TM 9-4935-647-14&P

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS

FOR

PDC MODEL 128A CIRCUIT TESTER

MULTIPLE LAUNCH ROCKET SYSTEM

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
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Change)
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DEPARTMENT OF THE ARMY
Washington, D.C. 22 July 1988

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
INCLUDING REPAIR PARTS
for
PDC MODEL 128A CIRCUIT TESTER
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TM 9-4935-647-14 & P, dated 11 June 1986, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

REMOVE PAGES	INSERT PAGES
11-1, 11-2	11-1, 11-2

2. New or changed material is indicated by a vertical bar in the outer margin of the page.

3. Retain this sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-32, Direct Support and General Support Maintenance requirements for Multiple Launch Rocket System (MLRS).

PIN: 059988-002

WARNING

DANGEROUS VOLTAGE

is used in the operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions

Never work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid. When the technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take particular care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever the nature of the operation permits, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

Do not be misled by the term “low voltage”. Potentials as low as 50 volts may cause death under adverse conditions.

TM 9-4935-647-14&P

Technical Manual

HEADQUARTERS
DEPARTMENT OF THE ARMY

No. 9-4935-647-14&P

Washington, D.C., *11 June 1986*

Operator's, Organizational, Direct Support, and General Support Maintenance Manual (Including Repair Parts)

for

PDC MODEL 128A CIRCUIT TESTER MULTIPLE LAUNCH ROCKET SYSTEM

REPORTING OF ERRORS

You can improve this manual by submitting your recommendations using DA Form 2028 (Recommended Changes to Publications and Blank Forms). Mail direct to: Commander, U.S. Army Missile Command,ATTN:AMSMI-MMC-LS-LP, Redstone Arsenal, Alabama 35898-5238. A reply will be furnished to you.

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This manual is, in part, authenticated manufacturer's commercial literature. A Maintenance Allocation Chart has been added to supplement the commercial literature. The format of this manual has not been structured to consider levels of maintenance.

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Section 0. GENERAL INFORMATION

0-1. Scope. This manual contains instructions for the operator, organizational, direct support, and general support maintenance of and calibration procedures for the PDC Model 128A Circuit Tester.

0-2. Indexes of Publications. Refer to DA Pam 310-1 to determine whether there are new editions, changes or additional publications pertaining to the PDC Model 128A Circuit Tester. Refer to DA PAM 310-7 to determine whether there are modification work orders (MWOS) pertaining to the PDC Model 128A Circuit Tester.

0-3. Maintenance Forms, Records and Reports. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS). The DA PAM is published in the Maintenance Management UPDATE. Units may subscribe to Maintenance Management UPDATE by submitting a completed DA Form 12-13. Accidents involving injury to personnel or damage to materiel will be reported on DA Form 285, Accident Report, in accordance with AR 385-40.

0-4. Reporting Equipment Improvement Recommendations (EIR). If your Model 128A PDC Circuit Tester needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, U.S. Army Missile Command, ATTN: AMSMI-QA-QM, Redstone Arsenal, AL 35898-5290. We'll send you a reply.

0-5. Administrative Storage. Instructions for administrative storage of the PDC Model 128A Circuit Tester are found in Section 2.

0-6. Destruction of Army Electronics Materiel. Destruction of PDC Model 128A Circuit Tester to prevent enemy use shall be in accordance with TM 43-0002-26, Destruction of Equipment to Prevent Enemy Use for Multiple Launch Rocket System.

SECTION 1

INTRODUCTION AND SPECIFICATION

1.1 THE 128-A INSTRUCTION MANUAL

The PDC INC.Model 128-A Circuit Tester Manual contains instructions essential to the operation, maintenance, checkout, and calibration of the 128-A.

The operator manual is divided into the following sections:

SECTION 1	INTRODUCTION SPECIFICATIONS AND DESCRIPTION	Introduces the 128-A Instruction Manual, describes the 128-A and its features, and lists the Instrument's specifications.
2	INSTALLATION	Contains instructions for unpacking, storing, and handling the Tester.
3	OPERATION	Provides the operator instructions for each of the components.
4	THEORY OF OPERATION	Explains the theory of operation for each function of the Tester based on signal paths and configuration of the Tester for the specific test where each function is used.
5	CALIBRATION, MAINTENANCE, AND TROUBLESHOOTING INSTRUCTIONS	Provides a step-by-step troubleshooting procedure to isolate Tester failures.
6	DRAWINGS	Contains assemblies, subassemblies, detailed schematic diagrams, circuit board assemblies, cable assemblies, block diagrams; detailed parts list, connector function list, drawing tree, recommended spare parts kits.
7	GENERAL INFORMATION	1. List of Abbreviations 2. Federal Supply Codes Of Manufactures 3. Static Precautions 4. Data Sheet for Part Identification
8	SECIAL TOOLS & TESTING EQUIPMENT	List Tools & No's

9	WARRANTY	Contains detailed Warranty
10	ERRATA SHEETS	Contains sheets for errors and omissions.
11	MLRS SET-UP AND TESTING CABLES	1. MLRS Adapter System Procedure For Testing 2. MLRS Interconnects For Testing 3. Cable Input Parts List Schematic 4. Cable Output Parts List Schematic 5. Reference Chart For Megohms, Reading When Testing.

1. 2 RELATED/AFFECTED TECHNICAL PUBLICATIONS

Operation and Maintenance Manual

The manual listed above should be delivered with each Tester.

"WARNING,""CAUTIONS"AND"NOTES"

Warnings, cautions and notes precede the text to which each applies. Warning, cautions and notes that appear in this manual are defined as follows:

" WARNING " An operating or maintenance procedure, practice condition, statement, etc., which if not strictly observed, could result in personal injury to or death of personnel.

CAUTION An operating or maintenance procedure practice, condition, statement, etc., which if not strictly observed, could result in damage to or destruction of equipment or loss of Tester effectiveness.

" NOTE " An essential operating or maintenance procedure, practice, condition, statement, that must be highlighted.

1.3 GENERAL

The PDC Model. 128A Circuit Tester is a general purpose automatic programmable cable tester. The features incorporated in the Tester will allow an operator to quickly set up the Tester and automatically test complex cables with various branch and open pin configurations. The Tester performs complete and comprehensive cable circuit resistance and leakage current measurements and compares these measured values to the values stored by the operator in the tester's temporary memory. The tester also detects a cable branch and open circuit configuration and compares this to branch and open circuits stored by the operator, in the tester's permanent memory. The Tester performs these functions automatically and without the use of external jumpers, straps or test equipment. If any circuit fails any of. the operator selected tests, the tester will halt the test, indicate the failed measurement, display the value of the failed measurement and resume testing at the operator's commnd.

1.4 GENERAL DESCRIPTION

The Tester is housed in a portable rain resistant case that has provisions for stowing the power cable. The Tester Front Panel (Page 6-6) has: power cable, test cable, test voltage connectors, power switch, test control switches, indicator lamps and a three digit display.

A. Functional Description

The tester consist of eleven functional blocks which are shown in block diagram Page 5-20.

1. FRONT PANEL

a. Input power Connector

b. Power ON/OFF switch

c. Three Digit BCD Data Entry switch; used to set the test period, max. leakage current, max. series resistance, test start position, high voltage leakage test voltage and the cable memory number.

d. Test Control and Memory Read/Program Switches

e. Three digit display which indicates; the circuit under test number, memory contents (decimals), measured leakage current, series resistance and test voltage levels.

f. One digit BCD Punction Select Switch.

9. Fault Indicators

h. Circuit Under Test Input and Output Connectors

2. POWER SUPPLY

Supplies + 5 Vdc, -12 Vdc and +12 Vdc to the tester circuitry.

3. FRONT PANEL INTERFACE

Contains the buffers and drivers needed to interface the tester logic circuitry with the front panel.

4. One permanent memory (retains data when power is off) that can hold branch and open circuit data for up to fifteen cables (With 128 Circuits Per Cable Maximum). Five temporary memories (loses data when power is off) that holds: Test Start circuit number (which allows starting a test at any circuit number) , Max. Leakage Level (A leakage level above which the operator wants a fault indicated), Max. Series Resistance (a series resistance above which the operator wants a fault indicated), Cable Memory (1 through 15), Test Voltage (Set between 100 and 500 Vdc and is the voltage level at which the operator wants the leakage measurement made).

S5 FUNCTION SELECT POSITION	EXAMPLE
7 Test Start Circuit No.	x x x 7
3 Maximum Leakage Level	x x x 3
4 Maximum Series Resistance	x x x 4
5 Select Memory	x x x 5
8 Set High Voltage Leakage Level	x x x 8

NOTES: See Page 3-1 And 3-2 To Enter

5. DISPLAY CONTROL

The logic circuitry that selects the desired data that is to be displayed.

6. FAULT LOGIC

The Logic Circuitry that compares measured data to memory data and operates the proper Fault Indicator when a fault Occurs.

7. CONTROL AND TIMING LOGIC

Circuitry that contains a clock, timing circuits, counters and control circuits that maintain the proper sequencing of all the tester circuitry.

8. MEASUREMENT MEMORY

A temporary memory that retains the measured data (series resistance, leakage current and test voltage) until the Control and Timing Logic and Fault Logic has made the necessary comparison and initiated testing on the next circuit. This data may be displayed whenever tester automatic sequencing is halted (either by the operator or by the Fault Logic when a fault is detected).

9. ANALOG TO DIGITAL CONVERTER

Circuitry that is used to make analog voltage measurements and convert the measurement to 12 bit of BCD data. This BCD data is stored in the Measurement Memory.

10. TEST VOLTAGE AND CURRENT SOURCES

Circuitry that generates a high voltage (up to 500 Volts) ramp and a 100 milliamp current source. The high voltage ramp is used in the leakage current measurement test and 100 milliamp current source is used in the series resistance measurement test. The Power Supply +12 Vdc is used for the Low Voltage Shorts Test.

11. CIRCUIT UNDER TEST SELECTOR

Circuitry that decodes and buffers the binary address generated by the Timing and Control Logic, energizes the circuit under test selection relays, and applies the high voltage ramp and current source to the circuit under test.

1.5 Physical Characteristics

The case dimensions of the Tester are 18 in. (wide) by 17 in. (high) by 12 in. (deep). The weight is 35 pounds.

1.6 Power Requirements

The Tester operates from 115 ±10 Vac or 230 ±10 Vac, 47 to 440 Hz, Single Phase Power. Refer to Page 6-47 of this manual for supply voltage selection.

1.7 MAJOR COMPONENTS

The Tester consists of the Enclosure, the *Front* Panel, the Power Supply, the card Cage and the Interconnect Cables described below.

1.7.1 MAJOR COMPONENTS DESCRIPTION

A. ENCLOSURE

The Tester and power cable are supplied in a suitcase type, rain resistant enclosure (See Page 6-38).

B. FRONT PANEL

The Tester controls end displays are mounted on a 18 inch by 17 inch control panel. The components mounted on the Front Panel are connected to the internal electronics by cabling. Table 1-1 on Page 1-9 is a Summary of the Front panel Connectors and their functions. Table 1-2 on Page 1-10 is a summary of the Front Panel Control Switches , their titles and a brief functional description. Table 1-3 on Page 1-12 is a summary of the Front Panel Display and a brief functional description.

C. POWER SUPPLY

The Power Supply is a stand alone unit that operates from 115 Vac or 230 Vac (user selectable) Line voltage and 47 tO 440 Hz line frequency (See Page 6-40).

D. CARD CAGE

The Card Cage is a rugged aluminum frame that houses the Mother Board (With PC Card Connectors) and PDC Card Guides (See Page 6-23).

E. INTERCONNECT CABLES

There are three Interconnect Cables: the measurement cable that connects between the Test Voltage/Current Sources, the Circuit Under Test Selector, the ADC (See Page 6-118); the interface cable that provides interconnection between the Front Panel and the Interface Electronics (See Page 6-123); Input/Output Cable that intercomects between the Circuit Under Test Selector and the Front Panel Input and Output Connectors (See Page 6-28).

1.8 EQUIPMENT SUPPLIED

The equipment required to operate the Tester is supplied as a part of the Tester. Other equipment required to calibrate, maintain and troubleshoot the tester is given in Section 5 and Section 8.

1.9 LIMITS OF ACCURACY

A. METER/DATA DISPLAY

The meter is diode clamped for protection. Readings that are above approximately 650 are diode clamped and should be considered an Over Range condition.

B. DC TEST VOLTAGE

1. The Low Voltage Test operates at 10 VDC ±10%.
2. The High Voltage Test is programmable and can operate from 200 VDC to 500 VDC ±10%.

C. LEAKAGE MEASUREMENT

The leakage reads in MICROAMPS ±10%.

D. OHMS MEASUREMENT

1. The Current Source operates at 100 MA ±10%.
2. The Internal Resistance of the Tester is 0.65 OHMS ±10%.

TABLE 1-1

FRONT PANEL CONNECTIONS BETWEEN THE TESTER AND CIRCUIT UNDER TEST

CONNECTOR	FRONT PANEL LOCATION	CONNECTION TO CIRCUIT UNDER TEST	
		TITLE	FUNCTION
J1	Lower Left	POWER	Input power (AC Power)
J2	Lower Cntr	INPUT	Circuit under test input connection
J3	Lower Right	OUTPUT	Circuit under test output connection
J4	Upper Left	Test Connector + Connector -	Test (Insulation Leakage Standard)
J5	Upper Cntr	Test Connector + Connector -	Test (Series Resistance Standard)

TABLE 1-2
FRONT PANEL CONTROL SWITCHES

SWITCH	FRONT PANEL TITLE	FUNCTIONAL DESCRIPTION
S1	POWER	CIRCUIT BREAKER, APPLIES POWER WHEN “ON” AND REMOVES POWER WHEN “OFF” OR AN OVERLOAD IS DETECTED
S2	READ	CAUSES MEASURED DATA TO APPEAR ON THE 3 DIGIT METER/DATA DISPLAY WHEN DEPRESSED (MOMENTARY). AUTOMATIC TEST SEQUENCING MUST BE STOPPED (HOLD) (S7)
S3	MEMORY	SETS THE CABLE MEMORY CONTENTS TO CLEAR (CENTER] , OPEN (LEFT) , OR SHORT (RIGHT} WHEN IN THE PROGRAM MEMORY FUNCTION (S5 , FUNCTION SELECT 6)
S4	RESET/ENTER	INITIALIZES THE TESTER LOGIC (CLEARS ALL FAULTS AND SETS THE TESTER TO THE “TEST START POSITION”) WHEN IN “RESET” (MOMENTARY) , AND “ENTER”S (MOMENTARY) DATA FROM THE FOUR DECK THUMBWHEEL AND/OR THE MEMORY SWITCH
S5	DATA ENTRY/ FUNCTION SELECT	A FOUR DECK TEN POSITION THUMBWHEEL SWITCH. THE THREE “DATA ENTRY” SWITCHES SETS THE VALUE OF THE DATA TO BE ENTERED. THE “FUNCTION SELECT” SWITCH SELECTS THE FUNCTION THE TESTER IS TO PERFORM
S6	HIGH VOLTAGE LEAKAGE/ LOW VOLTAGE SHORT	SELECTS THE LEAKAGE TEST THAT IS TO BE PERFORMED; LOW VOLTAGE SHORT, HIGH VOLTAGE LEAKAGE, OR OFF (NO LEAKAGE TESTING)

TABLE 1-2

(CONT.)

FRONT PANEL CONTROL SWITCHES :

SWITCH	FRONT PANEL TITLE	FUNCTIONAL DESCRIPTION
S7	RUN/ HOLD/ SINGLE STEP	SETS THE TESTER TO AUTOMATIC TEST SEQUENCING WHEN IN "RUN", STOPS AUTOMATIC TEST SEQUENCING WHEN IN "HOLD", AND ADVANCES TESTER TO THE NEXT TEST POSITION WHEN "SINGLE-STEP" IS DEPRESSED (MOMENTARY)
S8	SERIES RESISTANCE CONTINUITY/ LAMP TEST	SELECTS THE CONTINUITY TEST IF IN THE "CONTINUITY" POSITION, NO. CONTINUITY TEST IS PERFORMED WHEN "OFF", AND CAUSES ALL LAMPS, AND DECIMAL POINTS TO ILLUMINATE, AND THE THREE DIGIT METER/DATA DISPLAY DISPLAYS TO INDICATE "8.8.8." IN THE "LAMP TEST" POSITION.

TABLE 1-3

FRONT PANEL DISPLAYS

DISPLAY	FRONT PANEL TITLE	FUNCTIONAL DESCRIPTION
DS1 , DS2 , DS3	METER/DATA DISPLAY	DISPLAYS DATA SELECTED BY THE FUNCTION SELECT SWITCH AS FOLLOWS: 1,2,6 - TEST POSITION 3 -LEAKAGE FAULT LEVEL IN UA. 4 - HIGH SERIES RESISTANCE FAULT LEVEL X 0.01 OHMS 5 -CABLE MEMORY TO BE USED FOR THE NEXT TEST (1 THRU 15) 8 - THE MAXIMUM VOLTAGE TO BE USED FOR THE HIGH VOLTAGE LEAKAGE TEST
LEFT DECIMAL	LEFT DECIMAL	INDICATES AN “OPEN” IS EXPECTED AT THE DISPLAYED TEST POSITION, OR “OHMS” DATA IS BEING READ
CENTER DECIMAL	CENTER DECIMAL	INDICATES LEAKAGE DATA IS BEING DISPLAYED
RIGHT DECIMAL	RIGHT DECIMAL	INDICATES A “SHORT” IS EXPECTED AT THE DISPLAYED TEST POSITION OR “VOLTAGE” DATA IS BEING READ
D4	WARNING HIGH VOLTAGE	INDICATES THAT THE HIGH VOLTAGE LEAKAGE TEST WAS SELECTED AND THAT HIGH VOLTAGE MAY BE APPLIED TO THE CIRCUIT OR CABLE UNDER TEST AS WELL AS J4 THE INSULATION LEAKAGE JACKS

TABLE 1-3

(cont.)

FRONT PANEL DISPLAYS

DISPLAY	FRONT PANEL TITLE	FUNCTIONAL DESCRIPTION
D5	WARNING GROUND FAULT	INDICATES THAT THE INTERNAL GROUND FAULT DETECTOR HAS SENSED A GROUND FAULT
D6	PROGRAM ERROR	INDICATES THAT THE TESTER WAS PROGRAMMED FOR “OPEN” OR “SHORT” AT THIS TEST POSITION BUT THE SHORT OR OPEN ARE NOT IN THE CABLE
D7	EXCESS LEAKAGE	INDICATES THAT THE TESTER HAS DETECTED CIRCUIT LEAKAGE CURRENT IN EXCESS OF THE SELECTED LEAKAGE CURRENT FAULT LEVEL
D8	SHORT CIRCUIT	INDICATES THAT THE TESTER HAS DETECTED LEAKAGE CURRENT IN EXCESS OF THE INTERNALLY SET LEAKAGE CURRENT FAULT LEVEL
D9	CROSSED WIRES	INDICATES THAT THE TESTER HAS DETECTED A CROSSED WIRE, I.E . AN “OPEN” AND A “SHORT” WAS DETECTED AT THE SAME TEST POSITION
D10	OPEN CIRCUIT	INDICATES THAT THE TESTER HAS DETECTED A CONTINUITY RESISTANCE IN EXCESS OF THE INTERNALLY SET FAULT LEVEL
Dll	HIGH SERIES RESISTANCE	INDICATES THAT THE TESTER HAS DETECTED A CONTINUITY RESISTANCE IN EXCESS OF SELECTED CONTINUITY RESISTANCE FAULT LEVEL

SECTION 2

INSTALLATION

2.1 GENERAL

The Tester is a portable system and does not require installation. Set up adjustments are not required; however, after the Tester is unpacked,the supply voltage selection (See Page 6-47) should be checked and the Tester SELF-TEST (section 3.2A) should be performed.

2.2 SHIPPING

Shipping of the Tester will be in accordance with MIL-STD 1188A.

2.3 UNPACKING PROCEDURE

The following procedures should be used to unpack the Tester.

a. Remove the Tester from the shipping container.

b. Remove the packing material from around the Tester.

c. One person can lift the Tester from the shipping container and place it on an empty work bench or cart.

d. Unlatch the fasteners and remove cover.

"NOTE" The Tester power cable and manual are shipped inside the cover of the enclosure.

2.4 STORAGE

The Tester may be stored in any convenient location within the circuit testing area. The Tester power cable may be stored inside the cover of the Tester or any convenient location in the circuit test area.

"NOTE" The Tester Cover must be mounted in place when not in use to insure keeping Tester free of dirt, dust and foreign material.

2.5 INTERCONNECTIONS

Cable interconnections with illustrations for testing are provided in Section 11 of this manual. Functions of the interconnections are also provided.

2.6 SUPPLY VOLTAGE SELECTION

The Tester will operate from either of two supply voltage levels, 115 ±10 or 230 ±10 Vac. The Tester is connected for operation from The supply voltage level that is indicated by J1 on the Front Panel. If operation from the alternate supply voltage level (the level that is not indicated on the Front Panel) is desired see Page 5-2 for instruction to disassemble Power Supply. Using Wiring Diagram for Input Power on Page 6-47 reconnect the jumpers for selection of the desired supply voltage level.

STANDARD TEST PROCEDURE FOR
ANY INTERFACED CABLE OR
CIRCUIT UNDER TEST

"CAUTION" TEST STATUS SWITCHES S6, S7, AND S8 IN CENTER OR OFF POSITION WHEN ENTERING DATA OR FUNCTIONS WITH THUMB-WHEEL SWITCH S5 OR WHEN APPLYING OR REMOVING A C POWER

SECTION 3

OPERATION

3.1 GENERAL

This section provides set-up procedures for operation of the Tester to conduct the various circuit or cable tests.

3.2 OPERATION AND TEST PROCEDURES

The Tester hook-up and Set-up procedures are provided in the remainder of this section. For "HIGH VOLTAGE" Self Test.

A. The following steps should be performed prior to testing cables.

STEP 1 SET-UP PROCEDURES

S1 (Power Switch) _____ Set to OFF position
S3 (Memory) _____ Set to CLEAR position (Center)
S5 (Thumbwheel Switch) _____ Set as shown 001 1
S6 (Test Status Switch) _____ Set to OFF position
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position
INSERT AC PLUG IN J1 LOCATION

STEP 2 POWER ON PROCEDURE

S1 (Power Switch) _____ Set to ON position
METER/DATA DISPLAY WILL LIGHT UP
S8 (Test Status Switch) _____ Press DOWN position
TO VERIFY ALL LAMPS ILLUMINATE AND METER/DATA DISPLAY INDICATES
8.8.8.

"NOTE" AFTER STEP 2 TESTER SHOULD BE ALLOWED To WARM UP 30 MINUTES FOR MORE ACCURATE READINGS

STEP 3 SELF TEST

This test looks for any internal leakage up to 500 megohms.
CONNECT JUMPER FROM J5 (red) TO J5 (black).
"NOTE" NO CABLE CONNECTION REQUIRED FROM J2 OR J3

STEP 4 SET LEAKAGE LEVEL

Step 5 (Thumbwheel Switch) _____ Set as shown 010 3
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
01.0

STEP 5 SET-MAX SERIES RESISTANCE

S5 (Thumbwheel Switch) _____ Set as shown 100 4
S5 _____ Press ENTER to enter
DISPLAY WILL INDICATE
1.00

STEP 6 SET CABLE MEMORY

S5 (Thumbwheel Switch) _____ Set as shown 001 5
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
001

STEP 7 SET TEST START POSITION

S5 (Thumbwheel Switch) _____ Set as shown 001 7
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
000

STEP 8 TO SET HIGH VOLTAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 500 8
S4 _____ Press ENTER two times to enter
METER/DATA DISPLAY WILL INDICATE
500

"NOTE "This is a 500 Volt setting

STEP 9 HIGH VOLTAGE SELF TEST

S5 (Thumbwheel Switch) _____ Set as shown 010 2
S6 (Test Status Switch) _____ Set to HIGH VOLTAGE LEAKAGE
S8 (Test Status Switch) _____ Set to SERIES RESISTANCE CONTINUITY
Note After setting of S6 Switch, HIGH VOLTAGE LAMP will light up.

S4 _____ Press RESET to reset
METER/DATA DISPLAY WILL INDICATE THE TEST START POSITION
S7 _____ Set to RUN position

"Note"If memory is cleared Tester will now step through 128 Test positions. This will take 10 seconds per circuit at 500 volts. Any internal leakage below 500 megohms will be indicated by test stopping and "EXCESS LEAKAGE" or "SHORT CIRCUIT" being displayed.

STEP 10 COMPLETION OF TESTING

When Tester reaches circuit 129 (end of test), set switches as follows:

S7 _____ Set to HOLD position
S6 _____ Set to OFF position
S8 _____ Set to OFF position
S4 _____ Press to reset

REMOVE JUMPER WIRE FROM J5 (red) TO J5 (black)

"NOTE " This Tester has been checked out and is ready to perform additional testing.

STANDARD TEST PROCEDURE FOR ANY INTERFACED CABLE OR CIRCUIT

The model 128A Circuit Tester is designed to automatically test cables or circuits with a minimum of operator training or interaction. This capability can be illustrated by the following outline of a typical test:

STEP 1 SET-UP PROCEDURE

S1 (POWER Switch) _____ Set to OFF position
S3 (Memory) _____ Set to CLEAR position (center)
S5 (Thumbwheel Switch) _____ Set as shown 001 1
S6 (Test Status Switch) _____ Set to OFF position
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position
INSERT AC PLUG IN J1 LOCATION

STEP 2 POWER ON PROCEDURE

S1 (power Switch) _____ Set to ON position
METER/DATA DISPLAY WILL LIGHT UP
S8 (Test Status Switch) _____ Press DOWN position
TO VERIFY ALL LAMPS ILLUMINATE AND METER/DATA DISPLAY INDICATES

8.8.8

THIS TEST WILL PERFORM A 6 SECOND 500V INSULATION LEAKAGE TEST REJECTING ANY CIRCUIT UNDER A MINIMUM 200 MEGOHMS INSULATION RESISTANCE, PLUS PERFORM A SERIES RESISTANCE, CONTINUITY TEST REJECTING ANY SERIES RESISTANCE OF 0.5 OHMS OR GREATER, WILL LOCATE ANY OPENS OR SHORTS.

STEP 3 ATTACH ANY CABLE OR CIRCUIT THAT WILL INTERFACE WITH J2 AND J3

LOCATED ON FRONT PANEL OF TESTER SEE PAGE 6-1

STEP 4 SET MAX LEAKAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 024 3
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE

02.4

STEP 5 SET MAX SERIES RESISTANCE

S5 (Thumbwheel Switch) _____ Set as shown 096 4
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE

0.96

STEP 6 SET CABLE MEMORY

S5 (Thumbwheel Switch) _____ Set as shown 001 5
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE

001

STEP 7 SET START POSITION

S5 (Thumbwheel Switch) _____ Set as shown 001|7
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL READ
000

STEP 8 SET HIGH VOLTAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 500|8
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL READ
500

STEP 9 TEST PERIOD 600 X .01 (6 SECONDS)

S5 (Thumbwheel Switch) _____ Set as shown 600|1

STEP 10

S6 _____ Press HIGH VOLTAGE LEAKAGE (Up Position)

STEP 11

S8 _____ Press SERIES RESISTANCE CONTINUITY (Up Position)

STEP 12

S4 _____ Press RESET to reset
METER/DATA DISPLAY WILL INDICATE
001

STEP 13

S7 _____ Set to RUN position (up Position)

TESTER WILL NOW STEP THROUGH EACH CIRCUIT UP TO A MAXIMUM OF 128 CONTACTS REJECTING ANY FAILURES.

STEP 14 FINISHED TESTING FOR THE DAY

S7 _____ Set to HOLD
s6 _____ Set to OFF
S8 _____ Set to OFF
S1 (Power Supply) _____ Set to OFF
REMOVE FROM J2 AND J3 COMPLETED CIRCUIT OR CABLE TESTED

UNPLUG POWER CORD

"NOTE" The Tester Cover must be mounted in place when not in use to insure keeping Tester free *of* dirt, dust, and foreign material.

MEMORY

PROCEDURES

"CAUTION" TEST STATUS SWITCHES S6, S7, AND S8 IN CENTER OR OFF POSITION WHEN ENTERING DATA OR FUNCTIONS WITH THUMB-WHEEL SWITCH S5 OR WHEN APPLYING OR REMOVING A C POWER

MEMORY

THIS PROCEDURE FOR USING,VERIFYING,CLEARING AND ~~PROGRAMING~~ MEMORY FOR MODEL 128-AR CABLE TESTER (ALL MEMORY FUNCTIONS ARE OPTIONAL).

CONNECT JUMPER FROM J5 (red) TO J5 (black).

S1 (Power Switch) _____ Set to ON position

STEP 1 SET LEAKAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 010|3
S4 _____ Press down to enter
METER/DATA DISPLAY WILL INDICATE (01.0)

STEP 2 SET-MAX SERIES RESISTANCE

S5 (Thumbwheel Switch) _____ Set as shown 100|4
S4 _____ Press down to enter
DISPLAY WILL INDICATE (1.00)

STEP 3 SET CABLE MEMORY

S5 (Thumbwheel Switch) _____ set as shown 001|5
METER/DATA DISPLAY WILL INDICATE (001)
S4 _____ Press down to enter

STEP 4 SET TEST START POSITION

S5 (Thumbwheel Switch) _____ Set as shown 001|7
S4 _____ press to enter
METER/DATA DISPLAY WILL INDICATE (000)

S5 (Thumbwheel Switch) _____ Set as shown 030|1 3 Sec

VERIFYING MEMORY CONTENT

REMOVE ANY CABLING FROM J2 AND J3
S6 _____ Press Low Voltage Leakage (Down Position)
S8 (Test Statue Switch) _____ Set to UP Position
S4 _____ Press RESET to Reset
S7 (Test Status Switch) _____ Set to RUN position

AFTER COMPLETION OF THIS SEQUENCE TESTER WILL AUTOMATICALLY STEP THROUGH ALL POSITIONS UNLESS AN “OPEN” OR “SHORT” HAS BEEN PROGRAMMED IN ANY GIVEN LOCATION.

“NOTE“ When Tester locates and “open” or “short”) the program error lamp will light up and Tester will stop at that position indicated on METER/DATA DISPLAY.

CLEAR MEMORY

PRIOR TO CLEARING MEMORY RUN VERIFY MEMORY CONTENT Page 3-5)
AND RECORD PINS TO BE CLEARED.

