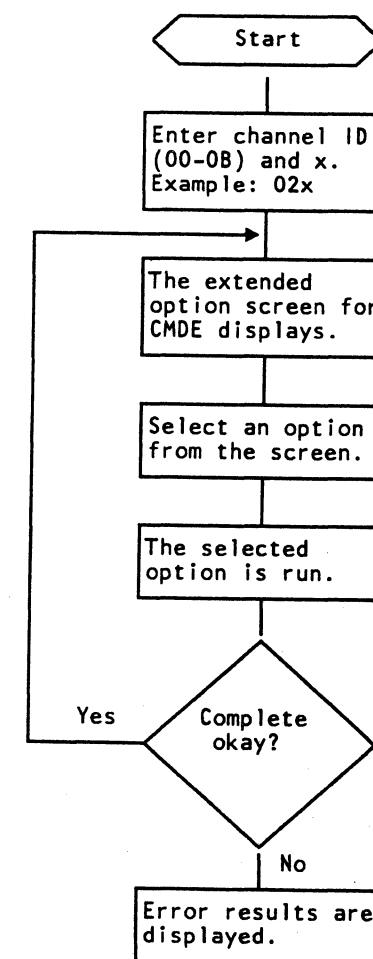
Channel Status

80	Program Controlled Interrupt
40	Wrong Length
20	Program Check
10	Protection Check
08	Channel Data Check
04	Channel Control Check
02	Interface Control Check
01	Chaining Check

Sense Byte 0

80	Command Reject
40	Intervention Required
20	Bus-Out Check
10	Equipment Check
08	Data Check
04	Overrun

Note: The sense information listed is not valid for all devices; it is a general guide only.



Channel Wrap Test

The Channel Wrap Test (CWT) can be used to isolate the following channel problems:

- Channel interface adapter receiver and driver failures.
- Channel interface cable and connector failures.

The CWT verifies that:

- When each bus-out or tag-out line is activated, the corresponding tag-in or bus-in line is at an active level. See "CWT Error Example 1 (Dropped Bits)."
- All tag and bus lines can be reset. See "CWT Error Example 2 (Unable to Reset Bits)."

For details on how to select CWT, see "How to Run Special Channel Tests." Before running CWT, run storage loads 1 through 5 to verify the operation of the processor up to the channel interface adapter receivers and drivers.

Two wrap terminators (bus wrap and tag wrap) must be installed before running CWT. For terminator part numbers and wiring, see "Bus Wrap Terminator (Part 8483772) Wiring" and "Tag Wrap Terminator (Part 8483773) Wiring."

The wrap terminators can be installed:

- At the I/O tailgate (01E) instead of the I/O interface cables to test the channel interface adapter card.
- At an I/O device instead of the interface terminators or on the channel out interface cables to test the interface cables and connections on the channel.

After you have completed CWT, remove the wrap terminators and reinstall the channel terminators and the interface cables.

Notes:

1. A short between DATA IN and SRV IN cannot be detected by this test.
2. METERING OUT is not tested here; see "Metering Test Repair Procedure" in Volume A01, page CHNL 061.
3. If the CWT runs successfully, the Mark In test is run automatically.

Bus Wrap Terminator (Part 8483772) Wiring

Bus Bit	Bus Out	Bus In
P	B03	G03
0(80)	D04	J04
1(40)	B05	G05
2(20)	D06	J06
3(10)	B08	G08
4(08)	D09	J09
5(04)	B10	G10
6(02)	D11	J11
7(01)	B12	G12
MARK	D13	J13

Tag Wrap Terminator (Part 8483773) Wiring

Tag Bit (hex)	Tag Out	Pin	Tag In	Pin
0(80)	SUPR	B12	REQ	J06
1(40)	OP	J13	OP	B03
2(20)	HOLD	G12	DISC	J11
3(10)	ADR	B10	ADR	B05
4(08)	SEL	D09	SEL	B08
5(04)	CMD	D11	STAT	D04
6(02)	DATA	G10	DATA	G08
7(01)	SRV	D13	SRV	D06
	MTR	J04	MTR	G05

Channel FRU Locations

Channel	Adapter Card	Bus Out/Tag Out	Bus In/Tag In
0	01AA3 K2	01AA2 ZG to 01E A1	01AA2 ZH to 01E A2
1	01AA3 E2	01AA3 B3 to 01E A3	01AA3 B4 to 01E A4
2	01AA3 F2	01AA3 B2 to 01E A5	01AA3 B5 to 01E A6
3	01AA3 G2	01AA3 YJ to 01E A7	01AA3 ZA to 01E A8
4	01AA3 H2	01AA3 YK to 01E A9	01AA3 ZB to 01E B1
5	01AA3 J2	01AA3 YL to 01E B2	01AA3 ZC to 01E B3
6	01AA3 P2	01AA3 YN to 01E B4	01AA3 ZE to 01E B5
7	01AA3 Q2	01AA3 YP to 01E B6	01AA3 ZF to 01E B7
8	01AA3 R2	01AA3 YQ to 01E B8	01AA3 ZG to 01E B9
9	01AA3 S2	01AA3 YR to 01E C1	01AA3 ZH to 01E C2
A	01AA3 T2	01AA3 X2 to 01E C3	01AA3 X5 to 01E C4
B	01AA3 U2	01AA3 X3 to 01E C5	01AA3 X4 to 01E C6

Note: For channel 0, the cables from 01AA3 to 01AA2 are:

Bus out/tag out	01AA3 YM to 01AA2 YQ
Bus in/tag in	01AA3 ZD to 01AA2 YR

For additional information, see Volume A06, Service Aids, "Channel Failure Isolation."

CWT Error Example 1 (Dropped Bits)

CWT Error Example 1 shows one instance of dropped bits and one instance of shorted lines on channel 4.

1. Dropped bus bit 1. Bits 1, 3, 5, and 7 (X'55') were sent on bus-out and bits 3, 5, and 7 (X'15') were returned on bus-in.

Also bit 1 (X'40') was sent on bus-out and no bits (X'00') were returned on bus-in.

2. Command Out (CD) or Status In (ST) is shorted to either Hold Out (HD) or Disconnect In (DC). Hold Out (X'20') was sent on tag-out; Disconnect In and Status In (X'24') were returned on tag-in.

Also Command Out, Data Out, and Service Out (X'07') were sent on tag-out and Disconnect In, Status In, Data In, and Service In (X'27') were returned on tag-in.

Notes:

1. Suspect a bus parity bit failure if the screen shows that a failure was detected but the ACTUAL and EXPECTED bit patterns are the same.
2. For the meanings of the tag abbreviations that appear on the screen, see "CWT Tag Abbreviations."
3. For the hex values assigned to the tag lines, see "Tag Bit Values."
4. The hardware sets tag bit 7 (Service Out) on whenever tag bit 5 (Command Out) and/or tag bit 6 (Data Out) are set on.
5. For bus and tag pin locations, see Volume A06, Service Aids, "Bus and Tag Lines."

CWT TAG ABBREVIATIONS

OP	Operational
AD	Address
HD	Hold
DC	Disconnect
SE	Select
SP	Suppress
RE	Request
SR	Service
CD	Command
ST	Status
DA	Data

Tag Bit Values

Bit	Hex	Tag-Out	Tag-In
0	80	Suppress	Request
1	40	Operational	Operational
2	20	Hold	Disconnect
3	10	Address	Address
4	08	Select	Select
5	04	Command	Status
6	02	Data	Data
7	01	Service	Service

CWT Error Example 2 (Unable to Reset Bits)

CWT Error Example 2 shows a failure to reset a tag and bus line on channel 4.

1. TAGS 10. The Address out tag (X'10') cannot be reset.
2. BUS 40. Bus bit 1 (X'40') cannot be reset.

Note: The hardware sets tag bit 7 (Service Out) on whenever tag bits 5 (Command Out) or tag bit 6 (Data Out) are set on. Ignore tag bit 7 if tag bits 5 or 6 are on.

```

CABLE WRAP TEST
CHANNEL: 04
ERROR DETECTED

BUS (BIT PATTERN):
EXPECTED 55 AA 80 40 20 10 08 04 02 01
ACTUAL 15* AA 80 00* 20 10 08 04 02 01

TAGS (OUT/IN):
OP/OP AD/AD HD/DC SE/SE SP/RE SR/SR CD/ST DA/DA
EXPECTED 40 10 20 08 80 03 07 03
ACTUAL 40 10 24* 08 80 03 27* 03

==> PRESS ENTER KEY TO RETURN TO CWT OPTION SCREEN
    
```

```

CABLE WRAP TEST
CHANNEL: 04

ERROR DETECTED
*****
UNABLE TO CLEAR TAG AND BUS LINES
TAGS: 10
BUS: 40

* SPECIAL WRAP TERMINATORS *
BITS OUT IN(TAGS) OUT IN (BUS)
0 SUPR REQ 0 0
1 OP OP 1 1
2 HOLD DISC 2 2
3 ADR ADR 3 3
4 SEL SEL 4 4
5 CMD STA 5 5
6 SRV/DATA SRV/DATA 6 6
7 CMD/SRV/DATA OUT (*) 7 7

== PRESS ENTER KEY TO RETURN TO CWT OPTION SCREEN
(*) FOR MORE INFORMATION ON TAG BIT (7) SEE THE "MAINTENANCE INFORMATION
MANUAL" UNDER DIAGNOSTICS: SPECIAL CHANNEL TESTS
    
```

Option T - Installation Mode

This option is to be run only at installation time to verify that all primary and backup hardware is error free.

If you select the Installation Mode option at installation time, all Basic and MSMD diagnostics are run against both primary and backup processor hardware. If the Installation Mode option is selected after installation time and primary hardware has been reconfigured, the reconfigured hardware is not tested. The following sequence is used to run the tests:

- Basic diagnostics D001 to D7FF (FUNC2 diskette)
- MSMD storage loads 1 through 5
- Basic diagnostics D800 to DFFF (DIAG1 diskette)

```

DIAGNOSTIC MODE
PU DIAGNOSTIC INSTALLATION TEST OPTION
EC xxxxxx

***WARNING***

THE FOLLOWING TEST IS FOR USE DURING
PROCESSOR INSTALLATION ONLY

IS THIS AN INSTALLATION DIAGNOSTIC RUN?

COMMAND:          =====> ENTER RESPONSE-(Y/N)
OPTIONS IN EFFECT: T
    
```

Seq GE085	PN 0446200 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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Option F - Field Support Center Mode

Select this option only under the direction of the Field Support Center or Engineering. When you select Option F for the first time, a warning message is displayed. If you can run diagnostics on the processor at this time, press ENTER. The Field Support Center screen is displayed.

To run diagnostics from the Field Support Center screen:

1. Key in a selection from each of the following option fields: DISPLAY, PRINT, TERMINATION, and TEST SELECTION.
2. Press ENTER.
3. If you selected an option other than the default (intensified) options, press ENTER again to start running the selected tests.

If no entry is made for any of the option fields, the default (intensified) value is used. The options may be entered in any order but you *must* have two digits for each selection and only one selection for any option.

When a selection other than the default selection is keyed in, the new selection is intensified on the screen as the default selection.

If you select options other than those offered on the screen or select conflicting options, a message prompts you to change your selections.

The options available are:

DISPLAY

- D0 Test IDs are displayed as the tests are run.
- D1 Results of a failing test are displayed.
- D2 All test IDs and results of failing tests are displayed.
- D3 Results of all tests are displayed.
- D4 No test IDs or test results are displayed.

PRINT

- P0 Test IDs are printed on the console printer as the test runs.
- P1 Test results are printed on the console printer only for failing tests.
- P2 All test IDs and the results of failing tests are printed on the console printer.
- P3 Test results are printed on the console printer for all tests.
- P4 No test IDs or results are printed.

TERMINATION

- T0 Testing stops on the first error.
- T1 Testing continues when errors are detected.

TEST SELECTION

- S0 The selected processing unit Basics are run.
- S1 The selected MSMDs are run
- S2 All MSMDs are run (except storage load 7).
- S3 All processing unit Basics on FUNC2 and all MSMDs except storage load 7 are run.

For selections D0, D2, P0 and P2, failing tests are identified by a * next to the test ID.

After the option selections are entered, one of four test input screens is displayed. The test input screen displayed depends on which test selection option (S0 to S3) was entered. The test input screens are:

Basic Test(s) Input screen. Displayed when Option S0 is selected (page DIAG 170).

MSMD Test(s) Input screen. Displayed when Option S1 is selected (page DIAG 170).

Runall MSMDs Input screen. Displayed when Option S2 is selected (page DIAG 175).

Runall Tests Input screen. Displayed when Option S3 is selected (page DIAG 175).

```

DIAGNOSTIC MODE
FIELD SUPPORT CENTER SCREEN
EC xxxxx

DISPLAY : D0 TEST ID ONLY          PRINT : P0 TEST ID ONLY
          D1 ALL RESULTS ON ERROR    P1 ALL RESULTS ON ERROR
          D2 TEST ID AND ERROR RESULTS P2 TEST ID AND ERROR RESULTS
          D3 ALL RESULTS ALWAYS      P3 ALL RESULTS ALWAYS
          D4 SUPPRESS DISPLAY        P4 SUPPRESS PRINT

TEST SELECTION : S0 BASIC TEST(S)   TERMINATION TO TERMINATE ON ERROR
                  S1 MSMD TEST(S)   T1 CONTINUE ON ERROR
                  S2 ALL MSMDS
                  S3 ALL BASICS AND MSMDS

RESTART : R RESTART DIAGNOSTIC MODE

COMMAND:          ==>  VERIFY SELECTED OPTIONS AND
OPTIONS IN EFFECT: CD1P3TOS1      PRESS ENTER TO CONTINUE
    
```

Basic Tests Input Screen

Enter the start and ending test identifiers for the tests you want to run in the START TEST ID and END TEST ID fields. (For the Basic test IDs, see "Basic Diagnostic Organization" on page DIAG 110.) If you want to run only one Basic test, enter that test in the START TEST ID field and leave the END TEST ID field blank. Enter the number of times you want the test or group of tests to run in the TEST RANGE LOOP COUNT field. If you want the tests to keep looping, enter four blanks in the TEST RANGE LOOP COUNT field.

MSMD Tests Input Screen

Enter the start and ending MSMD test identifiers or section names of the MSMDs you want to run in the START TEST ID and END TEST ID fields. (For MSMD section names and a description of MSMD test IDs, see "MSMD Test Organization" and "MSMD Test IDs" on page DIAG 115.) If you want to run only one MSMD test or section, enter the test ID or section name in the START TEST ID field and leave the END TEST ID field blank. If you want to run one MSMD storage load, enter the storage load as Mx (x=1 through 5) in the START TEST ID field and leave the END TEST ID field blank. If you want to continue running after an error, enter Y in the DISABLE MACHINE CHECKS field. If N is entered, the diagnostics stop when an error is detected with the error information displayed. To loop a test or group of tests, enter the number of times you want the loop to run in the TEST RANGE LOOP COUNT field, or enter four blanks to keep the tests looping until you press the ALT and MODE SEL keys. If you selected a group of tests, enter the number of times you want each test in the group to run in the TEST LOOP COUNT field.

```

DIAGNOSTIC MODE
BASIC TEST(S) INPUT SCREEN
EC xxxxx

ENTER:
START TEST ID =

END TEST ID =
(FOR A SINGLE TEST IGNORE END TEST ID)

TEST RANGE LOOP COUNT = 0001
(FOR INDEFINITE LOOP ENTER 4 BLANKS ABOVE)

RESTART : R RESTART DIAGNOSTIC MODE

COMMAND:                ==>
OPTIONS IN EFFECT: CD1P4SOT1

```

```

DIAGNOSTIC MODE
MSMD TEST(S) INPUT SCREEN
EC xxxxx

ENTER:
START TEST ID =

END TEST ID =
(FOR A SINGLE TEST IGNORE END TEST ID)

DISABLE MACHINE CHECKS (Y/N) = Y

TEST RANGE LOOP COUNT = 0001
(FOR INFINITE LOOP ENTER 4 BLANKS ABOVE)

TEST LOOP COUNT = 0001
RESTART : R RESTART DIAGNOSTIC MODE

COMMAND:                ==>
OPTIONS IN EFFECT: CD2P4T1S1

```

Seq GE090	PN 0446201 Pg 2 of 2	EC A02214 15 SEP 83	EC A02220 06 JUN 84			
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Runall Input Screen

Runs all Basic PU diagnostics on FUNC2 and MSMD storage loads 1 through 5. If you want the MSMDs to run more than one time, enter the number of times you want the MSMDs to run in the TEST LOOP COUNT field. If you want the tests to continue running when an error occurs, enter Y in the DISABLE MACHINE CHECKS field. If N is entered, the diagnostics stop when an error is detected and the error information is displayed.

```

DIAGNOSTIC MODE
RUNALL INPUT SCREEN
EC xxxxx

ENTER:
TEST LOOP COUNTER (RELIABILITY COUNT) = 02
DISABLE MACHINE CHECKS (Y/N) = Y

RESTART : R RESTART DIAGNOSTIC MODE

COMMAND:
OPTIONS IN EFFECT: CD1P4S3T1 ==>

```

All MSMDs Input Screen

Enter the number of times you want the MSMDs to run in the TEST LOOP COUNT field. If you want the tests to continue running when an error occurs, enter Y in the DISABLE MACHINE CHECKS field. If N is entered, the diagnostics stop when an error is detected and the error information is displayed.

```

DIAGNOSTIC MODE
ALL MSMDS INPUT SCREEN
EC xxxxx

ENTER:
TEST LOOP COUNTER (RELIABILITY COUNT) = 02
DISABLE MACHINE CHECKS (Y/N) = Y

RESTART : R RESTART DIAGNOSTIC MODE

COMMAND:
OPTIONS IN EFFECT: CD2P4T1S3 ==>

```

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Test Case Monitor Messages

Message	Reason	User Action Required
BOTH IDS MUST BE SECTION IDS OR TEST IDS REENTER TEST ID(S)	A MSMD range consisting of one test ID and one section ID was entered. When selecting an MSMD range, both IDs must be section IDs or both must be test IDs.	Enter a valid range of MSMD test or section IDs.
CONSOLE PRINTER NOT AVAILABLE. SUPPRESS PRINT OPTION ASSUMED.	An error occurred while attempting to configure a selected printer for TCM use. The print option defaults to suppress print.	Press ENTER to continue.
CONTINUING WILL DESTROY PROCESSING UNIT DATA. PRESS ENTER TO CONTINUE.	If PU diagnostic option F is selected, IML and IPL are required before starting customer programs again.	Press ENTER to go to the Field Support Center screen, or key in a new selection and press ENTER.
CONTROL STORE LOAD COMPLETE - MSMDs RUNNING	A MSMD storage load is complete and the tests have started.	None.
DIAGNOSTICS ENDED	An R option was encountered.	None. The General Selection screen is displayed.
DISPLAY ERROR	A TCM command to the console display failed probably because of a microcode error.	Press ENTER to return to the General Selection screen.
DUPLICATE IDS NOT ALLOWED REENTER TEST ID(S)	The start and end test IDs of a range were identical.	Reenter a valid test range.
END OF MSMD TEST(S). PRESS ENTER TO RESTART TCM	A MSMD run has completed.	Press ENTER to continue the TCM.
ENTER Y TO BYPASS CONTROL STORE LOAD	The requested MSMD storage load is the same as the storage load just completed.	Enter Y to request a different CS load. Press ENTER (with no Y) to run the same CS load.
INVALID LOOP COUNT REENTER LOOP COUNT	A not valid hex character was entered.	Enter a valid hex character.
INVALID INPUT - CHECK YOUR ENTRY	PU diagnostic option V was selected and a not valid character was entered.	Enter a valid character.
INVALID TEST ID: xxxxxxxx REENTER TEST ID(S)	A wrong test or section ID was entered. (The not valid ID remains in the input area.)	Reenter test or section ID(s).
INVALID OPTION: x REENTER OPTION	A not valid option was entered.	Enter a valid option.

Message	Reason	User Action Required
POWER GROUP NOT DEFINED CHECK QFS SCREEN	Power group on QFS screen is not defined.	Change the power group on QFS to a valid one.
MOUNT DIAG1 ON DRIVE 2. PRESS ENTER WHEN READY.	The requested test is not on the diskette that is now installed.	Install the requested diskette, and press ENTER.
MSMD CONTROL STORE LOAD: CSLOAD n	Informs the operator that the next MSMD storage load is loading. n = the load number (1-7).	None.
MSMD MONITOR ERROR. INVALID TEST ID. PRESS ENTER TO RESTART TCM.	The MSMD monitor detected a wrong MSMD section or test ID.	Press ENTER to return to the Diagnostic Mode PU Diagnostic Selection screen.
MSMD RESET IN PROCESS	Run status information.	None.
MULTIPLE TESTS MUST BE OF THE SAME TYPE REENTER TEST ID(S)	A range of tests was selected that included both Basic and MSMDs.	Enter a range of test IDs that includes only Basics or only MSMDs.
PRINT ERROR	A TCM command to the console printer failed. This is probably a printer problem.	Press ENTER to return to the General Selection screen.
PROCESSING UNIT POWER DOWN PRESS ENTER. USE PWR SCREENS.	Processing unit power is off.	Press ENTER to return to the General Selection screen. Power up the processing unit by the power screens (QW).
RANGE ENTERED NOT ON ONE DISKETTE REENTER TEST ID(S)	The range of tests selected are contained on more than one diskette.	Enter a range of test IDs that are contained on one diskette only.
RANGE ENTERED NOT ON ONE SECTION REENTER TEST ID(S)	The MSMD range selected is not contained in only one section.	Enter a range of MSMD test IDs that are contained in one section.
RECORD ALL INFORMATION ON THIS SCREEN. PRESS ENTER TO RESTART TCM.	A machine check occurred during an MSMD run. x = the MSMD CS load number (1 to 7), but the TCM cannot be certain of which test was running when the check occurred.	Exchange the listed FRUs, and run the selected tests again.
RDID ERROR MOD ID: xxxx RC: xx	A diskette error occurred. Some common return codes are: OF Diskette not ready 41 Module not found 81 Diskette read error.	Press ENTER to return to the Diagnostic Mode PU Diagnostic Selection screen.

Message	Reason	User Action Required
RE-ENTER MESSAGES	A wrong response was entered to a request for information.	Follow the displayed instructions, and enter the requested information.
RUN HALTED DUE TO TERMINATE ON ERROR OPTION. PRESS ENTER TO RESTART TCM.	An error was detected while running under the stop on error option.	Press ENTER to return to the Diagnostic Mode PU Diagnostic Selection screen.
SECTION Zxxxxx00 ENDED (STARTED)	Run status information.	None.
SELECTED TEST(S) xxxx TO xxxx PROCESSED. PRESS ENTER TO RESTART TCM.	The selected Basic tests have run to completion.	Press ENTER to return to the Diagnostic Mode PU Diagnostic Selection screen.
SELECTED TEST(S) NOT FOUND OR BYPASSED. PRESS ENTER TO RESTART TCM.	Either no test exists in the selected range or not all tests in the selected range can be executed.	Press ENTER to return to the Diagnostic Mode PU Diagnostic Selection screen.
TEST IDS MUST BE IN SEQUENCE REENTER TEST ID(S)	Selected test IDs were not entered in increasing order.	Enter test IDs in increasing order.
UNEXPECTED ERROR. GO TO START 001. USE REFERENCE CODE BELOW.	The support processor has detected an error.	Press ENTER to return to the General Selection Screen.
VERIFY SELECTED OPTIONS AND PRESS ENTER TO CONTINUE.	The selected options are highlighted. The user is given a chance to either change selections or leave it the way it is.	Press ENTER to go to the next screen.

Logs

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Introduction

When a hardware failure or a microcode error is detected in the processor, status information is collected, formatted, and recorded in the logout area of the diskette. For the MSS, support processor status and device adapter latches are recorded. For the processing unit, the scan ring latches are recorded.

Error Log Analysis (ELA) routines use the logged data to isolate the failure by developing a reference code, reference code extension, and FRU list. These are used with the repair procedures to guide the service representative in a repair action. See "Diagnostics" in this volume for more information on reference codes.

The error logs are:

- Reference Code History
- Support Processor (SP)
- SP Event Counters
- Processing Unit (PU)
- Channel Interface Control Check (IFCC)
- Power.

Time-of-day Clock (TODC) Equivalent: The TODC Equivalent is recorded with each log to show the time the error occurred. The TODC Equivalent is stored in the support processor with a format of: yy/mm/dd hh mm ss.

When the processor is powered up, the TODC Equivalent is set by the customer during support processor IML. The TODC Equivalent is updated periodically during normal machine operation from the system time-of-day clock.

How to Display Processor Logs

To display a log:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL. The General Selection screen is displayed.
3. Refer to "Summary of Log Screens." Select the log you want to display, and key in the digits shown in the **To Display, Enter** column. Then press ENTER.

Summary of Log Screens

Log Type	Screen Name	To Display, Enter:	Summary
Support Processor (SP)	SP Event Counters	QESE	Running totals of SP information.
	RSF Line	QEL	RSF line operations and errors.
	SP Summary	QESD	Summary of last 16 SP logs.
	SP Detail	QESDxx	Detailed information on SP log xx.
Power	Power Directory	QEWD	Summary of last 16 power logs.
	Power Detail	QEWDxx	Detailed information on power log xx.
Processing Unit (PU)	PU Logout Directory	QEPD	Last eight PU logs and last irrecoverable PU log.
	PU Summary	QEPS	PU error counters.
	Microword Directory	QEPM	PU control storage registers at the time of failure.
	PU Reconfiguration Data	QEPR	Areas of the processor reconfigured because of an error.
Channel	IFCC Summary	QEI	Summary of last 16 interface control checks.
	IFCC Detail	QEIxx	Detailed information on interface control check xx.

Reference Code History Log Screen

The Reference Code History Log screen is a record of the last 31 different power, support processor, and processing unit reference codes with the time of failure and number of times each one occurred.

To display the Reference Code History Log screen:

1. Press MODE SEL.
2. Key in QERD and press ENTER.

To clear the Reference Code History Log screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QERDP and press ENTER.
4. When prompted, key in P and press ENTER again.

Label Identification

RN: Record number. Record number 00 is the *latest* entry.

CT: Count. The number of consecutive times the same reference code was logged. If CT is greater than 1, the TODC Equivalent gives the time of the *first* failure.

TODC EQUIV: The time of the failure.

REF CODE: The reference code defining the failure. For a detailed description of reference codes, see "MSS, Power, and Reference Codes" in the "Diagnostics" section.

RC EXTN: The reference code extension, if any, for the failure.

REFERENCE CODE LOGOUT FILE				CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss			
RN	CT	---TODC EQUIV--	REF CODE RC EXTN.	RN	CT	---TODC EQUIV--	REF CODE RC EXTN.
0	01	mm/dd hh:mm:ss	EC517464 00000000	16	00	mm/dd hh:mm:ss	00000000 00000000
1	01	mm/dd hh:mm:ss	EC517A64 00000000	17	00	mm/dd hh:mm:ss	00000000 00000000
2	00	mm/dd hh:mm:ss	00000000 00000000	18	00	mm/dd hh:mm:ss	00000000 00000000
3	00	mm/dd hh:mm:ss	00000000 00000000	19	00	mm/dd hh:mm:ss	00000000 00000000
4	00	mm/dd hh:mm:ss	00000000 00000000	20	00	mm/dd hh:mm:ss	00000000 00000000
5	00	mm/dd hh:mm:ss	00000000 00000000	21	00	mm/dd hh:mm:ss	00000000 00000000
6	00	mm/dd hh:mm:ss	00000000 00000000	22	00	mm/dd hh:mm:ss	00000000 00000000
7	00	mm/dd hh:mm:ss	00000000 00000000	23	00	mm/dd hh:mm:ss	00000000 00000000
8	00	mm/dd hh:mm:ss	00000000 00000000	24	00	mm/dd hh:mm:ss	00000000 00000000
9	00	mm/dd hh:mm:ss	00000000 00000000	25	00	mm/dd hh:mm:ss	00000000 00000000
10	00	mm/dd hh:mm:ss	00000000 00000000	26	00	mm/dd hh:mm:ss	00000000 00000000
11	00	mm/dd hh:mm:ss	00000000 00000000	27	00	mm/dd hh:mm:ss	00000000 00000000
12	00	mm/dd hh:mm:ss	00000000 00000000	28	00	mm/dd hh:mm:ss	00000000 00000000
13	00	mm/dd hh:mm:ss	00000000 00000000	29	00	mm/dd hh:mm:ss	00000000 00000000
14	00	mm/dd hh:mm:ss	00000000 00000000	30	00	mm/dd hh:mm:ss	00000000 00000000
15	00	mm/dd hh:mm:ss	00000000 00000000	TIME OF LAST PURGE: yy/mm/dd hh:mm:ss			
COMMAND: QERD				==>			

Maintenance and Support Subsystem Logs

Maintenance and Support Subsystem (MSS) hardware failures and microcode errors are logged if enough of the MSS is operational.

The MSS log screens are:

- SP Logout Summary
- SP Detail Log
- SP Event Counters
- Remote Support Facility (RSF) Line Error Statistics.

SP Logout Summary Screen

The SP Logout Summary contains a record of the last 16 SP error logs.

To display the SP Logout Summary screen:

1. Press MODE SEL.
2. Key in QESD and press ENTER.

To clear the SP Logout Summary screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QESDP and press ENTER.
4. When prompted, key in P and press ENTER again.

SP LOGOUT SUMMARY													CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss			
LN	EVNT	CT	TODC	EQUIVALENT	LVL	MM	MC	--MSW--	C	IC	INST	ADPT	SIC	LMR	REF.CODE	
00	0003	01	mm/dd	hh:mm:ss	07	00	12	63402F2E	6340	EE05	0000	0000	3900	EC517464		
01	0002	01	mm/dd	hh:mm:ss	07	00	12	63402F2E	6340	EE05	0000	1856	96C8	EC517A64		
02	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
03	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
04	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
05	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
06	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
07	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
08	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
09	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
10	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
11	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
12	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
13	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
14	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
15	0000	00	mm/dd	hh:mm:ss	00	00	00	00000000	0000	0000	0000	0000	0000	00000000		
COMMAND: QESD										==>						

Label Identification

LN: Log number. Log number 00 is the *latest* entry.

EVENT: The total number of SP errors since the last IML.

CT: The number of consecutive times the same failure occurred.

TODC Equivalent: Time of the log.

LVL: The level the SP microcode was running in at the time of failure.

MM: The master mask value.

MC: SP check register contents. For bit values, see SPCK under "Label Identification" on page LOG 030.

MSW: Microcode status word value.

C-IC: Corrected instruction counter value.

INST: The SP microcode instruction executing at the time of failure.

ADPT: Adapter address the microcode was working with at the time of failure.

SIC: Address of the last microcode instruction.

LMR: Last module read from the diskette.

SP Detail Log Screen

The SP Detail Log screen contains detailed error information recorded at the time of a failure on the support processor.

To display the SP Detail Log screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QESDxx and press ENTER. Where xx is a log number (1-16) selected from the SP Logout Summary screen (QESD).

Two different formats are used for the SP Detail Log screen depending on the interrupt level of the SP microcode at the time of failure. The two formats are for:

Microcode levels 2 through 5 (see "SP Detail Log for Levels 2 through 5").

Microcode levels 1, 6, and 7 (see "SP Detail Log for Levels 1, 6, and 7").

Label Identification

LEVEL: Level of the SP microcode at the time of failure.

MMASK: Master mask setting.

CMASK: Common mask setting.

SPCK: SP check register contents. Bit values are:

- 0 I/O parity error
- 1 I/O timeout
- 2 SP storage parity error
- 3 SP microcode check
- 4 Burst mode change
- 5 Always zero
- 6 Instruction Counter change
- 7 Always zero

LOMC: SP check register contents after log (bits are the same as SPCK).

IOIRR: I/O interrupt request register contents at the time of failure.

MIRR: Microcode interrupt request register contents at the time of failure.

IOADPT: I/O adapter address (if error occurred during an I/O operation).

IOCMD: I/O command to a device attached directly to the SP bus.

IC: Instruction counter value.

C-IC: Corrected instruction counter value.

LMR: Last module ID read from the diskette.

LMRBASE: Last module ID base program read.

INST: Instruction at time of failure.

CNFG: Configuration data for devices attached to the SP bus.

DLAT: Directory lookaside tables.

REFCODE: Reference code defining the failure.

RC EXTN: Reference code extension.

MSWs: Microcode status words.

BURST MODE: Burst mode registers for each SP attached device.

I/O STATUS: Status of I/O devices attached to the SP. (See "I/O Status Fields.")

Note: A letter can be displayed before the value in the I/O status fields (except PU). The letters define the error condition. The error conditions are:

- C Machine check
- P Parity error
- T Timeout

PLDA: Program link data area values. (See "PLDA Fields.")

REGS: Data values in the active register pages.

PP: Primary page active at the time of error.

SP: Secondary page active at the time of failure.

SPIL CURRENT INSTRUCTION: Address and data of the current SP microcode instruction at the time of failure.

SPIL LAST INSTRUCTION: Address and data of the last SP microcode instruction at the time of failure.

SPIL BRN TABLE: Last 13 SP microcode instruction branch addresses.

DEVICE CONTROL BLOCK: Sixty-four bytes of device dependent information.

SP Detail Log for Levels 2 through 5

```

SP LOG:00 TODC EQUIV:yy/mm/dd hh:mm:ss ID:0000000000 EC:866898 EVENT:002D
-----
LEVEL 03 IOIRR 48 IC 7F00 CNFG:AB0000000000A201ED00 RC:FE400324 00000000
MMASK 01 MIRR 13 C-IC 7F00 DLAT LVL MSW LVL MSW
CMASK DF IOADT 00 LMR 9309 DATA 85 0 3010 2120 1 60DE 2322
SPCK 12 IOCMD 00 LMRB 9309 INST 80 2 0800 2524 3 7F04 2726
LOMC 00 INST EE05 4010 CHAN 85 4 9404 A928 5 208E AB2A
-----BURST MODE----- STAT 00 6 60DE AD2C 7 89A4 AF2E
LCA 8500D0 DISK 811000 -----I/O STATUS-----PLDA-----
DCA 85FA52 85FB80 DISK1 02 LCA 002000 C1 0000 C2 0000 C3 8000
DCA 85FC80 85FD80 DISK2 38 CCA 0000000000 OP 0000 CK 0000 BF 0000
DCA 85EB80 85FC00 PWR 01 DCA 0493 C4 00 DS 40 IM 90 PG 80
DCA 85FD02 85FE00 SBA 03 PU 00000000 TM 04 TP 8000 CB QLM
REGISTERS:
PP:26 0111 4200 2334 0000 8080 9978 0020 3AF0
SP:27 2000 1170 2020 3030 8400 8420 8440 8460
-----DEVICE CONTROL BLOCK-----
2080 0000 0000 0000 0080 00F8 0000 0000 0000 0000 0400 0000 0000 0200 0000 0000 0000
0000 A900 0000 0000 408C 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
COMMAND: QESD00 ==>
    
```

Seq GF015	PN 0446207 Pg 2 of 3	EC A02214 15 SEP 83	EC A02215 01 NOV 83			
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SP Detail Log for Levels 1, 6, and 7

```

SP LOG:01 TODC EQUIV:yy/mm/dd hh:mm:ss ID:0000000000 EC:866898 EVENT:0002
=====
LEVEL 07 IOIRR 00 IC 6344 CNFG:AB0000000000A201ED00 RC:EC517464 00000000
MMASK 00 MIRR 01 C-IC 6344          DLAT      LVL  MSW      LVL  MSW
CMASK DF IDADT 00 LMR 9000          DATA 81  0 3010 2120  1 60DE 2322
SPCK 12 IOCMD 00 LMRB 9000          INST 84   2 0800 2524  3 B068 2726
LOMC 00          INST EE05 8C60      CHAN 85   4 9304 A928  5 208E AB2A
-----BURST MODE-----
LCA 8500D0 DISK 810800 -----I/O STATUS-----PLDA-----
DCA 85FABE 85FB70  DISK1 02  LCA 000000  C1 0000 C2 0B00 C3 8000
DCA 85FC70 85FD70  DISK2 00  CCA 0000008000 OP 0000 CK 0000 BF 0000
DCA 85FE7C 85FBF0  PWR  C 02  DCA 0002      C4 00 DS 40 IM 90 PG 80
DCA 85FCF0 85FDF0  SBA  02  PU  300068E0  TM C4 TP 8000 CB QLIM
REGISTERS:
PP:2E C901 5201 F00A 62E0 8262 90F6 10EE 8493
SP:2F 00DC 00D6 8000 88DC 3E00 00D8 00D0 663C
-----SPIL CURRENT INSTRUCTION-----SPIL LAST INSTRUCTION-----
ADDR:00DC DATA:00EE 04F0 01A2 04F0 ADDR:00D6 DATA:5201 0000 0494 00EE
SPIL BRN TABLE 0722 00D0 007A 002C 000C 26DC 268E 266C 2646 2628 260C 0A66 0A54
COMMAND: QESD01 ==>
    
```

PLDA Fields

	C1	C2	C3
Byte 0			
Bit 0	Soft stop	Async stop occurred	CE switch on
Bit 1	Hard stop	Address compare	Operation rate not normal
Bit 2	Not used	Mode or swap key	Check control not normal
Bit 3	PU degraded	Console function request	Address control not normal
Bit 4	Machine check	Start key disabled	Diagnostic test active
Bit 5	Check stop	Not used	Not used
Bit 6	Offline	Mode key disabled	Not used
Bit 7	Wait state	Swap key disabled	Not used
Byte 1	No bits used	No bits used	No bits used

	OP	CK	BF
Byte 0			
Bit 0	Instruction step	Machine check channel detect	Block active
Bit 1	Word step	Not used	Block invoked
Bit 2	Clock cycle step	Not used	Block processing start
Bit 3	Clock pulse step	Not used	Address compare command
Bit 4	Repeat microword	Machine check no retry	Erase in progress
Bit 5	Not used	Log machine check no retry	Save request
Bit 6	Not used	Disable	Verify block
Bit 7	Not used	Stop after log	Deactivate
Byte 1	No bits used	No bits used	
Bit 0			QDD patch, special block
Bit 1			Not used
Bit 2			Deactivate
Bits 3-7			Not used

	C4	DS	IM	PG
Byte 0				
Bit 0	Not used	Not used	Cold IML	3270 mode
Bit 1	Not used	Configured	Not used	Printer/keyboard mode
Bit 2	Not used	Not used	Not used	RCS code
Bit 3	Not used	Not used	Interval timer	Not used
Bit 4	Not used	Channel to channel	Not used	Not used
Bit 5	Start key	Not used	Not used	RSAM code
Bit 6	Stop key	Not used	IPL failed	Not used
Bit 7	External interrupt	Not used	IML failed	ROCF monitor

I/O Status Fields

Bits	DISK1/DISK2	Bits	PWR	SBA	Byte 3	LCA	CCA	DCA	PU
0-1: 00	Good ending	0	Not used	Control parity check	Bit 0	Not used	DS ready	Not used	Not used
01	CRC error	1	Not used	Data parity check	Bit 1	Not used	CTS	Not used	Not used
10	Command error	2	Not used	Command parity check	Bit 2	Not used	RLSD	Not used	Not used
11	Hardware error	3	Not used	Address parity check	Bit 3	Not used	Ring indicator	Not used	Not used
2-4: 000	Adapter ready	4	Command check	Shift register busy	Bit 4	Not used	DSR transmit	Not used	Not used
001	SP machine check	5	SP machine check	SP machine check	Bit 5	Not used	Not used	Not used	Not used
010	Interrupt enable	6	Interrupt enable	Timer interrupt enable	Bit 6	Not used	RLSD transmit	Not used	Not used
011	Interrupt request	7	Interrupt request	Timer interrupt request	Bit 7	Not used	CTS transmit	Not used	Not used
100	Overrun/underrun				Byte 4				
101	Timeout				Bit 0	Not used	Terminal ready	Not used	Not used
110	Record not found				Bit 1	Not used	RTS	Not used	Not used
111	Disk not ready				Bit 2	Not used	Wrap	Not used	Not used
5:	SP check				Bit 3	Not used	Test	Not used	Not used
6:	Adapter enable				Bit 4	Not used	Standby	Not used	Not used
7:	Interrupt pending				Bit 5	Not used	Half speed	Not used	Not used
					Bit 6	Not used	New sync	Not used	Not used
					Bit 7	Not used	DCE interface disable	Not used	Not used

Byte 0	LCA	CCA	DCA	PU
Bit 0	Command received	Input request	Counter overflow	Operate
Bit 1	Status received	Output request	Read timeout	Stopword
Bit 2	Chaining	DCE interrupt	Line error	370 mode
Bit 3	Stop transfer	Timer interrupt	Read error	EC/BC mode
Bit 4	Chaining cancel	Exception	Stop poll	DAT
Bit 5	Count = 0	SP machine check	Timer	Wait
Bit 6	Interface disconnect	Interrupt enable	Error queue	Channel sequence match
Bit 7	Outstanding status	Interrupt request	Not used	CS address match
Byte 1				
Bit 0	SP Interface error	Overrun	Extended status	Store address match
Bit 1	370 interface error	Underrun	Command complete	LS address match
Bit 2	Interface disable	Receive clock	DCA active	Not used
Bit 3	Status pending	SDLC invalid	Key status	System state
Bit 4	Adapter busy	SDLC frame	Not used	PU clock run
Bit 5	SP machine check	Wrong character	SP machine check	Channel clock run
Bit 6	Interrupt enable	Break byte	Interrupt enable	Storage clock run
Bit 7	Interrupt request	Adapter in sync	Interrupt request	Instruction step
Byte 2				
Bit 0	System reset	Receive	Not used	Microword step
Bit 1	Stack status	Transmit	Not used	Clock step
Bit 2	Enable/disable chaining	Inhibit 0 insertion	Not used	Pulse step
Bit 3	Select reset	Auto, EBCDIC	Not used	Disable error
Bit 4	CU end error	ASCII, SDLC	Not used	Control store error
Bit 5	Data cancel	Code length	Not used	Disable error
Bit 6	Not used	Code length	Not used	Channel error
Bit 7	Not used	NRZI	Not used	Instruction step

SP Event Counter Screen

The SP Event Counter screen keeps a count of various events in the support processor.

