CONTROL DATA

CYBER 180

810 and 830 Computer Systems

Maintenance and Parts Data

810 Computer System
810A Computer System
65810 Computer System
830 Computer System
830A Computer System
65830 Computer System

60469500

REVISION RECORD

REVISION	DESCRIPTION
01 (02-84)	Preliminary manual released.
02 (03-84)	Manual revised; includes switching power supply.
03 (05-85)	Manual revised.
A (06-84)	Manual released. This edition obsoletes all previous editions.
B (06-84)	Manual revised; includes ICI channel and 256K chip memory options.
C (11-86)	Manual revised to include equipments AA179-A and BS228-A.

Publication no. 60469500

Revision Letters I, O, Q, S, X, and Z are not used.

Address comments concerning this manual to:

Control Data Canada
Information Products (210)
1855 Minnesota Court
MISSISSAUGA, Ont., Canada
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or use Comment Sheet at the back of this manual.

MANUAL TO EQUIPMENT LEVEL CORRELATION SHEET

This manual reflects the equipment configuration listed below.

EXPLANATION: Locate the equipment type and series number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

EQUIPMENT TYPE	SERIES	WITH FCOs	COMMENTS
AA161-A	87	03508	Mainframe
AA179-A	06	03508	Mainframe
AT453-A	11	03393	Second PPS Barrel
AU125-A	04	03286	Six Channel Increment
AU127-B	40	03488	Second CPU
AU129-A	01	-----	4DH0 ICI Channels
AU130-A	01	-----	CY170 Channels
BS167-A	01	-----	0DPH Memory Arrays
BS222-A	01	-----	3HBH Memory Arrays
BS228-A	01	-----	3HBH Memory Arrays

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LIST OF EFFECTIVE PAGES

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1-2	C	4-31	A	6-16	A	C-5	A
1-3	C	4-32	A	6-17	A	C-6	A
Divider 2	C	4-33	A	6-18	A	C-7	A
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3-5	A	5-1	A	6-26	A	D-3	C
Divider 4	C	5-2	B	6-27	A	D-4	C
4-1	A	5-3	A	Appendix A	C	D-5	C
4-2	A	5-4	A	A-1	A	D-6	C
4-3	A	5-5	B	A-2	C	D-7	C
4-4	C	5-6	A	A-3	C	D-8	C
4-5	C	5-7	A	A-4	C	D-9	C
4-6	C	5-8	B	A-5	A	D-10	C
4-7	A	5-9	B	A-6	A	D-11	C
4-8	C	5-10	A	A-7	A	Appendix E	C
4-9	A	5-11	B	A-8	B	E-1	C
4-10	A	5-12	B	A-9	B	E-2	C
4-11	C	5-13	B	A-10	A	E-3	C
4-12	C	5-14	B	A-11	A	E-4	C
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4-14	A	5-16	A	A-13	A	Sheet	C

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PREFACE

This manual is used by experienced field personnel familiar with CDC® CYBER computing systems and maintenance practices. Maintenance procedures and parts information are provided for the CDC® CYBER 180 models 810, 810A, 65810, 830, 830A and 65830 computer systems. Throughout this manual, CYBER 180 refers to all models unless otherwise indicated. Appendixes A, B, C, D and E provide specialized IOU and MEM troubleshooting guides, panel maps and pak layouts.

Related manuals are listed in the system publication index on the next page.

Other manuals and documents referenced within the text of this manual but not listed in the system publication index include:

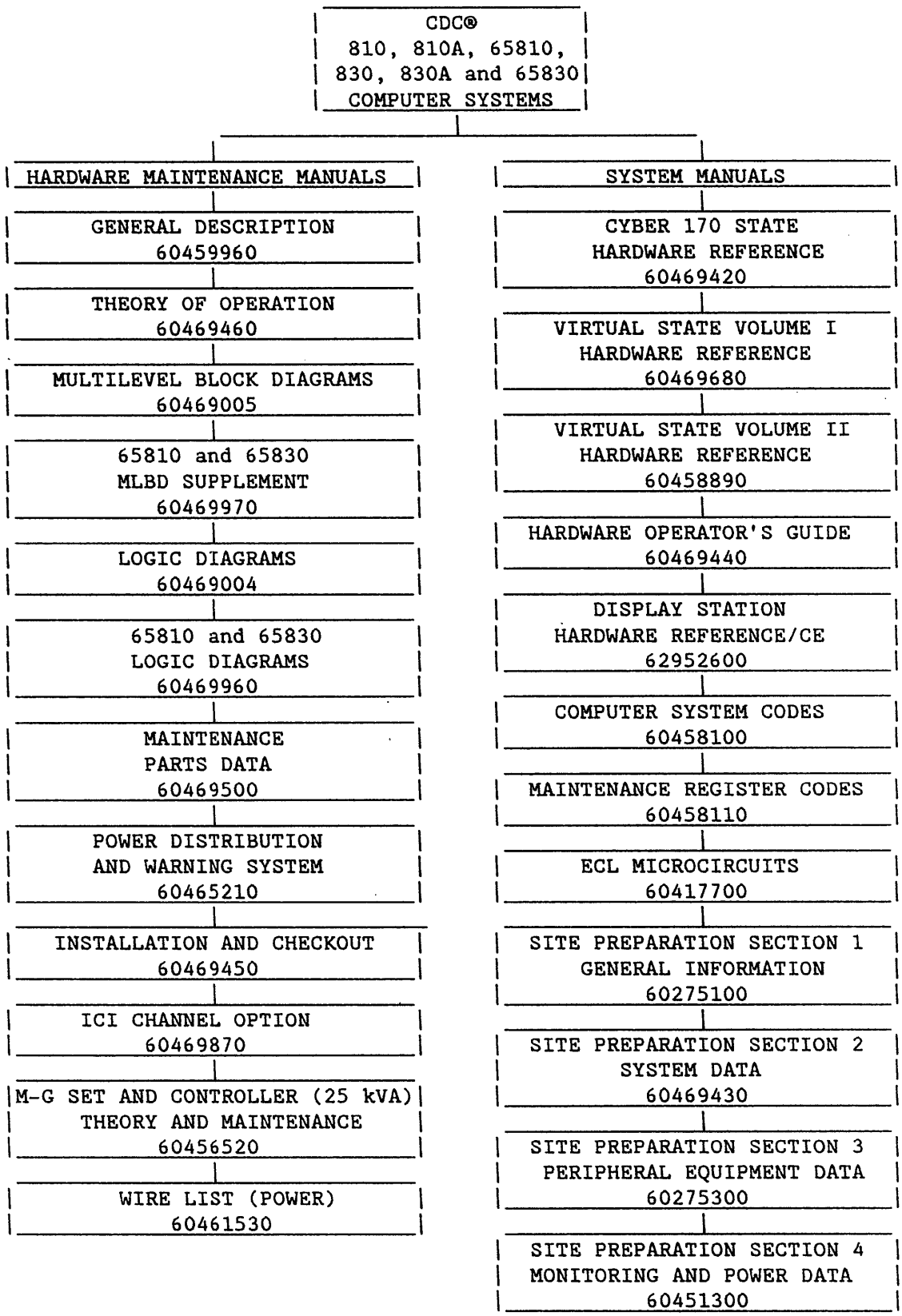
Title	Publication Numbers
Packaging Document	59120000
NOS On-Line Maintenance Software Reference Manual	60454200
NOS/BE On-Line Maintenance Software Reference Manual	60453900
Diagnostic Virtual System for NOS/VE Usage	60469720
MSL15X Off-Line Maintenance Software Library Reference Manual	60456530
MSL15X Model Independent Tests Maintenance Software Reference Manual	60469390
MSL151 Maintenance Software Reference Manual	60469400

Manual ordering information and latest publication revision levels are available from the Control Data Literature and Distribution Services Catalog, publication number 90310500.

The packaging document is available from:

Corporate Packaging and Material Handling Engineering
8100 34th Avenue South
Minneapolis, Minnesota 55420

SYSTEM PUBLICATION INDEX



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SECTION 1

PARTS DATA

This section contains lists of all parts which may be replaced during normal field maintenance procedures.

All miscellaneous parts are listed in the Exploded Bill of Material, publication number 19267998. Tools are listed in the Maintenance Aids section of this manual.

Table 1-1 lists parts data for logic paks. Table 1-2 lists parts data for power and cooling parts. Table 1-3 lists miscellaneous electrical components.

TABLE 1-1. LOGIC PAKS DATA (1 of 2)

Pak Type	Part Number	Description
0DPH	52803060	Central memory array pak, 64K RAM Chip
1CH0	19269031	Channel control and data
1CJ0	19268484	Channel 14, 15, 17 control and data
1CK0	19269827	Microprocessor, deadstart and two port mux
1CL0	19269335	OSB & EC registers, CM address & ADU control
1CM0	19267028	PP memory
1CN0	19269002	Maintenance register (IOU)
1CP0	19269334	I.K.C. barrel
1CQ0	19269132	CC545 display controller
1CR0	19269130	A.P.Q.R. barrel
1DA0	19269309	CM address, maintenance register
1DC0	19269310	CM function, maintenance register
1DD0	19269223	CM 1/2 data bytes, SECDED and ADU
1DE0	19269378	Execution miscellaneous logic
1DF0	19268827	Execution register file
1DP0	19269270	Master clock
1DQ0	19269193	Maintenance access control (MAC)
1DR0	19269224	Control store maintenance register and ARV12
1DS0	19269342	Control store, next add logic and SECDED
1DW0	19265888	MAP data
1DZ0	19268329	Performance monitoring facility
1GL0	19269305	Execution length YKW and ARVI1
2GA0	19269143	Read next instruction (RNI) MAP control
3HBH	24670814	Central memory array pak, 256K RAM Chip
4DH0	19268847	Optional channels, 3 x ICI, 1 x C170
5FQ0	19265796	CC545 Display Controller
5MQ0	19265795	Maintenance Access Control (MAC)
5SH0	19269365	Channel control and data
8TC0	19267245	Execution floating point S adder
8TD0	19269308	Execution normalizer, control and rings
8TG0	19269302	Execution upper immediate instruction pipe

TABLE 1-1. LOGIC PAKS DATA (2 of 2)

Pak Type	Part Number	Description
8TH0	19269303	Execution lower immediate instruction pipe
8TJ0	19269245	Execution process registers traps
8TM0	19269350	Execution main control
8TR0	19267819	Execution sense carry AD and BD select
8TS0	19267359	Execution shifter L adder
8TV0	19267402	Execution BDP data
8UX0	19267821	Map miscellaneous

TABLE 1-2. POWER AND COOLING PARTS DATA

Part Number	Description
815490	Filter
10126875	Power supply switching +5 V @ 150A
10126876	Power supply switching -5.2 V @ 285A
10126877	Power supply switching -2.2 V @ 330A
10126878	Power supply DC to DC outlet
15002459	RFI filter - 3 phase 60 A
15005255	Circuit breaker 4 pole 400 Hz
15005280	Circuit breaker 4 pole 50/60 Hz
15165801	Circuit breaker DC magnetic
19267824	Blower module frame assembly
22786542	Power blower - centrifugal, 230 V ac, 1050 CFM
51854907	Logic/power blower - centrifugal, 230 V ac, 850 CFM*
53201796	Module assembly - power supply interface
53367198	Power control interface
53370201	AC to DC convertor assembly
53370202	Bulk auxillary power supply
53370204	Transformer 5 kVA
53370206	Module assembly - auxillary power supply regulator
53370208	Module assembly - contact driver
53370210	Module assembly - battery switch dontrol
53370246	Battery control box assembly
53370287	Switching power supply meter assembly
53370288	Capacitor box assembly
53375397	Transformer 115 V
67304098	Module assembly - power control
95586431	Fuse 20 A
95586443	Fuse 2 A
95586447	Fuse 6 A
95586450	Fuse 10 A

* Used on plenum assemblies with protective air grates.

TABLE 1-3. MISCELLANEOUS ELECTRICAL COMPONENTS AND PARTS

Part Number	Description
10389974	Protect module assembly
12263509	Acoustic coupler
15181904	Capacitor
18336401	Plug in relay
18336408	Plug in relay
18336409	Plug in relay
18341401	Thermistor - bead
18782491	Air flow sensor assembly
19268849	Console cable direct connect
19266674	Switch octal coded
19266675	Switch keylock
19267044	METHODE pin and insulator kit
20261891	C/A protect to outlet
21961211	Backpanel repair tool kit
53574913	Air seal spacer
62032106	Cable assembly 2 port
67185786	Standard serial data cable assembly
95596510	Resistor - 30 ohm 5 W

SECTION 2

MAINTENANCE AIDS

This section lists tools, test equipment, and materials required for maintenance work on the computer system.

Part Number	Part List Description
General Purpose	
12210991	Psychrometer sling
12211611	Potentiometer
12212196	IC chip test clip
12215132	Scope probe - 6 ft x 10 ft
12215173	Adapter scope probe
12215178	Scope probe adapter - backpanel probe
12259173	Heat gun
12263242	Aerosol coolant
12263279	Digital voltmeter - model 8020A
12263495	Anti static pad
12263496	Static control wrist strap
12263513	Tri-chlorethane cleaner
18695766	Digital voltmeter
18697520	Scope probe 6 ft x 1 ft
18697528	Scope probe Tip - Hook Type
18697569	Oscilloscope - Tektronix Model 475
19268737	Cooling fan assembly - card extender
24615626	Signal extender
Pak and Backpanel FCO	
12206259	Soldering iron tip
12210394	AMP insertion extender
12210434	X-Acto knife
12210435	X-Acto knife blades
12210436	Solder desolder
12210437	Solder - .020 in. diameter 50/40 resin core, 1 lb
12210486	Soldersucker
12210768	Soldering iron tip - wide
12210773	Tool taper pin (for shock testing)
12210813	Crimper
12210816	Spring hook - small
12210827	Socket - 9/16 in. diode removal
12210876	Scriber
12210943	Tweezer - straight
12210945	Mirror
12259111	Wire wrapping gun - battery operated
12259135	Magnifying glass
12259141	Wire stripper
12259150	Shock test tip
12259183	Wire unwrapping tool

Part Number	Part List Description
12262555	Wire stripper - 30 gauge
12262599	Tweezer - curved
12263214	Soldering iron - 40 watt
12263499	Shielding bag
19268234	Pak insertion lever
53705665*	Backpanel repair kit
52948476	210 logic pak extender

6000 Type Controller Tools

12206342	Wire spreader
12209308	Shock test tip - 6000 type
12210773	Insertion tool - taper pin, 22-26 gauge
12210818	Crimper - taper pin 20-22, 24-26 gauge
12210894	Insertion tool extender
12259141	Wire stripper - 26 gauge
18072300	Card extender - 30 pin 6000/CY70 type
18697522	Scope probe tip - 6000/CY70 type

* Backpanel repair kit consists of several kits. One contains tools for use on all backpanels. The other kits contain replacement pins and housings for different vendor's backpanels. The vendor name or logo (stamped on backpanel) identifies the backpanel type. The same name or logo is stamped on the replacement kit case to identify which replacement kit to use.

SECTION 3

PREVENTIVE MAINTENANCE

This section provides Computer Aided Maintenance Schedules (CAMS) for preventive maintenance. There is no scheduled time for purely preventive maintenance. Therefore, use these procedures to perform preventive maintenance tasks following an emergency maintenance call.

5002 PM ON EM (FILTER, WARNING SYSTEM & BATTERY)

```
*
*   THE FOLLOWING PM TASKS SHOULD BE DONE IN CONJUNCTION WITH AN
*   UNSCHEDULED EM TRIP ON THE SITE OR A SCHEDULED MEMORY MAINT-
*   ENANCE TRIP, REFER TO CAMS ID C180810 TASK 5001.
*
*   AIR FILTER CHECK/CLEAN
**************************
*
*   THERE ARE THREE AIR FILTERS IN THE 810/830 CABINETS.  ONE
*   LOCATED IN THE FRONT DOOR OF THE POWER CABINET, AND ONE UNDER
*   EACH OF THE LOGIC COLUMNS IN THE FRONT OF THE LOGIC CABINET.
*
*   CLEAN AS REQUIRED.
*
*   WARNING SYSTEM CHECK
************************
*
*   ANY SITUATION REQUIRING A POWERING DOWN OF THE UNIT CAN
*   BE USED AS AN OPPORTUNITY TO TEST THE WARNING SYSTEM.
*   THIS MUST BE DONE AT LEAST ONCE EACH YEAR.
*
*   1.  PRESS THE CABINET POWER OFF BUTTON.
*
*   2.  PRESS AND HOLD THE AIR FLOW SENSOR TEST PUSHBUTTON
*       SWITCH FOR TWO TO THREE MINUTES UNTIL THE LOW AIR
*       FLOW AND FAULT INDICATORS LIGHT.  HOLD THE SWITCH IN
*       FOR AN ADDITIONAL TWO MINUTES AND THE CIRCUIT BREAKERS
*       WILL TRIP.
*
*   3.  TO POWER THE UNIT BACK UP, RESET THE CIRCUIT
*       BREAKERS, PRESS THE RESET SWITCH AND THE ON
*       SWITCH.
*
*
*   BATTERY OPTION CHECK
************************
```

```
*    IF THE BATTERY BACK-UP OPTION (GK410) IS INSTALLED
*    THE CONDITION OF THE BATTERIES AND CHARGER SHOULD BE
*    VERIFIED AT LEAST ONCE EACH YEAR.  THIS CAN BE DONE
*    ANYTIME THE SYSTEM IS SCHEDULED FOR MAINTENANCE
*    WITHOUT TURNING OFF THE POWER.
*
*    CAUTION** EXTRA CARE MUST BE USED WHEN WORKING IN
*              AREAS OF EXPOSED HIGH VOLTAGE AND CURRENT.
*
*     1. OPEN THE FRONT DOOR OF THE POWER CABINET.
*
*     2. WITH POWER ON AND WITHOUT DISCONNECTING THE
*        CONNECTOR, MEASURE THE VOLTAGE BETWEEN THE
*        TWO PINS OF J2 ON THE BATTERY CONTROL BOX.
*
*        THE VOLTAGE SHOULD READ BETWEEN 305 AND 315
*        VOLTS DC.
*
```

6000 INSTALLATION GENERAL INSTRUCTIONS

THE FOLLOWING INFORMATION IS TO BE USED WHEN PERFORMING AN INSTALLATION. THE REFERENCED POLICIES, PROCEDURES, AND ATTACHMENTS WILL ENABLE THE CE TO ADMINISTRATIVELY ACHIEVE A CORRECT INSTALLATION.

THE INSTALLATION MAINTENANCE TASKS CALLED OUT IN THE SUCCEEDING MAINTENANCE INDEX NUMBERS WILL ENSURE THAT THE EQUIPMENT IS FUNCTIONAL AND OPERATIONAL. THESE TASKS ARE PART OF THE EPS. AS SUCH, THEY ARE TO BE FOLLOWED BY ALL PERSONNEL. PROBLEMS, ADDITIONS, CHANGES OR DELETIONS TO THESE TASKS MUST BE COMMUNICATED BY TAR. PM PROCEDURES, AS RELEASED FROM ENGINEERING SERVICES HEADQUARTERS, CONSTITUTE PART OF THE EPS ACTIVITIES. IF MODIFICATION TO PM PROCEDURES HAVE BEEN MADE LOCALLY, IT IS MANDATORY THAT THE ORIGINAL PM TASKS BE USED FOR ANY EPS ACTIVITY.

NOTE

REFERENCE THE FOLLOWING ES POLICIES, PROCEDURES AND ATTACHMENTS FOR INSTALLION ACTIVITIES.

- 4.510 EQUIPMENT INSTALLATION PLANNING. THIS PROCEDURE REFERENCES APPENDIX A-42, ATTACHMENT F. ATTACHMENT F IS A DISTRICT PLANNING PACKET. SECTION 3 OF ATTACHMENT F IS A DETAILED PLANNING GUIDELINE FOR INSTALLATIONS. COMPLETION OF SECTION 3 WILL ENSURE THAT ALL ASPECTS OF AN INSTALLATION IS PROPERLY PREPARED AND ACHIEVED.
- 4.511 EQUIPMENT DELIVERY AND INSTALLATION
- 4.512 NEA/NEI
- 4.513 INSTALLATION REPORTING
- 4.514 SUPPLEMENTAL ITEMS. DOES NOT APPLY TO END USER (PLUG COMPATIBLE) OR OEM PRODUCTS. YOUR ATTENTION IS DRAWN TO THE USE OF THE "PRODUCT TO EQUIPMENT TO SUPPLEMENTAL CROSS REFERENCE" DOCUMENT BY THIS PROCEDURE. THIS DOCUMENT SHOWS THE STANDARD SUPPLEMENTALS WHICH WILL AUTOMATICALLY BE INCLUDED WITH THE EQUIPMENT.

****

6001 QSA GENERAL INSTRUCTIONS

THE QSA PROCEDURES WHICH FOLLOW ARE TO BE USED WHEN A QUALITY OF SERVICE AUDIT INSPECTION IS TO BE CONDUCTED AT A SITE. THE PROCEDURES ARE WRITTEN FOR A NORMAL QSA. IF,FOR ANY REASON-SUCH AS CUSTOMER CONCERN-IT IS DETERMINED THAT AN EQUIPMENT SHOULD RECEIVE A MORE THOROUGH CHECK THAN PROVIDED BY THE QSA PROCEDURES ALL PM TASKS SHOULD BE DONE. THESE PROCEDURES ARE PART OF THE EPS. AS SUCH, THEY ARE TO BE FOLLOWED BY ALL PERSONNEL. PROBLEMS, CHANGES, ADDITIONS OR DELETIONS TO THESE PROCEDURES MUST BE COMMUNICATED BY TAR.
PM PROCEDURES, AS RELEASED FROM ENGINEERING SERVICES HEADQUARTERS, CONSTITUTE PART OF THE EPS ACTIVITIES. IF MODIFICATION TO PM PROCEDURES HAVE BEEN MADE LOCALLY, IT IS MANDATORY THAT THE ORIGINAL PM TASKS BE USED FOR ANY EPS ACTIVITY.
****

6002 FIELD TRANSFER GENERAL INSTRUCTIONS

****
*
* NOTE *
* DUE TO THE LENGTH OF THE MATERIAL INVOLVED,CERTAIN FIELD *
* TRANSFER INFORMATION CATEGORIES COULD NOT BE PUT IN THE *
* MIF USING COMMON DECKS. THIS INFORMATION WAS GIVEN ITS *
* OWN CAMS ID,FIELD-TF. TO RETRIEVE THIS INFORMATION USE *
* THE CAMS 2 LISTER FORM,AA6313,STD STATEMENT. UNDER EPS *
* PROC.,COLUMN 5,PUT A "T" FOR FIELD TRANSFER. UNDER CAMS *
* ID,COLUMNS 6 THRU 13,PUT"FIELD-TF." *
*
****

THE FOLLOWING PROCEDURES FOR FIELD TRANSFERS ARE BEING PROVIDED TO ALLOW THE CE TO EFFICIENTLY DETERMINE IF AN EQUIPMENT IS FIELD TRANSFERABLE OR MUST BE REFURBISHED. THE CONDITION OF EQUIPMENT REPORT (CER),FORM AA678A,IS THE MASTER DOCUMENT TO BE USED FOR FIELD TRANSFERS. THE CER,IN STEP 13,ASKS IF THE EQUIPMENT "MEETS CAMS/EPS OPERATIONAL PERFORMANCE REQUIREMENTS". THE FOLLOWING PROCEDURES ARE THOSE REQUIREMENTS AND CONSTITUTE THE EPS FOR FIELD TRANSFERS. AS SUCH,THEY ARE TO BE FOLLOWED BY ALL PERSONNEL. PROBLEMS,CHANGES,ADDITIONS OR DELETIONS TO THESE PROCEDURES MUST BE COMMUNICATED BY TAR.
PM PROCEDURES, AS RELEASED FROM ENGINEERING SERVICES HEADQUARTERS, CONSTITUTE PART OF THE EPS ACTIVITIES. IF MODIFICATION TO PM PROCEDURES HAVE BEEN MADE LOCALLY, IT IS MANDATORY THAT THE ORIGINAL PM TASKS BE USED FOR ANY EPS ACTIVITY.
*** THE HEAT EXCHANGER IN ALL EQUIPMENTS UTILIZING SITE CHILLED WATER, MUST BE DISASSEMBLED AND SCRUBBED OUT, IF USAGE SINCE LAST CLEANING EXCEEDS 10,000 HOURS OR IF THE IN/OUT WATER PRESSURE DIFFERENCE EXCEEDS THE MAXIMUM PRESSURE SPECIFIED IN THE MAINTENANCE MANUAL. IF IT IS PHYSICALLY IMPOSSIBLE TO DISASSEMBLE THE HEAT EXCHANGER, IT SHOULD BE ACID FLUSHED UNTIL THE WATER PRESSURE DIFFERENTIAL IS BELOW THE SPECIFIED PRESSURE. ***

NOTE

REFERENCE THE FOLLOWING POLICIES AND PROCEDURES FOR FIELD TRANSFER ACTIVITIES.

4.700 EQUIPMENT REMOVAL
3.741 DEVIATION AUTHORIZATION FOR SITE-TO-SITE EQUIPMENT TRANSFERS. EQUIPMENT THAT HAS ANY NO ANSWER ON THE CONDITION OF EQUIPMENT REPORT MUST BE DEVIATED AND HAVE THE RECEIVING REGIONAL/COUNTRY MANAGER"S APPROVAL BEFORE SHIPMENT OCCURS.

****

6100	PM ON EM (FILTER,WARNING SYSTEM & BATTERY)	5002
6101	OFF LINE HPA ERROR ANALYSIS	5001

SECTION 4

TROUBLESHOOTING

This section directs the use of all known troubleshooting techniques in a step-by-step manner. Diagnostics (including some deadstart tests) and maintenance controls and indicators are described.

SAFETY PRACTICES

All customer engineers are required to take reasonable and appropriate precautions with respect to electrical, mechanical, and personal safety hazards when working on a computer system. Pay careful attention to all entries in the maintenance documentation labelled CAUTION or WARNING. These labels identify hazardous areas or procedures encountered in the maintenance of system equipment. Above all, use good judgement and common sense, a moment of thought before you act can save hours of agonizing afterthought. The following guidelines must be followed when working on equipment.

PERSONAL

1. You are responsible for ensuring that no action taken by you causes conditions that may expose any person to hazard.

2. Never work alone on equipment which has exposed operating mechanical parts and/or exposed power components. If you must do so, notify your EIC or manager. In any case, the following precautions must be observed:

   a. Someone familiar with the power-off procedures must be in the immediate area.

   b. Personel jewelry (rings, wristwatches, bracelets, necklaces, etc.) must be removed.

   c. If using only one hand, keep the other in your pocket.

   d. Avoid wearing loose articles of clothing which can be snagged and drawn into moving machinery. Wear a short-sleeved shirt or roll long sleeves above the elbows.

      Neckties should be tucked into the shirt between the second and third buttons or fastened with a tie-tack or tie-clasp, preferably non-conductive. Do not use tiechains. Clip-on neckties are preferable; if caught, they pull free without causing injury.

   e. Before starting equipment, make sure that no person is in a position where s/he could be hurt.

   f. While working in or on equipment, put red tape strips across, or DO NOT OPERATE tags on, the power controls.

3. Keep CE toolkits out of walkways; put them on or under a desk or table.

4. Doors and covers removed must be stored in a safe place where they cannot be tripped over or cause personal injury. All doors and covers must be returned to the machine before it is handed back to the customer.

5. All safety covers, guards, shields, groundstraps, panels, and so on, shall be properly reinstalled after maintenance is completed.

ELECTRICAL

1. Shut off all ac and dc power when installing or removing major assemblies, working inside power supplies or power control enclosures, performing detailed mechanical maintenance, or performing wiring and/or module changes in the machine. If possible, turn off and lock or tag the circuit-breaker in the service panel on the wall or unplug the main power-supply cord.

2. Use only well-insulated pliers, screwdrivers, test leads and so on, when working on or near live circuits.

3. Do not disconnect or otherwise disable safety grounding systems, even if the equipment is powered off. The grounding system is installed for your protection.

4. Avoid coming into contact with grounds, such as equipment frames, metal floor tile edgings, electrical conduit and so on. If possible, make a local purchase of rubber or vinyl mats.

MECHANICAL

1. Do not use chemicals, greases, oils, or solvents that have not been specifically approved by the manufacturer of a device.

2. Use the proper tools for the job. Improper use of tools can result in personal injury or equipment damage.

3. Replace worn or broken tools or test equipment as soon as possible.

4. If a machine is running, do not reach into it; remember, you only get one set of fingers in a lifetime.

5. If you are using a strobelight, do not touch anything; it may be moving.

6. Safety glasses or goggles must be worn if you are:

   a. Driving pins, riveting, swaging, or performing any similar activity.

   b. Using an electric drill, grinder, reamer and so on.

   c. Installing or removing springs under either tension or compression.

d. Using any type of solvent, spray, or chemical.

e. Doing anything which might endanger your eyes.

7. When lifting, use a method that will not cause injury to your spine or strain your muscles. Be realistic about your lifting capacity.

STANDARD TROUBLESHOOTING PROCEDURES

The standard troubleshooting flowcharts shown in figures 4-1 through 4-4 are guides for solving emergency maintenance problems.