S7 (Test Status Switch) _____ Set to HOLD
S8 (Test Status Switch) _____ Set to OFF position
S5 (Thumbwheel Switch) _____ Set as shown [6] -See Note

" Note " Set desired position to be cleared from memory.

Example: Test position 1 = [001 | 6]

"NOTE" Position on Meter/Data Display has been cleared. To clear other positions set S5 (Thumbwheel Switch) per example.

S3 _____ Verifying in CLEAR position (Center Position)
S4 _____ Press ENTER to enter

PROGRAMMING MEMORY

S6 (Test Status Switch) _____ Set to OFF position
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position
S5 (Thumbwheel Switch) _____ Set as shown [OXX | 6] -See Note

"Note" Set desired position to be programmed in memory, (OXX can be set from 001 to a maximum of 15) See Page 1-5 Paragraph 3.

EXAMPLE: Test position 1= [001 | 6]
Note that Meter/Data Display will indicate same reading as S5 Thumbwheel Switch.

AFTER COMLETION OF CLEAR MEMORY OPERATION,VERIFY MEMORY CONTENT
SEE PAGE 3-5.

S7 Single Step Passed Program Error (Open or Short)

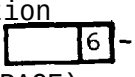
TO PROGRAM OPEN IN MEMORY

S3 _____ Set to OPEN position
S4 _____ Press ENTER to enter
S4 _____ PreSS RESET to verify

" Note " PROGRAM ERROR LAMP WILL LIGHT UP AND METER/DATA DISPLAY WILL INDICATE AS SHOW

(X.XX)

TO PROGRAM SHORT IN MEMORY

S3 _____ Set to SHORT position
S5 (Thumbwheel Switch) _____ Set as shown  -See Note
SET DESIRED POSITION (SEE EXAMPLE UNDER CLEAR MEMORY THIS PAGE).
S4 _____ Press ENTER to enter
S4 _____ Press RESET to verify

"Note" METER/DATA DISPLAY WILL INDICATE AS SHOWN
XXX.

TO VERIFY NEW MEMORY CONTENT

S4 _____ Press to reset

"Note" Meter/Data Display will indicate Cleared Memory for that position (No Decimal Points).

SECTION 4

THEORY OF OPERATION

4.1 GENERAL

The Model 128A Circuit Tester is designed to perform various circuit and cable tests automatically with a minimum of operator training or interaction. Six internal memories are provided to reduce testing complexity, and to assist failure analysis. The CABLE MEMORY retains branch and open wire data for up to 15 cables or circuits even when the power is off. The TEST DATA memory (continuity, leakage, and voltage) is retained for each test. The TEST DATA may be accessed, for failure analysis, by depressing the READ switch (MOMENTARY) three times for three individual readings. The FAULT LEVEL memory retains the continuity resistance and leakage current levels that the operator enters as the MAX SERIES RESISTANCE and MAX LEAKAGE levels allowable for the circuit under test. The SET TEST START POSITION memory retains the test position that the operator wants the Tester to test first. The LEAK TEST VOLTAGE memory retains the maximum voltage that should be applied to the circuit under test when testing HIGH VOLTAGE LEAKAGE current. The Tester operating characteristics are as follows:

* All tests are simply GO/NO GO type tests.

* No adjustments are required.

* The displays are digital readouts with indicating decimal points, and illuminated FAULT STATUS indicator lamps. The decimal points have two functions. When operating the Tester in the READ mode, the decimal points are used to indicate voltage (VDC), leakage (UA), and OHMS. Otherwise, the left and right decimal points indicate that the memory has an “OPEN” or “SHORT” programmed respectively for a given position.

* The Tester operates from 115 ± 10 VAC or 230 ± 10VAC @ 47/440 Hz.

4.2 FRONT PANEL CONTROLS

Page 6-1 illustrates the front panel controls on the Tester. the 115 VAC power is supplied to the Tester through J1 at the lower left-hand corner of the front panel. Power is applied by placing the AC POWER switch, S1, located next to the power cable, in the “ON” position. The METER/DATA DISPLAY will illuminate, indicating the power is applied.

A. READ/TEST/DATA- (S2)

The TEST DATA (MAX SERIES RESISTANCE - X 0.01 OHMS, HIGH VOLTAGE LEAKAGE - X 0.1 uA, and the HIGH VOLTAGE LEAKAGE TEST VOLTAGE - X 1 Volt) for each test position is retained in memory until the next test position testing is started. Consequently, if a test fails, the data associated with the failure can be observed and recorded if desired. The Test DATA may also be observed at any time by halting (placing the RUN/HOLD/SINGLE-STEP switch in the "HOLD" position) the test, and using the procedure on Page 1-11 for reading data. Briefly, to read data, make sure the Tester is in the "HOLD" position and depress S2 (the READ switch). The first time S2 is depressed, the voltage applied during the leakage current measurement is displayed on the 3 digit METER/DATA DISPLAY. The second depression of S2 displays the leakage measurement (in units of microamps). The third depression of S2 displays the SERIES RESISTANCE-CONTINUITY measured. Each of these readings are designated by their respective decimal points on the METER/DATA DISPLAY. (Note 1).

"NOTE"l: Care must be taken with the units of measure for each of the readings.

B. The CABLE MEMORY, which contains the location of open wires (missing wires) and shorted pins (branches), is stored in the TESTER (even when power is off) , and its content may be observed using the procedure on Page 3-5 and 3-6. When the Tester's FUNCTION SELECT switch is in position "1", "2", or "6", the cable MEMORY contents are displayed on the left most decimal point (indicating an "OPEN" is expected at the test position displayed on the three digit METER/DATA DISPLAY) , and the right most decimal point (indicating a branch or "SHORT" is expected at the displayed test position). The test positions may be incremented manually to observe the MEMORY by setting S6 (LOW VOLTAGE SHORT) and S8 (SERIES RESISTANCE-CONTINUITY/ LAMPS TEST) to "OFF" and setting the S7 RUN/HOLD/SINGLE-STEP to "SINGLE-STEP" (MOMENTARY). The test position is incremented by one each time S7 is set to "SINGLE STEP" and the MEMORY contents are displayed on the illuminated decimals. To automatically increment the test position and observe the MEMORY contents, disconnect J1 and J2, set S5 the FUNCTION SELECT switch to position "1"or"2" set S6 (HIGH VOLTAGE LEAKAGE/LOW VOLTAGE SHORT) and S8 (SERIES RESISTANCE-CONTINUITY/LAMP TEST) to "OFF". Set S5 (FUNCTION SELECT) to position "1" or "2" and set S5 (DATA ENTRY) to the desired sequencing rate.

Set S7 (RUN/HOLD/SINGLE-STEP) tO "RUN". The Tester will now automatically sequence through all test positions, at the rate selected on S5 (DATA ENTRY) and stop on test positions that detect an “OPEN” or “SHORT” that were not programmed in as a “normal” operation. The “PROGRAM ERROR” status lamp will illuminate when an “OPEN" or “SHORT” was programmed in but not detected. To continue automatic sequencing, set the RUN/HOLD/SINGLE-STEP switch to “SINGLE-STEP” and back to “RUN”.

C. MEMORY PROGRAMMING (S3)

The steps required to program that cable MEMORY at each test position are as follows:

1. Set S6 (HIGH VOLTAGE LEAKAGE/LOW VOLTAGE SHORT) and S8 (SERIES RESISTANCE-CONTINUITY/LAMP TEST) to “OFF”, and S7 (RUN/HOLD/SINGLE-STEP) to “HOLD”.

2. Set S5 (FUNCTION SELECT) to 6 (PROGRAM MEMORY).

3. Set S5 (DATA ENTRY) to the desired test position.

4. Set S3 (MEMORY) to “OPEN” (if the cable has a missing wire) or Set S3 to “SHORT” (if the cable has a branch or jumper to another cable test position). Otherwise set S3 (MEMORY) to "CLEAR” (if the cable has a wire with only two connections and no branch connections at the indicated test position).

5. Set S4 (RESET/ENTER) to “ENTER” (MOMENTARY) and then tO “RESET” (MOMENTARY).

6. Verify that the display matches the left 3 digits of S5 (DATA ENTRY).

7. Verify that the correct decimal (left=OPEN, right=SHORT) is illuminated.

8. Repeat step 3 through 7 until programming is completed.

D. RESET/ENTER - (S4)

when S4 (RESET/ENTER) is set to the "RESET" position, the internal logic circuits are initialized, and all fault conditions are cleared. Normally, “RESET” *is* used prior to setting up the TESTER for a new test, or prior to entering data.

E. DATA ENTRY- (S5)

Data is entered using the DATA ENTRY thumbwheel switch. When programming the CABLE MEMORY,S5 (DATA/ENTRY) selects the test position (MEMORY Address) where the data (S3 - SHORT or OPEN) is entered. The address for the remaining test conditions is selected by the FUNCTION SELECT, right most thumbwheel switch, while the data is entered in on the 3 left most thumbwheel switches. When the FUNCTION SELECT is set to position "1" or "2", the DATA ENTRY thumbwheel is not required).

F. TEST STATUS- (S6, S7, S8)

The Tester performs two basic types of test, LEAKAGE (HIGH VOLTAGE LEAKAGE AND LOW VOLTAGE SHORT S6) and CONTINUITY (SERIES RESISTANCE-CONTINUITY S8). The leakage tests (HIGH VOLTAGE LEAKAGE or LOW VOLTAGE SHORT), select by s6, may be performed in conjunction with the SERIES RESISTANCE-CONTINUITY (S8) test. The RUN/HOLD/SINGLE-STEP (S7) switch, when in the "RUN" position initiates automatic test sequencing. The "HOLD" position stops automatic test sequencing. The "SINGLE-STEP" position advances the test position by one and performs the test selected by S6 and S8. The LAMP TEST (S8) position causes all the lamps to illuminate and causes the METER/DATA DISPLAY to read.

4.3 FRONT PANEL DISPLAYS

Page 6-1 illustrates the front panel displays on the Tester. The front panel displays consist of 5 FAULT STATUS lamps, 2 WARNING lamps,1 "PROGRAM ERROR" lamp, 1 four deck indicating Thumbwheel switch, 8 indicating toggle switches, and 1 three digit METER/DATA DISPLAY with 2 indicating decimal points.

A. The 5 FAULT STATUS lamps illuminate under the following conditions:

1. EXCESS LEAKAGE	LEAKAGE current exceeds the operator's selected level.
2. SHORT CIRCUIT	LEAKAGE current exceeds the internally set value, and CABLE MEMORY does not indicate that a branch or short exist at this test position.

3. CROSSED WIRES	AN OPEN wire and an excessive leakage current was detected.
4. OPEN CIRCUIT	The CONTINUITY measured exceeds the internally set value, and the CABLE MEMORY does not indicate that an open exists at this position
5. HIGH SERIES RESISTANCE	The CONTINUITY measured exceeds the operator's set level.

B. The Two "WARNING" lamps illuminate under the following conditions:

1. "WARNING-HIGH" VOLTAGE	This lamp illuminates whenever the HIGH VOLTAGE LEAKAGE test is selected.
2. "WARNING-GROUND" FAULT	This lamp illuminates when the internal ground fault detector senses a ground fault current in excess of 5 milliamps.

C. The PROGRAM ERROR lamp illuminates whenever an "OPEN" or "SHORT" was programmed in the CABLE MEMORY and the SHORT or OPEN is not detected.

D. The four deck thumbwheel switch indicates the selected function and the 3 digits for DATA ENTRY. For instance, if the FUNCTION SELECT switch is in position "1", the TEST PERIOD X 0.01 seconds is indicated on the DATA ENTRY thumbwheel switches. Therefore, if 1 5 0 1 is loaded on to the thumbwheel, the TEST PERIOD will be 1.5 seconds.

E. The 8 indicating toggle switches, S1 through S8, indicate the power "ON/OFF" status, the "TEST STATUS", the cable configuration data (OPEN or SHORT),the RESET/ENTER" status and the "DATA READ" status.

F. The 3 digit METER/DATA DISPLAY indicates the test Position when the "FUNCTION SELECT" switch is in position "1", "2", or "6" . The 3 digit METER/DATA DISPLAY indicates the data value when the "FUNCTION SELECT" switch is in position "3", "4", or "8" and the "RESET/ENTER" switch is set to "ENTER" (depressed momentarily. The 3 digit METER/DATA DISPLAY indicates the "CABLE MEMORY" selected when the "FUNCTION SELECT" switch is in position "5" and the "RESET/ENTER" switch is set to "ENTER".

G. The 3 digit METER/DATA DISPLAYS left most (OPEN) and right most (SHORT) decimal points are used to indicate the "CABLE MEMORY" contents when the FUNCTION SELECT switch is in position "1", "2", or "6". The three digit METER/DATA DISPLAY decimal points indicate the data being read when the FUNCTION SELECT switch is in position "1" or "2", the RUN/HOLD/SINGLE-STEP switch is in the "HOLD" position or the Tester is halted due to a fault, and the "READ" switch is depressed.

4.4 FRONT PANEL CONNECTIONS

Page 6-1 illustrates the front panel connectors on the Tester. Connector J1 is a three pin connector where the primary power is applied to the Tester. Connecotr J2 and J3 are 156 pin connectors that connect the Tester's sense circuits to the circuit or cable under test.

4.5 INCREASED ACCURACY (Note 1)

Most leakage faults will occur when the test voltage is ramping up to a preset level. The accuracy suffers because during this time the voltage is constantly changing. A more precise measurement of the leakage value is made possible by the following procedure.

A. Set the "Leakage Test Voltage" tp 500 VDC as described in Section 3.2.A.

B. Set the "Maximum Leakage" to 50.0 uA as described in Section 3.2.A.

c. While switch S7 is in the "HOLD" position, depress S7 toward "SINGLE-STEP" to increment to the desired position, depress the "READ" switch S2 and watch the voltage increase to the preset test voltage.

D. Once the voltage is stable, depress "READ" again to display the leakage in UA which is being continuously measured and updated, thus allowing the operator to move and twist the cable, which could possibly locate the fault. (Note 2)

E. Refer to Megohm conversion chart Page 11-11 to determine Megohm values using the voltage and leakage readings from the METER/DATA Display.

F. To continue in this mode, single step to the next desired position and execute item 4.5.C thru 4.5.E.

4.6 READING MEGOHMS

This Model 128A Circuit Tester offers two indirect ways (using Megohm Conversion Chart Page 11-11 as a reference) and one direct way (reading the METER/DATA Display directly) to obtain the Megohm reading of a circuit. Section 4.5 describes one of the indirect modes while the following is the other.

INDIRECT MODE

A. Using Megohm Conversion Chart Page 11-11 find the Megohm value which is considered the desired fault level.

B. Note the Microamps value next to the desired Megohm value, and use this value to set the “Max Leakage” fault level as described in 3.2.A,

c. Set the “Leakage Test Voltage” to 500 VDC as described in 3.2.A. Example: A 200 Megohm fault level *requres* 2.5 UA and 500 VDC to be programmed into the Tester.

D. The “Excess Leakage” indicator will illuminate when the circuit under test fails.

"NOTE"1: Normally this test would be run after executing a test where fault levels were set and failures occur.

"NOTE"2: WARNING: When operator is moving cable, wear protective gloves. High Voltage is present in the cable.

DIRECT MODE

A. Set the “Leakage Test Voltage” to 500 VDC as described in Section 3.2.A.

B. Set the "Max Leakage” fault level to 00.9 uA as described in Section 3.2.A.

c. When excessive leakage is indicated, the Tester will record the max Leakage” at 01.0 uA. Therefore, when depressing the READ switch (S2), megohms can be read directly from the METER/DATA DISPLAY.

SECTION 5

DISASSEMBLING, TROUBLESHOOTING, REPAIR, REASSEMBLY OF EQUIPMENT, CALIBRATION, MAINTENANCE, AND TROUBLESHOOTING INSTRUCTIONS

5.1 INTRODUCTION

The Model 128A Circuit Tester is designed to be calibrated at the PC Board level. Maintenance required consists of keeping the Tester free of dirt, dust and foreign material. Troubleshooting Instructions are listed in this section.

"WARNING"

THIS TESTER GENERATES "HIGH VOLTAGE" AND "CAUTION" SHOULD BE EXERCISED WHEN OPERATING OR WORKING ON THE TESTER EVEN WHEN POWER HAS BEEN REMOVED.

5.2 POWER REQUIREMENTS

The Tester requires either 115 ± 10 or 230 ± 10 VAC, 47-400 Hz to operate. The Front Panel is labeled to indicate which is to be used. (See Page 2-2 Supply Voltage Selection).

5.3 PROCEDURES FOR DISASSEMBLING OF TESTER

5.3.1 FRONT PANEL ASSEMBLY

Step 1 Remove 12 screws from Front Panel (Item No. 21, See Page 6-l).

Step 2 Using the two handles on Front Panel (Item No. 6, See Page 6-7) Lift unit from ENCLOSURE (Item No. 5, See Page 6-l).

Step 3 Place unit on work bench and locate Power Supply (See Page 6-40).

Step 4 Remove 2 screws and nuts (Item No. 17 and Item No. 25, (See Page 6-1) holding J1 Power Receptacle in place.

Step 5 Remove nut holding S1 in place (See Page 6-l).

Step 6 Unplug Flat Cable Assembly (Item No. 23) from Front Panel Interface Card (Item No,12) (See Page 6-2).

Step 7 Remove screws (Item No. 18) from connectors holding Relay Harness in place (Item No's 7,8,9, and 10) (See Page 6-2).

Step 8 Unplug Relay Harness Connectors from Item No's 7,8,9 & 10 (See Page 6-2).

Step 9 Remove 10 screws (Item No. 28) (See page 6-2) holding Front Panel Assembly to Chassis.

Step 10 Remove 4 screws and nuts (Item No. 19 and 20) (See Page 6-1) holding Connector Plate for J2 and J3 to Front Panel.

Step 11 Now you have disassembled Front Panel from Card Cage Assembly. Troubleshooting can be completed on Front Panel Assembly, (See Page 6-7) Relay Harness Assembly, (See Page 6-118) Flat Cable Assembly, (See Page 6-123), Display Board (See Page 6-16).

5.3.2 INPUT POWER SUPPLY ASSEMBLY

Step 1 Remove 6 screws (Item No. 9) and 6 nuts (Item No. 10 and remove Item No. 8) (See Page 6-23).

Step 2 Remove nut from S1 and 2 screws item 17, and nuts item 25 from J1 (See Page 6-l).

Step 3 Slide Item No. 8 out from rear side of Card Cage Assembly.

Step 4 Remove 2 screws Item 18 holding P1 plug in place (See Page 6-2) .

Step 5 Unplug P1 from Mother Board Assmelby (See Page 6-2) .

Step 6 Place Power Supply on work bench, Remove 4 screws (Item 20) (See Page 6-2). Now you are ready to Troubleshoot Input Power Supply.

5.3.3 RELAY CIRCUIT CARDS

Step 1 Remove screw, Item 17, remove Support Bracket, Item 14, (See Page 6-2).

Step 2 Remove Relay Cards (Item 7 & 8) using Extractor Tool P12115374-1.

Step 3 You can now Troubleshoot as required.

5.3.4 LOGIC CIRCUIT CARDS

Step 1 Remove screw, (Item 17), remove Support Bracket, (Item 14) (See Page 6-6).

Step 2 Remove Logic Cards Items 9,10,11,12,13, and 15 using Extractor Tool P12115374-1.

Step 3 YOU can now Troubleshoot as required.

5.3.5 INPUT/OUTPUT INTERFACE ADAPTER ASSEMBLY

Step 1 Input/Output Interface Adapter Assembly (Item 13) (See Page 6-28) is mounted to Mother Board Assembly (Item 4) (See Page 6-2). To troubleshoot assembly leave attached as is and troubleshoot as required.

5.3.6 MOTHERBOARD ASSEMBLY

Step 1 Mother Board Assembly (Item 4) (See Page 6-2) is mounted to Card Cage Assembly. There is no need to disassemble the Mother Board to troubleshoot.

TROUBLESHOOTING TO CARD LEVEL

"WARNING" 1. Remove J1-AC Power Cord before removing or replacing any PCB.
2. s-6 must be in OFF position when turning power ON or OFF and entering any data into S5 including FUNCTION SELECT switch.
3. Refer to page 3-3 for proper OPERATION AND TEST PROCEDURES.

"NOTE" Prior to Troubleshooting run Self Test Page 3-1 and 3-2. If desired each pin of J2 and J3 can be verified using Jumper Cable P12115253 and procedures contained in Standard Test Procedure for Interfaced Cable or Circuit page 3-3 and 3-4.

TROUBLE	CHECK THE FOLLOWING
A. METER/DATA DISPLAY not illuminated.	1. AC plug connected to J1 and 120 VAC. 2. Test S2 Circuit Breaker Switch. 3. J1 AC inline filter 4. Test Low Voltage Power Supply (+5VDC). 5. Replace Low Voltage Power Supply if abnormal. 6. If Front Panel will not illuminate replace DISPLAY BOARD ASSEMBLY Part No. P12115231-1.
B. No High Voltage on METER/DATA DISPLAY after depressing S2 and decimal is above the VOLTS arrow.	1. Replace A3 POWER SUPPLY 2. Replace A2 ADC CARD
C. GROUND FAULT	1. Replace A3 POWER SUPPLY
D. PROGRAM ERROR	1. Replace A4 MEMORY CARD 2. Replace A5 FRONT PANEL INTERFACE 3. Replace A6 LOGIC CARD
E. EXCESS LEAKAGE	1. Replace A3 POWER SUPPLY CARD 2 Replace A4 MEORY CARD 3. Replace AS FRONT PANEL INTERFACE CARD
F. SHORT CIRCUIT	1. ReplacA4 MEMORY CARD 2. Replace AS FRONT PANEL INTERFACE CARD
G. CROSSED WIRES	1. Replace A4 MEMORY CARD 2. Replace AS FRONT PANEL INTERFACE CARD
H. OPEN CIRCUIT	1. Replace A4 MEMORY CARD 2. Replace A5 FRONT PANEL INTERFACE CARD

I. HIGH SERIES RESISTANCE	1. Replace A2 ADC CARD 2. Replace A4 MEMORY CARD
J. DATA ENTRY will not enter into METER/DATA DISPLAY	1. Replace Al DISPLAY CONTROLLER CARD
K. Defective relay in circuit 1 to 31	1. Replace A9 RELAY CARD,
L. Defective relay in circuit 32 to 63	1. Replace A1O RELAY CARD
M. Defective relay in circuit 64 to 95	1. Replace All RELAY CARD
N. Defective relay in circuit 96 to 127	1. Replace A12 RELAY CARD
O. Defective relay in circuit 128	1. Replace A13 RELAY CARD
P. Unable to store information into MEMORY CARD	1. Test BT1 for 3VDC (± .5VDC) Battery should be replaced yearly. 2. Replace A4 MEMORY if BT1 passes test.

"NOTE" For PCB Card location see Page 6-37

TROUBLESHOOTING PROCEDURES

1. MAIN POWER SUPPLY

The low voltage PDC Main Power Supply Part *Number* P12115225 supplies three individual voltages.

a. +5 VDC

b. +12 VDC

c. -12 VDC

2. All voltages recorded with a FLUKE multimeter Model 8050A with input impedance of 10 megohms.

3. All measurements taken with a 120 VAC Input Source.

STEPS TO ISOLATE FAILURES:

+5 VDC SUPPLY	CORRECTIVE ACTION
1. Measure Primary of T1 (120VAC)	No AC Power Source Defective Power Cord
2. Negative Test Lead Of Meter At Terminal "B" Of Power Supply	Defective S1 Circuit Breaker Switch. J1 Filter Linecord
3. Measure Q1 Collector (+20VDC)	Test For Defective Capacitor Cl or C2 Diodes CRl,CR2,CR3, or CR15 Measure Ql,Q2 Voltages
4. Measure Voltage At Terminal "A" (+5VDC) output.	Measure Voltage At u1 Test For Defective C4,CR5,CR6 SCR1, And Associated Components.

+12 VDC SUPPLY	CORRECTIVE ACTION
1. Measure Primary Of T1 (120VAC)	No AC Power Source Defective Power Cord
2. Negative Test Lead Of Meter At Terminal "D" Of Power Supply.	Defective S1 Circuit Breaker Switch. J1 Filter Linecord
3. Measure Q3 Collector (+28VDC)	Test For Defective Capacitor C7 Diodes CR7,CR8, & CR11
4. Measure Voltage At Terminal "c" (12VDC)	Measure Voltages At U2 Test For Defective Capacitor C12, CR12 And Associated Components.

+12 VDC SUPPLY	CORRECTIVE ACTION
1. Measure Primary Of T1 (120VAC)	No AC Power Source Defective Power Cord Defective S1 Circuit Breaker Switch J1 Filter Linecord
2. Negative Test Lead Of Meter At Terminal "D" Of Power Supply.	
3. Measure Q5 Emitter (-28VDC)	Test For Defective Capacitor C6, Diodes CR9,CR10,CR13, Transistors Q4, & Q5
4. Measure Voltage At Terminal "E" (-12VDC)	Measure Voltage At U3, Test For Defective Capacitor C13, CR14 And Associated Components.

FINAL CHECK

If previous step fails to isolate failure of Power Supply the following voltages can be checked to help locate problem:

I.C. PIN NO.	U1	U2	U3
1	N.C.	N.C.	N.C.
2	5V	12V	-12V
3	5.lV	12	-12V
4	5.lv	7.2V	-5V
5	5.lV	7.2v	-5V
6	7.2v	7.2V	-5V
7	Ov	0	-12V
8	N.C.	N.C.	N.C.
9	N.C.	N.C.	N.C.
10	6.42v	12.7	0.6v
11	20.8V	28v	6.2v
12	20.8V	28V	6.2v
13	7.6v	13.9v	1.8v
14	N.C.	N.C.	N.C.

TRANSISTOR	EMITTER	BASE	COLLECTOR
Q1	5.8V	6.41v	21V
Q2	5.14V	5.8V	10.2V
Q3	12.lV	12.7v	28v
Q4	.6v	Ov	-28V
Q5	-28.2v	-28V	-12.2v

	ANODE	CATHODE	GATE
SCR1	5.lV	Ov	.07V

DIODE (CR)	ANODE	CATHODE
*1	0	10.4
*2	0	10.4
*3	10.4	20.8
*4	5.1	10.4
*5	0	5.1
*6	0	5.1
7	0	28.
8	0	28.
9	-28.2	0
10	-28.2	0
11	12.1	28.
12	0	12.2
13	-28.5	12.2
14	-12V	0
*15	10.4	20.8
16	0	6.2

NOTE:

*Indicate measurements recorded with the common test lead minus at terminal “B”.

ALL other readings recorded with common test lead to “D”.

IF FAILURE CANNOT BE LOCATED AFTER FINAL CHECK PERFORMED, RECOMMEND SENDING BACK THE FAULTY CIRCUIT CARD ASSEMBLY (CCA) OR CABLE TESTER TO MANUFACTURE FOR REPAIR.

TROUBLESHOOTING HIGH VOLTAGE POWER SUPPLY P12115211

STEP 1 SET-UP PROCEDURE

S1 (power Switch) _____ Set to OFF position
S2 (Read Switch) _____ Center Position is OFF
S4 (ENTER/RESET Switch) _____ Center Position is OFF
S6 (Test Status Switch) _____ Set to OFF position
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position

STEP 2 POWER ON PROCEDURE

S1 (Power Switch) _____ Set to ON position
METER/DATA DISPLAY WILL LIGHT UP
S8 (Test Status Switch) _____ Press DOWN position
TO VERIFY ALL LAMPS ILLUMINATE AND METER/DATA DISPLAY INDICATES
(8.8.8.)

STEP 3

CONNECT JUMPER FROM JS (red) to J5 (black).

STEP 4 SET LEAKAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown [010|3]
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(01.0)

STEP 5 SET-MAX SERIES RESISTANCE

S5 (Thumbwheel Switch) _____ Set as shown [100|4]
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(1.00)

STEP 6 SET TEST START POSITION

S5 (Thumbwheel Switch) _____ Set as shown [001|7]
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(000)

STEP 7 TO SET HIGH VOLTAGE LEVEL (500V)

S5 (Thumbwheel Switch) _____ Set as shown [500|8]
S4 _____ Press ENTER twice to enter
METER/DATA DISPLAY WILL INDICIATE
(500)

STEP 8 TEST PERIOD (5 SECONDS)

S6 (Test Status Switch) _____ Press HIGH VOLTAGE LEAKAGE (Up Position)

"NOTE" HIGH VOLTAGE LAMP WILL ILLUMINATE

S8 (Test Status Switch) _____ Press SERIES RESISTANCE CONTINUITY (Up Position)

S2 (READ SWITCH) _____ Press DOWN until DECIMAL POINT is above the VOLTS ARROW

S7 (Test Status Switch) _____ Single Step Once

"NOTE" METER/DISPLAY WILL INDICATE
THIS INDICATES 500V READING.

"WARNING" HIGH VOLTAGE PRESENT

STEP 9 MEASURE 500 VDC ± 10%

Using multimeter 1000VDC range locate item number 10 (See Page 6-2). Connect the common (black) lead to TP-3 and the voltage (red) lead to Tpl. This voltage should correspond to METER/DISPLAY of 500 VDC.

ALL DCV MEASUREMENTS ARE± 10% WITH COMMON TEST LEAD TO TP3.

Cable Tester METER DISPLAY does not indicate 500.

1. Use a multimeter to measure the 500 VDC at TP1 (+) and TP3 (-). If 500 VDC is not present proceed to Step a.

"NOTE" Use a oscilloscope for the following test.

a. Measure voltage at u6, Pin 14 (5VDC) If abnormal measure u6 inputs, Pins 2,3,4,5,6, and 8 should be HIGH (+5VDC) and Pins 7,9,and 10 are LOW. If inputs are correct replace U6. If inputs are not correct proceed to Step b.

b. Measure U3 input, Pins 1,4,6,11, and 13 are HIGH (5VDC) and pin 3 is LOW (0VDC). The output Pins 4,6,11, and 13 should be HIGH (+5VDC) and pin 2 is LOW (OVDC) Replace U3 if any variation in signal levels.

c. Measure U5 input, Pins l,6,and 11 are HIGH (5VDC) and Pins 3,4,and 13 are LOW (OVDC) output Pins 7 and 10 are HIGH (+5vDc) and Pins 2 and 5 are LOW (OVDC) Replace U5 if any variation in signal levels.