To display the SP Event Counter screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QESE and press ENTER.

More than one screen is needed to display the SP counters. If you want to move between screens, press and hold the ALT key and press the PAGE UP or PAGE DOWN key.

The TOTAL columns record the number of times the event occurred since the machine was installed. The TOTAL columns are not reset when you clear the counters. The DELTA columns record the number of times the event has occurred since the last time the SP Event Counters were cleared.

If a TOTAL or DELTA field reaches its maximum value, it is reset and starts counting from zero. This can result in the DELTA field at a higher value than the TOTAL field.

If you want to clear the DELTA columns on the SP Event Counter screens:

1. Set the CE Mode switch to CE Mode.
2. Key in QESER and press ENTER.
3. When prompted, key in R and press ENTER again.

```

*ERROR LOG DISPLAY*          *SP EVENT COUNTERS*
0 TOTAL POWER ON HOURS      CURRENT TODC EQUIV: yy/mm/dd hh:mm:ss
0 DELTA POWER ON HOURS     LAST RESET TODC EQUIV:
TOTAL DELTA                TOTAL DELTA
0 0 TIMES POWERED ON       0 0 TIMES POWERED OFF
0 0 POWER FAULTS           0 0 HOURS IN CE MODE
0 0 HOURS IN DIAGNOSTIC MODE
0 0 SP PARITY ERR HARD RECOV 0 0 SP PARITY ERR HARD UNREC
0 0 SP PARITY ERR SOFT RECOV 0 0 SP PARITY ERR SOFT UNREC

0 0 SP REIML               0 0 AUTO SP-REIML
0 0 SP RESETS              0 0 AUTO SP-RESET

0 0 SUCCESSFUL LCA RETRY    0 0 UNSUCCESSFUL LCA RETRY
0 0 LCA CYCLE STEAL ERROR

0 0 SUCCESSFUL DCA RETRY    0 0 UNSUCCESSFUL DCA RETRY
0 0 DCA CYCLE STEAL ERROR

COMMAND: QESE                ==>
    
```

```

*ERROR LOG DISPLAY*          *SP EVENT COUNTERS*
0 TOTAL POWER ON HOURS      CURRENT TODC EQUIV: yy/mm/dd hh:mm
0 DELTA POWER ON HOURS     LAST RESET TODC EQUIV: yy/mm/dd hh:mm
TOTAL DELTA                TOTAL DELTA
0 0 SUCCESSFUL CCA RETRY    0 0 UNSUCCESSFUL CCA RETRY

0 0 SUCCESSFUL DDA RETRY    0 0 UNSUCCESSFUL DDA RETRY
0 0 DDA CYCLE STEAL ERROR

0 0 SUCCESSFUL PCA RETRY    0 0 UNSUCCESSFUL PCA RETRY
0 0 SUCCESSFUL SBA RETRY    0 0 UNSUCCESSFUL SBA RETRY

0 0 PU-IML XA-MODE         0 0 PU-IML S370
0 0 PU-IPL                 0 0 PU-IPL S370
0 0 SUCCESSFUL RETRY        0 0 UNSUCCESSFUL RETRY

COMMAND: QESE                ==>
    
```

RSF Line Error Statistics Screen

The RSF Error Statistics screen keeps a count of the number of Remote Support Facility operations and the line errors encountered.

To display the RSF Error Statistics screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QEL and press ENTER.

```
*CNFG/REMOTE*          *RSF LINE ERROR STATISTICS*

NUMBER OF OPERATIONS    SEND      RECEIVE
NUMBER OF ERRORS        0000      0000
                        0000      0000
NUMBER OF UNDERRUNS/OVERRUNS  0000

Q GENERAL SELECTION
Z RETURN TO PROG SYS

COMMAND: QEL                      ==>
```

Processing Unit Logs

The Processing Unit Log screens are:

- Processing Unit Logout Directory
- Processing Unit Microword Directory
- Processing Unit Logout Summary
- Processing Unit Reconfiguration Data.

Processing Unit Logout Directory Screen

The Processing Unit Logout Directory screen contains information on the last nine processing unit logs if at least one of them was caused by an irrecoverable error. If none of the last nine PU logs were caused by an irrecoverable error, the screen contains the last eight PU logs and the last log caused by an irrecoverable error.

To display the Processing Unit Logout Directory screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QEPD and press ENTER.

Label Identification

ID: Log identifier number from 0001 to FFFF.

TODC: Time of the failure.

REFERENCE CODE: The reference code that resulted from the error, or blank if the reference code was not available.

ERR: Storage error that occurred as follows:

- DBE Double-bit error
- KEY Key error

STG ADDR: The location of a storage failure if a storage error occurred or the message **AD N/A** if the address is not available.

ID	TODC	REF CODE	ERR	STG ADDR	MACH STATUS	CHANNEL RST
PROCESSING UNIT LOGOUT DIRECTORY MODEL: 4381 SERIAL NUMBER: 012345						
0008	yy/mm/dd hh:mm:ss	5DD218AE			CHECK STOP (RESET)	--X-----
0007	yy/mm/dd hh:mm:ss	5DD218AE			CHANNEL ERROR	-----
0006	yy/mm/dd hh:mm:ss	5DD218AE			CHANNEL ERROR	-----
0005	yy/mm/dd hh:mm:ss	5DD218AE			CHECK STOP	----X-----
0004	yy/mm/dd hh:mm:ss	5D03BCAE			CHECK STOP	-----
0003	yy/mm/dd hh:mm:ss	5DD218AC	DBE xxxxxxxx		SUCCESSFUL RETRY	-----
0002	yy/mm/dd hh:mm:ss	5DD218AE	DBE xxxxxxxx		UNSUCCESSFUL RETRY	-----
0001	yy/mm/dd hh:mm:ss	5DD218AE			CHANNEL ERROR	05-----
					LOGOUT NOT EXIST	
COMMAND: QEPD ==>						

MACH STATUS: The machine status after the failure is logged and analyzed as follows:

CHANNEL ERROR

A channel error occurred. If the channel error cannot be corrected, the channel is removed from use and the failing channel ID is displayed next to the CHANNEL RST field.

CHECK STOP

An error occurred that cannot be retried.

CHECK STOP (RESET)

An error occurred during system reset.

EXIGENT MACHINE CHECK

An error occurred with processor damage or system damage.

LOGOUT NOT EXIST

No logout data is available for the error.

LOGOUT PURGE

The date and time the log was cleared.

SUCCESSFUL RETRY

The error condition was retried without another error.

UNSUCCESSFUL RETRY

The error condition was retried and another error occurred.

CHANNEL RST

An X indicates that the channel(s) (00 through 0B) were reset because of the failure. A channel ID of 00 through 0B shows the ID of a channel that was removed from use because of an error.

Seq GF025	PN 0446209 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02220 06 JUN 84		
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Processing Unit Microword Directory Screen

The Processing Unit Microword Directory screen contains a record of the information stored in the PU control storage registers at the time of a failure.

To display the Processing Unit Microword Directory screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QEPM and press ENTER.

Label Identification

ID: The same ID as the Processing Unit Logout Directory screen.

CREG: The microinstruction performed at the time of failure.

CREGSAVEA, CREGSAVEB, and CREGSAVEC: The last three microinstructions performed.

CSARBU: Address of the microinstruction performed at the time of failure.

SAVERG: Address of the next-to-last microinstruction.

CK STOP: Two bytes defining the check stop. The bit values are:

Byte 0

- Bit 0 Check stop and machine check latches on.
- Bit 1 SBA error.
- Bit 2 SP to PU communication error during retry.
- Bit 3 Error while reporting a unit exception.
- Bit 4 Exigent machine check with PSW bit 13 = 0.
- Bit 5 SRASM/SRMAP error.
- Bit 6 Severe error.
- Bit 7 PU check stop.

Byte 1

- Bit 0 Unable to restart.
- Bit 1 Error during system reset.
- Bit 2 Error during clock pulse step mode.
- Bit 3 Storage key error.
- Bit 4 Parity error in storage address.
- Bit 5 ICTR parity check during instruction step.
- Bit 6 Prefix parity error during retry.
- Bit 7 ICER/CCER parity error during retry.

RECONF: What processing unit hardware (if any) has been reconfigured because of an error. The following areas can be reconfigured:

- CACHE Cache storage
- CACHE DR Cache directory
- CAM Multiply function (Model Group 2 only)
- CHANNEL Any channel (00 through 0B)
- CNTL STG Control storage
- SWAPBUF Swap buffer

A * next to one of the fields shows the field contains microinstruction address or data existing at the time of failure.

PROCESSING UNIT MICROWD LOGOUT DIRECTORY								MODEL:4381	SERIAL NUMBER:012345
ID	CREG	CREGSA	CREGSVB	CREGSVC	CSARBU	SAVERG	CK STOP	RECONF IG	
01B5	020057F1	*D0800000	00000000	00000000	008004	000004	0040		
01B4	7FF97FFB	*D0800000	00000000	00000000	008004	000004	0040		
01B3	020057F1	*D0800000	00000000	00000000	008004	000004	0040		
01B2	020057F1	*D0800000	00000000	00000000	008004	000004	0040		
01B1	*B8B06A30	F2001F00	FFFFFFFF	B8B06A30	*01702C	01702C	0040		
01B0	020057F1	*D0800000	00000000	00000000	008000	000004	0040		
01AF	020057F1	*D0800000	00000000	00000000	008000	000004	0040		
01AE	02105079	*02105079	91423B78	1C005B71	017678	017678	0040		
01AD	02105079	*02105079	91423B78	1C005B71	017678	017678	0040		

COMMAND: QEPM ==>

Processing Unit Logout Summary

The Processing Unit Logout Summary screen contains error statistics for sections of the processing unit.

To display the Processing Unit Logout Summary screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QEPS and press ENTER.

Each entry on the PU Logout Summary screen has two counters. The counters in the left-hand columns can be changed or reset by moving the cursor to the counter location and entering the desired value. The counters in the center columns collect over the life of the machine; they cannot be reset.

Machine status and storage error statistics are displayed in the left-hand side of the screen. The rest of the screen has error statistics for each area of the processing unit.

Label Identification

SUCCESSFUL RETRY: The processor retried a machine check successfully.

SUCCESSFUL I/O: The processor retried an I/O error successfully.

UNRTY (NORMAL): The processor was operating with check control in normal. Processor or system damage occurred because of a machine check; retry was not possible.

UNRTY (EHC): A machine check occurred during retry.

UNRTY (NO RETRY): The processor was operating with check control in no retry mode when a machine check occurred.

CK ST (FIRST): The processor went to check stop on a machine check; retry was not possible.

CK ST (EHC): A machine check occurred while trying to report an unretrieable error.

CK ST (NO LOG): The processor was operating with check control in no log. A machine check occurred during retry; the counter was updated but no log was recorded.

CK ST (MC RESET): A machine check occurred during processor IML or system reset.

KEYS: A storage key error occurred.

DBE HARD-HARD: A storage double-bit error where both bits are solid failures.

DBE HARD-SOFT: A storage double-bit error where one bit is a solid failure and the other bit is an intermittent failure.

DBE SOFT-SOFT: A storage double-bit error where both bits fail intermittently.

HARDWARE COUNTER: Records the number of single-bit main storage errors.

```

PU LOG SUMMARY MODEL: 4381 SERIAL: 012345 LOCAL TOD EQU: yy/mm/dd hh:mm:ss
001D 001D SUCCESSFUL RTY 0064 0064 CS CONTROL 000B 000B CH DATA BUFFR
0006 0006 SUCCESSFUL I/O 0018 0018 CS ARRAY 0 001D 001D CH CONTROL
0022 0022 UNRTY (NORMAL) 0014 0014 CS ARRAY 1 0015 0015 CH INTERFACE1
0014 0014 UNRTY (EHC) 0015 0015 CS ARRAY 2 0019 0019 CH INTERFACE0
0000 0000 UNRTY (NO RETRY) 0011 0011 CS ARRAY 3 001D 001D ST CACHE 0
001B 001B CK ST (FIRST) 002D 002D PU DATA FLOW L 000F 000F ST CACHE 1
0030 0030 CK ST (EHC) 001E 001E PU DATA FLOW H 0009 0009 ST CACHE 2
0010 0010 CK ST (NO LOG) 0016 0016 PU SHIFTER 000F 000F ST CACHE 3
00E7 00E7 CK ST (MC RESET) 0027 0027 PU SAR 0002 0002 ST CTL/ECC1 E
0007 0007 KEYS 0015 0015 PU I-CYCLES 000B 000B ST CTL/ECC1 O
0000 0000 DBE HARD-HARD 001E 001E PU INTRUPT 001E 001E ST BSM/ECC2 E
0000 0000 DBE HARD-SOFT 0012 0012 PU TIMER 001E 001E ST BSM/ECC2 O
0002 0002 DBE SOFT-SOFT 0021 0021 PU LS/EXT 000C 000C ST SAR
0002 0002 DBE UNCORRECTED 0017 0017 PU CL CONTROL 0 000B 000B ST KEYS
0000 0000 DBE CORRECTED 0000 0000 PU CL CONTROL 1 0035 0035 ST DLAT
000000 HARDWARE COUNTER

COMMAND: QEPS ==>
    
```

Seq GF030	PN 0446210 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02220 06 JUN 84		
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PU Reconfiguration Data

The PU Reconfiguration Data screen records any reconfiguration that takes place because of a processing unit error. Up to thirty reconfiguration logs can be stored.

To display the last 15 reconfiguration logs:

1. Press MODE SEL.
2. Key in QEPR and press ENTER.

If there are more than 15 reconfiguration logs, the message PRESS ENTER is displayed at the bottom of the screen.

Label Identification

LOGID: The same ID as the Processing Unit Logout Directory screen (QEPD). Since all processing unit errors do not result in reconfiguration, all log IDs on the QEPD screen may not be displayed on the PU Reconfiguration Data screen.

TODC: The time of the failure.

RECONFIGURATION DATA: Shows what areas of the processing unit have been reconfigured because of the error. The areas that can be reconfigured are:

- CACHE

Cache is reconfigured on a byte basis. If byte four of cache is bad, byte four is assigned to the backup area for all cache pages. The reconfigured bytes (0 through 7) are indicated by an X.

- CACHE DIR

If a part of the cache backup area is bad, the associated cache directory entry is used to flag the processor that this area of cache cannot be used. The cache directory has 32 associated classes (CONG. CL) with eight slots each.

- CDB

The channel data buffer has four extra buffers that can be used for reconfiguration: two extra buffers (X and Y) for channels 0 through 5 and two extra buffers (X and Y) for channels 6 through B. The extra buffers are shown with the channels assigned to them.

- CNT STG

Control storage is reconfigured to a 2K backup area on a byte pair basis. The screen displays the byte pair that was reconfigured, bit 20, and the address.

- HW MULT (Model Group 2 only)

If the multiply function fails, multiply instructions are done by microcode.

- STG DBE

If a double-bit error occurs in main storage, the error type is displayed with the address of the failing doubleword. The error types are:

- SS Both bits are failing intermittently (soft-soft). This error is not correctable.
- HH Both bits are failing all the time (hard-hard). This error is correctable.
- HS One bit is failing all the time; the other is failing intermittently (hard-soft). This error is correctable.
- CR The error is correctable.
- NC The error is not correctable.

```

PU.RECONFIGURATION DATA MODEL: 4381 SERIAL: 012345 TOD: yy/mm/dd hh:mm:ss
LOGID TOD EQUIVALENT RECONFIGURATION DATA
-----
0008 yy/mm/dd hh:mm:ss SWAP BUFF. BYTE --XX-----
0007 yy/mm/dd hh:mm:ss CDB CHANNEL X03 Y05
0006 yy/mm/dd hh:mm:ss HW. MULT. RECONFIG
0005 yy/mm/dd hh:mm:ss CACHE BYTE -X-----
0004 yy/mm/dd hh:mm:ss CNT. STG. BYTE 2/6 20=1 ADDR 002FF0
0003 yy/mm/dd hh:mm:ss CACHE DIR. CONG. CL 10 SLOT 00
0002 yy/mm/dd hh:mm:ss STG. DBE. SS NC ADDR 002AEA0

LATEST LOGID: 0008 -----
COMMAND: QEPR ==> PRESS ENTER
-----
    
```

ERR A machine check occurred while trying to analyze an error. The error type was not determined.

NE No error was found.

The error type is displayed to the left if an even address failed and to the right if an odd address failed. The sample screen on this page shows a soft-soft, noncorrectable error for an even address.

- SWAP BUFF

The swap buffer is reconfigured on a byte pair basis. The reconfigured bytes (0 through F) are indicated with an x.

LATEST LOGID: The last log ID that required reconfiguration.

Seq GF035	PN 0446211 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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Channel Interface Control Check (IFCC) Logs

Two channel IFCC log screens are available:

- Channel Interface Logout Summary
- Channel Interface Logout Detail.

Channel Interface Logout Summary Screen

The Channel Interface Logout Summary screen displays the number of Interface Control Check (IFCC) logs taken for each channel up to eight logs per channel. For channels with greater than eight logs, 8+ is displayed. The last channel to have an IFCC is displayed in the center of the screen.

To display the Channel Interface Logout Summary screen:

1. Press MODE SEL.
2. Key in QEI and press ENTER.

Notes:

1. Only channels which are configured for the processor are displayed on the Channel Interface Logout Summary screen.
2. If a reconfiguration has taken place, the LAST IFCC SAVED field may point to a channel that is not displayed on the screen.
3. If multiple errors occur in a short time span, IFCC logging can be stopped to increase processor speed. If logging has been stopped, you can start logging again by clearing the channel interface logs or by re-IMLing. The processor must be in instruction stop while clearing the log. If the processor is in hardstop when the logs are cleared, logging will not continue when the system is started again.
4. If ** is displayed in the LAST IFCC SAVED field, no IFCCs have occurred since the IFCC logs were purged.
5. If you display one of the Channel Interface Logout screens (QEI or QEIDxxy) with the system running and an interface control check occurs, the General Selection (Q) screen is displayed. (This will occur for any console function screen.) If IFCCs are occurring and you want to display a console function screen, press STOP.

ERROR DISPLAYS		*INTERFACE CONTROL CHECK LOGOUTS*		
XXY=CHNLXX,L Y		CHNL	IFCC LOGGED	LAST IFCC SAVED
DXXY DISPLAY		00	00	03
P PURGE IFCC LOGOUTS		01	02	
		02	00	
		03	01	
Q GENERAL SELECT		04	00	
		05	00	
Z RTN TO SYSTEM				
LAST PURGE: yy/mm/dd hh:mm				
COMMAND: QEI				==>

To clear the Channel Interface Logout Summary screen:

1. Set the CE Mode switch to CE Mode.
2. If the processor is running, press STOP on the operator console.
3. Key in QEIP, and press ENTER.
4. When prompted, key in P and press ENTER again. The IFCC log screens for all channels are cleared.

Channel Interface Logout Detail Screen

On the Channel Interface Logout Detail Screen, log 1 always contains information about the latest failure. If there are more than eight logs on the selected channel, 8+ is displayed for the selected channel on the Channel Interface Logout Summary Screen. Logs 1 through 4 contain information about the latest failures, and logs 5 through 8 contain information about the first four logs occurring after the logs were cleared. In this case, log 8 is the first error to occur after the logs were cleared.

To display the Channel Interface Logout Detail screen:

1. Press MODE SEL.
2. Key in QEIDxx and press ENTER. Where xx is the address of the channel (00 through 0B) that you want to display.
3. To intensify the tag lines active for a specific failure, key in QEIDxxy and press ENTER. xx is the same channel and y is the log number (1 through 8) from the L field.

Label Identification

L: The log number.

TYPE: 370 if the device active at the time of failure uses 370 mode; 370X if the device uses 370XA mode.

DEVA: The address of the device the channel was working with at the time of failure.

SCHID: The operating system's logical device address (for 370XA mode only).

TAGS IN: Tag in lines active on the channel at the time of failure as follows:

Bit:	0	1	2	3	4	5	6	7
Tag:	REQ	OPL	DIS	ADR	SEL	STAT	SRV/DATA	Not used

Note: Tags In gives the tag values *after* the interface receivers. The interface lines can be different from the values of Tags In if a receiver fails.

```

*ERROR LOGOUTS*      *CHANNEL 00 INTERFACE LOGOUTS*      TOD: yy/mm/dd hh:mm:ss
---ADDR--- -TAGS--  --BUS--      CAT      ENGINEERING
L TYPE DEVA SCHID IN OUT SQ IN OUT CNT NUM      TOD      DATA
1 370X 0233 7777 44 32 11 55 77 FF 55 yy/mm/dd hh:mm:ss 00000000000000
2 370 000E **** 00 02 44 00 00 04 42 yy/mm/dd hh:mm:ss 0E00F01C20
3 370 000E **** 00 02 44 00 09 09 42 yy/mm/dd hh:mm:ss 2400201C92
4 370 000E **** 00 02 44 00 00 03 42 yy/mm/dd hh:mm:ss 0E00F01C20
5 370 000E **** 00 02 44 00 09 05 42 yy/mm/dd hh:mm:ss 2400201C92
6 370 000E **** 00 02 44 00 00 02 42 yy/mm/dd hh:mm:ss 0E00F01C20
7 370X 0233 8657 44 32 77 55 77 64 55 yy/mm/dd hh:mm:ss 00000000000000
8 370 000E **** 00 02 44 00 09 03 42 yy/mm/dd hh:mm:ss 2400201C92
TAGIN= REQ DPL DIS ADR SEL STA SRV/DAT TAGOUT= ADR CMD DAT SRV SUP DPL SEL
COMMAND: QEID001                               ==>
    
```

TAGS OUT: Tag out lines active on the channel at the time of failure as follows:

Bit:	0	1	2	3	4	5	6	7
Tag:	Not used	ADR	CMD	DAT	SRV	SUP	OPL	SEL

The abbreviations used for the tag lines are:

- ADR Address in/out
- SEL Select in/out
- CMD Command out
- SRV Service in/out
- DIS Disconnect in
- DAT Data in/out
- OPL Operational in/out
- STAT Status in
- REQ Request in
- SUP Suppress out

Note: Tags Out gives the tag values *before* the interface drivers. The interface lines can be different from the values of Tags Out if a driver fails.

SQ: The microcode sequence count for the error. For information on sequence counts, see Volume A06, "Service Aids," "Catalog Numbers (S/370)" or "Catalog Numbers (S/370XA)."

BUS IN: Data on bus-in at the time of failure.

BUS OUT: Data on bus-out at the time of failure.

CNT: The number of times the same error occurred sequentially.

CAT NUM: The microcode catalog number for the error. For information on catalog numbers, see Volume A06, "Service Aids," "Catalog Numbers (S/370)" or "Catalog Numbers (S/370XA)."

TOD: Time-of-day equivalent of the error if the CNT field is one, or the time-of-day equivalent for the *last* error of the group if the CNT field is greater than one.

ENGINEERING DATA: Additional data logged to help identify the failure. The fields are all one byte long and are labeled:

Byte Field ID

- 0 CHSYNC0
- 1 CHDATA0
- 2 CHSYNC1
- 3 CHDATA2
- 4 CHCMDR
- 5 CHIMODE (370XA only)
- 6 WRKPATH (370XA only)

TOD (top line): Time you requested the IFCC Logout Detail screen.

TAGIN=...TAGOUT=... (line 19): The tag lines active at the time of failure are intensified on this line for the log ID you entered.

Power Logs

Two power error logout screens are available:

- Power Error Logout Directory
- Power Error Logout Detail.

Power Error Logout Directory Screen

The Power Error Logout Directory screen displays the reference codes and times of the last 16 power logs. Line 00 represents the latest power log.

To display the Power Error Logout Directory screen:

1. Set the CE Mode switch to CE Mode.
2. Press MODE SEL.
3. Key in QEWD and press ENTER.

To clear the Power Error Logout Directory screen:

1. Key in QEWP and press ENTER.
2. When prompted, key in P and press ENTER again.

All the Power Error Logout screens are cleared.

POWER LOGOUT DIRECTORY			CURRENT TODC EQUIVALENT: yy/mm/dd hh:mm:ss
LINE	TODC EQUIVALENT	REFERENCE CODE	
00	yy/mm/dd hh:mm:ss	11A0920E	
01	yy/mm/dd hh:mm:ss	11D1600E	
02	yy/mm/dd hh:mm:ss	1141300E	
03	yy/mm/dd hh:mm:ss	11D1920E	
04	yy/mm/dd hh:mm:ss	00000000	
05	yy/mm/dd hh:mm:ss	00000000	
06	yy/mm/dd hh:mm:ss	00000000	
07	yy/mm/dd hh:mm:ss	00000000	
08	yy/mm/dd hh:mm:ss	00000000	
09	yy/mm/dd hh:mm:ss	00000000	
10	yy/mm/dd hh:mm:ss	00000000	
11	yy/mm/dd hh:mm:ss	00000000	
12	yy/mm/dd hh:mm:ss	00000000	
13	yy/mm/dd hh:mm:ss	00000000	
14	yy/mm/dd hh:mm:ss	00000000	
15	yy/mm/dd hh:mm:ss	00000000	
COMMAND: QEWD			TIME OF LAST PURGE: yy/mm/dd hh:mm:ss ==>

Power Error Logout Detail Screen

The Power Error Logout Detail Screen gives detailed information about the power system at the time an error occurs.

Note: Only the last four logs of the Power Error Logout Summary screen (00 through 03) can be displayed in detail.

To select the Power Error Logout Detail screen:

1. Set the CE Mode switch to CE Mode.
2. Enter QEWDxx; where xx is the selected line number from the Power Error Logout Summary screen (00 through 03).

Label Identification

POWER LOGOUT xx: The detail logout number you selected by entering QEWDxx.

REFERENCE CODE: The reference code that defines the power error condition.

TOD: The time of the failure.

CONTROL LATCHES AT TIME OF ERROR: The sequence of power control latches up to the failure.

POWER ERRORS: The power error(s) detected at the time of failure.

```

POWER LOGOUT: 00          REFERENCE CODE = 11D1350E   TOD = yy/mm/dd hh:mm:ss
                           CONTROL LATCHES ON AT TIME OF ERROR:
01) PICK K3              06) +5V PS109 START
02) PICK K4              07) +5V PS108 START
03) -2.2V PS103 START    08) +6V PS107 START
04) -1.5V PS105 START
05) -4.3V PS106 START

                           POWER ERRORS:
+6V PS107 CURRENT LIMIT

COMMAND: QEWD00          ==>

```


System Test

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Advanced Capabilities of 4300-FRIEND	SYS TEST 030
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Symbolic I/O Areas	SYS TEST 030
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4300-FRIEND Commands	SYS TEST 065
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CCW Commands	SYS TEST 090
General CCWs	SYS TEST 090
Disk CCWs	SYS TEST 095
Fixed Block (FB) Commands - 3370	SYS TEST 095
Tape CCWs	SYS TEST 100
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Printer CCWs	SYS TEST 100
CRT and Hardcopy Printer CCWs (3277/3278-3287)	SYS TEST 105
Teleprocessing CCWs (270x, 370x)	SYS TEST 105
CCW Flags	SYS TEST 110
CCW Command Modifiers	SYS TEST 110

System Test/4381

Introduction

There are two versions of System Test for the 4381. Use System Test/4381 (abbreviation: ST4381) if your system runs in 370 mode *only*. Use System Test/4381XA (abbreviation: ST4381XA) if your system runs in 370XA mode *or* in both 370 and 370XA modes.

Note: ST4381XA is a limited use licensed maintenance program.

Use the flowcharts on this page and page SYS TEST 020 for general information on running either ST4381 or ST4381XA. The operation of either System Test is the same.

This page provides information about System Test. If you are not sure how to begin, read this page. Be especially attentive to the information about protecting customer data.

To run System Test, go to page SYS TEST 020.

For information on copying ST4381XA using MVS utilities, see page SYS TEST 022.

Note: For more information on running System Test, see the information shipped with your ST4381 tape and the information printed on the system printer after you IPL.

Wait State Codes

To display the wait state codes, press the STOP key. The code is displayed in the status area of the screen.

00DEAD01: An irrecoverable error on the operator console is preventing communication with the operator. More information may be available on the printer.

00DEAD02: An irrecoverable error occurred on the ST4381 load device. More information may be available on the printer.

00DEAD03: The ST4381 control program was damaged by an unexpected storage alteration or program interrupt, or a tape for S/370 mode (ST4381) was IPLed in S/370XA mode.

00DEAD04: Unrequested continuous interrupts are occurring when they are masked off. More information may be available on the printer or the operator console.

00EEEEEE: System Test is terminated in response to the Terminate command. This is the normal end of test.

From previous column

REASONS TO RUN ST4381
<ul style="list-style-type: none"> - To test the I/O configuration - After you install an EC - To attempt to repeat an earlier failure - To copy your ST4381 tape.

*** HAVE YOU PROTECTED THE *** *** CUSTOMER'S DATA? ***
--

Magnetic Tape Drives
<ul style="list-style-type: none"> - Do not test a tape drive if it is shared by another system; always make it not available. Directions on how to do this are displayed, when needed, on the screen. - Always install a scratch (spare) tape on the tape drives being tested. - Always remove a customer's tape from a tape drive if you are not sure of its safety. - Write a tape mark on all blank tapes (the screen gives directions when needed).
DASD Devices
<ul style="list-style-type: none"> - Do not test a DASD device that is shared. This slows system operation and may also stop (lock out) the customer's processor. To prevent this, either make the shared DASD not available (drop it) or vary it to Test Level 2 (the screen gives you directions when they are needed).

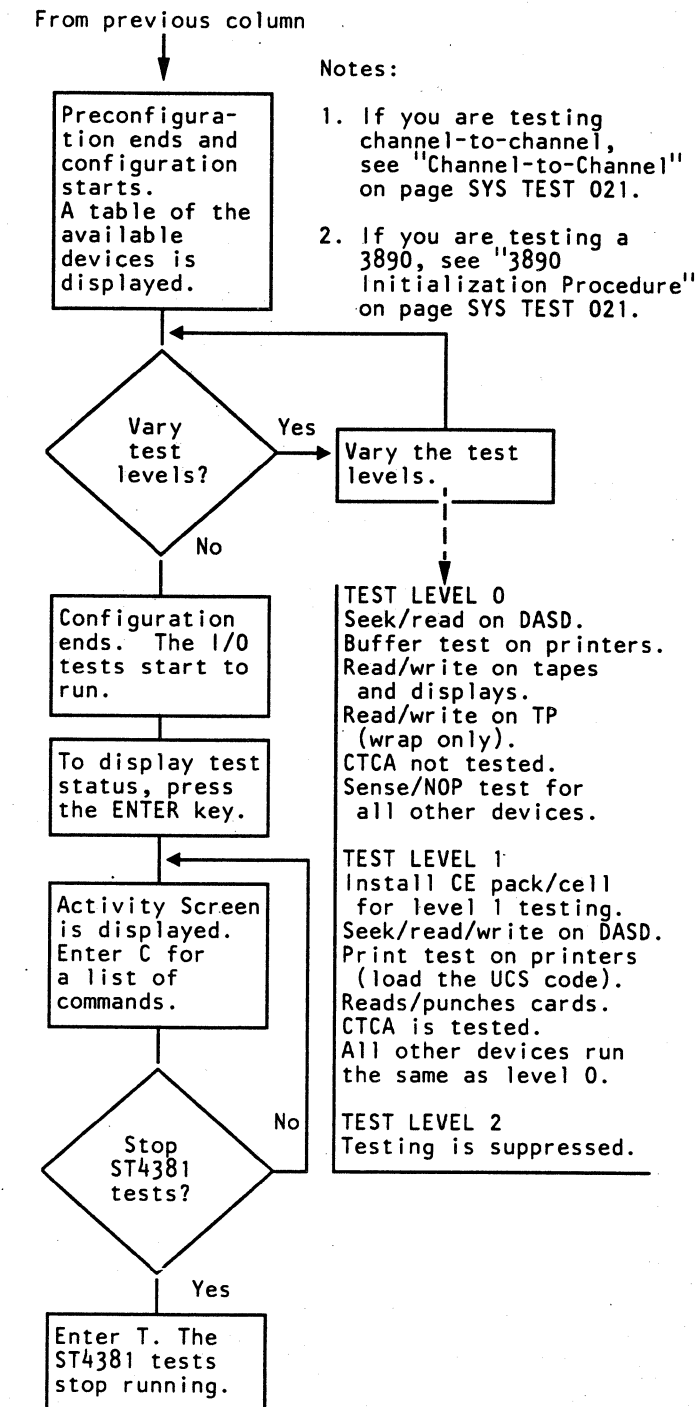
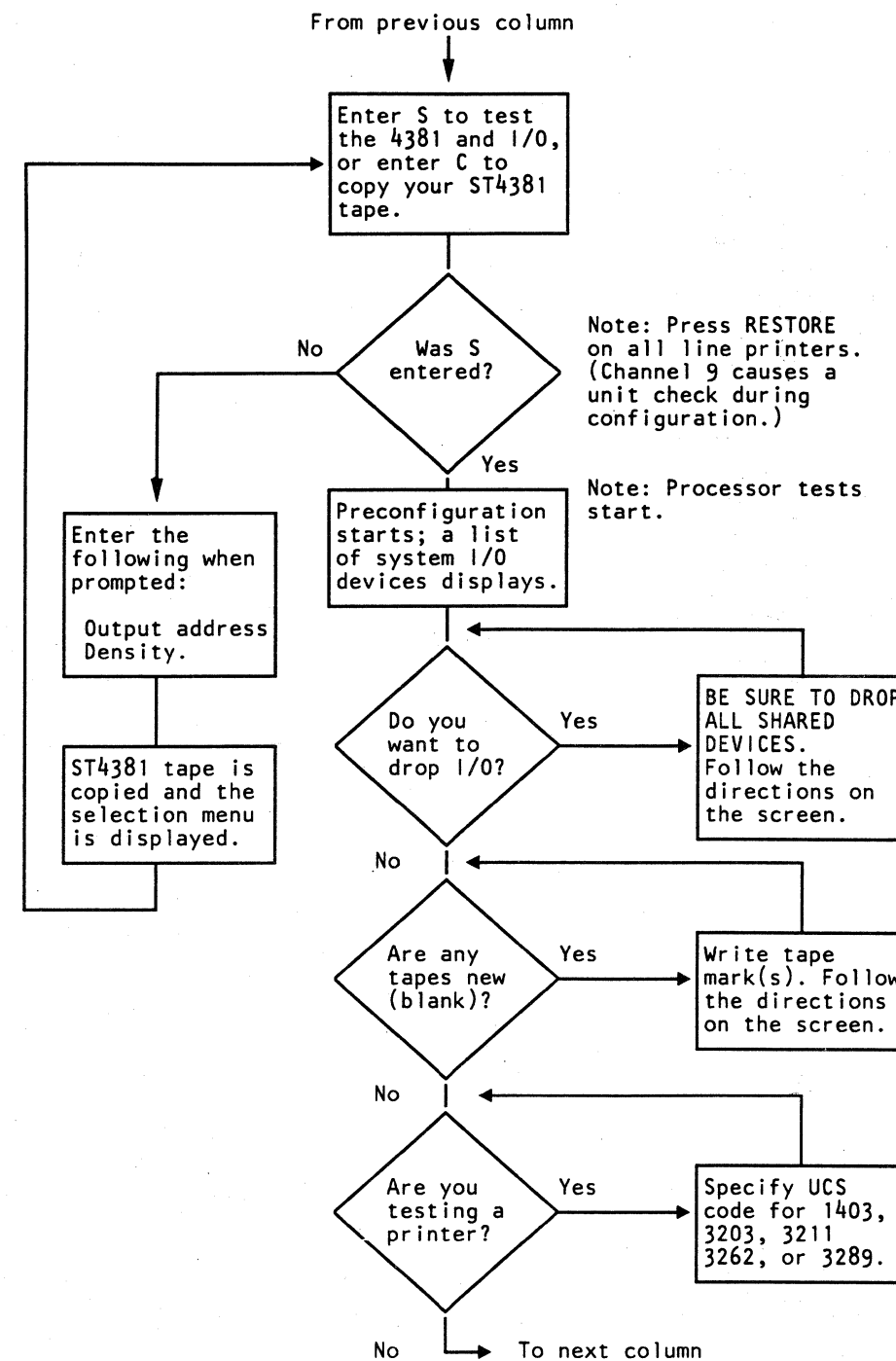
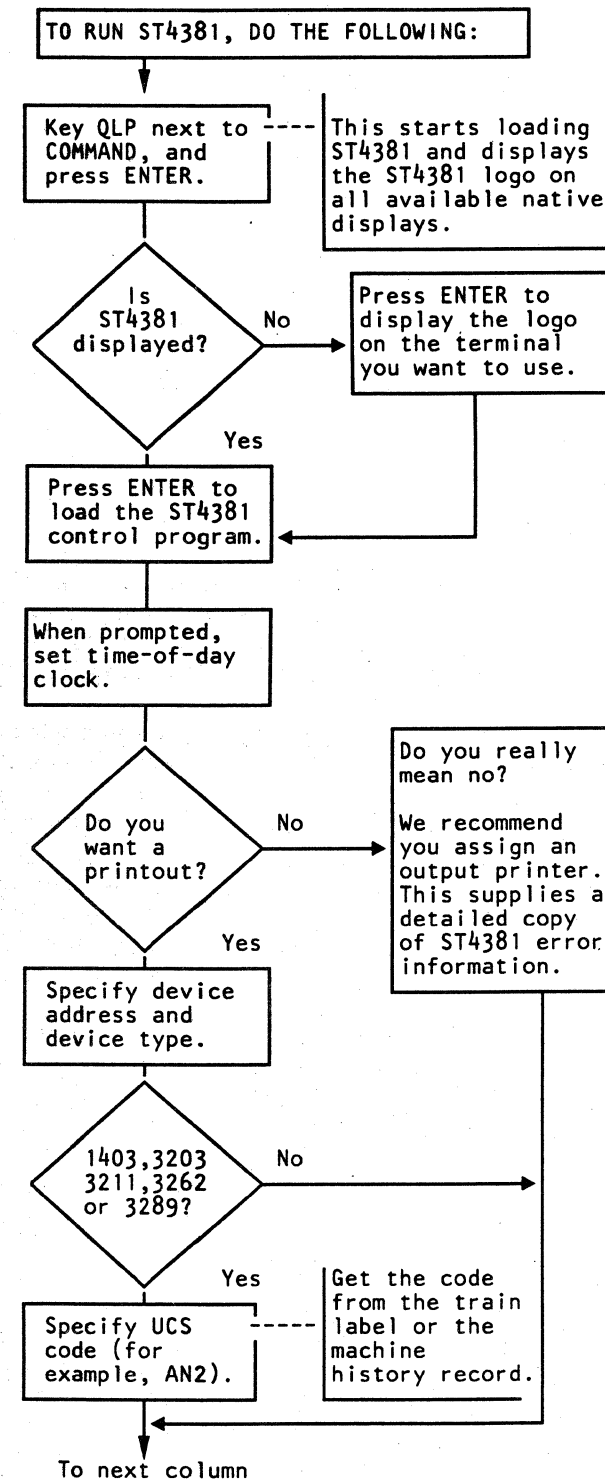
To next column

TO RUN ST4381, YOU NEED:
<ul style="list-style-type: none"> - A tape load device - An operator console - Two megabytes of processor storage - The I/O devices to be tested - An output printer (recommended).