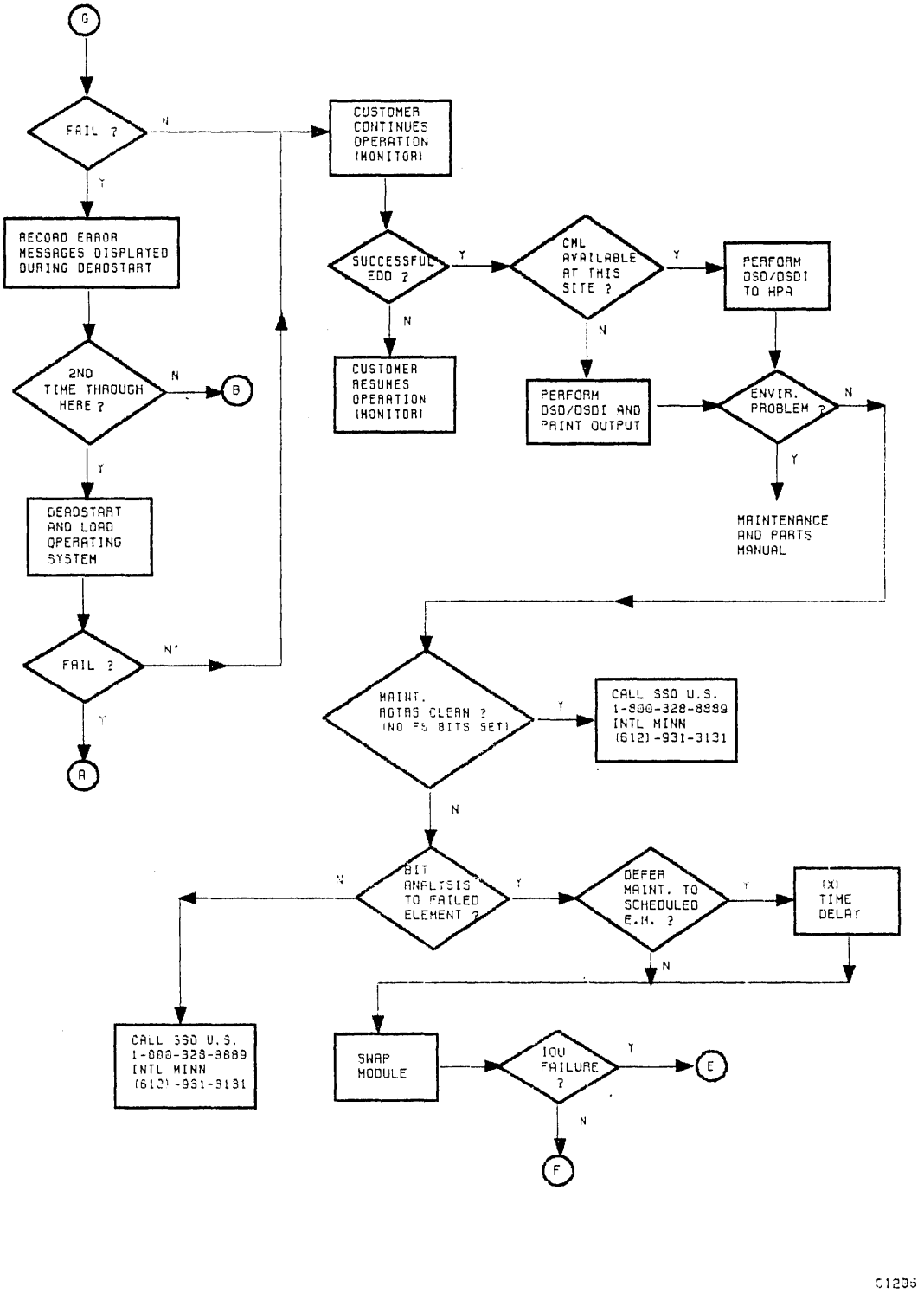
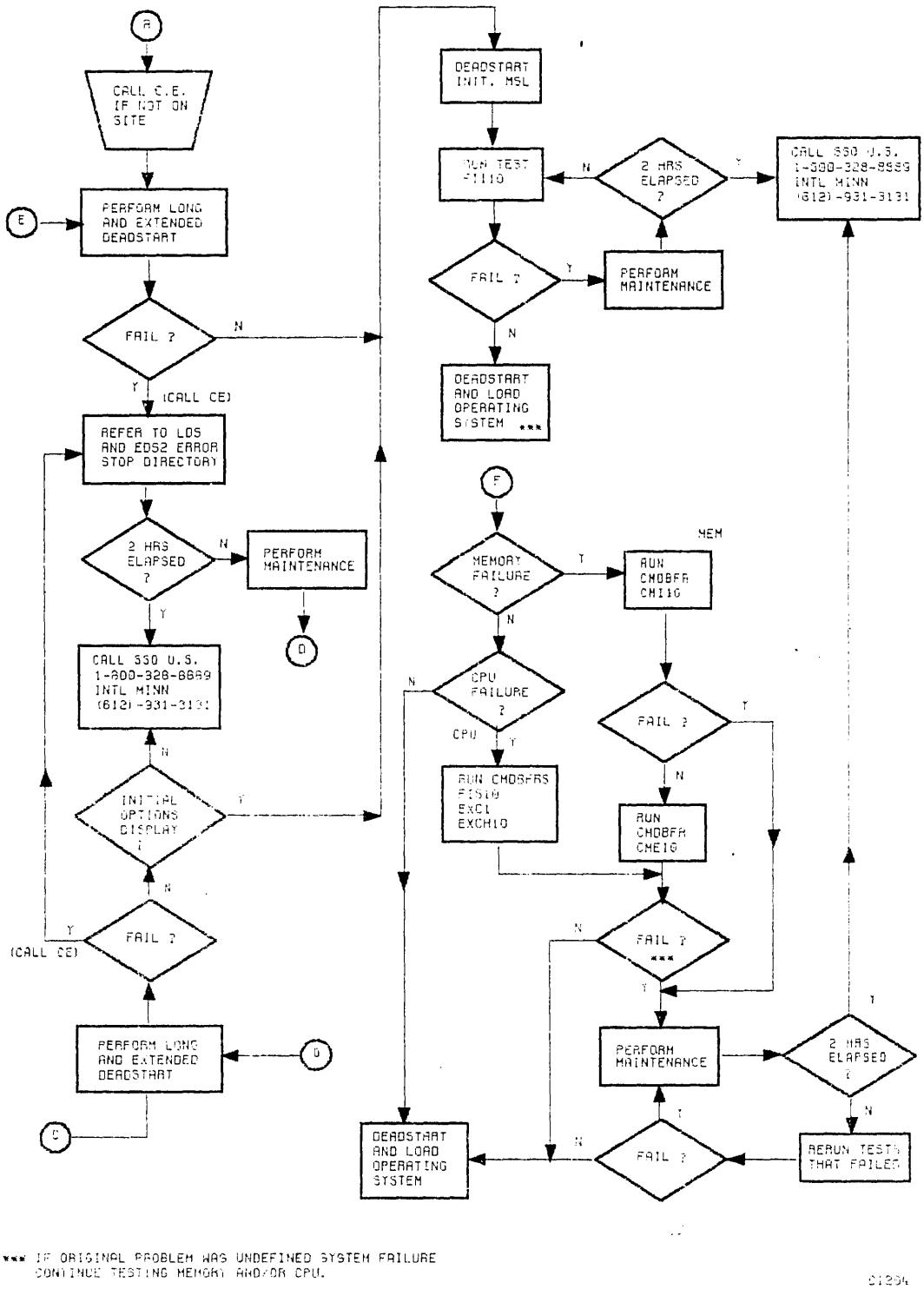
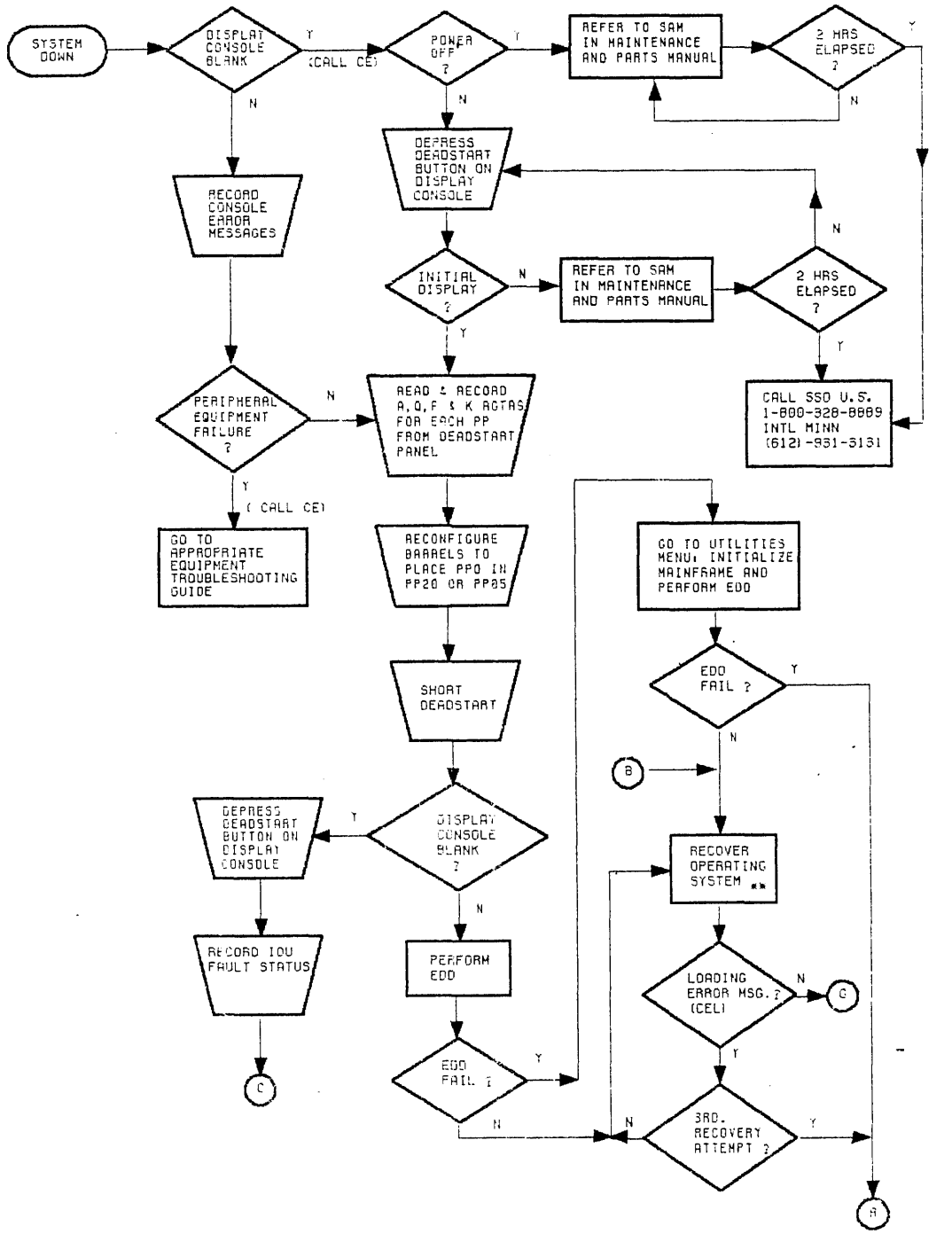


Figure 4-1. General Troubleshooting on Site (1 of 3)



*** IF ORIGINAL PROBLEM WAS UNDEFINED SYSTEM FAILURE CONTINUE TESTING MEMORY AND/OR CPU.

Figure 4-2. General Troubleshooting on Site (2 of 3)



** 1ST RECOVERY LEVEL 3
2ND RECOVERY LEVEL 3
3RD RECOVERY LEVEL 0

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Figure 4-3. General Troubleshooting on Site (3 of 3)

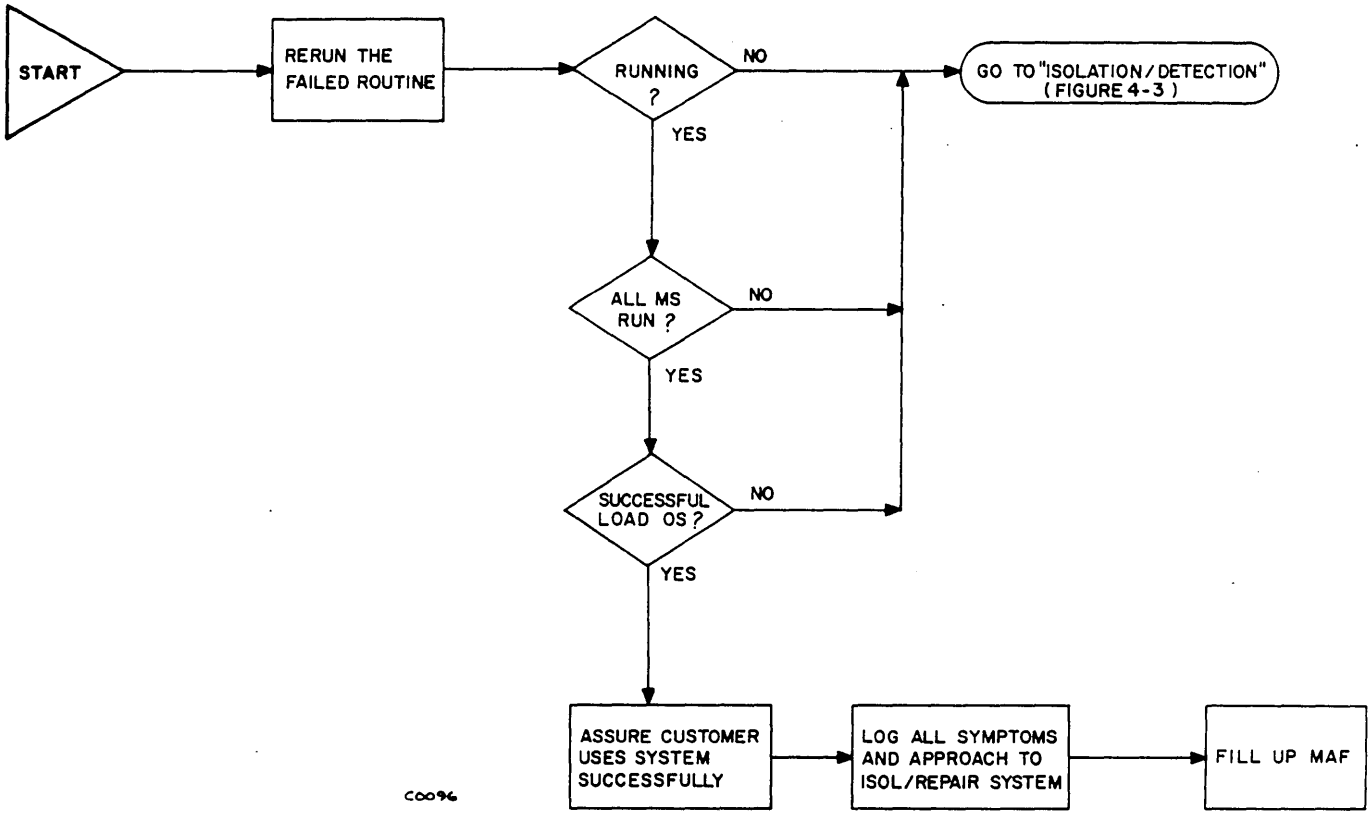


Figure 4-4. Verification/Reinstatement

ON-LINE TESTS

Preventive maintenance time is used to prevent, rather than to detect failures, and should occupy as little total system time as possible. To achieve this goal, on-line diagnostic programs are used. These programs detect errors in peripheral equipment and operating systems and enter the details in an error log for examination by user or maintenance personnel. When a failure is detected, isolation and correction can be attempted using peripheral processor maintenance tool programs run as user jobs. The information in the error log and the printout from the maintenance tool programs can be used to help solve the problem.

The NOS and NOS/BE operating systems' on-line tests are listed below. For a detailed description of these and other tests refer to the applicable on-line maintenance software reference manual.

The tests available are:

ALX - Random Instruction Test
CU8 - CP Command Test
FS8 - Product Set Microcode Validation
RAN - Random Number Command Test
CT8 - Product Set Microcode Validation
MRG - Sequenced CPU Test

The NOS/VE on-line tests are run under the Diagnostic Virtual System. See the Diagnostic Virtual System manual for tests and instructions for running them.

OFF-LINE DIAGNOSTICS

The Common Maintenance Software Executive (CMSE) provides off-line monitoring for the system computer. It monitors the system hardware and loads and executes maintenance and utility software. CMSE requires the following hardware:

3 PPs (four if driving both a CC545 and a CC555)
3 I/O Channels
1 local console (CC545) or Viking X (CC634B)
1 remote console (CC555 or TTY type)
1 tape drive (63X, 67X) or disk drive (ISD or 844) subsystem

The following paragraphs briefly describe some of the off-line diagnostic programs available. Detailed information is provided in the MSL15X Off-Line Maintenance Software Library Reference Manual, MSL151 Maintenance Software Reference Manual, and MSL15X Model Independent Tests Maintenance Software Reference Manual.

Model Independent CPU Tests - CYBER 170 State

CU8 - Central Processor Command Test tests CPU control hardware and functional units.

*CT8 - Random Instruction Test with CPU simulation sets up a random instruction loop (for machine answers) and simulates the CPU. Simulated answers are compared to machine answers for errors.

FM2 - Floating Multiply Test checks multiply instruction and uses random operands.

IMC - 170 Integer Multiply Test checks integer and floating point multiply instructions using random operands. Answers are compared to simulated results.

FDT - Floating Divide Test checks floating point divide instruction using random operands. Answer is compared to simulated results.

LAT - Long Add Test checks add and subtract instructions using random operands. Answer is compared to simulated results of long add unit.

POP - Population Counter Test checks hardware population count using random operands. Answer is compared to simulated results of a population counter.

RTJ - Return Jump Test checks both the return jump and the computed jump for an array of jump instructions.

MYI - 65K and 131K Memory Test checks for proper data read and write operations from and to central memory.

BGK - 30-Bit Instruction Test checks transfer of K field in a 30-bit instruction.

*CMC - Central Memory Conflict Test checks conflict situation in central memory when many PPs make requests continuously.

*CM6 - Central Memory Test checks stack ability to switch drive lines at rated speed between two randomly chosen addresses.

*EJP - Exchange Jump Test checks for exchange package errors.

* Tests CT8, CMC, CM6, and EJP are available with Hardware Initialization and Verification (HIVS).

Model Independent CPU Tests - CYBER 170 Command Tests

FCT1-3,5, and 9 - Fixed Command Tests detect instruction-level a failures in the CPU.

RCT1 - Random Command Test 1 checks general and floating point instructions. FCT2 must run successfully before RCT1 is run.

RCT2 - Random Command Test 2 checks BDP instructions. It uses random operands with random and fixed sequence of BDP instructions. FCT2 and RCT1 must run successfully before RCT2 is run.

Model Dependent CPU Test (FIS1)

The fault isolation system (FIS1) is a diagnostic that detects and isolates faults within the CYBER processor. It relies heavily on specialized microcode sequences to isolate most pak-related problems to a group of possible failing paks, and lists the paks in order of probability of failure. FIS1 requires a minimum of two PPs, and one PP channel to run in detection-only mode or three PPs and two channels to run in isolation mode. These PPs are in addition to the three needed by CMSE.

Model Independent CM Tests (CMEM)

CMEM is a CPU program that tests central memory to detect errors. The test runs with CMSE and interacts with the user through the system display device and keyboard.

Model Dependent CM Test (CMT1/CMI1)

Memory fault detection and isolation (CMT1/CMI1) is an IOU-based program which detects and isolates failures in central memory.

Model Dependent IOU Tests

The Input/Output Control Program (IOCP) is a set of subroutines that control the IOU fault detection tests and communicate with CMSE. Three types of drivers are used:

- Main PP test driver (MPPD)
- Single PP test driver (SPPD)
- Double PP test driver (DPPD)

CMSE requires three PPs and IOCP requires one PP. The deadstart test sequence requires Long Deadstart Sequence (LDS1) to be run to ensure that the IOU is stable enough to run CMSE. When LDS is complete, the common test and initialization package (CTI) loads Extended Deadstart Sequence (EDS1) into PP00 from the CTI device. EDS1 checks the hardware needed by CMSE that was not tested by LDS1. LDS1 and EDS1 must run in the barrel which is deadstarted before any attempt for fault isolation is made.

NOTE

LDS1 and EDS1 are known as in-line diagnostic tests because they do not require drivers.

QLT1 - Quick Look Test checks one word input and output over the channel being tested.

PMT1 - PP Memory Test 1 checks memory operation of the barrels not used by IOCP.

EXT1 - Execution Unit Test checks instruction execution and the arithmetic units in the PPs not used by IOCP and CMSE.

PMU1 - PP Memory Test 2 performs a more thorough check of the PP memories as compared to PMT1.

CHD1 - Channel Test checks inter-PP data transfer over selected channels.

CMA1 - Central Memory Access Test checks data paths from PP memory to CM and vice-versa.

MRA1 - Maintenance Register Access Test checks access to maintenance registers from all PPs.

MRT1/
MRTC - Maintenance Register Test checks all parity networks in the IOU.

MRC1 - Assembly Disassembly Unit (ADU) test.

CRA1 - Calendar clock test, auto answer test (modem interface).

DST1 - Display Alignment Test tests the interface to and from the CC545 display console.

TPM1 - Two Port Mux Test tests the interface to and from the CC555.

NOTE

CRA1, DST1, and TPM1 require operator interaction to detect the faults.

Six PPs are required to run the above detection tests: three for CMSE, one for IOCP and two for CHD1. After these tests are executed (excluding DST1 and TPM1), the Fault Isolation Program (FII1) is loaded. The FII1 analyses the errors recorded by the detection tests and identifies the problem causing group of logic paks. FII1 then sends appropriate error messages to CMSE.

DIAGNOSTIC HIERARCHY

The diagnostic hierarchy provides a logical method for testing the computer system. For a particular hardware unit you intend to test, list the available diagnostics with the one requiring the least hardware first. List the others

in order of increased hardware usage. Each of the diagnostics in the list must run error free before the one listed below is attempted. Do not run the entire diagnostic hierarchy. If a problem is suspected in one of the functional areas listed in the hierarchy, run one of the diagnostics for that functional area. If it runs successfully, run the next diagnostic in the list. Continue running diagnostics until a failure occurs. The purpose of the hierarchy is to allow selection of the proper diagnostic as quickly as possible.

Below is a guide for the order of each area in which diagnostics should be run:

Peripheral Processors
I/O Channels
Central Memory Access Hardware
Central Memory
Central Processor
Computer System

If available off-line diagnostics fail to detect a failure, use on-line diagnostics as a last resort for detection of failures.

TROUBLESHOOTING TECHNIQUES

Methods used to locate problems are troubleshooting techniques. The aim of good troubleshooting practices is quick location and correction of a problem.

Troubleshooting may be categorized under the following basic headings:

Selective isolation
Voltage margin tests
Timing margin tests
Shotgunning

SELECTIVE ISOLATION

Selective isolation is the technique of locating faulty modules by interchanging suspected modules with modules of the same type that are known to be good. This technique assumes that the symptoms provide an indication to the source of the trouble.

CAUTION

Exercise the utmost care when using this procedure for 210-pak modules. ESD procedure (refer to ESD Control) must be carried out to ensure no damage to any paks. Careless handling may result in any of the following:

- Damage to a module installed upside down or in an incorrect location.

CAUTION (CONTD)

- Damage to a module by reason of backpanel short circuits (swapping a good module into a faulty position may result in damage).

- Damage to electrically adjacent modules by a short in a 210-pak (swapping a faulty module may cause this).

An understanding of the purpose of each module type and its relationship with other modules is essential for selective isolation. For this purpose, the Multilevel Block Diagram (MLBD) manual provides pak placement charts and various levels of block diagrams.

VOLTAGE MARGIN TESTS

Voltage margin tests exercise the machine to find weak components and to verify that the equipment operates over a range of voltage variations in a controlled software environment. Weak components present the possibility of future failure, or they may already be failing intermittently on normal voltages. As a troubleshooting aid, voltage margin tests are used to locate intermittent problems by causing them to occur at a steady rate. This allows the use of scoping or selective isolation techniques while the problem is intensified under the applied marginal voltages.

TIMING MARGIN TESTS

Timing margins provide the means for locating slow switching circuits, weak logic voltages, and other problems which can cause changes in the basic timing of the machine. The clock period and the pulse width (frequency margins) are varied for these procedures. Refer to the appropriate CAMS procedures to adjust and run clock frequency and pulse width margins on system components.

SHOTGUNNING

CAUTION

Exercise care when using this technique on 210-pak modules for the reasons stated under Selective Isolation.

Shotgunning is the process of swapping or changing a large number of modules in an attempt to locate a problem. Shotgunning should be used only when all other techniques have failed.

DEADSTART TESTS

The equipment required for IOU hardware initialization is

CC545 console or
CC555 console or Viking X(721)

Eight deadstart programs are stored in ROMs and RAMs (CK pak) for use to initialize or test the IOU hardware. Short or long deadstart sequence can be selected by entering either L or S into the console. Short deadstart sequence executes one of the eight deadstart programs that is currently displayed on the screen. Long deadstart sequence executes a fixed test program that is stored in the ROMs (CK pak); if no error is detected, a short deadstart sequence is automatically initated. When LDS is completed, CTI loads EDS into PP00 from the CTI device. EDS is similar in structure to LDS. It checks the hardware needed by CMSE that was not tested by LDS. EDS must be run after LDS.

The short deadstart tests stored in four RAMs and four ROMs are short deadstart programs 0 through 7.

- Programs 0 through 2 are deadstart programs 0 through 2. They are user programmable scratch programs.
- Program 3 is a programmable deadstart program reserved for power recovery.
- Program 4 contains the lower chain test which tests PP-to-PP communication over channels 01 through 11.
- Program 5 contains the upper chain test which tests PP-to-PP communication over channels 20 through 31.
- Program 6 is for master clear and clear errors.
- Program 7 is for testing the CC545 display.

Table 4-1 shows the deadstart display keyboard options and maintenance commands.

TABLE 4-1. DEADSTART KEYBOARD OPTIONS AND MAINTENANCE COMMANDS
(Sheet 1 of 2)

Command	Meaning
XX YYYYYY	Enter deadstart program
XX+YYYYYY	Enter deadstart program, increment address, ready for new data
H	Help display (similar to this page)
S	Short deadstart
L	Long deadstart
RP XX	Enter PP configuration number (0-11)
RB X	Enter barrel configuration number (0-1)
GP X	Get deadstart program X (0-7) 0-2 - user scratch programs (RAM) 3 - power recovery program (RAM) 4-7 - canned programs (ROM)
(Space bar)	Next deadstart program
SP X	Store deadstart in program X (X=0 to 3)
SD	Short deadstart display Loop
TB xx YYYYYY	Toggle bits YYYYYY in DS program word xx
DE X	Enter loop delay value (0-7) (applies to all three loop routines)
LA YYYY	Enter octal long deadstart starting address (initialized to 6000)
PR	PP register display
PM xx YYYY	PP memory display (xx=PP number, YYYY=address)
FI xx	Idle PP xx
EP xxxx YYYYYY	Enter data YYYYYY into PP memory location xxxx (if PP memory display is up)
EP+xxxx YYYY	Same as above plus increment address
MR	PP maintenance register display
ER xx Y zz	Enter data zz-(hex) into byte Y of maintenance Register xx-(hex)
ER+xx Y zz	Same as above plus increment byte number
CH	PP channel status display
SM	Arms scope mode for subsequent S,L,RP,RB,PR, PM,EP,MR,ER,CH,FI,CF,SW,PS commands
+	Toggle barrels (if PP register display is up) Increment PPM address by 100 (octal) (if PP memory display is up)

TABLE 4-1. DEADSTART KEYBOARD OPTIONS AND MAINTENANCE COMMANDS
(Sheet 2 of 2)

Command	Meaning
-	Toggle help display (if help is up) decrement PPM address by 100 (octal) if PP memory display is up
PW DS xxxxxxxxxxxxxxx	Set remote deadstart password
PW PC xxxxxxxxxxxxxxx	Set remote power control password
OFF PWR	Turn system power off
	CAUTION When the R* command is used, all programs in RAM memory are destroyed.
*R	Deadstart with battery failure (power-on reset)
*T	Display calendar clock time (CC545 only)
*S YYMMDDHHMN	Set calendar clock time (CC545 only) YY = year MM = month DD = day HH = hour (00-24) MN = minutes (00-59)
Quit	Log off port and return to traffic (only valid for CC555 or equivalent)
CF X	Enter clock frequency X=F(fast), N(normal), S(slow) (initialized to normal)
SWX Y	Enter central memory reconfiguration switches ODPH array paks: x = 3,4,5; 3HBH array paks: x = 1,2,3 Y = U(up), D(down), C(center) (Initialized to center for all three switches)
PS XX YYY	Enter channel parity switch XX=Chan. No. 1,3,4,7,11,12,21,23,24,27,31,32 (CYBER 170 channels); YYY=ON, OFF (Initialized to OFF for above channels)
EM XXXX YYYY ZZZZZZ	Enter data pattern ZZZZZZ into PP Memory starting address XXXX to Ending address YYYY. (if PP memory display is up)
MP XX YY	Move content of PP memory XX to PP memory YY
MC	Clear errors and master clear (equivalent to program 6)

SWITCHES AND INDICATORS

This subsection illustrates all system controls and indicators and defines their functions. Figure 4-5 is a front view of the cabinet showing the location of each major component and power module assembly. Figure 4-6 is a rear view of the cabinet. Location of parts is indicated by find numbers in figures 4-5 and 4-6 that are defined in table 4-2. Figure 4-7 shows the control panel. Each major control in the panel is further illustrated and defined by following figures and table pairs.

TABLE 4-2. CABINET, FRONT AND REAR VIEWS (SHEET 1 of 2)

Find Number	Part Number	Description	Quantity Per Assembly
1	10389974	Protect module assembly	3
2	53370287	SPS meter assembly	1
3	53201796	Power supply interface module assembly	8
4	67304098	Power control module assembly	1
5	53367198	Power control interface	1
6	15005280	Circuit breaker - 50/60 Hz	1
7	15005280 or 15005255	Converter input circuit breaker-(50/60 Hz or 400 Hz)	1
8	53370292	Fuse panel	2
9	53370288	Capacitor box assembly	1
10	53370206	Auxiliary power supply regulator assembly	1
11	53370206	Bulk auxiliary power supply	1
12	53370201	Converter assembly - ac to dc	1
13	53370246	Battery control box assembly	1

TABLE 4-2. CABINET, FRONT AND REAR VIEWS (SHEET 2 of 2)

Find Number	Part Number	Description	Quantity Per Assembly
14	24633265	Battery pack assembly	3
15	10126878	Outlet power supply - dc to dc	1
16	53542405	Tap change panel	1
17	18782491	Air flow sensor assembly	3
18	15002459	RFI filter	1
19	10126876	Switching power supply - +5.2V	4
20	10126877	Switching power supply - -2.2V	3
21	10126875	Switching power supply - +5.0V	1
22	53370204	Transformer - 5 kVA	3
23	19267824	Blower module frame assembly	3
24		Two port mux box	1
25		Intelligent small disk	1
26		I/O connector panel	1
27		Emergency off switch	1
28	815490	Filter	3

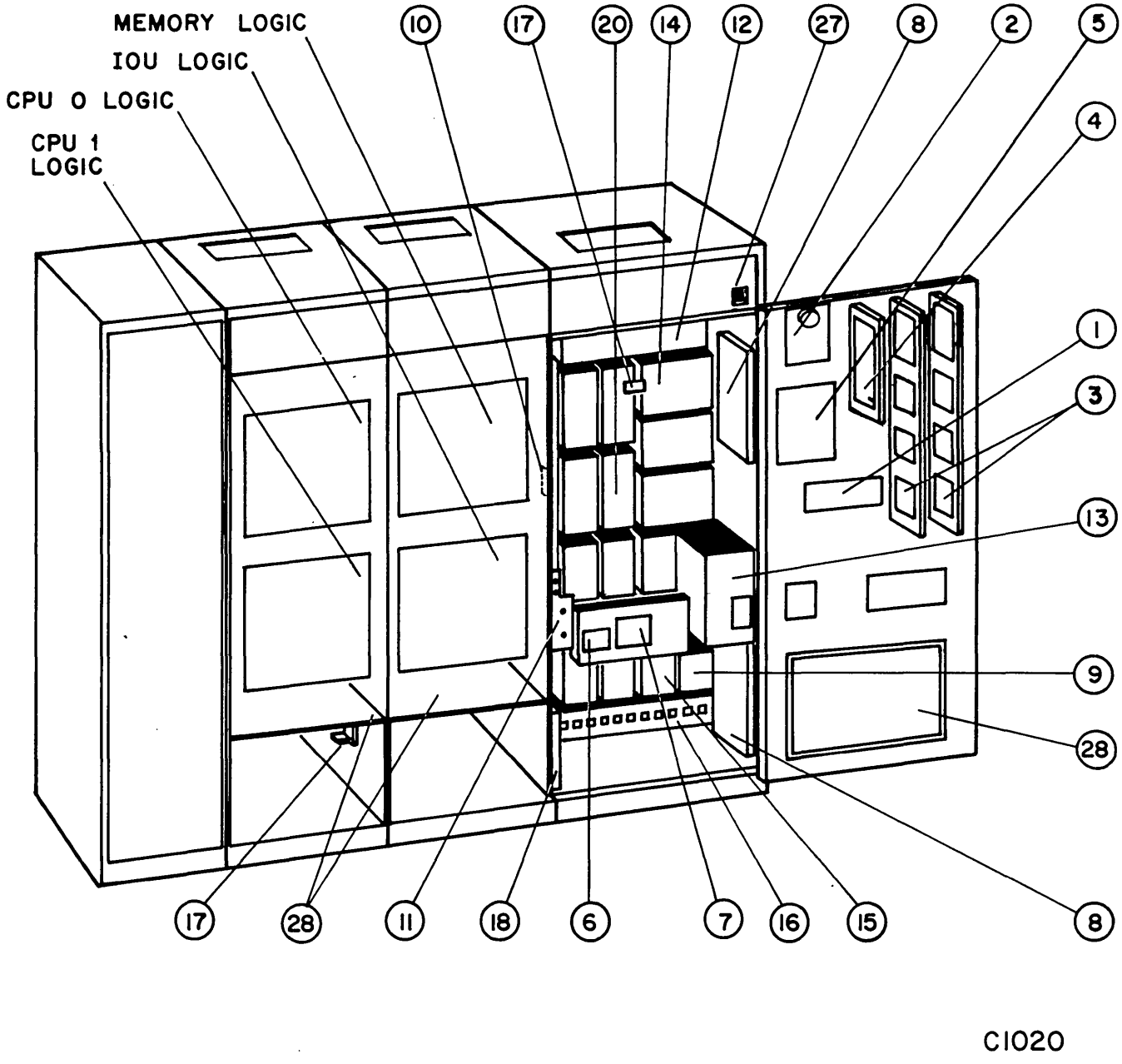
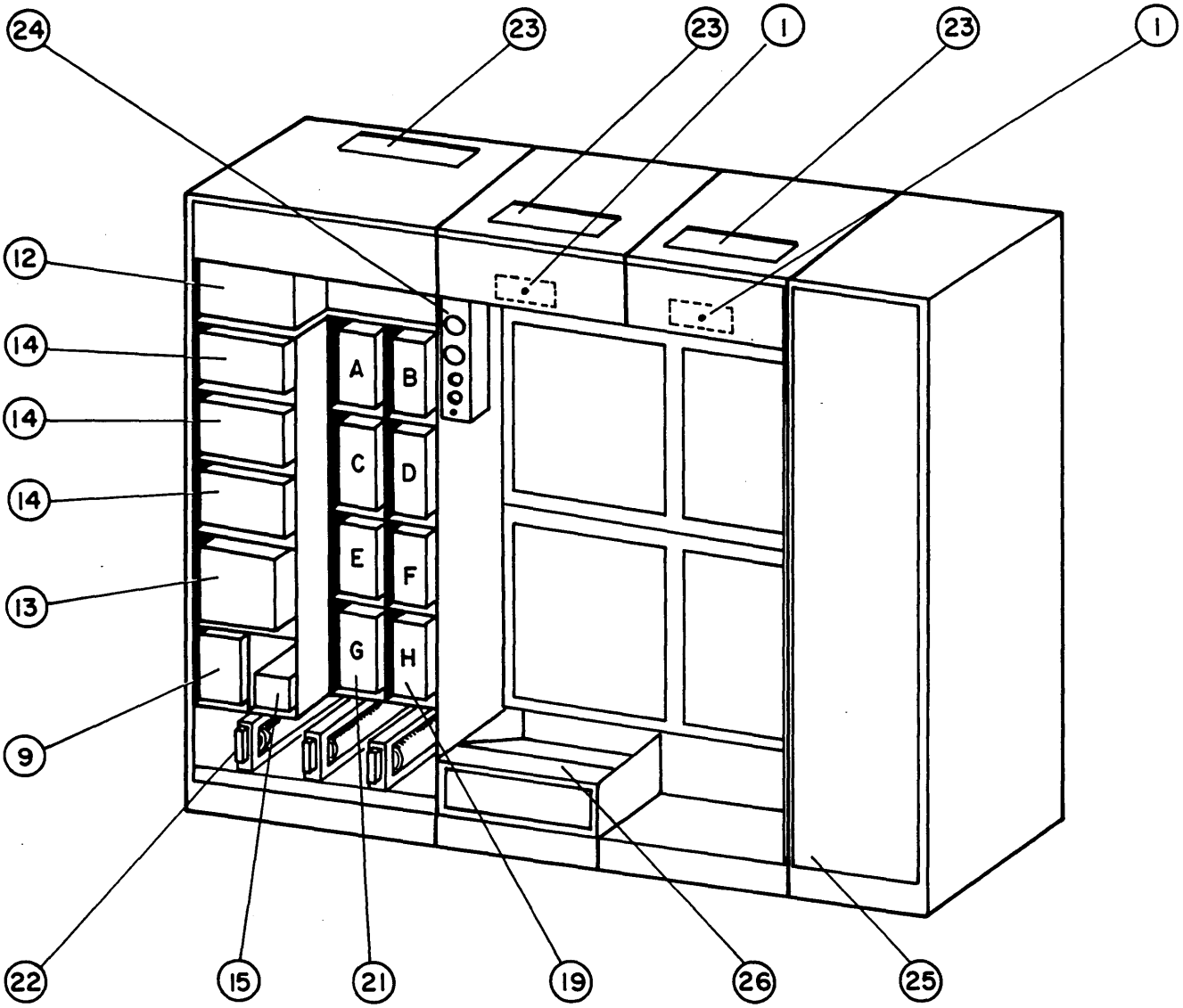