CONTINUED

CONTINUED

d. Measure U12, Pin 2 (2.5vDC). If abnormal check C5 and C2, replace if shorted.

e. Measure U12, Pin 16 for (5VDC). If abnormal replace U12.

f. Measure U12, Pin 11 for 9VDC Peak to Peak If abnormal replace U12.

g. Measure 450V AC at ANODE of CRll If voltage is abnormal check T2 or Q7. Replace defective component.

h. u8 and Q9 ramp the voltage from O to 500 VDC. Should Q9 short, the 500 VDC will drop to O.

i. Should any signals change state from the GROUND FAULT, EXCESS LEAKAGE, or SHORT CIRCUIT the 500 VDC will drop to O by the following steps:

1. Q1 will short out u12 Pin 2 to OV.

2. Q2, Q3, and Q1O will act like a switch dropping the 500 VDC to O.

j. If the EXCESS LEAKAGE & SHORT CIRCUIT LAMPS light up when S6 is in HIGH VOLTAGE LEAKAGE or LOW VOLTAGE probable cause is U35 on the ADC card.

TEST THE 100 MA CURRENT SOURCE

a. Measure the voltage at TP4 and TP5. If 1 VDC is measured the current source is optional

b. If voltage is abnormal at TP4 and TPS measure u1l, Pin 2 (2.5VDC), if abnormal replace U1l.

c. Measure voltage at U8, Pin 3 (2.6VK), if abnormal check voltages at Q5 and Q6, replace defective transistor.

d. Measure U8, Pin 4 (lVDC), if abnormal and u8 Pins 5 measure (2.5vDc) replace u8.

TROUBLESHOOTING RELAY CARDS

The PDC CABLE TESTER has 5 relay cards. Four relay cards has 33 relays and one relay card has 2 relays.

Starting with the relay card at rear of the cage and working towards the front panel in sequence.

A9 Test Circuits 1 to 31
A1O Test Circuit 32 to 63
101 Test Circuits 64 to 95
A12 Test Circuits 96 to 127
A13 Test Circuits 128

ALL VOLTAGE MEASUREMENTS ARE ± 10%.

PROBLEMS

All relays will not operate	Measure and Q1 emitters (+12VDC) abnormal reading check +12VDC Power supply.
Relays *K1* to K16 will not energize	Measure Q1 base (+11.2VDC) If abnormal reading replace URl Measure Q1 collector (+11.8VDC) If abnormal reading replace Q1
METER DISPLAY reads 001 and relay K2 is not energized	Measure voltage at cathode of CR22 (+0.8vDC) If voltage at cathode is OVDC replace CR22 If voltage at cathode is +1O.7VDC measure voltage at U6 pin 7 (0.OVDC) if normal replace U6 if abnormal replace U3.
Test for Open relay's	Connect test cable P12115253 to J2 and J3 and follow test procedures. If OPEN CIRCUIT fault lamp lights up, replace the relay that corresponds to display.
Test for Shorted relay's	Program memory for all 128 circuits tO be OPEN (MEMORY PROCEDURES) Remove all cables from J2 and J3. Proceed with standard test. If SHORT fault lamp lights up, replace the relay that corresponds to display.

REASSEMBLY

FOR REASSEMBLY, THE DISASSEMBLY PROCEDURES CAN GENERALLY BE FOLLOWED IN REVERSE. KEEP THE FOLLOWING CONSIDERATIONS IN MINE.

1. When reinstalling sub-assemblies and circuit cards care should be taken not to bend the connector pins.

CALIBRATION OF CIRCUITS

Calibration required is performed prior to shipment of completed units and should not require any additional CALIBRATION unless unit is disassembled to perform TROUBLESHOOTING function.

Some organizations require electronic equipment to be re-calibrated on 1 year and 2 year intervals, PDC recommends that 128-A Tester be re-checked for CALIBRATION every 12 months.

VERIFY THE TESTERS' MEASUREMENT ACCURACY

To verify the Testers' measurement accuracy connect a jumper wire in J5 (+RED) and J5 (-BLACK) and the 200 Megohm Module Assembly (PN-P12115243-1) to J4.

STEP 1 SET-UP PROCEDURE

S1 (Power Switch) _____ Set to OFF position
S3 (Memory) _____ Set to CLEAR position (center)
S5 (Thumbwheel Switch) _____ Set as shown
S6 (Test Status Switch) _____ Set to OFF position 001 1
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position
INSERT AC PLUG IN J1 LOCATION

STEP 2 POWER ON PROCEDURE

S1 (Power Switch) _____ Set to ON position
METER/DATA DISPLAY WILL LIGHT UP
S8 (Test Status Switch) _____ Press DOWN position
TO VERIFY ALL LAMPS ILLUMINATE AND METER/DATA DISPLAY INDICATES

S5 (Thumbwheel Switch) _____ Set as Shown
S4 _____ Press ENTER to enter 090 3
METER/DATA DISPLAY WILL INDICATE

STEP 4 SET MAX SERIES RESISTANCE

S5 (Thumbwheel Switch) _____ Set as shown 096|4
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(0.96)

STEP 5 SET CABLE MEMORY

S5 (Thumbwheel Switch) _____ Set as shown 001|5
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(001)

STEP 6 SET START POSITION

S5 (Thumbwheel Switch) _____ Set as shown 001|7
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(000)

STEP 7 SET HIGH VOLTAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 500|8
S4 _____ Press ENTER to enter
METER/DATA DISPLAY WILL INDICATE
(500)

STEP 8 TEST PERIOD 600 X .01 (6 SECONDS)

S5 (Thumbwheel Switch) _____ Set as Shown 600|1

STEP 9

S6 _____ Press HIGH VOLTAGE LEAKAGE (UP POSITION)

STEP 10

S8 _____ Press SERIES RESISTANCE CONTINUITY (UP POSITION)

STEP 11

S4 _____ Press RESET to reset
METER/DATA DISPLAY WILL INDICATE
(001)

WAIT 10 SECONDS AND PERFORM THE FOLLOWING: REF: SECTION 4 PAR. 4.2A

1. Depress S2 (READ) to read the HIGH VOLTAGE
   The 3 digit display should display (500) ± 10%
2. Depress S2 (READ) to read Megohm.
   The 3 digit display should display (02.5) ± 5 Megohms

"NOTE" SEE HIGH VOLTAGE LEAKAGE FAILURE LEVEL CHART PAGE 11-12

3. Depress s2 (READ) to read series resistance.
   Record the 3 digit display reading.

4. Depress S2
   Insert the 0.5 Ohm Module Assembly (PN-P12115216-1)
   in place of the jumper wire previously connected to J5.

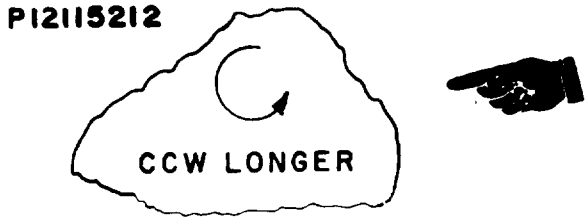
5. Depress S4 (RESET) then wait 10 seconds.

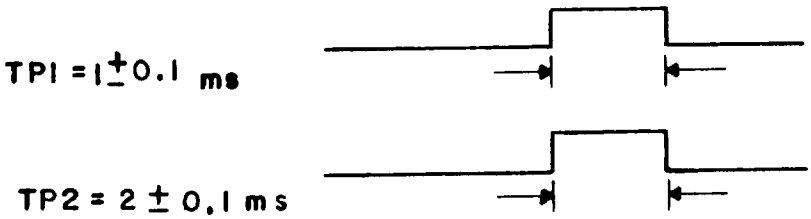
6. Depress S2 (READ) 3 times and record the 3 digit display reading.

7. Subtract the reading recorded in Step 3 above (internal tester resistance) from the reading recorded in Step 6 above. The results should be 0.5 ± .05 Ohms.

"NOTE" If any of the reading in Steps l,2, or 7 are not within tolerance or the Tester has not been Calibrated within the previous 12 month period perform Calibration procedures on pages 5-17 thru 5-21.

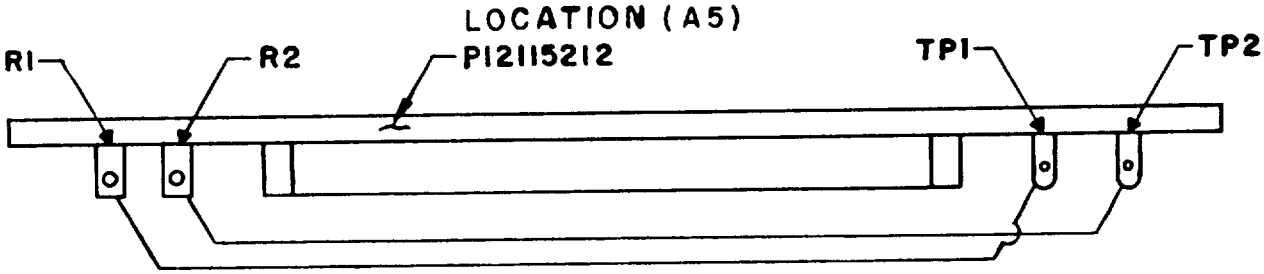
FRONT PANEL INTERFACE BOARD CALIBRATION





NOTE :

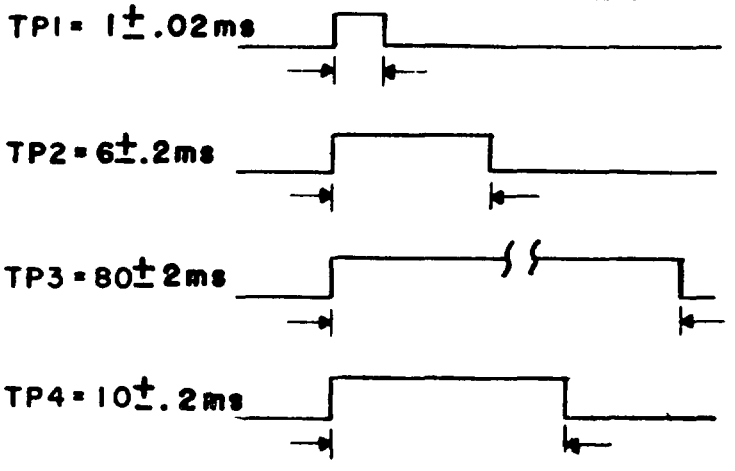
TO GENERATE PULSE PRESS S4 TO ENTER.
USE TP3 ON A3 POWER SUPPLY BOARD FOR GROUND.

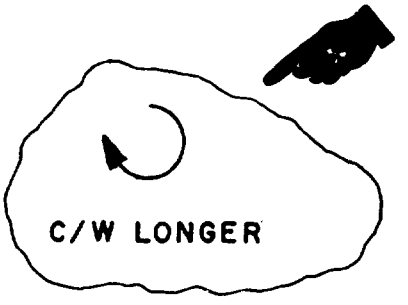


LOGIC BOARD CALIBRATIONS

P12115210

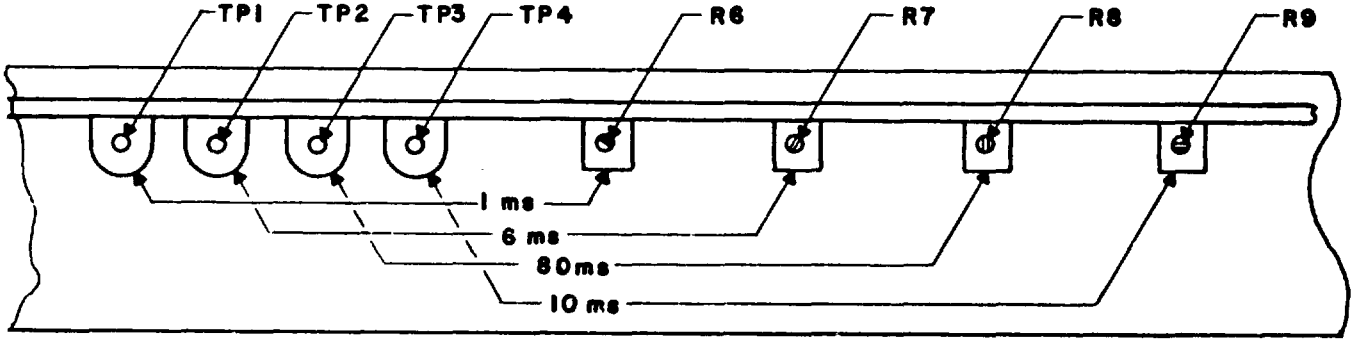
TP3 ON THE A3 POWER SUPPLY BOARD IS TO BE USED FOR GROUND.





TIMING INFORMATION LOGIC BOARD

P12115210 (LOCATION A6)

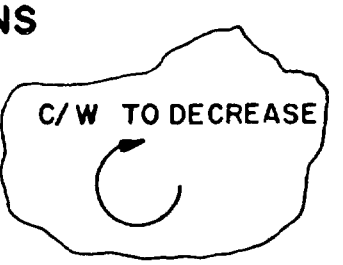


TO GENERATE PULSES FOR EACH CALIBRATION

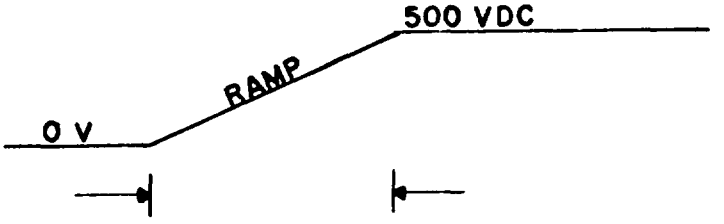
1. Set S5 Thumbwheel Switch ____ 020 1
2. Press S4 To ENTER
3. Press S4 To RESET
4. Set S7 To RUN
5. After Completion Of Calibration Set S7 To OFF

POWER SUPPLY BOARD CALIBRATIONS

P12115211



SET S6 TO HIGH VOLTAGE LEAKAGE.
SET S4 TO RESET TO OBSERVE RAMP PULSE.
ADJUST R38 FOR 500 V THEN R29 FOR RAMP TIME.



TP1 = 5 ± .1 sec
= 500 VDC ± 10%

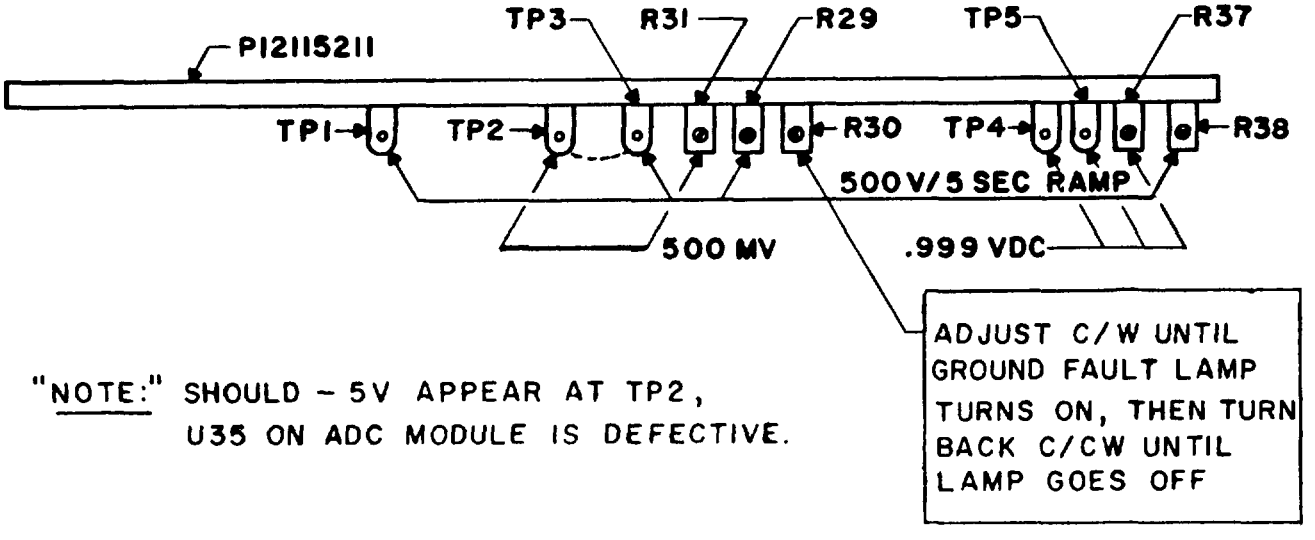
TP2 = 500 ± 1 mv DC (ADJUST R31 WHILE TP1 IS 500 V)

TP3 = GROUND (FOR ABOVE CALIBRATIONS)

TP4 = (-) .999 VDC (PLACE DC VOLTMETER BETWEEN TP4 AND TP5,
TP5 THEN ADJUST R37 FOR 999 ± .002 VDC)

"WARNING" HIGH VOLTAGE

P12115211 (A3 LOCATION)

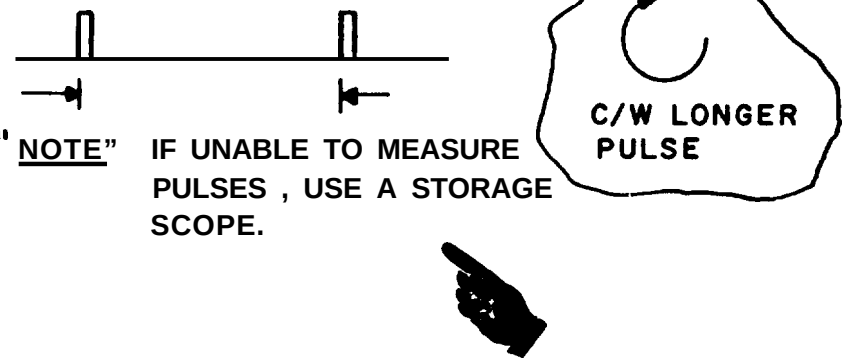


"NOTE:" SHOULD - 5V APPEAR AT TP2,
U35 ON ADC MODULE IS DEFECTIVE.

ANALOG TO DIGITAL CONVERTER BOARD CALIBRATIONS

P12115209

TP1 • 18 ± .4 ms

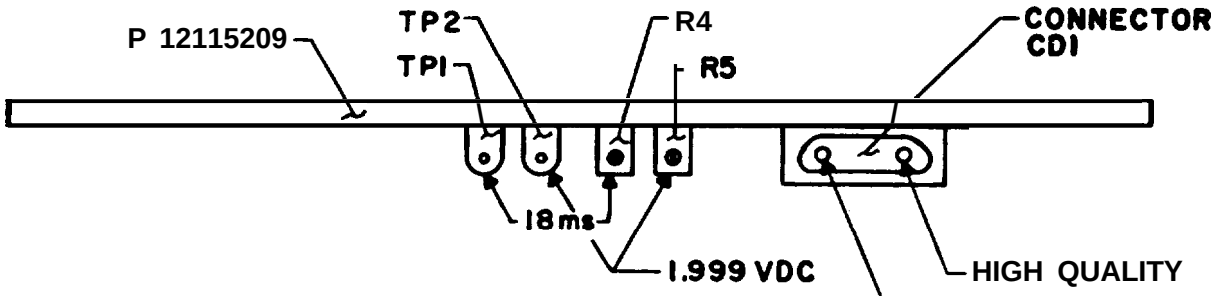


"NOTE" IF UNABLE TO MEASURE PULSES , USE A STORAGE SCOPE.

TP2 = 1.999 ± .001 VDC

CALIBRATION INFORMATION ADC BOARD

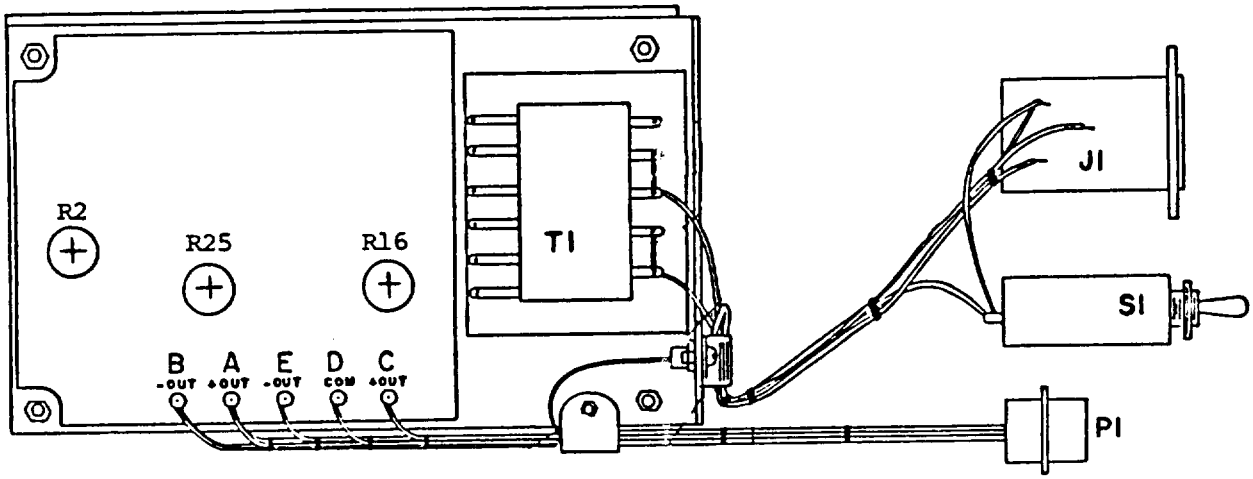
P12115209



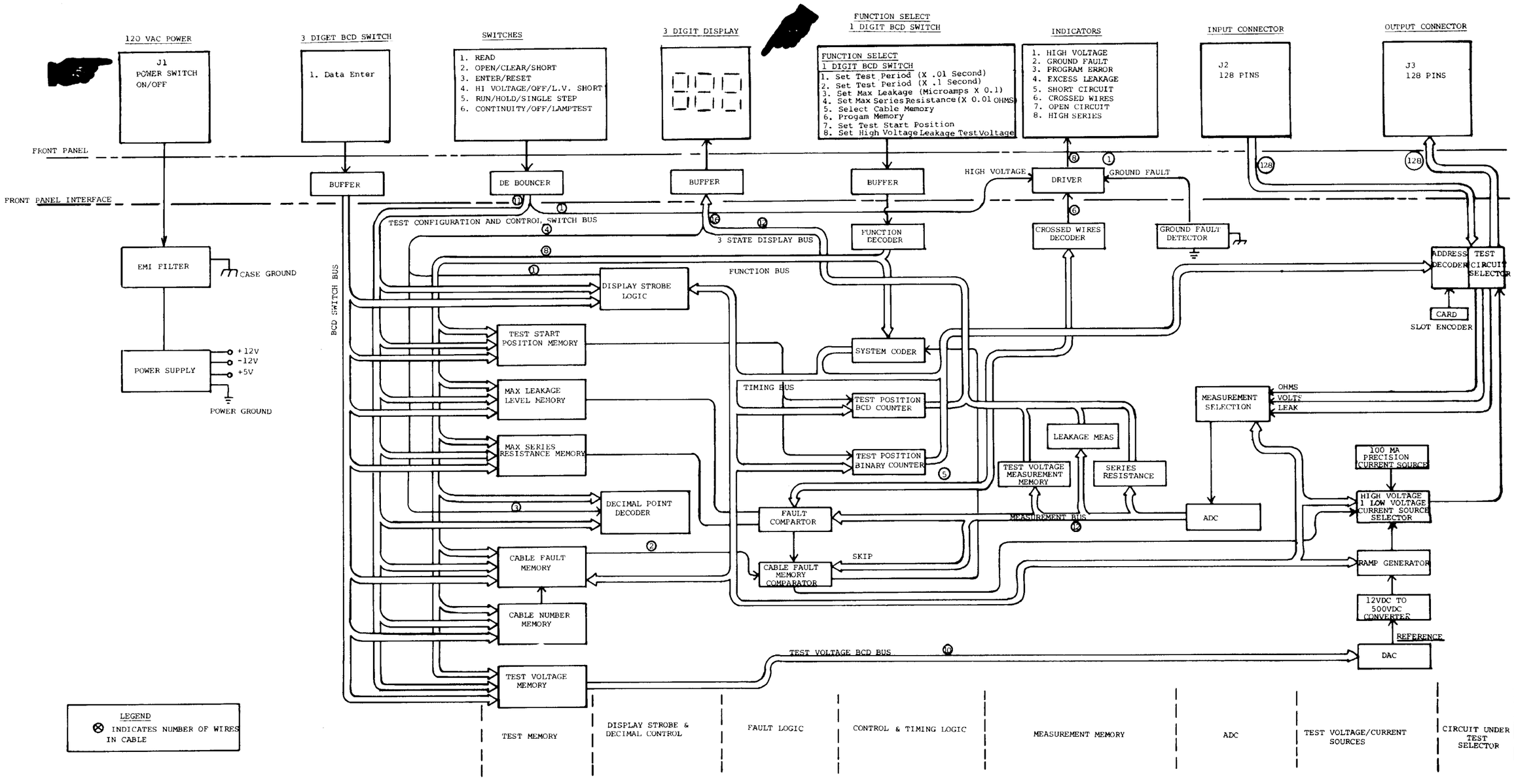
PLACE WIRE JUMPER BETWEEN HIGH QUALITY GROUND PIN & SYSTEM GROUND PIN.
USE THESE POINTS FOR 1.999 VDC CALIBRATION.

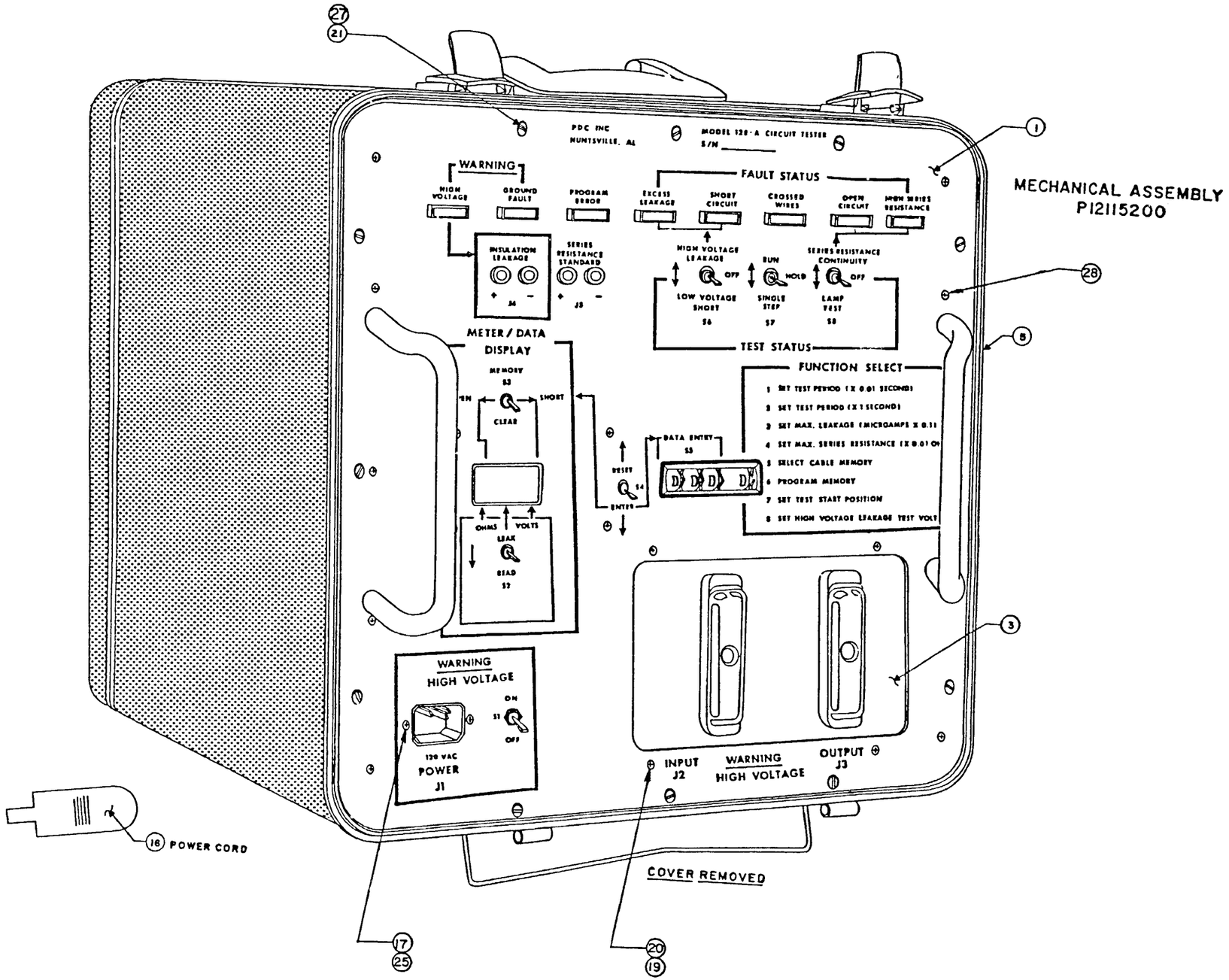
P12115225 LOW VOLTAGE POWER SUPPLY CALIBRATION

1. Calibrate +5 Volt Power Supply	1. Connect Volt Meter to Terminal A and B (B-Common). 2. Adjust R2 until Volt Meter reads +5 Volts DC.
2. Calibrate +12 Volt Power Supply	1. Connect Volt Meter to Terminal C and D (D-Common). 2. Adjust R1.6 until Volt Meter reads +12 volts DC.
3. Calibrate -12 Volt Power Supply	1. Connect Volt Meter to Terminal D and E (D-Common). 2. Adjust R25 until Volt Meter reads -12 volt DC.