GETTING READY TO RUN ST4381
<ol style="list-style-type: none"> 1. Ensure that the processor is IMLed. 2. Ready your IPL device. 3. Display the Program Load (QL) screen, and ensure: <ul style="list-style-type: none"> - The correct mode is specified (S/370 or S/370XA). <p style="margin-left: 20px;">To change the mode, display the QLI screen, and select the correct mode.</p> <ul style="list-style-type: none"> - U IPL UNIT specifies the ST4381 load device. 4. Display the QF0 screen, and ensure that the console is in DISPLAY mode. 5. Make ready the devices to be tested.

To next page

ST4381 and ST4381XA Run Flowchart



Channel-to-Channel

No testing is done on a channel-to-channel adapter or a 3088 unless they are varied to level 1 after configuration. Also, either run in wrap mode or run one of the following programs on the other CPU at the same time:

ST4300
 ST370
 NST-2
 System Test/4381
 System Test/4381XA.

3890 Initialization Procedure

To test a 3890 Document Processor with System Test/4381 or System Test/4381XA, do the following:

1. Ensure that functional coreload *FAO is loaded and that the test routine switch is set to image run.
2. Set all features to off using the operator panel. For details, see the *3890 Document Processor Operator's Guide*.
3. Install a jumper from 01B-C3J06 to ground. (This prevents time-outs.)
4. Set the On Line switch to On Line and press START.
5. After starting System Test/4381, make the 3890 not ready.
6. Vary the 3890 to test level 1.
7. Set the Test Routine switch to Process.
8. Place test documents in the hopper and press START. Testing of the 3890 begins.
9. Remove the time-out jumper at the end of the test.

Seq GG010	PN 0446217 Pg 3 of 4	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
-----------	-------------------------	------------------------	------------------------	------------------------	------------------------	------------------------

Using MVS Utilities to Copy System Test/4381XA

Copy System Test/4381XA to one of the following Direct Access Storage Devices (DASD):

- 3330
- 3340
- 3350
- 3375
- 3380.

To copy System Test/4381XA:

1. Delete the System Test/4381XA data set if it exists.
2. Copy System Test/4381/XA to DASD.
3. Create an IPL record.

Use the following JCL for steps 1 and 2.

Note: All lowercase characters are installation dependent and must be specified by the user.

```
//COPYST JOB parameters
//STEP1 EXEC PGM=IEFBR14
//DELDSN DD DSN=S80.SYSM,VOL=SER=volid,UNIT=disk,DISP=(OLD,DELETE)
//STEP2 EXEC PGM=LOADER,REGION=1024K
//SYSLIN DD VOL=SER=S80TAP,UNIT=tape,LABEL=(3,NL),
// DCB=(LRECL=80,BLKSIZE=2000,RECFM=FB,DEN=3),DISP=OLD
//SYSLOUT DD SYSOUT=A
//TAPEFILE DD VOL=REF=*.SYSLIN,UNIT=AFF=SYSLIN,LABEL=(,NL),
// DCB=DEN=3,DISP=OLD
//DISKFILE DD DSN=S80.SYSM,VOL=REF=*.DEL.DELDSN,UNIT=disk
// DISP=(,KEEP),SPACE=(2000,(3420,0,100),,CONTIG),
// DCB=(LRECL=80,BLKSIZE=2000,RECFM=FB)
//SYSPRINT DD SYSOUT=A
```

Notes:

1. Correct execution results in a return code of 0. If the return code is not 0, refer to the SYSPRINT output for the error messages.
2. System Test/4381XA requires a new or empty data set. If the data set already exists, delete it and reallocate it prior to the copy.
3. The copy program requires a 100K region.

Use the following JCL for step 3.

Note: All lowercase characters are installation dependent and must be specified by the user.

```
//WRIPL JOB parameters
//STEP3 EXEC PGM=ICKDSF
//SYSPRINT DD SYSOUT=A
//IPLTEXT DD DISP=SHR,DSN=S80.SYSM(UIPLDR),
// VOL=SER=volid,UNIT=disk
//S80 DD DISP=OLD,UNIT=disk,VOL=SER=volid
//SYSIN DD *
REFORMAT DDNAME(S80) VERIFY(volid) IPLDD(IPLTEXT)
/*
```

Correct execution results in a return code of 0. If the return code is not 0, refer to the SYSPRINT output for the error messages.

Seq GG010	PN 0446217 Pg 4 of 4	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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4300-FRIEND

Introduction to 4300-FRIEND

4300-FRIEND (Fast Running Interpreter Enabling Natural Diagnosis) is a test tool that lets you analyze complex I/O problems. It is a stand-alone, offline program that requires 64K bytes of customer storage and a display console.

4300-FRIEND supports all channel command words (CCWs) for most S/370 files, drums, tapes, card reader/punch units, and teleprocessing devices. You enter each channel command from the console keyboard. Channel programs for up to 99 devices can be entered and run simultaneously.

If 4300-FRIEND needs any additional information about the command (such as record numbers or data length), the program asks you for the information.

How to Use 4300-FRIEND

Loading 4300-FRIEND from the DIAG1 Diskette

To load 4300-FRIEND from the DIAG1 diskette:

1. Do a system IML (S/370 mode).

Note: If your normal console keyboard language is Japanese/Katakana, use the QFL screen to select U.S. English before running 4300-FRIEND. For information on changing console keyboard language, see Volume A08, "(QFL) Language Support."
2. Key QCLEAR next to COMMAND.
3. Key QFO next to COMMAND and then key N next to PRT/KYBD.
4. Set the CE Mode switch to CE Mode.
5. Key QLKE next to COMMAND and press the ENTER key. Message MOUNT PROPER DISK, ENTER appears.
6. Remove the FUNC2 diskette from diskette drive 2, insert the DIAG1 diskette into diskette drive 2, and press the ENTER key. After 4300-FRIEND is loaded, message REMOUNT FUNCTIONAL DISK appears.

7. Remove the DIAG1 diskette and insert the FUNC2 diskette into diskette drive 2.
8. Press the MODE SEL key on the system display console (the keyboard with the OCP).
9. Enter: QRES

Note: If you are using a single console system, do steps 10 through 12; if you are using a multiple console system, skip steps 10 through 12, and go to step 13.
10. Enter: QZ
11. Press the ENTER key twice (4300-FRIEND starts running).
12. Enter your replies to the 4300-FRIEND requests.
13. Press the ENTER key on the display console that you want to use to control 4300-FRIEND.
14. Enter your replies to the 4300-FRIEND requests on the display console you selected in step 13. (You can now use the system display console for normal manual system console functions while the display console you selected in step 13 is controlling 4300-FRIEND.)

The following is a list of the 4300-FRIEND requests. For details about these requests, see "Information Requested by 4300-FRIEND."

ADR=	LOG START=
ATT=	MASK=
BBCCHH=	MASK BYTE=
BL OFFS=	MLCCCBBCCHHRDDS=
BLCK CNT=	MODE (BC/EC)=
CMD=	MODE CMD=
CYL=	MODEL=
DATA=	NUMBER OF TIMES=
DEV=	OP BYTE=
DEV ADDR=	PHY START=
DEV TYPE=	RCD NO=
DL=	REPL CNT=
HARD COPY(Y/N)=	SD=
HD=	SEC PRINTER ADDR=
IDAWS IN HEX=	SECOND SD=
KEY=	THIRD SD=
KL=	WCC=
LOG END=	

The following is a list of the 4300-FRIEND commands. For details about these commands, see "4300-FRIEND Commands."

\$\$?	I
\$\$nnn,*	INCREASE
\$*=hh	INT
? or ??	KEY CAW
ACTIVATE	KEY CCW
ADD	KEY DATA
ALARM	KEY IDA
ALTER KEY	LIST
ALTER nnn	LOOP
BMPX	NO ALARM
BTS	NO BMPX
BUILD	NO COMPARE
CCW	NO DATA DUMP
CHANGE KEYBOARD	NO DECREASE
CHANGE nnn	NO HALT
CLEAR	NO INCREASE
CLEAR\$c	NO INT
COMPARE	NO TEST I/O
CONFIG	NO TIME DELAY
CONNECT	NO WAIT
COPY	POINTER CCW
COUNTER	POINTER DATA
CREATE	POINTER IDA
CSW=xxxx	PRINT SENSE
DATA DUMP	PSW
DECREASE	QUIT
DEVICE=	REMOVE
DISCONNECT	REP
DISPLAY	RESET
DUMP \$	RETURN
DUMP KEY	SCOPE
DUMP	SENSE
DUMP T	SET FB
EX CLRIO	SIZE
EX HDV	START READER
EX HIO	STATUS
EX STIDC	STOP
EX TCH	SUBST
EX TIO	TEST I/O
FLAG	TIME DELAY
GO	TRACE
HALT	WAIT
HELP	

Overview on Making a CCW Chain

To make a CCW chain:

- Respond to 4300-FRIEND requests (see "Information Requested by 4300-FRIEND").
- Respond to 4300-FRIEND messages (see "4300-FRIEND Messages").
- Optionally specify a predefined CCW chain (see "Predefined CCW Chains").
- Specify 4300-FRIEND commands (see "4300-FRIEND Commands").
- Specify CCW commands (see "CCW Commands").

Specifying a Single CCW Chain

To specify a single CCW chain:

1. Specify the device address of the unit you want to exercise when 4300-FRIEND asks for it (DEV=).
2. When COMMAND appears on line 20, key a CCW command and press the ENTER key.
3. Key any additional information requested by 4300-FRIEND.
4. After you have specified the entire CCW chain, key GO and press the ENTER key. The device performs the operation you requested.
5. If you want to specify another CCW chain, press the REQUEST key.
6. When the PROCEED indicator turns on, key RESET or I.
7. Go to step 1, and specify the new CCW chain.

Examples of a Single CCW Chain

The following example instructs 4300-FRIEND to first seek cylinder 5, head 5 and then to seek cylinder 198, head 9 on device address 260.

```
DEV=DEVICE ADDRESS=260 (Enter address)
ENTER CCW LIST IN ENGLISH
seek      (Enter command)
CYL=5     (Enter number)
HD =5     (Enter number)
seek      (Enter command)
CYL=198   (Enter number)
HD =9     (Enter number)
go
reset
```

The next example instructs 4300-FRIEND to read one block of data from a fixed block device (3370).

```
DEV= 240
I/O= 438100-337000
CHAR= 3008210102...
set fb
ENTER CCW LIST IN ENGLISH
def ext
MASK BYTE= c0
PHY.START=
LOG.START=
LOG. END = 31
locate
OP. BYTE = 06
REPL. CNT=
BLCK. CNT= 32
BL. OFFS.=
read fb
DL= 16384
loop 1
go
LOOP IS FINISHED ON UNIT 0240
```

Restrictions

4300-FRIEND inserts TIC *-8 or SET FILE MASK CCWs if it is left out. This can cause an invalid CCW chain.

Example of an Invalid CCW Chain

```
seek
CYL= 5
HD= 1
search ha eq
write r0
N 10
SET FILE MASK INSERTED (Placed before
                        the WRITE R0)
KL= 0
DL= 100
```

The sequence in the above CCW chain is invalid because the **write r0** command is not directly preceded by a SEARCH CCW. You must specify a Set File Mask before the **search ha** command.

Advanced Capabilities of 4300-FRIEND

Specifying Multiple CCW Chains

To enter (and run) multiple CCW chains for the same or different devices, do the following:

1. Do steps 1 through 4 in "Specifying a Single CCW Chain." (After you key GO and press the ENTER key, the first CCW chain begins to run).
2. Press the ENTER key again (while the first CCW chain is running).
3. When PROCEED appears on line 20, key dev= xxx (xxx is a device address). You can enter the previously-specified device address or a different device address.
4. Do not key RESET.
5. Enter the CCW chain to be overlapped.
6. Key GO.
7. Repeat steps 2 through 6 to specify another CCW chain.

To change one or more of the CCW chains in a multiple CCW chain, see "Changing CCW Chains."

Example of a Multiple CCW Chain

This example assumes that you are overlapping a seek operation on devices 160 and 161.

```
DEV= 160
ENTER CCW LIST IN ENGLISH
seek
CYL= 0
HD = 1
seek
CYL= 100
HD = 2
go (First CCW chain starts to run)
(Press ENTER)

dev=161 (Enter address for next CCW chain)
seek
CYL= 100
HD = 3
seek
CYL= 200
HD = 4
go (Both CCW chains run)
```

Symbolic I/O Areas

You can reference the data address specified in one CCW from another CCW by using 4300-FRIEND. This lets you first read and then write the same data or vice versa. Also, by using the same area to read into and write from, you can conserve storage space.

For disk files, the symbolic I/O area applies only to the data area of any count-key-data (CKD) or key-data command. 4300-FRIEND uses data chaining to get the data field of these commands.

To use symbolic I/O areas:

1. Key the normal READ, WRITE, PRINT, etc. commands followed by a comma and *into \$x* if the command is an input command, or *from \$x* if the command is an output command.

x can be any keyboard character, but using characters a to z are recommended for ease of cross-referencing. Characters entered in lowercase are converted to uppercase.

2. If your data is in character and hexadecimal format, use the CREATE/BUILD command. This command builds a symbolic output area that can be used by subsequent write-type CCW commands.
3. If this is your first use of a symbolic character, 4300-FRIEND asks for the normal additional information. If you have already used the symbolic character and no RESET command has been issued, you are not asked for the data length or the data field. (The Symbolic Table generated by 4300-FRIEND contains the corresponding data address and the implied length of the data area.)

To get a list of the assigned symbolic names, use the DUMP\$ command.

Example 1: Writing Disk Records 0 and 1 from Same Area

```
DEV= 160
ENTER CCW LIST IN ENGLISH
seek
CYL= 5
HD = 1
set file mask
MASK= c0
search ha eq
tic *-8
write r0,from$a ($a points to data area)
KEY=
DATA= 500xf0f0 (1000 bytes of data)
write count key data,from $a
RCD NO.= 1
KEY=
go
```

Seq GG015	PN 0446218 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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Example 2: Using the CREATE/BUILD Command

```
DEV= 184
create 50,$b (Creates area $b with length 50)
DATA= x02
DATA= 4cABCDEFGH1234
DATA= x03
DATA= (Press ENTER to end requests)
write,from$b
read backward$
read into $a
DL= 50
1-compare $a,$b (Specifies data compare)
go
    (Press ENTER)
counter (Prints loop counter)
01-UNIT=0184, LOOP= 0000000/0001585 -A
go (Restarts operation)
```

CCW Chain Sequence Control and Delay Between CCW Chains

The WAIT command causes 4300-FRIEND to wait until a CCW chain routine has been completed (device-end interrupt) before the next chain is started. You usually use the WAIT command with symbolic I/O areas when you are writing data that was read by a previous CCW chain. This ensures that all the data is read before the write CCW is run. You can also use the WAIT command for a single CCW chain.

To use WAIT:

1. Specify WAIT anytime during the entry of the CCW chain.
2. After you key WAIT in the last CCW chain, key GO.

Example 1: Tape to Printer (80/80 List)

```
DEV= 281
ENTER CCW LIST IN ENGLISH
read,into$a
DL= 80
wait
DEV= e
print,from$a
csw=01
sns=01
wait
go
```

Example 2: WAIT with Time Delay (Single CCW Chain)

```
reset
DEV= 185
ENTER CCW LIST IN ENGLISH
write
DATA= 100xf0f0
wait 500 (Causes delay of 500 ms
         after device end before
         starting the next write CCW)
go
```

Data Compare

Specify the COMPARE command anytime during the entry of a CCW chain. If you are using symbolic I/O areas, you must have already defined them. 4300-FRIEND compares the areas at each completion of the CCW chain.

Example 1: Write and Read Disk Record Zero

In this example of the COMPARE command, \$r and \$s are any previously defined symbolic I/O areas. If you do not specify a compare length, 4300-FRIEND uses the length of the operand r for the amount of data to be compared.

```
DEV= 161
ENTER CCW LIST IN ENGLISH
seek
CYL= xa0
HD= 7
write ha (Writes home address
         from seek argument)
SET FILE MASK INSERTED
write r0,from$r
KEY=
DATA= 1800xf0f0
read r0,into$s
KL=
DL= 3600
compare $r,$s (Uses length of $r)
go
```

Example 2: Write and Read a Tape Record

In this example of the COMPARE command, d000 and d3e9 are the addresses of the areas you want compared. (To obtain the addresses, use the CCW command.) 1000 is the number of bytes to be compared in decimal or hexadecimal.

```
reset
DEV= 180
ENTER CCW LIST IN ENGLISH
write
DATA= 1000xff
backspace
read
DL= 1000
ccw (Displays a CCW chain)
1-00A000 01 00D000 6000 03E8
2-00A008 27 00D3E8 6000 0001
3-00A010 02 00D3E9 6000 03E8
compare d000,d3e9,1000 (Compares data addresses)
go
```

Increase/Decrease Counter

Use the INCREASE or DECREASE command to increase or decrease a one- to four-byte field by a specified amount after each running of the CCW chain. You can use this function to change seek arguments in the data field of a CCW chain or to step a hexadecimal record counter.

Example 1: Record Counter for Tape

```
DEV= 180
write,from $a
DATA= 100c1234567890
(See data pointer address
 on the status line or enter
 STATUS command. ... C= 00A008,
 1 D= 00D3E8, 1 I=...)
To use last 4 bytes of write
data field as counter, subtract
4 from (D) data pointer.)
increase 4,d3e4,1,0,1
loop 1000 (Writes 1000 records)
go
LOOP IS FINISHED ON UNIT 0180
1-stop (Stops first CCW chain)
dev=180 (New UCB)
rewind
loop 1
go
LOOP IS FINISHED ON UNIT 0180
rep1
read,into $b
DL= 1000
increase 4,d3e4,1,0,1 (Updates old $a area)
compare $a,$b (Compares record to
              expected one)
loop 1000
go
```

Example 2: Change a Device Address

This example shows how to test a certain range of device addresses for availability (see also CONFIG command).

```
DEV= 0
sense device,into$x
list=1 (Gets UCB address)
01-UNIT= 0000, UCB= 0D0000, FL=0019
00A000 E4 00D000 6000 0007
increase 2,d0000,1,xff,0 (Changes
 device address from X'000' to X'0FF')
data dump$x,* (Dumps result of sense I/O)
go
```

Data Ripple/Random

RIPPLE and RANDOM are CCW command modifiers that you can specify with a CCW command. If you specify RIPPLE or RANDOM, 4300-FRIEND searches for all CCWs to be rippled or randomized in the CCW chain and either ripples (moves the data pattern one byte to the left) or generates a random data pattern at each completion of the CCW chain. Random data is generated four bytes at a time, and data is rippled in blocks of 256 bytes. SEARCH, WRITE HA, and the count field of WRITE COUNT KEY DATA CCWs are bypassed.

Restrictions: Do not use RIPPLE or RANDOM with indirect data addressing (IDA) or with WRITE SPECIAL COUNT KEY DATA CCWs.

Example 1: Write Random Data on Disk

```
DEV= 161
ENTER CCW LIST IN ENGLISH
seek
CYL= 5
HD = 1
MASK= c0
write ha
write r0,random
KEY=
DATA= 3600xff (Data used for first record
and establishes data length)
read ha (Verifies home address)
read r0 (Verifies record zero written)
KL= 0
DL= 3600
go
```

Example 2: Ripple Data on Printer

```
reset
DEV= e
ENTER CCW LIST IN ENGLISH
space1,ripple
DATA= 4cABCDEFGHJKLMNOPQRSTUVWXYZ
csw=0100
loop
NUMBER OF TIMES= 500
go
```

Predefined CCW Chains

Specify \$\$xxx to use the predefined CCW chains (and data strings) that are provided by 4300-FRIEND. (To display the available CCW chains, key \$\$?)

You may need to specify a RESET command or the device address (DEV=cuu) before using a predefined CCW chain. In some cases, the device address is fixed, and you must modify it with the n-DEV=cuu or SUBcuu,nnn command.

The predefined chains are:

- \$\$001 Card to Printer (00C/00E)
- \$\$002 Sets Tape to 1600 BPI (181) and Copies Tape to Tape (180/181)
- \$\$010 Defines four UCS images for symbolic data areas \$A, \$H, \$1, and \$2. \$A = AN-train, \$H = HN-train, \$1 = PCS-AN train, \$2 = PCS-HN train. (Use Examples 1 and 2 below as a guide in the use of \$\$010.)
- \$\$101 3287 Ripple Print 1 (specify DEV=... before).
- \$\$102 3287 Ripple Print 2 (specify DEV=... before).
- \$\$103 3287 Color Print (specify DEV=... before).
- \$\$104 3287 Color Print of programmed symbols (specify DEV=... before).
- \$\$110 327x Display/read (specify DEV=... before). Two SIOs are used with increments on the screen buffer addresses, and the read data is compared.
- \$\$111 3278 Display/read (specify DEV=... before). Same as 110, but with a single SIO.
- \$\$119 327x Display with Increment (specify DEV=... before).
- \$\$5nn Type RESET before \$\$50n commands, and specify the device address DEV=...
- \$\$500 3310 - CE Track Initialization
- \$\$501 3310 - Read FB with Increment
- \$\$510 3370 - CE Track Initialization
- \$\$511 3370 - Read FB with Increment
- \$\$520 3370 - Verify CE Track
- \$\$521 3370 - Repair

Example 1: Load 1403/3203 with PCS-AN Image

```
DEV= 00e
$$010 (Loads 4 UCS images into symbolic area)
$$004 (Loads UCS buffer with PCS-AN image)
go
LOOP IS FINISHED ON UNIT 000E
```

Example 2: Load 1403/3203 with AN, HN, or PCS-HN Image

```
DEV= 00e
$$010
gtld (Needed for 1403 only)
load ucs,from $x (x is either A (AN),
H (HN), or 2 (PCS-HN))
loop 1
go
LOOP IS FINISHED ON UNIT 000E
```

Example 3: Ripple Print Using the AN Image

This example assumes that you have loaded the UCS buffer with the AN image (see Example 2 above).

```
DEV= 2e
$$010 (Gets train data images)
print,from$a,ripple (Ripples AN-train image)
csw=01 (Masks unit exception)
sns=01 (Masks sense X'01')
loop 100 (Do 100 times)
go
LOOP IS FINISHED ON UNIT 002E
```

Storage Protection Key Modification

Use the KEY CAW, KEY CCW, KEY DATA, KEY IDA, DUMP KEY, and ALTER KEY commands to display or modify the storage keys of the different storage areas used for CCW chains. Initially, and after a RESET command, all areas are storage protected with key one (1). The current assignments are displayed on line 20 or after the STATUS command.

You can dump or alter the storage keys of any area with the DUMP KEY or ALTER KEY commands. You can alter the special areas for CCWs, data, and IDAW with the KEY CCW=, KEY DATA=, or KEY IDA= commands. You can display for each CCW chain the key used for the CAW with the CCW= or LIST= commands in the third flag digit; you can alter it with the nn-KEY CAW= command.

Trace Function

Use the TRACE command to make a trace table in storage of all SIOs issued for, and all interrupts received from, the test devices during the running of the CCW chains. You can use the TRACE command instead of the GO command. If you specify the TRACE,* command, all SIOs, TIOs, and HIOs are traced, including those for the operator console and the secondary printer. You can restrict the trace to one device by specifying a device address with the TRACE command. The trace table start address is stored at location X'040C'; the current trace table pointer is stored at address X'0414'. Use the DUMP function after the trace loop is finished (or the running is stopped).

Example:

```
dump12,40c
00040C 000D2000000D3F70 000D28F0
```

The trace function stores trace information in 16-byte records.

The CPU timer value stored in the trace entry represents bytes 3 to 5 of the doubleword binary counter. The last digit of the stored value is decremented every 16 microseconds.

The one-byte repetition counter is incremented if identical trace entries (except the time value) are stored in sequence. The first entry is stored and all others are ignored.

An entry of 16 bytes containing all X'FF' indicates the end of the current trace area. If the trace reaches the last trace area entry, the trace again uses the first entry and all following. You can display the last trace entries or the complete trace table with the DUMP command; for example, DUMP x300,d20e0. The DUMPT command automatically displays the last trace entries (up to a maximum of 36).

Because the same storage area is used for predefined chains, these chains (command \$\$nnn) are destroyed after a trace run as well as the HELP command text.

Special Storage Areas

- X'0300' Special TIO/SIO loop area.
- X'0400' Four-byte data area address (standard X'D000'). This address should point behind all other FRIEND areas because FRIEND uses the data space up to the end of the storage.
- X'0404' Four-byte CCW area address (standard X'A000' must start on double word boundary).
- X'0408' Four-byte IDA area address (standard X'9F80' must start on word boundary).
- X'040C' Four-byte trace area start address (standard X'4FFF' before storage end).
- X'0410' Four-byte trace area end address (standard X'2FFF' before storage end).
- X'0414' Four-byte current trace entry pointer.
- X'0418' Four-byte address of first unit control block (UCB).
- X'041C' Two-byte internal program version/level (xxyy).
- X'041E' Two-byte secondary output station (printer) address.
- X'0402' Two-byte keyboard device address.
- X'0422' Two-byte printer device address (for internal use).
- X'0424' Two-byte current test device unit address used for TIO.
- X'0426' Two-byte last test device used unit address used for HIO after 2x external interrupt (INT command).
- X'044C' Control indicator byte (INDBYTE)
 - X'01' = 3277-type console
 - X'10' = EC mode.
- X'044F' SP console control byte X'01' = SP console unit control block area; storage end = X'6FFF'.

To change the area where 4300-FRIEND locates the data area, the CCW area, or the IDA area, include the following patch (REP) card preceding the END (last) card, or alter the storage areas after 4300-FRIEND is loaded by the ALTER command. Note that CCWs start on doubleword boundaries and IDAWs on word boundaries and that these areas must not overlap. Assign the data area to the last part of the storage.

Patch Card Format

```

column
1234 7    17

&REP 000400  XXXX,XXXX (XXXXXXXXXX
is the address of the new data area)
2
9
    
```

ALTER command example:

```

DEV=DEVICE ADDRESS= (Any device address)
alter 8,400,xxxxxx (xxxxxx is address
of new data area)
0003f8 ..... xxxxxxxx
(Altered storage is displayed)
reset (Activates changes)
DEV=
    
```

Unit Control Block (UCB)

For each CCW chain that is made, 4300-FRIEND uses a special control block called a UCB. The address of each UCB can be displayed by the CCW= or LIST= commands. The length of one UCB entry is 48 bytes.

Information Requested by 4300-FRIEND

Listed below are the 4300-FRIEND requests and your replies to them. Enter decimal data with no separation; that is, 123456 (not 123,456 or 123 456). Enter hexadecimal data with a preceding x; for example, x60. If you enter incorrect information, 4300-FRIEND asks you to try again.

If a program loop occurs, enter the character i or perform a program (PSW) restart.

ADR=

Specify (in hex) a two-byte 3277 buffer address.

ATT=

Specify (in hex) a one-byte 3277 attribute character. The default is x60.

BBCCHH=

Specify (in hex) a six-byte 2321 seek argument.

Byte	Function/Range (hex)
0	-----/00
1	Cell/00-09
2	Subcell/00-13
3	Strip/00-09
4	Head position/00-04
5	Head number/00-13

BL. OFFS.=

Specify a block offset value for the LOCATE fixed block command. Enter either a decimal value (0 to 4294967295) or a hexadecimal value (x0 to xffffff). The default value is 0.

BLCK. CNT=

Specify a block count value for the LOCATE fixed block command. Enter either a decimal value (1 to 65535) or a hexadecimal value (x1 to xffff). The default value is 1.

CMD=

Specify a 3277 command.

- 'EM' End of message - for printer
- 'EU' Erase unprotected + address
- 'FF' Forms feed - for printer
- 'IC' Insert cursor
- 'MF' Modify field + attribute character
- 'NL' New line - for printer
- 'PT' Program tabulator
- 'RA' Repeat to address + address and fill character
- 'SA' Set attribute + attribute character
- 'SB' Set buffer address + address
- 'SF' Start field + attribute character
- 'SX' Start field extended + attribute character
- ' ' ENTER = no command
- '*' End of data stream (no code generated)

CYL=

Specify (in decimal or hex) a cylinder number for a seek command. The default is 0.

DATA=

Specify data. 4300-FRIEND repeats the DATA= request until no more data is entered. (You can specify both hexadecimal and decimal data for one symbolic data area by using the CREATE/BUILD command.)

Specify the data in one of the following formats:

nnxhhhhh or nncdddd

nn is an optional decimal duplication factor.

x indicates hexadecimal data.

hhhhh is the hexadecimal data.

c indicates EBCDIC data.

dddd is the EBCDIC data (up to 242 characters). 4300-FRIEND does not convert lowercase characters to uppercase.

Example of DATA=

- DATA= 100xff (100 bytes of X'FF')
- DATA= 1000xf0f0 (1000 groups of X'F0F0')
- DATA= 80c1 (80 bytes of X'F1')
- DATA= 12cab (12 groups of X'818283')
- DATA= 12cABC (12 groups of X'C1C2C3')
- DATA= 12cAaB (12 groups of X'C181C2')
- DATA= Press ENTER (after all data is entered)

DEV=DEVICE ADDRESS=

(appears first time only)

DEV=

(all other times)

Specify a device address in hex. Leading zeros are not required. If you do not specify a device address, 4300-FRIEND uses the last-entered device address or enters the command input mode (if no device address was previously specified). For more details, see the "DEVICE=" command.

DEV. ADDR=

Specify the device address of the new operator console or the address of the secondary output station (printer). If the secondary output station address is set to zero, the secondary printer function is inoperative.

DEV. TYPE

Specify the type of new console.

- 1052 1052-type console
- 327x 327x-type console
- PRT Secondary output printer, which must accept a X'09' print command. The PRT function is not used for a 1052 and SP console.
- SP System console with X'83' op code enabled.
- TP Terminal printer as secondary output required.

DL=

Specify the data length; either a decimal (1 to 32767) or hexadecimal (x0001 to x7ffff) value. The default value is 1.

ENTER DEVICE TYPE (32xx)=

If the device did not respond to the Sense ID command, 4300-FRIEND requests the printer device type for the UCSB load.

ENTER TIME hh:mm:ss=

Enter the current time of day. The default time-of-day is zero.

HARD COPY (Y/N)=

Specify Y for a copy of all console messages; press the ENTER key if you do not want a copy (4300-FRIEND defaults to the N reply).

HD=

Specify (in decimal or hex) a head number. The default is head 0.

IDAWS IN HEX=

Specify the real storage addresses for the IDA address list (IDAWs). Enter as many addresses as required, separated by commas (leading zeros are not required). Do not use storage range X'0000' to X'A000' (the 4300-FRIEND program resides there). If data is requested for the CCW, 4300-FRIEND automatically moves the data to the specified real storage area(s).

KEY=

Specify the key for the data field. Enter the data as shown for DATA=.

KL=

Specify the key length. Enter either a decimal (0 to 255) or hexadecimal (x00 to xff) value. The default value is 0.

LOG. END=

Specify the logical end for the DEFINE EXTENT fixed block command. Enter a decimal value (up to 4294967295) or a hexadecimal value (up to xffffff). The default is the value read by the READ DEVICE CHAR fixed block command.

LOG.START=

Specify the logical start for the DEFINE EXTENT fixed block command. Enter a decimal value (up to 4294967295) or a hexadecimal value (up to xffffff). The default value is 0.

MASK=

Specify (in hex) a one-byte file mask for the SET FILE MASK command (for example, MASK=18). The default is X'CO' (press the ENTER key).

MASK BYTE=

Specify (in hex) a one-byte mask for the DEFINE EXTENT fixed block command. If you do not provide a mask, the default mask for the first 12 bytes of the data area is X'00'. 4300-FRIEND sets the last four bytes in the data area to the value read by the READ DEVICE CHAR command (logical end).

MLCCCBBCCHHRDDS=

Specify (in hex) 15 bytes of buffer control information for the buffer control record (this is the record transferred to the 2314 on an INIT BUF command).

- M Mode byte; 81 (needs write buffer) or 01
- L Length byte; 6D
- CCC Command 1 (00, 07, 13)
Command 2 (29, 31, 69, A9, E9)
Command 3 (05, 06, 0D, 0E, 16, 1A, 35, 3D)
- BBCCHH Seek argument
- R Record number
- DD Data length
- S Search key length

Example:

```
INIT BUF
MLCCCBBCCHHRDDS= 816d0731350
                    00000c3000101005000
WRITE BUF
DATA= 40xf0f0
```

MODE (BC/EC)=

Specify the control mode; BC for Basic Control mode or EC for Extended Control mode. The default is EC.

MODE CMD=

Specify (in hex) a MODE SET command code. The default is x93 (7-track tape/800 bpi).

MODEL=

Specify 81 for the processor model. (This chooses the proper time calculation for the WAIT and TIME DELAY commands).

NUMBER OF TIMES=

Specify the number of times you want to run the last entered CCW chain or the CCW chain specified in the LOOP command. Enter 1 to 32767 in decimal.

OP. BYTE=

Specify (in hex) the operation byte for the LOCATE fixed block command. The default is X'06'.

PHY.START=

Specify the physical start for the DEFINE EXTENT fixed block command. Enter a decimal (up to 4294967295) or hexadecimal value (up to xffffff). The default is 0.

RCD NO.=

Specify the record number to be used in the file identifier field. Enter a decimal (0 to 255) or hexadecimal value (x00 to xff).

REPL. CNT=

Specify the replication count for the LOCATE fixed block command. Enter a decimal (0 to 255) or hexadecimal value (x00 to xff). The default is 0.

SD=

Specify (in decimal) the defect skip displacement for the 3340/3350 home address.

SEC. PRINTER ADDRESS=

Specify either the device address of the secondary output printer on which a hard copy of all operator messages are to be printed or UCSB which invokes the UCSB load routine to load a UCS buffer. You can enter the optional LOG operand after the printer address; for example, 0E,LOG. This causes the call of the PRINT LOG function. If you want to modify the secondary printer address later, use the CHANGE KEYBOARD command.

SECOND SD=

Specify (in decimal) the second defect skip displacement for the 3340/3350 home address.

SELECT UCS-TYPE (xx,xx,xx,xx)

Select a UCS buffer type from a displayed menu.

THIRD SD=

Specify (in decimal) the third defect skip displacement for the 3340/3350 home address.