Figure 4-5. Cabinet Front View



A — CPU 0 -2·2V
B — MEM +5·2V
C — MEM I/O -2·2V
D — CPU 0 +5·2
E — CPU 1 -2·2V
F — I/O +5·2V
G — MEM I/O +5 V
H — CPU 1 +5·2 V

C1021

Figure 4-6. Cabinet Rear View

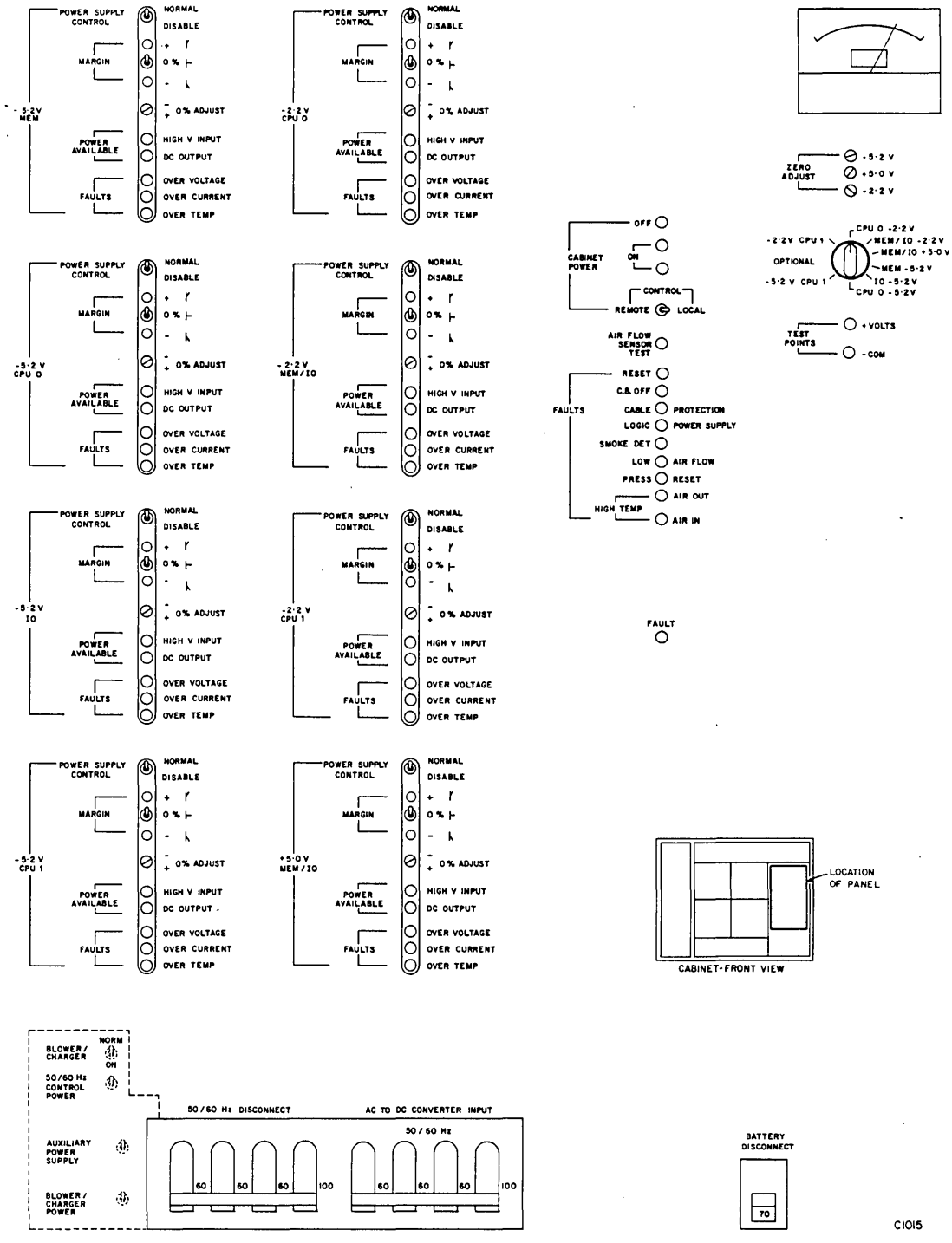


Figure 4-7. Cabinet Control Panel

SYSTEM POWER CONTROL PANEL (SPCP)

Figure 4-8 shows the controls and indicators of the optional wall-mounted System Power Control Panel (SPCP). These controls and indicators are described in table 4-3.

TABLE 4-3. SYSTEM POWER CONTROL PANEL CONTROLS AND INDICATORS (SHEET 1 of 2)

Panel Marking	Description	Function
REMOTE ENABLE/ LOCAL START	Pushbutton switch (momentary)	With mode switch in LOCAL position unlatches STOP switch, applies 50/60-Hz power to system motor generator, SPCP fault warning and shutdown circuits, and peripheral equipment, and applies 400-Hz power from system motor generator to cabinet. With mode switch in any REMOTE position, unlatches STOP switch so a remote control point can perform to functions similar to those above.
STOP	Pushbutton switch (latching)	Removes 50/60-Hz power from system motor generator, SPCP fault warning and shutdown circuits, and peripheral equipment, and removes 400-Hz power from cabinet. This action occurs regardless of mode switch position.
POWER AVAILABLE	Indicator light	Indicates that 50/60-Hz power is present at SPCP and that SYSTEM DISCONNECT switch is in ON position.
POWER ON	Indicator light	Indicates that POWER AVAILABLE conditions are present, that REMOTE ENABLE/LOCAL START switch has been pressed, and that 50/60-Hz power has been applied throughout the system either locally or through remote control.

TABLE 4-3. SYSTEM POWER CONTROL PANEL CONTROLS AND INDICATORS
(SHEET 2 of 2)

Panel Marking	Description	Function
400-Hz VOLTAGE	Meter	Indicates percentage deviation of system motor-generator output from nominal level (120 V line-to-neutral, 208 V line-to-line). Indication is average of the three 400-Hz lines.
VOLTAGE ADJUST	Rheostat	Adjusts percentage deviation of system motor-generator output from nominal level (see above).
TIME METER	Digital meter	Indicates total motor-generator running time.
MODE (OFF/LOCAL/ REMOTE)	Rotary switch (keylock)	Selects control point for application of 50/60-Hz and 400-Hz power to system: OFF-off LOCAL - Local SPCP control REMOTE 1- CYBER 180/810 or 830 controlled by master CYBER 170/700, or SPCP for peripherals shared by master CYBER 170/700 and slave CYBER 180/810 or 830. REMOTE 2 - CYBER 180/810 or 830 controlled by master CYBER 180/810 or 830 REMOTE 3 - CYBER 180/810 or 830 controlled by configuration environment monitor (CEM).
SYSTEM DISCONNECT	Toggle switch	Applies single-phase 50/60-Hz power from power source, through wall-mounted EMERGENCY OFF switch to SPCP.
	Dewpoint indicator	Indicates room dewpoint between -17.8 and 37.7°C (0 to 100°F) An audible alarm sounds when dewpoint reaches 11.1°C (52°F). If dewpoint reaches 13.3°C (56°F) the system displays a warning message and powers down in 2.5 seconds.

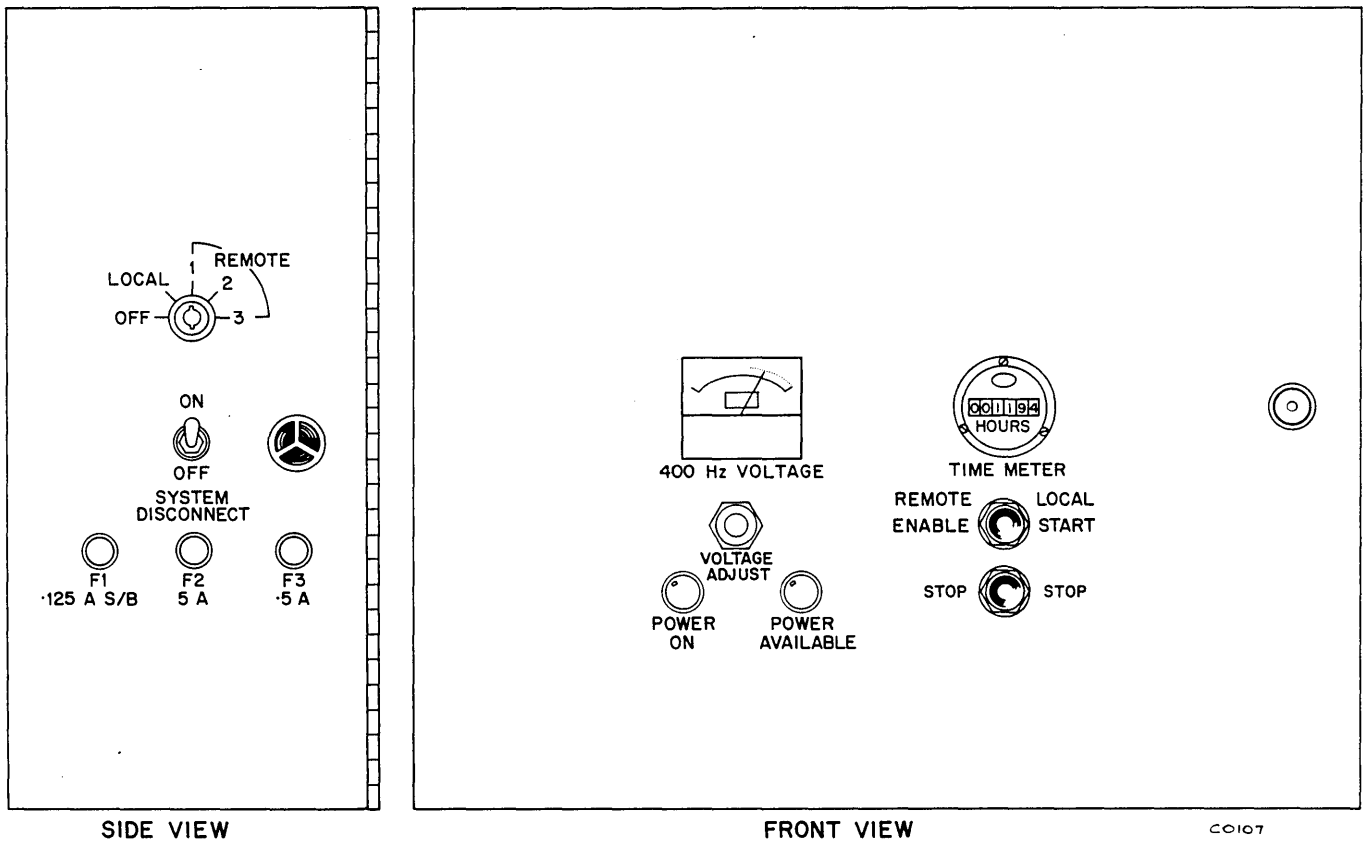


Figure 4-8. System Power Control Panel

LOGIC POWER SUPPLY CONTROLS

The two CPU 1 power supplies are optional. Therefore, no controls are in these locations if the option is not present (refer to figure 4-7). If not present, a jumper connector is installed to bypass the optional controls.

Figure 4-9 and table 4-4 illustrate and define the controls and indicators on the logic power supplies.

TABLE 4-4. LOGIC POWER SUPPLY CONTROLS
(SHEET 1 of 2)

Panel Marking	Description	Function
NORMAL/DISABLE	Toggle switch	In the NORMAL position, dc power is available at the output of the related power supply. In the DISABLE position, dc power is removed from the output of the related power supply, but the internal POWER GOOD signal is still generated. When all power supplies are in the DISABLE mode, the system POWER GOOD signal is disabled by the logic.
MARGIN	Toggle switch	Allows ±5% margin shift of the logic power supply output voltages. The MARGIN function can also be performed via the terminal keyboard.
+ MARGIN	Indicator	Indicates a +5% margin shift.
- MARGIN	Indicator	Indicates a -5% margin shift.
0% ADJUST	Potentio-meter	Allows adjustment of the power supply output-voltage. Refer to Test Points under Voltmeter.
HIGH V INPUT	Indicator	Indicates: That voltage is present at the input of the related power supply. That control/protection signals are present at the control connector of the related power supply.

TABLE 4-4. LOGIC POWER SUPPLY CONTROLS
(SHEET 2 of 2)

Panel Marking	Description	Function
DC OUTPUT	Indicator	Indicates that power is present at the output of the related power supply.
OVER VOLTAGE	Indicator	Indicates that an over-voltage condition exists in the related power supply.
OVER CURRENT	Indicator	Indicates a problem in the related power supply's load or within the power supply.
OVER TEMP	Indicator switch	Indicates an over-temperature condition in the related power supply.

NOTE

When one or more of the OVER VOLTAGE, OVER CURRENT, or OVER TEMP indicators is on, the LOGIC POWER SUPPLY system fault indicator will come on. Refer to System Fault Controls.

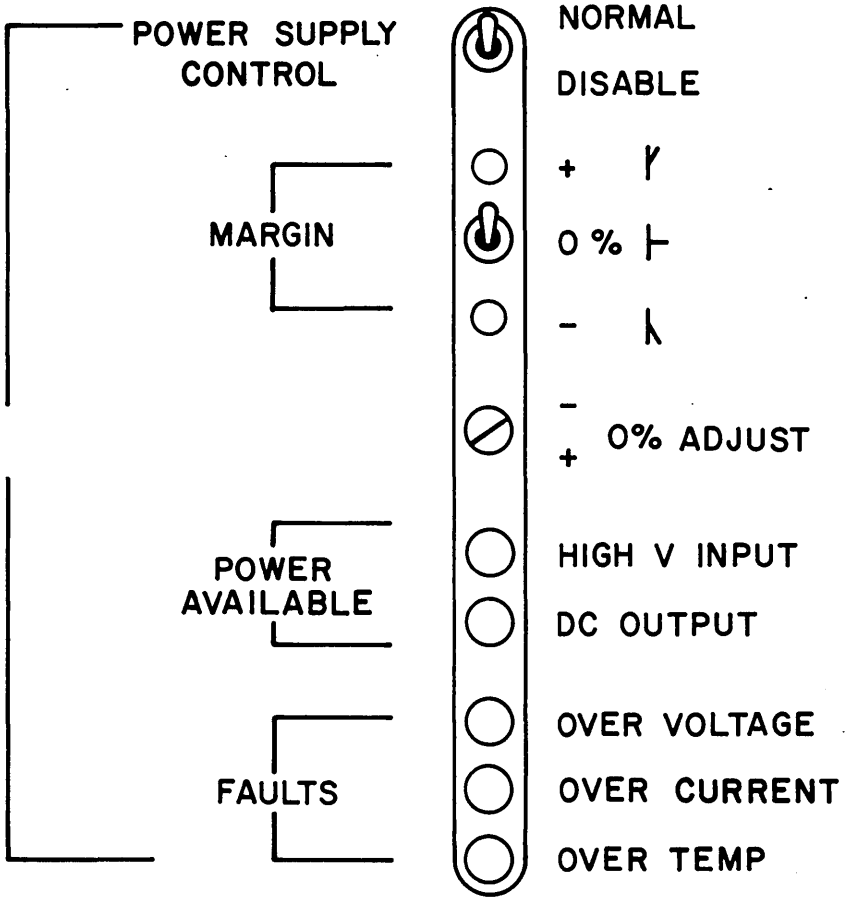


Figure 4-9. Typical Logic Power Supply Controls

Figure 4-10 illustrates the cabinet power and fault control. Table 4-5 and 4-6 define their controls and indicators respectively.

TABLE 4-5. CABINET POWER CONTROL

Panel Marking	Description	Function
OFF	Pushbutton switch	When pressed, the logic power supply dc outputs are disabled. The ON indicator and the power supply DC OUTPUT indicators turn off but the power supply HIGH V INPUT indicators stay on. The logic power supplies are preset to turn off sequentially.
ON	Indicator	Lights when the logic power supply dc outputs are successfully enabled by pressing the ON switch or when the AIR FLOW SENSOR TEST switch is pressed.
ON	Pushbutton switch	Enables the dc output of all of the logic power supplies if the circuit breakers are on, unregulated input voltage is present, and no faults exist. The logic power supplies are preset to turn on sequentially.
CONTROL, REMOTE/ LOCAL	Toggle switch	Determines whether logic power is controlled via the power control panel (LOCAL) or by a remote signal.
AIR FLOW SENSOR TEST	Pushbutton switch (momentary)	Provides a test of the low air flow sensors. When pressed for two to three minutes continuously, the LOW AIR FLOW indicator and the FAULT indicator light. The cabinet blower must be off during the test. If held on for approximately two more minutes, the circuit breakers trip.

TABLE 4-6. SYSTEM FAULT CONTROLS

Panel Marking	Description	Function
RESET	Pushbutton switch	Press when PUSH RESET indicator is on.
CB OFF	Indicator	Indicates that a circuit breaker other than the 50/60 Hz disconnect breaker has tripped.
CABLE PROTECTION	Indicator	Indicates that a cable or connector is open (in the cable protect line).
LOGIC POWER SUPPLY	Indicator	Indicates a fault in one of the logic power supplies.
SMOKE DET	Indicator	Indicates a missing smoke detector bypass jumper on a protect board.
*LOW AIR FLOW	Indicator	Indicates low air flow in the power column or the logic columns.
PUSH RESET	Indicator	Lights after a time delay when any fault indicator lights. Also lights when 50/60 Hz power has been lost and restored.
*AIR OUT	Indicator	Indicates high outlet temperature in a logic column or a missing bypass jumper in the power column protect board.
*AIR IN	Indicator	Indicates high ambient temperature in the power column or the logic columns.
FAULT	Indicator	Indicates an AIR FLOW, or AIR IN fault or a missing bypass jumper in the power column.

* Check fault LED indicators at back of cabinet to see which logic column has the fault (see figure 4-6 for location).

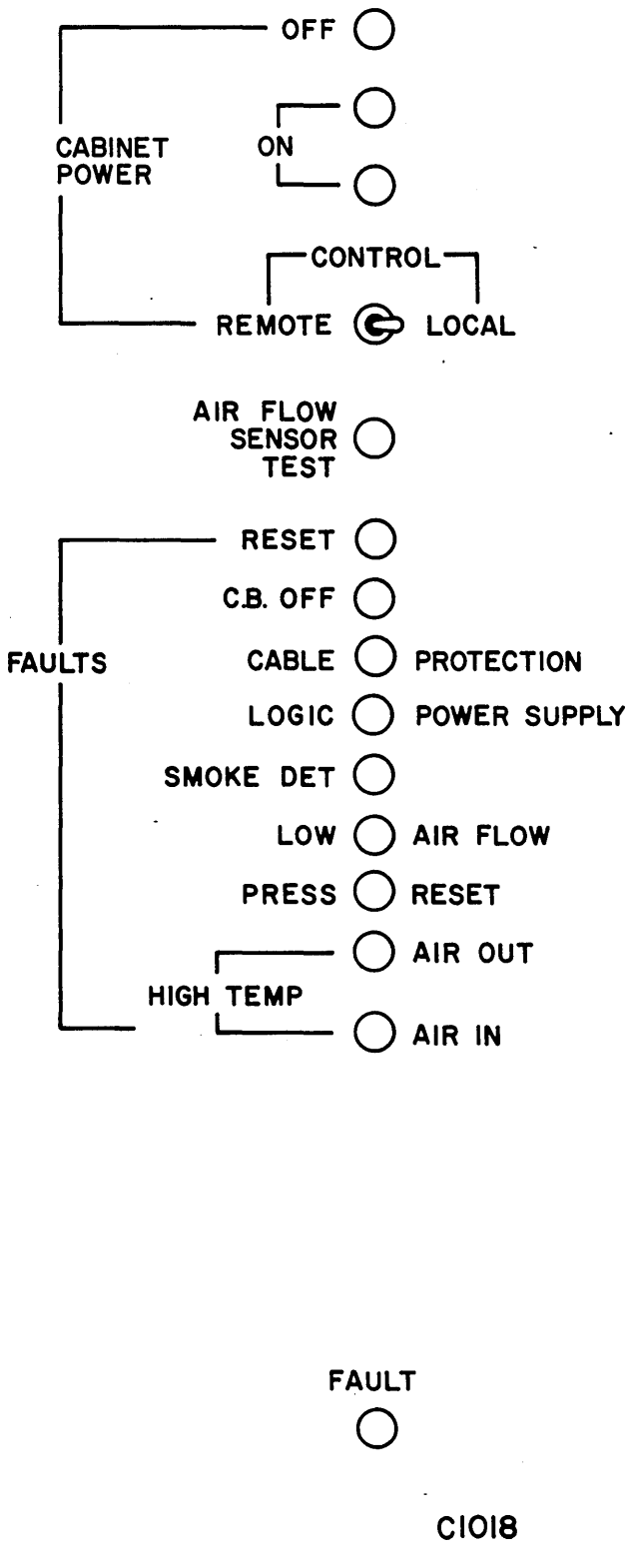


Figure 4-10. Cabinet Power and Fault Controls

LOGIC POWER SUPPLY DC OUTPUTS CONTROLS

Figure 4-11 and table 4-7 illustrate and define the voltmeter control for the logic power supply dc output.

TABLE 4-7. VOLTMETER CONTROLS

Panel Marking	Description	Function
ZERO ADJUST	Potentio-meters	When a power supply output is properly adjusted (using digital voltmeter), the related zero adjust potentiometer allows adjustment of the panel meter to 0%.
	Rotary switch	Switches the panel meter and test points to any one of the 8 logic power supply dc outputs.
TEST POINTS, +VOLTS/-COMMON	Test jacks	Digital voltmeter probes connect to these points for checking and adjustment of the logic power supply dc outputs. The 0% ADJUST potentiometer on each logic power supply interface board adjusts the output to the correct voltage for that supply.

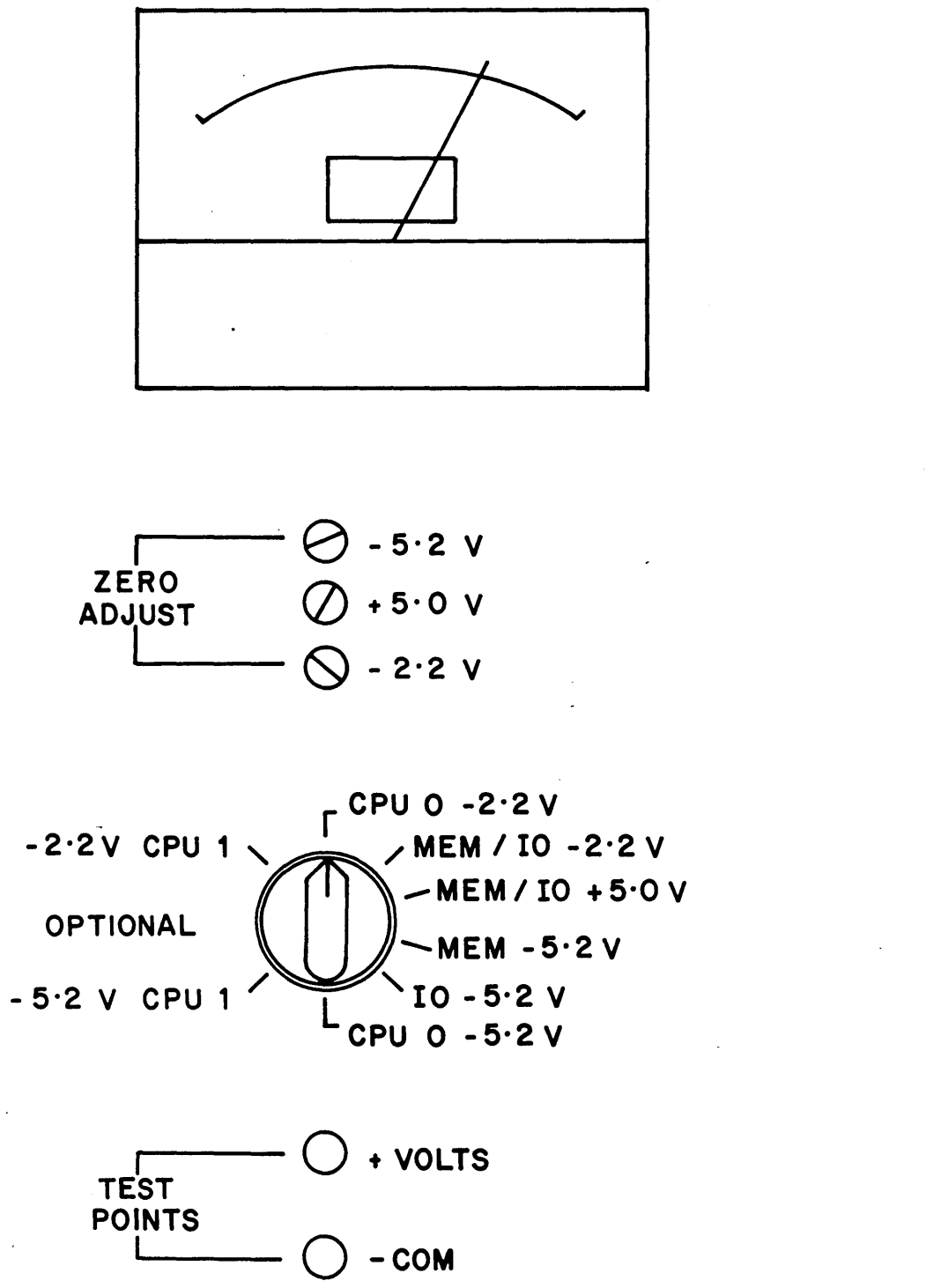


Figure 4-11. Voltmeter Controls

BLOWER/CHARGER SWITCH AND CIRCUIT BREAKERS

Figure 4-12 and table 4-8 illustrate and define the blower/charger switch and circuit breakers.

TABLE 4-8. BLOWER/CHARGER SWITCH AND CIRCUIT BREAKERS

Panel Marking	Description	Function
BLOWER/CHARGER	Toggle Switch	When down, this switch allows battery charging and blower operation with the ac to dc converter circuit breaker off. It is up during normal operation.
50/60 HZ CONT PWR	Pushbutton Type Circuit Breaker	Protects the auxiliary bulk power supply. If it trips or is not turned on, the CB OFF system fault indicator lights. Push to reset.
AUXILIARY PWR SPLY	Toggle Type Circuit Breaker	Located in the power input lines to the auxiliary power regulator. It is up during normal operation. If it trips or is not turned on, the CB OFF system fault indicator lights.
BLO/CHGR PWR	Toggle Type Circuit Breaker	Protects the blowers and charger. It is up during normal operation. If it trips or is not turned on, the CB OFF system fault indicator lights.
50/60 HZ DISCONNECT	Circuit Breaker	The 50/60 Hz ac main breaker. It is up during normal operation.
AC TO DC CONVERTER INPUT	Circuit Breaker	It is up during normal operation. If it trips, the CB OFF system fault indicator lights. This can be a 50/60 Hz or 400 Hz breaker depending on system installation.
BATTERY DISCONNECT	Toggle Type Circuit Breaker	It is up during normal operation. If it trips or is not turned on, the CB OFF system fault indicator lights.

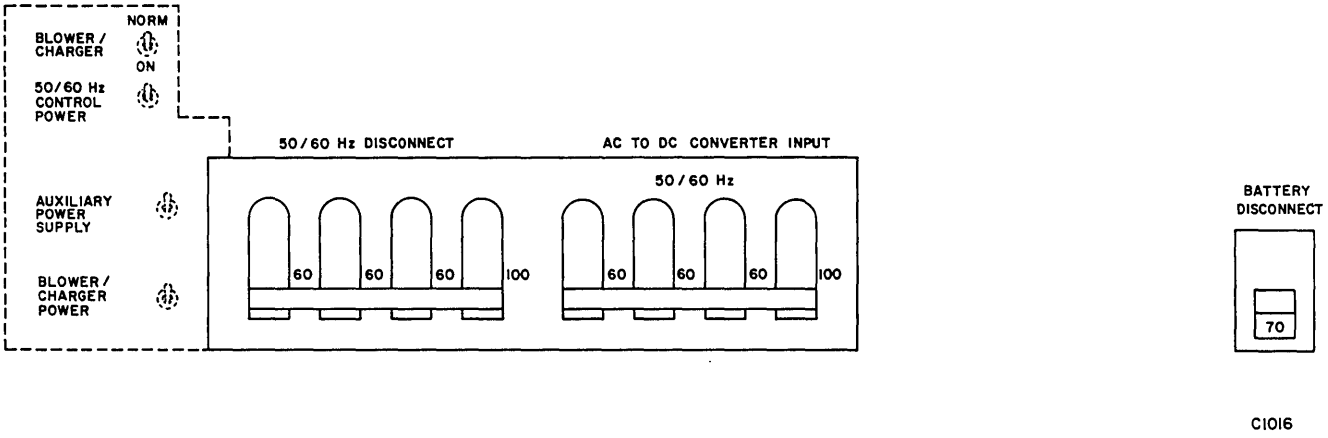


Figure 4-12. Blower/Charger Switch and Circuit Breakers

TWO PORT MUX BOX

Figure 4-13 and table 4-9 illustrate and define the controls on the Two Port Mux Box.

TABLE 4-9. TWO PORT MUX BOX CONTROLS

Panel Marking	Description	Function
BAUD RATE SELECTION PORT 0, 1	Rotary Switch	Selects baud rate of Two Port Mux ports 0, 1 ranging from 110 to 19.2K.
PORT OPTIONS PORT 0, 1	Rotary Switch (keylock)	Selects port option of Two Port Mux ports 0, 1. In DISABLED position, port is disabled. In MSG ONLY (message) position, port is enabled. Remote deadstart and remote power-up is disabled. In DS ENABLED position, port is enabled, remote deadstart is enabled, and remote power-up is disabled. In DS & PWR ENABLE position, port is enabled, and remote deadstart, and remote power-up are enabled.
DIAGNOSTIC/ NORMAL	Toggle Switch	In NORMAL position, computer remains in normal operation mode. In DIAGNOSTIC position, sends a 4.096 millisecond pulse to microprocessor causing a nonmask interrupt for diagnostic purposes.