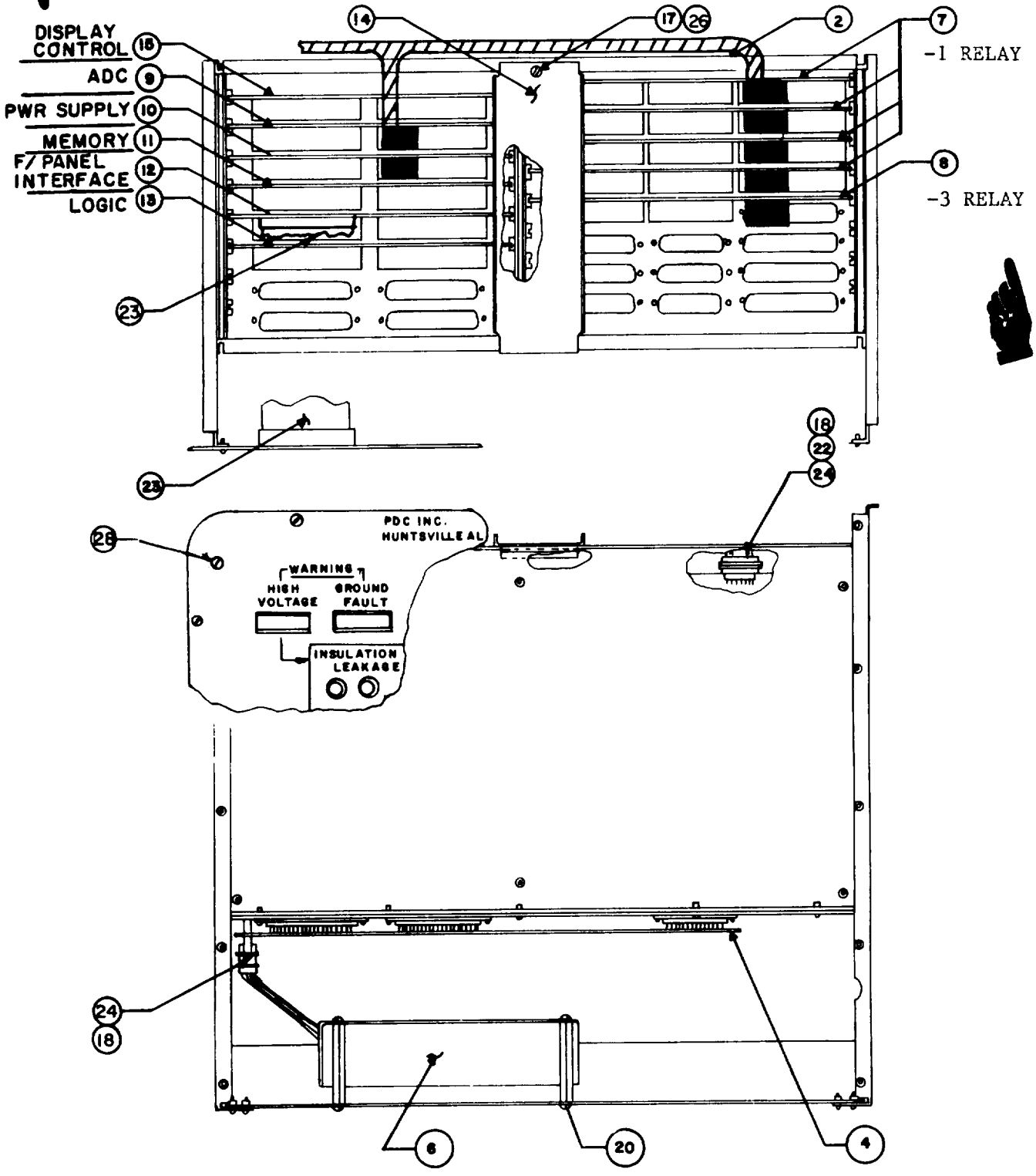


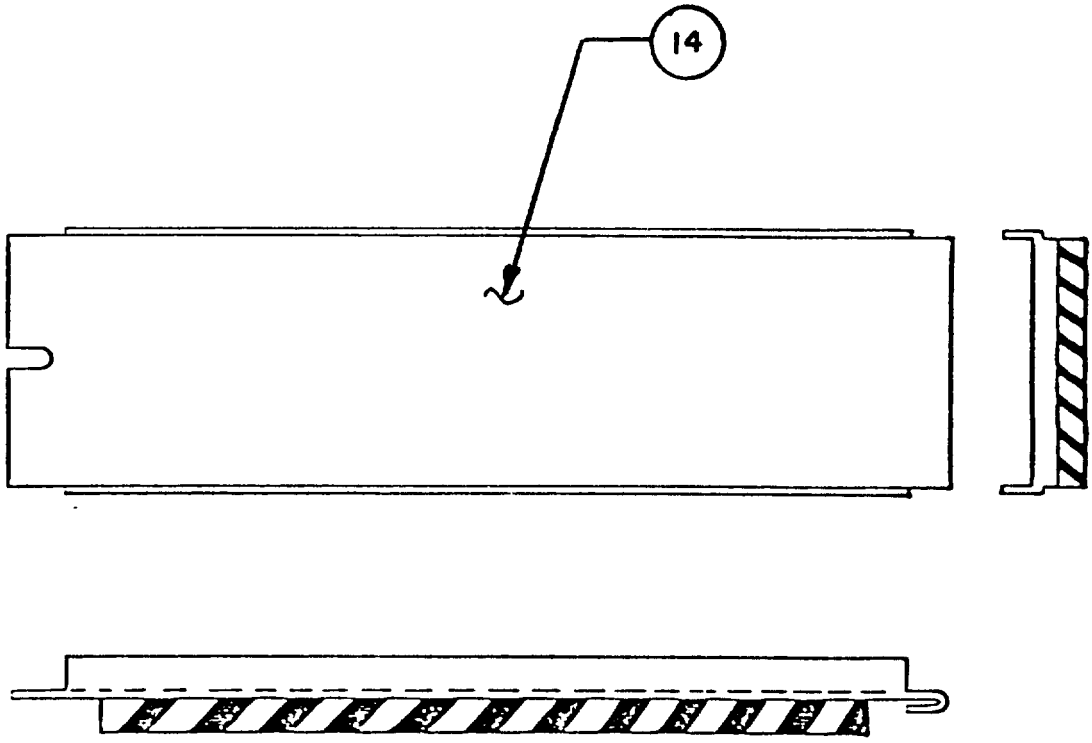
MAIN POWER SUPPLY P12115225


120 VAC POWER
J1
POWER SWITCH
ON/OFF
3 DIGET BCD SWITCH
1. Data Enter
SWITCHES
1. READ
2. OPEN/CLEAR/SHORT
3. ENTER/RESET
4. HI VOLTAGE/OFF/L.V. SHORT
5. RUN/HOLD/SINGLE STEP
6. CONTINUITY/OFF/LAMPTEST
3 DIGIT DISPLAY
FUNCTION SELECT
1 DIGIT BCD SWITCH
FUNCTION SELECT
1 DIGIT BCD SWITCH
1. Set Test Period (X .01 Second)
2. Set Test Period (X .1 Second)
3. Set Max Leakage (Microamps X 0.1)
4. Set Max Series Resistance (X 0.01 OHMS)
5. Select Cable Memory
6. Progam Memory
7. Set Test Start Position
8. Set High Voltage Leakage Test Voltage
INDICATORS
1. HIGH VOLTAGE
2. GROUND FAULT
3. PROGRAM ERROR
4. EXCESS LEAKAGE
5. SHORT CIRCUIT
6. CROSSED WIRES
7. OPEN CIRCUIT
8. HIGH SERIES
INPUT CONNECTOR
J2
128 PINS
OUTPUT CONNECTOR
J3
128 PINS
FRONT PANEL
FRONT PANEL INTERFACE
BUFFER
DE BOUNCER
BUFFER
BUFFER
HIGH VOLTAGE
DRIVER
GROUND FAULT
TEST CONFIGURATION AND CONTROL SWITCH BUS
3 STATE DISPLAY BUS
FUNCTION DECODER
CROSSED WIRES DECODER
GROUND FAULT DETECTOR
EMI FILTER
CASE GROUND
BCD SWITCH BUS
FUNCTION BUS
DISPLAY STROBE LOGIC
ADDRESS DECODER
TEST CIRCUIT SELECTOR
CARD
SLOT ENCODER
POWER SUPPLY
+12V
-12V
+5V
POWER GROUND
TEST START POSITION MEMORY
SYSTEM CODER
MAX LEAKAGE LEVEL MEMORY
TIMING BUS
TEST POSITION BCD COUNTER
MEASUREMENT SELECTION
OHMS
VOLTS
LEAK
MAX SERIES RESISTANCE MEMORY
TEST POSITION BINARY COUNTER
LEAKAGE MEAS
100 MA PRECISION CURRENT SOURCE
DECIMAL POINT DECODER
TEST VOLTAGE MEASUREMENT MEMORY
SERIES RESISTANCE
FAULT COMPARTOR
MEASUREMENT BUS
ADC
HIGH VOLTAGE 1 LOW VOLTAGE CURRENT SOURCE SELECTOR
CABLE FAULT MEMORY
SKIP
CABLE FAULT MEMORY COMPARATOR
RAMP GENERATOR
CABLE NUMBER MEMORY
12VDC TO 500VDC CONVERTER
REFERENCE
TEST VOLTAGE BCD BUS
DAC
TEST VOLTAGE MEMORY
LEGEND
INDICATES NUMBER OF WIRES IN CABLE
TEST MEMORY
DISPLAY STROBE & DECIMAL CONTROL
FAULT LOGIC
CONTROL & TIMING LOGIC
MEASUREMENT MEMORY
ADC
TEST VOLTAGE/CURRENT SOURCES
CIRCUIT UNDER TEST SELECTOR


MECHANICAL ASSEMBLY
P12115200
PDC INC
HUNTSVILLE, AL
MODEL 128-A CIRCUIT TESTER
S/N
WARNING
HIGH VOLTAGE
GROUND FAULT
PROGRAM ERROR
FAULT STATUS
EXCESS LEAKAGE
SHORT CIRCUIT
CROSSED WIRES
OPEN CIRCUIT
HIGH SERIES RESISTANCE
INSULATION LEAKAGE
SERIES RESISTANCE STANDARD
HIGH VOLTAGE LEAKAGE
RUN
SERIES RESISTANCE CONTINUITY
OFF
HOLD
OFF
LOW VOLTAGE SHORT
SINGLE STEP
LAMP TEST
S6
S7
S8
TEST STATUS
METER / DATA DISPLAY
MEMORY
S3
SHORT
CLEAR
FUNCTION SELECT
1 SET TEST PERIOD (X 0.01 SECOND)
2 SET TEST PERIOD (X 1 SECOND)
3 SET MAX. LEAKAGE (MICROAMPS X 0.1)
4 SET MAX. SERIES RESISTANCE (X 0.01 OH
5 SELECT CABLE MEMORY
6 PROGRAM MEMORY
7 SET TEST START POSITION
8 SET HIGH VOLTAGE LEAKAGE TEST VOLT
DATA ENTRY
S5
RESET
S4
ENTER
OHMS
VOLTS
LEAK
READ
S2
WARNING
HIGH VOLTAGE
ON
S1
OFF
120 VAC
POWER
J1
INPUT
J2
WARNING
HIGH VOLTAGE
OUTPUT
J3
COVER REMOVED
16 POWER CORD
17
25
20
19
1
28
8
3

MECHANICAL ASSEMBLY
P12115200





SUPPORT BRACKET P.C. CARDS P1211226

MECHANICAL ASSEMBLY MODEL 128-A CABLE TESTER P/N P12115200

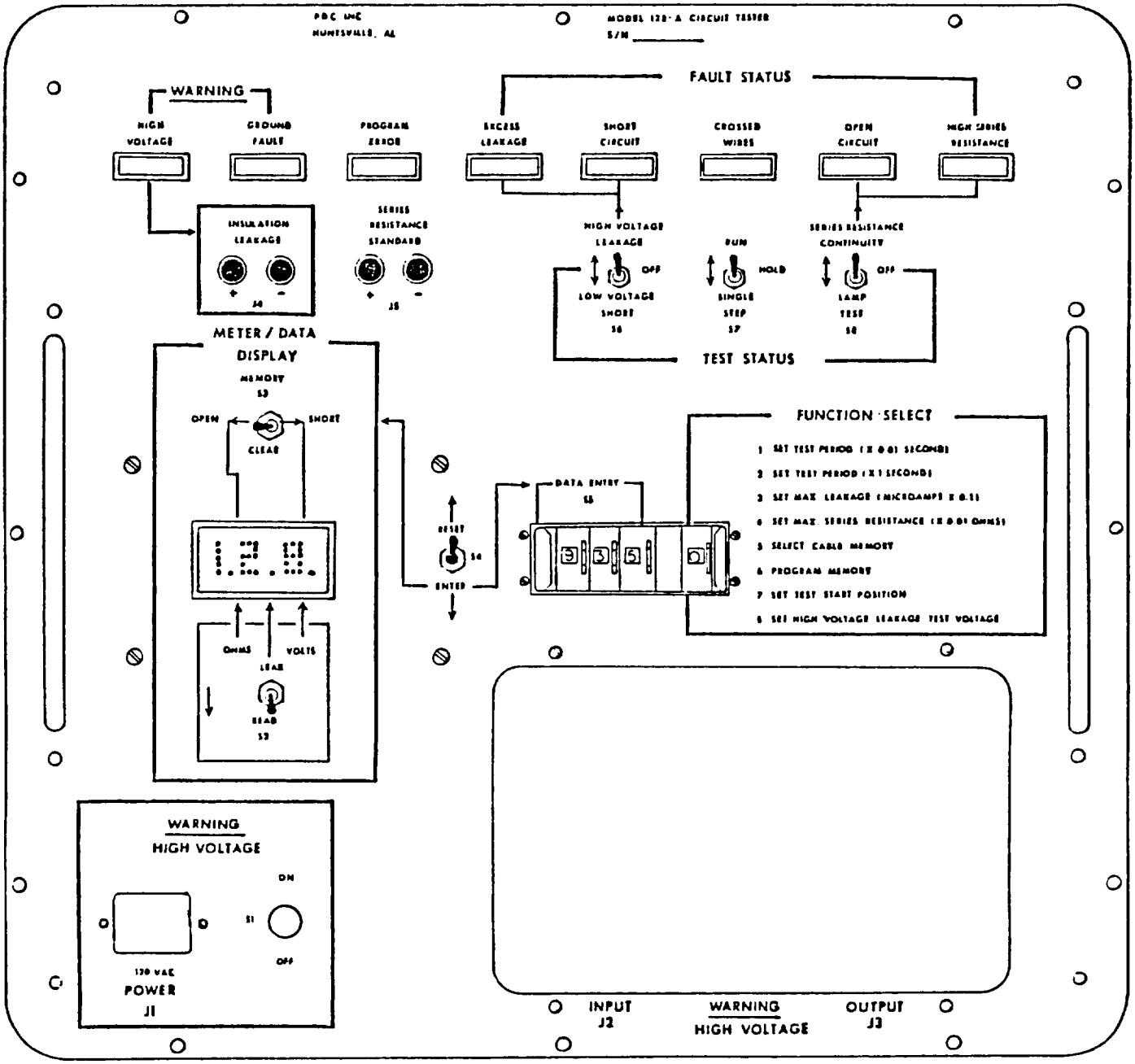
ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Front Panel Assembly	P12115218-1	64217	P12115218-1
2	Card Cage Assembly	P12115206-1	64217	P12115206-1
3	I/0 Interface Adapter Assembly	P12115249-1	64217	P12115249-1
4	Mother Board Assembly	P12115220-1	64217	P12115220-1
5	Enclosure Assembly	P12115239-1	64217	P12115239-1
6	Main Power Supply	P12115225-1	64217	P12115225-1
7	Relay Module	P121152607-1	64217	P121152607-1
8	Relay Module	P121152607-3	64217	P121152607-3
9	ADC Module	P12115209-1	64217	P12115209-1
10	Power Supply Module	P12115211-1	64217	P12115211-1
11	Memory Module	P12115208-1	64217	P12115208-1
12	Front Panel Interface	P12115212-1	64217	P12115212-1
13	Logic Module	P12115210-1	64217	P121I5210-1
14	Support Bracket	P12115226-1	64217	P12125226-1
15	Display Control Module	P12115213-1	64217	P12115213-1
16	Power Cord (1 Reqd.)	4048	70903	17608C
17	Screw 4-40 X .375 (3 Reqd.)	MS51957-15	N/A	MS51957-15
18	Screw 4-40 X .188 (16 Reqd.)	MS51957-12	N/A	MS51957-12
19	Nut 6-32 (4 Reqd.)	MS35649-15	N/A	MS35649-15
20	Screw 6-32 X .375 (Reqd.)	MS51957-28	N/A	MS51957-28
21	Screw 10-32 X .500(12 Reqd.)	MS5195-63	N/A	MS51959-63
22	Relay Harness	P12115238-1	64217	P12115238-1

MECHANICAL ASSEMBLY MODEL 128-A CABLE TESTER P/N P12115200

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
23	Front Panel Flat Cable	P12115251-1	64217	P12115251-1
24	Threaded Hex Spacer 4-40 (14 Reqd.)	4049	83330	8216
25	Nut 4-40 (2 Reqd.)	MS35649-44	N/A	MS35649-44
26	Washer #4 (1 Reqd.)	AN960-4	N/A	AN960-4
27	Washer Counter Sunk #10	4099	83330	#1117
28	Screw #4-40 X .25 Long	MS51959-13	N/A	MS51959-13

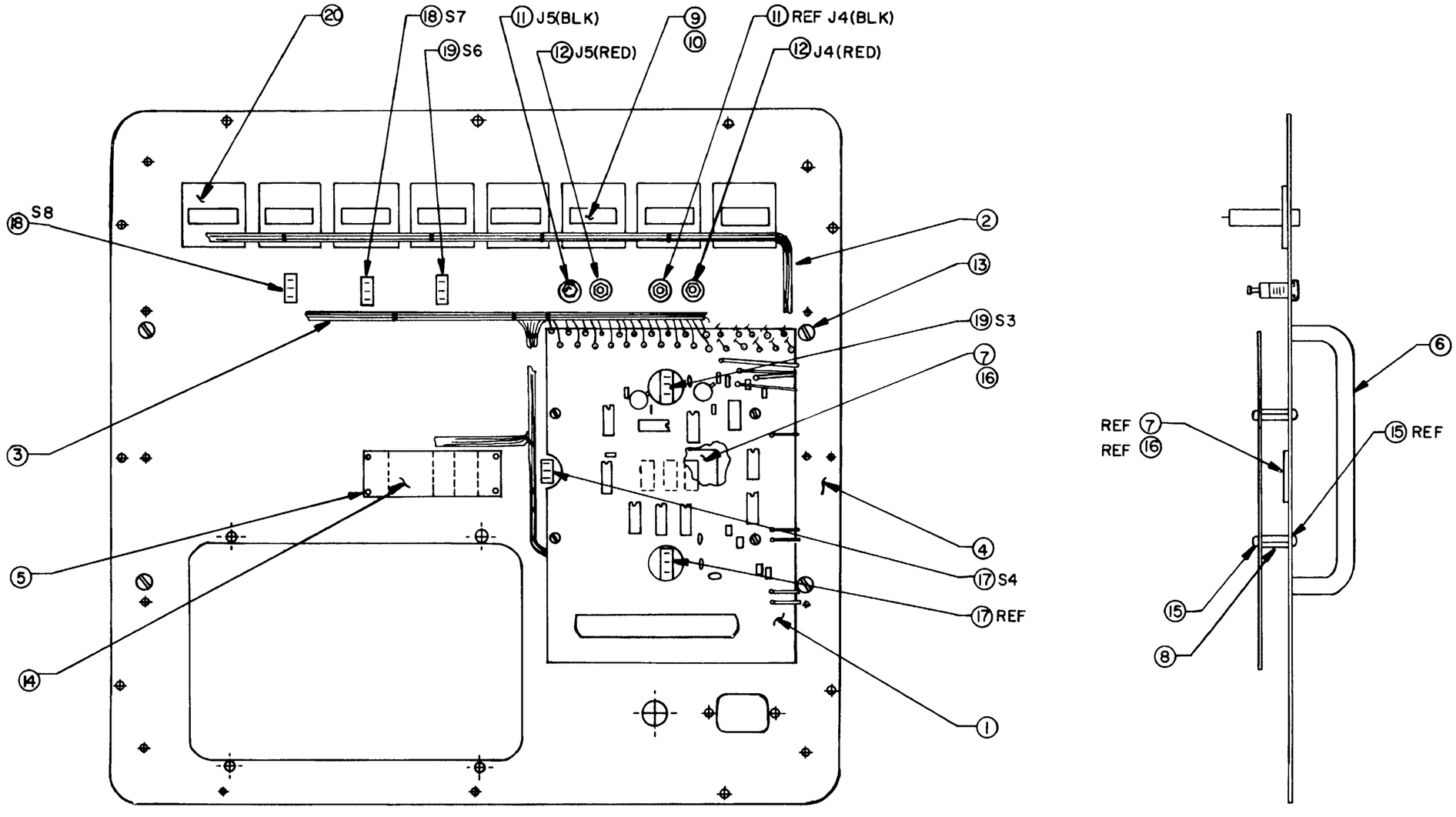
ASSEMBLY FRONT PANEL

P12115218



FRONT VIEW SHOWN

ASSEMBLY FRONT PANEL
P12115218

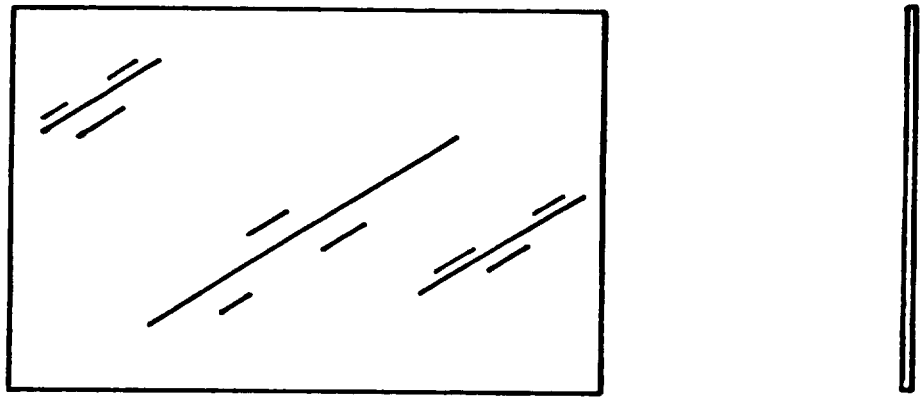


REAR VIEW SHOWN

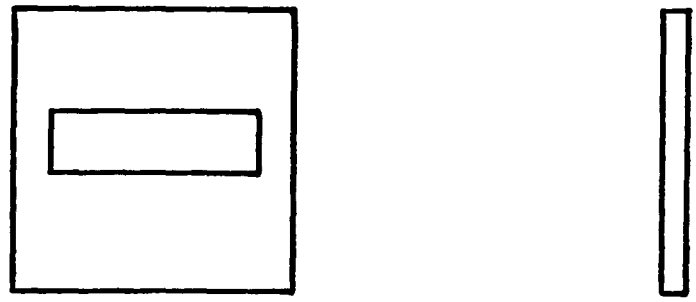
Assembly FRONT PANEL P/N P12115218

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Display Board Assembly PC-1	P12115231-1	64217	P12115231-1
2	Display Harness Assembly W2	P12115234-1	64217	P12115234-1
3	Switch Harness Assembly Wl	P12115235-1	64217	P12115235-1
4	Front Panel Detail	P12115205-1	64217	P12115205-1
5	Screw 2-56 X .56 Lg. (4 Reqd.)	MS51957-7	N/A	MS51957-7
6	Aluminum Handle (2 Reqd.)	4039	06540	10511-1032-1B
7	Contrast Enhancement Filter	P12115240-1	64217	P12115240-1
8	Aluminum Spacer 3/8" Lg. (4 Reqd.)	4033	83330	8422
9	LED Display Dual (8 Reqd.)	4027	3G533	AML45RKA2RR
10	Bezel Display, Red (8 Reqd.)	4028	3G533	AML59RK10R
11	Banana Jack, Black (2 Reqd.)	4030	83330	1459
12	Banana Jack, Red (2 Reqd.)	4029	83330	1459
13	Screw, Flat Head (4 Reqd.) 10-32 X .312 Lg.	MS51959-14	N/A	MS1959-14
14	Thumbwheel Spacer	4031	97525	S75SG
15	Screw Machine #6-32 X 25 Lg. (8 Reqd.)	MS51957-28	N/A	MS51957-28
16	Rubber Silicon Compound	4032	0D426	RTV-118
17	Switch SPDT S2, S4	4040	96170	T06-127
18	Switch SPDT S7, S8	4041	96170	T06-131
19	Switch SPDT S3, S6	4042	96170	T06-121
20	LED Bracket Support (8 Reqd.)	P12115372-1	64217	P12115372-1

CONTRAST ENHANCEMENT FILTER
P12115240



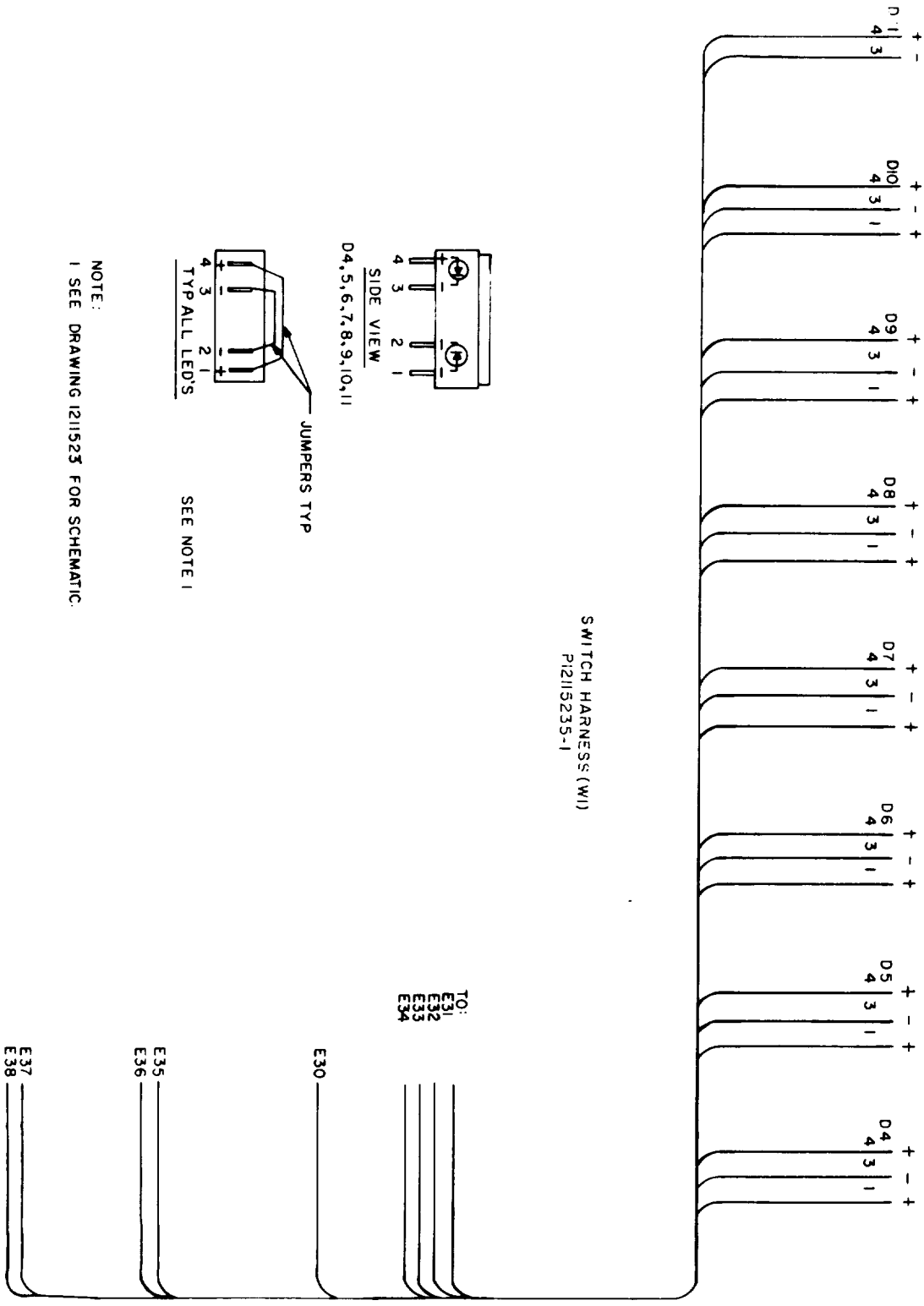
LED SUPPORT BRACKET FRONT PANEL
P12115372

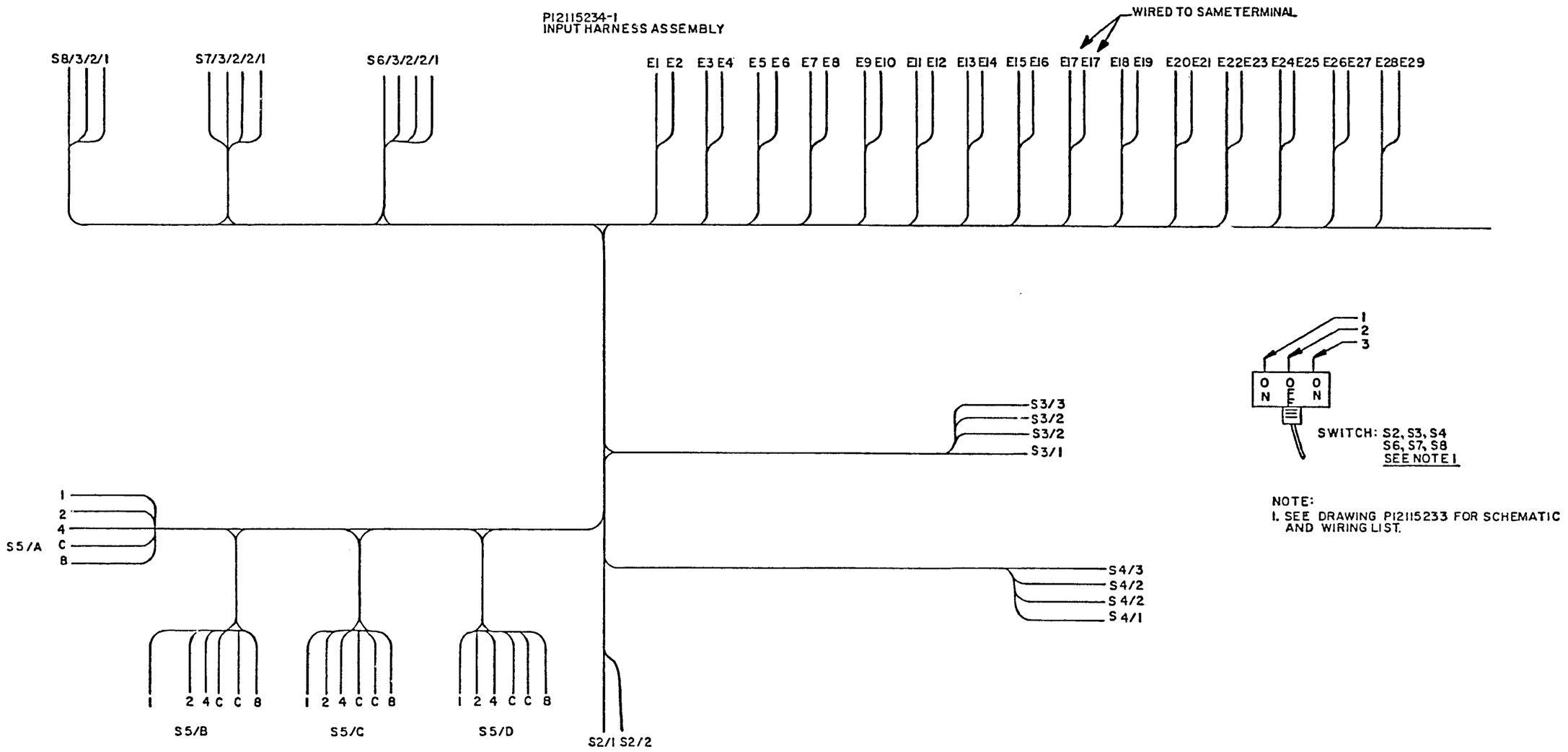


P12115235 RUNNING LIST W1 HARNESS		
S8/1	TO	P12115231/E25
S8/2		S7/2
S8/3		P12115231/E19
S7/1		P12115231/E29
S7/2		S6/2
S7/3		P12115231/E27
S6/1		P12115231/E28
S6/2		P12115231/E18
S6/3		P12115231/E26
S3/1		P12115231/E22
S3/2		P12115231/E17
S3/3		P12115231/E24
S4/1		P12115231/E21
S4/2		S3/2
S4/3		P12115231/E23
S2/1		OPEN
S2/2		S4/2
S2/3		P12115231/E20
S5/A1		/E16
S5/A2		E15
S5/A4		E14
S5/AC		E17
S5/A8		E13
S5/B1		E1