WCC=

Specify (in hex) the 3277 write control character. The default is X'C3'.

XATT

Enter 327x extended data stream attribute TYPE/VALUE pair as four hex digits. If commands START FIELD EXTENDED or MODIFY FIELD were specified, you can enter more than one attribute pair. To end the sequence, enter '*'. If you press the ENTER key only, value X'C040' is entered and the sequence ends.

4300-FRIEND Messages

If a message starts with *, 4300-FRIEND waits before displaying the message to let you use the ENTER key to stop processing. Status information is displayed as follows (the current UCB is displayed together with area pointers):

aa nn-ccuu-ff C=xx,kf D=xx,kf I=xx,kf mm

- aa indicates the following:

COMMAND	Key a 4300-FRIEND command.
REPLACE	Key a replacement CCW command.
RESPOND	Key requested information.
RUNNING	4300-FRIEND is running CCW chain(s). If stop address X'ODEADO' is displayed, 4300-FRIEND is waiting for an I/O interrupt from a device being tested. You can enter 4300-FRIEND commands during this mode without stopping the processing.
TRACING	4300-FRIEND is tracing CCW chain(s) as they run.
SCOPING	4300-FRIEND is looping on a SIO or TIO command.
TIOLOOP	4300-FRIEND is repeating a TIO command.
PRNTLOG	PRINT LOG function; copies the screen to a printer.
WORKING	4300-FRIEND commands are running; no action is required.

- nn = Chain number
- ccuu = Unit address
- ff = Flag bytes
- C=xx = CCW area address
- k = Area key
- f = Fetch protection on if F
- D=xx = Data area address
- I=xx = IDA area address
- mm = Block multiplexer mode (BMPX) or selector mode (SEL).

Status and Operator Messages

\$x aaaaaa llll

Appears after the DUMP\$ command. x = the symbolic I/O area name; aaaaaa = address (in hex) of the area; llll = length (in hex) of the area.

aaaaaa K=k,F=f,R=r,C=c

Displays the storage protection keys of a 2K storage area. Address aaaaaa is the first byte of the area; k = storage key in hex; f = fetch protection on if 1; r = reference bit on if 1; c = change bit on if 1.

CHAR= xxx...

Displays the data received for a READ DEVICE CHAR fixed block command.

COND CODE= n ON UNIT xxxx

Displays condition code n for device xxxx after an XTIO, XCLRIO, XHIO, XHDV, XTCH, or XSTIDC command. This message is also displayed to indicate the status of the Test I/O.

Condition code 0 indicates that device xxxx is ready and available. Condition code 2 indicates that the channel or subchannel to which the device is attached is busy. Condition code 3 indicates that the address is not recognized by a channel or any device on the channel. To enter commands, press the ENTER key and enter NOTEST. If SCOPE is active, 4300-FRIEND requires a PSW restart to exit from the scope loop.

COND CODE= 1 ON UNIT xxxx

CSW yy yy ... yy yy
SNS zzzzzzzzzz.zzzzzzzz

Displays the condition code, CSW, and sense bytes for device xxxx after an XTIO, XCLRIO, XHIO, XHDV, XTCH, or XSTIDC command.

This message is also displayed to indicate the status of the TEST I/O. Condition code 1 indicates that the channel status word (CSW) was stored.

EC-MODE SET, NO RESET POSSIBLE

Indicates that the Extended Control mode was set, and no return to Basic Control Mode is possible except by the re-IPL of 4300-FRIEND.

ENTER CCW LIST IN ENGLISH

Displayed after you enter reply to DEV= at the beginning of a new CCW chain.

EXT-INTRPT BROKE CHAIN

Indicates that the INT feature was active and that the second external interrupt stopped 4300-FRIEND. The TIO mode is reset.

HALT

Displayed after 4300-FRIEND detects a condition that requires a program halt. To continue, specify GO.

HALT ON ERROR

Indicates that an error occurred during the running of a CCW chain. It also indicates a unit check or a permanent CU-busy condition at the device used for the START READER command.

ID = xxxx...

Displays the ID of the processor.

I/O= cccctt-dddttt

Displays bytes two to seven of the Sense I/O command for the new device specified. This message does not appear if the Sense I/O command is not supported by the device (first byte is not X'FF').

LOOP IS FINISHED ON UNIT xxxx

Displayed if the CCW chain of unit xxxx has run the number of times specified by the LOOP command. The running of all active CCW chains is discontinued after waiting for outstanding I/O interrupts. If busy devices do not present their interrupt in the time specified by the TIME DELAY command, a Halt I/O is issued.

nn*UNIT=ccuu, LOOP=xxx/yyy - I

Appears after the COUNTER command. nn = CCW chain number; ccuu = unit address; xxx = loop threshold; yyy = SIO counter. I = active/stopped line indication.

nn*UNIT=ccuu, UCB=aaaaaa, FL=cccc

Indicates the UCB entry if CCW= or LIST= was specified. nn = CCW chain number; ccuu = unit address; aaaaaa = address of 34-byte long UCB entry; cccc = active UCB flags.

nn-ccuu-ff C=xxx,kf D=yyy,kf I=zzz,kf mmm

Appears after the STATUS command. The current UCB is displayed together with area pointers. nn = CCW chain number; ccuu = unit address; ff = flag bytes; xxx = CCW area address; k = area key; f = fetch protection if F; yyy = data area address; zzz = IDA area address; C= CCW area; D= data area; I= IDA area; mmm = block multiplexer mode if BMPX or selector mode if SEL.

PRINTER NOT READY

Displayed if the secondary printer is not available or not ready. Make the printer ready or correct the device address.

SET FILE MASK INSERTED

Indicates that you did not specify a SET FILE MASK command. Therefore, 4300-FRIEND automatically inserted a Set File Mask CCW preceding the last CCW entered. Because the CCW chain being generated requires a set file mask if you specify a WRITE HA (home address) or WRITE R0 (record zero) command, an invalid CCW chain may result.

START

Displayed after you start running the CCW chain by pressing the ENTER key without input GO.

STORAGE SIZE= xxxxxx

Displays (in hex) the storage size of the system.

TIC *-8 INSERTED

Indicates that you did not specify a TIC. Therefore, 4300-FRIEND automatically inserted a TIC *-8 CCW preceding the last CCW entered. Because the CCW chain being generated requires a TIC if you specify a Search CCW command, an invalid CCW chain may result.

UCSB LOAD SUCCESSFUL FINISHED

The UCS buffer load was successful.

UNIT=xxxx - COUNT=nnn

Indicates a DATA DUMP print out. xxxx = unit address, nnn = SIO counter.

WAIT UP TO 5 SECONDS UNTIL LOAD IS FINISHED

Indicates that the UCS buffer load is in process.

4300-FRIEND STANDARD OPTION SET

Displays all the standard options of 4300-FRIEND set during program initialization. If you want to change options, use the BMPX, NO BMPX, TIME DELAY nn, HALT, ALARM, or NO INT commands.

Error Messages

DEVICE END OR OTHER I/O INTERRUPT MISSING

Indicates a working device issued no I/O interrupt within 15 seconds.

DEVICE NOT AVAILABLE, CC=3

Indicates the specified printer is not operational.

-DEVICE QUEUE FULL, LAST CMD IGNORED

You have tried to enter more than 99 devices into the device queue. Enter RESET to clear the device queue, and start again.

-ENTER

"DEV=" OR "ADD" BEFORE CCW- You entered a CCW command with an incorrect UCB (device) assignment.

ERROR DURING UCSB LOAD

Indicates an error was detected in the CSW during the UCSB load.

EXT-INTRPT, PSW = xxx/yyyy E

4300-FRIEND detected an abnormal external interrupt. xxx is the old PSW for the interrupt.

E at the end of the message indicates an EC mode interrupt. In this case, yyy is the interruption code.

-IDAW POINTS TO PROGRAM AREA

Indicates that one of the specified IDA addresses points inside the 4300-FRIEND program. 4300-FRIEND ignores all entered IDAWs and repeats the request for IDAWs.

-INVALID MODEL, USE 31-41-81 OR 115-168 OR 25-75

Indicates that you specified the wrong model.

I/O-INTRPT, PSW = xxx/yyyy E

4300-FRIEND detected an abnormal input/output interrupt (usually from other devices becoming ready). xxx is the old PSW for the interrupt. The CSW and sense data are also displayed.

E at the end of the message indicates an EC mode interrupt. In this case, yyy is the interruption code.

MCK-INTRPT, PSW = xxx/yyyy E

4300-FRIEND detected an abnormal machine check interrupt. The log-out area is saved so that it can be displayed by the DUMP command. xxx is the old PSW for the interrupt.

E at the end of the message indicates an EC mode interrupt. In this case, yyy is the interruption code.

NO UCS SUPPORT FOR THIS DEVICE

The specified printer is not a 3203, 3211, 3262, or 3289 device.

PGM-INTRPT, PSW = xxx/yyyy E

4300-FRIEND detected an abnormal program interrupt. xxx is the old PSW for the interrupt.

E at the end of the message indicates an EC mode interrupt. In this case, yyy is the interruption code.

If PGM interrupts start to be displayed, do a PSW restart. If this does not help, reload 4300-FRIEND. For the DUMP, DISPLAY, or ALTER commands, this error can occur if the specified address is out of storage or the page is disconnected in VSE mode.

PRINTER NOT READY

CC=0 was not received from the printer during the UCSB load.

SVC-INTRPT, PSW = xxx/yyyy E

4300-FRIEND detected an abnormal supervisor call (SVC) interrupt. xxx is the old PSW for the interrupt.

E at the end of the message indicates an EC mode interrupt. In this case, yyy is the interruption code.

-SYMBOL TABLE FULL, LAST CMD IGNORED

You tried to enter more than 40 symbolic characters. To clear the symbol table, key CLEAR\$.

-SYNTAX ERROR-

Displayed for misspelled statements or information, invalid or wrong number of characters, undefined CCWs, missing delimiter (comma), unknown verbs, etc. Key ? and correct the error.

-SYNTAX ERROR- ON INPUT

4300-FRIEND detected an error in the information entered for a DATA=, KEY=, or BBCCHH= request. Possible data field errors are missing x or c (indicates type of data) or no data after x or c. Enter ? and correct the error.

-UNDEFINED SYMBOL(S)

4300-FRIEND detected a symbol that was not previously defined. You cannot COMPARE or DUMP from a symbolic I/O area unless it has already been defined by a BUILD or CREATE command or the FROM or INTO CCW command modifier.

***UNIT=xxxx - CC=1 AFTER SIO
CSW yyy
SNS zzz
LOOP nnn**

Indicates that the Start I/O command is not accepted (condition code = 1). The CSW device status is not control unit busy or device busy or not a single channel end or device end/channel end (immediate commands). Check that the device is ready and online. LOOP counter nnn is not incremented and indicates the number of successfully initiated I/O operations.

***UNIT=xxxx - CC=3 AFTER SIO
LOOP nnn**

Indicates that the Start I/O command is not accepted (condition code = 3). LOOP counter nnn is not incremented.

***UNIT=xxxx - DATA COMPARE ERROR
BYTE NO.=aaaa \$X=bb \$Y=cc
'(one entry for each byte
' that failed to compare)
LOOP nnn**

Indicates a data compare error.

- xxxx Device address.
- nnn Loop number that failed.
- aaaa Relative byte number of the two areas compared (first byte = 1).
- X Represents the first area and is a symbolic character if symbolic I/O areas were used (otherwise = 1).
- Y Represents the second area (= 2, if no symbolic area).
- bb Represents the hexadecimal byte in the first area.
- cc Represents the hexadecimal byte in the second area.

***UNIT=xxxx - INCORRECT CSW
CSW yyy
LOOP nnn**

Indicates any unusual status; for example, attention, unit exception, and any channel status in the CSW.

***UNIT=xxxx - I/O INTRPT,UNIT CHECK
CSW 00 00D4E0 0E 00 0000
SNS 100020C800 0000000000 ...
LOOP 00662**

Indicates that 4300-FRIEND received an I/O interrupt, and unit check is on in the CSW. 4300-FRIEND displays the device address that gave the unit check, the actual CSW, and the sense bytes received from the device. If the message ERROR ON SENSE is displayed in front of the sense data, the SIO sense ended with an invalid status.

***UNIT=xxxx - NO DEV-END OR CU-END I/O
INTRPT**

Indicates that 4300-FRIEND did not receive a device end or control unit end within five to ten seconds after starting a CCW chain or receiving a control unit busy. The delay time depends on the number of devices running.

You can change the time delay with the TIME DELAY command. If a timeout occurs, 4300-FRIEND issues a HALT I/O to reset the device and then waits another time period for a device interrupt from the HALT I/O.

4300-FRIEND Commands

In general, all vowels, blanks, periods, and asterisks are ignored in 4300-FRIEND input except in data. You can use a comma to separate a parameter from the command.

For syntax errors or to repeat the previous input, enter a question mark (?).

If storage addresses are entered for a command, they must be entered in hex. Other numeric data (for example, data length) can be entered in either decimal or hex (the hex value must be preceded by an x).

The first line of the commands shows the primary form of the commands; accepted alternate forms are listed after the primary form.

\$\$?

Use this command to display the first 79 source characters of all predefined CCW chains.

\$\$nnn,*

Use this command to display the source of predefined CCW chain nnn.

\$\$*=hh

Use this command to assign two hexadecimal digits (hh) for the characters \$ and *. The characters \$ and * in hexadecimal input fields are replaced by the digits assigned. The default value is X'FF'.

? or ??

Use this command (?) to display (and modify) the last input entered on a 3277-type console (up to 30 bytes). If you specify two question marks (??), the next to last input is displayed.

**nn-ACTIVATE,*
nn-ACT**

Use this command to reactivate a CCW chain(s). nn is the UCB number displayed by the LIST= function. If the optional parameter * is specified, all stopped CCW chains are activated (see "LOOP" command).

ADD

Use this command to add a CCW to the last CCW chain entered. (4300-FRIEND turns on the command chain bit in the preceding CCW.) For an existing CCW chain, additional CCWs can be added by using the nn-ADD command (see "Modifying Existing CCW Chains").

ALARM

Use this command to sound an audible alarm after a message appears that requires operator action.

To reset ALARM, see the "NO ALARM" command.

**ALTER KEY nnn,addr,k,f
ALTER KEY nnn,\$c,k,f
ALTER KEY \$c,k,f**

Use this command to alter the storage key for storage area addr or symbolic I/O area \$c (c can be any alphabetic character) to the key specified by k. This command also sets fetch protection on if you specify an f as the last operand. The length is nnn bytes.

**ALTER nnn,addr,hhhh
ALTER nnn,\$c,hhhh
ALTER \$c,hhhh**

Use this command to alter up to 80 bytes at address addr or symbolic I/O area \$c (c can be any alphabetic character). Data hhhh is moved to storage. The length nnn of the area to be altered can be specified in decimal or hex. After the alter operation, the changed data is dumped (this includes the preceding and following eight bytes).

BMPX

(Enable block multiplexer mode)
Use this command to set block multiplexer mode on (standard if EC mode specified).

To disable block multiplexer mode, see the "NO BMPX" command.

BTS

(Branch to TIO/SIO loop)
Use this command to loop (using a small TIO/SIO loop at address X'300') the last CCW chain entered. Stop the loop by pressing the external interrupt button twice if INT is active. If INT is not active, do a PSW restart.

**BUILD nnn,\$c
BLD nnn,\$c
CREATE nnn,\$c
CRT nnn,\$c**

Use this command to reserve a symbolic data area \$c (c represents any alphabetic character). You can specify the length nnn of the area in decimal or hex. If you specify length zero (0), a data area with length one is created and no data is requested (pointer). The created data area can be used in all following CCWs until you specify the RESET command. (Enter data in response to message DATA=. 4300-FRIEND repeats the DATA= request until you enter no more data or the length count decrements to 0).

**CCW or CCW=xxx
LIST**

(List CCWs) Use this command to display the channel program being generated together with up to 16 data bytes in hex. If you specify a device address, all CCW blocks for this specific device are listed. If you specify a device address of 0 or CCW= alone, 4300-FRIEND displays all CCW blocks of all devices.

If you have not entered GO, the command chain bit is on in the last CCW. If you enter CCW immediately after an I/O error message, the displayed CCW chain is the one that detected the error. The actual failing command is flagged by ** (CCW address in CSW minus 8).

Example:

UCB= unit control block address for this CCW chain. FL= flag bytes in this UCB. Use the nn-CCW command for one UCB; for example, 2-CCW to display UCB chain two.

**CHANGE KEYBOARD
CK**

Use this command to request a new keyboard address for command input or the address of the secondary printer for CRT hard copy.

Note: 4300-FRIEND asks for the device type of the new console/secondary output station. Secondary output station printing produces a hard copy of all messages for the console. If a secondary output station is specified, make sure that it can handle the print CCW X'09'. Reset the secondary output by specifying address = 0 and type = PRT.

CHANGE nnn,addr,cccc
CHANGE nnn,\$b,cccc
CHANGE \$b,cccc

Use this command to alter up to 80 bytes at address addr or symbolic I/O area \$b (\$b represents any alphabetic character). Data cccc is moved to storage (lowercase characters are accepted). You can specify the length (nnn) of the area in decimal or hexadecimal. After the storage alter operation, the changed area is displayed.

CLEAR

Use this command to clear all CCW execution flags in all active UCBs and to reset the execution counters. You can use this command after an error stop to reinitialize the CCW run sequence.

CLEAR\$c
CLR\$

Use this command to clear the reference to symbolic data area \$c or to all symbolic references if you do not specify a symbolic data area.

COLOR TEST

Use this command to invoke an interactive test case for extended data stream orders (requires 327x extended features).

COMPARE \$x,\$y,nnn
CMP addr1,addr2,nnn

Use this command to compare two data areas (addr1 to addr2 or symbolic I/O area \$x to \$y). Specify the length (nnn) of the area in decimal or hexadecimal format (maximum length is 65535 or X'ffff'). If you do not specify a length, the length of the first symbolic I/O area is used. Only two areas can be compared for one CCW chain. The two areas compared can be different in any CCW chain(s).

You can enter COMPARE anytime during the generation of a CCW chain, and you can specify it for each CCW chain entered. Any symbolic I/O areas to be used must have been defined before. 4300-FRIEND does the comparison at each completion of the CCW chain.

To reset COMPARE, see the "NO COMPARE" command.

CONFIG xxx,yyy
CNFG

Use this command to test a range of devices (from address xxx to address yyy). If you do not specify device addresses, all device addresses from X'000' to X'FFF' are tested.

4300-FRIEND issues a TIO command, a SIO sense, and SIO sense I/O command to each device. The resulting condition codes, first four sense bytes, and sense I/O information bytes one to seven are displayed. In addition, TCH and STIDC commands are issued for the first device and for all following channel addresses ending with X'00'. The first byte of the channel ID means X'00' = selector channel; X'10' = byte-MPX channel; X'20' = burst-MPX channel. Devices or channels that store condition code 3 after TIO/TCH are not displayed.

All outstanding I/O interrupts are cleared before the CONFIG command. If an I/O interrupt is encountered after one device is tested, a message is displayed.

CONNECT nnn, addr
CONN nnn, \$c
CNN \$c

Use this command to connect a storage block of length nnn (full 2K blocks are used).

COPY xxx

Use this command to copy the last-entered CCW chain for device xxx. The CCW chain is not actually duplicated. Instead, the same physical CCW chain is used. This permits the same CCW chain to be run on several devices (of the same type) at the same time.

COUNTER
CNTR

Use this command to display the LOOP values and the SIO counters for all active CCW chains/UCBs.

CREATE

See the "BUILD" command.

CSW=xxxx

(CSW status mask)

Use this command to generate a CSW device and channel status mask. The two-byte long hexadecimal xxxx field indicates those bits that you want 4300-FRIEND to ignore. You can enter CSW= anytime during the generation of a CCW chain and you can specify it for each CCW chain entered. The device-end bit cannot be turned off.

DATA DUMP nnn,addr,*
DATA DUMP nnn,\$c,*
DTDMP \$c,*

Use this command to dump the specified data area (addr or symbolic I/O area \$c) on the secondary printer after running each CCW chain. You do not have to specify the length (nnn) of the area for a symbolic I/O area. If the secondary printer is not specified, the operator console is used for the display. If the optional parameter * is specified, the dump also appears on the operator console.

To reset DATA DUMP, see the "NO DATA DUMP" command.

DECREASE n,addr,incr,thr,ini,*
DCR n,addr,incr,thr,ini,n2,
addr2,incr2,thr2,ini2,*

Use this command to decrement a counter after each completion of a channel program. Optionally, you can specify a second counter which is updated if the threshold of the first counter is reached. Use this command with the INCREASE command only. For an explanation of the parameters, see the "INCREASE" command.

To reset the DECREASE command, see the "NO DECREASE" command.

DEVICE=xxx
DEV=xxx

Use this command to create a new UCB for the next CCW chain entered with the unit address of xxx (leading zeros are not required). If the device address is *, the address of the operator console is used. The last-entered UCB entry is completed by turning the command chaining bit off in the last CCW.

Note: 4300-FRIEND analyzes the device type at this time. The following commands are run if the device is ready:

For FB device type determination: Sense I/O (X'E4')
2321 determination (if Sense I/O not accepted):
Seek Cylinder (X'0B') - length 4 X'FF.FF'
Seek (X'07') X'000010000000'
After previous checks:
Sense (X'04') - if any error occurred before to clean status.

If the specified device does not handle the above commands, you can specify a dummy device address (for example, 0) and later specify the real device address with the nn-DEVICE= command.

DISCONNECT nnn, addr
DISC nnn, \$c
DSC \$c

Use this command to disconnect a storage block of length nnn (full 2K blocks are used). Reconnect the block(s) before using the DUMP/ALTER commands.

DISPLAY nnn,addr,xxx
DISPLAY nnn,\$c,xxx
DSPL \$c,xxx

Use this command to display the contents of storage in character format. Storage is displayed in lines of 64 bytes (maximum) along with the address of the first byte. addr indicates the beginning address; nnn indicates the length (in decimal or hex) of the area to be displayed. Optionally, you can specify a line printer address xxx for output.

DUMP \$

Use this command to dump the names of all assigned symbolic I/O areas along with their storage address and length in hex.

DUMP KEY nnn,addr
DUMP KEY nnn,\$c
DMPK \$c

Use this command to dump the storage keys of storage area addr for nnn bytes.

DUMP nnn,addr,xxx
DUMP nnn,\$c,xxx
DMP \$c,xxx

Use this command to dump nnn bytes of storage starting at address addr. You can specify nnn in decimal or hex. Optionally, you can specify a line printer address xxx for output. \$c is any symbolic I/O area specified by a previous BUILD or CREATE command or by the FROM or INTO CCW command modifiers (if you do not specify a length, the one stored for the symbolic field is used). Symbolic address can be offset \$c+a (a = offset 1..F).

DUMP T

Use this command to dump the last entries (36 maximum) of the TRACE area.

EX CLRIO,xxx
XC

(Execute Clear I/O) Use this command to display the condition code received after running the Clear I/O command to device xxx.

EX HDV,xxx
XHD

(Execute Halt Device)
 Use this command to display the condition code received after running the Halt Device command to device xxx.

EX HIO,xxx
XH

(Execute Halt I/O)
 Use this command to display the condition code received after running the Halt I/O command to device xxx.

EX STIDC,xxx
XS

(Execute Store Channel ID)
 Use this command to display the condition code received after running the Store Channel ID command for device xxx.

EX TCH,xxx
XTC

(Execute Test Channel)
 Use this command to display the condition code received after running the Test Channel command for device xxx.

EX TIO,xxx
XT

(Execute Test I/O)
 Use this command to display the condition code received after running the Test I/O command to device xxx. If you do not specify device address xxx, 4300-FRIEND uses the last device address entered.

FLAG nn,xx

(Modify Flag Byte)
 Use this command to modify the flag byte in CCW nn to hex value xx. If you specify no value, the flag is set to zero.

GO

Use this command to start running all active CCW chains. After they have started running, the CRT console accepts commands (for example, STOP, ACTIVATE, COUNTER, EXHIO, etc.) without halting the run. You can stop 4300-FRIEND with an I/O interrupt by pressing the ENTER key on the operator's console.

HALT

Use this command to halt processing after an I/O error or false PSW swap occurs. No device is restarted, but additional errors can be indicated.

To not halt after an I/O error occurs, see the "NO HALT" command.

HELP

Use this command to display operating hints.

I

(Initialize)
 Use this command to initialize 4300-FRIEND. (This command is the same as RESET, except it is accepted in all input fields; for example, in data request.) The device queue, CCW area, data area, and IDA areas are zeroed. All references to symbolic I/O areas (\$a to \$z) are reset. A new device address is requested.

INCREASE n,addr,inc,thr,ini,*
INCR n,addr,inc,thr,ini,
n2,addr2,inc2,thr2,ini2,*

Use this command to increase (advance) a counter after each completion of a channel program. Optionally, you can specify a second counter that is updated if the threshold of the first counter is reached. Use this command with the DECREASE command only.

- n = length of the counter (field) 1 to 4.
- addr = hexadecimal address of the counter.
- inc = optional increase value (in decimal or hex). The default is 1.
- thr = optional threshold value (decimal or hex) of the counter at which the counter is initialized. The default = 0.
- ini = optional value (decimal or hex) to which the counter is initialized at the beginning and when the threshold is reached. The default is 0.
- * = stop processing if threshold of the only or second counter is reached.

To reset the INCREASE function, see the "NO INCREASE" command.

INT

(Interrupt)
 Use this command to discontinue the running of CCW chain(s) after the external interrupt button has been pressed twice. A Halt I/O instruction is issued after about five seconds to those I/O devices that are still active. The TIO mode of 4300-FRIEND is reset.

To handle external interruptions normally, see the "NO INT" command.

KEY CAW=k

Use this command to specify CAW key k for the running of the CCW chain. k can be any hexadecimal digit 0 to F. The standard key used is 1.

KEY CCW=k,f

Use this command to specify storage key k for the CCW area (for all CCW chains). The standard key is 1 without fetch protection. Specify f to fetch-protect the CCW area.

KEY DATA=k,f

Use this command to specify storage key k for the data area (for the next CCW chains to be entered). 4300-FRIEND increments the data area pointer to the next 2K storage boundary and sets the specified key up through the end of storage. The standard key is 1 without fetch protection. Specify f to fetch-protect the data area.

KEY IDA=k,f

Use this command to specify the storage key k for the IDA area (for all CCW chains). The standard key is 1 without fetch protection. Specify f to fetch-protect the IDA area.

LIST

See the "CCW" Command.

LOAD UCSB

Use this command to load the UCSB buffer of the 3203, 3211, 3262 or 3289 printers (4300-FRIEND requests all necessary load information). The Block Data Check function is set for the printer.

LOOP / LOOP nnn,*

Use this command to specify the number of times to loop the entered CCW chain. Specify the loop number nnn in decimal (the maximum number is 65535). The SIO counter is reset to zero.

If the optional parameter * is specified, the CCW chain is stopped when the specified loop count is reached. You can activate the stopped CCW chains again with the ACT,* command. If the parameter * is not specified and the CCW chain has looped the specified number of times, 4300-FRIEND stops running all active CCW chains, displays LOOP IS FINISHED ON UNIT xxxx, and requests a new command.

Enter GO to repeat the CCW chain(s). You can display the current loop values (thresholds) with the COUNTER command.

**NO ALARM
NLRM**

Use this command to reset the audible alarm on the operator console.

NO BMPX

Use this command to set block multiplexer mode off (standard if BC mode is specified).

**NO COMPARE
NCMP**

Use this command to reset the compare indication for the last entered chain or for the chain specified in the nn-NOCOMPARE format.

**NO DATA DUMP
NDTDMP**

Use this command to reset the Data Dump command.

**NO DECREASE
NDCR**

Use this command to reset the Decrease command.

NO HALT

Use this command for no halt after an I/O error occurs.

**NO INCREASE
NINCR**

Use this command to reset the Increase command.

NO INT

Use this command to instruct 4300-FRIEND to handle the external interruptions normally (no interrupt).

NO TEST I/O

Use this command to reset the TIO mode.

**NO TIME DELAY
NTD**

Use this command to instruct 4300-FRIEND to go to wait state after all active UCB devices are started until an I/O interrupt occurs. Devices that do not return a device-end interrupt are not restarted. This mode is recommended, in order to save processor time, if 4300-FRIEND is used in the VM environment.

NO WAIT

Use this command to reset the wait indication for the last entered chain or for the chain specified in the nn-NOWAIT format.

**POINTER CCW=xxx
PTRCCW=xxx**

Use this command to specify the next CCW address (xxx) (must be on doubleword boundary).

**POINTER DATA=xxx
PTRDT=xxx**

Use this command to specify the next CCW data area address (xxx).

**POINTER IDA=xxx
PTRD=xxx**

Use this command to specify the next IDAW address (xxx) (must be on word boundary).

**PRINT SENSE
PRTSNS**

Use this command to display the 32-byte long standard sense area. The TIO mode of 4300-FRIEND is reset.

PSW

(Program (PSW) Restart)
In execution mode, use this command to request a Clear function without counter reset.

**QUIT
Q**

Use this command to quit (cancel) a 4300-FRIEND request for console input (for example, DATA=). The whole last command is ignored, and a new command is requested. The REPLACE function is reset.

**REMOVE=xxx
RMV=xxx**

Use this command to remove all CCW chains for device xxx from the device queue. If you are running several different devices in overlap mode, the complete CCW chain(s) of a device can be removed with this command. To remove a single CCW chain, use the STOP command.

REP nn

(Replace CCW)
Use this command to replace CCW nn in the last CCW chain entered with the next CCW that is entered. Use the nn-REP command to modify a specific CCW chain. When you are entering a CCW chain, specifying REP alone replaces the last entered CCW with the next one.

RESET

Use this command to reinitialize 4300-FRIEND. The device queue, CCW area, data area, and IDA areas are zeroed. All references to symbolic I/O areas (\$a to \$z) are reset. A new device address is requested.

RETURN

Use this command to change from card/tape input to operator console input. Otherwise, use the GO or TRACE command.

SCOPE

Use this command to loop on a Start I/O or Test I/O instruction. SCOPE can only be used in single CCW chain mode. If you specify SCOPE after a TEST I/O, do a PSW RESTART to exit SCOPE mode. If you specify SCOPE after a START I/O, use the console REQUEST to exit.

SENSE=xxxx

Use this command to create a sense byte status mask. The two-byte long, hexadecimal xxxx field indicates those bits to be ignored by 4300-FRIEND in the first two bytes of the sense field. You can enter this command anytime during generation of a CCW chain, and you can specify it for each CCW chain entered.

SET FB

(Set Fixed-Block Device)
Use this command if a device does not store the correct FB ID after a sense I/O.

SIZE

Use this command to display the storage size in hexadecimal.

**START READER,xxx,*,nnnn,B
S,xxx**

Use this command to read the CCW chain(s) from either a card reader or a tape drive with address xxx. If the second parameter is *, all records read are displayed. As an optional third parameter, a four-digit test case number can be specified. This number must be located in columns 3 to 6 of the first record of a test case. If a tape is used and a desired test case has been passed, a fourth parameter B for backward read can be used. 4300-FRIEND skips all test cases up to the one specified.

STATUS

Use this command to print all the program indicators normally displayed on line 20.

nn-STOP

Use this command to deactivate CCW chain nn. nn is the UCB number displayed by the LIST= function.

SUBST xxx,yyy

(Substitute)
Use this command to search all channel programs for device address yyy and then change the device address to xxx. If you want to change the device address in a specific CCW chain, use the nn-DEV=xxx CCW chain control command.

**TEST I/O
T**

Use this command to repeatedly run the TIO instruction (using the last-entered device address only) and display its results; that is, condition code, CSW, and sense bytes. If you specify a loop count for the last entered UCB, the TIO loop can be restricted. To execute the TIO only once, use the EX TIO command. By entering SCOPE instead of GO, the results are not displayed.

Reset TIO mode by pressing the ENTER key twice (if INT feature is active) or by commands NO TEST I/O, PRINT SENSE, or RESET.

TIME

Use this command to get the current time. This is either the time-of-day or the elapsed time since the program was started.

**TIME DELAY nn
TMDL nn**

Use this command to set the timeout counter (for the running of all CCW chains) to decimal nn seconds. An error message is displayed if 4300-FRIEND does not receive a device end for a CCW chain within the specified time period. Also use this command if an operator console or secondary printer is used as a test device.

For no time delay, see the "NO TIME DELAY" command.

**TRACE xxx
TRC**

Use this command to start running all active CCW chains and to build up a trace area that contains information about all SIOs and I/O interrupts of all test devices. If you specify an asterisk (*) for device address xxx, the SIOs and TIOs for the operator console and the secondary printer are also traced. If you specify device address xxx, only trace entries for this device are stored in the trace area. You can dump the last entries in the trace area with the DUMPT command.

WAIT nn,n

Use this command to instruct 4300-FRIEND to wait until the current CCW chain has been completed (device end interrupt) before the next CCW chain is started. If you do not specify nn, 4300-FRIEND starts the next CCW chain immediately upon the receipt of the device end interrupt; otherwise, it waits for nn milliseconds before starting the next CCW chain. The second parameter (n) is optional and specifies 0.1 milliseconds.

To reset the Wait function, see the "NO WAIT" command.

Changing Existing CCW Chains

During the generation of a CCW chain, all entered commands are related to the current UCB (the number of the current UCB is displayed on the screen). To change an existing CCW chain (UCB), specify the UCB/CCW chain number (get the UCB/CCW chain number by using the CCW= or LIST= commands), a hyphen (-), and then the command (see the following examples).

Example 1

This command changes the loop count for CCW chain 12:

12-loop 5000

Example 2

This command copies CCW chain number 2 to the current UCB by using the same CCWs and data:

2-copy

Change Commands

For more information on these commands, see "4300-FRIEND Commands."

nn-ACTIVATE

Activates UCB/CCW chain number nn.

nn-ADD

Adds a command after CCW chain number nn (see also "nn-SETFB").

nn-CCW

Lists the CCWs of UCB/chain number nn.

nn-COMPARE ...

Specifies/changes COMPARE values.

nn-NO COMPARE

Deactivates COMPARE for CCW chain number nn.

nn-COPY

Copies CCW chain number nn to the current UCB.

nn-COUNTER

Lists the counters of UCB/CCW chain number nn.

nn-CSW=xxxx

Specifies/changes the CSW bits to be ignored.

nn-DATA DUMP

Specifies/changes the DATA DUMP values.

nn-NO DATA DUMP

Deactivates DATA DUMP for CCW chain number nn.

nn-DECREASE ..

Specifies/changes the DECREASE values.

Seq GG045	PN 0446224 Pg 1 of 2	EC A02214 15 SEP 83				
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nn-NO DECREASE

Deactivates DECREASE for CCW chain number nn.

nn-DEVICE=

Changes the device address for CCW chain number nn.

nn-FLAG nn,xx

Changes the flag byte in CCW chain number nn.

nn-INCREASE ..

Specifies/changes the INCREASE values.

nn-NO INCREASE

Deactivates INCREASE for CCW chain number nn.

nn-KEY CAW=

Specifies/changes the CAW key.

nn-LIST

Lists the CCWs of UCB/CCW chain number nn.

nn-LOOP

Specifies/changes the LOOP count.

nn-REP nn

Replaces a CCW in CCW chain number nn (see also "nn-SETFB").

nn-SENSE=nnnn

Specifies/changes the sense bits to be ignored.

nn-SETFB

Sets FB type for device (required before nn-REP and nn-ADD commands for 3370).

nn-STOP

Stops/deactivates UCB/CCW chain number nn.

nn-WAIT nnnn

Specifies/changes WAIT for CCW chain number nn.

nn-NO WAIT

Deactivates WAIT for CCW chain number nn.

CCW Chain Execution Control

Before an SIO is issued, 4300-FRIEND checks the CCW chain and zeros all input areas indicated by the ZERO flag in the CCW.

If an I/O interrupt or condition code 1 or 3 occurred after a Start I/O, 4300-FRIEND analyzes the CSW and issues the specified UCB control commands in the following sequence:

1. Successful completion of a CCW chain (either no error detected or error was masked out by CSW=/SENSE= commands).
 - a. Data compare
 - b. Data dump
 - c. Data ripple or random
 - d. Increment or decrement storage field
 - e. Compare loop count
2. Unsuccessful execution of a CCW chain (error in CSW after I/O interrupt and CSW status not masked).
 - a. Issue sense command in case of unit check in CSW.
 - b. If all the sense bytes are masked and no other error is in CSW, handle it as normal interrupt.
 - c. Display error message.
 - d. Data dump.
 - e. Data ripple or random.
 - f. Increment or decrement storage field.
 - g. Compare loop count.

3. Condition Code 1 (CSW stored) after Start I/O with unexpected CSW status.
 - a. If all the CSW status error bits are masked, handle it as immediate interrupt.
 - b. Issue sense command in case of unit check in CSW.
 - c. If all the sense bytes are masked and no other error is in CSW, handle it as immediate interrupt.
 - d. Display error message.
 - e. Increment or decrement storage field.
 - f. Retry Start I/O (SIO counter is not incremented). The SIO is not retried if the loop count is one.
4. Condition Code 3 after Start I/O.
 - a. Display error message.
 - b. Increment or decrement storage field.
 - c. Retry Start I/O (SIO counter is not incremented). The SIO is not retried if the loop count is one.
5. Condition Code 2 (busy) after Start I/O.
 - If WAIT specified, wait until device end is signaled by device, or stop execution if interrupt not received after about five seconds.
 - If WAIT was not specified, start next device (if specified).
6. Test I/O Loop (last entered device address at storage location X'420').
 - a. Print condition code.
 - b. Increment or decrement storage field.
 - c. Compare loop count.

CCW COMMANDS

In general, all vowels, blanks, periods, and asterisks are ignored in 4300-FRIEND input except in requested data. All commands can be entered in either uppercase or lowercase characters.

Following the CCW command, a CCW flag or CCW command modifier can be entered, separated by a comma.

The CCWs that have an *S* following the command are automatically generated with the Suppress Incorrect Length Indicator (SILI) set on. If you do not want the SILI bit set on, specify NOSILI after the CCW command.

For a detailed description of the device CCWs, refer to the *Component Description* manual for that device.

General CCWs

CMD HH *S*

(Command Code in Hex)
Enter any hexadecimal command code. If the last hex digit is odd, data is requested.

HEX HHHHHHHHHHHHHHHH

(Complete CCW in Hex)
Enter a complete CCW in hex. Sixteen hex characters are packed into an 8-byte CCW and inserted into the CCW chain. The data address in the CCW is changed to point to the next available data area location of 4300-FRIEND (if SKIP bit is not on in CCW flag). Blanks can be inserted to separate fields. No CCW flag or CCW command modifier can be specified.