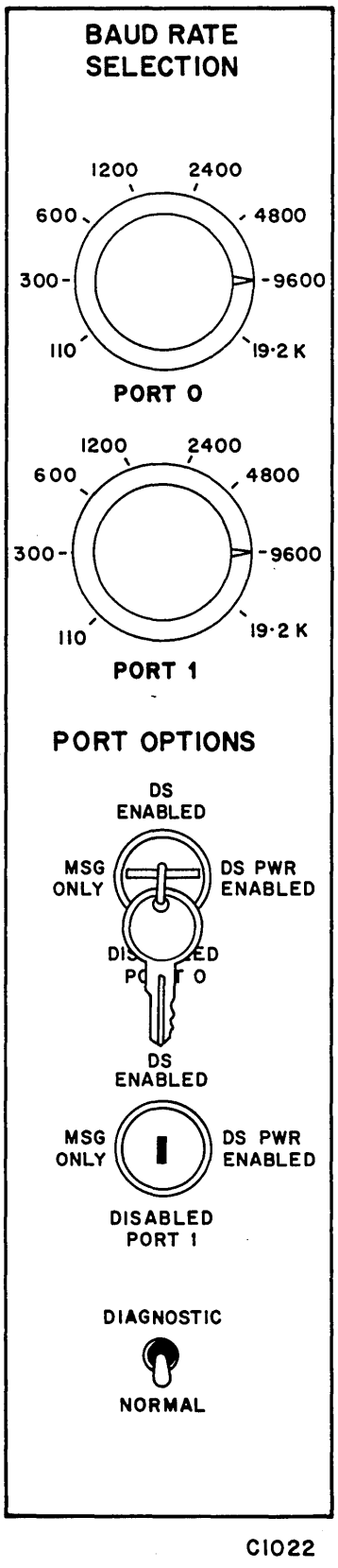


Figure 4-13. Two Port Mux Box

Memory Configuration Switch (Register)

This 1-byte register is only accessible to the deadstart microprocessor. Its contents can be changed by the deadstart keyboard's maintenance command SW. It allows logical reconfiguration of memory to remove failing memory portions from the address space. The available memory remaining after reconfiguration is contiguous and starts at address zero as seen from the processor.

The standard central memory using the 64K chip paks allows a maximum memory configuration of 16 MB, whereas the optional central memory using the 256K chip paks allows a maximum memory configuration of 64 MB. If memory option of 256K chip paks are installed, bit 12 of the options installed register will be set.

Depending on the type of memory paks used, the configuration switch register can represent the positions of either standard configuration switches SW3, SW4, and SW5, or optional configuration switches SW1, SW2, and SW3 as follow:

	Bits	Meaning	Action
Standard memory	0,1	Not Used	
Configuration	2	SW3 Up	RMA bit 40 set to 1
(64K chip)	3	SW3 Down	RMA bit 40 set to 0
Options installed	4	SW4 Up	RMA bit 41 set to 1
bit 12 = 0	5	SW4 Down	RMA bit 41 set to 0
	6	SW5 Up	RMA bit 42 set to 1
	7	SW5 Down	RMA bit 42 set to 0
Optional memory	0,1	Not Used	
Configuration	2	SW1 Up	RMA bit 38 set to 1
(256K chip)	3	SW1 Down	RMA bit 38 set to 0
Options installed	4	SW2 Up	RMA bit 39 set to 1
bit 12 = 1	5	SW2 Down	RMA bit 39 set to 0
	6	SW3 Up	RMA bit 40 set to 1
	7	SW3 Down	RMA bit 40 set to 0

When bits are zero (center position), normal addressing takes place. When they are set, memory is degraded according to table 4-10 for 64K chip memory reconfiguration and table 4-11 for 256K chip memory reconfiguration.

TABLE 4-10. 64K CHIP MEMORY RECONFIGURATION

Installed Memory (M bytes)	Portion of Memory Used RMA Bit 40	41	42	Memory Configuration Switches 3	4	5	Options Installed Register Bits 12	16	19	20	21	Remaining Available Memory (M bytes)
4 MB	X	X	0	-	-	U	0	1	0	0	1	2 MB
	X	X	1	-	-	D	0	0	0	0	1	2 MB
8 MB	X	0	X	-	U	-	0	1	0	1	0	4 MB
	X	1	X	-	D	-	0	0	0	1	0	4 MB
16 MB	0	X	X	U	-	-	0	1	1	0	0	8 MB
	1	X	X	D	-	-	0	0	1	0	0	8 MB

X - Don't Care
U - Up
D - Down
- - Center (zero)

TABLE 4-11. 256K CHIP MEMORY RECONFIGURATION

Installed Memory (M bytes)	Portion of Memory Used RMA Bit 38	39	40	Memory Configuration Switches 1	2	3	Options Installed Register Bits 12	16	17	18	19	Remaining Available Memory (M bytes)
16 MB	X	X	0	-	-	U	1	1	0	0	1	8 MB
	X	X	1	-	-	D	1	0	0	0	1	8 MB
32 MB	X	0	X	-	U	-	1	1	0	1	0	16 MB
	X	1	X	-	D	-	1	0	0	1	0	16 MB
48 MB	0	X	X	U	-	-	1	1	1	0	0	16 MB
	1	X	X	D	-	-	1	0	1	0	0	32 MB
64 MB	0	X	X	U	-	-	1	1	1	0	0	32 MB
	1	X	X	D	-	-	1	0	1	0	0	32 MB

X - Don't Care
U - Up
D - Down
- - Center (zero)

CHANNEL DISABLE PARITY SWITCH

A channel disable parity switch software register is provided for each regular I/O Channel. Its contents can be changed using the deadstart keyboard maintenance command PS.

If the switch is ON, it forces a new parity of the data bits that are sent from the external device and disables any parity error associated with the data.

If the switch is OFF, it does not force a new parity and does not disable any parity error. The parity sent to the PP is the same parity that is sent from the external device.

POWER TROUBLESHOOTING

Refer to the power down troubleshooting SAMS in appendix C if computer shuts down on a fault condition. If more detailed information is needed, refer to the Power Distribution and Warning System manual.

The following two procedures are for use in checking the transformer and the load in the bus-bar.

FAULTY TRANSFORMER CHECK

1. Press CABINET POWER OFF.
2. Disconnect all wires from all terminals of suspect transformer.
3. Using an ohmmeter, check for shorts between primary and secondary terminals. A good transformer produces a reading of infinity.
4. Using an ohmmeter, check for open circuits across the primary and secondary windings of the transformer. A good transformer produces a low resistance reading across the windings.

SHORT IN LOAD CHECK

WARNING

Be sure no power is present when making resistance measurements.

1. With an ohmmeter on X1 scale, check for a short between bus bar and ground.
2. If a short is detected, check for pieces of wire on other material that may be causing a short in bus bar assembly.

SECTION 5

MAINTENANCE REGISTERS

Maintenance registers contain information and control functions which are useful to the customer engineer in both preventive and corrective maintenance.

This section gives the addresses and bit definition of these registers.

IOU MAINTENANCE REGISTERS

The IOU maintenance registers can be displayed through the deadstart display keyboard command MR. However, this display is potentially destructive to a running system; use it only when the system is hung or otherwise idled. Table 5-1 lists the IOU maintenance registers.

TABLE 5-1. IOU MAINTENANCE REGISTERS

Register	Direct MAC Read/Write	Number of Bytes	Address (Hex)	Address (Octal)	Type Code
Status Summary	Read	1	00	000	0
Element ID	Read	4	10	020	0
Options Installed	Read	6	12	022	0
Fault Status Mask	Read/Write	8	18	030	0
OS Bounds	Read/Write	8	21	041	0
Environment Control	Read/Write	4	30	060	0
Status	Read	4	40	100	0
Fault Status 1	Read/Write	8	80	200	0
Fault Status 2	Read/Write	4	81	201	0
Test Mode	Read/Write	2	A0	240	0

Bit assignments are listed on the following pages in the order they appear in table 5-1.

IOU MAINTENANCE REGISTER BIT ASSIGNMENTS

Register	Byte Number	Bit Number	Description
Status Summary	7	56-58	N/A
		59	Summary Status
		60	Processor Halt
		61	Uncorrected Error
		62	N/A
		63	Physical Environment Monitor

Register	Byte Number	Bit Number	Description
Element ID	0-3	0-31	N/A
	4	32-39	Element type number 02 (hex) for CYBER 180/810, 830
	5	40-47	Model number (hex): 13 for 180/830 14 for 180/810
	6-7	48-63	CYBER 180/810, 830 serial number
Options Installed	0-1	0-15	N/A
	2	16-19	N/A
		20	PP25-31
		21	PP20-24
		22	PP 5-11
		23	PP 0-4
	3	24	Channel 7
		25	Channel 6
		26	Channel 5
		27	Channel 4
		28	Channel 3
		29	Channel 2
		30	Channel 1
		31	Channel 0
	4	32	Channel 17
		33	N/A
		34	Channel 15
		35	N/A
		36	Channel 13
		37	Channel 12
		38	Channel 11
		39	Channel 10
	5	40	Channel 27
		41	Channel 26
		42	Channel 25
		43	Channel 24
		44	Channel 23
		45	Channel 22
		46	Channel 21
		47	Channel 20
	6	48-51	N/A
		52	Channel 33
		53	Channel 32
		54	Channel 31
		55	Channel 30
	7	56	Battery backup

N/A Bits not available will always be zero.

Register	Byte Number	Bit Number	Description
Options Installed	7	57-59	N/A
		60	Radial interface 2/3
		61	Radial interface 0/1
		62	2 Port mux
		63	CC545 controller
Fault Status Mask *	0	0-1	N/A
		2	Not used
		3	Barrel 0 PP4 mask vector
		4	Barrel 0 PP3 mask vector
		5	Barrel 0 PP2 mask vector
		6	Barrel 0 PP1 mask vector
		7	Barrel 0 PP0 mask vector
	1	8-9	N/A
		10	Not used
		11	Barrel 0 PP11 mask vector
		12	Barrel 0 PP10 mask vector
		13	Barrel 0 PP7 mask vector
		14	Barrel 0 PP6 mask vector
		15	Barrel 0 PP5 vector
		16-17	N/A
		18	Not used
		19	Barrel 1 PP4 mask vector
		20	Barrel 1 PP3 mask vector
		21	Barrel 1 PP2 mask vector
		22	Barrel 1 PP1 mask vector
		23	Barrel 1 PP0 mask vector
	3	24-25	N/A
		26	Not used
		27	Barrel 1 PP11 mask vector
		28	Barrel 1 PP10 mask vector
		29	Barrel 1 PP7 mask vector
		30	Barrel 1 PP6 mask vector
		31	Barrel 1 PP5 mask vector
	4	32	Channel 7 mask vector
		33	Channel 6 mask vector
		34	Channel 5 mask vector
		35	Channel 4 mask vector
		36	Channel 3 mask vector
		37	Channel 2 mask vector
		38	Channel 1 mask vector
		39	Channel 0 mask vector

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* Register cleared by LDS.
Not used Bits are not assigned; may be read or written.
N/A Bits not available will always be zero.

Register	Byte Number	Bit Number	Description
Fault Status Mask *	5	40	Channel 17 mask vector
		41	Not used
		42	Channel 15 mask vector
		43	Not used
		44	Channel 13 mask vector
		45	Channel 12 mask vector
		46	Channel 11 mask vector
		47	Channel 10 mask vector
	6	48	Channel 27 mask vector
		49	Channel 26 mask vector
		50	Channel 25 mask vector
		51	Channel 24 mask vector
		52	Channel 23 mask vector
		53	Channel 22 mask vector
		54	Channel 21 mask vector
		55	Channel 20 mask vector
	7	56-58	Not used
		59	Radial interface 2/3 mask vector
		60	Channel 33 mask vector
		61	Channel 32 mask vector
		62	Channel 31 mask vector
		63	Channel 30 mask vector
OS Bounds	0	0-2	N/A
		3	Barrel 0 PP4 bit vector
		4	Barrel 0 PP3 bit vector
		5	Barrel 0 PP2 bit vector
		6	Barrel 0 PP1 bit vector
		7	Barrel 0 PP0 bit vector
	1	8-10	N/A
		11	Barrel 0 PP11 bit vector
		12	Barrel 0 PP10 bit vector
		13	Barrel 0 PP7 bit vector
		14	Barrel 0 PP6 bit vector
		15	Barrel 0 PP5 bit vector
	2	16-18	N/A
		19	Barrel 1 PP4 bit vector
		20	Barrel 1 PP3 bit vector
		21	Barrel 1 PP2 bit vector
		22	Barrel 1 PP1 bit vector
		23	Barrel 1 PP0 bit vector

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* Register cleared by LDS.
Not used Bits are not assigned; may be read or written.
N/A Bits not available will always be zero.

Register	Byte Number	Bit Number	Description
OS Bounds	3	24-26	N/A
		27	Barrel 1 PP11 bit vector
		28	Barrel 1 PP10 bit vector
		29	Barrel 1 PP7 bit vector
		30	Barrel 1 PP6 bit vector
		31	Barrel 1 PP5 bit vector
	4	32-39	N/A
	5-7	40-45	Not used
		46-63	OS boundary address
Environment Control	0-3	0-31	N/A
	4	32	N/A
		33 **	Not used
		34	Not used
		35-39	PP number
	5	40,41	N/A
		42	Not used
		43-47	Channel number
	6	48-49 **	Not used
		50	Not used
		51	Load mode
		52 **	Dump mode
		53	Idle mode
		54,55	Register select (A,P,Q,K)
	7 **	56	Barrel 1 block mode select
		57	Barrel 0 block mode select
		58	Enable deadstart/dump/idle
		59	Enable test mode
		60	Enable OS bounds checking
		61	Enable (R)+(A) to PP memory
		62	Not used
		63	Enable error stop
Status	0-3	0-31	N/A
	4	32-37	N/A
	4-6	38-55	Internal register (A,P,Q,K)
	7 ***	56	LDS bit
		57	N/A
		58	N/A
		59	Barrel reconfiguration
		60-63	PP reconfiguration

** Byte or Bit cleared by Master Clear.
*** Byte latched by Master Clear.
Not used Bits are not assigned; may be read or written.
N/A Bits not available will always be zero.

Register	Byte Number	Bit Number	Description
Fault Status 1 *	0	0-2	N/A
		3	Barrel 0 PP4 error
		4	Barrel 0 PP3 error
		5	Barrel 0 PP2 error
		6	Barrel 0 PP1 error
		7	Barrel 0 PP0 error
	1	8-10	N/A
		11	Barrel 0 PP11 error
		12	Barrel 0 PP10 error
		13	Barrel 0 PP7 error
		14	Barrel 0 PP6 error
		15	Barrel 0 PP5 error
	2	16-18	N/A
		19	Barrel 1 PP4 error
		20	Barrel 1 PP3 error
		21	Barrel 1 PP2 error
		22	Barrel 1 PP1 error
		23	Barrel 1 PP0 error
	3	24-26	N/A
		27	Barrel 1 PP11 error
		28	Barrel 1 PP10 error
		29	Barrel 1 PP7 error
		30	Barrel 1 PP6 error
		31	Barrel 1 PP5 error
	4	32	Error detected on CL module
		33	Error detected on CR module
		34	Firmware error
		35	Error detected on CM module
		36	Error detected on CP module
		37	12/16 bit conversion error
		38	Not used
		39	PP memory data-in error
	5	40-44	Not used
		45	OS bounds violation
		46	OS bounds address PE
		47	Not used
	6	48	CM data out error
		49	Uncorrected CM read error
		50	Uncorrected CM write error
		51	CM reject
		52	CM tag out error
		53	CM response code error
		54	Not used
		55	Not used
	7	56-63	Not used

* Register cleared by LDS.
Not used Bits are not assigned; may be read or written.
N/A Bits not available will always be zero.

Register	Byte Number	Bit Number	Description
Fault Status 2 *	0-3	0-31	N/A
	4	32	Channel 7 error
		33	Channel 6 error
		34	Channel 5 error
		35	Channel 4 error
		36	Channel 3 error
		37	Channel 2 error
		38	Channel 1 error
		39	Channel 0 error
	5	40	Channel 17 error
		41	N/A
		42	Channel 15 error
		43	N/A
		44	Channel 13 error
		45	Channel 12 error
		46	Channel 11 error
		47	Channel 10 error
	6	48	Channel 27 error
		49	Channel 26 error
		50	Channel 25 error
		51	Channel 24 error
		52	Channel 23 error
		53	Channel 22 error
		54	Channel 21 error
		55	Channel 20 error
	7	56	N/A
		57	Not used
		58	Not used
		59	Radial interface 2/3
		60	Channel 33 error
		61	Channel 32 error
		62	Channel 31 error
		63	Channel 30 error
Test Mode	0-5	0-47	N/A
	6	48-49	N/A
		50	Logical barrel
		51	Not used
		52-55	Logical PP
	7	56-57	N/A
		58	Not used
		59-63	Test code

---

* Register cleared by LDS.
Not used Bits are not assigned; may be read or written.
N/A Bits not available will always be zero.

CPU MAINTENANCE REGISTERS

Table 5-2 lists the CPU maintenance registers.

TABLE 5-2. CPU MAINTENANCE REGISTERS

Register	Direct MAC Read/Write	Number of Bits	Address (Hex)	Type Code
Status Summary	Read	8	00	F
Element ID	Read	32	10	F
Processor ID	Read	8	11	F
Options Installed	Read	64	12	F
Environment Control	Read/Write	40	30	F
Control Store Address	Read/Write	64	31	F
Control Store Breakpoint	Write	64	32	F
Processor Fault Status	Read/Write	32	80	F
Control Store Error Log	Read	40	81	F
Retry Corrected Error Log	Read/Write	32	90	F
Map Corrected Error Log	Read/Write	8	93	F
Processor Test Mode	Read/Write	8	A0	F
Maintenance Scan	Read Scan Data/Write Scan Limit	8	00	4
Control Store	Read/Write	84	00	5

CPU MAINTENANCE REGISTER BIT ASSIGNMENTS

Bit assignments are listed on the following pages in the order they apear in table 5-2.

Register	Byte Number	Bit Number	Description
Status Summary	7	56,57	Not used (zero)
		58	Monitor mode
		59	Short warning
		60	Processor halt
		61	Uncorrected error
		62	Corrected error
		63	Physical environment warning
Element ID	4-7	32-42	Zero
		43	One
		44-53	Zero
		54-63	Serial number in packed decimal

Register	Byte Number	Bit Number	Description
Processor ID	7	56-62	Zero
		63	Wired in logic: 0 for single CPU 1 for two CPUs
Options Installed	3	27	Dual CPU
		28	Concurrent 170
		29	170 option installed
		30	SECDED CS
		31	Performance monitor installed
Environment Control		5	Enable processor microstep
		6	Enable processor trap
		20	Control CYBER 170 exchange in CPU
	6	24	Enable processor fault status
		25	Enable MAP RMA mode
		26	Enable MAP file 0
		27	Enable MAP file 1
		28	Enable MAP file 2
		29	Enable MAP file 3
		30	Enable instruction retry
		31	Enable instruction step
	7	32	Not used
		33	Enable test mode
		34	Not used
		35	Disable corrected error to Status summary
		36	Enable control store breakpoint
		37	Enable control store sweep
		38	Force good response on Single bit error
		39	Disable corrected error log
Control Store Address *	0-6 6,7	0-50 51-63	Not used Register data
Control Store Breakpoint **	0-6 6,7	0-50 51-63	Not Used Control store breakpoint Address

* Contains the address at which a micrand is to be executed.

** Contains the address at which control store execution or control store sweep stops if enabled by control store breakpoint enable bit in the Environment Control register.

Not used Bits are not assigned; may be read or written.

Register	Bit	Name	Description	Category ***
Processor Fault Status (PFS0 80, PFS1 81)	33	UM2CPE	ARVI PE bits 8-15, 40-47	2
	34	UM3CPE	ARVI PE bits 16-23, 48-55	2
	35	UM4CPE	ARVI PE bits 24-31, 56-63	2
	36	DE1201	Uncorrected memory word error	1
	37	DE1207	Memory reject	1
	38	DE12BC	Memory tag PE	1
	39	DE12PB	Response code PE	1
	40	DEMP0	Floating point exception Index ROM PE	2
	41	DF1CPF	AD or BD bits 0-15 PE	2
	42	DL19PC	Length determination (length add, mark 0-7) box ROM PE	2
	43	PR18PE	AD select or BD select	2
	44	PS1CAP	CPU shift control ROM PE or Shifter input	2
	45	DE1205	Uncorrected memory read error	2
	46	DF2CPF	AD or BD bits 16-31 PE	2
	47	UN11PE	MAC/AD PE DS	2
	48	DE1AHU*	Memory response timeout	2
	49	PH14PP	CYBER address conversion ROM PE	2
	50**	PH14IP	Instruction PE	2
	51	PR18XP	XBD select ROM PE	2
	52	DF3CPF	AD or BD bits 32-47 PE	2
	53	PV1DPE	BDP adder PE, BDP data ROM PE, RJB, RKB PE	2
	54	PH14PE	Immediate select ROM PE	2
	55	DF4CPF	AD or BD bits 48-63 PE	2
	56	DW15PE*	MAP PE	1
	57	DW25PE*	MAP PE	1
	58	DW35PE*	MAP PE	1
	59	DW45PE*	MAP PE	1
	60	UX1BMH	MAP multiple hit fault	3
	61		Not used	3
	62	UM19AD	MAC error	3
	63	UM29AD	Control store DBE	Processor will hang

* Part of signal name.
** Unpredictable until OP code is taken.
*** Category 1: Non-retryable errors
Category 2: Conditional retryable errors
Category 3: Retryable errors

Register	Byte Number	Bit Number	Description
Control Store Error Log	3	24	Double bit error in DR pak location 16
		25	Chip select
		26-31	Syndrome bits 0-5 in DR pak location 16
	4	32	Double bit error in DR pak location 17
		33	Chip select
		34-39	Syndrome bits 0-5 in DR pak location 17
	5	40	Double bit error in DR pak location 18
		41	Chip select
		42-47	Syndrome bits 0-5 in DR pak location 18
	6	48	Double bit error in DR pak location 19
		49	Chip select
		50-55	Syndrome bits 0-5 in DR pak location 19
	7	56	Double bit error in DS pak location 20
		57	Chip select
		58-63	Syndrome bits 0-5 in DS pak location 20

Retry Corrected Error Log Register

The Retry Corrected Error Log register contains parity error indications copied from the Processor Fault Status registers and retains the same format for bit distribution as the PFS register.

Register	Bit	Name	Description
MAP Corrected Error Log **	56	DW15F0*	File 0 PAK PE
	57	DW35F0*	File 0 PAK PE
	58	DW15F1*	File 1 PAK PE
	59	DW35F1*	File 1 PAK PE
	60	DW15F2*	File 2 PAK PE
	61	DW35F2*	File 2 PAK PE
	62	DW15F3*	File 3 PAK PE
	63	DW35F3*	File 3 PAK PE

Register	Code	Name	Description
Processor Test Mode ***	0800	UM3ABA	Not used
	0900	UM3ABB	Invert memory function parity
	0A00	UM3ABC	Invert memory tag parity
	0B00	UM3ABD	Invert memory mark parity
	0C00	UM3ABE	Invert execution Data/address parity Byte 0, 1

* Part of signal name.

** Contains information relating MAP PE information.

*** Eight bits are used as a code to force a bad parity generation on various paks; enabled by bit 33 of Environment Control Register.

Register	Code	Name	Description
	0D00	UM3ABF	Invert execution Data/address parity Byte 2, 3
	0E00	UM3ABG	Invert execution Data/address parity Byte 4, 5
	0F00	UM3ABH	Invert execution Data/address parity Byte 6, 7
	0008	UM4ABA	Invert PSR parity
	0009	UM4ABB	Invert floating point Exception index ROM parity
	000A	UM4ABC	Invert floating point trap Index ROM parity
	000B	UM4ABD	Invert MAC bus data parity
	000C	UM4ABE	Invert S adder latch parity
	000D	UM4ABF	Not used
	000E	UM4ABG	Not used
	000F		Not used

Register	Bit	Description
Maintenance Scan *	0	Control store halt
	1	S Full
	2	S' Full
	3	M Full
	4	M' Full
	5	CYBER exchange request
	6	Not next instruction
	7	Select trap

Control Store

Contents of control store can be read back through MAC and maintenance control unit (MCU) for verification. Similarly, microcode can be loaded into control store by MCU through MAC. The control store register has the same format as a control store word.

* Provides capability of reading a set of signals from CP after a selectable number of clock intervals. A write function from MCH with type code 4, register number 00 loads binary number of clock intervals into maintenance scan limit counter.

CM MAINTENANCE REGISTERS

Table 5-3 lists the CM maintenance registers.

TABLE 5-3. CM MAINTENANCE REGISTERS

Register	Direct Mac Read/Write	Number of Bits	Address (HEX)	Type Code
Status Summary	Read	8	00	E
Element ID	Read	32	10	E
Options Installed	Read	24	12	E
Environment Control	Read/Write	40	20	E
Bounds	Read/Write	64	21	E
Corrected Error Log	Read/Write	64	A0	E
Uncorrected Error Log 1	Read/Write	64	A4	E
Uncorrected Error Log 2	Read/Write	64	A8	E
Free Running Counter	Write (Reset)	48	B0	E

CM MAINTENANCE REGISTER BIT ASSIGNMENT

Bit assignments are listed on the following pages in the order they appear in table 5-3.

Register	Bit	Description
Status Summary *	56,57	Master oscillator module frequency select (00 = normal, 01 = -2%, 10 = +2%)
	58-60	Not used (zero)
	61	Uncorrected error
	62	Corrected error
	63	Long warning
Element ID	32-39	Element: 01 (hex)
	40-47	Model: 10 (hex)
	48-63	Binary-coded-decimal representation of serial number
Options Installed	0,2,4,10, 13-15, 22-23,	Not used (zero)
	1	2 Megabytes (MB) memory installed
	3	4 MB memory installed
	5	64 MB memory installed if bit 12=1

* Bits are dynamic and cannot be set or cleared directly.

Register	Bit	Description
Options Installed	6	32 MB or 48 MB memory installed if bit 12=1
	7	8 MB memory installed if bit 12=0 16 MB or 48 MB memory installed if bit 12=1
	8	8 MB memory installed if bit 12=1
	9	12 MB memory installed
	11	16 MB memory installed
	12	Set for 256K chips
	16	Set when any one of bit 2, 4, and 6 in the configuration switch register (CSR) is set
	17	Set when either bit 2 or 3 (switch 1) of CSR is set (32 MB)
	18	Set when either bit 4 or 5 (switch 2) of CSR is set (16 MB)
	19	Set when either bit 2 or 3 (switch 3) of CSR is set (8MB)
	20	Set when either bit 4 or 5 (switch 4) of CSR is set (4MB)
	21	Set when either bit 6 or 7 (switch 5) of CSR is set (2MB)
Environment Control	0	Disable parity checking
	1	Disable SECDED
	2,5-6,11-15, 20-37	Not used
	3,4 (Decoded)	Write check bits/read check bits/read Syndrome bits 00 - Perform all memory functions normally. 01 - Write bits 0,1,4,5,8,9,12, and 13 of the word on the data-in lines into the check bits of the word cycled in memory for all writes. 10 - Read the check bits of the word cycled in memory and return these in bits 0,1,2,4,5,8,9,12, and 13 on the data-out lines for all reads. 11 - Read the syndrome bits generated by the word cycled in memory and return these bits on bits 0,1,4, 5,8,9,12, and 13 on the data-out lines for all reads.
	7	Force even parity
	8	Disable CPU 0 port
	9	Disable IOU port
	10	Disable CPU 1 port
	16	Control pulse width margin +15% IOU
	17	Control pulse width margin -15% IOU
	18	Control pulse width margin +15% CMC
	19	Control pulse width margin -15% CMC
	38	Force good response code
	39	Disable corrected error log

Register	Bit	Description
Bounds	0-2	Bit Vectors that designate ports CPU-0, IOU, CPU-1 respectively
	3-31	Not used (zero)
	32-47	Upper bounds *
	48-63	Lower bounds *
Corrected Error Log	0	Valid single bit error
	1	Unlogged single bit error
	2-4,7	Not used (zero)
	5,6	Port Code 0, 1
	8-28	Address bits 40-60 of correctable error
	29-31	Parity bits 5-7 of address bits 40-60
	32-39	Syndrome bits 0-7
	40-63	Not used (zero)
Uncorrected Error Log 1	0	Valid error
	1	Unlogged error
	2	Illegal function
	3	Address bounds fault
	4	Second pass error (PW error)
	5,6	Port codes 0, 1
	7	Refresh port
	8-28	Address bits 40-60 of uncorrectable error
	29-31	Parity Bits 5-7 of address bits 40-60
	32-35	Write data PE PAK 1-4
	36-42	Not used
	43	Tag in PE
	44	Function PE
	45	Mark PE
	46-49	Address PE 4-7
	50-53	Function code 0-3
	54	Function code Parity
	55	MARK parity
	56-63	Mark bits 0-7
Uncorrected Error Log 2	0	Valid error
	1	Unlogged uncorrectable error
	2	Memory data out PE
	3	SECDED double bit error
	4	Tag out PE
	5,6	Port code 0, 1
	8-28	Address bits 40-60 of uncorrectable error
	29-31	Parity bits 5-7 of address bits 40-60
	32-39	Memory data out PE 0-7
	7,40-63	Not used

* The upper three bits of upper and lower bounds are not used. The lower 13 bits of upper and lower bounds represent bits 39 through 51 of the real memory address.

Free Running Counter

The Free Running Counter is a 48-bit incrementer with a one-microsecond rate. It is accessible by memory ports. Any attempt to write the Free Running Counter via MAC will reset the counter to all ones, regardless of the data sent to the MAC.

SECTION 6

FIELD REMOVAL AND REPLACEMENT

Field removal and replacement procedures are for equipment subassemblies and components that might cause personnel hazards, equipment damage, or procedural problems. It is important that you read the removal and replacement steps to gain familiarity with the procedure and determine the need for special tools, test equipment, and parts. It is also important that you conduct proper electrostatic discharge control in handling any components.

ELECTROSTATIC DISCHARGE (ESD) CONTROL

The computer contains many semi-conductor components that are highly sensitive to electrostatic discharge (ESD). For control of ESD, any assembly containing an IC (integrated circuit) should be handled using the following techniques.

GUIDELINES FOR HANDLING INTEGRATED CIRCUITS

1. Do not remove an assembly, subassembly, part, component, or pak from its static-shielded bag unless you are at a static-protected workstation and you are wearing a properly grounded wrist strap.

2. Handle assemblies by edges of board; do not touch connectors or components.

3. Turn power off before removing or installing an ESD sensitive assembly from any part of a computer system.

4. Put on a properly grounded wrist strap before removing any ESD sensitive assembly. A properly grounded wrist strap is one that is grounded to the chassis of the equipment you are working on.

5. Place an assembly in a static-shielded bag immediately after removing it for repair. It is important that you do so before it is laid asside and while you still have your wrist strap connected.

6. If you are going to use any test device on an ESD sensitive assembly, touch the leads of the test device to the unit ground before starting.

7. If you received an assembly in a static-shielded bag, replace it in a static-shielded bag before returning it.

8. Test your wrist strap monthly with an ohmmeter as follows:

    1) Measure resistance between the banana plug and the metal strip on the inside of the wrist strap band. (The wrist strap contains a 1M ohm resistor for current limiting and user safety.)
    2) If the reading is not between 870 K ohms and 1.5 M ohms, discard the strap and get a new one.

COMPUTER CABINET POWER DOWN PROCEDURE

1. Set cabinet power control to LOCAL then press CABINET POWER OFF switch at front of the power cabinet.

2. Set BATTERY DISCONNECT circuit breaker to OFF (down) position.

3. Set AC TO DC CONVERTER INPUT circuit breaker to OFF position.

4. Set 50/60 Hz DISCONNECT circuit breaker to OFF position.

WARNING

Steps 5 through 8 are necessary as safety precautions when you work inside the power cabinet because of high voltage from power source and battery packs.

5. Open the power control panel cover using an Allen wrench to loosen the two holding screws.

6. Unplug power input to computer cabinet from the 50/60-Hz connector or 50/60 Hz and 400-Hz connectors depending on the power option.

7. Wait for five minutes to allow capacitors to discharge.

8. Disconnect three cable connectors to the battery packs, if installed.

COMPUTER CABINET POWER UP PROCEDURE

1. Connect three cable connectors to the battery packs, if installed.

2. Plug power input connectors to computer cabinet.

3. Close the power control panel cover by tightening two holding screws.

4. Reset 50/60 Hz DISCONNECT circuit breaker to ON position.

5. Reset AC to DC CONVERTER INPUT circuit breaker to ON position.

6. Reset BATTERY DISCONNECT circuit breaker to ON position.

7. Press FAULTS RESET button if PUSH RESET LED is lit.

8. Press CABINET POWER ON switch.

WIRE-WRAP CONNECTIONS

Wire-wrap connections provide twisted-pair wire connections to the chassis backpanel. Removal and replacement of one or more wire-wrap connections may be required during replacement of twisted-pair wires or backpanel connectors.

TOOLS REQUIRED

Wire unwrapping tool (12259183), wire wrapping gun (12259111), wirestripper (12262555).

REMOVAL

1. Remove power from computer cabinet by following Computer Cabinet Power Down procedure steps 1 through 4.
2. Place end of wire unwrapping tool over end of wire-wrap pin from which wire is to be removed.