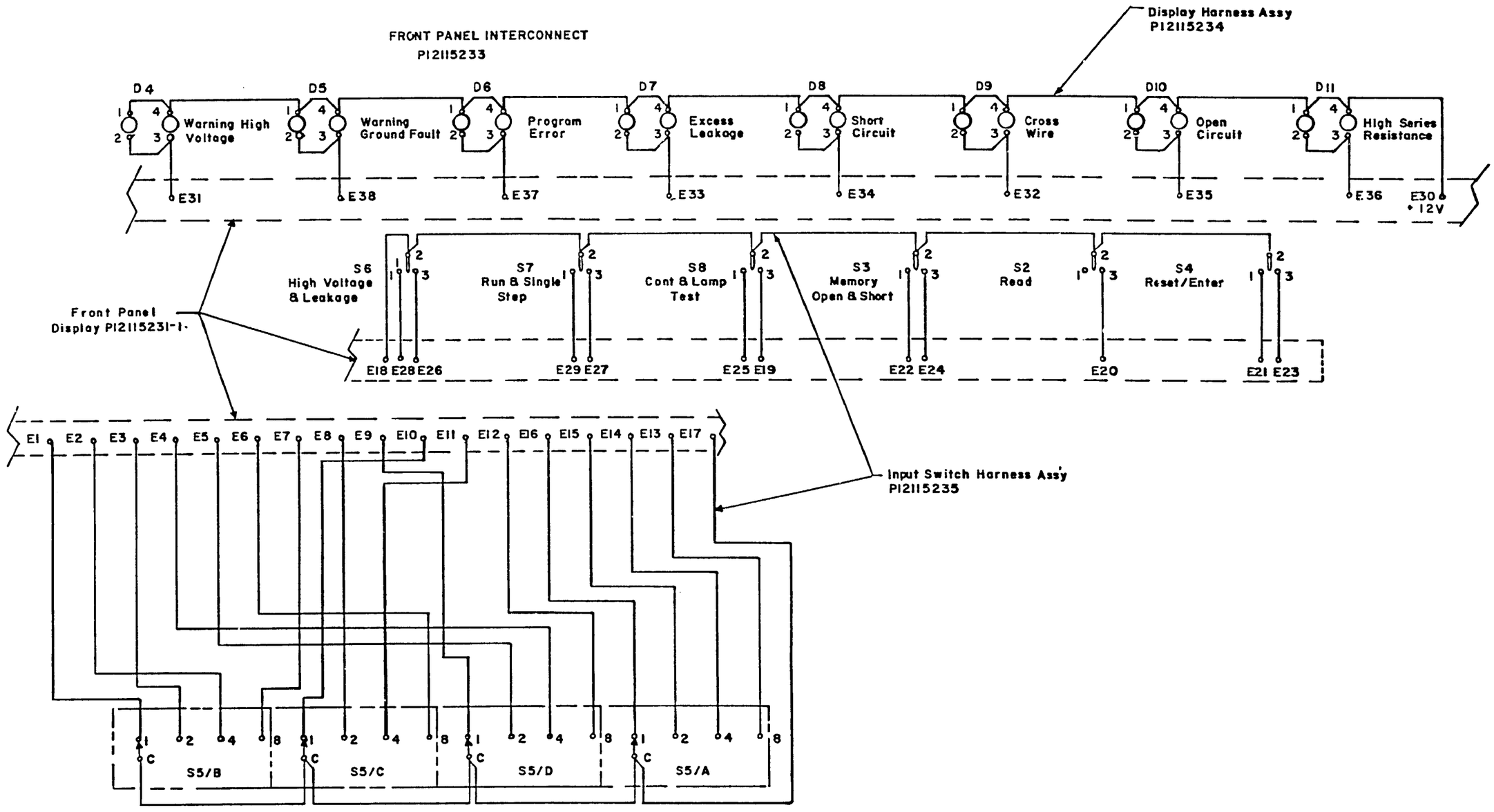
CONT.

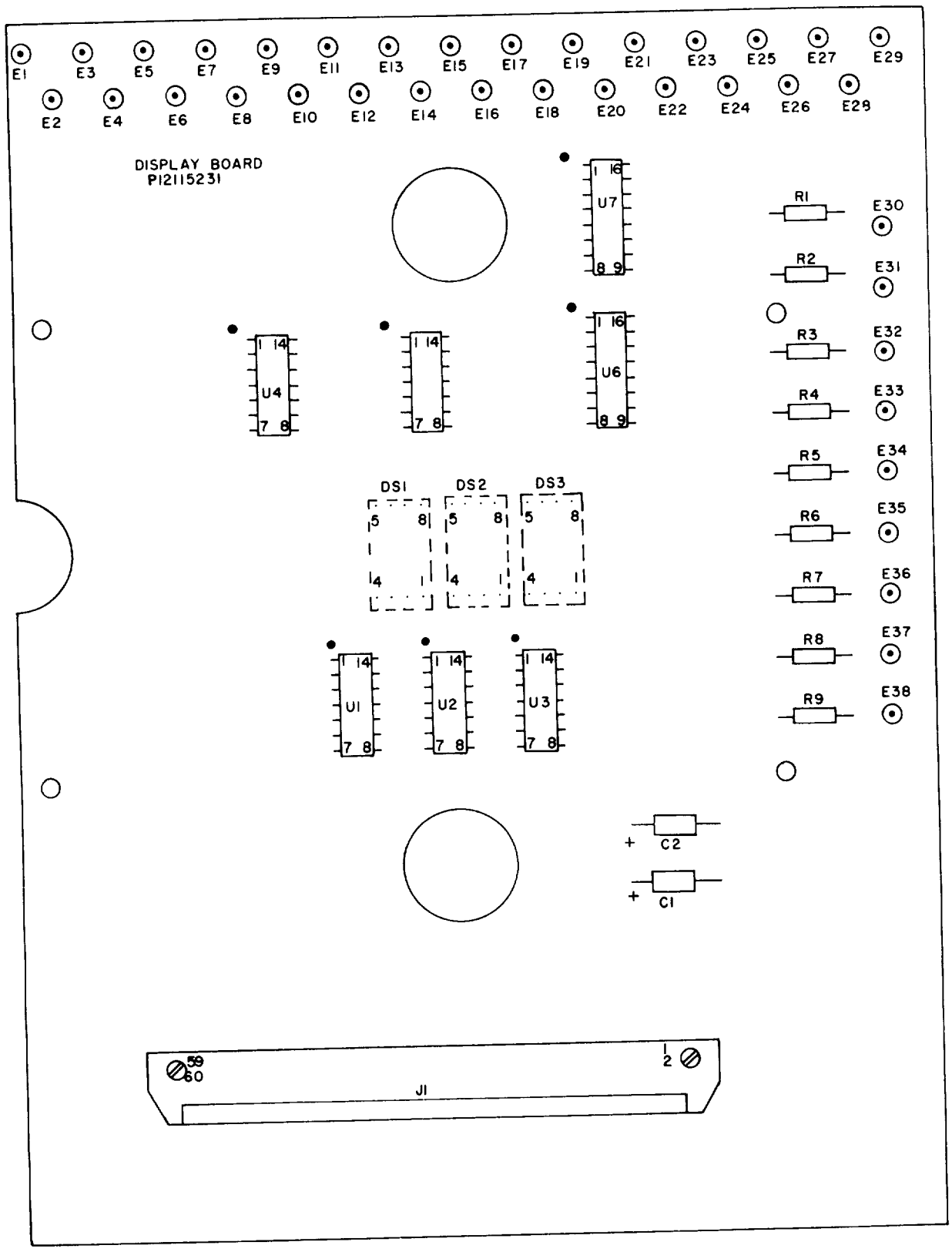
P12115235 RUNNING LIST (W1) HARNESS		
S5/B2		E3
S5/B4		P12115231/E2
S5/BC		S5/AC
S5/C1		P12115231/E10
S5/C2		P12115231/E8
S5/C4		P12115231/E11
S5/CC		S5/BC
S5/C8		P12115231/E6
S5/D1		P12115231/E9
S5/D2		P12115231/E5
S5/D4		P12115231/E4
S5/DC	↓	S5/CC
S5/D8	TO	P12115231/E12


D1
D10
D9
D8
D7
D6
D5
D4
SWITCH HARNESS (W1)
P12115235-1
TO:
E31
E32
E33
E34
E30
E35
E36
E37
E38
SIDE VIEW
D4,5,6,7,8,9,10,11
JUMPERS TYP
TYP ALL LED'S
SEE NOTE 1
NOTE:
1 SEE DRAWING 12115231 FOR SCHEMATIC.



NOTE:
1. SEE DRAWING P12115233 FOR SCHEMATIC AND WIRING LIST.


FRONT PANEL INTERCONNECT
P12115233
Display Harness Assy
P12115234
D4
Warning High Voltage
D5
Warning Ground Fault
D6
Program Error
D7
Excess Leakage
D8
Short Circuit
D9
Cross Wire
D10
Open Circuit
D11
High Series Resistance
E31
E38
E37
E33
E34
E32
E35
E36
E30
+12V
S6
High Voltage & Leakage
S7
Run & Single Step
S8
Cont & Lamp Test
S3
Memory Open & Short
S2
Read
S4
Reset/Enter
E18 E28 E26
E29 E27
E25 E19
E22 E24
E20
E21 E23
Front Panel
Display P12115231-1
E1 E2 E3 E4 E5 E6 E7 E8 E9 E10 E11 E12 E16 E15 E14 E13 E17
Input Switch Harness Assy
P12115235
S5/B
S5/C
S5/D
S5/A
C


E1
E3
E5
E7
E9
E11
E13
E15
E17
E19
E21
E23
E25
E27
E29
E2
E4
E6
E8
E10
E12
E14
E16
E18
E20
E22
E24
E26
E28
DISPLAY BOARD
P12115231
U7
U4
U6
DS1
DS2
DS3
U1
U2
U3
R1
R2
R3
R4
R5
R6
R7
R8
R9
E30
E31
E32
E33
E34
E35
E36
E37
E38
C2
C1
J1

Board #6 DISPLAY BOARD, FRONT PANEL P12115231

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
R1	Res, 10K, l/4W, ±5%	1087	01121	RC07G103J
R2	Res, 47Ω, l/4W, ±5%	l031	01121	RC07G470J
R3	Res. 47Ω, 1/4W, ±5%	1031	01121	RC07G470J
R4	Res, 47Ω, l/4W, ±5%	1031	01121	RC07G470J
R5	Res. 47Ω, l/4W, ±5%	1031	01121	RC07G470J
R6	Res. 47Ω, l/4W, ±5%	1031	01121	RC07G470J
R7	Res. 47Ω, l/4W, ±5%	1031	Ol121	RC07G470J
R8	Res. 47 Ω, l/4W, ±5%	1031	01121	RC07G470J
R9	Res. 47Ω, l/4W, ±5%	1031	Oll21	RC07G470J
U1	Inverter Hex Schmitt Trigger	6033	04713	MC14584BCP
U2	Inverter Hex Schmitt Trigger	6033	04713	MC14584BCP
U3	Inverter Hex Schmitt Trigger	6033	04713	MC14584BCP
U4	Quad 2-Input “NOR” Gate	6001	04713	MC1400lBCP
U5	Inverter Hex Schmitt Trigger	6033	04713	MC14584BCP
U6	Driver 8 Transistor Array	6042	18324	SN75469
U7	Driver 8 Transistor Array	6042	18324	SN75469
N/A	Printed Circuit Board	P12115231-3	64217	P12115231-3
N/A	Screw 4-40 X .250 (2 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (2 Reqd.)	MS35649-44	N/A	MS35649-44
N/A	Conformal Coating	MS1005	21223	#65-16

Board # 6 DISPLAY BOARD, FRONT PANEL P12115231

ITEM #	DESCRIPTION	PDC STK #	FSCM	MFG-P/N
E17	Solder Terminal	MIS1002	83330	2027C
E18	Solder Terminal	MIS1002	83330	2027C
E19	Solder Terminal	MIS1002	83330	2027C
E20	Solder Terminal	MIS1002	83330	2027C
E21	Solder Terminal	MIS1002	83330	2027C
E22	Solder Terminal	MIS1002	83330	2027C
E23	Solder Terminal	MIS1002	83330	2027C
E24	Solder Terminal	MIS1002	83330	2027C
E25	Solder Terminal	MIS1002	83330	2027C
E26	Solder Terminal	MIS1002	83330	2027C
E27	Solder Terminal	MIS1002	83330	2027C
E28	Solder Terminal	MIS1002	83330	2027C
E29	Solder Terminal	MIS1002	83330	2027C
E30	Solder Terminal	MIS1002	83330	2027C
E31	Solder Terminal	MIS1002	83330	2027C
E33	Solder Terminal	MIS1002	83330	2027C
E34	Solder Terminal	MIS1002	83330	2027C
E35	Solder Terminal	MIS1002	83330	2027C
E36	Solder Terminal	MIS1002	83330	2027C
E37	Solder Terminal	MIS1002	83330	2027C
E38	Solder Terminal	MIS1002	83330	2027C

Board # 6 DISPLAY BOARD, FRONT PANEL P12115231

ITEM #	DESCRIPTION	PDC STK #	FSCM	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K020AS
C2	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K20AS
DS1	Numeric Display	NU1000	2G336	5082-7300
DS2	Numeric Display	NU1000	2G336	5082-7300
DS3	Numeric Display	NU1000	2G336	5082-7300
J l	Conn. 60 Pin Plug	4006	76381	3372/1202
E l	Solder Terminal	MIS1002	83330	2027C
E2	Solder Terminal	MIS1002	83330	2027C
E3	Solder Terminal	MIS1002	83330	2027C
E4	Solder Terminal	MIS1002	83330	2027C
E5	Solder Terminal	MIS1002	83330	2027C
E6	Solder Terminal	MIS1002	83330	2027C
E7	Solder Terminal	MIS1002	83330	2027C
E8	Solder Terminal	MIS1002	83330	2027C
E9	Solder Terminal	MIS1002	83330	2027C
E1O	Solder Terminal	MIS1002	83330	2027C
E l l	Solder Terminal	MIS1002	83330	2027C
E12	Solder Terminal	MIS1002	83330	2027C
E13	Solder Terminal	MIS1002	83330	2027C
E14	Solder Terminal	MIS1002	83330	2027C
E15	Solder Terminal	MIS1002	83330	2027C
E16	Solder Terminal	M1S1002	83330	2027C

FRONT PANEL DISPLAY CARD P12115231

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
J1/1.	+12 VOLTS	E1	
2.	+12 VOLTS	E2	
3.	CMOS GND & IND. GND	E3	
4.	CMOS GND & IND. GND	E4	
5.	+5 DISPLAY VOLTS	E5	
6.	+5 DISPLAY VOLTS	E6	
7.	CMOS GND. & IND GND	E7	
8.	CMOS GND & IND. GND	E8	SEE DISPLAY HARNESS ASS'Y P12115234
9.	+5 VOLTS CMOS	E9	
10.	CROSSED WIRE	E10	
11.	D-4	E11	
12.	D-11	E12	
13.	D-8	E13	
14.	D-7	E14	
15.	D-9	E15	
16.	D-6	E16	
17.	D10	E30	+5 VOLTS
18.	D-2	E31	WARNING HI VOLTAGE LAMP
19.	D-9	E32	CROSSED WIRES LAMP
20.	D-5	E33	EXCESSIVE LEAKAGE LAMP
21.	D-1	E34	SHORT CIRCUIT LAMP
22.	D-3	E35	OPEN CIRCUIT LAMP
23.	DISPLAY STROBE D-15	E36	HI SERIES RESISTANCE LAMP
24.	$\overline{\text{SHORT}}$	E37	PROGRAM ERROR
25.	D-12	E38	WARNING GND FAULT LAMP

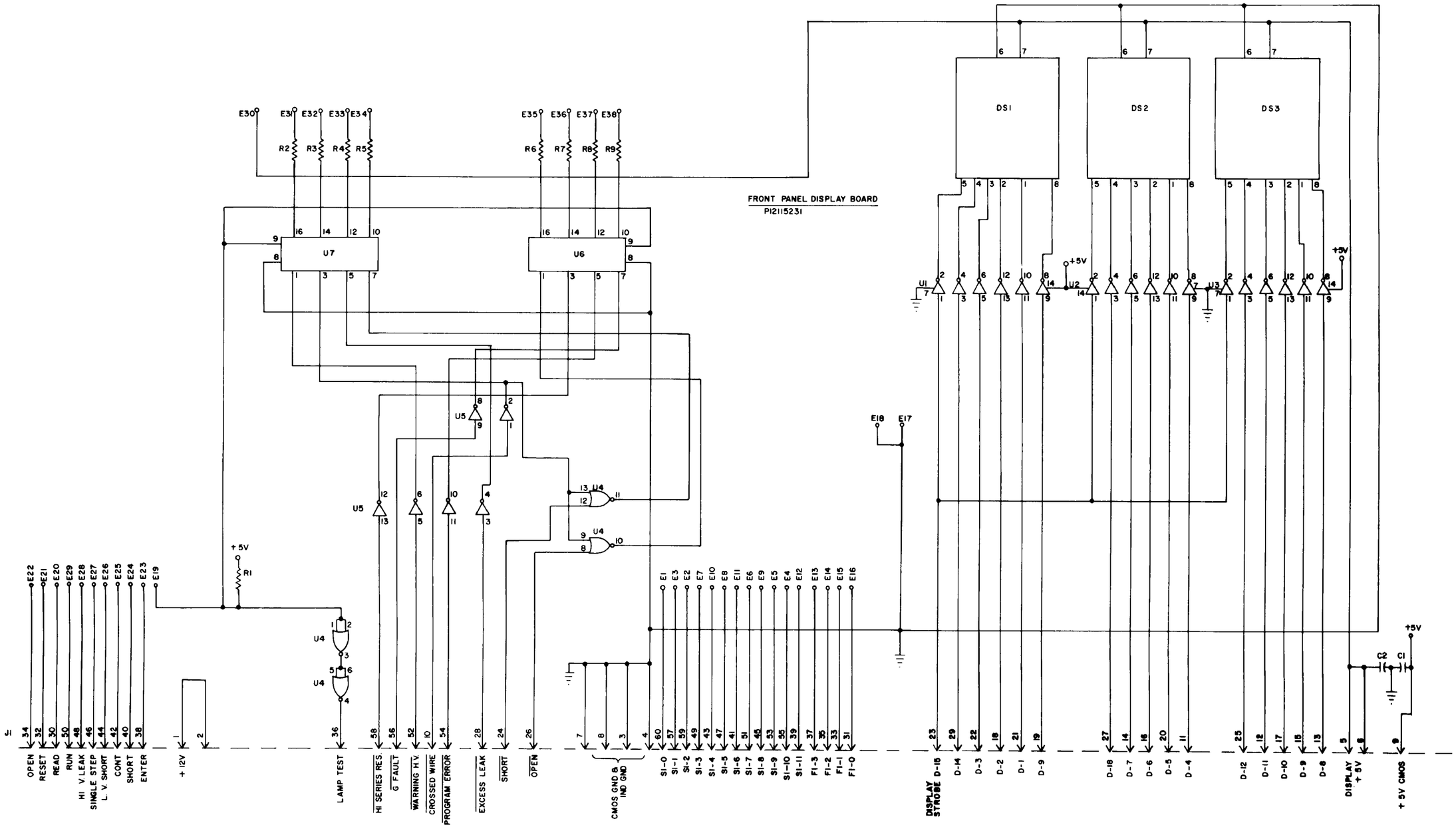
FRONT PANEL DISPLAY CARD P12115231

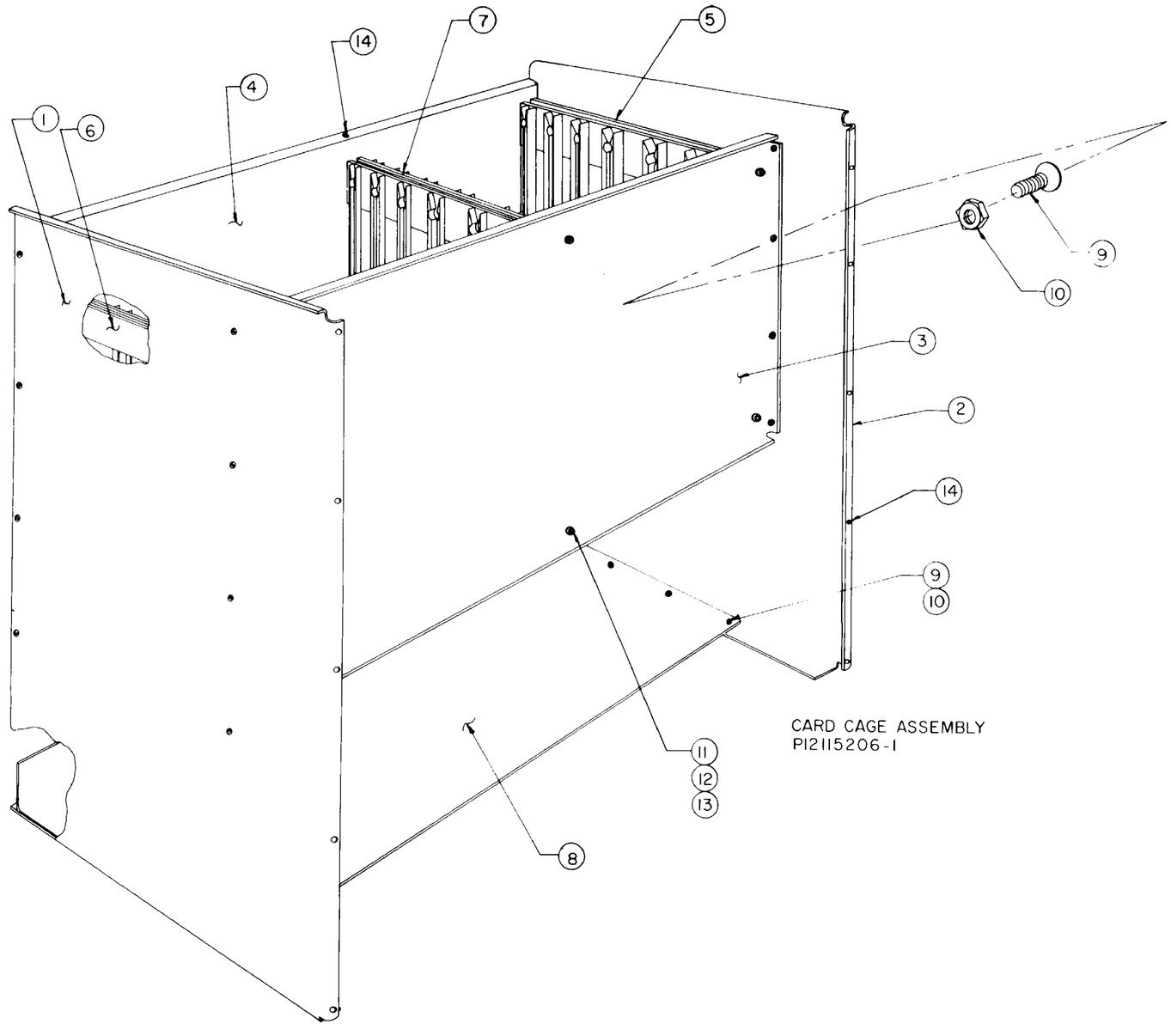
CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
J1/26.	OPEN		
27.	D-18		
23.	EXCESS LEAKAGE		
23.	D-14		
30.	READ		
31.	F1-O		
32.	RESET		
33.	F1-1		
34.	OPEN		
35.	F1-2		
35.	LAMP TEST		
37.	F1-3		
39.	ENTER		
39.	S1-11		
49.	SHORT		
41.	S1- 6		
42.	CONTINUITY		
43.	S1-4		
44.	LOW VOLTAGE LEAK		
45.	S1-8		
45.	SINGLE STEP		
47.	S1-5		
48.	HIGH VOLTAGE LEAK		
49.	S1-3		
50.	RUN		

CONTINUED

FRONT PAMEL DISPLAY CARD P12115231

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
J1/51.	S1-7		
52.	WARNING HIGH VOLTAGE		
53.	S1-9		
54.	$\overline{\text{PROGRAM ERROR}}$		
55.	S1-10		
56.	$\overline{\text{GND FAULT}}$		
57.	S1-1		
58.	HIGH SERIES RESISTANCE		
59.	S1-2		
60.	S1-0		


FRONT PANEL DISPLAY BOARD
P12115231
DS1
DS2
DS3
U1
U2
U3
U4
U5
U6
U7
+5V
+12V
R1
R2
R3
R4
R5
R6
R7
R8
R9
C1
C2
E30
E31
E32
E33
E34
E35
E36
E37
E38
E18
E17
E22
E21
E20
E29
E28
E27
E26
E25
E24
E23
E19
OPEN
RESET
READ
RUN
HI V LEAK
SINGLE STEP
L. V SHORT
CONT
SHORT
ENTER
LAMP TEST
HI SERIES RES.
G FAULT
WARNING H.V.
CROSSED WIRE
PROGRAM ERROR
EXCESS LEAK
SHORT
OPEN
CMOS GND & IND GND
SI-0
SI-1
SI-2
SI-3
SI-4
SI-5
SI-6
SI-7
SI-8
SI-9
SI-10
SI-11
FI-3
FI-2
FI-1
FI-0
DISPLAY STROBE
D-15
D-14
D-13
D-12
D-11
D-10
D-9
D-8
D-7
D-6
D-5
D-4
D-3
D-2
D-1
D-9
DISPLAY +5V
+5V CMOS

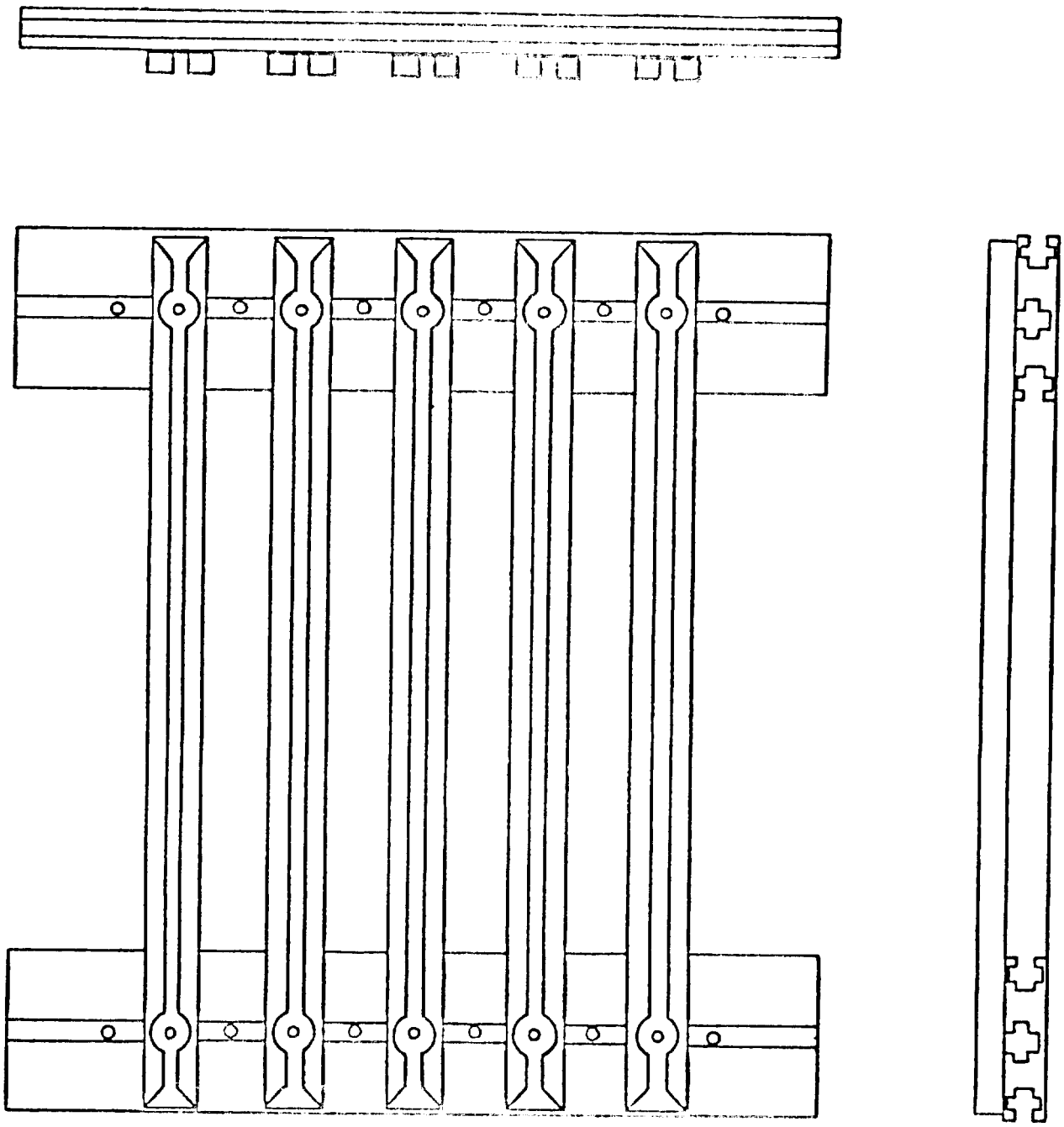


CARD CAGE ASSEMBLY
P12115206-1

ASSEMBLY CARD CAGE P/N P12115206

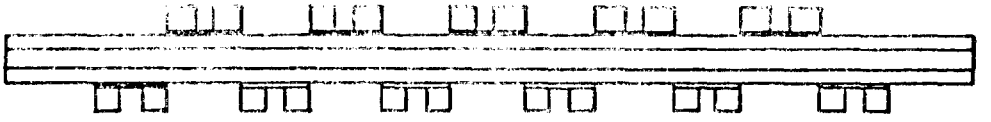
ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Card Cage Plate, Left	P12115215-1	64217	P12115215-1
2	Card Cage Plate, Right	P12115215-2	64217	P12115215-2
3	Card Cage Plate, Front	P12115214-1	64217	P12115214-1
4	Card Cage Plate, Rear	P12115214-2	64217	P12115214-1
5	Card Guide, Right Side	P12115228-1	64217	P12115228-1
6	Card Guide, Left Side	P12115228-2	64217	P12115228-2
7	Card Guide, Center	P12115227-1	64217	P12115227-1
8	Power Supply Bracket Mount	P12115217-1	64217	P12115217-1
9	Machine Screw (22 Reqd.) #4-40 X .25	MIS51957-13	N/A	MIS51957-13
10	Nut, Hex (22 Reqd.)	MS35649-44	N/A	MS35649-44
11	Threaded Rod S/S 6 Pcs	4043	N/A	#6-32X 7.12 LG
12	Nut Hex #6-32 (12 Reqd.)	MS35649-64	N/A	MS35649-64
13	Washer #6-32 (12 Reqd.)	NAS620-6L	N/A	NAS620-6L
14	Press Nuts (11 Reqd.)	4096	1L667	FEX-440