NOP (X'03') *S*

READ (X'02') *S*

SENSE (X'04') *S*
SNS

Length is always 32 bytes. The standard sense bits (byte zero) are:

- X'80' = Command reject
- X'40' = Intervention required
- X'20' = Bus-out check
- X'10' = Equipment check
- X'08' = Data check
- X'04' = Overrun

SENSE I/O DEVICE (X'E4') *S*
SNSDVC

TIC *-n..n or -n..n (X'08')
TIC *+n..n or +n..n

(Transfer in Channel)
 n..n is the decimal number of bytes for the channel to transfer to (displacement) the * and + or - are optional. If only TIC is entered, *-8 is assumed. If X is the first character of n..n, the following characters are taken as hexadecimal displacement.

WRITE (X'01') *S*

Disk CCWs

DIAGNOSTIC LOAD (X'53')
DGL

DIAGNOSTIC WRITE (X'73')
DW

ERASE (X'11') *S*

INIT BUF (X'E3')
NTBF

(Initialize Buffer - 2314)

MT + CCW

(Set multitrack bit for specified CCW)

READ BUF (X'E2')

(Read Buffer - 2314)

READ BUFFERED LOG (X'A4')
RBL

(Read Buffered Log - 33XX)

READ COUNT (X'12')
RC

READ COUNT KEY DATA (X'1E') *S*
RDCKD

READ DATA (X'06') *S*

READ DIAGNOSTIC STATUS (X'44')
RDDGS

READ HA (X'1A')
RH

(Read Home Address)

READ IPL (X'02') *S*
RDPL

READ KEY DATA (X'0E') *S*
RKD

READ R0 (X'16') *S*
RR0

(Read Record Zero)

READ SECTOR (X'22')
RSC

RECALIBRATE (X'13') *S*
RCL

RELEASE (X'94')
RL

(Device Release - string switch)

RESERVE (X'B4')
RSV

(Device Reserve - string switch)

RESET BUF (X'C3') *S*
RSTBF

(Reset Buffer - 2314)

RESTORE (X'17') *S*
RSTR

SEARCH HA EQ (X'39')
SHQ

(Search Home Address Equal)

SEARCH ID EQ (X'31')
SQD

SEARCH ID HI (X'51')
SDH

SEARCH ID HI EQ (X'71')
SDQH

SEARCH KD EQ (X'2D') *S*
SDT

(Search Key and Data Equal)

SEARCH KD EQ HI (X'6D') *S*
SKDQH

(Search Key/Data Eq/Hi)

SEARCH KD HI (X'4D') *S*
SCHKDH

(Search Key and Data High)

SEARCH KEY EQ (X'29') *S*
SQK

SEARCH KEY EQ HI (X'69') *S*
SKQH

SEARCH KEY HI (X'49') *S*
SKH

SEEK (X'07')
SK

SEEK CYL (X'0B')
SKCL

SEEK HEAD (X'1B')
SKHD

SET FILE MASK (X'1F')
SFM

SET SECTOR (X'23')
SS

SPACE COUNT (X'0F') *S*
SPCNT

WRITE BUF (X'E1')
WBF

(Write Buffer - 2314)

WRITE COUNT KEY DATA (X'1D')
WCKD

WRITE DATA (X'05')
WD

WRITE HA (X'19')
WH

(Write Home Address)

WRITE H40 (X'19')
WH40

(Write 3340 Home Address)

WRITE H50 (X'19')
WH50

(Write 3350 Home Address)

WRITE KEY DATA (X'0D')
WKD

WRITE R0 (X'15')
WRR0

(Write Record Zero)

WRITE SPECIAL COUNT KEY DATA (X'01')
WSPCKD

Fixed Block (FB) Commands - 3370

Fixed block (FB) devices are identified during device address specification time (DEV=...). If the device handles FB (depends on SENSE I/O bytes 4 and 5 which must be X'3370'), the DEVICE CHARACTERISTIC is read and saved for later use. If the device does not store the correct FB ID after the sense I/O command, the SET FB command can be used after DEV=.

DEFINE EXTENT (X'63')
DX

(16 bytes)

Requested parameters are:

MASK BYTE= (two hex digits)

PHY.START= (decimal value or up to 8 hex digits preceded by "X").

LOG.START= (decimal value or up to 8 hex digits preceded by "X").

LOG. END= (decimal value or up to 8 hex digits preceded by "X").

If nothing is entered, the defaults are:

First three parameters are all 0.

LOG. END is the value read by the READ DEVICE CHAR command (reduced by 1).

DIAGNOSTIC CONTROL (X'F3')
DCNT

DIAGNOSTIC SENSE (X'C4') *S*
DGSNS

LOCATE (X'43')
LC

(8 bytes)

Requested parameters are:

OP. BYTE =(two hex digits)

REPL. CNT=(decimal value or up to 2 hex digits preceded by "X").

BLCK. CNT=(decimal value or up to 4 hex digits preceded by "X").

BL. OFFS.=(decimal value or up to 8 hex digits preceded by "X").

If nothing is entered the defaults are:

OP. BYTE = X'06'

REPL. CNT= X'00'

BLCK. CNT= X'0001'

BL. OFFS.= X'00000000'

READ BUFFERED LOG (X'A4') *S*
RBL

READ DEVICE CHAR (X'64')
RDDVC

READ FB (X'42') *S*
RFB

READ IPL (X'02') *S*
RDPL

RELEASE (X'94') *S*
RL

(Device Release - string switch)

RESERVE (X'B4') *S*
RSV

(Device Reserve - string switch)

SENSE EXTENDED (X'84') *S*
SNSX

WRITE FB (X'41')
WFB

Tape CCWs

BACKSPACE (X'27') *S*
BSR

(Backspace Record)

BSF (X'2F') *S*

(Backspace File)

ERG (X'17') *S*

(Erase Record Gap)

FSF (X'3F') *S*

(Forward Space File)

FSR (X'37') *S*

(Forward Space Record)

MODE SET (X'93')
MDST

(Mode Set 7-track, 800 bpi)

MODE SET 800 (X'CB')
MDST 8

(Mode Set 9-track, 800 bpi)

MODE SET 1600 (X'C3')
MDST 1

(Mode Set 9-track, 1600 bpi)

MODE SET 6250 (X'D3')
MDST 6

(Mode Set 9-track, 6250 bpi)

READ (X'02') *S*
RD

READ BACKWARDS (X'0C') *S*
RDBK

REWIND (X'07') *S*
REW

UNLOAD (X'0F') *S*
RUN

WRITE (X'01') *S*
WRT

WTM__ (X'1F') *S*

(Write Tape Mark)

Card Reader / Punch CCWs

PUNCH (X'01') *S*
PCH

(2540 punch, feed, select stacker)

PUNCH BINARY (X'21') *S*
PNCHBNR

(2540 punch binary, feed, select stacker)

PUNCH 42 (X'C1') *S*
PNCH42

(1442 punch, eject, select stacker 2)

PUNCH 42 BINARY (X'E1') *S*
PNCH42BNR

(1442 punch binary/eject/select stacker)

READ CARD (X'02') *S*
RCD

Printer CCWs

ALLOW DC (X'7B')
LLWDC

(Allow Data Check)

BLOCK DC (X'73')
BLCKDC

(Block Data Check)

FOLD (X'43')
FLD

(Fold -3211 + 3203-4)

GATE LOAD (X'EB')
GTLD

(Gate Load - 1403)

IMM + CCW command
MM

(Immediate - use with SPACE/SKIP commands)

LOAD FCB (X'63') *S*
LDFCB

(Load Forms Control Buffer)

LOAD UCS (X'FB') *S*
LDCS

(Load UCS Buffer without Folding)
For 1403, a GATE LOAD command must be executed before a LOAD UCS.

LOAD UCS F (X'F3') *S*
LDCSF

(Load UCS Buffer and Fold - not for 3211)

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PRINT (X'09') *S*
PRT

(Print with one Space after)

RAISE COVER (X'6B')
RSCVR

READ FCB (X'12') *S*
RFCB

(Read FCB 3211)

READ PLB (X'02') *S*
RDPLB

(Read PLB 3211)

READ UCSB (X'0A') *S*
RCSB

(Read UCSB 3211)

SKIP n *S*
SKPn

(Skip to Channel n; n is 1 to 12)

SKIP 0 (X'83')
SKP0

(Skip to Channel 0 immediate - 3211)

SPACE n (X'CC') *S*
SPCn

(Print with n Spaces After)
 n is 1, 2, or 3; command is X'09', X'11', or X'19';
 immediate X'0B', X'13', or X'1B'.

UNFOLD (X'23')
NFLD

(Unfold [3211 + 3203-4])

WRITE (X'01') *S*

(Write without Space)

Warning: This can destroy printer ribbons.

CRT and Hard-Copy Printer CCWs
(3277/3278-3287)

ERASE ALL U (X'0F') *S*
RSLL

(Erase All Unprotected)

ERASE/WRITE (X'05') *S*
RSW

ERASE WRITE CRT (X'05') *S*
RSW3277

(Erase Write 3277 Data)
 Instead of DATA= 3277, specific requests are
 keyed. To end them, enter * after CMD= is keyed.
 See "Command Table." Do not specify indirect
 addressing (IDA).

READ BUFFER (X'02') *S*
RBFF

READ MODIFIED (X'06') *S*
RMD

SELECT (X'0B') *S*
SLCT

WRITE (X'01') *S*

WRITE CRT (X'01') *S*
W3277

(Write 3277 Data Stream)
 Instead of DATA= 3277 specific requests are typed.
 To end them, enter * after CMD= is typed. See
 "Command Table" below. Do not specify indirect
 addressing (IDA).

Command Table

If you specify WRITE CRT or ERASE WRITE CRT,
 4300-FRIEND asks for the 3277 command (buffer
 control order).

- 'SB' Set Buffer Address (X'11') + address
- 'Sf' Start Field (X'1D') + attribute character
- 'IC' Insert Cursor (X'13')
- 'Pt' Program Tabulator (X'05')
- 'Ra' Repeat to Address (X'3C') + address and
 'fill' character (DATA=)
- 'Eu' Erase Unprotected (X'12') + address
- 'EM' End of Message (X'19') - for printer
- 'FF' Forms Feed (X'0C') - for printer
- 'NI' New Line (X'15') - for printer
- '% %' ENTER key = no command
- '*&' end of data stream (no code generated)

Teleprocessing CCWs (270x, 370x)

ADPREP (X'1E') *S*
ADP

(Address Prepare)

BREAK (X'0D') *S*
BRK

CONTROL SCB (X'0B') *S*
CS

(Ctl SCB SDLC -16 bytes)
 Address aligned on fullword boundary.

- OFS Enter buffer offset in decimal (default= 2).
- ADR Enter SDLC station address.
- FLG Enter control flag byte in hex:
 X'80' Inactive station (0= active).
 X'40' Datapoll station (0= contact).
 X'20' Send rnr poll (0= rr).
 X'10' Reply rnr to poll (0= rr).
- NSC Enter ns current.
- NSA Enter ns acknowledged.
- NRA Enter nr of next frame to be received.
- IDT Enter four byte identification field in hex.

DIAL (X'29') *S*
DL

(Dial, switched line with autocal)

DISABLE (X'2F') *S*
DSBL

(Disable Line)

ENABLE (X'27') *S*
NBL

(Enable Line)

INHIBIT (X'0A') *S*
NHBT

LISTEN (X'0A') *S*
LSN

(SDLC X.21 switched)

POLL (X'09') *S*

(Poll/Autopoll)

POLL SCB (X'09') *S*
PLLS

(Poll SCB -SDLC Autopoll)
 Enter SCBs as for Control SCB command. End
 command with answer 'n' after Y-N=.

POLL SDLC (X'0F') *S*
PLLSD

PREPARE (X'06') *S*
PP

READ (X'02') *S*

READ PIU (X'06') *S*
RDP

(Read PIU - SDLC)

SADn *S*
SDn

(SAD n -270x; n is 0, 1, 2, or 3)

SET MODE (X'23') *S*

SENSE SCB (X'14') *S*
SNSS

(Sense SCB SDLC - 24 bytes)
Address aligned on fullword boundary.

WRAP (X'05')
WRP

WRITE (X'01') *S*

WRITE PIU (X'05') *S*
WP

(Write PIU - SDLC)

CCW FLAGS

You can enter a CCW flag after a CCW command, a CCW modifier, or another CCW flag (separated by a comma). Note that some CCW flags are automatically set by 4300-FRIEND. (After the CCW has been specified, you can change these flags with the 4300-FRIEND FLAG command.)

DC (X'80')

(Data Chaining)
Uses address portion of next CCW (command chaining is not turned on)

IDA (X'04')

(Indirect Data Addressing)

Note: This parameter must be the last one entered in the CCW command. 4300-FRIEND requests IDA areas for IDAW. Do not specify a CCW command modifier with IDA.

NOSILI (resets X'20')
NSL

(Reset Suppress Incorrect Length Indicator)

PCI (X'08')

(Program Controlled Interrupt)
Causes a channel controlled interruption. 4300-FRIEND ignores all interrupts with PCI on in the CSW until device end is posted in the CSW.

SILI (X'20')

(Suppress Incorrect Length Indicator)
Causes suppression of possible incorrect length indication in CSW.

SKIP (X'10')

Suppress transfer of information to storage.

CCW COMMAND MODIFIERS

Add the following CCW command modifiers to a CCW command for the indicated reasons. You can combine these modifiers where applicable.

CRT or 3277

Requests a special 3277 data stream after WRITE and ERASE WRITE.

FROM

Specifies a symbolic I/O area is to be used.

INTO

Specifies a symbolic I/O area is to be used.

LENGTH
LN

(Data Length)
4300-FRIEND requests key length and data field length for the file count instead of using the amount of data entered from KEY= and DATA= . For commands which have a fixed data length assigned by 4300-FRIEND, use LENGTH to change the fixed data length.

NEW

(Reset CCW indicators.)
This modifier resets the disk indicators for:

- TIC required
- Seek argument not required
- Set File Mask required.

RANDOM
RN

Generates random data (bypasses 'home address' and 'count fields').

RIPPLE
RP

Moves the data area one byte to the left for all write CCWs.

ZERO
ZR

Clears input area of CCW before

Processor Installation

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Processor and Ship Group Checkout	INST 002	Installing Interface Cables	INST 027
Power Plug Installation (If Required)	INST 005	Final System Checkout	INST 029
Preparing the Power Cable for Plug	INST 005	Running System Test/4381	INST 029
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Installation Time Guidelines

Clock Time	Area
.8 to 1.0	Processor and Ship Group Checkout Power Plug Installation (If Required) Site and Processor Safety Checkout Physical Setup
.3 to .6	Install Operator Console Install RSF
1.2 to 1.4	MSS Power-On Checks and Diagnostics
1.7 to 2.0	System Configuration
1.5 to 2.0	Install Interface Cables
1.5 to 2.0	Final System Checkout

7 to 9 Hours Total Install Time

Processor and Ship Group Checkout

DANGER

Do not touch any customer power receptacles at the installation site until instructed in the "Site and Processor Safety Checkout" procedure.

Start here after completing the unpacking instructions.

1. Check the processor for physical damage.
2. Ensure that possible last minute processor location changes have not affected I/O cable lengths or power outlets.
3. Unpack the large shipping group package. Inside the large package will be several smaller boxes. Open the boxes and compare the contents to the enclosed packing list.
4. Verify that one DIAG1, two FUNC1, and two FUNC2 diskettes are packed in the storage pocket near the service panel.

Note: If the Remote Support Facility (RSF) feature (B/M 1806885) was ordered, cable and coupler assembly (part 401441) will be installed in gate 01G. Go to "Site and Processor Safety Checkout."

5. If the RSF feature other than B/M 1806885 was ordered, verify the correct external RSF cable is part of the ship group. For the correct cable part number, refer to the RSF table shown at **A**.

A

Cable Part Number	Feature Code
8482931	9510
8482934	2837
8382934	2836
8482931	2944/2943
401441	9514
8482930	9511
8482930	2833/2838
8482933	2839

Power Plug Installation (If Required)

This procedure applies only in countries where the machine is shipped without a plug on the power cable. Because of the various styles of power plugs, *This Procedure is for Reference Only*. The shield must be properly terminated at the plug to ensure proper grounding of the power cable.

Preparing the Power Cable for Plug

Review the figure before starting, and refer to this figure during the procedure.

1. Remove about 65 mm (2-5/8 in) of the cable jacket starting at the plug end of the cable.
2. Unbraid (do not cut), and carefully comb out the shield exposing the cable core.
3. Remove the Mylar separator and cable filler exposing the conductors.
4. Carefully fold the shield back over the cable jacket, and temporarily wrap tape to protect the shield.
5. Install clamp, rubber insulator, and connector shell over the cable core.
6. Remove 14 mm (9/16 in) of insulation from the conductors.

Installing the Power Plug

Note: Nonraised Floor Only. Slide the power cable under the machine frame before connecting the power plug.

The following steps show you how to attach one style of the power plug to the line cord.

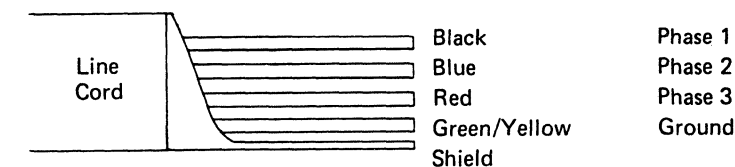
1. Remove the tape from the shield, and then loosen and separate the strands.

2. Slide the rubber bushing up against the shield.

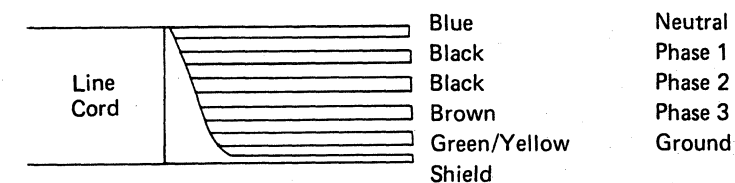
Note: Ensure that the ground wire is slightly longer than the adjacent wires.

3. Complete the installation of the power plug by installing the contact assembly to the proper conductors of the power plug. Ensure that the shell makes contact with the shield at all places (360 degrees).

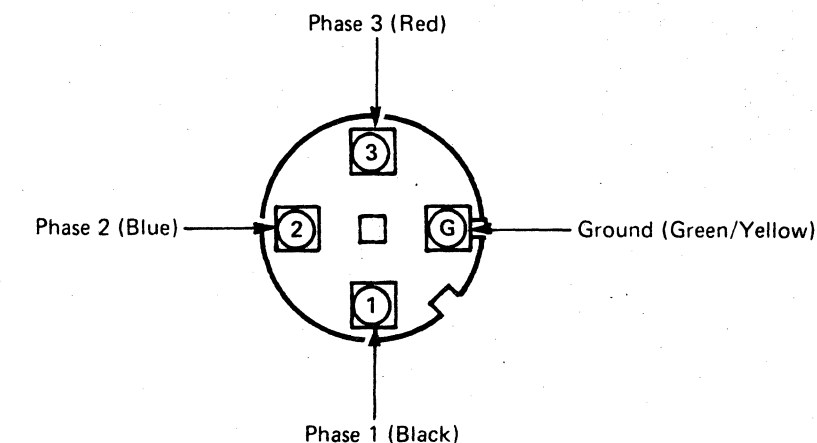
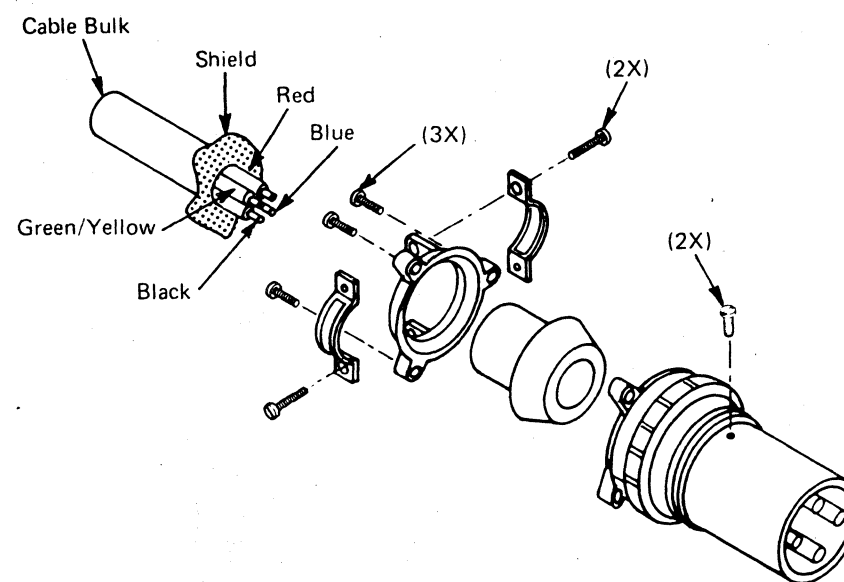
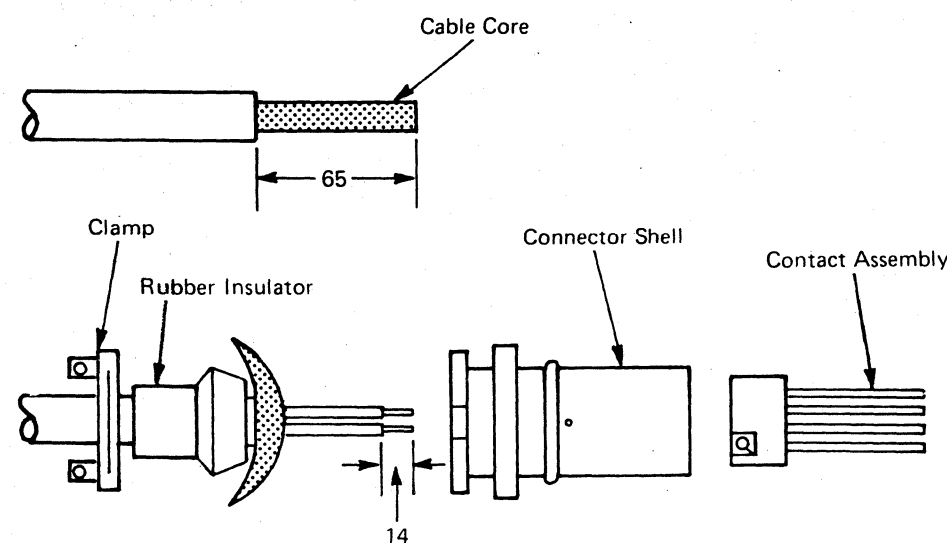
Typical Line Cord Identification—AFE



Typical Line Cord Identification—EMEA



*For wiring 220V, tie the neutral to the line cord.



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Site and Processor Safety Checkout

Tools required:

- CE Tool Kit
- Digital CE Meter (part 8496278)
- High Voltage Test Probes (parts 1749249 and 1749250).

This procedure must be performed to ensure that the installation environment is safe. For plug and receptacle pin locations, see figure **A**. Place a CHECK MARK next to each completed step.

Checking the 4381 Processor Power Plug

Repair all IBM product problems if any are found.

1. ___ Verify CB1 and CB2 are in the OFF position.
 2. ___ Make the following resistance measurements; a reading of less than .1 ohm shows a safe and continuous grounding conductor.
 - a. ___ Measure the resistance between the ground pin of the processor power plug and the processor frame.
 - b. ___ Measure the resistance between the processor power plug shell and the processor frame. If there is no plug, measure between the green/yellow wire and the processor frame.
- Note:** If the resistance values are less than .1 ohm, the processor power plug has a safe ground. Continue this procedure.
3. ___ Make the following resistance measurements; a value greater than 2000 ohms shows a safe processor power plug.
 - a. ___ Measure the resistance from the phase pins to the processor power plug shell.
 - b. ___ Measure the phase-to-phase resistance of the processor power plug.

Checking the Customer Power Receptacle

If any problems are found:

- Alert the responsible Field Manager.
- Call your Installation Planning Representative (IPR) for assistance.
- Notify the customer of the problem.

DANGER
With the customer branch CB in the OFF position, do not touch the exterior shell of the customer receptacle with anything except the test probes until you have completed step 2.

Power must not be applied to the processor if the building ground cannot be located and verified.

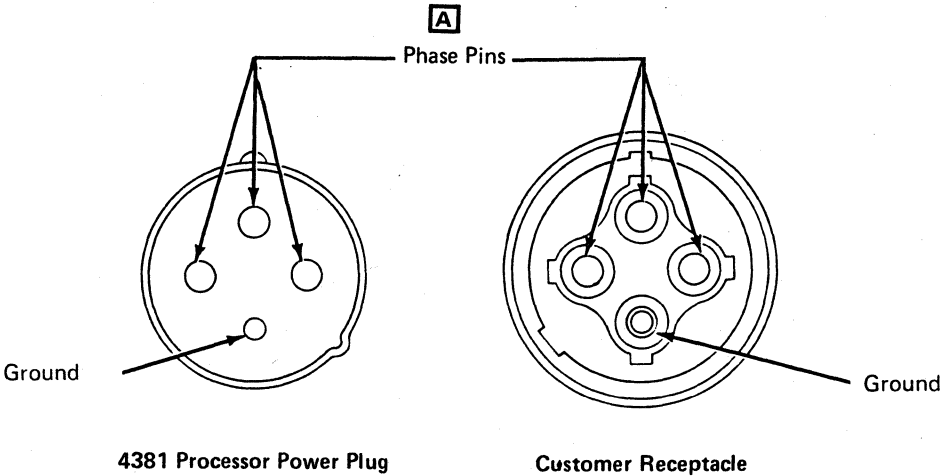
Note: Water pipes, raised floors, and electrical conduit **MAY** be connected to building ground; therefore, provide a usable ground reference. If you are unable to locate building ground, contact your IPR for assistance.

1. ___ Ensure that the customer branch CB is in the OFF position.
2. ___ Perform the following voltage measurements; all voltage values should be less than 1 Vac.
 - a. ___ Measure the voltage between the exterior shell of the customer receptacle and the building ground.
 - b. ___ Measure the voltage between the ground pin of the customer receptacle and the building ground.
 - c. ___ (World Trade Only) Measure the voltage between the neutral of the customer receptacle (if present) and the building ground.

Note: If the voltage values are less than 1 Vac, the customer receptacle is safe to touch.

3. ___ Make the following resistance measurements; a reading of less than .1 ohm shows a safe and continuous grounding conductor.
 - a. ___ Measure the resistance between the ground pin of the customer receptacle to the exterior shell.
 - b. ___ Measure the resistance between the ground pin of the customer receptacle to the building ground.
- Note:** If the resistance is less than .1 ohm, the customer receptacle has a safe ground.
4. ___ Perform the following voltage measurements of the customer receptacle; all voltage values should be less than 1 Vac.
 - a. ___ Measure the phase-to-phase voltage.
 - b. ___ Measure the phase-to-ground voltage.
 - c. ___ (World Trade Only) Measure phase-to-neutral voltage (if present).
 - d. ___ (World Trade Only) Measure neutral-to-ground voltage (if present).

Note: If voltage values are less than 1 Vac, continue.



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Measuring the Customer Primary Power

DANGER

This procedure must not be performed until you have completed the following procedures.

“Checking the 4381 Processor Power Plug”

“Checking the Customer Power Receptacle”

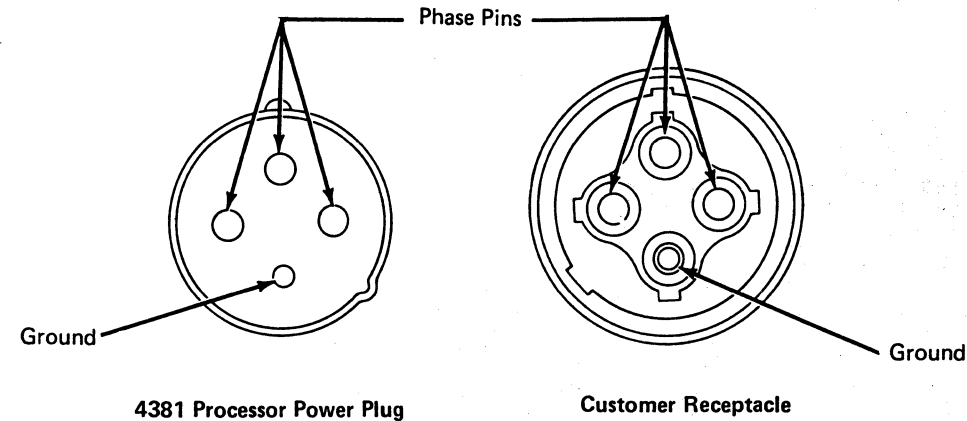
Do not touch the internal parts of the customer receptacle with anything except the test probes.

1. Place the customer branch CB in the ON position.
 2. Perform the following voltage measurements; all voltage values should be less than 1 Vac.
 - a. Measure the voltage between the exterior shell of the customer receptacle and the building ground.
 - b. Measure the voltage between the ground pin of the customer receptacle and the exterior shell.
 - c. (World Trade only) Measure the voltage between the neutral of the customer receptacle and the building ground.
- Note:** If the voltage values are less than 1 Vac, the customer receptacle is safe.
- d. **Impedance-grounded neutral power systems only.** Measure the voltage between neutral of the customer receptacle and building ground. If the voltage is greater than 10 Vac, check the phase fault indicator for a phase fault and notify the customer. Do not continue until the phase fault is corrected.
 - e. Measure the phase-to-phase voltage of the customer receptacle. Continue only if the voltage values measured meet the requirements as indicated in chart **A**.

- f. Check the voltage label on the cover of the Primary Control Compartment (PCC) box to ensure the processor is correctly wired for the customer outlet. If there is a problem, see Volume C01, “Power Logics” on page YA081 for proper wiring, or invoke your support structure.
- g. Place the customer branch CB in the OFF position.

A 50/60 Hertz Primary Power Voltage

Nominal	Minimum	Maximum
50 Hz		
200	180	220
220	193	238
380	333	410
400	350	432
415	363	448
60 Hz		
200	180	220
208	180	220
220	193	238
240	208	254



Physical Setup

Processor Location

1. The cable entry and exit holes in the processor frame are shown at **A**. The opening in the subfloor hole must be large enough to accommodate all I/O, Power, and Power Control Interface (PCI) cables.

2. Remove the I/O cable cover 01E, and route the power cable through the frame opening.

Note: Channel to Channel Adapter Only. For feature B/M 410477, install the leveler plate assemblies (part 401502) positioned as shown at **B**.

3. Install four leveling pads (part 4154689) under the frame, and adjust until the casters are free to rotate. The leveling pads stabilize the processor.

4. For nonraised floor installations only.

a. Remove two setscrews shown at **C**.

b. Remove rubber O ring, and slide locking collar away from power plug.

c. Slide power plug under machine frame.

d. Reverse procedure for replacement.

Note: Ensure that the O ring is seated in the grooved area of the plug.

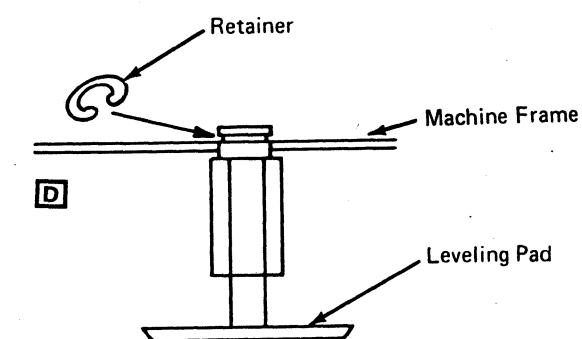
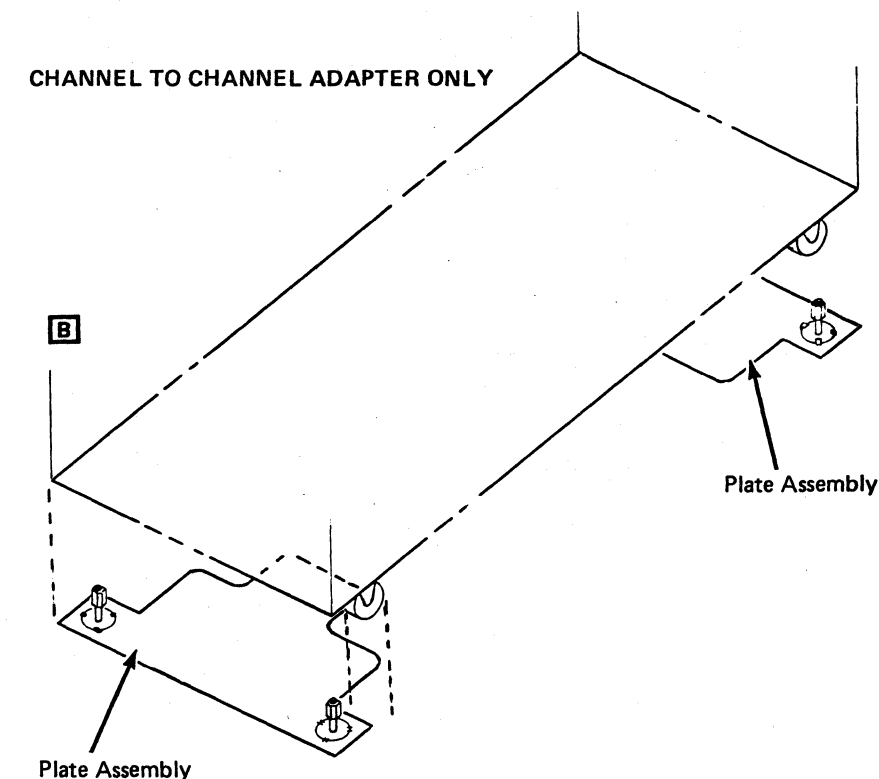
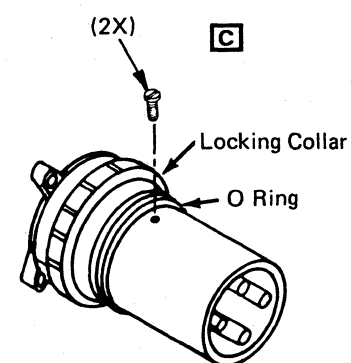
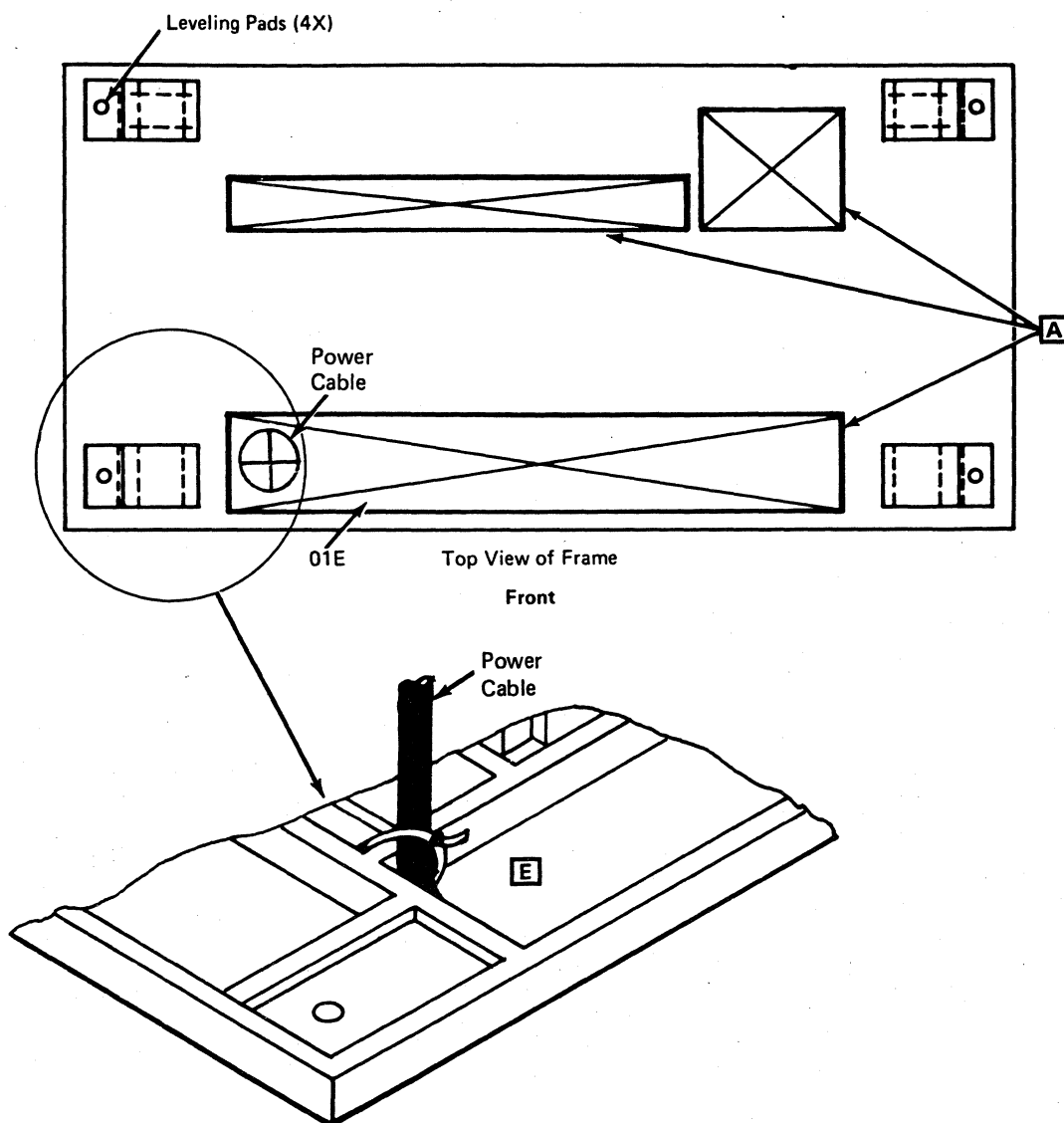
5. (Japan only). For machines with B/M 1806743, install leveler retainers as shown at **D**.

6. Install cable tie (part 2637668) from the frame support shown at **E** to the cable.

7. Connect the power plug to the customer receptacle.

Channel To Channel Adapter (CTCA) Only

For CTCA switch settings, refer to Volume A06, Service Aids, "CTCA Switch Settings."