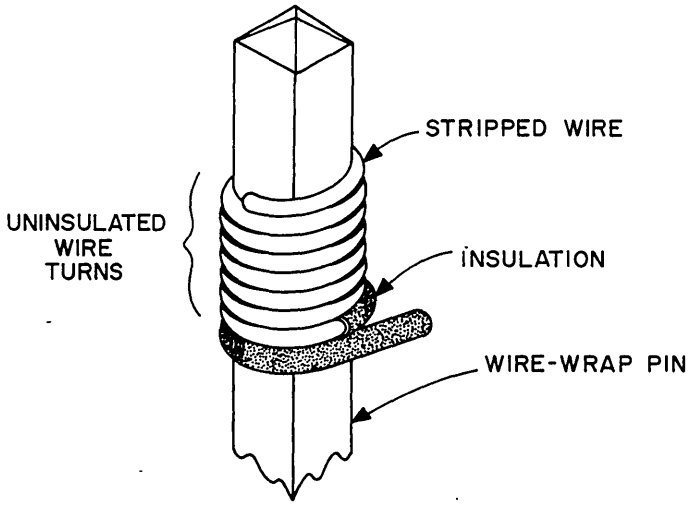
CAUTION

Do not allow broken pieces of wire to fall into wire mat.

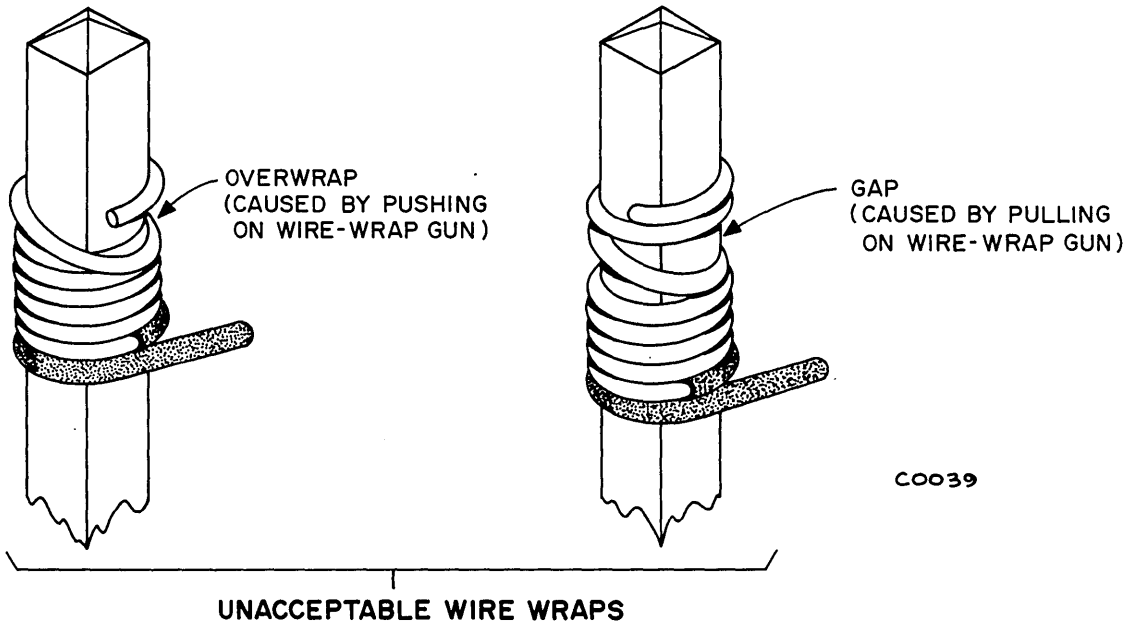
3. Push tool gently toward pin and turn counter-clockwise approximately six turns.
4. Pull tool and wire from wire-wrap pin when wire loosens or unwraps.

REPLACEMENT

1. Install a bit in wire-wrap gun that fits size of wire to be replaced.
2. Cut off wire end removed from wire-wrap pin and strip 25 mm (1 in) of insulation from end of wire. New wires do not require this step.
3. Insert bare end of wire as far as it will go into small hole of bit.
4. Bend wire across end of bit and back against bit shaft; hold wire to shaft.
5. Place large hole in end of bit over pin while keeping wire-wrap gun aligned with pin.
6. Apply power to wire-wrap gun, allowing gun to back off from pin during wrapping; do not push or pull gun.



ACCEPTABLE WIRE WRAP



UNACCEPTABLE WIRE WRAPS

Figure 6-1. Correct and Incorrect Wire Wraps

7. Remove gun completely from pin. Correctly wound wire is tight on pin with seven turns as shown in figure 6-1. An incorrectly wound wire is loose and has overlap or gaps.

8. Repeat removal steps 2 through 4 and replacement steps 2 through 8 for an incorrectly wrapped wire.

9. Apply chassis power by following Computer Cabinet Power Up procedure steps 4 through 8.

10. Perform checks/diagnostic tests to confirm success of repair.

NOTE

Approximately 25 mm (1 in) of insulation should be stripped off the wire. The twisted pair should not be unwrapped more than 25 mm (1 in). An acceptable wrap (figure 6-1) should have seven turns of bare wire and at least one turn of insulated wire.

LOGIC PAK

CAUTION

ESD protection guidelines must be followed during the following procedure.

REMOVAL

1. Remove power from computer cabinet by following computer Cabinet Power Down procedure steps 1 through 4.

2. Remove pak using extractors at top and bottom.

REPLACEMENT

1. Position pak on wire cage guides.

2. Seat pak in connector with equal thumb pressure on top and bottom pak extractors.

   or

2. Slide pak in until it stops at connectors, then use push-in tool to gently seat the pak.

3. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 4 through 8.

CAUTION

ESD protection guidelines must be followed during the following procedure.

INSERTION

1. Remove pak from chassis.
2. Position extender on wire cage guides and seat extender in connector with equal thumb pressures on top and bottom of extender.
3. Open zero insertion force (ZIF) connector on extender by moving lever at top to vertical position.
4. Position pak on extender pak guides and seat pak in extender ZIF connector.
5. Close ZIF connector by moving lever at top to horizontal position.

CAUTION

Macrocell paks require cooling while extended. When using extenders for troubleshooting, slide in cooling fan assembly (part number 19268737) to bottom of card extender and then secure it to extender by tightening the two holding screws.

REMOVAL

1. Open ZIF Connector by moving lever at top of connector to vertical position.
2. Remove pak from extender.
3. Remove extender from chassis.
4. Replace pak in chassis.

BACKPANEL PIN

TOOLS REQUIRED

Tools from backpanel repair tool kit (21961211), pins, and insulator kit (19267044).

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 4.

2. Remove all paks in panel where pin is to be replaced.

3. Remove insulator from panel as follows:

   a. Using insulator puller from replacement part kit, rotate the handle fully counterclockwise until it stops. This allows the grippers to extend to the extreme down position.

   b. Place puller over insulator.

   c. Tighten cap screw securely using a 5/32 Allen wrench.

   d. Turn handle clockwise approximately five revolutions.

4. Remove wire-wrap from pin if not already removed (refer to Wire-Wrap Connections).

5. Remove insulator from panel.

6. Remove damaged pin using either method below.

First Method (preferred)

1. Slip pin removal tool over pin from backpanel side.

2. Tap lightly with small hammer until tool clamps onto pin and pushes it through panel.

Second Method

The contact extraction tool has two hooks on each end. The end with the smaller hooks is always used first. Its purpose is to raise the contact far enough so the larger hooks on the opposite end can be employed.

1. Place extraction tool into front panel next to pin.

2. Using end with small hooks, tilt tool approximately 20 degrees and slide small hooks under pin shoulder.

3. Pivot tool to rear to partially remove pin.

4. Insert opposite end of tool under partially removed pin.

5. Pivot to rear to extract pin.

REPLACEMENT

1. Place a new or repaired pin in pin insertion tool; hold pin in position with light thumb pressure.

2. Insert wire-wrap portion of pin into hole in panel as far as it will go.

NOTE

Repair contacts are slightly oversize in staking area to ensure a proper fit between contact and board.

3. Tap top of tool lightly with a hammer to seat pin flush with panel.

4. Refer to other pins for proper seating depth.

5. Place new insulator loosely in position over the pins by hand.

6. Replace any pins that protrude into insulator opening.

7. If pins appear uniform, insert beveled edge of seating blade. A slight back and forth motion when inserting seating blade helps align insulator with pins.

CAUTION

Seating blade aligns and spreads pins into proper cavity in insulator. Any pressure on insulator when pins are not spread will severely damage all pins under insulator.

8. Press seating blade firmly down so it enters between rows of pins and spreads them to align with pockets in insulator.

9. Tap top of blade with a soft hammer to seat insulator flush with panel.

10. Pull blade out and check for bent pins.

11. Wire-wrap replaced pin (refer to Wire-Wrap Connection).

12. Install paks that were removed.

13. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 4 through 8.

THERMISTOR

NOTE

Inlet (ambient) air temperature thermistor is part of the air flow sensor assembly. This procedure refers to the outlet air temperature thermistor, refer to figure 6-2 for location.

TOOLS REQUIRED

Wire stripper (12262555), soldering iron (12263214), electrical tape or heat-shrinkable sleeving.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 4.
2. Detach access panel on top of cabinet by removing mounting screws.
3. Locate thermistor (copper-plated 3/4 inch bicylinder assembly) attached to a mounting screw.
4. Disconnect thermistor from mounting screw.
5. Sever thermistor assembly wires six inches from assembly. Thermistor assembly detaches.
6. Remove sleeving from ends of severed wire leads with wire stripper.
7. Sever replacement thermistor assembly wires six inches from assembly.
8. Remove sleeving from ends of replacement thermistor assembly wire leads with wire stripper.

REPLACEMENT

1. Solder replacement thermistor assembly wire leads to cabinet wire leads.
2. Insulate wire connection by attaching protective sleeving or wrapping electrical tape around connection.
3. Connect thermistor assembly to mounting screw.
4. Reattach blower access panel by replacing mounting screws.
5. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 4 through 8.

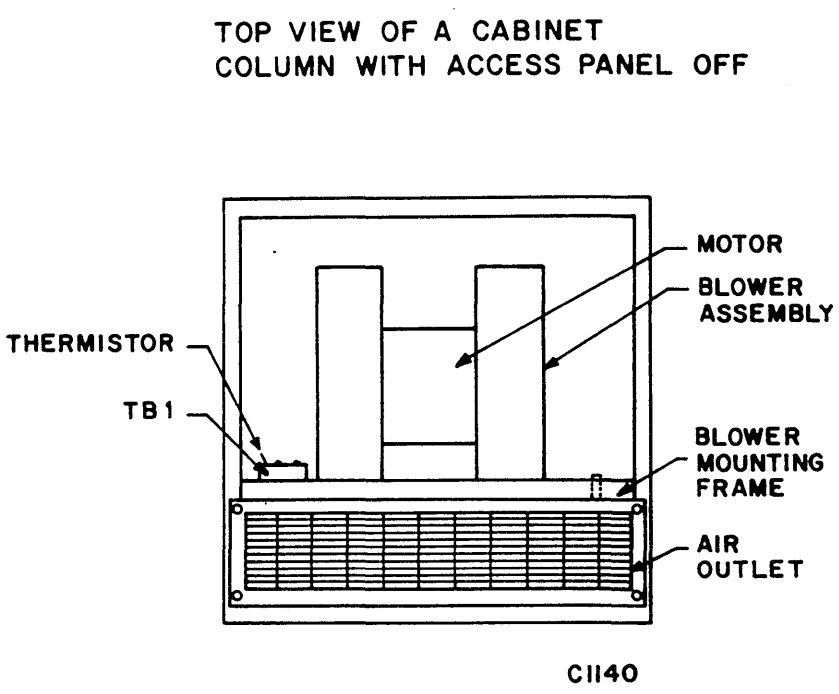


Figure 6-2. Outlet Air Temperature Thermistor and Blower Assembly

BLOWER ASSEMBLY

TOOLS REQUIRED

Firm platform or ladder, socket wrench.

REMOVAL

1. Remove power from computer cabinet using Computer Cabinet Power Down procedure steps 1 through 4.
2. Detach access panel on top of cabinet by removing mounting screws (figure 6-2).
3. Disconnect black, white, and green (ground) wires leading to defective blower at terminal block inside blower cavity (TB1 in all blowers).
4. Remove terminal block(s) from blower mounting frame/bracket.
5. Detach blower mounting frame/bracket from blower housing by removing hex nuts, and lifting frame off blower housing.

REPLACEMENT

1. On the bench, remove the eight screws that hold the blower assembly to the mounting frame/bracket and mount replacement blower assembly.

2. Attach replacement blower assembly to blower housing by installing hex nuts.

3. Attach terminal block(s) to blower mounting frame/bracket.

4. Reconnect black, white, and green (ground) wires.

5. Reattach blower access panel by replacing mounting screws.

NOTE

Lugs must be attached and crimped to ends of blower wire leads.

6. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 4 through 8.

AIR FLOW SENSOR ASSEMBLY

REMOVAL

1. Power down computer cabinet following Computer Cabinet Power Down procedure steps 1 through 4.

2. Open cabinet doors at front of cabinet.

3. Locate air flow sensor assembly inside each of the tandem intake plenums near base of cabinet.

4. Detach bracket assembly from plenum interior by removing two mounting screws.

5. With wires attached, gently pull bracket assembly to workable position near plenum entrance.

6. Detach connector at air flow sensor thermostat mounted on end of bracket mounting plate.

7. Detach air flow sensor assembly from bracket mounting plate by removing two mounting screws.

NOTE

There is another air flow sensor assembly inside the power cabinet in front of the switching power supply. The removal procedure involves removing power completely following Computer Cabinet Power Down procedure and then steps 6 and 7 of above Air Flow Sensor Assembly removal procedure.

REPLACEMENT

1. Set replacement air flow sensor assembly in mounting position on bracket mounting plate.

2. Replace two mounting screws to secure air flow sensor assembly to bracket mounting plate.

3. Reconnect connector to air flow sensor thermostat mounted on bracket mounting plate.

4. Place bracket assembly in mounting position inside intake plenum.

5. Replace two mounting screws to secure bracket assembly to intake plenum interior.

6. Close front cabinet doors.

7. Apply power to computer cabinet using Computer Cabinet Power Up procedure steps 4 through 8.

PROTECT MODULE ASSEMBLY

Refer to figures 4-5 and 4-6, find number 1 for locations.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 5.

2. Disconnect two 15-pin connectors and one 90° (right angle) connector from the assembly.

3. Dismount protect module assembly from its holding bracket.

REPLACEMENT

1. Pull the smoke detector jumper and outlet ambient jumper (for power column only) from the faulty assembly and insert into the new assembly.

2. Mount protect module assembly on its holding bracket.

3. Reconnect the three connectors.

4. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 3 through 8.

SWITCHING POWER SUPPLY (SPS) METER ASSEMBLY

Refer to figure 4-5, find number 2 for location.

TOOL REQUIRED

Digital voltmeter.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 5 (page 6-2).

2. Disconnect the 12-position connector from the assembly.

3. Disconnect four holding screws from front of the power control panel cover.

4. Dismount SPS meter assembly from its mounting plate.

REPLACEMENT

1. Replace new assembly by reversing removal procedure steps 2 through 4.

2. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 3 through 8.

3. Connect a digital voltmeter to the meter test points to calibrate meter for zero percent adjust as follows:

   a. Select a logic voltage using the meter rotary switch.

   b. Ensure the digital voltmeter reading for the selected logic power is zero percent adjust to the correct output voltage. If not, adjust the 0% ADJUST potentiometer on the corresponding logic power supply interface board to output the correct voltage.

c. Compare reading from the meter with the digital meter to ensure it is zero percent deviation for the selected logic voltage. If not, adjust the corresponding ZERO ADJUST potentiometer below the meter to indicate zero percent deviation.

d. Repeat steps a to c for other logic voltages.

POWER SUPPLY INTERFACE MODULE ASSEMBLY

Refer to figure 4-5 find, number 3 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 5.

2. Disconnect 15-position cable connector, 30-pin connector and 12-pin right angle connector from the assembly.

3. Dismount power supply interface module assembly from its holding bracket.

REPLACEMENT

1. Mount new assembly to its holding bracket.

2. Reconnect the three connectors to new assembly.

3. Power up computer cabinet following Computer Cabinet Power Up procedure steps 3 through 8.

4. Ensure all switches on the assembly are positioned as required.

POWER CONTROL MODULE ASSEMBLY

Refer to figure 4-5, find number 4 for location.

REMOVAL

1. Remove power from computer cabinet by following Computer Cabinet Power Down procedure steps 1 through 5.

2. Disconnect four cable connectors.

3. Dismount power control module assembly from its holding bracket.

REPLACEMENT

1. Mount new assembly to its holding bracket.

2. Reconnect four cable connectors to the new assembly.

3. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 3 through 8.

POWER CONTROL INTERFACE

Refer to figure 4-5, find number 5 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure steps 1 through 5.

2. Disconnect eight harness connectors and one right angle (30-pin) connector from the interface and label them for replacement.

3. Dismount the power control interface from its standoff.

REPLACEMENT

1. Mount the new interface to its standoff.

2. Reconnect all the connectors to the interface.

NOTE

Make sure the 12-position connector on the meter assembly is firmly attached. It may be loosened during removal of other connectors.

3. Apply power to computer cabinet following Computer Cabinet Power Up procedure steps 3 through 8.

CIRCUIT BREAKER (50/60 Hz OR 400 Hz)

Refer to figure 4-5, find number 6 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

2. Disconnect circuit breaker bracket assembly by removing four holding screws.

3. Disconnect connectors on the circuit breaker and label them for replacement.

4. Dismount the faulty circuit breaker from the bracket assembly by removing its holding screws.

REPLACEMENT

1. Replace new assembly by reversing removal procedure steps 2 through 4.

2. Apply power to computer cabinet by following Computer Cabinet Power Up procedure.

FUSE

Refer to figure 4-5, find number 8 for location.

TOOL REQUIRED

Ohmmeter

REMOVAL

1. Remove all power from computer cabinet following Computer Cabinet Power Down procedure.

2. Loosen three holding screws to remove fuse panel cover.

3. Locate the faulty fuse using the ohmmeter. Remove faulty fuse from panel.

REPLACEMENT

1. Insert the replacement fuse in its panel location.

CAUTION

Be sure to replace the faulty fuse with a fuse of the same part number (same size and rating).

2. Replace fuse panel cover and tighten the three holding screws.

3. Power up computer cabinet following Computer Cabinet Power Up procedure.

CAPACITOR BOX ASSEMBLY

Refer to figure 4-5, find number 9 for location.

REMOVAL

1. Remove all power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Disconnect two cable connectors and two mounting screws from capacitor box assembly.

3. Open the back doors of the computer cabinet.

4. Detach the back cover of the power module by removing three holding screws.

5. Remove two frame holding screws from capacitor securing plate.

6. Pull the capacitor box assembly out from the back of the cabinet.

NOTE

If changing capacitor is needed, follow steps 7 through 9, otherwise, skip to replacement procedure.

7. Detach assembly cover by removing holding screws.

8. Remove all the bus bars on top of the capacitors and label them for replacement.

9. Loosen the foot clamp on the faulty capacitor and detach capacitor from assembly.

REPLACEMENT

1. Install replacement capacitor by reversing removal procedure steps 2 through 9.

2. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

AUXILIARY POWER SUPPLY REGULATOR ASSEMBLY

Refer to figure 4-5, find number 10 for location.

TOOL REQUIRED

Digital Voltmeter

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Disconnect two connectors from the regulator assembly.

3. Remove three regulator assembly holding screws.

4. Pull out regulator assembly from the standoff.

REPLACEMENT

1. Replace new regulator by reversing removal procedure steps 2 through 4.

2. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

3. Verify the output voltages on the regulator test points 1 through 4 using the voltmeter.

BULK AUXILIARY POWER SUPPLY

Refer to figure 4-5, find number 11 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Detach circuit breaker's mounting assembly by removing its holding screws.

NOTE

The bulk auxiliary power supply will come out with its harness attached. Hence, you must cut the tied wrap and subsequently retie the harness when you reinstall the supply.

3. Disconnect 3-position (red) connector from the battery control box terminal J4.
4. Disconnect three molex connectors on bulk auxiliary power supply.
5. Disconnect the small molex connector on auxiliary power supply regulator (figure 4-5, find number 10).
6. Disconnect red connector to power module blower.
7. Open the rear doors of the computer cabinet.
8. Locate the two logic column blower red connectors under blowers and disconnect them.
9. Return to the bulk auxiliary power supply and remove ground screws on the right side of ground plane.
10. Loosen three nuts from the left side of ground plane.
11. Slide out the bulk auxiliary power supply.

REPLACEMENT

1. Remove auxiliary power supply regulator from old bulk auxiliary power supply and install it on new bulk auxiliary power supply (this step is necessary only when the new bulk auxiliary power supply does not come with a regulator attached).

2. Replace bulk auxiliary power supply by reversing removal procedure steps 2 through 11.

3. Apply power to computer cabinet by following Computer Cabinet Power Up procedure.

AC TO DC CONVERTER ASSEMBLY

Refer to figures 4-5 and 4-6, find number 12 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

NOTE

The converter assembly will remove together with its harness.

2. Disconnect 3-position connector and 12-position molex connector at the converter assembly.

3. Disconnect 9-position (white) connector and 2-position connector from the battery control box assembly (if battery option is installed).

4. Disconnect 2-position connector from capacitor (capacitor left connector).

5. Open the back doors of the computer cabinet.

6. Detach the back cover of the power module by removing three holding screws.

7. Remove two frame holding screws from assembly securing plate.

8. Pull the converter assembly out from the back of the cabinet.

REPLACEMENT

1. Remove assembly securing plate from faulty assembly by removing two holding screws and install plate onto replacement assembly.

2. Replace replacement assembly by reversing removal procedure steps 2 through 8.

3. If battery backup option is not installed, remove jumper plug J3 from faulty assembly and install it on the replacement assembly.

4. Power up computer cabinet following Computer Cabinet Power Up procedure.

CONTACT DRIVER MODULE ASSEMBLY

REMOVAL

1. Remove ac to dc converter assembly following AC to DC Converter Assembly Removal procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Open the converter assembly cover by removing four holding screws.

3. Locate the contact driver (circuit board) assembly along the wall of the assembly.

4. Disconnect five wire connectors on the terminal and label them for replacement.

5. Disengage contact driver assembly from standoffs.

REPLACEMENT

1. Engage new contact driver assembly to its standoffs.

2. Reconnect wire connectors to the assembly.

3. Close the converter assembly cover by installing its holding screws.

4. Replace ac to dc converter assembly to cabinet by following AC to DC Convertor Assembly Replacement procedure steps 2 through 3.

5 KVA TRANSFORMER

Refer to figure 4-6 find number 22 for location. Transformer weighs more than 45 kg (100 lb) so you should arrange to have help when performing this procedure.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Open the back doors of the computer cabinet.
3. Detach the back cover of the power module by removing three holding screws.
4. Disconnect yellow wires from terminal block and label them for replacement.
5. Disconnect ground wire from the frame.
6. Remove two frame holding bolts from the transformer mounting plate.
7. Slide out transformer and mounting plate with help from other personnel.

REPLACEMENT

1. Remove faulty transformer from mounting plate and install new transformer onto the mounting plate.
2. Replace transformer by reversing removal procedure steps 2 through 7.
3. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

BATTERY CONTROL BOX ASSEMBLY

Refer to figure 4-5, find number 13 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Detach circuit breaker assembly by removing four holding screws and rest assembly on the floor.
3. Disconnect four cable connectors from battery control box assembly and label them for replacement.
4. Open the back doors of the computer cabinet.
5. Detach the back cover of the power module by removing three holding screws.
6. Remove two frame holding screws from box assembly securing plate.
7. Detach box assembly from the back of the cabinet.

REPLACEMENT

1. Detach box assembly securing plate from assembly by removing two holding screws and install plate onto new assembly.
2. Replace new assembly in cabinet by reversing removal procedure steps 2 through 7.
3. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

BATTERY SWITCH CONTROL MODULE ASSEMBLY

REMOVAL

1. Detach battery control box assembly by following Battery Control Box Assembly removal procedure.
2. Detach box assembly cover by removing holding screws.

3. Locate the battery switch control module assembly along the wall.

4. Disconnect 14-position connector from the assembly.

5. Detach battery switch control module assembly from its standoff.

REPLACEMENT

1. Replace new assembly by reversing removal procedure steps 2 through 5.

2. Replace battery control box assembly by following Battery Control Box Assembly replacement procedure steps 2 through 3.

BATTERY PACK

Refer to figure 4-5, find number 14 for location.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Disconnect two holding screws from the front of the battery pack assembly.

3. Open the back door of the computer cabinet.

4. Detach the back cover of the power module by removing three holding screws.

5. Remove two frame holding screws from battery pack assembly securing plate.

6. Detach battery pack assembly from the back of the cabinet.

7. Detach battery pack assembly cover by removing its holding screws.

8. Detach battery from assembly and observe polarity for replacement.

REPLACEMENT

1. Replace battery pack by reversing removal procedure steps 2 through 8.

2. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

SWITCHING POWER SUPPLY

Refer to figures 4-5, and 4-6, find numbers 19, 20, and 21 to identify power supply.

TOOL REQUIRED

Set of wrenches, voltmeter.

REMOVAL

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Disconnect 15 position plug from the power supply.

3. Measure the input V dc to the power supply at terminals marked + and −. Make sure voltage level equals zero or below 20 V dc.

4. Disconnect two wires from the terminals and label them for replacement.

5. Remove four bolts connecting power supply and power bus.

6. Open the back doors of the computer cabinet.

7. Detach the back cover of the power module by removing three holding screws.

8. Remove two frame holding screws from the faulty power supply securing plate.

9. Go to the front of the power module and push the power supply out far enough so that you can remove it from the back.

10. Remove power supply from the back of the power module.

REPLACEMENT

1. Detach securing plate from faulty power supply by removing the two holding screws and install plate onto new power supply.

2. Replace power supply by reversing removal procedure steps 5 through 10.

3. Reconnect two terminal wires.

CAUTION

Make sure wire connections are red to +, blue to -.

4. Reconnect 15-position plug to the power supply.

5. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

6. Measure power output voltage at the bus bar to be sure it is within range.

7. Verify the power supply percent deviation on the meter assembly and the corresponding power interface board.

DC TO DC OUTLET POWER SUPPLY

Refer to figure 4-5, find number 15 for location.

TOOL REQUIRED

Voltmeter

1. Remove power from computer cabinet following Computer Cabinet Power Down procedure.

WARNING

If backup battery option is installed, make sure three cable connectors to the battery packs are disconnected.

2. Disconnect connector on the power supply.

3. Measure the input V dc to the power supply at terminals marked + and - . Make sure voltage level is equal to zero or below 20 V dc.

4. Remove two terminal wires and label them for replacement.

5. Open the back doors of the computer cabinet.

6. Detach the back cover of the power module by removing three holding screws.

7. Remove two frame holding screws from the faulty power supply securing plate.

8. Pull out power supply from the back of the power module.

REPLACEMENT

1. Detach securing plate from faulty power supply by removing the two holding screws and install plate onto new power supply.

2. Replace power supply by reversing removal procedure steps 5 through 8.

3. Reconnect two terminal wires.

CAUTION

Make sure wire reconnections are red to +, blue to -.

4. Reconnect connector to the power supply.

5. Apply power to computer cabinet following Computer Cabinet Power Up procedure.

APPENDIX A

IOU DEADSTART TROUBLESHOOTING

(LDS/EDS)

PART 1 SCOPE

This section is used for isolation of IOU deadstart problems. Its purpose is to relate error stops during Long Deadstart Sequence (LDS) and Extended Deadstart Sequence (EDS) to suspected faulty modules.

PART 2 THE USAGE OF SAM IOU-DS AND ERROR ISOLATOR TABLES (DDLT)

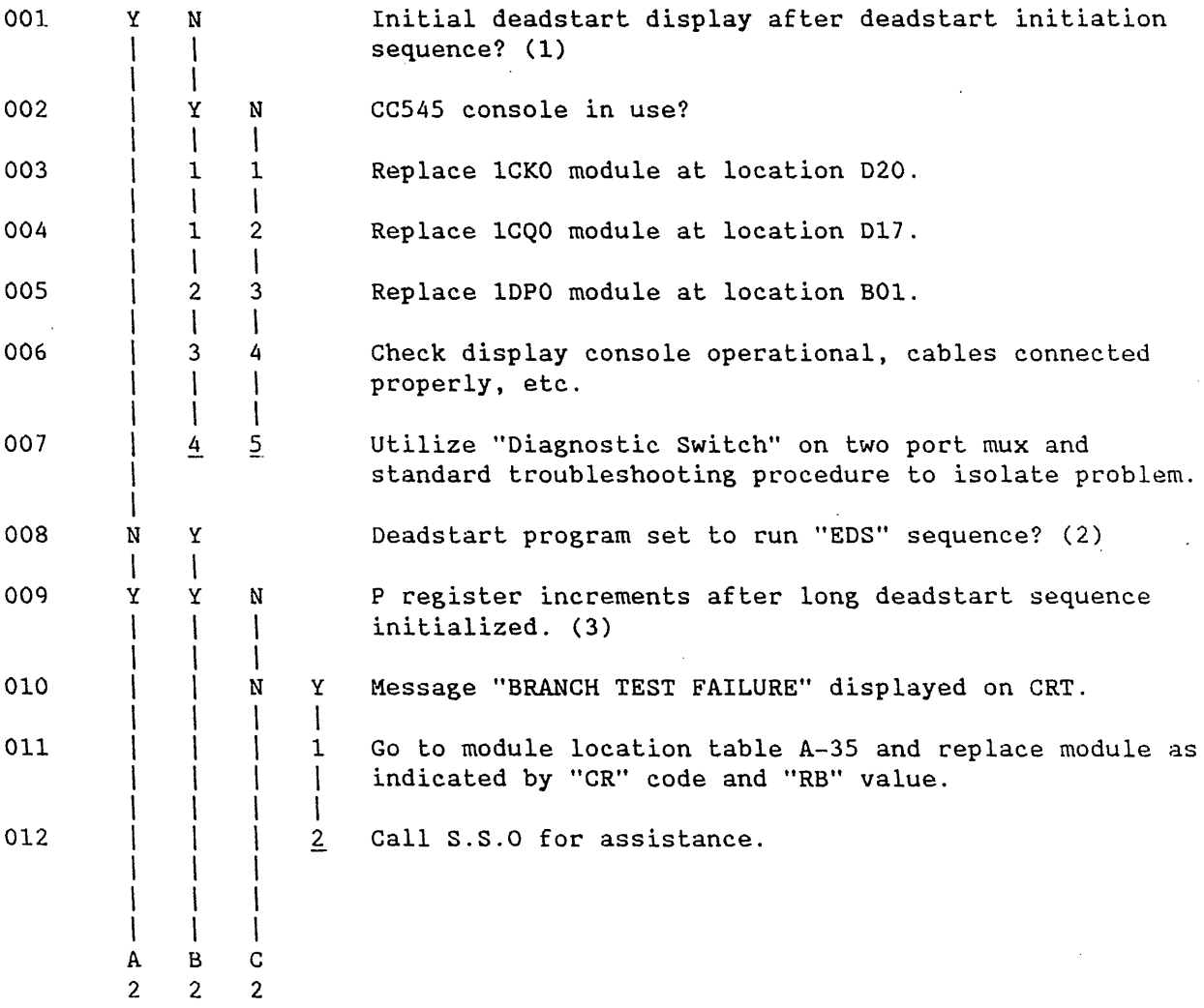
When IOU won't deadstart or LDS/EDS test stops, the CE should start troubleshooting by using the IOU Won't Deadstart SAM in part 3. If it is necessary to go to error isolator tables, the CE should read the PP registers (P.Q.A.K.) values and find the corresponding value for the P register in part 4 (LDS) or 5 (EDS) Error Isolator Tables. For a given P, the suspected failing modules' CODES are listed on the same line. These codes should be used to reference table A-35 in part 6 to find the module type and location for the value of the PP reconfiguration.

The table in part 4 and 5 may also refer to one or both of the table in part 6 or 7, depending on the value of P. The A register contents is used to index other suspected failing modules.

This SAM is for isolating IOU failures occuring with initial deadstart.

Assumptions:

1. Mainframe and peripheral equipment powered up, on-line, and ready.
2. "NORMAL/DIAGNOSTIC" switch on 2 port mux box in "NORMAL" position.
3. Two port mux baud rate switch set to 19.6K for port with "VIKING X" terminal connected.
4. "DISPLAY SELECT" switch on left side of console in center position (CC545 console).



	A	B	C		
	1	1	1		
013			N	Y	Message "TRANSFER ERROR" displayed on CRT.
014				1	Go to module location table A-35 and replace modules per the following codes one at a time and in order - CP, CN, CL, DQ, CR, CM, CJ.
015			1	2	Call S.S.O. for assistance.
016	Y	Y	N		P register halted between address 0012 and 7776.
017			Y	N	CTI display appears? (15 second blank screen pause for EDS run)
018				1	"EDS" error. Redeadstart and type in "PR". Locate halted "P" address in "EDS" error isolator table. Using module codes as indicated by failing "P" address and pak location table A-35 replace paks one at a time in order.
019				2	Call S.S.O. for assistance.
020			1		Load MSL or O.S.
021	Y	Y	N		Address of "P" register halt listed in LDS error isolator table.
022			1		Using module location table A-35 replace paks for the following module codes one at a time in order - CR, CM, CP.
023			2		Call S.S.O. for assistance.
024	1	1			LDS error. Using module codes as indicated by failing "P" address and pak location table A-35 replace paks one at a time in order.
025	2	2			Call S.S.O. for assistance.