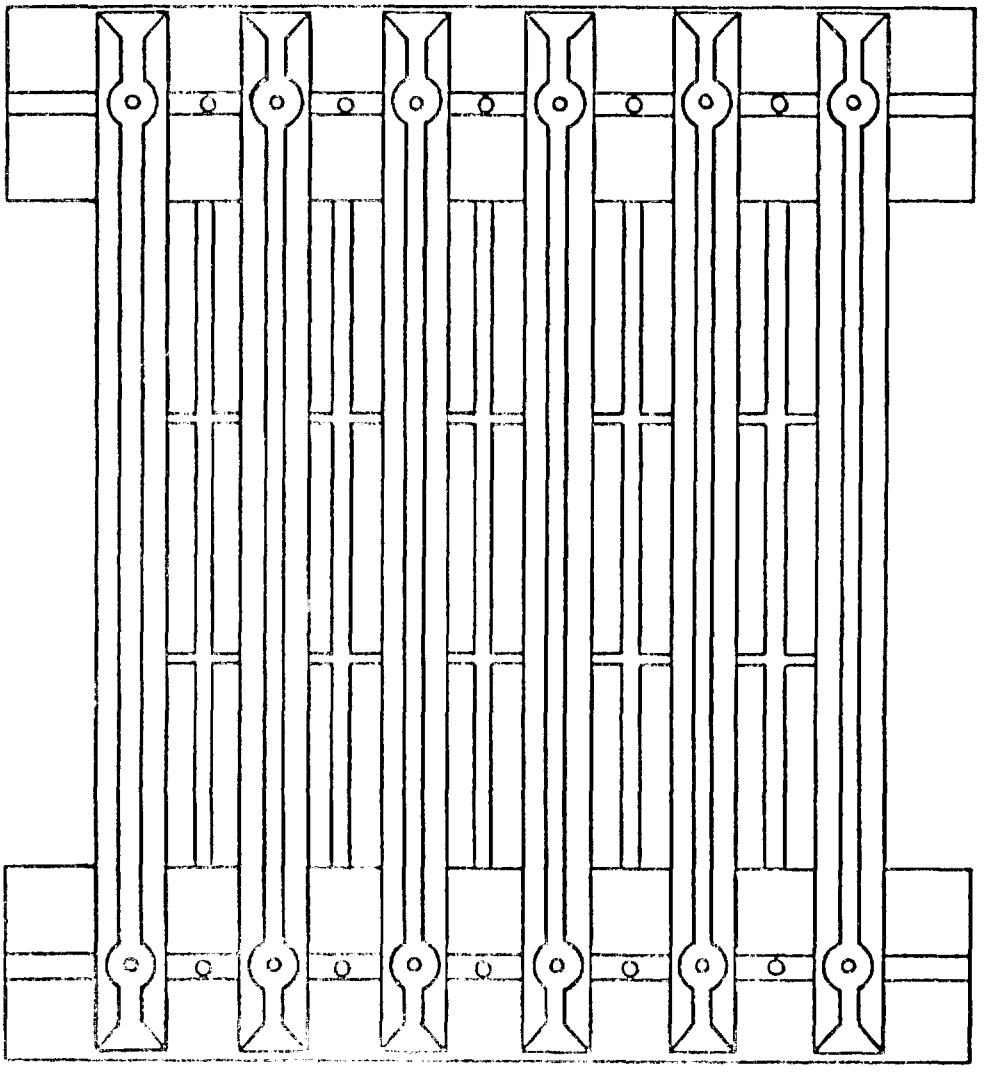
CARD GUIDE, END (5 CARD)
P 12115228-I

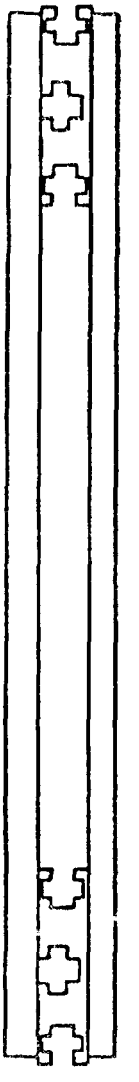


CARDGUIDE, CENTER

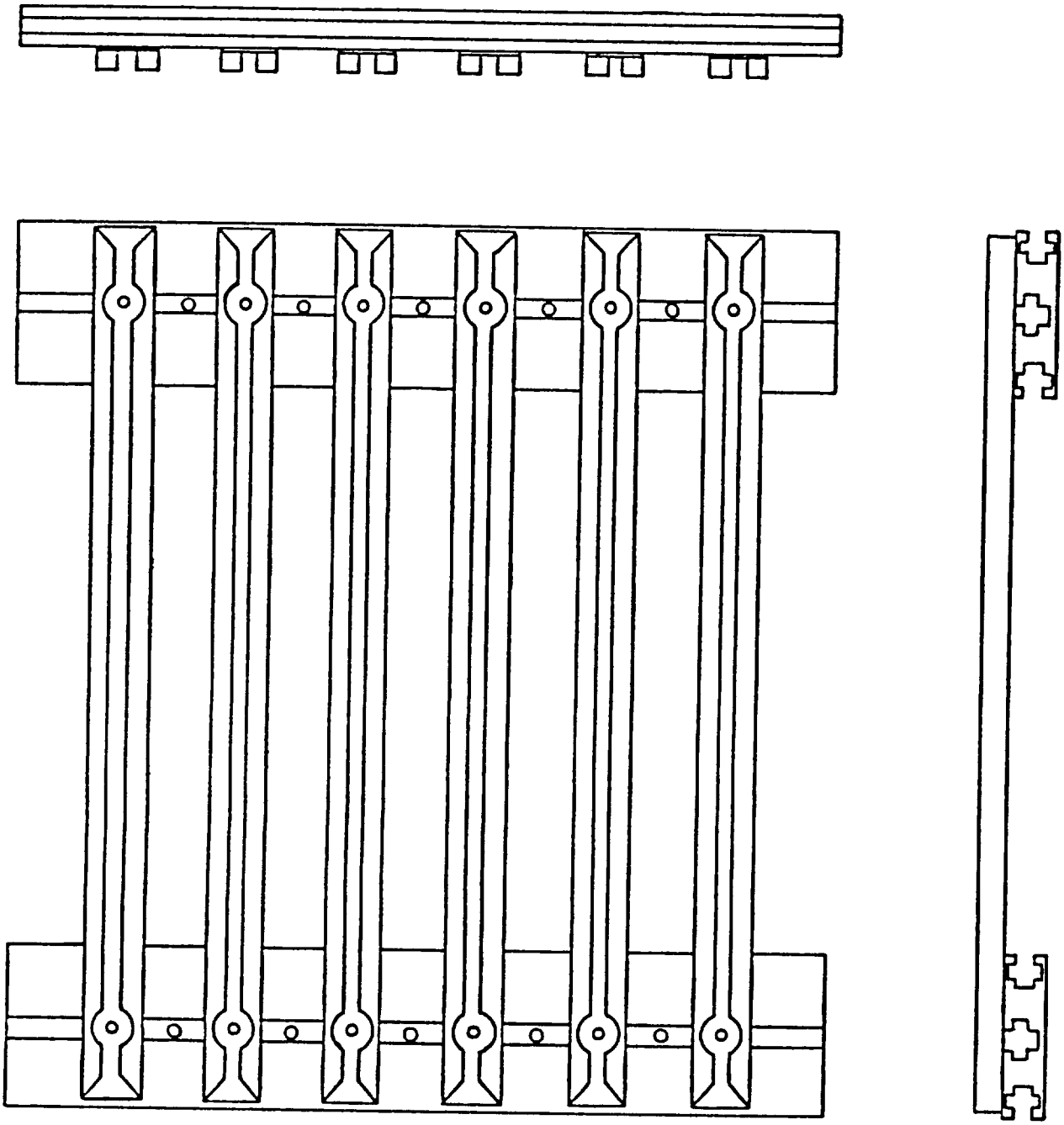
P11275227







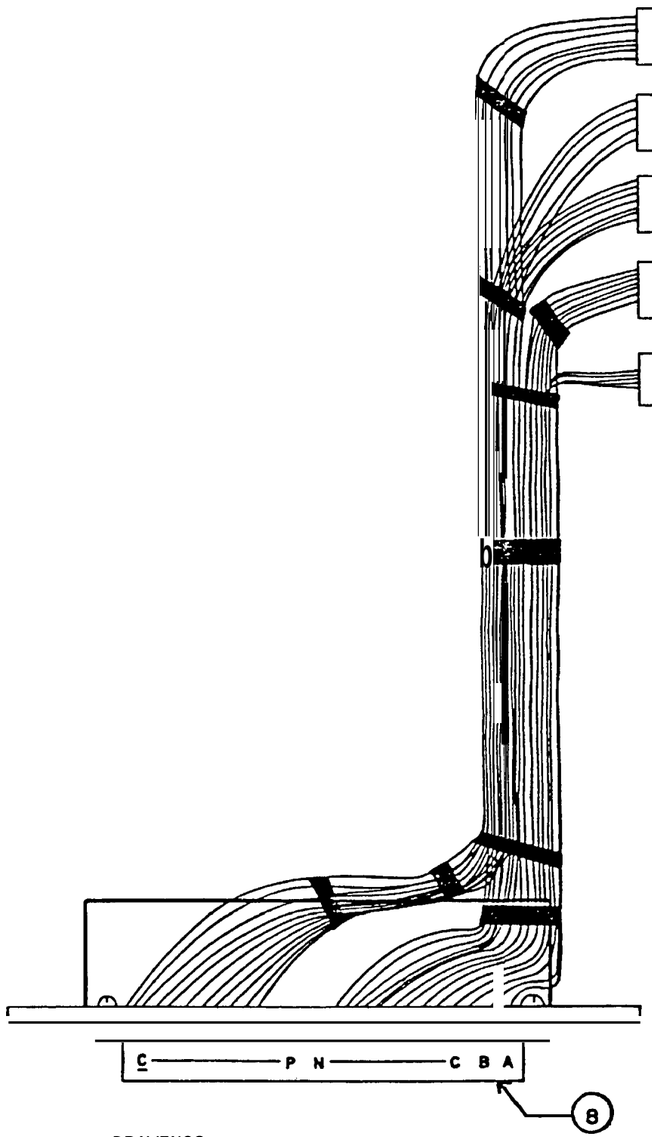
CARDGUIDE END (6 CARD)
P12115228-3

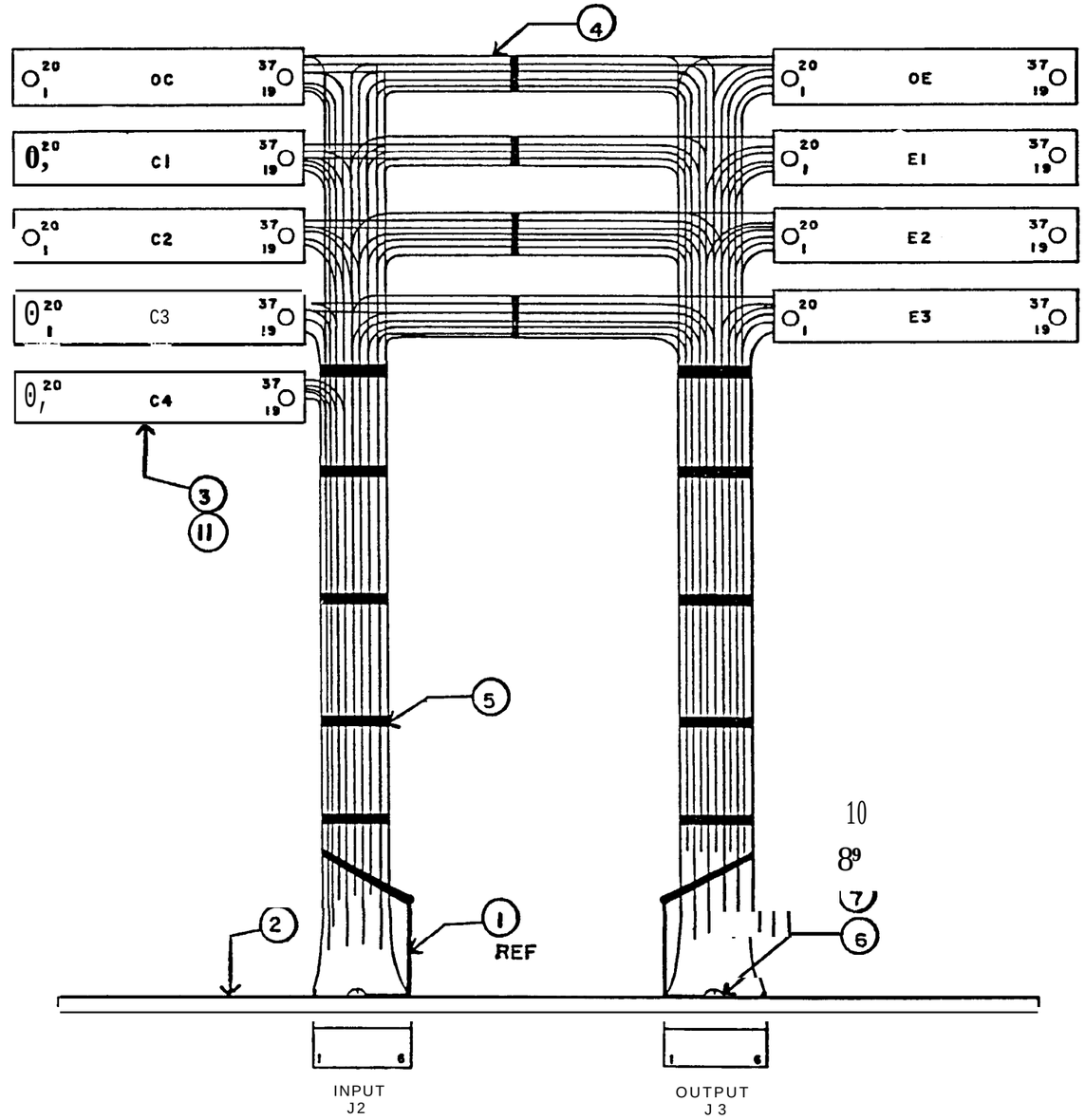


INPUT/OUPUT

INTERFACE ADAPTER
ASSEMBLY

P121 15249





Assembly I/0 INTERFACE ADAPTER P/N P12115249

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Strain Relief (2 Reqd.)	P12115250	64217	P12115250
2	I/0 Interface Adapter Plate (1 Reqd.)	P12115248	64217	P12115248
3	Conn. 37 Pin, D-Sub (9 Reqd.)	4100	04618	745213-2
4	Wire 22 Ga. White EE	4034	4G874	EE2219-9
5	Lacing Cord	4021	4G874	LC 136
6	Screw 4-40 X .50 LG (6 Reqd.)	MS51957-17	N/A	M51957-17
7	Washer 4-40 (6 Reqd.)	AN96041L	N/A	AN9604L
8	Connector 156 Pin (2 Reqd.)	MIS1036	71468	DL1-156R
9	Nut 4-40 (6 Reqd.)	MS35649-44	N/A	MS35649-44
10	Pins #AWG 20 (312 Reqd.)	4101	71468	030-2064-028
11	20 Gauge Sockets (333 Reqd.)	4102	04618	1-66504-0

TM

INPUT/OUTPUT INTERFACE WIRING LIST P12115249

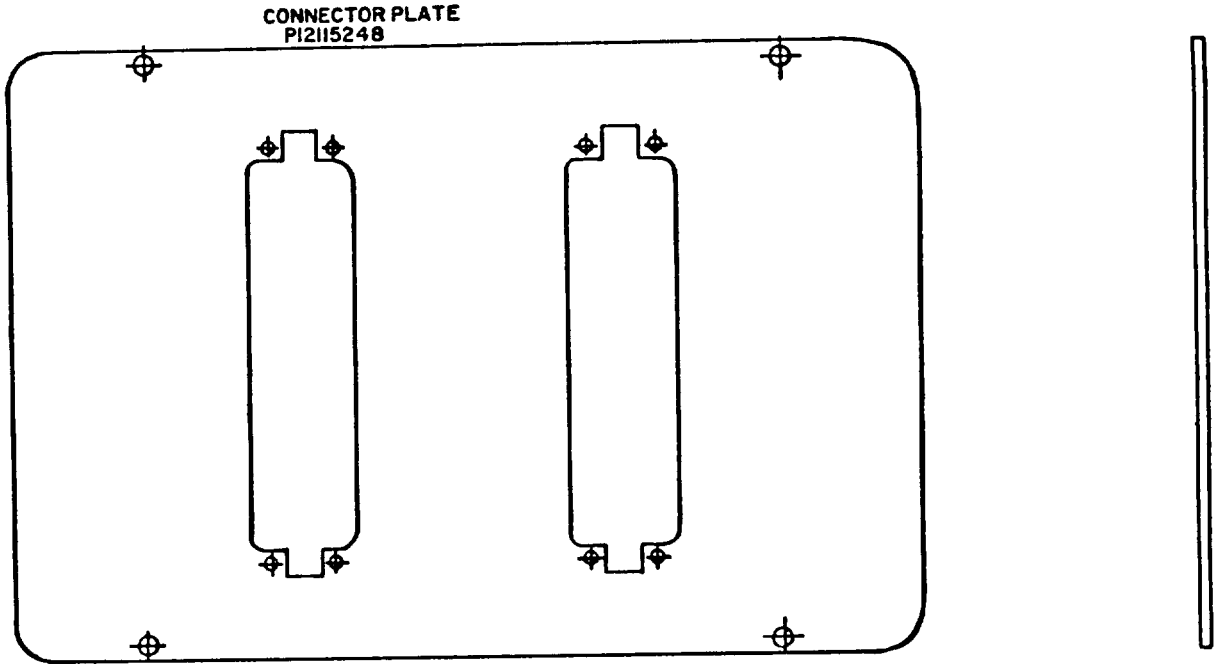
OUTPUT			INPUT		OUTPUT			INPUT	
LINE	FROM	TO/J3	FROM	TO/J2	LINE	FROM	TO/J3	FROM	TO/J2
0	0C-30	N.C.	0C-27	N.C.	64	2C-30	1M-2	2C-27	M-2
1	0C-12	1A-1	0C-8	A-1	65	2C-12	1P-1	2C-8	P-1
2	0C-31	1A-2	0C-26	A-2	66	2C-31	1P-2	2C-26	P-2
3	0C-13	1A-3	0C-7	A-3	67	2C-13	1P-3	2C-7	P-3
4	0C-32	1A-4	OC-25	A-4	68	2C-32	1P-4	2C-25	P-4
5	0C-14	1A-5	0C-6	A-5	69	2C-14	1P-5	2C-6	P-5
6	0C-33	1A-6	0C-24	A-6	70	2C-33	1P-6	2C-24	P-6
7	0C-15	1B-1	0C-5	B-1	71	2C-15	1R-1	2C-5	R-1
8	0C-34	1B-2	QC-23	B-2	72	2C-34	1R-2	2C-23	R-2
9	0C-16	1B-3	0C-4	B-3	73	2C-16	1R-3	2C-4	R-3
10	0C-35	1B-4	OC-22	B-4	74	2C-35	1R-4	2C-22	R-4
11	0C-17	1B-5	0C-3	B-5	75	2C-17	1R-5	2C-3	R-5
12	0C-36	1B-6	0C-21	B-6	76	2C-36	1R-6	2C-21	R-6
13	0C-18	1C-1	0C-2	C-1	77	2C-18	1S-1	2C-2	S1
14	0C-37	1C-2	OC-20	C-2	78	2C-37	1S-2	2C-20	S-2
15	0C-10	1C-3	0C-1	C-3	79	2C-19	1S-3	2C-1	S-3
16	0E-30	1C-4	0E-27	C-4	80	2E-30	1S-4	2E-27	S-4
17	0E-12	1C-5	0E-8	C-5	81	2E-12	1S-5	2E-8	S-5
18	0E-31	1C-5	0E-26	C-6	82	2E-31	1S-6	2E-26	S-6
19	0E-31	1D-1	0E-6	D-1	83	2E-13	1T-1	2E-7	T-1
20	0E-32	1D-2	0E-25	D-2	84	2E-32	IT-2	2E-25	T-2
21	0E-14	1D-3	0E-6	D-3	85	2E-14	1T-3	2E-6	T-3
22	0E-33	1D-4	0E-24	D-4	86	2E-33	1T-4	2E-24	T-4
23	0E-15	1D-5	0E-5	D-5	87	2E-15	1T-5	2E-5	T-5
24	0E-34	1D-6	0E-23	D-6	88	2E-34	1T-6	2E-23	T-6
25	0E-16	1E-1	0E-4	E-1	89	2E-16	1U-1	2E-4	U1
26	0E-35	1E-2	0E-22	E-2	90	2E-35	1U-1	2E-22	U-2

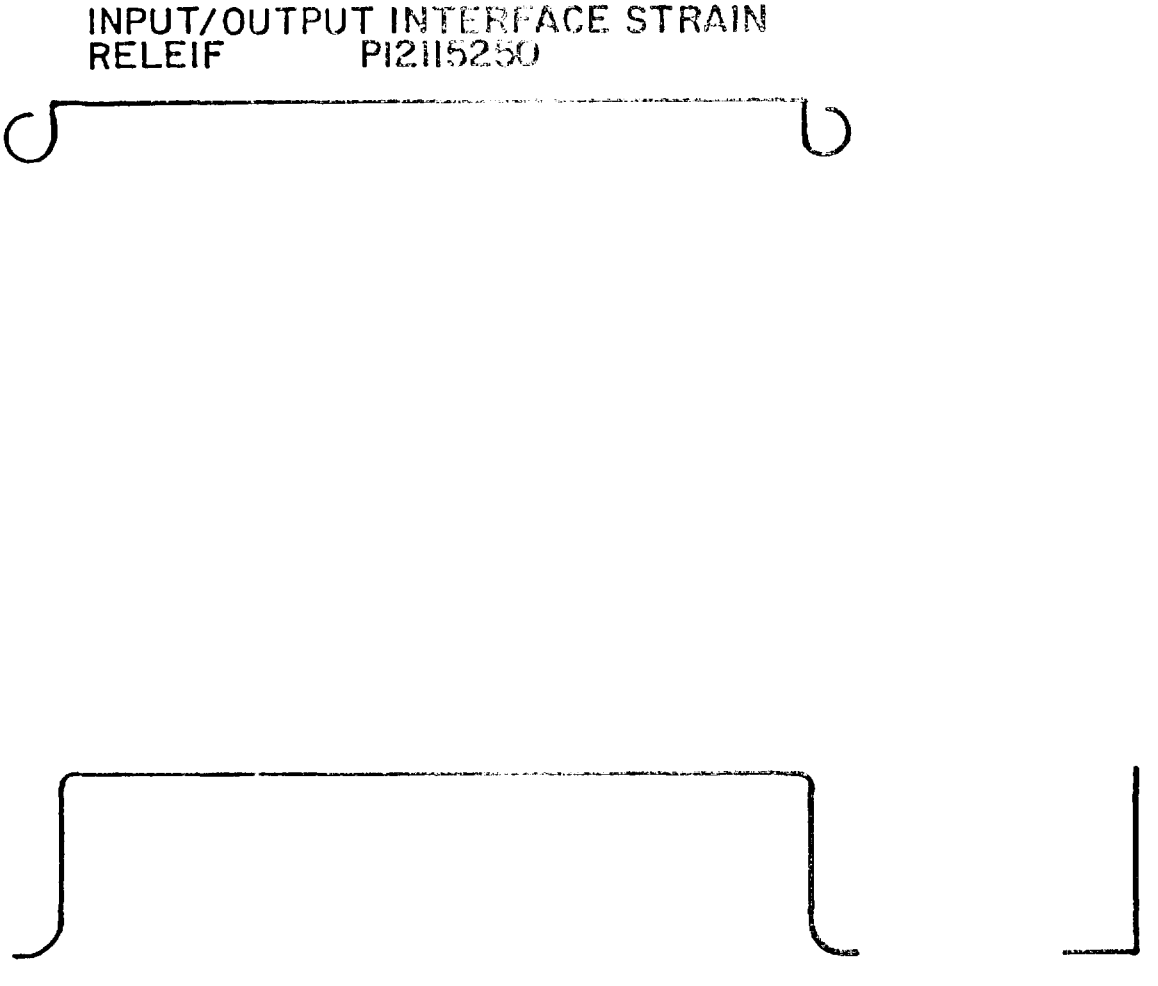
INPUT/OUT INTERFACE WIRING LIST P12115249

OUTPUT LINE FROM TO/J3	INPUT FROM TO/J2	OUTPUT LINE FROM TO/J3	INPUT FROM TO/J2
27 OE-17 1E-3	OE-3 E-3	91 2E-17 1U-3	2E-3 U-3
28 OE-36 1E-4	OE-21 E-4	92 2E-36 1U-4	2E-21 U-4
29 OE-18 1E-5	OE-2 E-5	93 2E-18 1U-5	2E-2 U-5
30 OE-37 1E-6	OE-20 E-6	94 2E-37 1U-6	2E-20 U-6
31 OE-19 1F-1	OE-1 F-1	95 2E-19 1V-1	2E-1 V-1
32 1C-30 1F-2	1C-27 F-2	96 3C-30 1V-2	3C-27 V-2
33 1C-12 1G-1	1C-8 G-1	97 3C-12 1W-1	3C-8 W-1
34 1C-31 1G-2	1C-26 G-2	98 3C-31 1W-2	3C-26 W-2
35 1C-13 1G-3	1C-7 G-3	99 3C-13 1W-3	3C-7 W-3
36 1C-32 1G-4	1C-25 G-4	100 3C-32 1W-4	3C-25 W-4
37 1C-14 1G-5	1C-6 G-5	101 3C-14 1W-5	3C-6 W-5
38 1C-33 1G-6	1C-24 G-6	102 3C-33 1W-6	3C-24 W-6
39 1C-15 1H-1	1C-5 H-1	103 3C-15 lX-l	3C-5 X-1
40 1C-34 1H-2	1C-23 H-2	104 3C-34 lX-2	3C-23 X-2
41 1C-16 1H-3	1C-4 H-3	105 3C-16 1X-3	3C-4 X-3
42 1C-35 1H-4	1C-22 H-4	106 3C-35 1X-4	3C-22 X-4
43 1C-17 1H-5	1C-3 H-5	107 3C-3 X-5	3C-3 X-5
44 1C-36 1H-6	1C-21 H-6	108 3C36 1X-6	3C-21 X-6
45 1C-18 1J-1	1C-2 J-1	109 3C-18 1Y-1	3C-2 Y-1
46 1C-37 1J-2	1C-20 J-2	110 3C-37 1Y-2	3C-20 Y-2
47 1C-10 1J-3	1C-1 J-3	111 3C-19 1Y-3	3C-1 Y-3
48 1C-30 1J-4	1E-27 J-4	112 3E-30 1Y-4	3E-27 Y-4
49 1E-12 1J-5	1E-8 J-5	113 3E-12 1Y-5	3E-8 Y-5
50 1E-31 1J-6	1E-26 J-7	114 3E-31 1Y-6	3E-26 Y-6
51 1E-13 1K-1	1E-7 K-1	115 3E-13 1Z-1	3E-7 Z-1
52 1E-32 1K-2	1E-25 K-2	116 3E-32 1Z-2	3E-25 Z-2
53 1E-14 1K-3	1E-6 K-3	117 3E-14 1Z-3	3E-6 Z-3

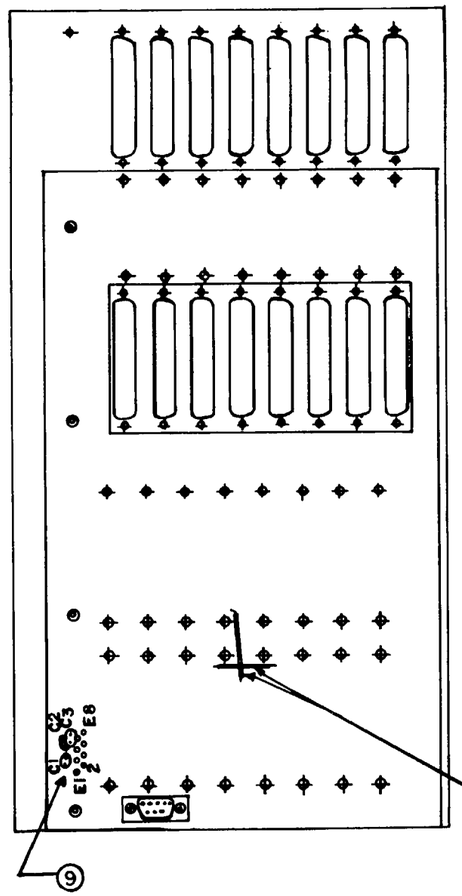
INPUT/OUTPUT INTERFACE WIRING LIST P12115249