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Installing Operator Console

3278-2A



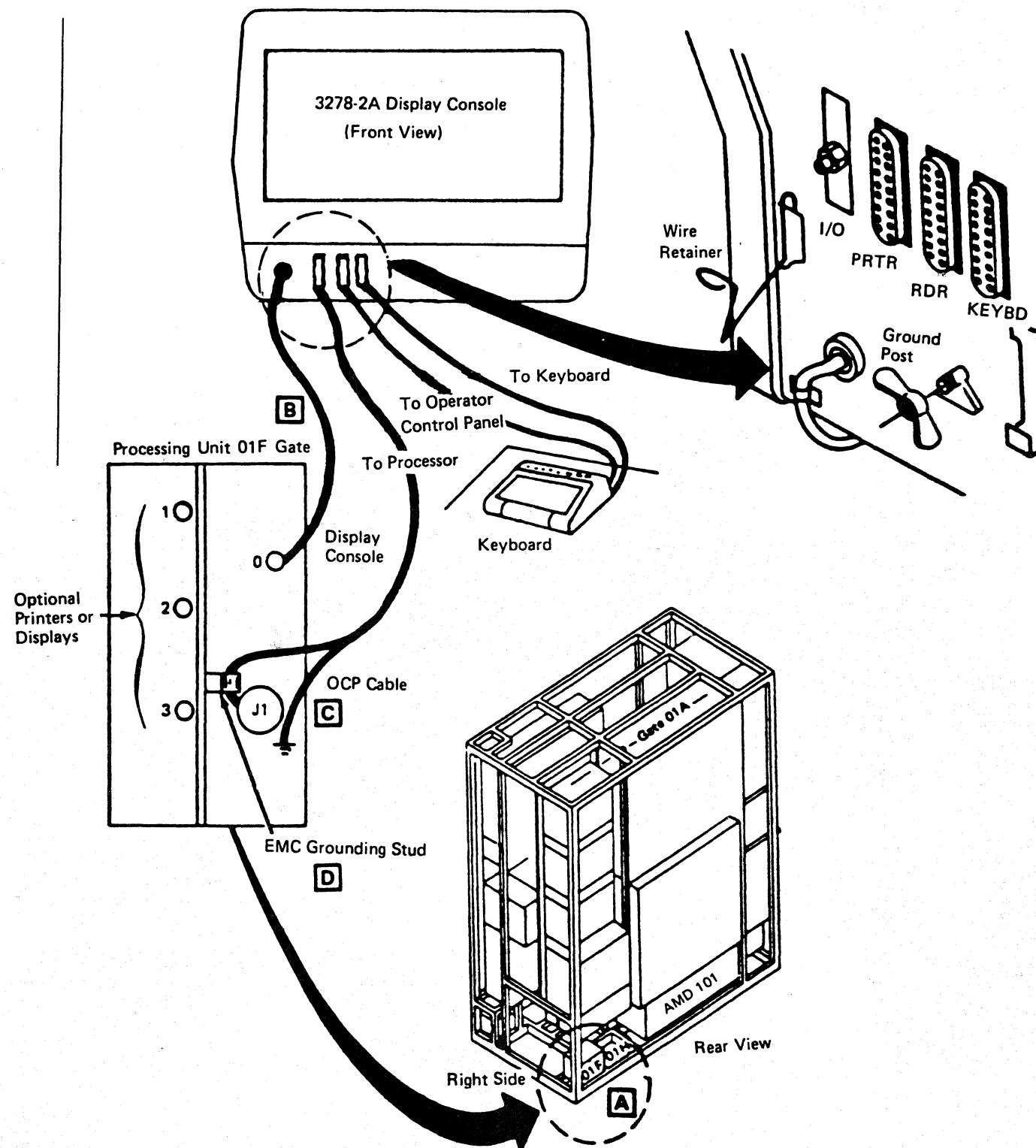
CAUTION

Display console weighs about 36 kg (80 lb). Obtain aid in lifting.

Note: For the correct setup procedures, see *3278-2A Setup Instructions*, and adhere to normal safety practices.

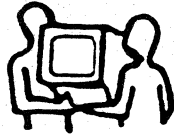
1. The operator console consists of a keyboard with the operator control panel and display console unit. This unit is to be placed on the operator console table.
 2. Remove the cover on gate 01F/01H as shown at **A**.
 3. Connect the coaxial cable (part 5578477) to the display console, route the cable to gate 01F, and connect to socket 0 as shown at **B**.
 4. Connect the OCP cable (part 401462) to the display console, route the cable to gate 01F, and connect to socket J1 and ground tab as shown at **C**.
 5. Install the EMC clamp (part 167338) to the OCP cable, and then fasten the clamp to the grounding stud **D** using a flat washer (part 1622305), lockwasher (part 1622319), and nut (part 1622404).
 6. Connect the power cord to the customer-supplied outlet.
- Note:** If the display has the Security Lock feature, ensure that the key is in the ON position.
7. Replace the cover on gate 01F/01H.
 8. Perform the offline test using the *3278 Model 2A Display Console Maintenance Information*, Order No. SY27-2546.

9. Connect all optional printers or displays to gate 01F at positions 1, 2, or 3.
10. If RSF is featured on this processor go to INST 017.
11. If RSF is not featured on this processor go to INST 023.



Seq GH020	PN 0446230 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	
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3279-2C

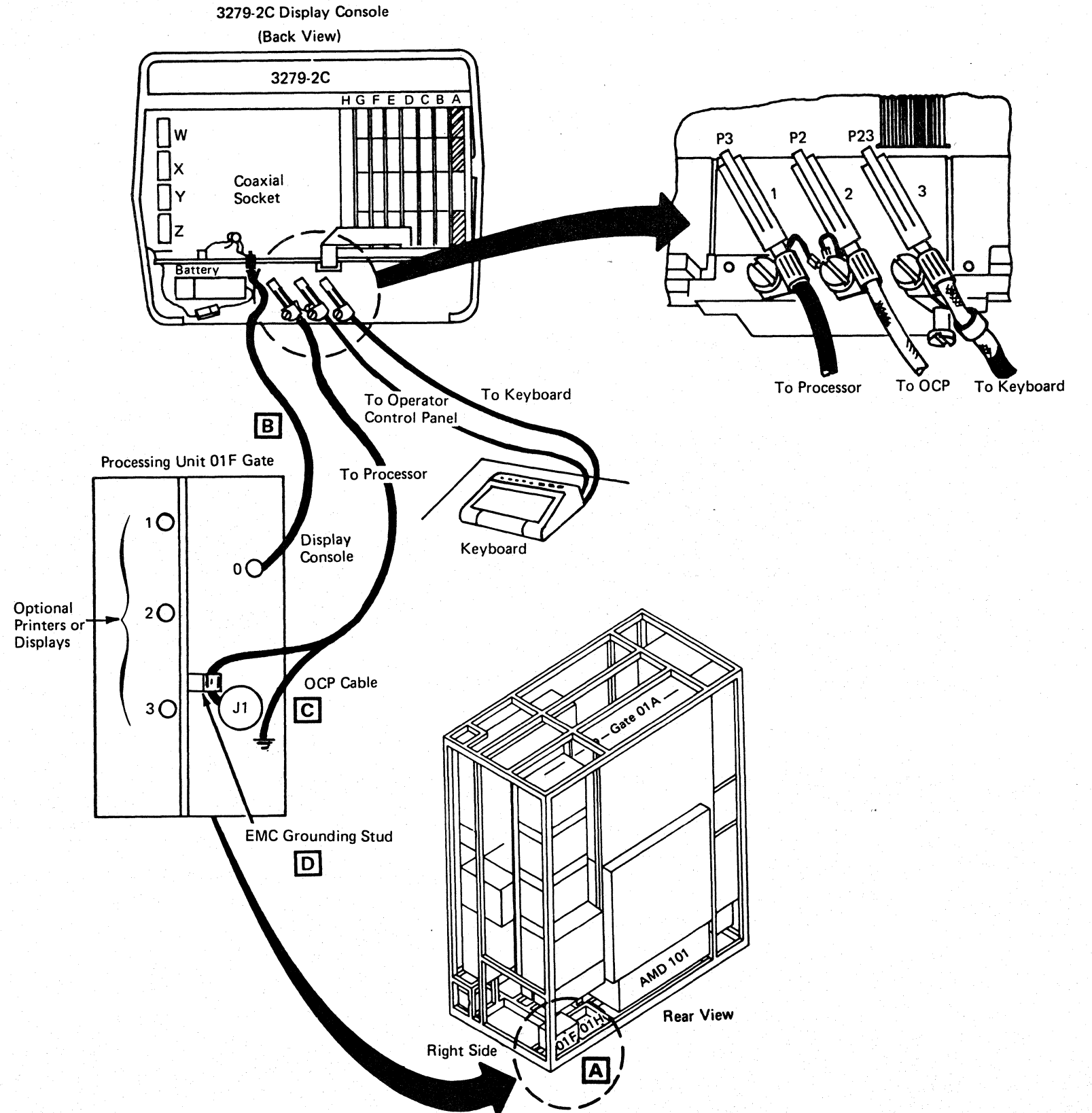


CAUTION
Display console weighs about 36 kg (80 lb).
Obtain aid in lifting.

Note: For the correct setup procedures, see *3279-2C Setup Instructions*, and adhere to normal safety practices.

1. The operator console consists of a keyboard with the operator control panel and display console unit. The unit is to be placed on the operator console table.
 2. Remove the cover on gate 01F/01H as shown at **A**.
 3. Connect the coaxial cable (part 5578477) to the display console, route the cable to gate 01F, and connect to socket 0 as shown at **B**.
 4. Connect the OCP cable (part 401462) to the display console, route the cable to gate 01F, and connect to socket J1 and the ground tab shown at **C**.
 5. Install the EMC clamp (part 167338) to the OCP cable, and then fasten the clamp to the grounding stud **D** using a flat washer (part 1622305), lockwasher (part 1622319), and nut (part 1622404).
 6. Connect the power cord to the customer-supplied outlet.
- Note:** If the display has the Security Keylock feature, ensure that the key is in the ON position.
7. Replace the cover on gate 01F/01H.
 8. Perform the offline test using the *3279 Display Terminal Maintenance Information*, Order No. SY33-0069.

9. Connect all optional printers or displays to gate 01F at positions 1, 2, or 3.
10. If RSF is featured on this processor go to INST 017.
11. If RSF is not featured on this processor go to INST 023.



Seq GH020	PN 0446230 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	
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Installing Remote Support Facility (RSF)

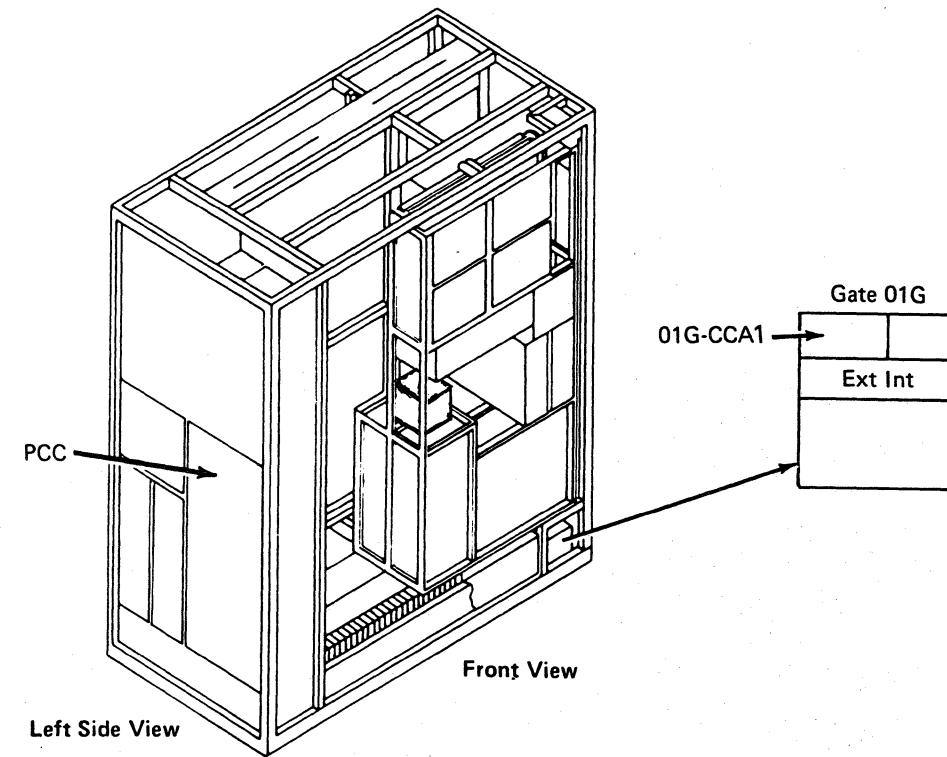
Note: If this installation does not include the Remote Support Facility feature, go to page INST 023.

This section describes the installation of the RSF cable to gate 01G.

Unpacking the Cable Box

If feature B/M 1806885 has been ordered, cable assembly (part 401441) will be installed in gate 01G; go to page INST 022 to continue the cable installation.

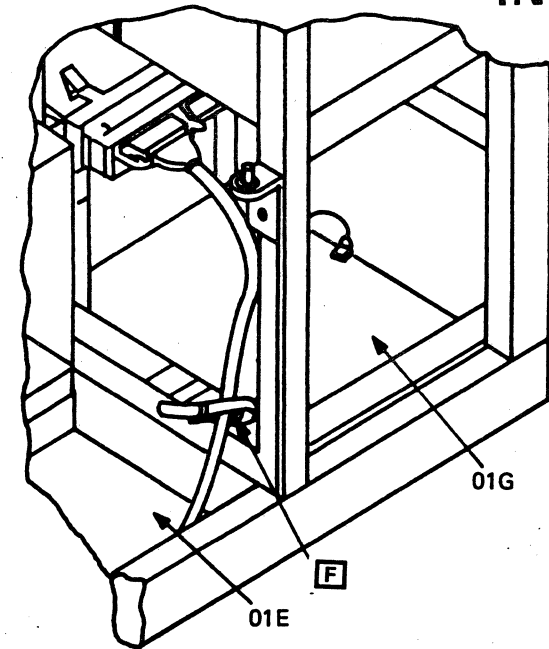
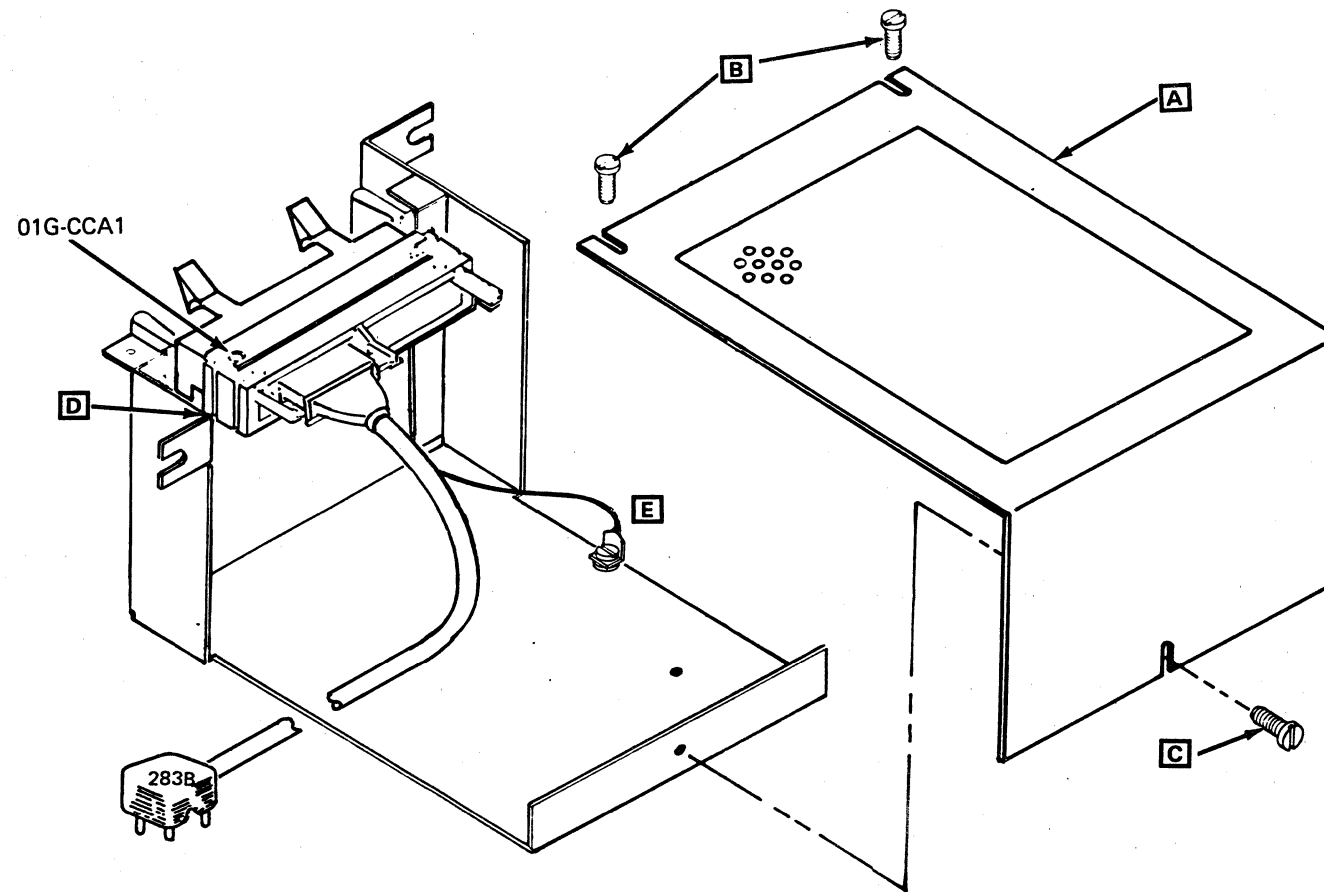
1. For external cable (part 8482931), go to page INST 018.
2. For external cable (part 8482930), go to page INST 019.
3. For external cable (part 8482934), go to page INST 020.
4. For external cable (part 8482933), go to page INST 021.
5. For external cable (part 401441), go to page INST 022.



Seq GH025	PN 0446231 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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External Cable -- Part 8482931

1. Locate and remove the cover **A** on gate 01G by loosening screws **B** and **C**.
2. Connect RSF external cable **D** to 01G-CCA1 as shown.
3. Connect cable shield **E** to gate 01G (as shown).
4. Route RSF external cable through opening adjacent to gate 01G.
5. Install tie wrap (part 5270166) to the external cable, and fasten it to the adjacent frame support shown at **F** using screw (part 1621230).
6. Reinstall the cover **A** by tightening screws **B** and **C**.
7. Do one of the following to complete the RSF external cable installation:
 - To connect external cable, part 8482931 (Canada/U.S.A.), first connect adapter (part 1853134) and then refer to the coupler instructions.
 - To connect external cable, part 8482931 (Japan), see B/M 1864633 contained within B/M 4143541.



Set Modem Adapter Card (Japan)

1. Remove card (part 5688021) from 01A-A2Q4.
2. Set all rocker switches to the OFF position.
3. Set rocker switches AA, BB, CC, DD, L, M, and N to the ON position.
4. Use the Transmit DBM chart to match the rocker switch settings A through H and R levels shown on the coupler (X=ON).
5. If no level is shown, use the -8 dbm settings.
6. Install the card in 01A-A2Q4.
7. Go to page INST 023.

Set Modem Adapter Card (Canada/U.S.A.)

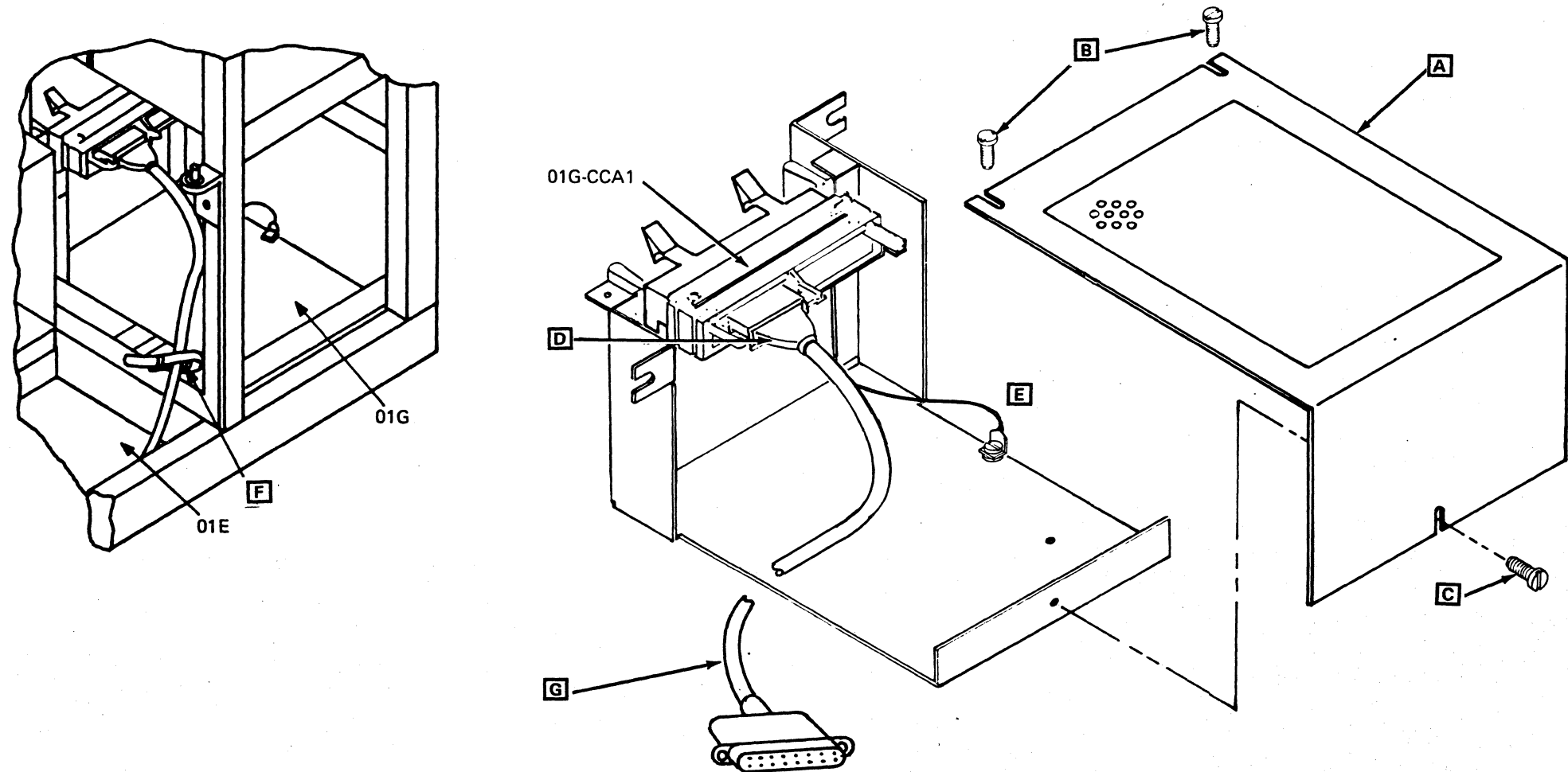
1. Remove card (part 8564508) from 01A-A2Q4.
2. Set all rocker switches to the OFF position.
3. Set rocker switch K to the ON position.
4. Use the Transmit DBM chart to match rocker switches A through I to levels specified on the coupler (X=ON).
5. If level is not shown, use the -8 dbm settings.
6. Install the card in 01A-A2Q4.
7. Go to page INST 023.

Rocker Switches	Transmit DBM																		Rocker Switch Identification						
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	On	Off	R	H	P	G
A	X					X							X						X						
B		X					X							X											
C			X					X							X										
D				X					X							X									
E					X					X							X								
F						X					X							X							
G							X	X	X	X	X														
H												X	X	X	X	X	X	X							
I																			X						

Rocker Switches	Transmit DBM																		Rocker Switch Identification						
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	On	Off	R	H	P	G
A	X												X						X						
B		X											X						X						
C			X											X					X						
D				X											X				X						
E					X								X						X						
F						X								X					X						
G							X	X	X	X	X														
H												X	X	X	X	X	X	X							
I																			X						
R																			X						

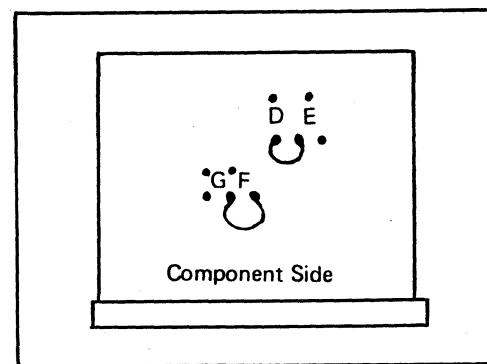
External Cable -- Part 8482930 (External Modem)

1. Locate and remove the cover **A** on gate 01G by loosening screws **B** and **C**.
2. Connect RSF external cable **D** to 01G-CCA1 position.
3. Connect cable shield **E** to gate 01G as shown.
4. Route RSF external cable through the opening adjacent to gate 01G.
5. Install tie wrap (part 5270166) to the external cable, and fasten it to the adjacent frame support shown at **F** using screw (part 1621230).
6. Reinstall the cover **A** by tightening screws **B** and **C**.
7. Connect external cable connector **G** to the customer supplied modem.
8. To complete this cable installation, see your modem instructions.



Set Modem Adapter Card (External Modem)

1. Remove card (part 5864668) from 01A-A2Q4.
2. Verify that positions D and F have jumpers installed.
3. Install the card in 01A-A2Q4.
4. Go to page INST 023.



A2Q4
(Reference Only)

Seq GH030	PN 0446232 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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External Cable -- Part 8482934

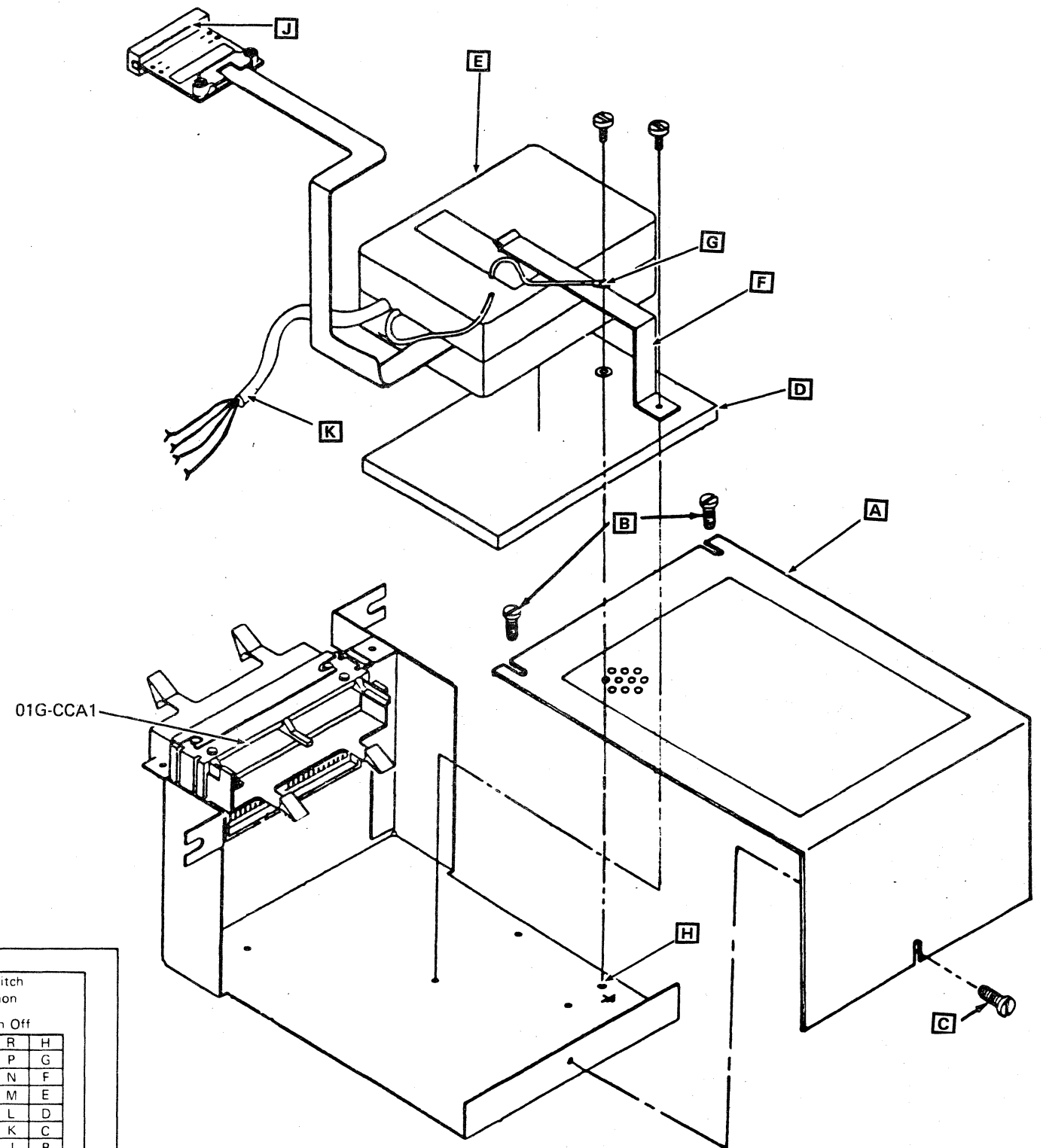
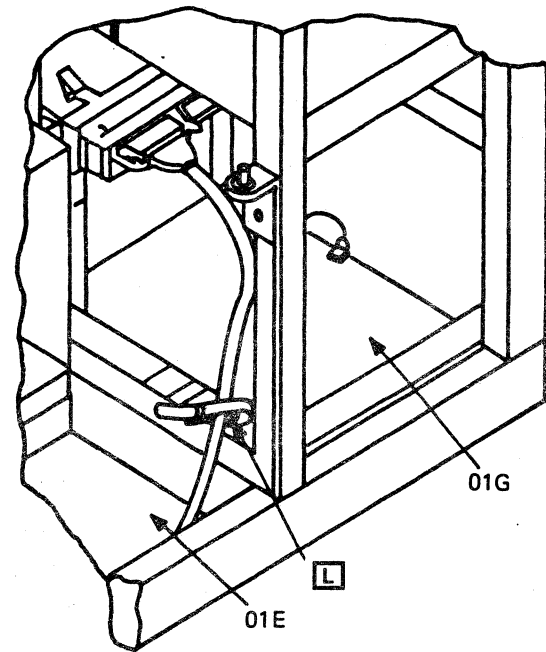
1. Locate and remove the cover **A** on gate 01G by loosening screws **B** and **C**.
2. Place foam pad (part 401478) **D** on gate 01G as shown.
3. Place the RSF external cable assembly **E** on top of the foam pad in gate 01G.
4. Install retainer bracket (part 401479) **F** using screw (part 1621176).
5. Install ground wire **G** to housing **H** using screw (part 1621190) and washer (part 1622346).
6. Install connector **J** to 01G-CCA1.
7. Route TB1 cable **K** through the opening adjacent to gate 01G to the location of the telephone coupler.
8. Install tie wrap (part 5270166) to the external cable and fasten it to the adjacent frame support shown at **L** using screw (part 1621230).
9. Reinstall the cover **A** by tightening screws **B** and **C**.

Note: For a detailed description of TB1 wiring, refer to Volume A06, Service Aids, "Line Plate Configuration (World Trade)."

10. To complete the RSF external cable installation, contact your telephone company representative.

Set Modem Adapter Card

1. Remove card (part 5167246) from 01A-A2Q4.
2. Set all rocker switches to the OFF position.
3. Set rocker switches I, J, K, P, and N to the ON position.
4. Use the Transmit DBM chart to match rocker switches A through H and R to levels specified on the coupler (X=ON).
5. If no level is shown, use the -8 dbm settings.
6. Install the card in 01A-A2Q4.
7. Go to page INST 023.



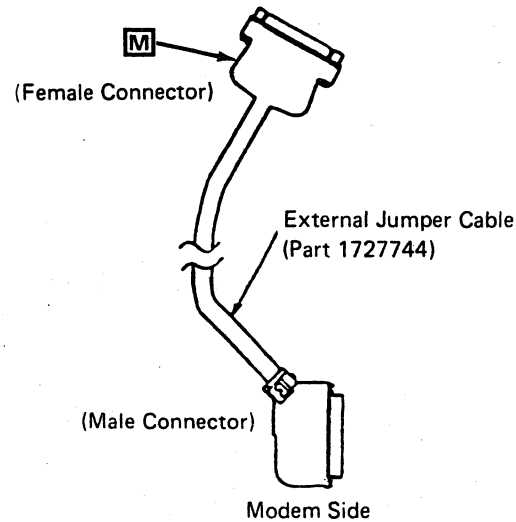
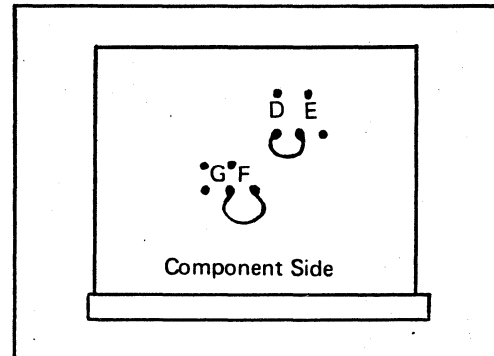
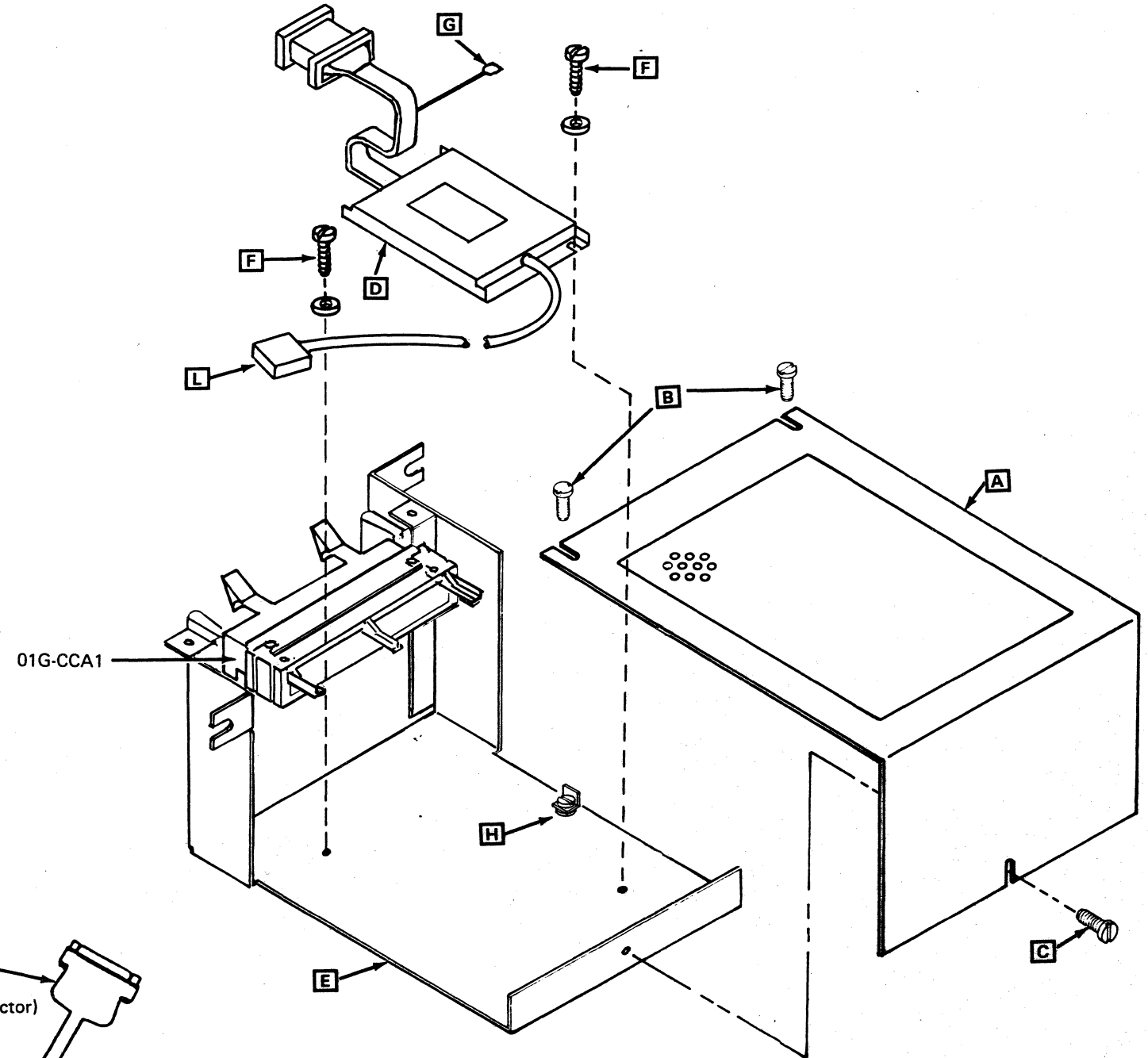
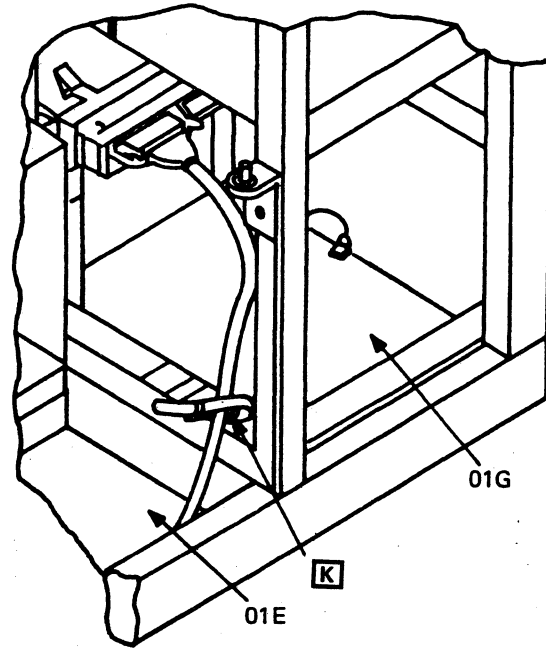
Rocker Switches	Transmit DBM																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	X						X							X					X
B		X						X						X					
C			X						X						X				
D				X						X						X			
E					X						X						X		
F						X					X							X	
G							X	X	X	X	X	X							
H												X	X	X	X	X	X	X	
R																			X

Rocker Switch Identification	
On	Off
R	H
P	G
N	F
M	E
L	D
K	C
J	B
I	A

Component Side On Off

External Cable -- Part 8482933

1. Locate and remove the cover **A** on gate 01G by loosening screws **B** and **C**.
2. Install the RSF external cable assembly **D** into gate 01G **E**.
3. Route the cable assembly through the opening adjacent to gate 01G and then to the location of telephone coupler.
4. Install the two mounting screws (part 1621176) and the two flat washers (part 1622304) shown at **F**.
5. Connect the cable shield **G** to gate 01G shown at **H**.
6. Connect cable **J** to 01G-CCA1.
7. Install tie wrap (part 5270166) to the external cable, and fasten it to the adjacent frame support shown at **K** using screw (part 1621230).
8. Reinstall the cover **A** by tightening screws **B** and **C**.
9. Connect external cable connector (part 8482933) **L** to cable connector (part 1727744) **M**.
10. To complete this cable installation, see your modem instructions.