(1) Refer to CYBER 180 Models 810, 810A, 65810, 830, 830A and 65830 Hardware Operator's Guide publication number 60469440, for initial display format.

(2) Set least significant bit in word 12 of deadstart program to select "EDS" test.

(3) To initiate LDS test type "L" and "CR" after initial deadstart display.

PART 4 LDS ERROR TABLES

TABLE A-1 I/O HANG STOPS

P RGTR	Q RGTR	K RGTR	A RGTR	SUSPECTED FAILING MODULE(S)
0012	XXXX	6400	XXXXXX	CR, CM, CP
0025	0024	0500	XXXXXX	CR, CM, CP
0026	XXXX	7300	XXXXXX	CP, CR, CM
0030	XXXX	7500	XXXXXX	CP, CR, CM
0035	XXXX	7400	XXXXXX	CP, CR, CM
0043	XXXX	7200	XXXXXX	CP, CR, CM
0046	XXXX	7000	XXXXXX	CP, CR, CM
0062	XXXX	6500	XXXXXX	CP, CR, CM

TABLE A-2 STOPS FOR CHANNEL ERRORS

P RGTR	Q RGTR	K RGTR	A RGTR	SUSPECTED FAILING MODULE(S)
0130	0130	0300	XXXXXX	*CH00, CP, CR, CM
0131	0131	0300	XXXXXX	CH00, CP, CR, CM
0132	0132	0300	XXXXXX	CH00, CP, CR, CM
0133	0133	0300	XXXXXX	CH00, CP, CR, CM
0134	0134	0300	XXXXXX	CH00, CP, CR, CM
0147	0147	0300	XXXXXX	CJ, CP, CR*
0150	0150	0300	XXXXXX	CH00, CP, CR
			000000	CH00, CP, CR
0151	0151	0300	XXXXXX	CH00, CP, CR
			000000	CH00, CP, CR
0152	0152	0300	XXXXXX	CH00, CP, CR
			000000	CH00, CP, CR
0153	0153	0300	XXXXXX	CH00, CP, CR
			000000	CH00, CP, CR
0154	0154	0300	XXXXXX	CH00, CP, CR
			000000	CH00, CP, CR
0167	0167	0300	XXXXXX	CJ, CP, CR**
			000000	CJ, CP, CR

NOTES

* On a 65810 or 65830 machine the CH paks are called SH.

** When you detect a channel board bus failure, pull out one channel board at a time and run LDS to find which channel board causes the bus failures.

TABLE A-3. STOPS FOR BLOCK TRANSFER ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0171	0171	0300	000000	CM, CR, CP
			034343	CP, CR
			XXXXXX	CM, CR, CP
0172	0172	0300	000000	CM, CR, CP
			034343	CP, CR
			XXXXXX	CM, CR, CP
0173	0173	0300	000000	CM, CR, CP
			034343	CP, CR
			XXXXXX	CM, CR, CP
0174	0174	0300	000000	CM, CR, CP
			034343	CP, CR
			XXXXXX	CM, CR, CP

TABLE A-4. STOPS FOR CONVERSION ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0201	0201	0300	XXXXXX	CP, CM
0202	0202	0300	XXXXXX	CP, CM
0203	0203	0300	XXXXXX	CP, CM
0204	0204	0300	XXXXXX	CP, CM

TABLE A-5. STOPS FOR PP MEMORY ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0211	0211	0300	XXXXXX	CM, CR, CP
0212	0212	0300	XXXXXX	CM, CR, CP
0213	0213	0300	XXXXXX	CM, CR, CP
0214	0214	0300	XXXXXX	CM, CR, CP

TABLE A-6. ARITHMETIC UNIT ERROR STOPS
UNCONDITIONAL JUMP ERROR STOPS (Page 1 of 3)

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6000	6000	0000	10000	CR, CP
6001	6001	0300	10000	CR, CP
6004	6004	0300	10000	CR, CP
6005	6005	0300	10000	CR, CP
6010	6010	0300	10000	CR, CP
6012	6012	0300	10000	CR, CP
6013	6013	0300	10000	CR, CP
6014	6014	0300	10000	CR, CP
6015	6015	0300	10000	CR, CP

TABLE A-6. ARITHMETIC UNIT ERROR STOPS
UNCONDITIONAL JUMP ERROR STOPS (Page 2 of 3)

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6016	6016	0300	10000	CR, CP
6020	6020	0300	10000	CR, CP
6021	6021	0300	10000	CR, CP
6022	6022	0300	10000	CR, CP
6023	6023	0300	10000	CR, CP
6024	6024	0300	10000	CR, CP
6025	6025	0300	10000	CR, CP
6026	6026	0300	10000	CR, CP
6027	6027	0300	10000	CR, CP
6030	6030	0300	10000	CR, CP
6031	6031	0300	10000	CR, CP
6033	6033	0300	10000	CR, CP
6034	6034	0300	10000	CR, CP
6036	6036	0300	10000	CR, CP
6037	6037	0300	10000	CR, CP
6041	6041	0300	10000	CR, CP
6042	6042	0300	10000	CR, CP
6043	6043	0300	10000	CR, CP
6045	6045	0300	10000	CR, CP
6046	6046	0300	10000	CR, CP
6050	6050	0300	10000	CR, CP
6053	6053	0300	10000	CR, CP
6054	6054	0300	10000	CR, CP
6055	6055	0300	10000	CR, CP
6056	6056	0300	10000	CR, CP
6060	6060	0300	10000	CR, CP
6061	6061	0300	10000	CR, CP
6062	6062	0300	10000	CR, CP
6066	6066	0300	10000	CR, CP
6067	6067	0300	10000	CR, CP
6071	6071	0300	10000	CR, CP
6072	6072	0300	10000	CR, CP
6074	6074	0300	10000	CR, CP
6075	6075	0300	10000	CR, CP
6077	6077	0300	10000	CR, CP
6100	6100	0300	10000	CR, CP
6102	6102	0300	10000	CR, CP
6103	6103	0300	10000	CR, CP
6105	6105	0300	10000	CR, CP
6106	6106	0300	10000	CR, CP
6110	6110	0300	10000	CR, CP
6111	6111	0300	10000	CR, CP
6113	6113	0300	10000	CR, CP
6114	6114	0300	10000	CR, CP
6116	6116	0300	10000	CR, CP
6117	6117	0300	10000	CR, CP
6121	6121	0300	10000	CR, CP
6122	6122	0300	10000	CR, CP
6124	6124	0300	10000	CR, CP
6125	6125	0300	10000	CR, CP

TABLE A-6. ARITHMETIC UNIT ERROR STOPS
UNCONDITIONAL JUMP ERROR STOPS (Page 3 of 3)

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6127	6127	0300	10000	CR, CP
6130	6130	0300	10000	CR, CP
6132	6132	0300	10000	CR, CP
6133	6133	0300	10000	CR, CP
6135	6135	0300	10000	CR, CP
6140	6140	0300	10000	CR, CP
6141	6141	0300	10000	CR, CP
6143	6143	0300	10000	CR, CP
6145	6145	0300	10000	CR, CP
6146	6146	0300	10000	CR, CP
6147	6147	0300	10000	CR, CP
6150	6150	0300	10000	CR, CP
6151	6151	0300	10000	CR, CP
6153	6153	0300	10000	CR, CP
6154	6154	0300	10000	CR, CP
6155	6155	0300	10000	CR, CP
6156	6156	0300	10000	CR, CP
6157	6157	0300	10000	CR, CP
6162	6162	0300	10000	CR, CP
6163	6163	0300	10000	CR, CP
6165	6165	0300	10000	CR, CP
6166	6166	0300	10000	CR, CP
6170	6170	0300	10000	CR, CP
6171	6171	0300	10000	CR, CP
6172	6172	0300	10000	CR, CP
6173	6173	0300	10000	CR, CP
6176	6176	0300	10000	CR, CP
6177	6177	0300	10000	CR, CP
6201	6201	0300	10000	CR, CP

TABLE A-7. CONDITIONAL JUMP ERROR STOP

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6203	6202	1400	XXXXX	CP, CR
6204	6203	0700	XXXXX	CP, CR
6205	6204	0500	XXXXX	CP, CR
6206	6206	0300	00000	CP, CR
6207	6207	0300	10000	CP, CR
6211	6211	0300	00000	CP, CR
6214	6213	0700	00001	CP, CR
6215	6214	0400	00000	CP, CR
6216	6216	0300	00001	CP, CR
6220	6220	0300	00001	CP, CR
6222	6221	1500	XXXXX	CP, CR
6223	6222	0600	XXXXX	CR, CP
6224	6224	0300	777777	CR, CP

TABLE A-8. ERROR STOPS FOR 1X INSTRUCTIONS (Page 1 of 2)

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6226	6225	1600	XXXXXX	CP, CR
6227	6226	0500	XXXXXX	CR, CP
6230	6230	0300	000000	CR, CP
6233	6232	0400	000000	CR, CP
6235	6234	0400	000000	CR, CP
6237	6236	0400	000000	CR, CP
6241	6240	0400	000000	CR, CP
6243	6242	0400	000000	CR, CP
6245	6244	1700	XXXXXX	CP, CR
6246	6245	0500	XXXXXX	CR, CP
6251	6250	0500	XXXXXX	CR, CP
6261	6260	0500	XXXXXX	CR, CP
6271	6270	0500	XXXXXX	CR, CP
6272	6271	1100	XXXXXX	CP, CR
6274	6273	0500	XXXXXX	CR, CP
6300	6277	0500	XXXXXX	CR, CP
6302	6301	1200	XXXXXX	CP, CR
6303	6302	0500	XXXXXX	CR, CP
6307	6306	0500	XXXXXX	CR, CP
6311	6310	1300	XXXXXX	CP, CR
6312	6311	0500	XXXXXX	CR, CP
6315	6314	0500	XXXXXX	CR, CP
6317	6316	1000	XXXXXX	CP, CR
6322	6321	0500	XXXXXX	CR, CP
6327	6326	0500	XXXXXX	CR, CP
6330	6327	2400	XXXXXX	CP, CR
6331	6330	2500	XXXXXX	CP, CR
6332	6331	2000	XXXXXX	CP, CR
6334	6333	0500	XXXXXX	CR, CP
6337	6336	0400	000000	CR, CP
6342	6341	0400	000000	CR, CP
6345	6344	0400	000000	CR, CP
6350	6347	0400	000000	CR, CP
6353	6352	0400	000000	CR, CP
6356	6355	0400	000000	CR, CP
6361	6360	0400	000000	CR, CP
6364	6363	0400	000000	CR, CP
6367	6366	0400	000000	CR, CP
6372	6371	0400	000000	CR, CP
6375	6374	0400	000000	CR, CP
6400	6377	0400	000000	CR, CP
6403	6402	2100	XXXXXX	CP, CR
6405	6404	0500	XXXXXX	CR, CP
6406	6405	2300	XXXXXX	CP, CR
6410	6407	0600	XXXXXX	CR, CP
6412	6411	0500	XXXXXX	CR, CP
6413	6412	2200	XXXXXX	CP, CR
6417	6416	0500	XXXXXX	CR, CP
6425	6424	0500	XXXXXX	CR, CP
6433	6432	0500	XXXXXX	CR, CP
6441	6440	0500	XXXXXX	CR, CP

TABLE A-8. ERROR STOPS FOR 1X INSTRUCTIONS (Page 2 of 2)

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6447	6446	0500	XXXXXX	CR, CP
6474	6473	0500	XXXXXX	CR, CP
6506	6505	0400	XXXXXX	CR, CP
6510	6507	0500	XXXXXX	CR, CP

TABLE A-9. ERROR STOPS FOR 3X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6511	6510	3400	XXXXXX	CP, CR
6516	6515	3000	XXXXXX	CP, CR
6517	6516	0500	XXXXXX	CM, CR
6521	6520	0400	XXXXXX	CM, CR
6522	6521	3100	XXXXXX	CP, CR
6525	6524	0500	XXXXXX	CM, CR
6527	6526	3200	XXXXXX	CP, CR
6531	6530	0500	XXXXXX	CM, CR
6533	6532	3300	XXXXXX	CP, CR
6535	6534	0500	XXXXXX	CM, CR
6537	6536	3500	XXXXXX	CP, CR
6541	6540	0500	XXXXXX	CM, CR
6552	6551	0500	XXXXXX	CM, CR
6553	6552	3600	XXXXXX	CP, CR
6554	6553	3700	XXXXXX	CP, CR

TABLE A-10. ERROR STOPS FOR 4X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6563	6562	4400	XXXXXX	CP, CR
6566	6565	4000	XXXXXX	CP, CR
6570	6567	0500	XXXXXX	CR, CM
6572	6571	4100	XXXXXX	CP, CR
6573	6572	0500	XXXXXX	CR, CM
6574	6573	4200	XXXXXX	CP, CR
6576	6575	0500	XXXXXX	CR, CM
6577	6576	4300	XXXXXX	CP, CR
6601	6600	0500	XXXXXX	CR, CM
6602	6601	4600	XXXXXX	CP, CR
6606	6606	0300	XXXXXX	CR, CM
6611	6610	4700	XXXXXX	CP, CR
6614	6613	0500	XXXXXX	CR, CM
6616	6615	4500	XXXXXX	CP, CR
6624	6623	0500	XXXXXX	CR, CM

TABLE A-11. ERROR STOPS FOR 5X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6631	6630	5000	XXXXXX	CP, CR
6633	6632	5400	XXXXXX	CP, CR
6637	6636	0500	XXXXXX	CR, CM
6641	6640	5100	XXXXXX	CP, CR
6643	6642	0500	XXXXXX	CR, CM
6644	6643	5200	XXXXXX	CP, CR
6647	6646	0500	XXXXXX	CR, CM
6650	6647	5300	XXXXXX	CP, CR
6653	6652	0500	XXXXXX	CR, CM
6656	6656	0300	XXXXXX	CP, CR
6662	6661	5500	XXXXXX	CR, CM
6671	6670	0500	XXXXXX	CR, CM
6672	6671	5600	XXXXXX	CP, CR
6701	6700	0500	XXXXXX	CR, CM
6702	6701	5700	XXXXXX	CP, CR
6711	6710	0500	XXXXXX	CR, CM

TABLE A-12. ERROR STOPS FOR 13X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
6720	6717	103400	XXXXXX	CP, CR
6723	6722	103000	XXXXXX	CP, CR
6726	6725	0500	XXXXXX	CM, CR
6727	6726	103100	XXXXXX	CP, CR
6732	6731	0500	XXXXXX	CM, CR
6734	6733	103200	XXXXXX	CP, CR
6735	6734	0500	XXXXXX	CM, CR
6737	6736	102200	XXXXXX	CP, CR
6741	6740	0500	XXXXXX	CM, CR
6743	6742	103300	XXXXXX	CP, CR
6744	6744	0300	XXXXXX	CM, CR
6747	6746	103600	XXXXXX	CP, CR
6755	6754	0500	XXXXXX	CM, CR
6756	6755	103700	XXXXXX	CP, CR
6763	6762	0500	XXXXXX	CM, CR
6765	6764	103500	XXXXXX	CP, CR
6773	6772	0500	XXXXXX	CM, CR

TABLE A-13. ERROR STOPS FOR 14X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7005	7004	104400	XXXXXX	CP, CR
7007	7006	104000	XXXXXX	CP, CR
7011	7010	0500	XXXXXX	CR, CM
7012	7011	104100	XXXXXX	CP, CR
7014	7013	0500	XXXXXX	CR, CM
7016	7015	104200	XXXXXX	CP, CR
7017	7016	0500	XXXXXX	CR, CM
7021	7020	102300	XXXXXX	CP, CR
7023	7022	0500	XXXXXX	CR, CM
7025	7024	104300	XXXXXX	CP, CR
7026	7026	0300	XXXXXX	CR, CM
7031	7030	104600	XXXXXX	CP, CR
7037	7036	0500	XXXXXX	CR, CM
7040	7037	104700	XXXXXX	CP, CR
7045	7044	0500	XXXXXX	CR, CM
7047	7046	104500	XXXXXX	CP, CR
7055	7054	0500	XXXXXX	CR, CM

TABLE A-14. ERROR STOPS FOR 15X INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7062	7061	105000	XXXXXX	CP, CR
7065	7064	0500	XXXXXX	CR, CM
7067	7066	105400	XXXXXX	CP, CR
7073	7072	0500	XXXXXX	CR, CM
7074	7073	105100	XXXXXX	CP, CR
7077	7076	0500	XXXXXX	CR, CM
7101	7100	102400	XXXXXX	CP, CR
7104	7103	0500	XXXXXX	CR, CM
7106	7105	105200	XXXXXX	CP, CR
7110	7107	0500	XXXXXX	CR, CM
7112	7111	105300	XXXXXX	CP, CR
7114	7114	0300	XXXXXX	CR, CM
7117	7116	105600	XXXXXX	CP, CR
7126	7125	0500	XXXXXX	CR, CM
7127	7126	105700	XXXXXX	CP, CR
7136	7135	0500	XXXXXX	CR, CM
7140	7137	105500	XXXXXX	CP, CR
7147	7146	0500	XXXXXX	CR, CM

TABLE A-15. ERROR STOPS FOR 01 AND 02 INSTRUCTION

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7164	7164	0300	XXXXXX	CP, CR,CM
7362	7362	0300	XXXXXX	CP, CR,CM
7363	7363	0300	XXXXXX	CP, CR,CM
7402	7402	0300	XXXXXX	CP, CR,CM

TABLE A-16. ERROR STOPS FOR IO INSTRUCTIONS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7475	14	6400	XXXXXX	CP, CR,CM
7476	7476	0300	XXXXXX	CP, CJ
7500	14	6500	XXXXXX	CP, CR,CM
7502	14	6600	XXXXXX	CP, CR,CM
7503	7503	0300	XXXXXX	CP, CJ
7505	14	6700	XXXXXX	CP, CR,CM
7507	14	106400	XXXXXX	CP, CR, CM
7510	7510	0300	XXXXXX	CP, CJ
7512	14	106500	XXXXXX	CP, CR, CM

TABLE A-17. ERROR STOPS FOR MULTIPLY PP ARITHMETIC TEST

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7671	01	106500	CP, CR	***** ERROR IN PP 01
7673	02	106500	CP, CR	***** ERROR IN PP 02
7675	03	106500	CP, CR	***** ERROR IN PP 03
7677	04	106500	CP, CR	***** ERROR IN PP 04

TABLE A-18. ERROR STOPS FOR ESCAPE BIT TEST

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7733	00	7500	XXXXXX	CP, CR
7735	00	7200	XXXXXX	CP, CR
7736	00	7000	XXXXXX	CP, CR
7737	7736	0500	XXXXXX	CP, CR
7740	00	7300	XXXXXX	CP, CR
7742	7741	0500	XXXXXX	CP, CR
7743	00	7100	XXXXXX	CP, CR
7745	7744	0500	XXXXXX	CP, CR
7747	00	7400	XXXXXX	CP, CR
7750	00	7600	XXXXXX	CP, CR
7751	00	7700	XXXXXX	CP, CR
7753	00	6600	XXXXXX	CP, CR

TABLE A-19. ERROR STOP FOR LDS BIT IN MR TEST

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
7756	17	7700	XXXXXX	CJ, CL, CN, DQ
7761	17	7400	XXXXXX	CJ, CL, CN, DQ
7762	17	7300	XXXXXX	CJ, CL, CN, DQ
7764	17	7500	XXXXXX	CJ, CL, CN, DQ
7767	17	7100	XXXXXX	CJ, CL, CN, DQ
7771	17	7500	000000	CJ, CL, CN, DQ
7776	7775	0400	000000	CJ, CL, CN, DQ

PART 5 EDS ERROR TABLES

TABLE A-20. REAL TIME CLOCK ERROR STOP

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0123	0123	0300	XXXXXX	CJ, CP

TABLE A-21. STOPS FOR RESPONSE ON FUNCTIONS ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0132	0132	0300	XXXXXX	CJ, DQ
0136	0136	0300	XXXXXX	CJ, DQ
0145	0145	0300	XXXXXX	CJ, DQ
0150	0150	0300	XXXXXX	CJ, DQ
0165	0165	0300	XXXXXX	CJ, DQ
0203	0203	0300	XXXXXX	CJ, DQ
0206	0206	0300	XXXXXX	CJ, DQ
0211	0211	0300	XXXXXX	CJ, DQ
0216	0216	0300	XXXXXX	CJ, DQ
0223	0223	0300	XXXXXX	CJ, DQ

TABLE A-22. STOPS FOR MCH TIMEOUT ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0236	0236	0300	XXXXXX	CJ, DQ
0241	0241	0300	XXXXXX	CJ, DQ
0245	0245	0300	XXXXXX	CJ, DQ
0250	0250	0300	XXXXXX	CJ, DQ
0253	0253	0300	XXXXXX	CJ, DQ
0257	0257	0300	XXXXXX	CJ, DQ
0262	0262	0300	XXXXXX	CJ, DQ
0274	0274	0300	XXXXXX	CJ, DQ

TABLE A-23. STOPS FOR ECHO TEST ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0307	0307	0300	XXXXXX	DQ, CJ
0312	0312	0300	XXXXXX	DQ, CJ
0316	0316	0300	XXXXXX	DQ, CJ
0321	0321	0300	XXXXXX	DQ, CJ
0326	0326	0300	XXXXXX	DQ, CJ
0331	0331	0300	XXXXXX	DQ, CJ
0336	0336	0300	XXXXXX	DQ, CJ
0341	0341	0300	XXXXXX	DQ, CJ
0345	0345	0300	XXXXXX	DQ, CJ
0351	0351	0300	XXXXXX	DQ, CJ
0354	0354	0300	XXXXXX	DQ, CJ
0362	0362	0300	XXXXXX	DQ, CJ
0365	0365	0300	XXXXXX	DQ, CJ
0371	0371	0300	XXXXXX	DQ, CJ

TABLE A-24. STOPS FOR CLEAR FAULT STATUS REGISTER 1 ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0404	0404	0300	XXXXXX	CN, DQ
0407	0407	0300	XXXXXX	CN, DQ
0414	0414	0300	XXXXXX	CN, DQ
0417	0417	0300	XXXXXX	CN, DQ
0423	0423	0300	XXXXXX	CN, DQ
0426	0426	0300	XXXXXX	CN, DQ
0434	0434	0300	XXXXXX	CN, DQ
0437	0437	0300	XXXXXX	CN, DQ
0443	0443	0300	XXXXXX	CN, DQ
0447	0447	0300	XXXXXX	CN, DQ
0455	0455	0300	XXXXXX	CN, DQ
0460	0460	0300	XXXXXX	CN, DQ
0463	0463	0300	XXXXXX	CN, DQ
0475	0475	0300	XXXXXX	CN, DQ
0505	0505	0300	XXXXXX	CN, DQ
0510	0510	0300	XXXXXX	CN, DQ
0514	0514	0300	XXXXXX	CN, DQ
0517	0517	0300	XXXXXX	CN, DQ

TABLE A-25. STOPS FOR FAULT STATUS REGISTER 2 ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0525	0525	0300	XXXXXX	CN, DQ
0530	0530	0300	XXXXXX	CN, DQ
0534	0534	0300	XXXXXX	CN, DQ
0540	0540	0300	XXXXXX	CN, DQ
0544	0544	0300	XXXXXX	CN, DQ
0547	0547	0300	XXXXXX	CN, DQ
0554	0553	0500	XXXXXX	CN, DQ
0556	0556	0300	XXXXXX	CN, DQ
0562	0562	0300	XXXXXX	CN, DQ
0572	0572	0300	XXXXXX	CN, DQ
0575	0575	0300	XXXXXX	CN, DQ
0601	0601	0300	XXXXXX	CN, DQ
0604	0604	0300	XXXXXX	CN, DQ
0611	0611	0300	XXXXXX	CN, DQ
0615	0614	0500	XXXXXX	CN, DQ

TABLE A-26. STOPS FOR CLEAR ENVIROMENT CONTROL REGISTER ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0621	0621	0300	XXXXXX	CL,DQ
0624	0624	0300	XXXXXX	CL,DQ
0631	0631	0300	XXXXXX	CL,DQ
0634	0634	0300	XXXXXX	CL,DQ
0640	0640	0300	XXXXXX	CL,DQ
0643	0643	0300	XXXXXX	CL,DQ
0647	0647	0300	XXXXXX	CL,DQ
0653	0653	0300	XXXXXX	CL,DQ
0657	0657	0300	XXXXXX	CL,DQ
0662	0662	0300	XXXXXX	CL,DQ
0667	0666	0500	XXXXXX	CL,DQ
0671	0671	0300	XXXXXX	CL,DQ
0675	0675	0300	XXXXXX	CL,DQ

TABLE A-27. STOPS FOR CLEAR TEST MODE RGTR ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
0704	0704	0300	XXXXXX	CN,DQ
0707	0707	0300	XXXXXX	CN,DQ
0713	0713	0300	XXXXXX	CN,DQ
0716	0716	0300	XXXXXX	CN,DQ
0724	0724	0300	XXXXXX	CN,DQ
0727	0727	0300	XXXXXX	CN,DQ
0733	0733	0300	XXXXXX	CN,DQ
0737	0737	0300	XXXXXX	CN,DQ
0743	0743	0300	XXXXXX	CN,DQ
0746	0746	0300	XXXXXX	CN,DQ
0753	0753	0300	XXXXXX	CN,DQ
0756	0756	0300	XXXXXX	CN,DQ
0765	0765	0300	XXXXXX	CN,DQ

TABLE A-28. STOPS FOR REGISTER SELECT ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
1002	1001	0500	XXXXXX	CN, DQ
1013	1012	0400	XXXXXX	CN, DQ
1020	1017	0500	XXXXXX	CN, DQ

TABLE A-29. STOPS FOR STATUS SUMMARY ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
1137	1136	0500	XXXXXX	CJ, DQ

TABLE A-30. STOP FOR ERRORS IN READING THE A REGISTER

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
1312	1311	0500	XXXXXX	CL, DQ, CR- logical PP 0-4
1324	1323	0500	XXXXXX	CL, DQ, CR- logical PP 5-11
1335	1334	0500	XXXXXX	CL, DQ, CR- logical pp 20-25
1347	1346	0500	XXXXXX	CL, DQ, CR- logical PP 25-31

TABLE A-31. STOPS FOR CHANNEL FLAG ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
1546	1546	0300	XXXXAA	*, CP, CM, CR

A=channel number * Refer to channel table (table A-36).

TABLE A-32. STOPS FOR CHANNEL 10 AND 15 ERRORS

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
2137	2137	0300	XXXXXX	CQ, CP, CR, CM
2141	2141	0300	000010	CQ, CP, CR, CM
			000015	CJ, CP, CR, CM
2143	2143	0300	000010	CQ, CP, CR, CM
			000015	CJ, CP, CR, CM
2144	2144	0300	XXXXXX	CJ, CP, CR, CM

TABLE A-33. STOPS FOR ERRORS IN WRITE AND READ MR

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
2154	2154	0300	XXXXXX	CJ, DQ
2165	2165	0300	XXXXXX	CJ, DQ
2176	2176	0300	XXXXXX	CL, CN, DQ
2177	2177	0500	XXXXXX	CL, CN, DQ
2211	2211	0300	XXXXXX	CJ, DQ
2222	2222	0300	XXXXXX	CJ, DQ
2233	2233	0300	XXXXXX	CL, CN, DQ
2234	2234	0500	XXXXXX	CL, CN, DQ

TABLE A-34. ERROR STOP FOR BUFFER COMPARE ROUTINE

P Rgtr	Q Rgtr	K Rgrt	A Rgrt	Suspected Failing Module(s)
2271	2271	0300	00XXXX	CL, DQ
			01XXXX	DQ
			02XXXX	CN,DQ
			03XXXX	CN, DQ
			04XXXX	CL,DQ
			05XXXX	CL,DQ
			06XXXX	CL,*
			07XXXX	CN,**
			10XXXX	CN,***
			11XXXX	CN
2576	2576	0500	XXXXXX	CL,*
2606	2606	0500	XXXXXX	CN,*
2631	2631	0500	XXXXXX	CN, DQ
2650	2650	0300	XXXXXX	CN, DQ

NOTES

* Type keyboard command PM00,0031 and record the following:
Address 41(octal) - logical PP number
Address 31(octal) - test value
If test value is 00, 01, or 03, suspected module is CR for barrel as indicated in table A-36.
If test value is 02, suspected module is CP for barrel as indicated in table A-36.
If test value indicates none of the above, refer to table A-37 and using the same channel number as logical PP number specified in address 41 replace the suggested module.

** Refer to parity error table A-38.

*** Refer to A register VS pack code table A-37.

PART 6 MODULE LOCATION

Module locations of CP, CR, and CM are dependent on barrel configuration (RB=0, or RB=1). All other module locations are not affected by the barrel reconfiguration.

TABLE A-35. IOU MODULE

MODULE CODE	MODULE	MODULE LOCATION RB=0	MODULE LOCATION RB=1	COMMENT
CP	1CP0	IOU11	IOU14	I reg and conversion mod
CR	1CR0	IOU12	IOU13	A,P,Q and R registers
CM	1CM0	IOU18	IOU19	PP memory module
CK	1CK0	IOU20		Deadstart module
CL	1CL0	IOU06		CM control and maint reg
CN	1CN0	IOU07		Maing. register module
DQ	1DQ0	IOU02		MAC
DP	1DP0	IOU01		Master clock
CH00	1CH0	IOU10		Module for ch 0 - 5
CH01	1CH0	IOU09		Mod. for ch 6,7,11,12,13
CQ00	1CQ0	IOU17		Ch10 and display cont.
CJ00	1CJ0	IOU08		Ch 15 and ch 17
CH02	1CH0	IOU15		Channel 20 - 25
CH03	1CH0	IOU16		Channle 26 - 33

PART 7 USE OF THE A REGISTER FOR FAULT ISOLATION

In LDS and EDS the A register display is used to indicate the failing bit(s). The following tables are used to find the suspected module(s) in conjunction with the error tables in parts 4 and 5.

TABLE A-36. CHANNEL NUMBER VS. PACK CODE

Channel No.	00	01	02	03	04	05	06	07
Code *	CH00	CH00	CH00	CH00	CH00	CH00	CH01	CH01
Channel No.	10	11	12	13		15		17
Code *	CQ00	CH01	CH01	CH01		CJ00		CJ00
Channel No.	20	21	22	23	24	25	26	27
Code *	CH02	CH02	CH02	CH02	CH02	CH02	CH03	CH03
Channel No.	30	31	32	33				
Code *	CH03	CH03	CH03	CH03				

* Refer pack code to table A-35 to isolate pack type and location.

TABLE A-37. A REGISTER VS PACK CODE

A Register	Pack Code*
104001	CH00
104002	CH00
104004	CH00
104010	CH00
104020	CH00
104040	CH00
104100	CH01
104200	CH01
105001	CQ00
105002	CH01
105004	CH01
105010	CH01
105040	CJ00
105200	CJ00
106001	CH02
106002	CH02
106004	CH02
106010	CH02
106020	CH02
106040	CH02
106100	CH03
106200	CH03
107001	CH03
107002	CH03
107004	CH03
107010	CH03

* Refer pack code to table A-35 to isolate pack type and location.

TABLE A-38. PARITY ERROR TABLE FOR A=7XXXX

1. Display Maintenance registers
2. Read register 80 (FS1)
3. Read bytes 0 through 3 to find which logical PP recorded an error
4. Read deadstart display for RB = xx.
5. Read bytes 4 through 7 and convert to the suspected module using module location table A-35.

Byte	Reading In Hex	Pack Code
4	X1	CM
	X4	CP
	X8	CP
	1X	CM
	2X	CP
	4X	CR
	8X	CL
5	X2	CN,CL
	X4	CL,CN
6	X2	CM
	X4	CN
	X8	CN
	1X	CN
	2X	CM
	4X	CN
	8X	CM

APPENDIX B

CRASH KITS

The CYBER 180 Service Center maintenance strategy requires unique case kits and off-site logic spares to be taken on service calls. To help in selecting hardware for a call, parts are divided below into cases, and grouped according to functional area or power control units. Because ECO/FCO activity affects part numbers, these lists are for reference only.