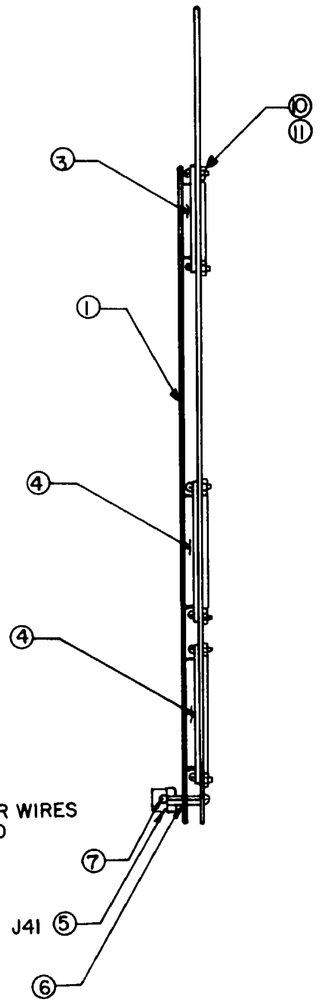
OUTPUT LINE FROM TO/J3	INPUT FROM TO/J2	OUTPUT LINE FROM TO/J3	INPUT FROM TO/J2
54 1E-33 1K-4	1E-24 K-4	118 3E-33 1Z-4	3E-24 Z-4
55 1E-15 1K-5	1E-5 K-5	119 3E-15 1Z-5	3E-5 Z-5
56 1E-34 1K-6	1E-23 K-6	120 3E-34 1Z-6	3E-23 Z-6
57 1E-16 1L-1	1E-4 L-1	121 3E-16 1a-1	3E-4 a-1
58 1E-35 1L-2	1E-22 L-2	122 3E-35 1a-2	3E-22 a-2
59 1E-17 1L-3	1E-3 L-3	123 3E-17 1a-3	3E-3 a-3
60 1E-36 1L-4	1E-21 L-4	124 3E-36 1a-4	3E-421 a-4
61 1E-18 1L-5	1E-2 L-5	125 3E-18 1a-5	3E-2 a-5
62 1E-37 1L-6	1E-20 L-6	126 3E-37 1a-6	3E-20 a-6
63 1E-19 1M-1	1E-1 M-1	127 3E-19 1b-1	3E-1 b-1
		128 4C-30 1b-2	4C-27 b-2

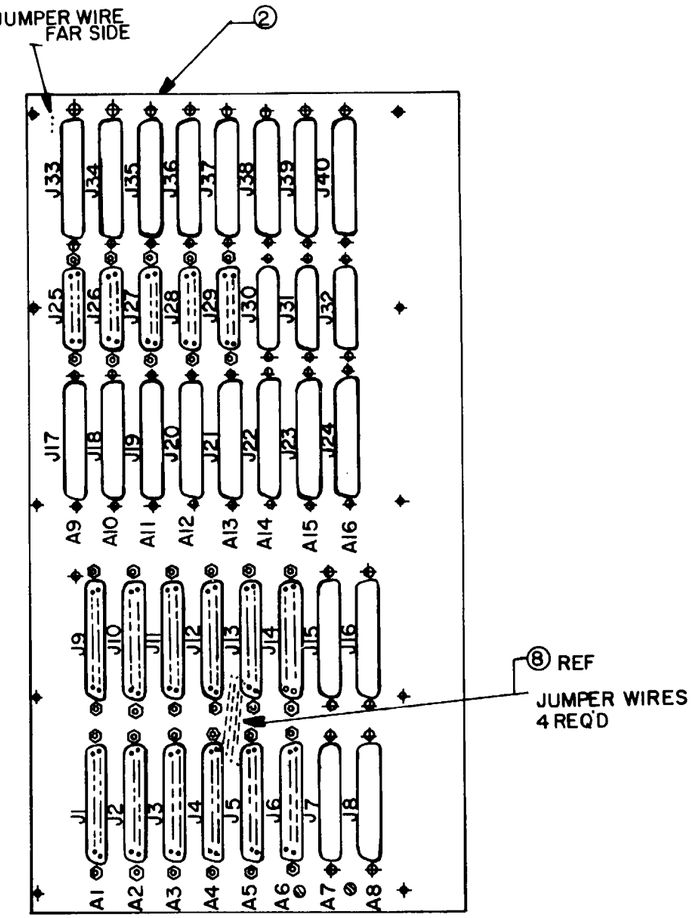

CONNECTOR PLATE
P12115248


INPUT/OUTPUT INTERFACE STRAIN
RELEIF P12115250

ASSEMBLY MODULE MOTHERBOARD



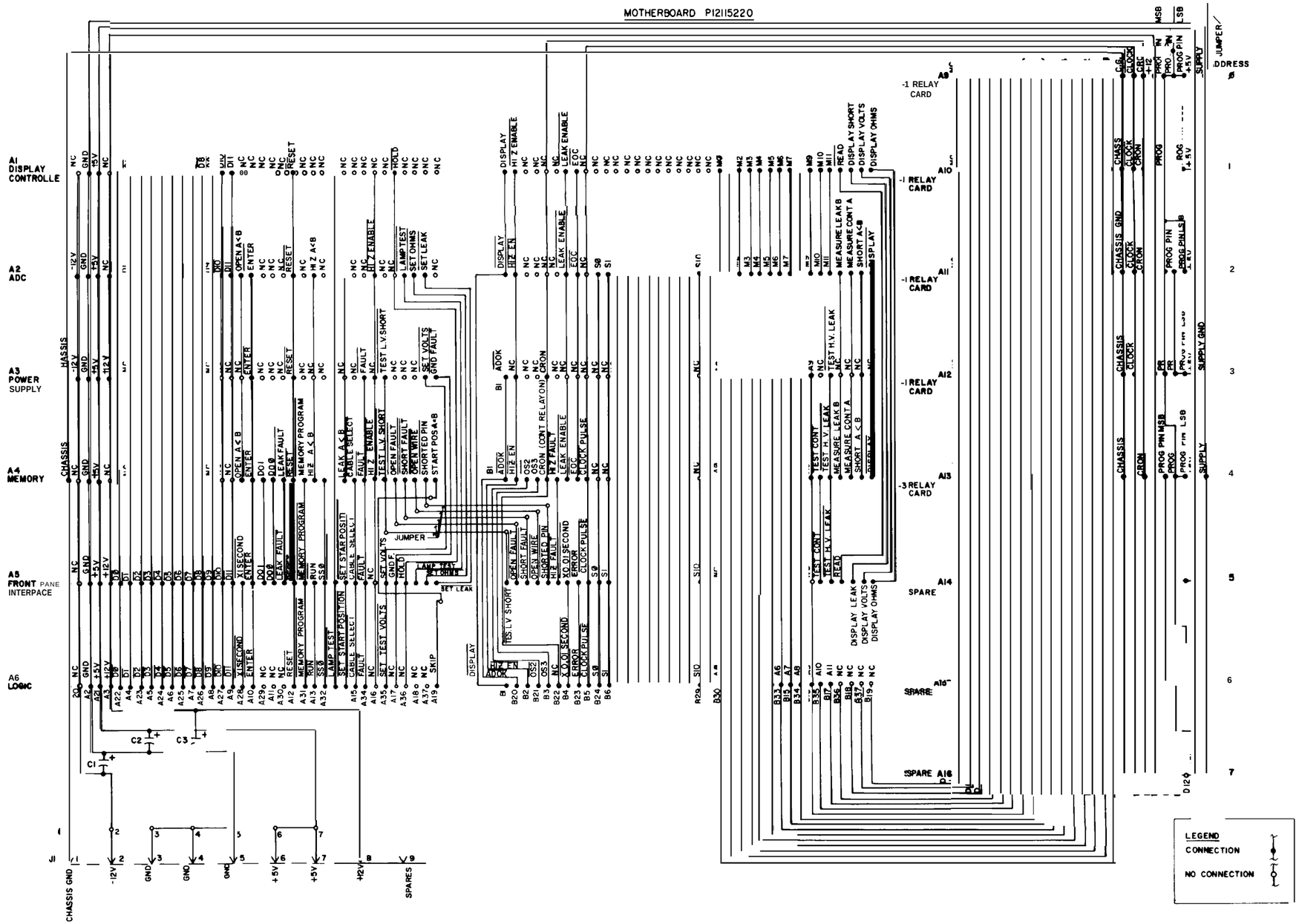


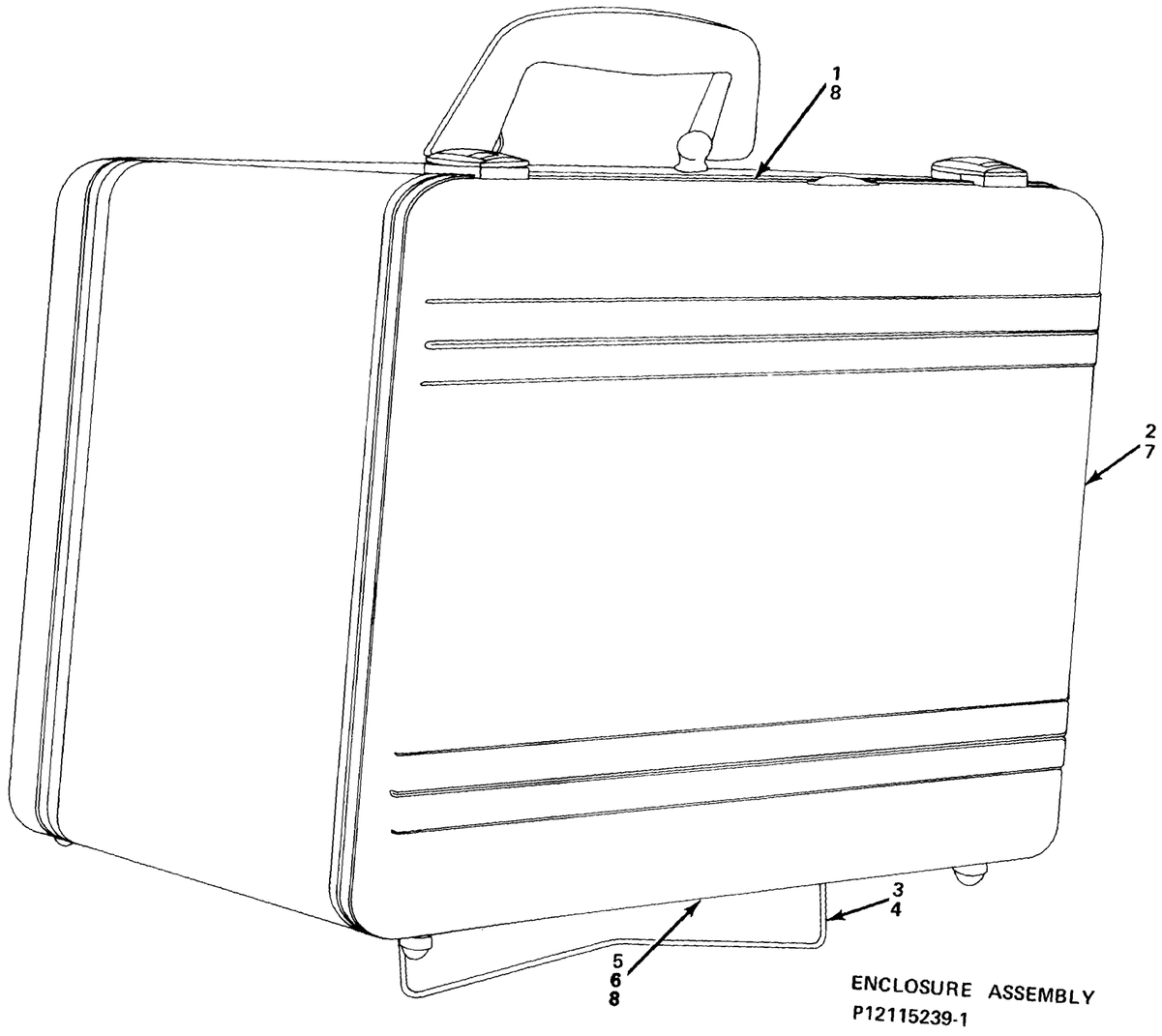


NOTES:
1. FOR SCHEMATIC SEE PI2115220

Board # 10 MOTHER BOARD P/N P12115220

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Printed Wiring Board	P12115220-1	64217	P12115220-1
2	Mother Board Panel	P12125219-1	64217	P12115219-1
3	J25 Conn. Elect. 25 Pin, Recpt. 4009		7G413	H2R25ST28A
3	J26 Conn. Elect. 25 Pin, Recpt. 4009		7G413	H2R25ST28A
3	J27 Conn. Elect. 25 Pin, Recpt. 4009		7G413	H2R25ST28A
3	J28 Conn. Elect. 25 Pin, Recpt. 4009		7G413	H2R25ST28A
3	J29 Conn. Elect. 25 Pin, Recpt. 4009		7G413	H2R25ST28A
4	J1 Conn. Elect. .37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J2 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J3 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J4 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R27ST28A
4	J5 Conn. Elect. 37 Pin, Recpt, 4010		7G413	H2R37ST28A
4	J6 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J9 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J1O Conn. Elect 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J11 Conn. Elect 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J12 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J13 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
4	J14 Conn. Elect. 37 Pin, Recpt. 4010		7G413	H2R37ST28A
5	J41 Conn. Elect. 9 Pin, Recpt. 4011		04618	205204-1
6	Spacer, Threaded, 4-40 X .75 LG 4012 (2 Reqd.)		83330	8405
7	Screw 4-40 X .375 (4 Reqd.)	MS51957-15	N/A	MS51957-15


MOTHERBOARD P12115220
A1 DISPLAY CONTROLLE
A2 ADC
A3 POWER SUPPLY
A4 MEMORY
A5 FRONT PANE INTERPACE
A6 LOGIC
-1 RELAY CARD
-3 RELAY CARD
SPARE
SPARE A16
JUMPER
MSB
LSB
CHASSIS GND
-12V
GND
+5V
+12V
SPARES
LEGEND
CONNECTION
NO CONNECTION

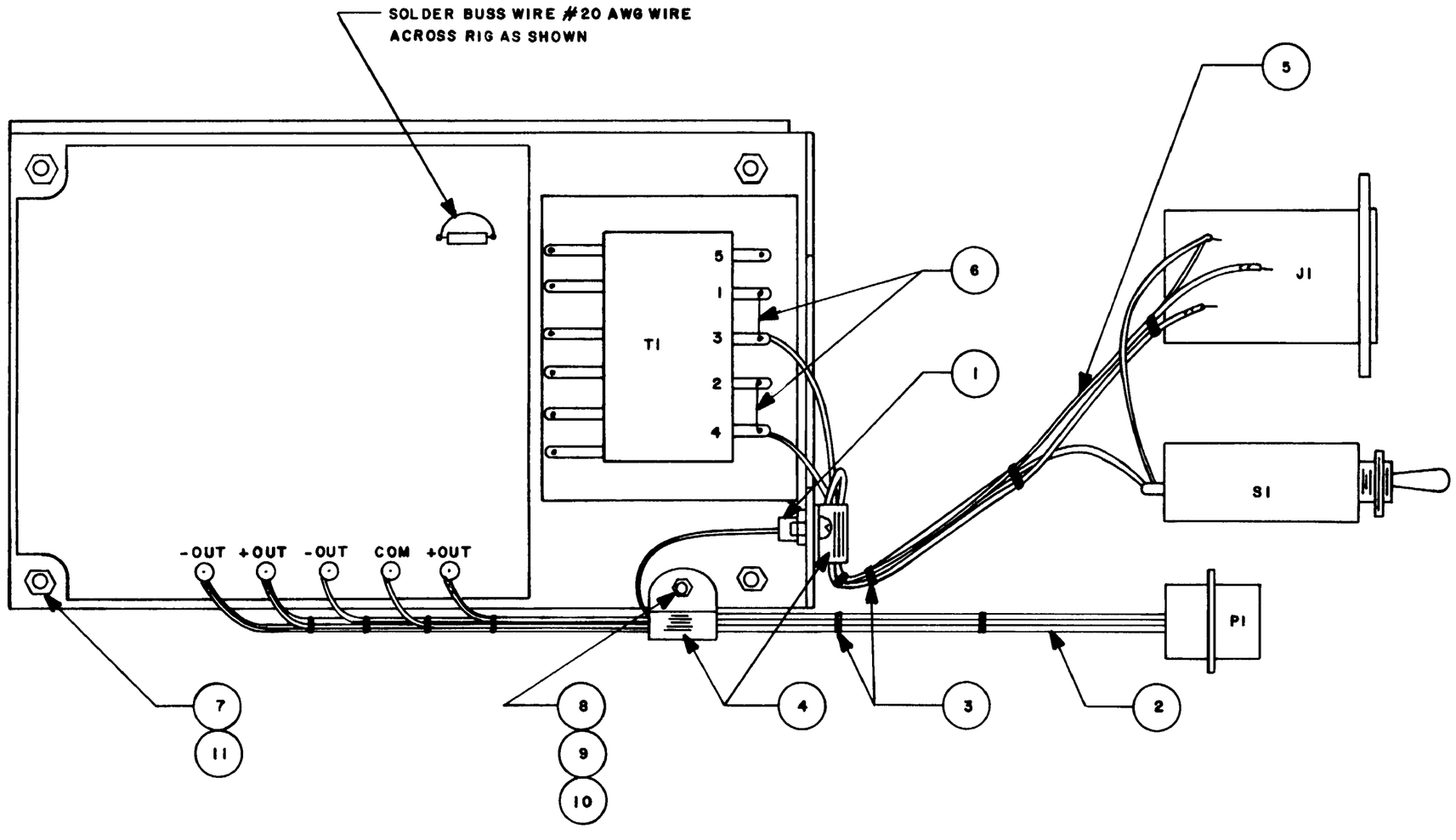


ENCLOSURE ASSEMBLY
P12115239-1

ASSEMBLY ENCLOSURE P/N P12115239

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Name Plate	P12115254-2	64217	P12115254-1
2	Raintight Case	P12115239-1	05049	114 X
3	#8 Short Metal Screw (2 Reqd.)	MS51861-34	N/A	MS51861-34
4	Bail Support (1 Reqd.)	4045	71218	BC 14210
5	Hinge (1 Reqd.)	4046	05049	ZP20142-1
6	Hinge (1 Reqd.)	4047	05049	ZP20142-3
7	Panel Support Bkt. (12 Reqd.)	4044	05049	ZP20653
8	Rivet (6 Reqd.)	MS20470-DD-2-4	N/A	MS20470-DD-2-4

MAIN POWER SUPPLY
P12115225



Assembly MAIN POWER SUPPLY P/N P12115225

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
J1	Filter Linecord, IEC	4015	20829	APF300CET
P1	Conn. Elect. 9 Pin	4016	04618	205203-1
S1	Circuit Breaker	4017	2N432	112-205-101
PS1	Module Power Supply	4018	54407	HTAA-16W-A
1	Ring, Terminal	4019	06865	22-18
2	Standard Wire 22 AWG	4034	4G874	EE 22/19-9
3	Lacing Tape	4021	4G874	LC 136
4	Strain Relief	4022	18076	MS21919-DE4
5	Wire 18 AWG	4023	4G874	EE-18/19-9
6	Buss Wire 20 AWG	4024	4G874	20 AWG Solid
7	Aluminum Spacer, Hex 6-32 X 2.00 (4 Reqd.)	4014	83330	9094
8	Screw (2 Reqd.) 4-40 X .500	MS51957-17	N/A	MS51957-17
9	Nut 4-40 (2 Reqd.)	MS51957-13	N/A	MS51957-13
10	Flat Washer (2 Reqd.) 4-40	AN960-4L	N/A	AN960-4L
11	Machine Screw, 6-32 X .50 (4 Reqd.)	MS51957-30	N/A	MS51957-30
12	Solder	4026	4G874	.05/63WRMA

MAIN POWER SUPPLY PS1 HTAA-16W-A

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
PC1	P.W. Board (1 Reqd.)	4059	54407	505-53029
T1	Transformer (1 Reqd.)	4060	54407	082-50060
R1	Res. 47Ω, 1/4W, 5%CF	4068	54407	150-20327
R2	Potentiometer 2K	4061	54407	154-20020
R3	Res. 750Ω 1/4W, 5%CF	4065	54407	150-20356
R4	Res. 3.6K, 1/4W, 5%CF	4071	54407	150-20372
R5	Res. 240Ω 1/4W, 5%CF	4063	54407	150-20344
R6	Res. 1.6K, 1/4W, 5%CF	4064	54407	150-20364
R7	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361
R8	Res. 100Ω 1/4W, 5%CF	1015	54407	RCO7G1O1JS
R9	Res. .22Ω 2W, 10%BWH	4062	54407	158-10079
R1O	Res. 2.7Ω 1/4W, 5%CF	4109	54407	RC07G2R7JS
R11	Res. 47Ω 1/4W, 5%CF	4068	54407	150-20327
R12	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361
R13	Res. 750Ω 1/4W, 5%CF	4065	54407	150-20356
R14	Res. 1Ω 1/4W, 5%CF	4110	54407	RC07G1ROJS
R15	Res. 220Ω 1/4W, 5%CF	4069	54407	150-20343
R16	Potentiometer 2K	4061	54407	154-20020
R17	Res. 180Ω 1/4W, 5%CF	4072	54407	150-20341
R18	Res. 1.6K, 1/4W, 5%CF	4064	54407	150-20364
R19	Res. 47Ω, 1/4W, 5%CF	4068	54407	150-20327
R20	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361
R21	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361

CONTINUED

MAIN POWER SUPPLY PS1 HTAA-16W-A

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
R22	Res. 1.6K, 1/4W, 5%CF	4064	54407	150-20364
R23	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361
R24	Res. 1 , 1/4W, 5%CF	4110	54407	RC07G1ROJS
R25	Potentiometer 2K	4061	54407	154-20020
R26	Res 180Ω, 1/4W, 5%CF	4072	54407	150-20341
R27	Res. 1.6K, 1/4W, 5%CF	4064	54407	150-20364
R28	Res. 750Ω, 1/4W, 5%CF	4065	54407	150-20356
R29	Res. 750Ω, 1/4W, 5%CF	4065	54407	150-20356
R30	Res. 1.2K, 1/4W, 5%CF	4067	54407	150-20361
R31	Res 1Ω, 1/4W, 5%CF	4110	54407	
SCR1	SCR,3,Amp, 30V	4073	54407	160-10258
U1	IC Voltage Reg. UA723	4074	54407	130-10287
U2	IC Voltage Reg. UA723	4074	54407	130-10287
U3	IC Voltage Reg. UA723	4074	54407	130-10287
U1	Socket 14 PIN	4091	54407	321-10679
U2	Socket 14 PIN	4091	54407	321-10679
U3	Socket 14 PIN	4091	54407	321-10679
Q1	TIP 29A Transistor	4080	54407	172-20771
Q2	Transistor NPN 2N6569	4075	54407	171-10261
Q3	Transistor NPN 2N6569	4075	54407	171-10261
Q4	Transistor PNP 2N2905A	4076	54407	172-10248
Q5	Transistor NPN 2N6569	4075	54407	171-10261
CR1	IN4003 Diode 1 AMP 200V	4077	54407	111-10251

CONTINUED

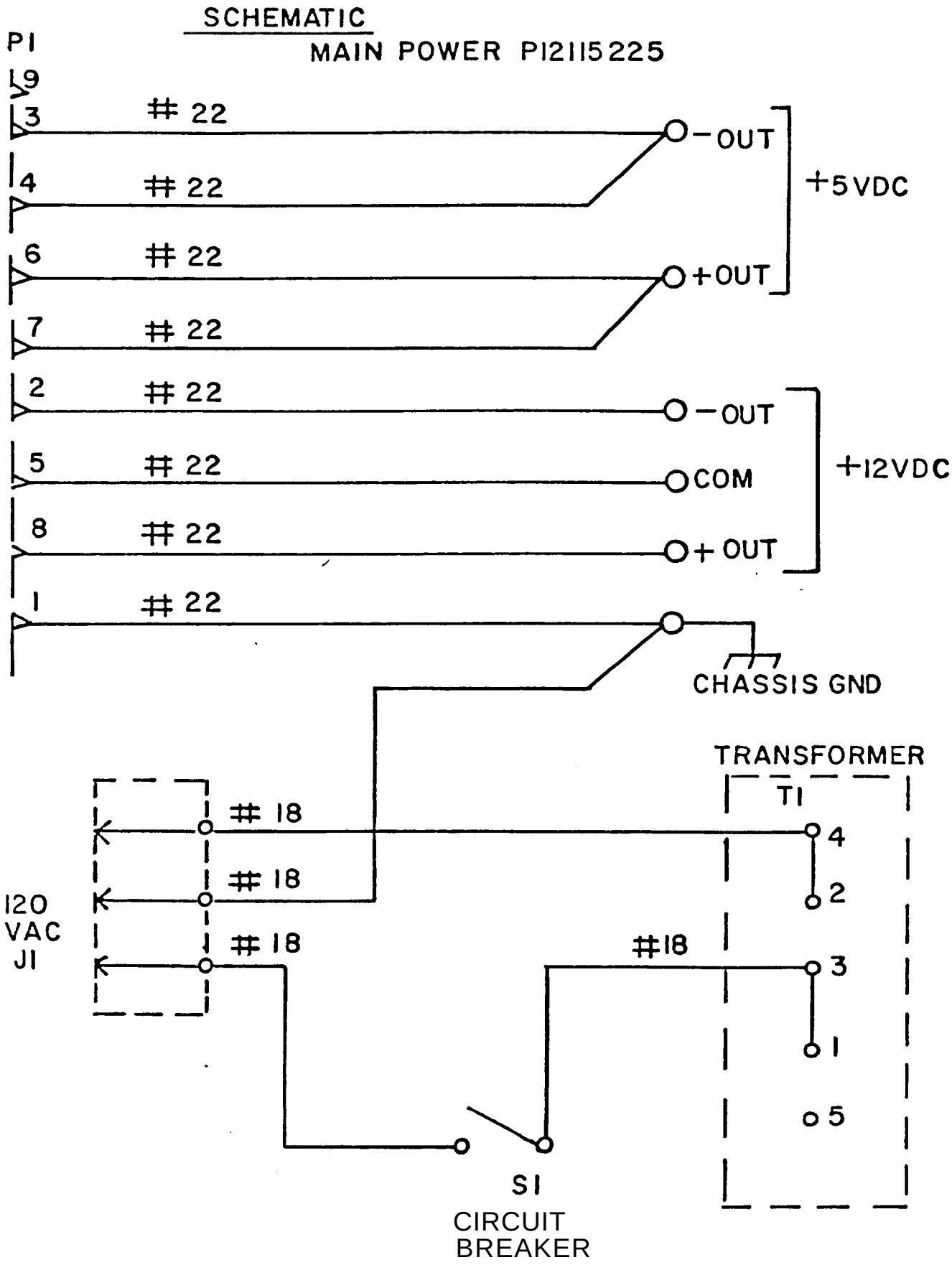
MAIN POWER SUPPLY PS1 HTAA-16W-A

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
CR2	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR3	1N5401 Diode 3 AMP 100V	4078	54407	111-10252
CR4	1N5401 Diode 3 AMP 100V	4078	54407	111-10252
CR5	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR6	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR7	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR8	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR9	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR1O	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR11	1N965Diode Zener 15V	4079	54407	112-10009
CR12	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR13	1N752A Diode Zener 5.6V	4081	54407	112-10006
CR14	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR15	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
CR16	1N4003 Diode 1 AMP 200V	4077	54407	111-10251
C1	Cap. 330uf, 35V	4082	54407	101-10109
C2	Cap. 10,000uf, 16V	4084	54407	101-20933
C3	Cap..001, 100V	4089	54407	104-10093
C4	Cap. 220us, 16V	4087	54407	101-10107
C5	Cap. 1uf,50V	4085	54407	101-10111
C6	Cap. 1000uf, 35V	4083	54407	101-20812
C7	Cap. 1000uf, 35V	4083	54407	101-20812
C8	Cap 220uf, 1KV	4090	54407	105-10088

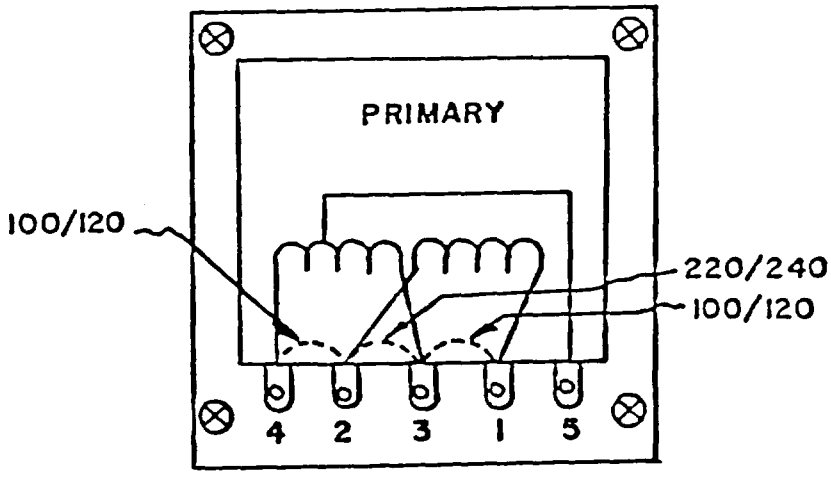
CONTINUED

MAIN POWER SUPPLY PS1 HTAA-16W-A

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
C9	Not Used			
C10	Cap. .001uf, 100V	4089	54407	104-10093
C11	Cap. .001uf, 100V	4089	54407	104-10093
C12	Cap. 100uf, 35V	4088	54407	101-10110
C13	Cap. 100uf, 35V	4088	54407	101-10110
A,A	WIRE 20AWG BLK ¼ x ¼T 5½	4092	54407	914-21065
A,T	WIRE 20AWG WHT ¼ x ¼T 5½	4093	54407	914-21022
B,B	WIRE 20AWG BLK ¼ x ¼T 4½	4094	54407	914-21019
B,T	WIRE 20AWG WHT ¼ x ¼T 4½	4095	54407	914-21023