Set Modem Adapter Card (External Modems)

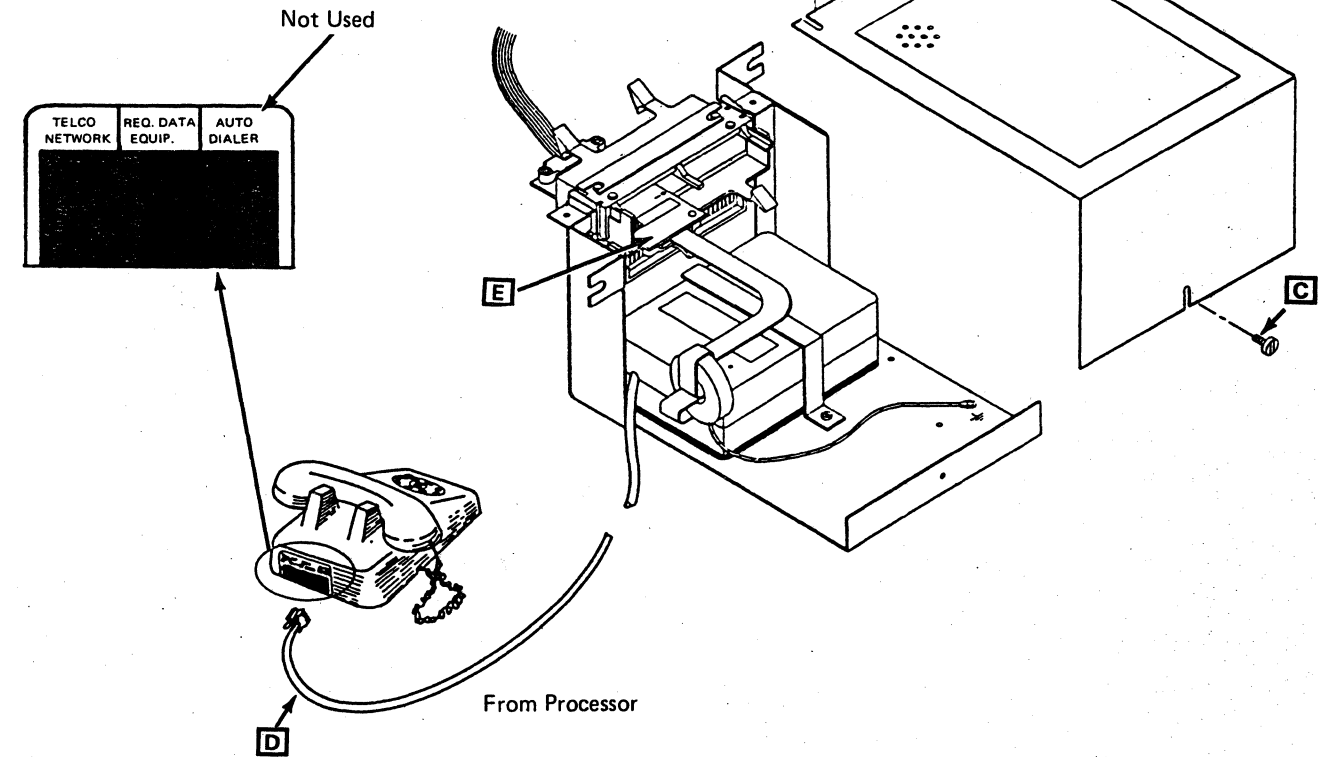
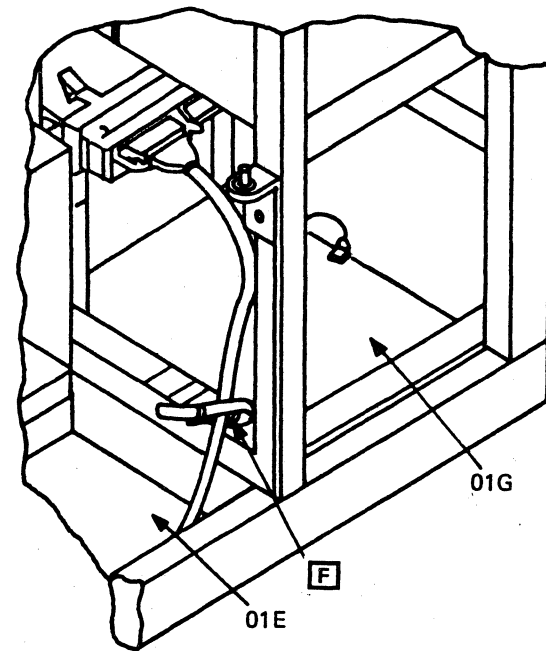
1. Remove card (part 5864668) from 01A-A2Q4.
2. Verify that positions D and F have jumpers installed.
3. Install the card in 01A-A2Q4.
4. Go to page INST 023.

Seq GH035	PN 0446233 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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External Cable -- Part 401441

1. Locate and remove the cover **A** by loosening screws **B** and **C**.
2. Route cable **D** through the opening adjacent to gate 01G and then to the telephone.
3. Ensure that the 01G-CCA1 connector **E** is properly seated.
4. Install tie wrap (part 5270166) to the external cable, and fasten it to the adjacent frame support shown at **F** using screw (part 1621230)
5. Reinstall the cover **A** by tightening screws **B** and **C**.
6. **Note:** *The unpacking, assembly, and connection of the IBM supplied telephone is **TOTALLY** the responsibility of the customer and is **NOT** to be performed by the IBM service representative.*

Give the customer the box labeled part 4494964, which contains the IBM supplied telephone.



Set Modem Adapter Card

1. Remove card (part 8564508) from 01A-A2Q4.
2. Set all rocker switches to the OFF position.
3. Use the Transmit DBM chart to match rocker switches A through I to the 0 dbm level (X=ON).
4. Set rocker switch J to the ON position.
5. Install the card in 01A-A2Q4.
6. Go to page INST 023.

Rocker Switches	Transmit DBM																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	X						X						X						X
B		X						X						X					
C			X						X						X				
D				X						X						X			
E					X						X						X		
F						X					X							X	
G							X	X	X	X	X	X							
H												X	X	X	X	X	X	X	
I																			X

Rocker Switch Identification	
On	Off
R	H
P	G
N	F
M	E
L	D
K	C
J	B
I	A

Component Side On Off

MSS Power-On Checks and Diagnostics

Note: If a machine failure should occur while performing the following instructions, go to the repair procedure indicated on the screen. Once the failure has been corrected, return to the point in the instructions from where you left.

1. Ensure the Unit Emergency Only switch is in the On position and the customer branch CB is in the ON position.
2. Diskette drives 1 and 2 are unloaded.
3. Ensure that the operator console is powered on.
4. Set the CE Mode switch to CE Mode, the Power Off switch to Normal, and verify the following.
 - a. CP1, CB1, and CB2 are in ON position at the PCC.
 - b. The 5 Volt, 24 Volt, Basic Check, and MBC On indicators are on.
5. Press Power On at the service panel, and verify the following:
 - a. The Power In Process indicator is on.
 - b. After about 30 seconds, 81504 appears in the MSS Code display indicating the SP ROS diagnostics ran error free.
6. Press Lamp Test, and verify that the remaining service panel lights are now on.

Running MSS Extended Diagnostics

1. Set the CE Mode switch to Normal.
2. Set the I/O Power Hold switch to I/O Power Hold.
3. Set the Power Off switch to Power Off.
4. Install the DIAG1 diskette into diskette drive 1.
5. Set the Power Off switch to Normal.
6. Press Power On. The Basic and Extended Diagnostics (FF) begin to run.
7. The message MSS EXTENDED DIAGNOSTICS COMPLETED is displayed when the tests are completed.

Note: Errors are indicated by the stop words displayed on the service panel or by a reference code shown on the console.

Running Additional MSS Tests

Note: A error message is displayed on the operator console screen if ports 1, 2, or 3 on gate 01F are unused.

1. Power on all displays/printers, and ensure that all device switches are set to the Normal position.
2. Key in the two-digit code for each selected test, and press ENTER.

3. Follow the instructions displayed on the operator console screen.

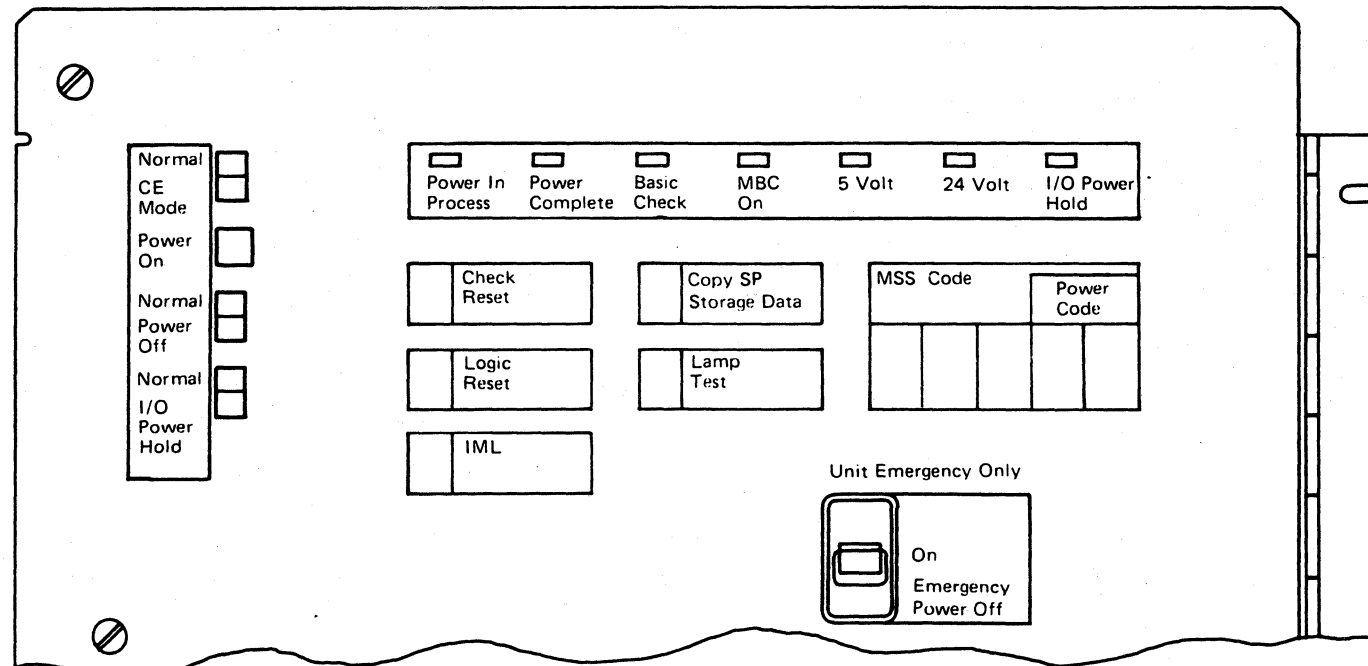
Notes:

- a. Run Test A0 against diskette drive 1 and diskette drive 2.
- b. Run test EO **ONLY** if external cable 8482930 or 8482933 is installed.

MSS Test Selection.

- 90 Run Service Panel diagnostics
- A0 Run DDA/Drive tests
- CE Test all console/printer ports
- DO Run RSF adapter diagnostics
- EO Run RSF cable wrap test (EIA interface only)

Note: For additional information refer to Diagnostics, "Optional MSS Diagnostics."



Service Panel (Front)

Running PU Diagnostics Based on Initial Install or Relocation

Notes:

- 1. Ensure that channel 0 is terminated.
- 2. If a failure should occur, correct the failure and restart at the beginning of this test.
- 3. Perform Language Configuration first if another keyboard other than the U.S. console keyboard is used. Refer to Volume A06, Service Aids, "Language Configuration."

General Instructions

- 1. Set CE Mode switch to CE Mode.
- 2. Remove DIAG1 diskette from diskette drive 1.
- 3. Install FUNC1 diskette into diskette drive 1 and FUNC2 diskette into diskette drive 2.
- 4. Press Power On at the service panel.
- 5. Press IML at the service panel.

Note: Ignore the message "PORT x CONFIG ERROR."

- 6. Enter date and time.
 - 7. Go to Volume A06, Service Aids, and perform "System Configuration--Service."
- Note: A printout is packaged with the diskettes. For the correct system configuration information, refer to this printout.
- 8. After performing "System Configuration--Service," continue with step 9 on this page.

- 9. Key in UC, and then press ENTER.
- 10. The Power Complete indicator is now on.
- 11. Press MODE SEL.
- 12. Key in QG, and press ENTER to display the Diagnostic Mode PU Diagnostic Selection screen.

13. Select the correct option.

Note: When either option is selected, all available Basic and MSMD diagnostics are run against the processor hardware.

- a. INITIAL INSTALL—Option T
 - 1) Key in T, and press ENTER.
 - 2) Key in Y, and press ENTER.
- b. RELOCATION—Option I (Isolate Failure)

Note: If Option T is run at this time and reconfiguration has occurred, a message is displayed on the operator screen indicating that the hardware is reconfigured. Run Option I at this time.

- 1) Key in I, and press ENTER.
- 2) Key in None, and press ENTER.
- 3) Key in Y, and press ENTER.
- 4) To terminate this test, press and hold ALT and then press MODE SEL.

Running Cable Wrap Test (CWT)

- 1. Ensure that the CE Mode switch is in CE Mode.
- 2. Ensure the FUNC1 diskette is in diskette drive 1.
- 3. Install DIAG1 diskette in diskette drive 2.
- 4. Key in QG, and press ENTER to display the Diagnostic Mode PU Diagnostic Selection screen.
- 5. Select Option C, and press ENTER.
- 6. Select O2 for Cable Wrap Test after the Channel Test Selection screen is displayed.

Note: Detailed run instructions and test options are displayed on the operator console.

- 7. After completing this test, remove DIAG1 from diskette drive 2, and install FUNC2 in diskette drive 2.

If the processor does not have the Channel To Channel Adapter feature, go to "System Configuration."

Running Channel To Channel Adapter (CTCA) Test

Note: Ensure that channel 0 is terminated.

To run this test, both sides of the CTCA (X and Y) must be cabled to channels on the same processor. Before running this test, verify that the channels are operational. For details on the CTCA tests refer to Volume A06, Service Aids, "CTCA Tests."

Seq GH040	PN 0446234 Pg 2 of 2	EC A02214 15 SEP 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84	
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System Configuration

The following procedures are contained in Volume A06, Service Aids. Do these procedures now.

Note: Language Configuration should be done first, only if other than U.S. console keyboard is used.

3279 Display Console Aids

Do the following procedure if the system has a 3279-2C Display Console attached:

- "3279 Display Console Adjustment."

Configuration Aids

Do the following configuration procedures at installation:

- ✓ "System Configuration--Customer"
- ✓ I/O Configuration

"I/O Configuration (S/370)" for S/370 mode of operation.

"S/370XA Installation" for 370-XA mode of operation.

- "Customer Data and Security Control (Problem Analysis)"
- "Component Location and Part Number Update Procedure."

Remote Support Facility Aids

Do the following RSF procedures at installation:

- "Send Service Information (Problem Analysis)"
- "Remote Operator Console Facility (ROCF)" (if applicable)
- "Data Bank Initialization."

Diskette Aids

Do the following diskette procedures at installation:

- "Language Configuration" (if required)
- "Module Transfer"
- "Diskette Copy."

Patch Aids

Do the following patch procedure at installation:

- "Patch Installation" (if applicable).

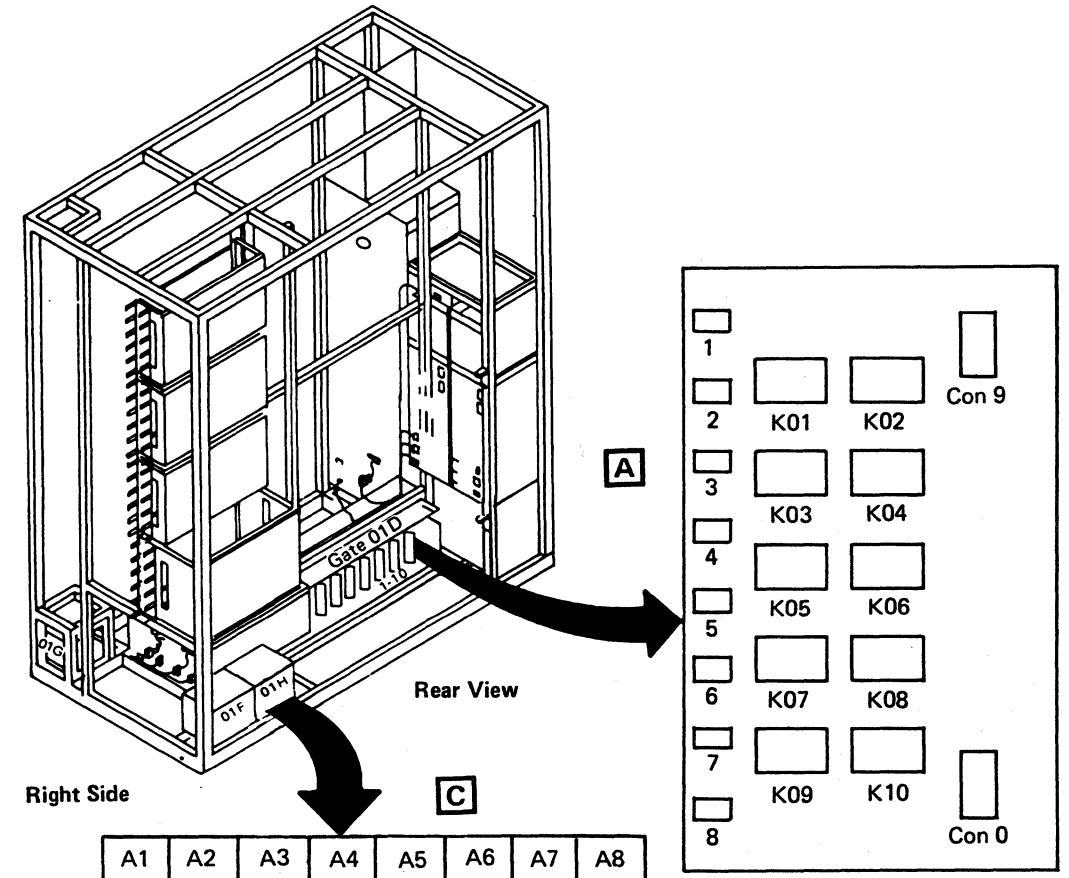
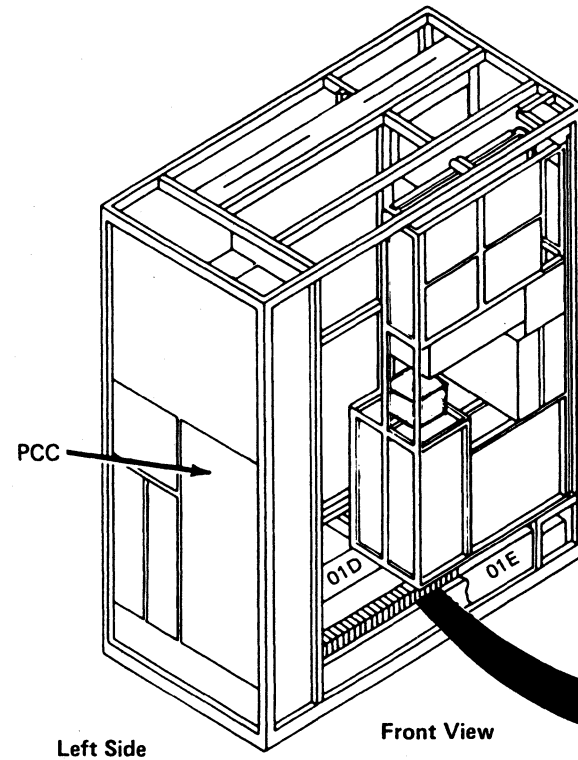
Seq GH045	PN 0446235 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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Installing Interface Cables

1. Set the CE Mode switch to Normal, and set the Power Off switch to Power Off.
2. Plug the Power Control Interface (PCI) cables into the 01D I/O rack as shown at **A**.
 - a. Start with position 1 (top left socket) on the PCI panel located at 01D.
 - b. Remove the yellow wire jumper from its plug position.
 - c. Plug the PCI cables in numerical order until all PCI cables are plugged.
 - d. Install the yellow wire jumper next to the last position plugged with the PCI cables.
3. Connect channel cables to gate 01E as shown at **B**.

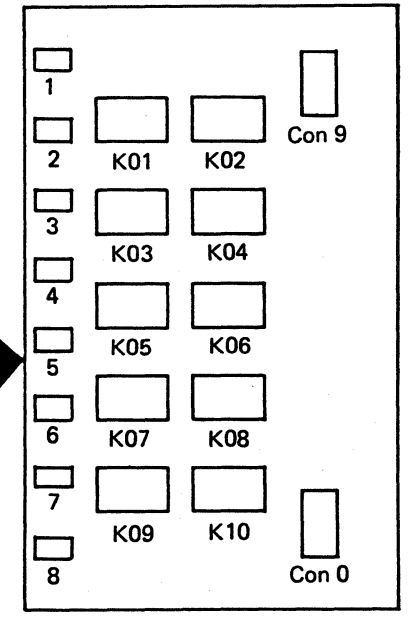
Notes:

 - a. To prevent cable interference, install channel cables in a left-to-right sequence.
 - b. Ensure that **ALL** channels are terminated.
4. Connect CTCA cables to gate 01H as shown at **C**.
5. If the processor has an interrupt cable that must be connected to the processor, go to Volume A06, Service Aids, "External Interrupts" for more details.
6. Reinstall gates 01E and 01F/01H covers.



Gate 01H (CTCA)

A1	A2	A3	A4	A5	A6	A7	A8
Bus In	Tag In	Bus Out	Tag Out	Bus In	Tag In	Bus Out	Tag Out
X	X	X	X	Y	Y	Y	Y



Gate 01E (Channel Interface)

Channel 0	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	Channel 9	Channel A	Channel B												
A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	B8	B9	C1	C2	C3	C4	C5	C6
Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag	Bus	Tag

Final System Check

Running System Test/4381

System Test/4381 should be run for approximately one hour (2 passes) with all I/O devices connected. For a complete description of System Test/4381, see "System Test/4381" in this volume.

After running System Test/4381, go to Volume A06, Service Aids, and perform "S/370 XA Installation" if this is a XA account. After successfully running System Test/4381, invoke PA Option E (service action complete).

Completing the Installation

1. If you have installed more than one machine, report your time accurately on each machine.
2. File all documents, and complete any associated paperwork.
3. Turn system and the *4381 Processor Operations Manual* over to the customer.

Relocation or Discontinuance Procedure

Note: If this system uses the IBM supplied telephone (part 4494964) for RSF transmissions, the telephone is part of the system and must be packaged with the system. The part number is located on the bottom of the telephone.

By using the *Processor Installation* instructions and the *Pack/Unpacking Instructions*, you can disconnect the system for equipment location change or discontinuance.

Seq GH055	PN 0446237 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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4381 Processor Safety Inspection Guide

Contents

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Items Needed INSP 002

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Gate 01A INSP 011
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Console Devices (3278-2A, 3279-2C) INSP 013
External Check INSP 013
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Power On/Off Check INSP 015

Safety Labels INSP 017

Purpose

To supply a safety inspection procedure for the processor. This safety inspection should be done:

- When you inspect a processor for an IBM maintenance agreement and there is reason to question the processor's safety.
- When IBM per call service is requested and no IBM provided service has recently been performed.
- When an alterations and attachments review is performed.

If the inspection indicates unacceptable safety condition(s), the condition(s) must be corrected before IBM provides service to the machine.

While performing this inspection, special attention must be given to these areas:

- 50 to 60 Hz conversions using IBM or non-IBM parts.
- Feature/model changes and EC upgrades.
- Additions of non-IBM power supplies or attachments.
- Missing safety covers.
- Removed, faded, or painted-over safety labels.
- Primary power parts replacement requirements.
- Other product safety related items.

Items Needed

- CE tool kit
- Fluke* 8060A digital voltmeter (part 8496278) or equivalent.

* Trademark of John Fluke Mfg. Co. Mount Lake Terrace, Washington

Seq G1005	PN 0446239 Pg 2 of 2	EC A02214 15 SEP 83					
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Line Cord Ground Check

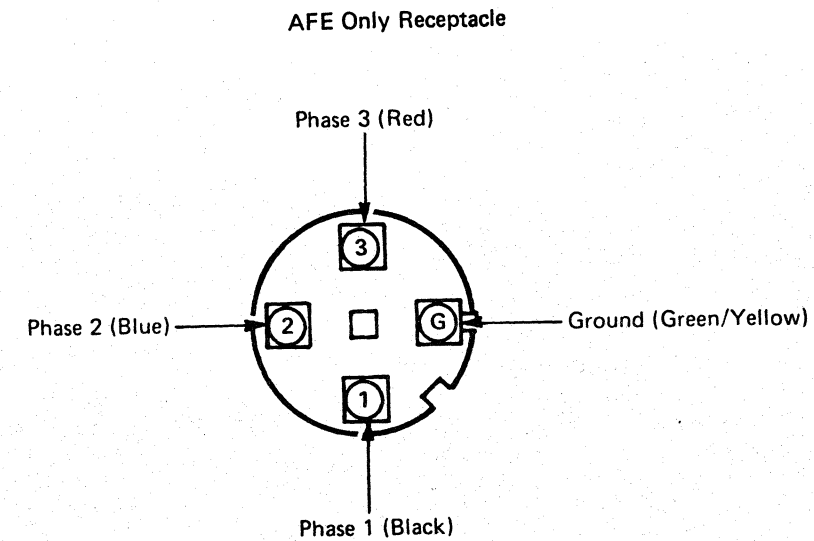
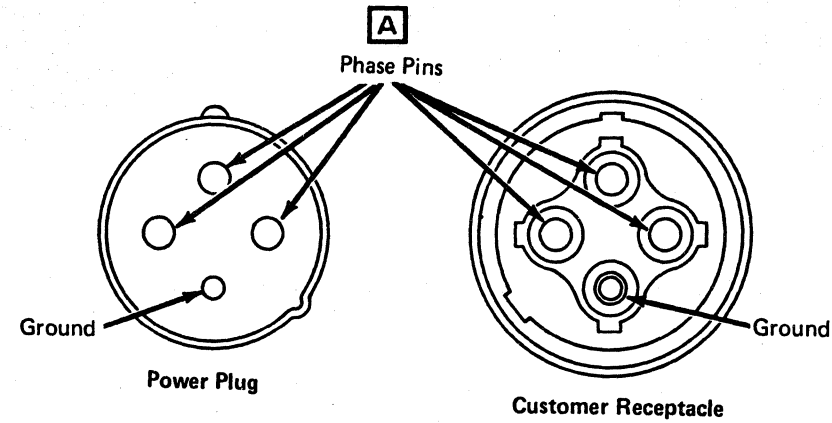
DANGER
Use only test probes to touch the exterior shell of the customer's receptacle until step 7.

1. If processor main power connector is unplugged, go to step 7.
2. Press Power Off at the operator control panel or the service panel.
3. Switch CB1 and CB2 off.
4. Have the customer locate and turn off the branch circuit breaker to the processor and all physically attached I/O devices.
5. Use Fluke 8060A meter to check for 0 Vac from the receptacle case **A** to building ground. If voltage is less than 1 Vac, the shell can be touched but not separated.
6. Loosen locking device but do not separate connectors.

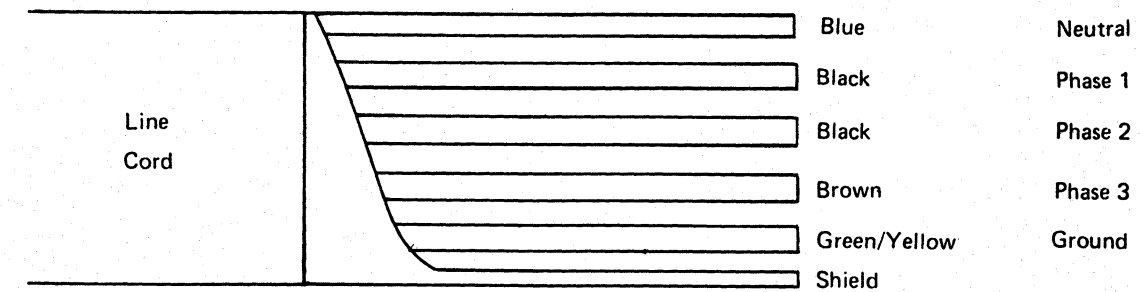
DANGER
Do not touch connectors to be separated. Wrap connector with electrical tape or wear rubber gloves.

7. After taping connector or while wearing rubber gloves, separate connectors.
8. Carefully meter from ground pin of receptacle to building ground for 0 Vac. Do not continue if condition is not met.
9. Measure from ground pin of receptacle to the case of the receptacle for 0 Vac. Do not continue if condition is not met.
10. Measure resistance from ground pin of the receptacle to building ground. Reading should be less than 1 ohm.
11. Measure resistance from ground pin of receptacle to receptacle case. Reading should be less than 1 ohm.
12. Measure resistance from ground pin of disconnected power cord to frame ground. The resistance should be less than 1 ohm.
13. Check main power cord for damaged, broken insulation, or arced pins. Ensure the correct locking plug is used.

DO NOT RECONNECT MAIN POWER CONNECTOR UNTIL INSTRUCTED TO DO SO.



EMEA Only: Line Cord Identification



*For wiring 220V tie the neutral to the line cord.

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Frame

INSP 004

External Check

- Check for damaged or missing external covers.
- Check cover latches for functioning correctly.
- As doors are opened, check the hinges for breakage or corrosion.
- Check covers for sharp edges.

Check for:

- FDS cables seated and undamaged.
- Covers properly installed and no screws or washers missing.

Internal Check

- Check for non-IBM alterations or attachments. If present, complete form R-009, *Non-IBM Alterations/Attachments Survey*.
- Inspect for smoke or water damage and presence of rust or other contaminations.
- Inspect all cables for damage, correct ratings, all needed grommets in place at frame feed-throughs, and tie-downs in place.

DANGER
A shock hazard may exist while plugging or disconnecting inline or Mate-N-Lok connectors because of the connector pin slipping from its socket. Before working with any connectors, ensure power is off.*

* Trademark of AMP Inc. Harrisburg, Pennsylvania.

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INSP 004

Fuses and PCC

Located on the cover of the PCC. **A**

- F1 4 amps 230 Vac
- F2 2.8 amps 240 Vac

Located on PS104 to the left of the PCC. **B**

- F1 15 amps 600 Vac
- F2 15 amps 600 Vac
- F3 15 amps 600 Vac
- F4 15 amps 600 Vac
- F5 6 amps 600 Vac
- F6 6 amps 600 Vac
- F7 6 amps 600 Vac
- F8 6 amps 600 Vac
- F9 1.6 amps 600 Vac

Ensure the following:

___ Green/yellow wire **G** from PCC cover to frame is secure.

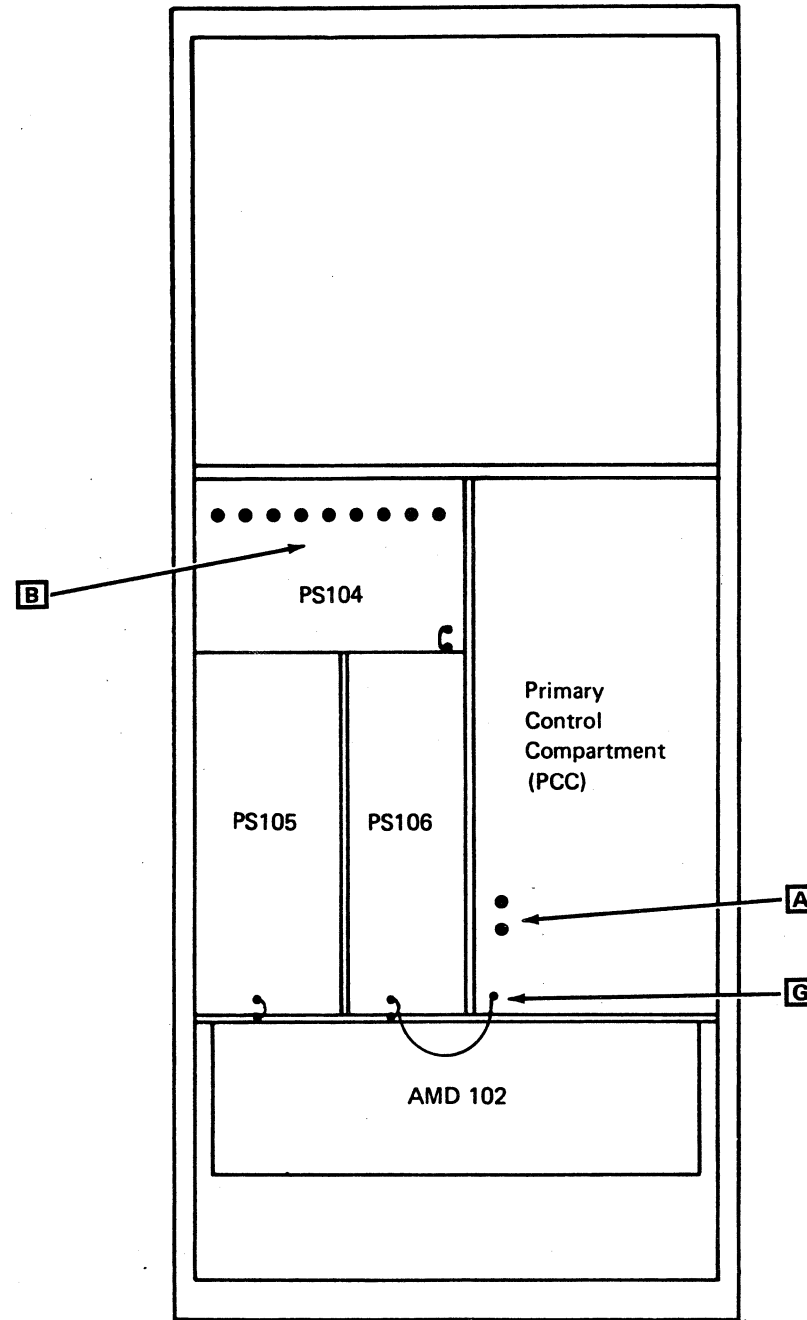
___ Green/yellow wire **D** from top rear of PCC to frame is secure. Located near J14.

___ Green/yellow wires **H** at lower rear of PCC are secure.

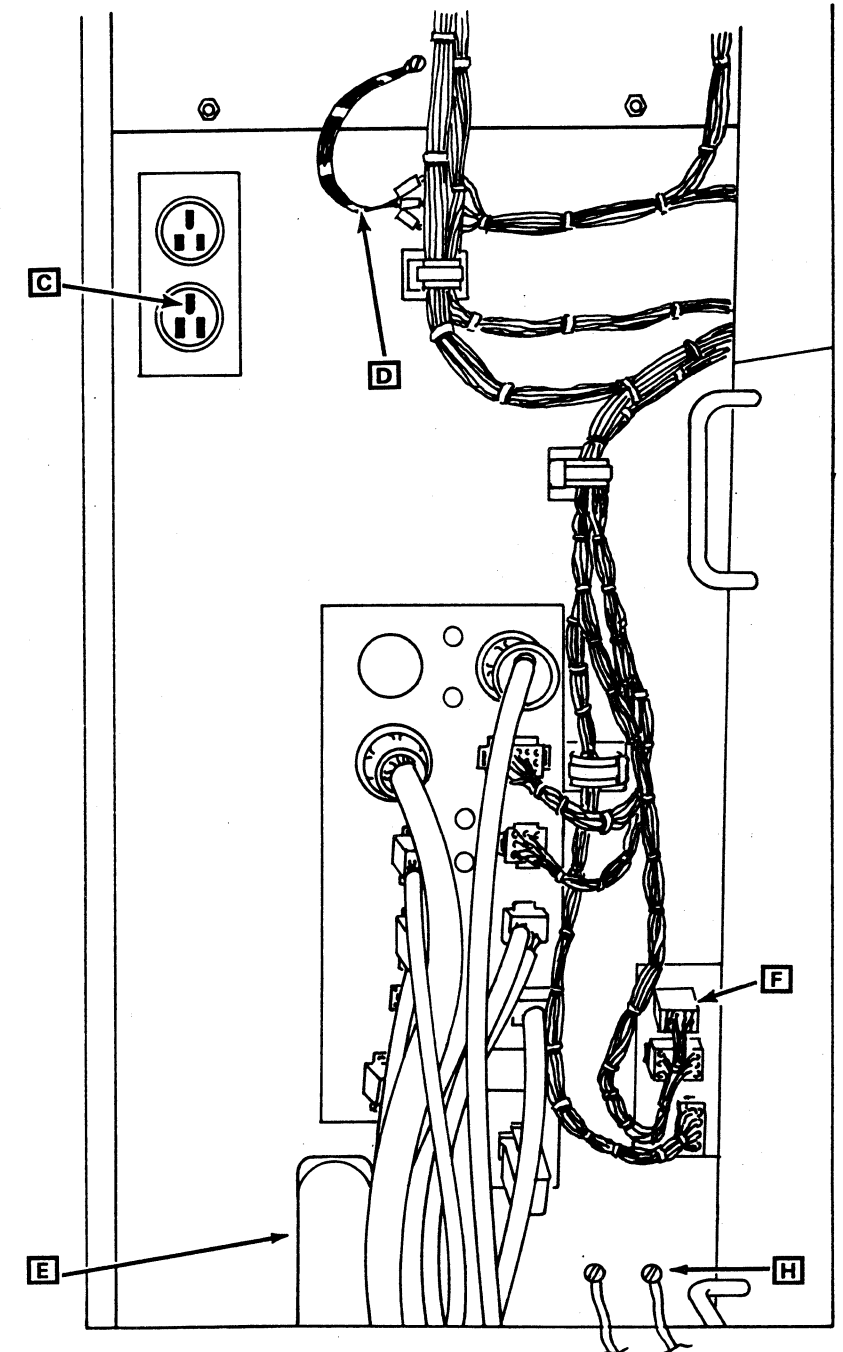
___ The power strain relief **E** is secure and undamaged.