Maintenance Spares Kit

Maintenance kit ZKCY830M02 consists of the following two cases:

Part Number	Quantity	Description
CASE 1		
19269131 (19257028)	1	PAK ASSY 1CMO
19269317	1	PAK ASSY 1CKO
19269342	1	PAK ASSY 1DSO
19269031	1	PAK ASSY 1CHO
19269310	1	PAK ASSY 1DCO
19269002	1	PAK ASSY 1CNO
19268827	1	PAK ASSY 1DFO
53702671	1	PAK ASSY ODPH MEM
19269365	1	PAK ASSY 5SHO
75446278	1	SUITCASE
CASE 2		
19269224	1	PAK ASSY 1DRO
19269223	1	PAK ASSY 1DDO
19269130	1	PAK ASSY 1CRO
19269270	1	PAK ASSY 1DPO
19269309	1	PAK ASSY 1DAO
19269334	1	PAK ASSY 1CPO
24670813	1	PAK ASSY 3HBH
53574913	1	AIR SEAL
53367198	1	POWER CONTROL I/F
95586447	2	FUSE 6A
95586450	2	FUSE 10A
95586431	2	FUSE 20 AMP
95586443	2	FUSE 2 AMP
19268971	1	PAK ASSY 4DHO
18336401	1	RELAY
18336408	1	RELAY
18336409	1	RELAY
15181904	1	CAPACITOR
75446278	1	SUITCASE
SHELF PARTS		
10126876	1	POWER SUPPLY - 5.2V
10126877	1	POWER SUPPLY - 2.2V

Diagnostic and Installation Kit

Diagnostic and installation kit ZKCY830D00 consists of the following three cases:

Part Number	Quantity	Description
CASE 1		
19268484	1	PAK ASSY 1CJO
19269179	1	PAK ASSY 1DWO
19269340 (19269378)	1	PAK ASSY 1DEO
19269193	1	PAK ASSY 1DQO
19269132	1	PAK ASSY 1CQO
19269305	1	PAK ASSY 1GLO
19269335	1	PAK ASSY 1CLO
75446278	1	SUITCASE
CASE 2		
19269350	1	PAK ASSY 8TMO
19267402	1	PAK ASSY 8TVO
19267359	1	PAK ASSY 8TSO
19269303	1	PAK ASSY 8THO
19269245	1	PAK ASSY 8TJO
19269302	1	PAK ASSY 8TGO
19267819	1	PAK ASSY 8TRO
19267245	1	PAK ASSY 8TCO
75446278	1	SUITCASE
CASE 3		
19267821	1	PAK ASSY 8UXO
19269143	1	PAK ASSY 2GAO
19269308	1	PAK ASSY 8TDO
18782491	1	SENSOR ASSY
10389974	1	MOD ASSY PROTECT
53201796	1	MOD ASSY PWR SUP I/F
67304098	1	MOD ASSY CONT. BD.
53370206	1	MOD ASSY PWR SUP REGO
19265795	1	PAK ASSY 5MQO
19265796	1	PAK ASSY 5FQO
67184895 (67185313)	1	ISD ADAPTER
23143052	1	ISMT ADAPTER
75446278	1	SUITCASE
SHELF PART		
10126875	1	POWER SUPPLY 5.0V

APPENDIX C

POWER TROUBLESHOOTING SAMS

SAM TROUBLESHOOTING PROCEDURES

Three SAMS are provided:

SAM 1 - Initial Troubleshooting Procedure
SAM 2 - AC to DC Converter Circuit Breaker Tripped
SAM 3 - Fault Indicators

The intent of these SAMs is to aid in isolating the cause when the AA161-A fails to power up when the ON switch is pressed. When troubleshooting, begin by performing the Initial Troubleshooting Procedure (SAM 1). This SAM references the other SAMs.

WARNING

Hazardous voltage is present in the AA161-A. Therefore, be cautious while working on the equipment.

WARNING

If the battery ride-through option is present and if the BATTERY DISCONNECT breaker is on, the batteries maintain dangerous current after the wall circuit breaker is turned off.

Refer to the section of this manual titled, Field Removal and Replacement for appropriate procedures. Refer to schematic diagrams in the CYBER 180 Models 810 and 830 Power Distribution and Warning System manual as necessary when you are using the SAMs.

SAM 1 - INITIAL TROUBLESHOOTING PROCEDURE

Assumptions: 1) RESET switch has been pressed. 2) ON switch as been pressed.
3) All margins are normal.

```
0010 N Y   Is the PUSH RESET indicator on?
0020 | N Y   Is the CB OFF indicator on?
0030 | | N Y   Is the AC TO DC CONVERTER INPUT circuit breaker (cb) tripped?
0040 | | | 1   Refer to SAM 2.
     | | | -
0050 | | N Y   Is the AUXILIARY POWER SUPPLY cb tripped?
0060 | | | 1   Disconnect the input to the auxiliary power supply regulator
     | | |     (unplug the 12-contact connector from J1 of the regulator).
0070 | | | 2   Reset cb and attempt power on (reset and on).
0080 | | | N Y   Does the AUXILIARY POWER SUPPLY cb trip?
0090 | | | | 1   The problem is in the circuit breaker or wiring, it will be
     | | | | -   necessary to troubleshoot using diagrams and voltmeter. Be
     | | | |     cautious when working in this area.
0100 | | | 1   Turn power off (press OFF switch).
0110 | | | 2   Reconnect J1 of the auxiliary power supply.
0120 | | | 3   Disconnect the output from the auxiliary power supply regulator
     | | |     (unplug the 6-contact connector from J2 of the regulator).
0130 | | | 4   Attempt power on (reset and on).
0140 | | | N Y   Does the auxiliary power supply cb trip?
0150 | | | | 1   Replace the auxiliary regulator.
     | | | | -
0160 | | | 1   The problem is in the backpanel or load, it will be necessary
     | | | -   to troubleshoot using diagrams and voltmeter. Be cautious when
     | | |     working in this area.
0170 | | N Y   Is the BLOWER/CHARGER POWER CB tripped?
0180 | | | 1   Disconnect P3, P6, and P7 from blowers and unplug the 3-contact
     | | |     connector from J4 of the battery charger control box.
0190 | | | 2   Reset cb and attempt power on (reset and on).
0200 | | | N Y   Does the BLOWER/CHARGER CB trip?
0210 | | | | 1   The problem is in the circuit breaker or wiring, it is
     | | | | -   necessary to troubleshoot with diagrams and voltmeter. Be
     | | | |     cautious when working in this area.
     2 2 2 2
     A B C D
```

```
     A B C D
     1 1 1 1
     | |
0220 | | | 1   Reconnect blower cables J3, J6, and J7 one at a time, if the cb
     | | |     trips replace the appropriate blower.
0230 | | | 2   Reconnect the charger cable.  If the cb trips, replace the
     | | |     battery control box.
0240 | | N Y   Is the battery disconnect tripped?
0250 | |   1   Replace the battery control box.
     | |   -
0260 | | 1   At this point it is necessary to troubleshoot the power control
     | | -   system using diagrams and voltmeter.  Be cautious when working in
     | |     areas that may contain dangerous voltage and current levels.
0270 N Y     Is the 50/60 HZ CONTROL POWER cb tripped?
0280 | 1     Reset the cb (press).
0290 | 2     Try turning on the system again.
0300 | N Y     Did the cb remain set?
0310 |   1     Monitor operation to see if the problem recurs.
     | | -
0320 | 1     Disconnect any external device connected to 3J2 and retry.
0330 | 2     If cb trips, check the auxiliary bulk power supply using diagrams
     | -     and voltmeter.
     |
0340 N Y     Is the 50/60 HZ DISCONNECT tripped?
0350 | 1     Reset the 50/60 HZ DISCONNECT.
0360 | N Y     Did the disconnect remain set?
0370 |   1     Try turning on the system again.
     |   -
0380 | 1     Open the AC TO DC CONVERTER INPUT breaker (CB2).
0390 | 2     Reset the 50/60 HZ cb and try turning on the system again.
0400 | N Y     Did the 50/60 HZ disconnect remain set?
0410 | | 1     Power down.
0420 | | 2     Remove the ac to dc converter from circuit by unplugging the
     | |       3-contact connector from J1 of the ac to dc converter.
     | | |
     3 3 3
     A B C
```

```
     A B C
     2 2 2
     | | |
0430 | | 3   Reset the AC TO DC CONVERTER INPUT cb.
0440 | | 4   Attempt to power up.
0450 | | Y N   Did the 50/60 HZ DISCONNECT trip?
0460 | |   1   Replace the ac to dc converter.
     | |   -
0470 | | 1   Check the wiring on the AC TO DC CONVERTER INPUT cb.
0480 | | 2   Replace the AC TO DC CONVERTER INPUT cb.
0490 | | 3   Reconnect the 3-contact connector to J1 of the ac to dc converter.
     | | -
0500 | 1   Check transformer taps for proper configuration.
0510 | 2   Check transformers T1, T2, and T3 for burned wires or other
     | -   indications of failure.
     |
0520 1   Check the input power to the unit.
0530 2   At this point it is necessary to troubleshoot the power control
     -   system using diagrams and voltmeter.  Be cautious when working in
         areas that may contain dangerous voltage and current levels.
```

SAM 2 - AC TO DC CONVERTER INPUT CIRCUIT BREAKER TRIPPED

Assumptions: 1) PRESS RESET indicatior is on. 2) CB OFF indicator is on.
3) AC to DC CONVERTER INPUT circuit breaker has tripped.

0010 N Y Are any of the following fault indicators on? HIGH TEMP AIR IN, LOW AIR FLOW, LOGIC POWER SUPPLY, CABLE PROTECTION or HIGH TEMP AIR OUT.

0020 | 1 This is a back-up shut down condition, these faults normally disable the logic power via the primary protection circuit without tripping the AC TO DC CONVERTER INPUT cb.

0030 | 2 Refer to SAM 3.

0040 | 3 After the fault has been corrected, determine why the primary
| - protection circuit did not shut the power down without tripping the circuit breaker. Use diagrams and meter.

0050 1 Remove the ac to dc converter from the circuit by unplugging the 3-contact connector from J1 of the ac to dc converter.

0060 2 Attempt to power on (reset and on).

0070 N Y Does the AC TO DC CONVERTER INPUT cb trip?

0080 | 1 The problem is either in the circuit breaker or the wiring.
| - It will be necessary to troubleshoot using the diagrams and a voltmeter. Use caution when working in this area.

0090 1 Reconnect the 3-contact connector to J1 of the ac to dc converter.

0100 2 Unplug the 2-contact connector from J1 of the capacitor bank ass'y.

0110 3 Unplug the 2-contact connector from J4 of the ac to dc converter.

0120 4 Attempt to power on (reset and on).

0130 N Y Does the AC TO DC CONVERTER INPUT cb trip or is there smoke coming from the ac to dc converter?

| WARNING

| Be careful when working with the capacitor bank. There can be up to 300 V dc between pins 1 and 2 OF J1.

2
A

```
     A
     1
     |
0140 | 1   Replace the ac to dc converter.
     | -
0150 1   Check the voltage between pins 1 and 2 of J1 on the capacitor bank.
0160 Y N   Is the 0 V dc?
0170 | 1   Wait for 5 minutes and check again (capacitors discharge
     |     through bleeder resistors).
0180 | Y N   Is the voltage 0 V dc?
0190 | | 1   Be careful when handling a charged capacitor assembly, do not
     | |     touch the connector pins.  There may be up to 300 V dc between
     | |     pins 1 and 2 of J1.  After disconnecting the plug, cover the
     | |     connector on the capacitor bank assembly with tape before
     | |     handling the assembly.
0200 | | 2   Replace the capacitor bank.
     | | -
0210 1 1   Check resistance between pins 1 and 2 of J1 on the capacitor bank.
0220   N Y   Is there 0 resistance for 30 seconds?
0230   | 1   Replace the capacitor bank.
       | -
0240   1   Reconnect the 2-contact connector to J1 on the capacitor bank.
0250   2   Remove the fuses and load from the circuit by unplugging the
           4-contact connector from J3 of the capacitor bank.
0260   3   Attempt to power on (reset and on).
0270   N Y   Does the AC TO DC CONVERTER INPUT cb trip or is there smoke
       |     coming from the ac to dc converter?
0280   | 1   Power down (off switch).
0290   | 2   Be careful when handling a charged capacitor assembly; do not
       |     touch the connector pins.  There may be up to 300 V dc between
       |     pins 1 and 2.  After disconnecting the plug, cover the connector
       |     on the capacitor bank with tape before handling the assembly.
     | |
     3 3
     A B
```

```
      A B
      2 2
      |
0300  | 3   Replace the capacitor bank.
      | -
0310  1   Reconnect the 4-contact connector to J3 on the capacitor bank.
0320  2   Power on (reset and on).
0330  N Y   Does the AC TO DC CONVERTER INPUT cb trip or is there smoke
      |     coming from the ac to dc converter?
0340  | 1   Check the fuse panel for a short circuit using a meter and the
      |     diagrams.
      | -
0350  1   Power down and reconnect the 2-contact connector to J4 of the ac to
          dc converter (goes to the battery control box).
0360  2   Power on (reset and on).
0370  N Y   Does the AC TO DC CONVERTER INPUT cb trip or is there smoke
      |     coming from the ac to dc converter?
0380  | 1   Power down and replace the battery control box.
      | -
0390  1   All circuits are now reconnected to the ac to dc converter.
      -   Monitor the system for a recurrence of the problem.  If problem
          persists, troubleshoot using diagrams and meter.
```

SAM 3 - FAULT INDICATORS

Assumptions: 1) PRESS RESET indicator is lit. 2) One or more other fault indicators are lit.

WARNING

When the CB OFF indicator and one or more other fault indicators are lit, a system backup shut down has occurred. The system disables logic power via the primary protection circuits without tripping the AC TO DC CONVERTER INPUT circuit breaker.

NOTE

More than one of the temperature related fault indicators can be on simultaneously. This can be because of normal interaction such as low air flow causing high outlet temperature. It can also be the result of an open ambient thermistor or air flow sensor.

```
0010 N Y   Is the CABLE FAULT INDICATOR on?
0020 | 1   Check for loose connectors in the cable fault loop.  Refer to the
     |     cable fault loop diagram in section 5.
0030 | 2   Check for an open conductor in the cable fault loop.
0040 | 3   Replace the power control borad.
     | -
0050 N Y   Is the HIGH TEMP AIR OUT FAULT indicator on?
0060 | 1   Determine which of the three columns has a fault indicator on.
0070 | 2   Check the air flow (filter, blower, etc.).
0080 | 3   Check for open or short (use 200k ohm scale) between pins 1 and 2
     | |   of connector which plugs into J4 of the protect board.  Remove the
     | |   connector from J4 of the protect board before checking the
     |     resistance.
0090 | 4   Replace the protect board for the column with the fault.
     | -
     | |
     2 2
     A B
```

```
     A B
     1 1
     | |
0100 | 5   Replace the power control board.
0110 | Y   Is the LOGIC POWER SUPPLY fault indicator on?
0120 | N Y   Is the OVER TEMP fault indicator on?
0130 | | 1   Check air flow (filter, blower, etc.).
0140 | | 2   Check the voltage between pins 7 and 4 of J1 of the power supply
     | |     interface board.  If there is less than 1 V, replace the power
     | |     supply.
0150 | | 3   Replace related power supply interface board.
0160 | | 4   Replace the power control interface board.
0170 | | 5   Replace the power control board.
0180 | | 6   Replace the power supply.
     | | -
0190 | N Y   Is the over current fault indicator on?
0200 | | 1   Check the load for shorts by disconnecting the output and
     | |     measuring the load for zero resistance.
0210 | | 2   Check the voltage between pins 5 and 4 of J1 of the power supply
     | | |   interface board.  If there is less than 1 V, replace the power
     | |     supply.
0220 | | 3   Replace the related power supply interface board.
0230 | | 4   Replace power control interface board.
0240 | | 5   Replace the power control board.
0250 | | 6   Replace the power supply.
     | | -
0260 | N Y   Is the OVER VOLTAGE indicator on?
0270 | | 1   Set the related MARGIN switch to -5%.
0280 | | 2   Attempt power on (reset and on).
0290 | | N Y   Did unit power up normally?
0300 | | | 1   Adjust voltage to nominal using voltmeter.  Refer to
     | | |     adjustments in the preceding pages.
0310 | | | 2   Set MARGIN switch to 0%.
     | | | -
     3 3 3
     A B C
```

```
     A B C
     2 2 2
     | | |
0320 | | 1   Check the voltage between pins 3 and 4 of J1 of the power supply
     | |     interface board.  If there is less than 1 V replace the power
     | |     supply.
0330 | | 2   Replace the related power supply interface board.
0340 | 1 3   Replace the power control interface board.
0350 | 2 4   Replace the power control board.
0360 | - 5   Replace the power supply.
     |   -
0370 N Y   Is the SMOKE DET fault indicator on?
0380 | Y N   Is there a fault indicator on in the logic or power columns?
0390 |   1   Replace power control module.
     |   -
0400 | 1   Ensure that the jumper is in the protect module (J3 pins 1 and 2).
0410 | 2   Replace the related protect module.
     | -
0420 N Y   Is the LOW AIR FLOW fault indicator on?
0430 | Y N   Is there a fault indicator on in the logic or power columns?
0440 |   1   Replace the power control module.
     |   -
0450 | 1   Check the air flow path (filter, blower, etc.).
0460 | 2   Ensure that the air seals are in the logic panels.
0470 | 3   Ensure that the air flow sensor is connected.
0480 | 4   Replace the air flow sensor.
0490 | 5   Replace the related protect module.
0500 | 6   Replace the power control module.
     | -
0510 N Y   Is the HIGH TEMP AIR IN fault indicator on?
0520 | Y N   Is there a fault indicator on in the logic or power columns?
0530 |   1   Replace the power control module.
     |   -
     | |
     4 4
     A B
```

```
     A B
     3 3
     | |
0540 | 1   Check the air flow path (filter, blower, etc.).
0550 | 2   Replace the air flow sensor assembly.
0560 | 3   Replace the related protect module.
0570 | 4   Replace the power control module.
     | -
0580 | Y   Is a fault indicator on in the power or logic columns?
0590 | 1   Replace the related protect board.
       -
0600 1   At this point it is necessary to troubleshoot the power control
     -   system using diagrams and voltmeter.  Be cautious when working in
         areas that may contain dangerous voltage and current levels.
```

APPENDIX D

INTERMITTENT FAILURE TROUBLESHOOTING GUIDE

This troubleshooting guide lists up to four potentially bad paks that are called out by the hardware performance analyzer (HPA) when a bit is set in a system maintenance register. A description of the error in question is included along with the parity checker's signal name and pak location for each product.

CY180-810 PFS BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
32	ARVI PE BITS 0-7, 32-39	DR-CP016/UM1CPE	DR-CP016,TC-CP010, TD-CP011,DE-CP009,
33	ARVI PE BITS 8-15, 40-47	DR-CP017/UM2CPE	DR-CP017,TC-CP010, TD-CP011,DF-CP003,
34	ARVI PE BITS 16-23, 48-55	DR-CP018/UM3CPE	DR-CP018,TC-CP010, TD-CP011,DF-CP004,
35	ARVI PE BITS 24-31, 56-63	DR-CP019/UM4CPE	DR-CP019,TC-CP010, TD-CP011,DF-CP004,
36	UNCORRECTED MEMORY WRITE ERROR	DE-CP009/DE1201	DE-CP009,DR-CP016.
37	MEMORY REJECT	DE-CP009/DE1207	DE-CP009,DR-CP016.
38	MEMORY TAG PARITY ERROR	DE-CP009/DE12BC	DE-CP009,DR-CP016, DR-CP018.
39	RESPONSE CODE PE	DE-CP009/DE12PB	DE-CP009,DR-CP016.
40	FP EXCEPTION TRAP INDEX ROM PE	DE-CP009/DE17PO	DE-CP009,DR-CP017, DR-CP019,TC-CP010.
41	AD OR BD BITS 0-15 PE	DF-CP003/DF1CPF	DF-CP003,DF-CP004, DF-CP006,DR-CP016,
42	LD BOX ROM PE	GL-CP015/DL19PC	GL-CP015,DR-CP017, DR-CP018.
43	ADS OR BDS ROM PE	TR-CP012/PR18PE	TR-CP012,DR-CP017.
44	SHIFT TYPE ROM PE OR SHIFTER INPUT	TS-CP007/PS1CAP	TS-CP007,TC-CP010, TD-CP011,DF-CP003,
45	UNCORRECTED MEMORY READ ERROR	DE-CP009/DE1205	DE-CP009,DR-CP017
46	AD OR BD BITS 16-31 PE	DF-CP004/DF2CPF	DF-CP004,DF-CP003, DF-CP005,DR-CP017,
47	AD-UN PE, MAC WRITE PE	DS-CP020/UN11PE	DS-CP020,DF-CP006, DR-CP017,TV-CP013.
48	MEMORY RESPONSE TIMEOUT	DE-CP009/DE1AHU	DE-CP009,DR-CP018, DW-CPX22,DW-CPX23,
49	CYBER ROM PARITY ERROR	TH-CP001/PH14PP	TH-CP001,DR-CP018,
50	INSTRUCTION PARITY ERROR	TH-CP001/PH14IP	TH-CP001,DR-CP018, GA-CP021.
51	XBD ROM PARITY ERROR	TR-CP012/PR18XP	TR-CP012,DR-CP018.
52	AD OR BD BITS 32-47 PE	DF-CP005/DF3CPF	DF-CP005,DF-CP004, DF-CP006,DR-CP016,
53	BDP ADDER, DATA ROM RJB, RKB PE	TV-CP013/PV1DPE	TV-CP013,DE-CP009, DF-CP003,DF-CP004,
54	IMMEDIATE ROM	TH-CP001/PH14PE	TH-CP001,DR-CP018.
55	AD OR BD BITS 48-63 PE	DF-CP006/DF4CPF	DF-CP006,DF-CP003, DF-CP005,DR-CP018,
56	MAP PE BITS 32-39	DW-CP022/DW15PE	DW-CP022,DE-CP009, DF-CP005,DR-CP016,
57	MAP PE BITS 40-47	DW-CP023/DW25PE	DW-CP023,DE-CP009, DF-CP005,DR-CP017,
58	MAP PE BITS 48-55	DW-CP025/DW35PE	DW-CP025,DE-CP009, DF-CP006,DR-CP018,
59	MAP PE BITS 56-63	DW-CP026/DW45PE	DW-CP026,DE-CP009, DR-CP019,DW-CP022,
60	MAP MULTIPLE HIT FAULT	UX-CP024/UX1BMH	UX-CP024,DR-CP019, DW-CP022,DW-CP023,
62	MAC ERROR	DR-CP016/UM19AD DR-CP017/UM19AD	UK-CP027,DQ-IOU02, DR-CP016,DR-CP017,
63	ANY CS DATA PE	DR-CP016/UM29AD DR-CP017/UM29AD	DR-CP016,DR-CP017, DR-CP018,DR-CP019,

CY180-830 PFS BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
32	ARVI PE BITS 0-7, 32-39	DR-CPX16/UM1CPE	DR-CPX16,TC-CPX10, TD-CPX11,DE-CPX09,
33	ARVI PE BITS 8-15, 40-47	DR-CPX17/UM2CPE	DR-CPX17,TC-CPX10, TD-CPX11,DF-CPX03,
34	ARVI PE BITS 16-23, 48-55	DR-CPX18/UM3CPE	DR-CPX18,TC-CPX10, TD-CPX11,DF-CPX04,
35	ARVI PE BITS 24-31, 56-63	DR-CPX19/UM4CPE	DR-CPX19,TC-CPX10, TD-CPX11,DF-CPX04,
36	UNCORRECTED MEMORY WRITE ERROR	DE-CPX09/DE1201	DE-CPX09,DR-CPX16.
37	MEMORY REJECT	DE-CPX09/DE1207	DE-CPX09,DR-CPX16.
38	MEMORY TAG PARITY ERROR	DE-CPX09/DE12BC	DE-CPX09,DR-CPX16, DR-CPX18.
39	RESPONSE CODE PE	DE-CPX09/DE12PB	DE-CPX09,DR-CPX16.
40	FP EXCEPTION TRAP INDEX ROM PE	DE-CPX09/DE17PO	DE-CPX09,DR-CPX17, DR-CPX19,TC-CPX10.
41	AD OR BD BITS 0-15 PE	DF-CPX03/DF1CPF	DF-CPX03,DF-CPX04, DF-CPX06,DR-CPX16,
42	LD BOX ROM PE	GL-CPX15/DL19PC	GL-CPX15,DR-CPX17, DR-CPX18.
43	ADS OR BDS ROM PE	TR-CPX12/PR18PE	TR-CPX12,DR-CPX17.
44	SHIFT TYPE ROM PE OR SHIFTER INPUT	TS-CPX07/PS1CAP	TS-CPX07,TC-CPX10, TD-CPX11,DF-CPX03,
45	UNCORRECTED MEMORY READ ERROR	DE-CPX09/DE1205	DE-CPX09,DR-CPX17.
46	AD OR BD BITS 16-31 PE	DF-CPX04/DF2CPF	DF-CPX04,DF-CPX03, DF-CPX05,DR-CPX17,
47	AD-UN PE, MAC WRITE PE	DS-CPX20/UN11PE	DS-CPX20,DF-CPX06, DR-CPX17,TV-CPX13.
48	MEMORY RESPONSE TIMEOUT	DE-CPX09/DE1AHU	DE-CPX09,DR-CPX18, DW-CPX22,DW-CPX23,
49	CYBER ROM PARITY ERROR	TH-CPX01/PH14PP	TH-CPX01,DR-CPX18.
50	INSTRUCTION PARITY ERROR	TH-CPX01/PH14IP	TH-CPX01,DR-CPX18, GA-CPX21.
51	XBD ROM PARITY ERROR	TR-CPX12/PR18XP	TR-CPX12,DR-CPX18.
52	AD OR BD BITS 32-47 PE	DF-CPX05/DF3CPF	DF-CPX05,DF-CPX04, DF-CPX06,DR-CPX16,
53	BDP ADDER, DATA ROM RJB, RKB PE	TV-CPX13/PV1DPE	TV-CPX13,DE-CPX09, DF-CPX03,DF-CPX04,
54	IMMEDIATE ROM	TH-CPX01/PH14PE	TH-CPX01,DR-CPX18.
55	AD OR BD BITS 48-63 PE	DF-CPX06/DF4CPF	DF-CPX06,DF-CPX03, DF-CPX05,DR-CPX18,
56	MAP PE BITS 32-39	DW-CPX22/DW15PE	DW-CPX22,DE-CPX09, DF-CPX05,DR-CPX16,
57	MAP PE BITS 40-47	DW-CPX23/DW25PE	DW-CPX23,DF-CPX09, DF-CPX05,DR-CPX17,
58	MAP PE BITS 48-55	DW-CPX25/DW35PE	DW-CPX25,DE-CPX09, DF-CPX06,DR-CPX18,
59	MAP PE BITS 56-63	DW-CPX26/DW45PE	DW-CPX26,DE-CPX09, DR-CPX19,DW-CPX22,
60	MAP MULTIPLE HIT FAULT	UX-CPX24,UX1BMH	UX-CPX24,DR-CPX19, DW-CPX22,DW-CPX23,
62	MAC ERROR	DR-CPX16/UM19AD DR-CPX17/UM19AD	UK-CPX27,DQ-IOU02, DR-CPX16,DR-CPX17,
63	ANY CS DATA PE	DR-CPX16/UM29AD DR-CPX17/UM29AD	DR-CPX16,DR-CPX17, DR-CPX18,DR-CPX19,

CY180-65810

PFS BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
32	ARVI PE BITS 0-7, 32-39	DR-CP016/UM1CPE	DR-CP016,TC-CP010, TD-CP011,DE-CP009,
33	ARVI PE BITS 8-15, 40-47	DR-CP017/UM2CPE	DR-CP017,TC-CP010, TD-CP011,DF-CP003,
34	ARVI PE BITS 16-23, 48-55	DR-CP018/UM3CPE	DR-CP018,TC-CP010, TD-CP011,DF-CP004,
35	ARVI PE BITS 24-31, 56-63	DR-CP019/UM4CPE	DR-CP019,TC-CP010, TD-CP011,DF-CP004,
36	UNCORRECTED MEMORY WRITE ERROR	DE-CP009/DE1201	DE-CP009,DR-CP016.
37	MEMORY REJECT	DE-CP009/DE1207	DE-CP009,DR-CP016.
38	MEMORY TAG PARITY ERROR	DE-CP009/DE12BC	DE-CP009,DR-CP016, DR-CP018.
39	RESPONSE CODE PE	DE-CP009/DE12PB	DE-CP009,DR-CP016.
40	FP EXCEPTION TRAP INDEX ROM PE	DE-CP009/DE17PO	DE-CP009,DR-CP017, DR-CP019,TC-CP010.
41	AD OR BD BITS 0-15 PE	DF-CP003/DF1CPF	DF-CP003,DF-CP004, DF-CP006,DR-CP016,
42	LD BOX ROM PE	GL-CP015/DL19PC	GL-CP015,DR-CP017, DR-CP018.
43	ADS OR BDS ROM PE	TR-CP012/PR18PE	TR-CP012,DR-CP017.
44	SHIFT TYPE ROM PE OR SHIFTER INPUT	TS-CP007/PS1CAP	TS-CP007,TC-CP010, TD-CP011,DF-CP003,
45	UNCORRECTED MEMORY READ ERROR	DE-CP009/DE1205	DE-CP009,DR-CP017
46	AD OR BD BITS 16-31 PE	DF-CP004/DF2CPF	DF-CP004,DF-CP003, DF-CP005,DR-CP017,
47	AD-UN PE, MAC WRITE PE	DS-CP020/UN11PE	DS-CP020,DF-CP006, DR-CP017,TV-CP013.
48	MEMORY RESPONSE TIMEOUT	DE-CP009/DE1AHU	DE-CP009,DR-CP018, DW-CPX22,DW-CPX23,
49	CYBER ROM PARITY ERROR	TH-CP001/PH14PP	TH-CP001,DR-CP018.
50	INSTRUCTION PARITY ERROR	TH-CP001/PH14IP	TH-CP001,DR-CP018, GA-CP021.
51	XBD ROM PARITY ERROR	TR-CP012/PR18XP	TR-CP012,DR-CP018.
52	AD OR BD BITS 32-47 PE	DF-CP005/DF3CPF	DF-CP005,DF-CP004, DF-CP006,DR-CP016,
53	BDP ADDER, DATA ROM RJB, RKB PE	TV-CP013/PV1DPE	TV-CP013,DE-CP009, DF-CP003,DF-CP004,
54	IMMEDIATE ROM	TH-CP001/PH14PE	TH-CP001,DR-CP018.
55	AD OR BD BITS 48-63 PE	DF-CP006/DF4CPF	DF-CP006,DF-CP003, DF-CP005,DR-CP018,
56	MAP PE BITS 32-39	DW-CP022/DW15PE	DW-CP022,DE-CP009, DF-CP005,DR-CP016,
57	MAP PE BITS 40-47	DW-CP023/DW25PE	DW-CP023,DE-CP009, DF-CP005,DR-CP017,
58	MAP PE BITS 48-55	DW-CP025/DW35PE	DW-CP025,DE-CP009, DF-CP006,DR-CP018,
59	MAP PE BITS 56-63	DW-CP026/DW45PE	DW-CP026,DE-CP009, DR-CP019,DW-CP022,
60	MAP MULTIPLE HIT FAULT	UX-CP024/UX1BMH	UX-CP024,DR-CP019, DW-CP022,DW-CP023,
62	MAC ERROR	DR-CP016/UM19AD DR-CP017/UM19AD	UK-CP027,MQ-IOU02, DR-CP016,DR-CP017,
63	ANY CS DATA PE	DR-CP016/UM29AD DR-CP017/UM29AD	DR-CP016,DR-CP017, DR-CP018,DR-CP019,

CY180-65830

PFS BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
32	ARVI PE BITS 0-7, 32-39	DR-CPX16/UM1CPE	DR-CPX16,TC-CPX10, TD-CPX11,DE-CPX09,
33	ARVI PE BITS 8-15, 40-47	DR-CPX17/UM2CPE	DR-CPX17,TC-CPX10, TD-CPX11,DF-CPX03,
34	ARVI PE BITS 16-23, 48-55	DR-CPX18/UM3CPE	DR-CPX18,TC-CPX10, TD-CPX11,DF-CPX04,
35	ARVI PE BITS 24-31, 56-63	DR-CPX19/UM4CPE	DR-CPX19,TC-CPX10, TD-CPX11,DF-CPX04,
36	UNCORRECTED MEMORY WRITE ERROR	DE-CPX09/DE1201	DE-CPX09,DR-CPX16.
37	MEMORY REJECT	DE-CPX09/DE1207	DE-CPX09,DR-CPX16.
38	MEMORY TAG PARITY ERROR	DE-CPX09/DE12BC	DE-CPX09,DR-CPX16, DR-CPX18.
39	RESPONSE CODE PE	DE-CPX09/DE12PB	DE-CPX09,DR-CPX16.
40	FP EXCEPTION TRAP INDEX ROM PE	DE-CPX09/DE17PO	DE-CPX09,DR-CPX17, DR-CPX19,TC-CPX10.
41	AD OR BD BITS 0-15 PE	DF-CPX03/DF1CPF	DF-CPX03,DF-CPX04, DF-CPX06,DR-CPX16,
42	LD BOX ROM PE	GL-CPX15/DL19PC	GL-CPX15,DR-CPX17, DR-CPX18.
43	ADS OR BDS ROM PE	TR-CPX12/PR18PE	TR-CPX12,DR-CPX17.
44	SHIFT TYPE ROM PE OR SHIFTER INPUT	TS-CPX07/PS1CAP	TS-CPX07,TC-CPX10, TD-CPX11,DF-CPX03,
45	UNCORRECTED MEMORY READ ERROR	DE-CPX09/DE1205	DE-CPX09,DR-CPX17.
46	AD OR BD BITS 16-31 PE	DF-CPX04/DF2CPF	DF-CPX04,DF-CPX03, DF-CPX05,DR-CPX17,
47	AD-UN PE, MAC WRITE PE	DS-CPX20/UN11PE	DS-CPX20,DF-CPX06, DR-CPX17,TV-CPX13.
48	MEMORY RESPONSE TIMEOUT	DE-CPX09/DE1AHU	DE-CPX09,DR-CPX18, DW-CPX22,DW-CPX23,
49	CYBER ROM PARITY ERROR	TH-CPX01/PH14PP	TH-CPX01,DR-CPX18.
50	INSTRUCTION PARITY ERROR	TH-CPX01/PH14IP	TH-CPX01,DR-CPX18, GA-CPX21.
51	XBD ROM PARITY ERROR	TR-CPX12/PR18XP	TR-CPX12,DR-CPX18.
52	AD OR BD BITS 32-47 PE	DF-CPX05/DF3CPF	DF-CPX05,DF-CPX04, DF-CPX06,DR-CPX16,
53	BDP ADDER, DATA ROM RJB, RKB PE	TV-CPX13/PV1DPE	TV-CPX13,DE-CPX09, DF-CPX03,DF-CPX04,
54	IMMEDIATE ROM	TH-CPX01/PH14PE	TH-CPX01,DR-CPX18.
55	AD OR BD BITS 48-63 PE	DF-CPX06/DF4CPF	DF-CPX06,DF-CPX03, DF-CPX05,DR-CPX18,
56	MAP PE BITS 32-39	DW-CPX22/DW15PE	DW-CPX22,DE-CPX09, DF-CPX05,DR-CPX16,
57	MAP PE BITS 40-47	DW-CPX23/DW25PE	DW-CPX23,DF-CPX09, DF-CPX05,DR-CPX17,
58	MAP PE BITS 48-55	DW-CPX25/DW35PE	DW-CPX25,DE-CPX09, DF-CPX06,DR-CPX18,
59	MAP PE BITS 56-63	DW-CPX26/DW45PE	DW-CPX26,DE-CPX09, DR-CPX19,DW-CPX22,
60	MAP MULTIPLE HIT FAULT	UX-CPX24,UX1BMH	UX-CPX24,DR-CPX19, DW-CPX22,DW-CPX23,
62	MAC ERROR	DR-CPX16/UM19AD DR-CPX17/UM19AD	UK-CPX27,MQ-IOU02, DR-CPX16,DR-CPX17,
63	ANY CS DATA PE	DR-CPX16/UM29AD DR-CPX17/UM29AD	DR-CPX16,DR-CPX17, DR-CPX18,DR-CPX19,

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MCEL BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
56	FILE 0 PARITY ERROR	DW-CP022/DW15FO	DE-CP009,DW-CP022,
		DW-CP023/DW15FO	DW-CP023,GA-CP021,
57	FILE 0 PARITY ERROR	DW-CP025/DW15FO	DW-CP025,DW-CP026,
		DW-CP026/DW15FO	GA-CP021.
58	FILE 1 PARITY ERROR	DW-CP022/DW15F1	DW-CP022,DW-CP023,
		DW-CP023/DW15F1	GA-CP021,UX-CP024.
59	FILE 1 PARITY ERROR	DW-CP025/DW15F1	DW-CP025,DW-CP026,
		DW-CP026/DW15F1	GA-CP021.
60	FILE 2 PARITY ERROR	DW-CP022/DW15F2	DW-CP022,DW-CP023,
		DW-CP023/DW15F2	GA-CP021,UX-CP024.
61	FILE 2 PARITY ERROR	DW-CP025/DW15F2	DW-CP025,DW-CP026,
		DW-CP026/DW15F2	GA-CP021.
62	FILE 3 PARITY ERROR	DW-CP022/DW15F3	DW-CP022,DW-CP023,
		DW-CP023/DW15F3	GA-CP021,UX-CP024.
63	FILE 3 PARITY ERROR	DW-CP025/DW15F3	DW-CP025,DW-CP026,
		DW-CP026/DW15F3	GA-CP021.