___ Green/yellow wire **F** in plug J01 is secure.

___ Meter for less than 1 ohm from the convenience outlet ground pin **C** to the frame.



Left Side View



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Ensure the following:

___ Green/yellow wires from PS104, PS105, and PS106 **A** to the frame are secure.

___ Remove the acoustical barrier **B** at AMD 102. Ensure green/yellow wire from motor to frame is secure. This wire is mounted above the motor on the blower mounting frame. Ensure green/yellow wire from the blower mount to the frame and green/yellow wire in plug are secure. Install the acoustical barrier.

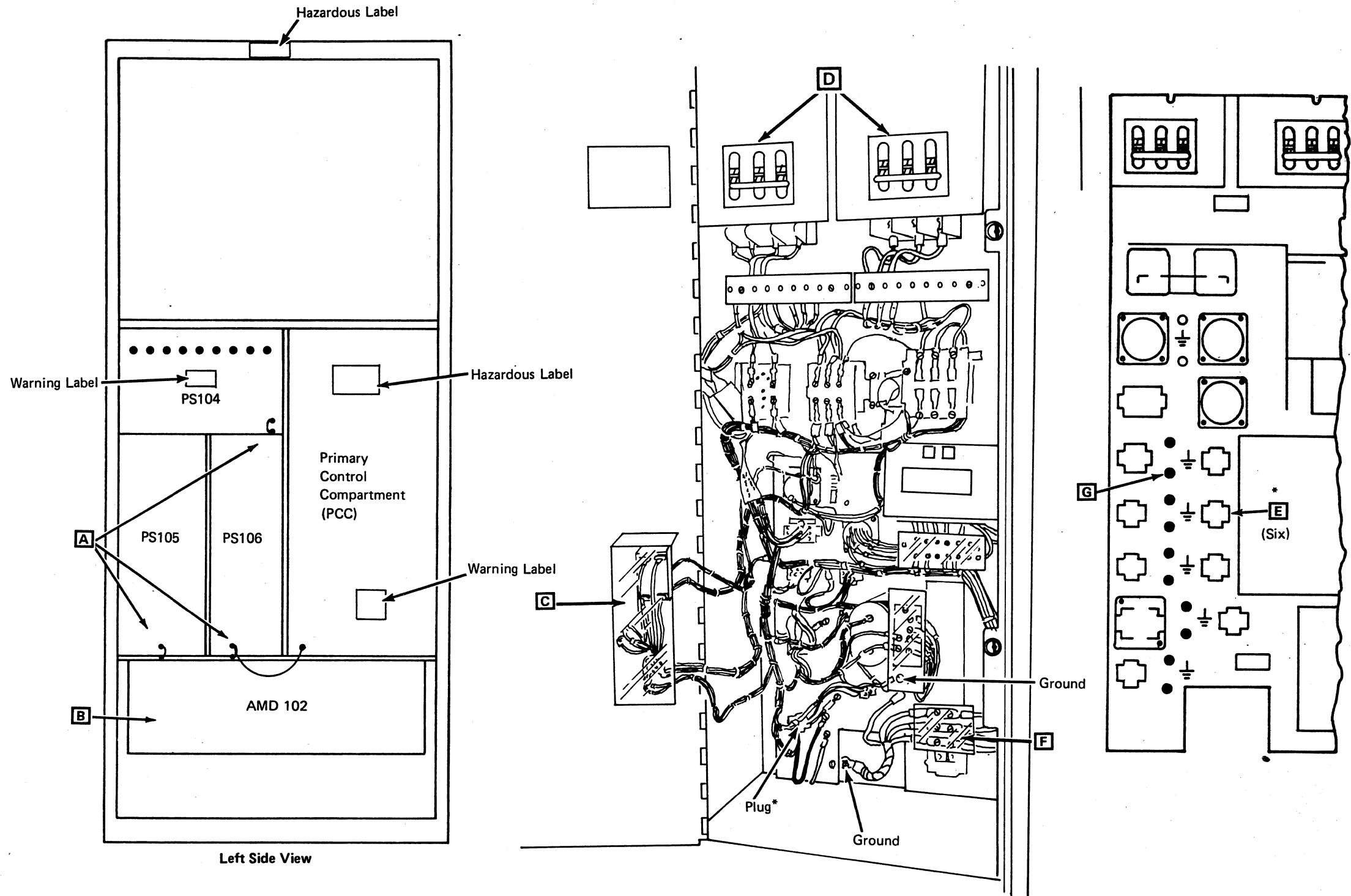
___ Open PCC box cover. Ensure safety covers for CP1 **C**, CB1, and CB2 are in place. CB1 is rated for 10 amps; CB2 is rated for 25 amps **D**. Ensure green/yellow wires **E** in all plugs inside the PCC are secure.

___ Green/yellow wires **G** inside of PCC are secure.

Line Filter

Note: Line filter is not installed on machines for Japan.

Remove line filter cover **F**. Ensure all wires at the line filter are secure. Install line filter cover.



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Safety Labels

Ensure all safety labels as shown are in place and readable. For safety label part numbers, see page INSP 017.

Item **B** is located between CB1 and CB2 inside the PCC.

Item **D** is located inside the PCC.

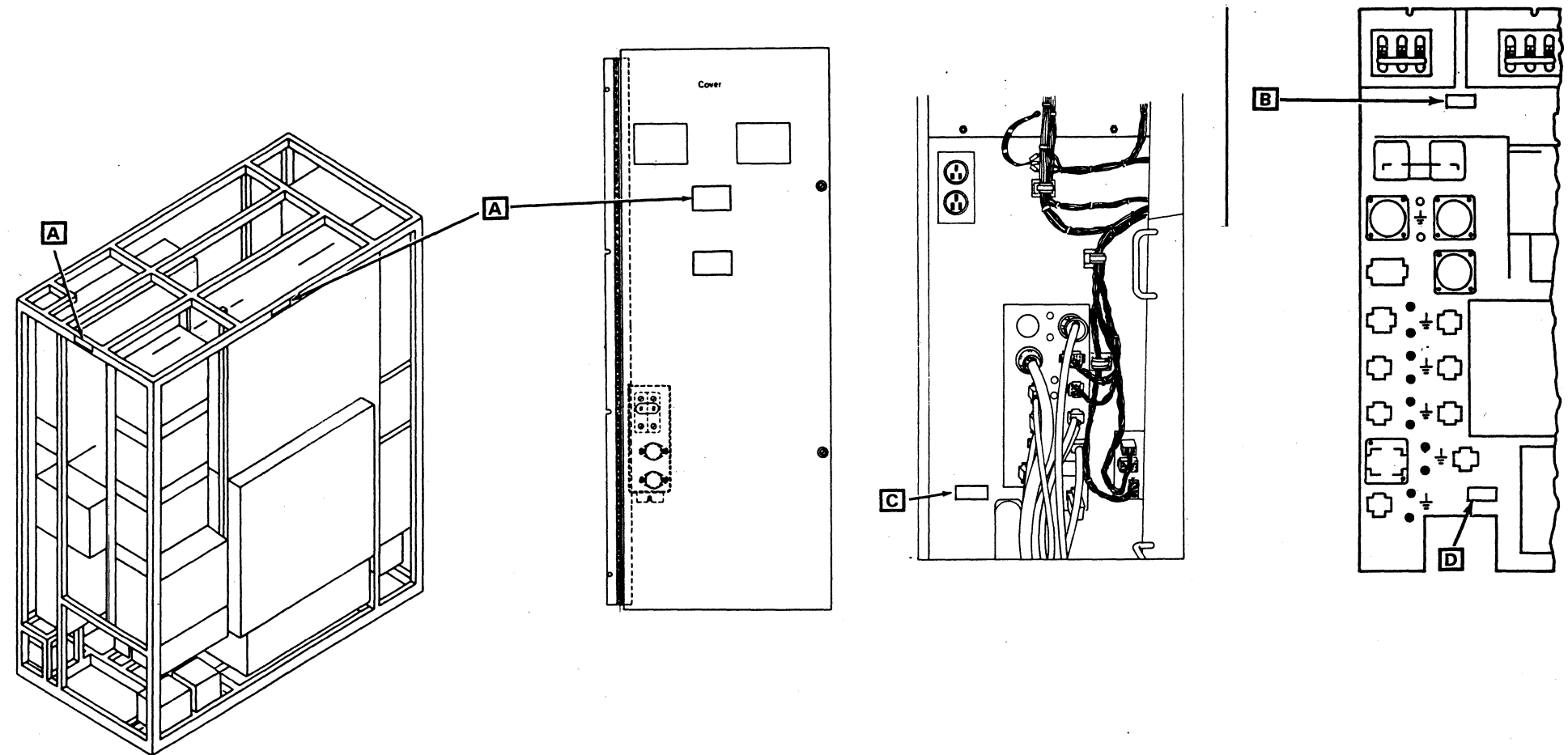
Close the cover of the Power Control Compartment (PCC).

A **HAZARDOUS AREA**
TRAINED SERVICE
PERSONNEL ONLY

B **LINE VOLTAGE**
PRESENT WITH
MACHINE POWER OFF

C **This unit equipped with line filter circuits.**
See installation manual for special grounding
wire requirements.

D **WARNING**
High grounding conductor current. Grounding circuit continuity is vital for safe operation of machine. Never operate machine with grounding conductor disconnected.



Seq GI020	PN 0446242 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02219 29 FEB 84	EC A02220 06 JUN 84
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Gate 01C

Ensure the following:

___ Green/yellow strap **A** from gate 01C to frame is secure.

___ Green/yellow strap **B** from PS107, PS108, and PS109 to the frame is secure.

___ Remove the acoustical barrier **C** at AMD 105. Ensure green/yellow wire to blower cover, green/yellow wire from motor to blower cover, and green/yellow wire in plug are secure. Install acoustical barrier.

___ Green/yellow strap **D** from AMD 105 to the frame is secure.

___ Green/yellow strap **E** from PS101, PS102, and PS103 is secure.

___ Green/yellow wire in all plugs is secure.

___ Green/yellow strap from the service panel to the frame is secure.

Note: Transformers 104A, 104B, and 104C are for all 50 Hz and Japan 60 Hz machines.

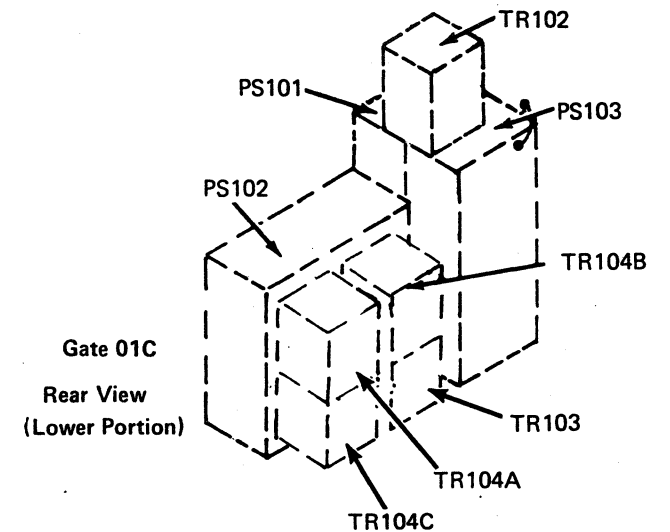
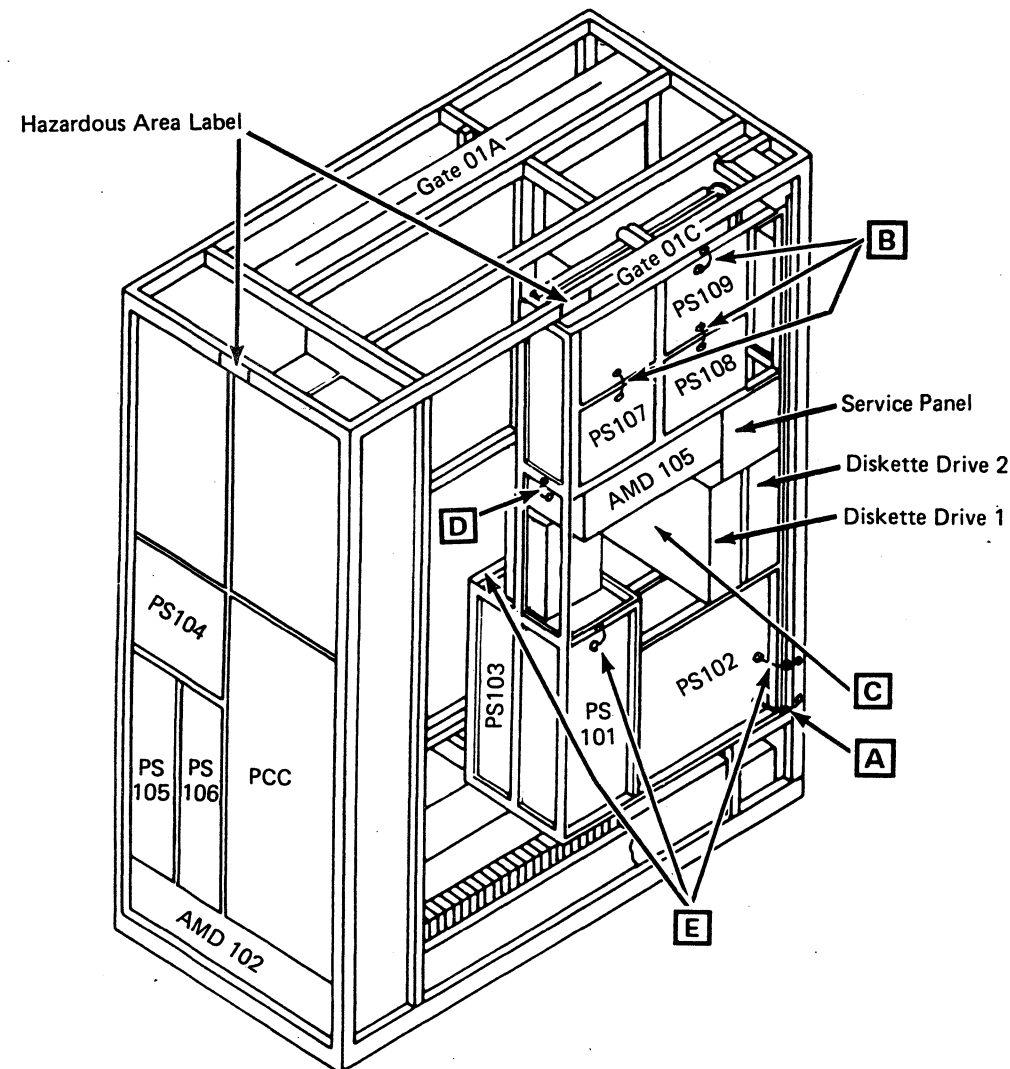
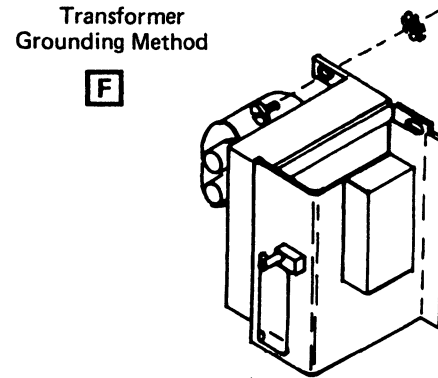
Ensure the following:

___ Green/yellow wire in plugs for TR101, TR102, TR103, TR104A, TR104B, and TR104C to transformer case is secure.

___ Nuts or screws **F** mounting TR101, TR102, TR103, TR104A, TR104B, and TR104C are secure.

___ Check for a 3.2 amp fuse in TR102 and a 4.0 amp fuse in TR103.

___ Ensure the DANGER 550V label is in place for TR101, TR102, and TR103. Label is mounted on the capacitors on the transformers. For safety label part numbers, see page INSP 017.

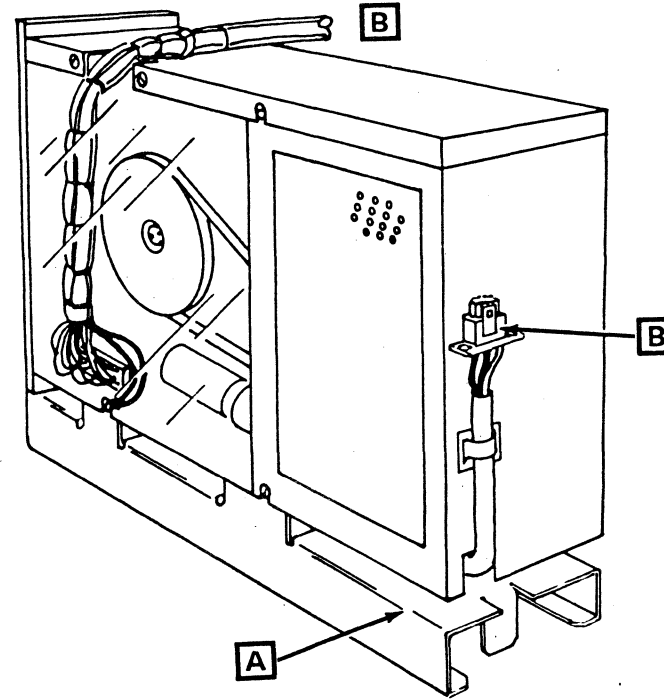


Seq GI025	PN 0446243 Pg 1 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84	
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Diskette Drives

Ensure the following:

- ___ Diskette drives are installed securely.
- ___ Green/yellow wires in plugs for diskette drives are secure.
- ___ Belt safety cover (if installed) is in place.
- ___ Green/yellow wire from both diskette drives **A** to the frame is secure.
- ___ Power cable strain relief for both diskette drives **B** is secure.



Seq G1025	PN 0446243 Pg 2 of 2	EC A02214 15 SEP 83	EC A02215 01 NOV 83	EC A02217 10 JAN 84	EC A02220 06 JUN 84	
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Gate 01A

Ensure the following:

___ Green/yellow strap **A** from board 01A-B2 to frame is secure.

___ Remove acoustical barrier **B** from AMD 101. Ensure green/yellow wire to blower cover and green/yellow wire in plug are secure. Install acoustical barrier.

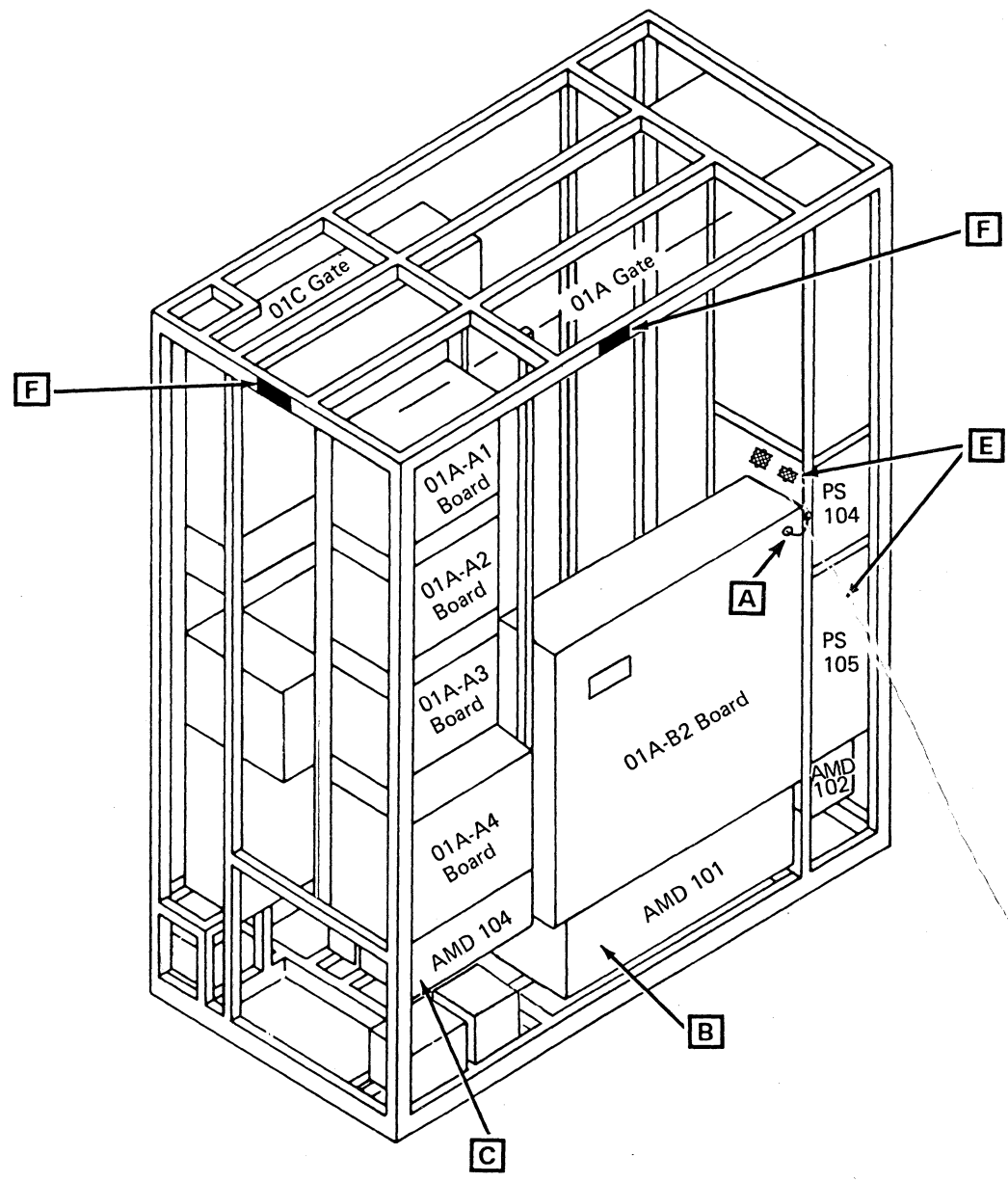
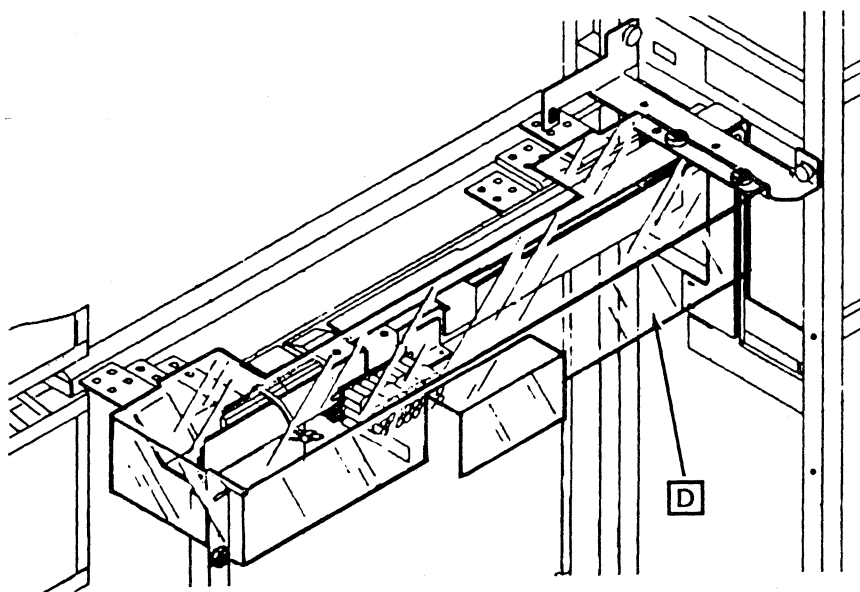
___ Remove acoustical barrier **C** from AMD 104 and AMD 103. (AMD 103 located behind AMD 104). Ensure green/yellow wire to blower cover, green/yellow wire from motor to blower cover, and green/yellow wire in plugs are secure. Install acoustical barrier.

___ Ensure the safety cover over the decoupling capacitor **D** is secure. Decoupling capacitor is mounted at top of board 01A-B2, and the cover is mounted over the capacitors.

___ Green/yellow wire in plugs at rear of PS104 and PS105 **E** is secure. Gate 01A-B2 must be swung open to see the rear of PS105.

Safety Labels

Ensure safety label **F** is in place and readable. For all safety label part numbers, see page INSP 017.



**F HAZARDOUS AREA
TRAINED SERVICE
PERSONNEL ONLY**

Seq GI026	PN 0447373 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83				
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Console Devices (3278-2A, 3279-2C)

External Check

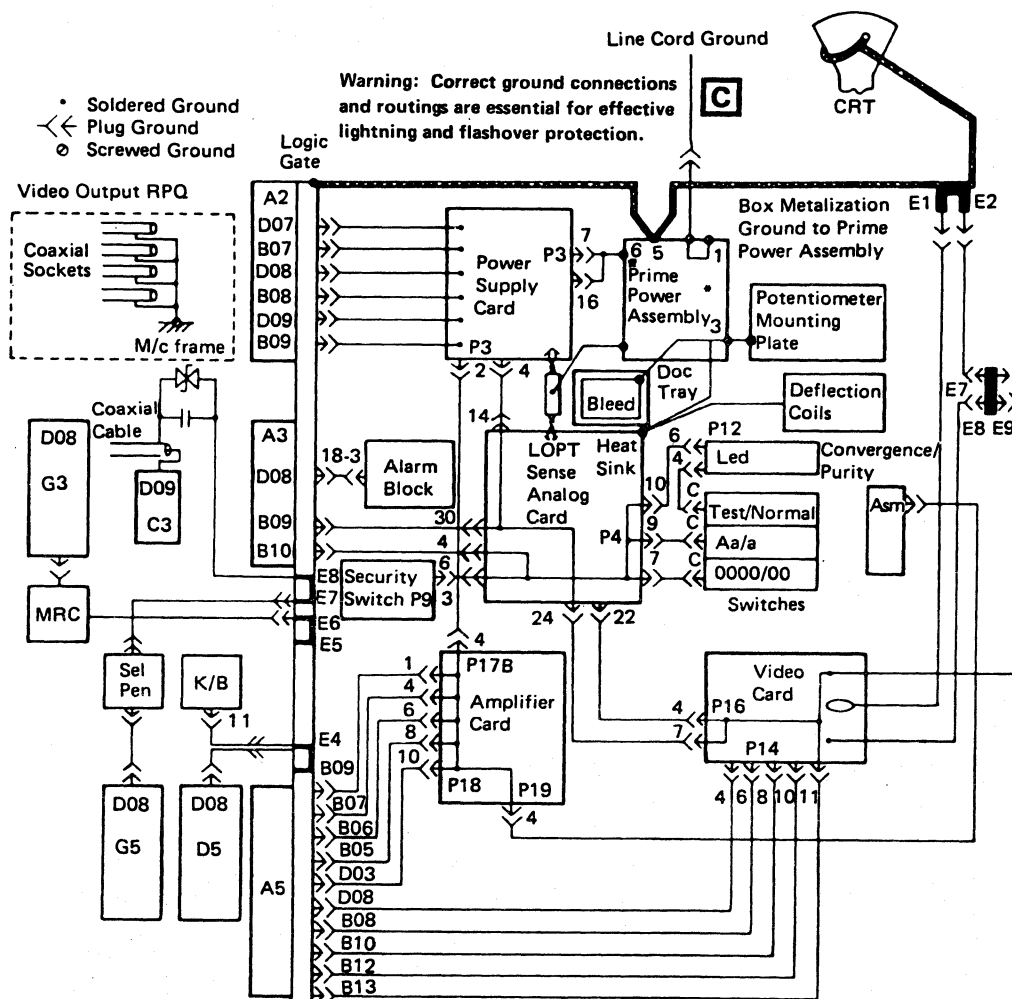
- ___ Check all covers for correct latching.
- ___ Inspect for sharp edges.
- ___ Ensure all feet are present and undamaged at the base.
- ___ Check CRT for cracks, bubbles, or chipping.

Internal Check

- ___ No smoke, water damage, or foreign substances.
- ___ Frayed or broken wiring.
- ___ Terminal board covers undamaged; no screws missing.
- ___ Mate-N-Lok plugs for pushed back pins or wires.
- ___ Rubber boot over filter capacitor is undamaged.
- ___ Correct grounding of CRT yoke **A**.
- ___ All capacitors for dents, expansion, or leakage.
- ___ Verify connections to all capacitors are secure.
- ___ Correct grounding of CRT main power cord **B** to frame.
- ___ Correct grounding of (3278-2A) or (3279-2C) line cord **C**.

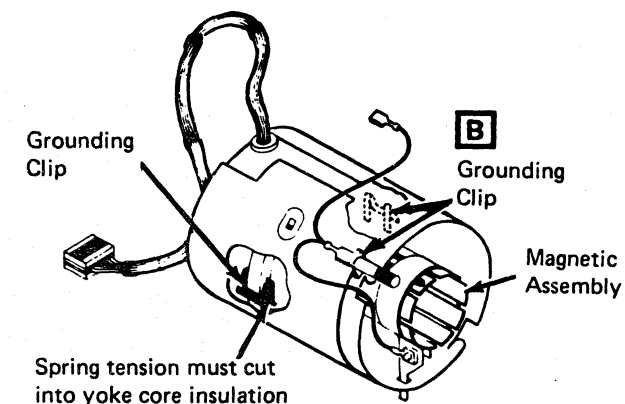
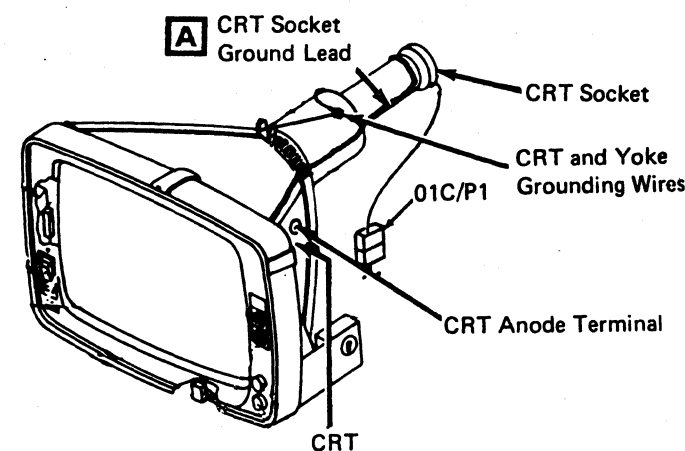
___ All high voltage, hazardous voltage, fuse size, and any other safety labels are in place and readable. For safety label part numbers, see page INSP 017.

LINE CORD GROUNDING (3279-2C)

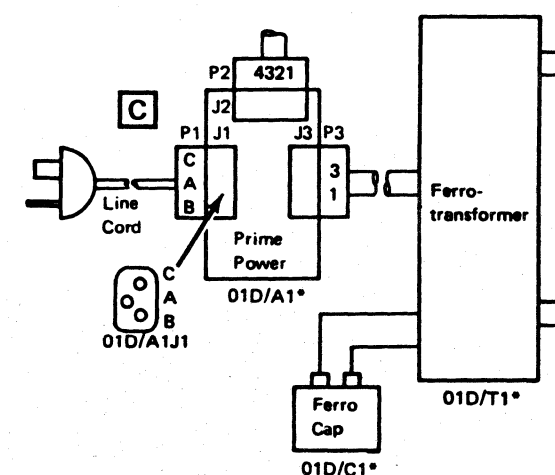


*Wires may be connected to alternative screws.

CRT YOKE GROUNDING



LINE CORD GROUNDING (3278-2A)



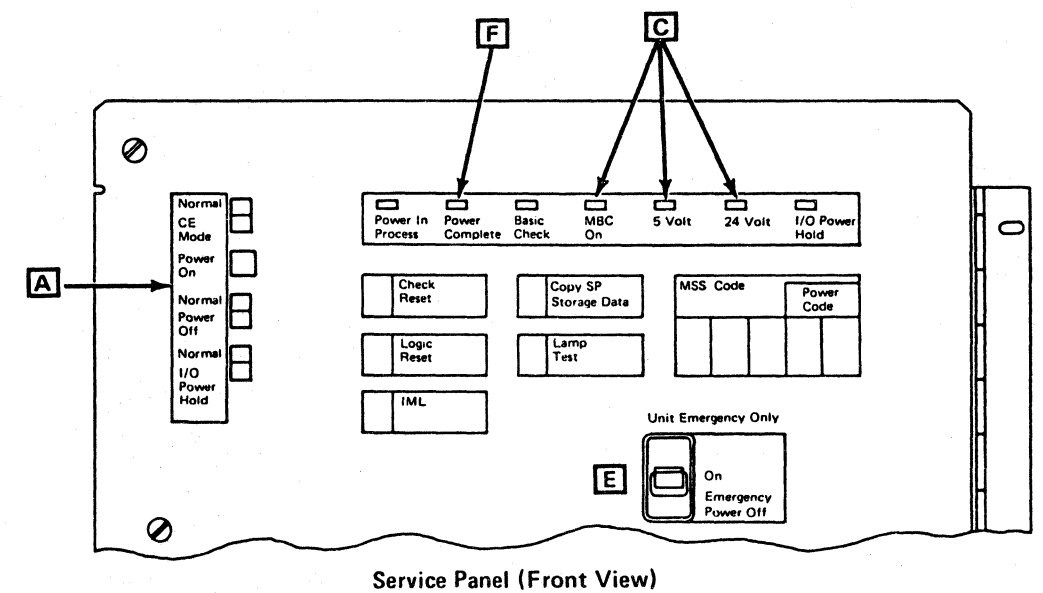
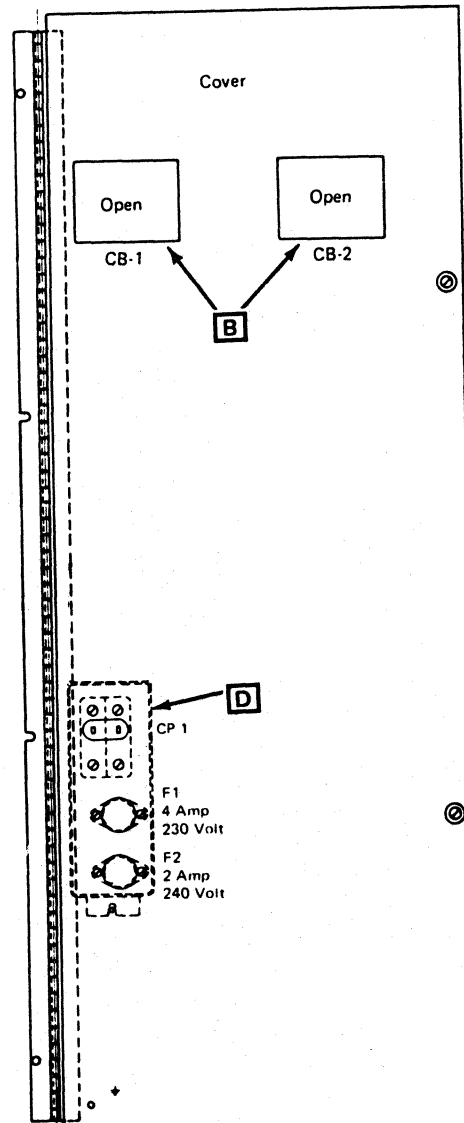
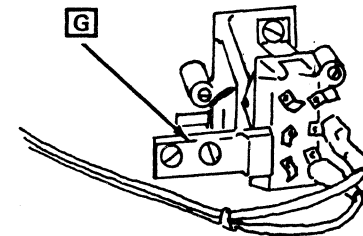
*Grounded only when mounted and fastened in place.

Seq G1030	PN 0446244 Pg 1 of 1	EC A02214 15 SEP 83	EC A02215 01 NOV 83		
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Power On/Off Check

1. Verify the customer's branch circuit breaker is off.
2. Connect the processor power plug to the customer's receptacle.
3. Activate the customer's branch circuit breaker.
4. Activate CB1 and CB2 [B] at the PCC in the processor.
5. Ensure the processor console is powered on.
6. Press Power On [A] on the service panel.
7. At Power Complete [F], set the Unit Emergency Only switch on the service panel to Emergency Power Off.
8. Ensure that PS104, AMD 102, and AMD 104 are off. If PS104 is still on, reference code 11D1160E is displayed on the system console. If any of these items are on, a safety hazard exists.
9. Set the Power Off switch to Normal at the service panel. Press Power On.

10. At Power Complete, switch the Unit Emergency Only switch [E] to Power Off.
11. Ensure that the 5 Volt, 24 Volt, and MBC On indicators at the service panel are off.
12. Switch the Unit Emergency Only switch to On.
Note: If the switch fails to reset, a retention spring [G] is installed. To reset the switch, push down on the retention spring behind the switch and push up on the Unit Emergency Only switch on the service panel.
13. Press Power On at the service panel. At Power Complete, switch CB1 and CB2 off.
14. Ensure processing unit power is off and AMDs and diskette drives are not running.
15. Ensure that the 5 Volt, 24 Volt, and MBC On indicators on the service panel are off.
16. Switch CB1 and CB2 on.
17. Press Power On on the service panel.
18. At Power Complete, switch CP1 off [D].
19. Ensure no voltage is present at the convenience outlet.
20. Switch CP1 on.



SAFETY LABEL DESCRIPTION and PART NUMBERS

Description	English	German	Canadian	French	French Dutch	Finnish	Italian
HAZARDOUS AREA TRAINED SERVICE PERSONNEL ONLY	369207	6815193	6815179 and 369207	6815182	6081052	8326801	
LINE VOLTAGE PRESENT WITH MACHINE POWER OFF	138755	6825819	984123	6825828	6121851	6825818	
DANGER 550 VOLTS	8483959	2582954					
WARNING High grounding conductor current. Grounding circuit continuity is vital for safe operation of machine. Never operate machine with grounding conductor disconnected.	5731697	4154584	4154583	6825908	4154587	6825879	
This unit equipped with line filter circuits. See installation manual for special grounding wire requirements.	5397579						

Description	Norwegian	Spanish	Swedish	Brazilian Portuguese	Japanese	Denmark	Netherlands Dutch
HAZARDOUS AREA TRAINED SERVICE PERSONNEL ONLY	369207	6815180	8551904	6815183	8326797	1806772	369207
LINE VOLTAGE PRESENT WITH MACHINE POWER OFF	138775	4154591	8551903	6815188	6825840	1806773	138775
DANGER 550 VOLTS							
WARNING High grounding conductor current. Grounding circuit continuity is vital for safe operation of machine. Never operate machine with grounding conductor disconnected.		4154589	4154586				5731697
This unit equipped with line filter circuits. See installation manual for special grounding wire requirements.							