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MCEL BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
56	FILE 0 PARITY ERROR	DW-CPX22/DW15FO	DE-CPX09,DW-CPX22,
		DW-CPX23/DW15FO	DW-CPX23,GA-CPX21,
57	FILE 0 PARITY ERROR	DW-CPX25/DW15FO	DW-CPX25,DW-CPX26,
		DW-CPX26/DW15FO	GA-CPX21.
58	FILE 1 PARITY ERROR	DW-CPX22/DW15F1	DW-CPX22,DW-CPX23,
		DW-CPX23/DW15F1	GA-CPX21,UX-CPX24.
59	FILE 1 PARITY ERROR	DW-CPX25/DW15F1	DW-CPX25,DW-CPX26,
		DW-CPX26/DW15F1	GA-CPX21.
60	FILE 2 PARITY ERROR	DW-CPX22/DW15F2	DW-CPX22,DW-CPX23,
		DW-CPX23/DW15F2	GA-CPX21,UX-CPX24.
61	FILE 2 PARITY ERROR	DW-CPX25/DW15F2	DW-CPX25,DW-CPX26,
		DW-CPX26/DW15F2	GA-CPX21.
62	FILE 3 PARITY ERROR	DW-CPX22/DW15F3	DW-CPX22,DW-CPX23,
		DW-CPX23/DW15F3	GA-CPX21,UX-CPX24.
63	FILE 3 PARITY ERROR	DW-CPX25/DW15F3	DW-CPX25,DW-CPX26,
		DW-CPX26/DW15F3	GA-CPX21.

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CSEL BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
00-07	NOT USED		
08-15	NOT USED		
16-23	NOT USED		
24	DOUBLE BIT ERROR FLAG	--	DR-CP016
25	CHIP SELECT	--	DR-CP016
26-31	SYNDROME CODE	--	DR-CP016
32	DOUBLE BIT ERROR FLAG	--	DR-CP017
33	CHIP SELECT	--	DR-CP017
34-39	SYNDROME CODE	--	DR-CP017
40	DOUBLE BIT ERROR FLAG	--	DR-CP018
41	CHIP SELECT	--	DR-CP018
42-47	SYNDROME CODE	--	DR-CP018
48	DOUBLE BIT ERROR FLAG	--	DR-CP019
49	CHIP SELECT	--	DR-CP019
50-55	SYNDROME CODE	--	DR-CP019
56	DOUBLE BIT ERROR FLAG	--	DS-CP020
57	CHIP SELECT	--	DS-CP020
58-63	SYNDROME CODE	--	DS-CP020

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CSEL BIT	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
00-07	NOT USED		
08-15	NOT USED		
16-23	NOT USED		
24	DOUBLE BIT ERROR FLAG	--	DR-CPX16
25	CHIP SELECT	--	DR-CPX16
26-31	SYNDROME CODE	--	DR-CPX16
32	DOUBLE BIT ERROR FLAG	--	DR-CPX17
33	CHIP SELECT	--	DR-CPX17
34-39	SYNDROME CODE	--	DR-CPX17
40	DOUBLE BIT ERROR FLAG	--	DR-CPX18
41	CHIP SELECT	--	DR-CPX18
42-47	SYNDROME CODE	--	DR-CPX18
48	DOUBLE BIT ERROR FLAG	--	DR-CPX19
49	CHIP SELECT	--	DR-CPX19
50-55	SYNDROME CODE	--	DR-CPX19
56	DOUBLE BIT ERROR FLAG	--	DS-CPX20
57	CHIP SELECT	--	DS-CPX20
58-63	SYNDROME CODE	--	DS-CPX20

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FS1 BITS	ERROR DESCRIPTION	MODULE TYPE	POTENTIAL BAD PAKS B0	B1	B2	B3
32	ERROR ON CL	CL	IOU06		IOU06	
33	ERROR ON CR	CR	IOU12		IOU13	
34	FIRMWARE ERROR	CP	IOU11		IOU14	
35	ERROR ON CM	CM	IOU18		IOU19	
36	ERROR ON CP	CP	IOU11		IOU14	
37	CONVERSION ERROR	CP	IOU11		IOU14	
39	PPM DATA IN ERROR	CM	IOU18		IOU19	
		CP	IOU11		IOU14	
45	O.S. BOUNDS	CL	IOU06		IOU06	
	VIOLATION	CN	IOU07		IOU07	
46	O.S. BOUNDS	CL	IOU06		IOU06	
	ADDR. P.E.	CN	IOU07		IOU07	
48	C.M. DATA OUT ERROR	DC	MEM07		MEM07	
49	UNCORRECTED CM	DC	MEM07		MEM07	
	WRITE ERROR	CL	IOU06		IOU06	
50	UNCORRECTED CM	CL	IOU06		IOU06	
	WRITE ERROR	CM	IOU18		IOU19	
51	CM REJECT ERROR	DC	MEM07		MEM07	
		CL	IOU06		IOU06	
52	CM TAG OUT ERROR	DC	MEM07		MEM07	
		CL	IOU06		IOU06	
53	CM RESPONSE ERROR	DC	MEM07		MEM07	
		CL	IOU06		IOU06	

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FS1 BITS	ERROR DESCRIPTION	MODULE TYPE	POTENTIAL BAD PAKS B0	B1	B2	B3
32	ERROR ON CL	CL	IOU04		IOU04	
33	ERROR ON CR	CR	IOU11		IOU12	
34	FIRMWARE ERROR	CP	IOU10		IOU13	
35	ERROR ON CM	CM	IOU18		IOU19	
36	ERROR ON CP	CP	IOU10		IOU13	
37	CONVERSION ERROR	CP	IOU11		IOU14	
39	PPM DATA IN ERROR	CM	IOU18		IOU19	
		CP	IOU10		IOU13	
45	O.S. BOUNDS	CL	IOU04		IOU04	
	VIOLATION	CN	IOU05		IOU05	
46	O.S. BOUNDS	CL	IOU04		IOU04	
	ADDR. P.E.	CN	IOU05		IOU05	
48	C.M. DATA OUT ERROR	DC	MEM07		MEM07	
49	UNCORRECTED CM	DC	MEM07		MEM07	
	WRITE ERROR	CL	IOU04		IOU04	
50	UNCORRECTED CM	CL	IOU04		IOU04	
	WRITE ERROR	CM	IOU18		IOU19	
51	CM REJECT ERROR	DC	MEM07		MEM07	
		CL	IOU04		IOU04	
52	CM TAG OUT ERROR	DC	MEM07		MEM07	
		CL	IOU04		IOU04	
53	CM RESPONSE ERROR	DC	MEM07		MEM07	
		CL	IOU04		IOU04	

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FS2 BITS	ERROR DESCRIPTION	MODULE TYPE	POTENTIAL BAD PAKS B0	B1	B2	B3
32	CH7 ERROR	CH	IOU09		IOU09	
33	CH6 ERROR	CH	IOU09		IOU09	
34	CH5 ERROR	CH or DH	IOU10		IOU10	
35	CH4 ERROR	CH or DH	IOU10		IOU10	
36	CH3 ERROR	CH or DH	IOU10		IOU10	
37	CH2 ERROR	CH or DH	IOU10		IOU10	
38	CH1 ERROR	CH or DH	IOU10		IOU10	
39	CH0 ERROR	CH or DH	IOU10		IOU10	
40	CH17 ERROR	CJ	IOU08		IOU08	
42	CH15 ERROR	CJ	IOU08		IOU08	
		CK	IOU20		IOU20	
44	CH13 ERROR	CH	IOU09		IOU09	
45	CH12 ERROR	CH	IOU09		IOU09	
46	CH11 ERROR	CH	IOU09		IOU09	
47	CH10 ERROR	CQ	IOU17		IOU17	
48	CH27 ERROR	CH	IOU16		IOU16	
49	CH26 ERROR	CH	IOU16		IOU16	
50	CH25 ERROR	CH	IOU15		IOU15	
51	CH24 ERROR	CH	IOU15		IOU15	
52	CH23 ERROR	CH	IOU15		IOU15	
53	CH22 ERROR	CH	IOU15		IOU15	
54	CH21 ERROR	CH	IOU15		IOU15	
55	CH20 ERROR	CH	IOU15		IOU15	
59	RI 2/3	--	--		--	
60	CH33 ERROR	CH	IOU16		IOU16	
61	CH32 ERROR	CH	IOU16		IOU16	
62	CH31 ERROR	CH	IOU16		IOU16	
63	CH30 ERROR	CH	IOU16		IOU16	

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FS2 BITS	ERROR DESCRIPTION	MODULE TYPE	POTENTIAL BAD PAKS B0	B1	B2	B3
32	CH7 ERROR	SH	IOU08		IOU08	
33	CH6 ERROR	SH	IOU08		IOU08	
34	CH5 ERROR	SH	IOU07		IOU07	
35	CH4 ERROR	SH	IOU09		IOU09	
36	CH3 ERROR	SH	IOU09		IOU09	
37	CH2 ERROR	SH	IOU07		IOU07	
38	CH1 ERROR	SH	IOU09		IOU09	
39	CH0 ERROR	SH	IOU09		IOU09	
40	CH17 ERROR	CJ	IOU06		IOU06	
42	CH15 ERROR	CJ	IOU06		IOU06	
		CK	IOU20		IOU20	
44	CH13 ERROR	SH	IOU07		IOU07	
45	CH12 ERROR	SH	IOU08		IOU08	
46	CH11 ERROR	SH	IOU08		IOU08	
47	CH10 ERROR	FQ	IOU17		IOU17	
48	CH27 ERROR	SH	IOU15		IOU15	
49	CH26 ERROR	SH	IOU15		IOU15	
50	CH25 ERROR	SH	IOU16		IOU16	
51	CH24 ERROR	SH	IOU14		IOU14	
52	CH23 ERROR	SH	IOU14		IOU14	
53	CH22 ERROR	SH	IOU16		IOU16	
54	CH21 ERROR	SH	IOU14		IOU14	
55	CH20 ERROR	SH	IOU14		IOU14	
59	RI 2/3	--	--		--	
60	CH33 ERROR	SH	IOU16		IOU16	
61	CH32 ERROR	SH	IOU15		IOU15	
62	CH31 ERROR	SH	IOU15		IOU15	
63	CH30 ERROR	SH	IOU16		IOU16	

CEL BITS	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
32	SYNDROME BIT 0	DC-MEM07/DDSYN0	DC-MEM07, DD-MEM08 DA-MEM12
33	SYNDROME BIT 1	DC-MEM07/DDSYN1	DC-MEM07, DD-MEM08 DA-MEM12
34	SYNDROME BIT 2	DC-MEM07/DDSYN2	DC-MEM07, DD-MEM09 DA-MEM12
35	SYNDROME BIT 3	DC-MEM07/DDSYN3	DC-MEM07, DD-MEM09 DA-MEM12
36	SYNDROME BIT 4	DC-MEM07/DDSYN4	DC-MEM07, DD-MEM10 DA-MEM12
37	SYNDROME BIT 5	DC-MEM07/DDSYN5	DC-MEM07, DD-MEM10 DA-MEM12
38	SYNDROME BIT 6	DC-MEM07/DDSYN6	DC-MEM07, DD-MEM11 DA-MEM12
39	SYNDROME BIT 7	DC-MEM07/DDSYN7	DC-MEM07, DD-MEM11 DA-MEM12

UEL1 BITS	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
2	+ILLEGAL FUNCTION	DC-MEM07/------	DC-MEM07
3	+MEMORY BOUNDS FAULT	DC-MEM07/------	DC-MEM07, DA-MEM12
32	+WRITE DATA PAK PAR. ERR. BYTE 1	DC-MEM07/DD14PE	DC-MEM07, DD-MEM08
33	PAR. ERR. BYTE 2	DC-MEM07/DD24PE	DC-MEM07, DD-MEM09
34	PAR. ERR. BYTE 3	DC-MEM07/DD34PE	DC-MEM07, DD-MEM10
35	PAR. ERR. BYTE 4	DC-MEM07/DD44PE	DC-MEM07, DD-MEM11
43	+TAG IN PAR. ERR.	DC-MEM07/------	DC-MEM07
44	+FUNCTION PAR. ERR.	DC-MEM07/------	DC-MEM07

UEL2 BITS	ERROR DESCRIPTION	PAR CHK PAK LOC/SIGNAL	POTENTIAL BAD PAKS
2	DATA OUT PAR. ERR.	DC-MEM07/------	DC-MEM07
3	SEC/DED DBE	DC-MEM07/------	DC-MEM07
4	+TAG OUT PAR. ERR.	DC-MEM07/------	DC-MEM07
32	+DATA OUT PAR. ERR. BYTE 0	DD-MEM08/DD1JEA	DC-MEM07, DD-MEM08
33	BYTE 1	DD-MEM08/DD1JEB	DC-MEM07, DD-MEM08
34	BYTE 2	DD-MEM09/DD2JEA	DC-MEM07, DD-MEM09
35	BYTE 3	DD-MEM09/DD2JEB	DC-MEM07, DD-MEM09
36	BYTE 4	DD-MEM10/DD3JEA	DC-MEM07, DD-MEM10
37	BYTE 5	DD-MEM10/DD3JEB	DC-MEM07, DD-MEM10
38	BYTE 6	DD-MEM11/DD4JEA	DC-MEM07, DD-MEM11
39	BYTE 7	DD-MEM11/DD4JEB	DC-MEM07, DD-MEM11

APPENDIX E

PANEL MAPS AND PAK LAYOUTS

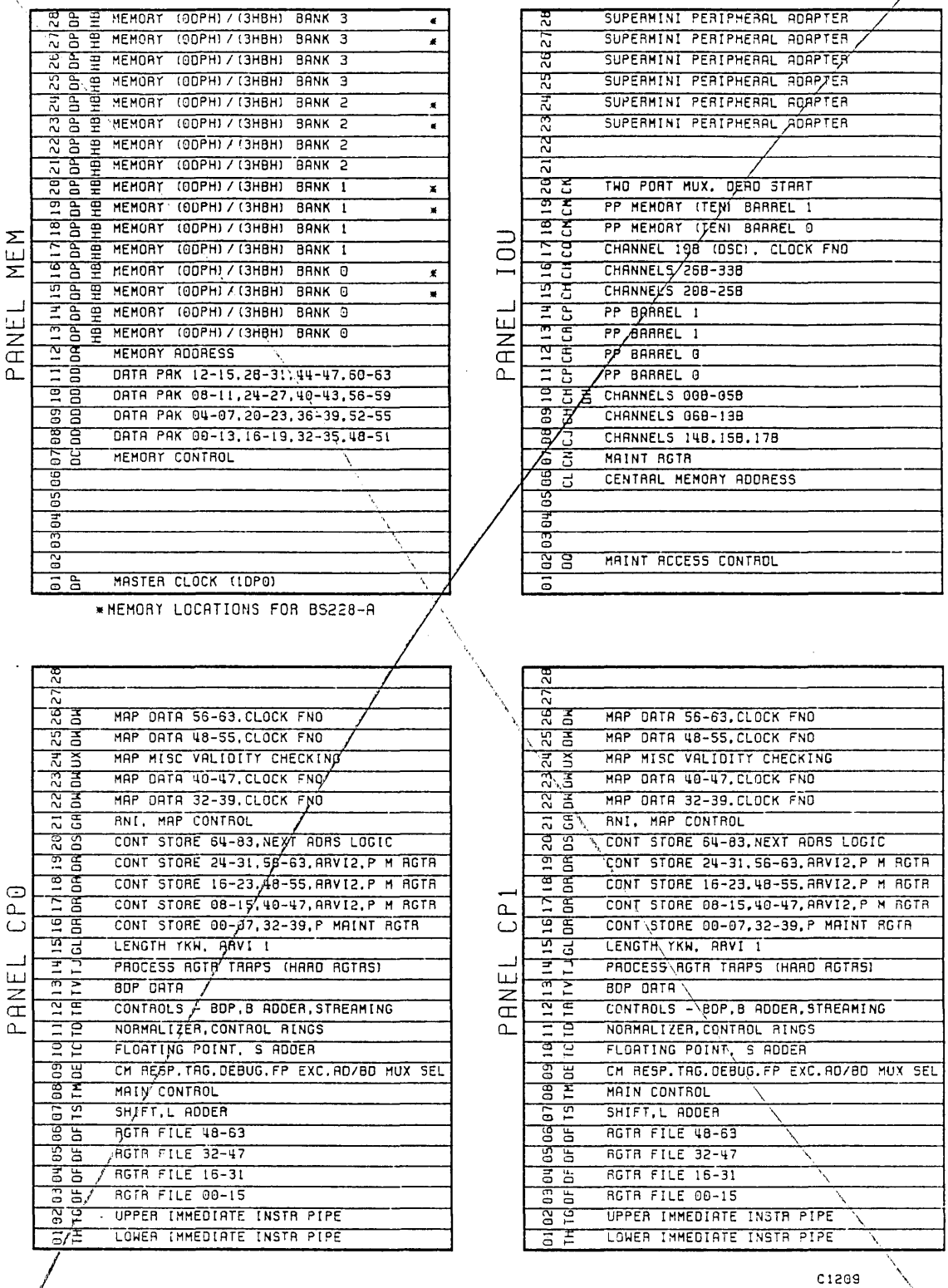

Figure E-1 Panel Map - Models 810, 810A, 830 and 830A

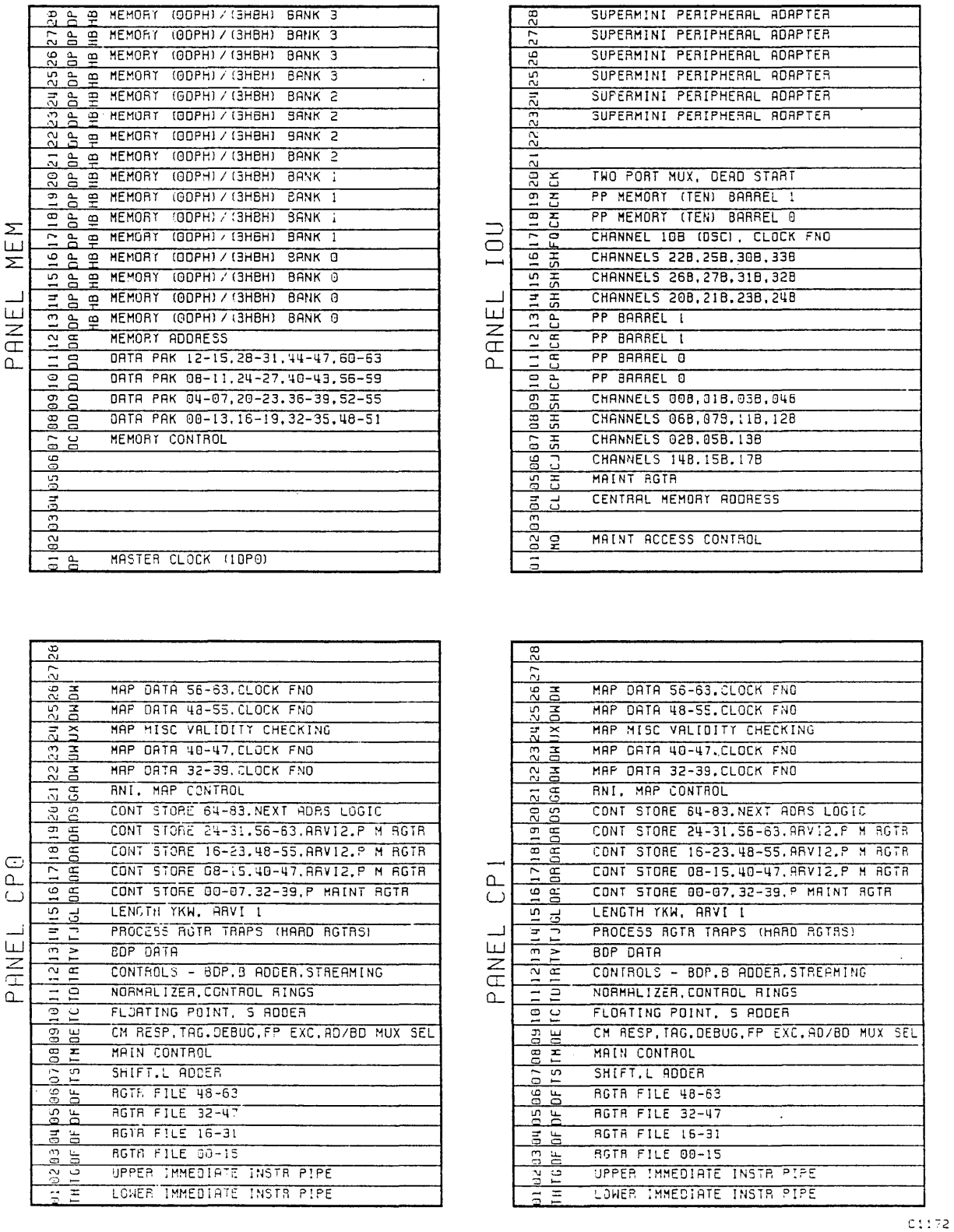

Figure E-2 Panel Map - Models 65810 and 65830

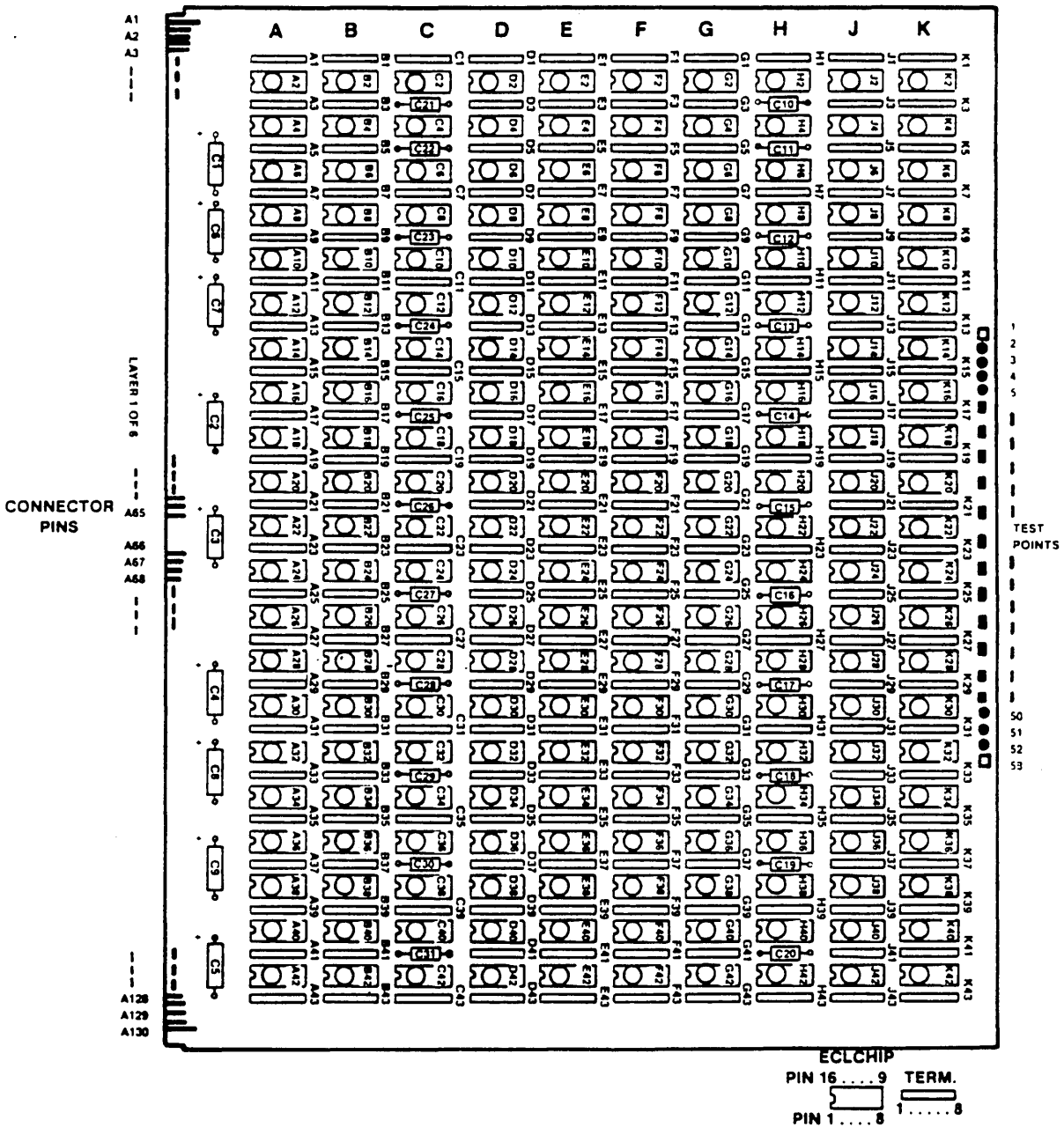

Figure E-3 210 Logic Pak Layout

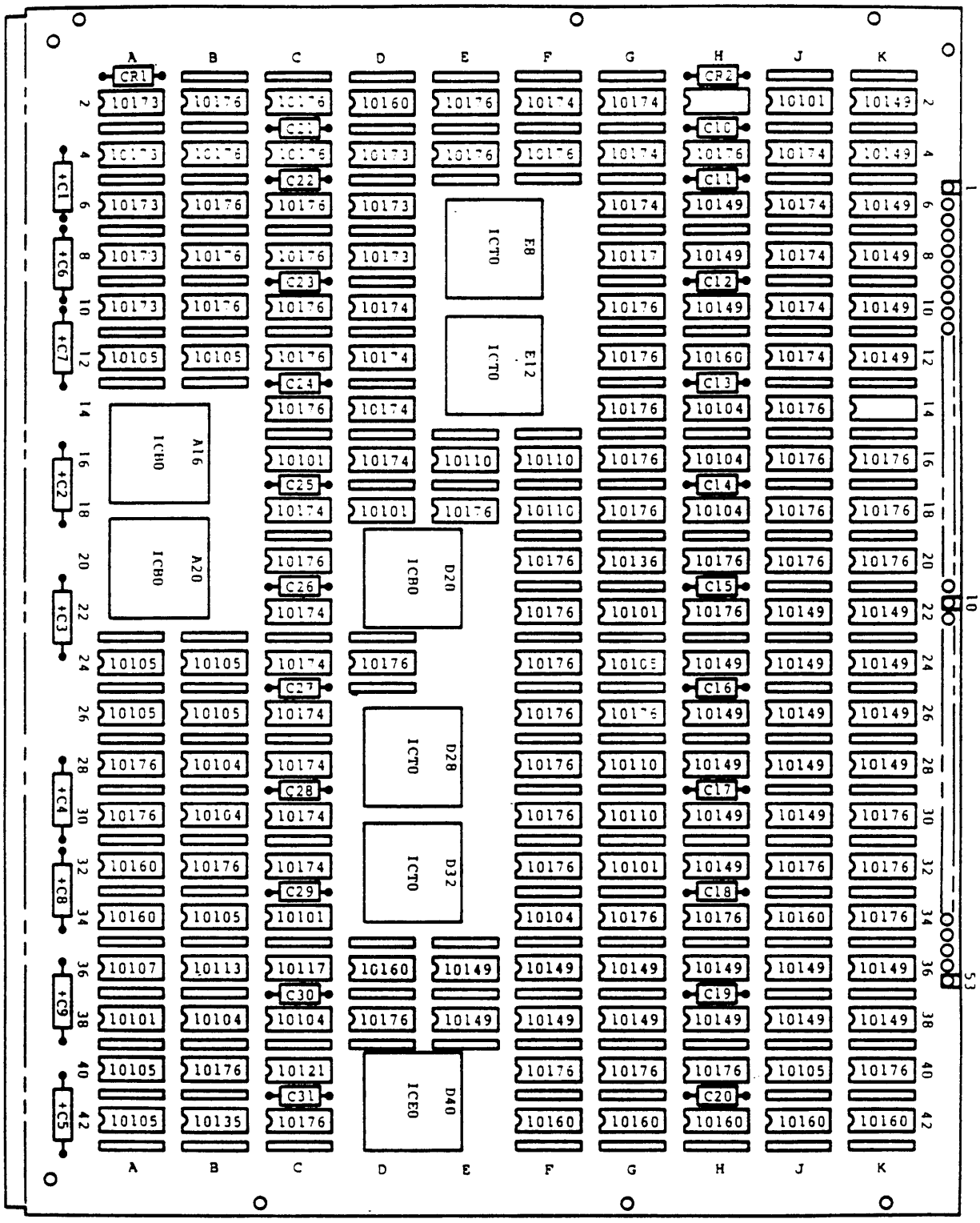

Figure E-4 210 Logic with Macrocell Pak Layout

COMMENT SHEET

MANUAL TITLE: CYBER 180 Models 810, 810A, 65810, 830, 830A and 65830
Computer Systems
Maintenance Parts Data

PUBLICATION NO.: 60469500 REVISION: C

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