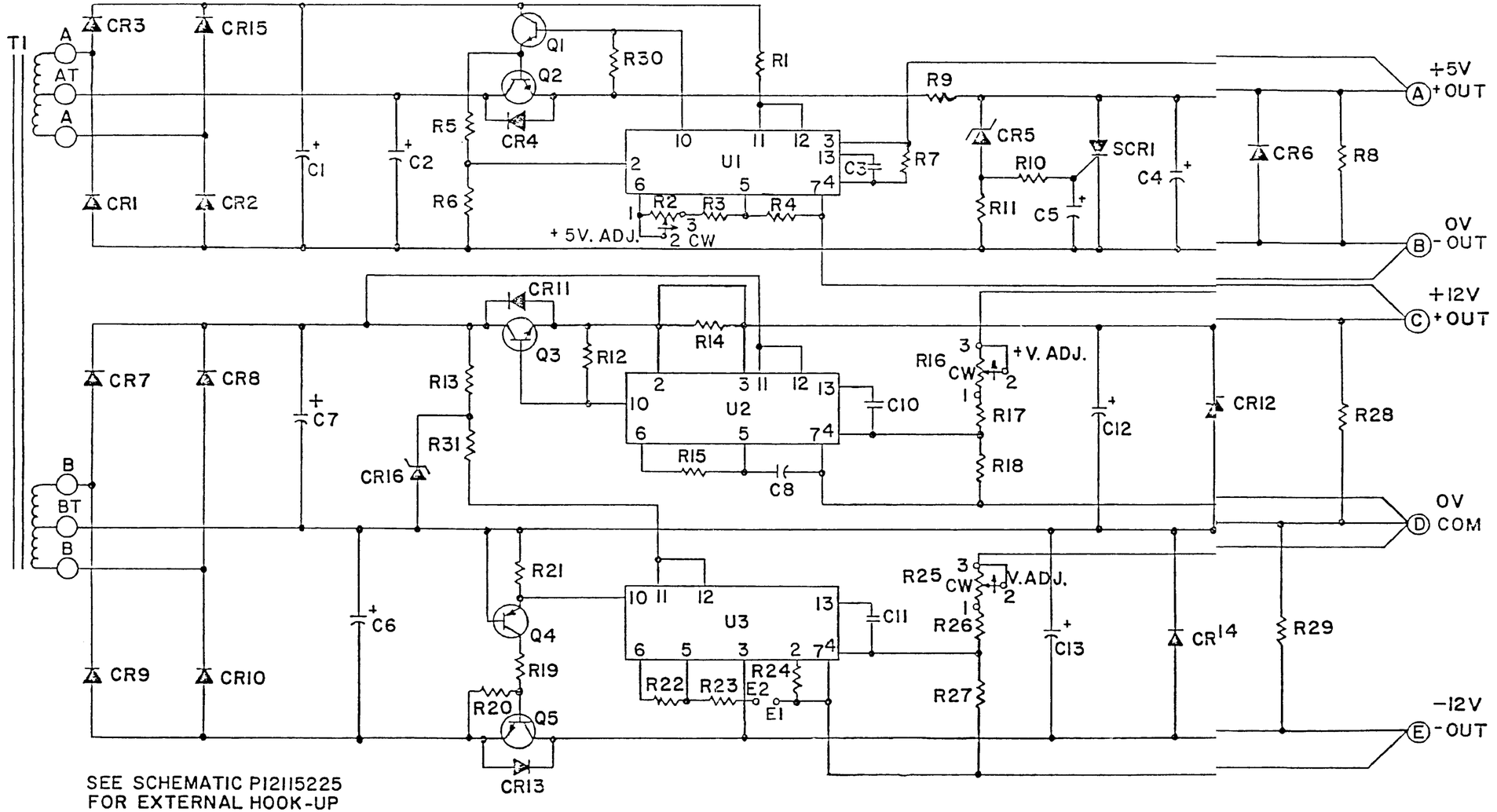

SCHEMATIC
MAIN POWER P12115225
P1
9
3
22
-OUT
4
22
+5VDC
6
22
+OUT
7
22
2
22
-OUT
5
22
COM
+12VDC
8
22
+ OUT
1
22
CHASSIS GND
TRANSFORMER
T1
18
4
18
2
120
VAC
J1
18
#18
3
1
5
S1
CIRCUIT
BREAKER

WIRING DIAGRAM FOR INPUT POWER ON MAIN POWER SUPPLY P12115225



AC INPUT, 47—440HZ				
FOR USE AT	100 VAC	120 VAC	220 VAC	230/240 VAC
JUMPER	183 284	183 284	283	283
APPLY	185	481	185	481

SCHEMATIC MAIN POWER SUPPLY HTAA-16-W-A



MAIN POWER SUPPLY HTAA-16-W-A

VOLTAGE READING

P12115225

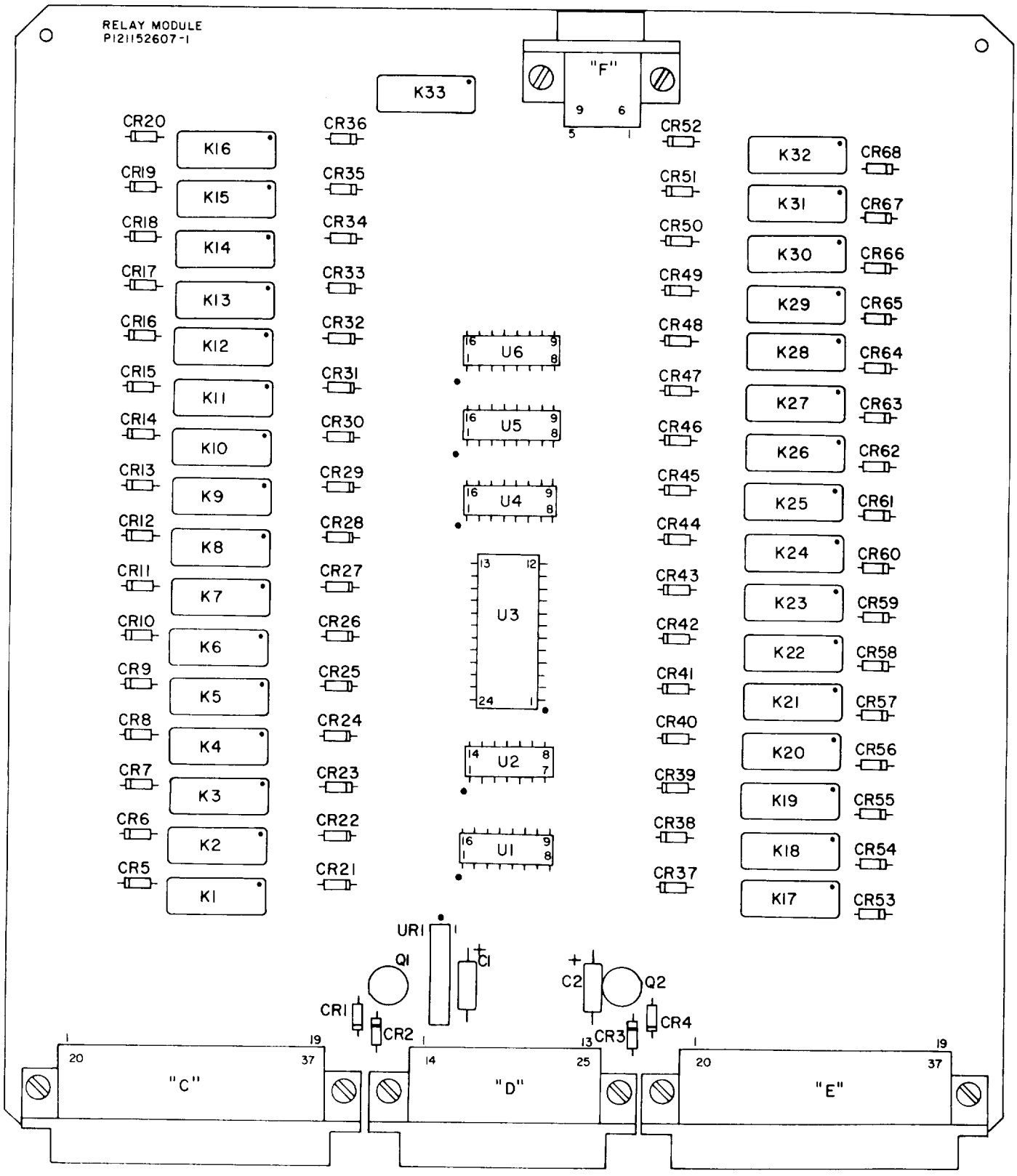
120 VAC INPUT

	EMITTER	BASE	COLLECTOR
Q1	5.8	41V	21.0
Q2	5.14	5.8V	10.2
Q3	12.1V	12.7V	28.0V
Q4	. 6V	:0V	-28V
Q5	-28.2V	-28V	-12.2V

DIODE	ANODE	CATHODE
*CRl	0.0	10.4
*CR2	0.0	10.4
*CR3	10.4	20.8
*CR4	5.1	10.4
*CR5	0.0	5.1
*CR6	0.0	5.1
CR7	0.0	28.
CR8	0.0	28.
CR9	-28.2	0.0
CR10	-28.2	0.0
CR11	12.1	28.0
CR12	0.0	12.2
CR13	-28.5	-12.2
CR14	12V	0
*CR15	10.4	20.8
CR16	0.0	6.2

NOTE:

- Indicates measurements recorded with the common test lead minus at Terminal “B”.
  All other reading recorded with common test lead to “D”.


RELAY MODULE
P121152607-1
"F"
9
6
5
1
K33
CR20
K16
CR19
K15
CR18
K14
CR17
K13
CR16
K12
CR15
K11
CR14
K10
CR13
K9
CR12
K8
CR11
K7
CR10
K6
CR9
K5
CR8
K4
CR7
K3
CR6
K2
CR5
K1
CR36
CR35
CR34
CR33
CR32
CR31
CR30
CR29
CR28
CR27
CR26
CR25
CR24
CR23
CR22
CR21
U6
U5
U4
U3
U2
U1
CR52
CR51
CR50
CR49
CR48
CR47
CR46
CR45
CR44
CR43
CR42
CR41
CR40
CR39
CR38
CR37
K32
CR68
K31
CR67
K30
CR66
K29
CR65
K28
CR64
K27
CR63
K26
CR62
K25
CR61
K24
CR60
K23
CR59
K22
CR58
K21
CR57
K20
CR56
K19
CR55
K18
CR54
K17
CR53
URI
Q1
C1
C2
Q2
CR1
CR2
CR3
CR4
"C"
"D"
"E"

Board #8 RELAY MODULE P/N P12112607-1

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K020AS
C 2	Cap. l0uf, 20V, ±l0%	2012	61637	T310BI06K020AS
Conn "D"	Conn 25 Pin, Plug	4002	7G413	H2M25RA28A
Conn "F"	Conn 9 Pin, Plug	4001	7G413	H2M09RA28A
Conn C & E	Conn 37 Pin, Plug (2 Reqd.)	4004	7G413	H2M37RA28A
CR1	Diode	7001	04713	1N914
CR2	Diode	7001	04713	1N914
CR3	Diode	7001	04713	1N914
CR4	Diode	700l	04713	1N914
CR5	Diode	7001	04713	1N914
CR6	Diode	7001	04713	1N914
CR7	Diode	7001	04713	1N914
CR8	Diode	7001	04713	1N914
CR9	Diode	7001	04713	1N914
CR1O	Diode	7001	04713	1N914
CR11	Diode	7001	04713	1N914
CR12	Diode	7001	04713	1N914
CR13	Diode	7001	04713	1N914
CR14	Diode	7001	04713	1N914
CR15	Diode	7001	04713	1N914
CR16	Diode	7001	04713	1N914
CR17	Diode	7001	04713	1N914

Board # 8 RELAY MODULE P/N P121152607-1

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
CR18	Diode	7001	04713	1N914
CR19	Diode	7001	04713	1N914
CR20	Diode	7001	04713	1N914
CR21	Diode	7001	04713	1N914
CR22	Diode	7001	04713	1N914
CR23	Diode	7001	04713	1N914
CR24	Diode	7001	04713	1N914
CR25	Diode	7001	04713	1N914
CR26	Diode	7001	04713	1N914
CR27	Diode	7001	04713	1N914
CR28	Diode	7001	04713	1N914
CR29	Diode	7001	04713	1N914
CR30	Diode	7001	04713	1N914
CR31	Diode	7001	04713	1N914
CR32	Diode	7001	04713	1N914
CR33	Diode	7001	04713	1N914
CR34	Diode	7001	04713	1N914
CR35	Diode	7001	04713	1N914
CR36	Diode	7001	04713	1N914
CR37	Diode	7001	04713	1N914
CR38	Diode	7001	04713	1N914
CR39	Diode	7001	04713	1N914

Board # 8 RELAY MODULE P/N P121152607-1

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
CR40	Diode	7001	04713	1N914
CR41	Diode	7001	04713	1N914
CR42	Diode	7001	04713	1N914
CR43	Diode	7001	04713	1N914
CR44	Diode	7001	04713	1N914
CR45	Diode	7001	04713	1N914
CR46	Diode	7001	04713	1N914
CR47	Diode	7001	04713	1N914
CR48	Diode	7001	04713	1N914
CR49	Diode	7001	04713	1N914
CR50	Diode	7001	04713	1N914
CR51	Diode	7001	04713	1N914
CR52	Diode	7001	04713	1N914
CR53	Diode	7001	04713	1N914
CR54	Diode	7001	04713	1N914
CR55	Diode	7001	04713	1N914
CR56	Diode	7001	04713	1N914
CR57	Diode	7001	04713	1N914
CR58	Diode	7001	04713	1N914
CR59	Diode	7001	04713	1N914
CR60	Diode	7001	04713	1N914
CR61	Diode	7001	04713	1N914

Board # 8 RELAY MODULE P/N P121152607-1

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
CR62	Diode	7001	04713	1N914
CR63	Diode	7001	04713	1N914
CR64	Diode	7001	04713	1N914
CR65	Diode	7001	04713	1N914
CR66	Diode	7001	04713	1N914
CR67	Diode	7001	04713	1N914
CR68	Diode	7001	04713	1N914
K1	Relay	9052	02289	M39016/6-116L
K2	Relay	9052	02289	M39016/6-116L
K3	Relay	9052	02289	M39016/6-116L
K4	Relay	9052	02289	M39016/6-116L
K-5	Relay	9052	02289	M39016/6-116L
K-6	Relay	9052	02289	M39016/6-116L
K-7	Relay	9052	02289	M39016/6-116L
K-8	Relay	9052	02289	M39016/6-116L
K-9	Relay	9052	02289	M39016/6-116L
K-10	Relay	9052	02289	M39016/6-116L
K-11	Relay	9052	02289	M39016/6-116L
K-12	Relay	9052	02289	M39016/6-116L
K-13	Relay	9052	02289	M39016/6-116L
K-14	Relay	9052	02289	M39016/6-116L
K-15	Relay	9052	02289	M39016/6-116L

Board # 8 RELAY MODULE P/N P121152607-1

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
K16	Relay	9052	02289	M39016/6-116L
K17	Relay	9052	02289	M39016/6-116L
K18	Relay	9052	02289	M39016/6-116L
K19	Relay	9052	02289	M39016/6-116L
K20	Relay	9052	02289	M39016/6-116L
K21	Relay	9052	02289	M39016/6-116L
K22	Relay	9052	02289	M39016/6-116L
K23	Relay	9052	02289	M39016/6-116L
K24	Relay	9052	02289	M39016/6-116L
K25	Relay	9052	02289	M39016/6-116L
K26	Relay	9052	02289	M39016/6-116L
K27	Relay	9052	02289	M39016/6-116L
K28	Relay	9052	02289	M39016/6-116L
K29	Relay	9052	02289	M39016/6-116L
K30	Relay	9052	02289	M39016/6-116L
K31	Relay	9052	02289	M39016/6-116L
K32	Relay	9052	02289	M39016/6-116L
K33	Relay	9052	02289	M39016/6-116L
U1	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U2	Hex Schmitt Trigger	6033	04713	MC14584BCP
U3	4-Bit Latch/4-to-16 Line Decoder (High)	6029	04713	MC14514BCP

Board # 8 RELAY MODULE P/N P121152607-1

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U4	Transistor Array	6040	18324	ULN2003A
U5	Transistor Array	6040	18324	ULN2003A
U6	Transistor Array	6040	18324	ULN2003A
UR1	Resistor, Sip 10K X 4	6061	56845	608-3-1O3G
Q1	Transistor PNP	3003	04713	2K2905
Q2	Transistor PNP	3003	04713	2N2905
N/A	Relay Module Card	P121152607-1	64217	P121152607-1
N/A	Screw 2-56 X .250 (8 Reqd.)	MS51957-3	N/A	MS51957-3
N/A	Nut 2-56 (8 Reqd.)	MS35649-24	N/A	MS35649-24
N/A	Conformal Coating	MIS1OO5	21223	#65-16

RELAY CARD P121152607-1

CONNECTOR	FUNCTION
F1	HIGH QUALITY GND
F2	HIGH QUALITY GND
F3	OHMS
F4	
F5	VOLTS
F6	VOLTS
F7	OHMS
F8	LEAK
F9	LEAK

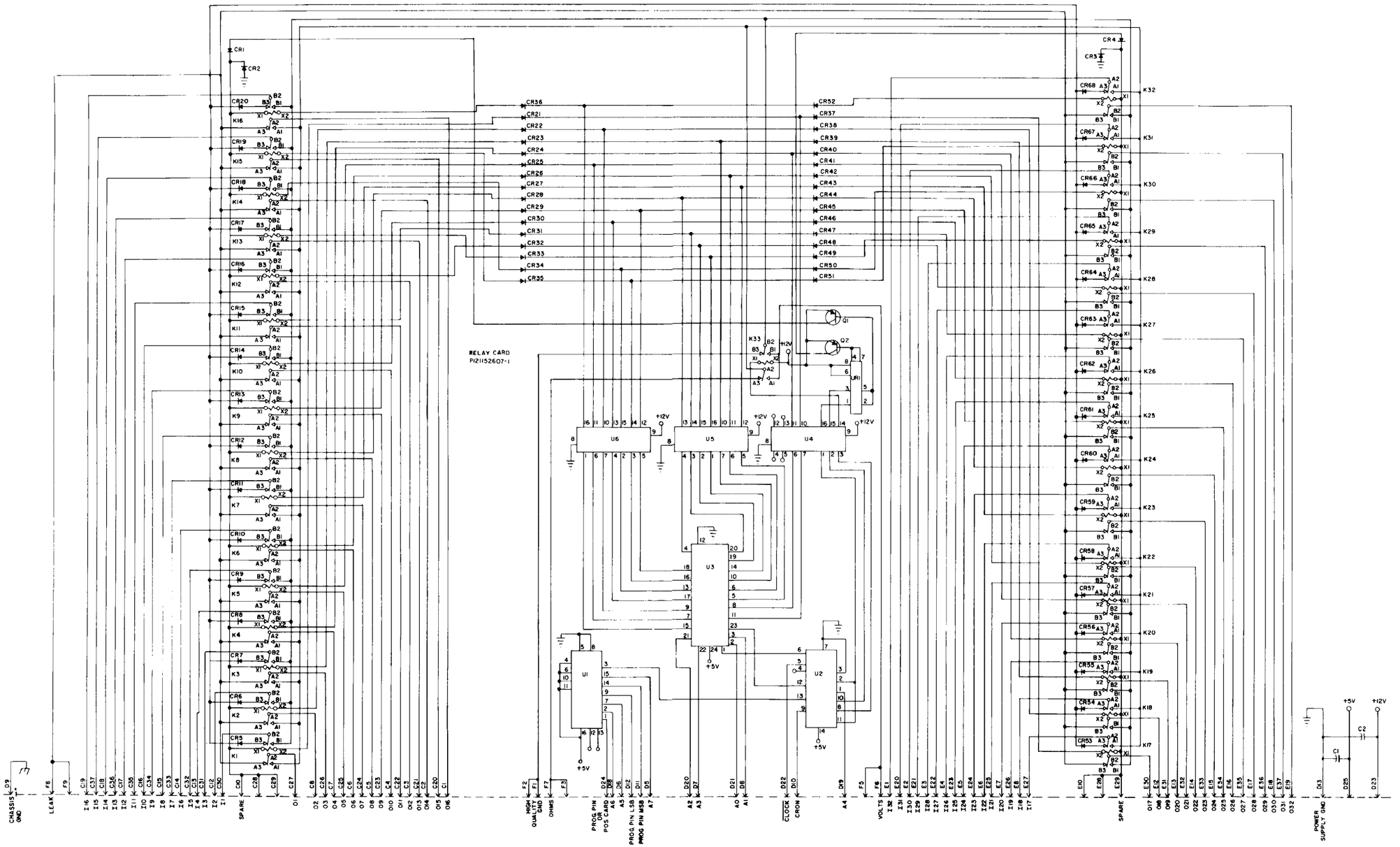
CONNECTOR	FUNCTION
D1	N. C.
D2	N. C.
D3	N.C.
D4	N.C.
D5	A7
D6	A5
D7	A3
D8	Al
D9	CHASSIS GND
D10	CRON
Dll	PROGRAM PIN MSB
D12	PROGRAM PIN LSB
D13	POWER SUPPLY GND
D14	N.C.
D15	N.C.
D16	N.C.
D17	N.C.
D18	A6
D19	A4
D20	A2
D21	AO
022	$\overline{\text{CLOCK}}$
D23	±12 VOLTS
D24	PROGRAM PIN OR POSITION CARD
D25	±5 VOLTS

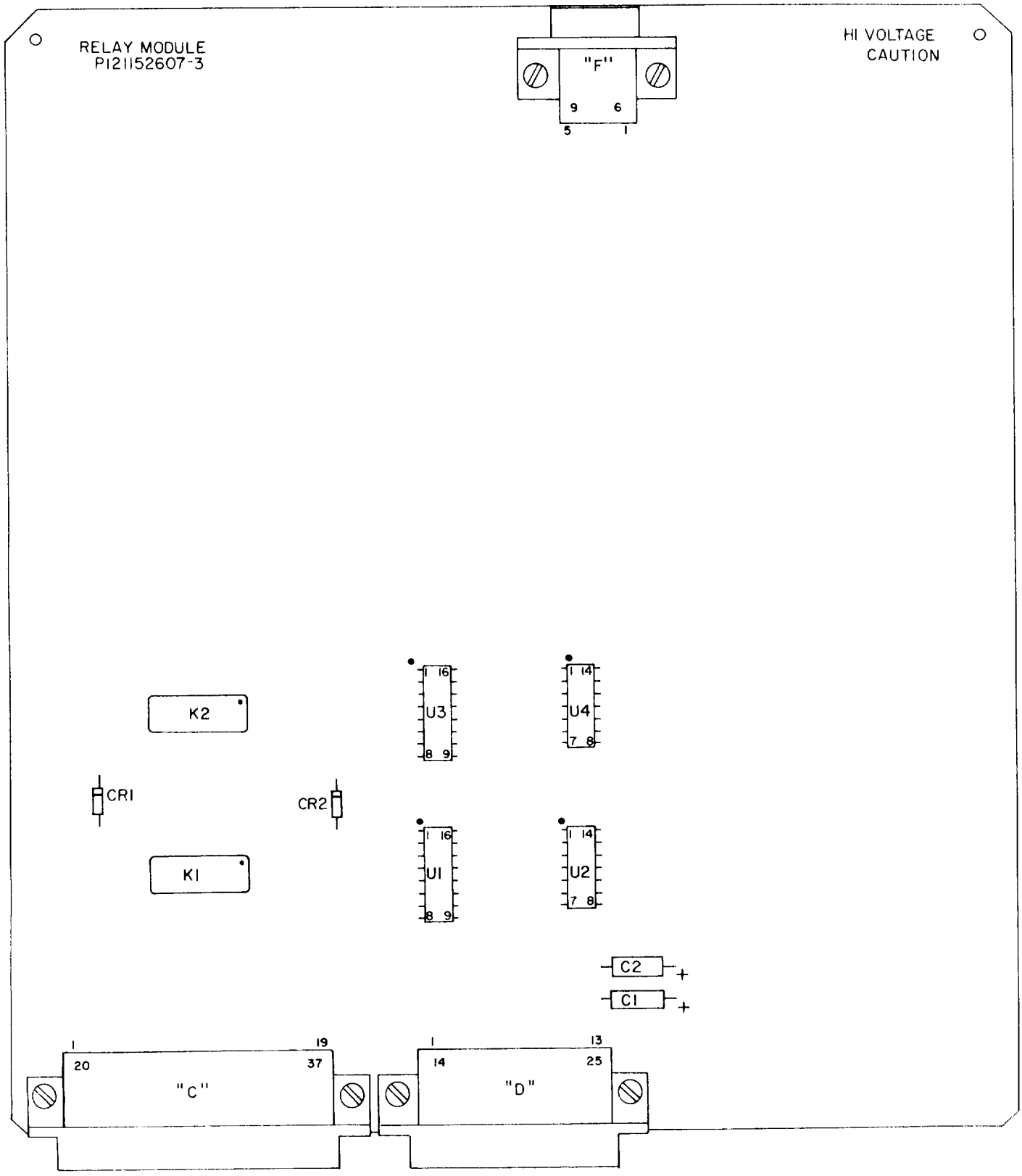
RELAY CARD P121152607-1

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
C1	016	El	I32
C2	014	E2	I30
C3	012	E3	I28
C4	010	E4	I26
C5	08	E5	I24
C6	D6	E6	122
C7	04	E7	I20
C8	02	E8	118
C9	N.C.	E9	116
Cl0	SPARES	E1O	SPARES
Cll	N.C.	Ell	N.C.
C12	12	E12	018
C13	14	E13	020
C14	16	E14	022
C15	18	E15	024
C16	110	E16	026
C17	112	E17	028
C18	114	E18	030
C19	116	E19	032
C20	015	E20	131
C21	013	E21	129
C22	011	E22	127
C23	09	E23	125
C24	07	E24	123
C25	05	E25	121

RELAY CARD P121152607-1

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
C26	03	E26	119
C27	01	E27	117
C28	SPARES	E28	SPARES
C29	SPARES	E29	SPARES
C30	11	E30	017
C31	13	E31	019
C32	I5	E32	021
C33	IF	E33	023
C34	I9	E34	025
C35	111	E35	02F
C36	113	E36	029
C37	115	E37	031


RELAY CARD
P12152607-1
CR1
CR2
CR20
K16
CR19
K15
CR18
K14
CR17
K13
CR16
K12
CR15
K11
CR14
K10
CR13
K9
CR12
K8
CR11
K7
CR10
K6
CR9
K5
CR8
K4
CR7
K3
CR6
K2
CR5
K1
CR36
CR21
CR22
CR23
CR24
CR25
CR26
CR27
CR28
CR29
CR30
CR31
CR32
CR33
CR34
CR35
CR52
CR37
CR38
CR39
CR40
CR41
CR42
CR43
CR44
CR45
CR46
CR47
CR48
CR49
CR50
CR51
K33
Q1
Q2
URI
+12V
U6
U5
U4
U3
U1
U2
+5V
CR4
CR3
CR68
K32
CR67
K31
CR66
K30
CR65
K29
CR64
K28
CR63
K27
CR62
K26
CR61
K25
CR60
K24
CR59
K23
CR58
K22
CR57
K21
CR56
K20
CR55
K19
CR54
K18
CR53
K17
C1
C2
CHASSIS GND
LEAK
SPARE
HIGH QUALITY GND
OHMS
PROG PIN OR POS CARD
PROG PIN LSB
PROG PIN MSB
CLOCK
CROM
VOLTS
SPARE
POWER SUPPLY GND


RELAY MODULE
P121152607-3
"F"
9
6
5
1
HI VOLTAGE
CAUTION
K2
K1
CR1
CR2
U3
U4
U1
U2
1
16
14
7
8
C2
C1
+
"C"
20
37
19
"D"
14
25
13

Board # 9 RELAY MODULE P/N P121152607-3

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2014	61637	T31OB1O6KO2OAS
C2	Cap. 10uf, 20V, ±10%	2014	61637	T31OB1O6KO2OAS
CR1	Diode	7001	04713	1N914
CR2	Diode	7001	04713	1N914
Conn "D"	Conn 25 Pin, Plug Male	4002	7G413	H2M25RA28A
Conn "C"	Conn 37 Pin, Plug Male	4004	7G413	H2M37RA28A
Conn "F"	Conn 9 Pin, Plug Male	4001	7G413	H2M09RA28A
K1	Relay	9052	02289	M39016/6-116L
K2	Relay	9052	02289	M39016/6-116L
U1	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U2	Dual 4-Input "NOR" Gate	6002	04713	MC14002BCP
U3	Driver Transistor Array	6005	1F221	SN75468N
U4	Hex Schmitt Trigger	6033	04713	MC14584BCP
N/A	Screw 2-56 X .250 (4 Reqd.)	MS51957-3	N/A	MS51957-3
N/A	Nut 2-56 (4 Reqd.)	MS35649-24	N/A	MS35649-24
N/A	Conformal Coating	MIS1OO5	21223	# 65-16
N/A	Relay Module Card	P121152607-5	64217	P121152607-5

RELAY MODULE P121152607- 3

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
C1	N.C.	D01	N.C.
C2	N.C.	D2	N.C.
C3	N.C.	D3	N.C.
C4	N.C.	D4	N.C.
C5	N.C.	D5	A7
C6	N.C.	D6	A5
C7	N.C.	D7	A3
C8	01	D8	Al
C9	01	D9	CHASSIS GND
Cl0	N.C,	D1O	CRON
Cll	11	Dll	PROGRAM PIN MSB
C12	11	D12	PROGRAM PIN LSB
C13	N.C.	D13	SUPPLY GND
C14	N.C.	D14	N.C.
C15	N.C.	D15	N.C.
C16	N.C.	D16	N.C.
C17	N.C.	D17	N.C.
C18	N.C.	D18	A6
C19	N.C.	D19	A4
C20	N.C.	D20	A2
C21	N.C.	D21	AO
C22	N.C.	D22	N.C.
C23	N.C.	D23	+12 VOLTS
C24	N.C.	D24	PROGRAM PIN
C25	N.C.	D25	±5 VOLTs

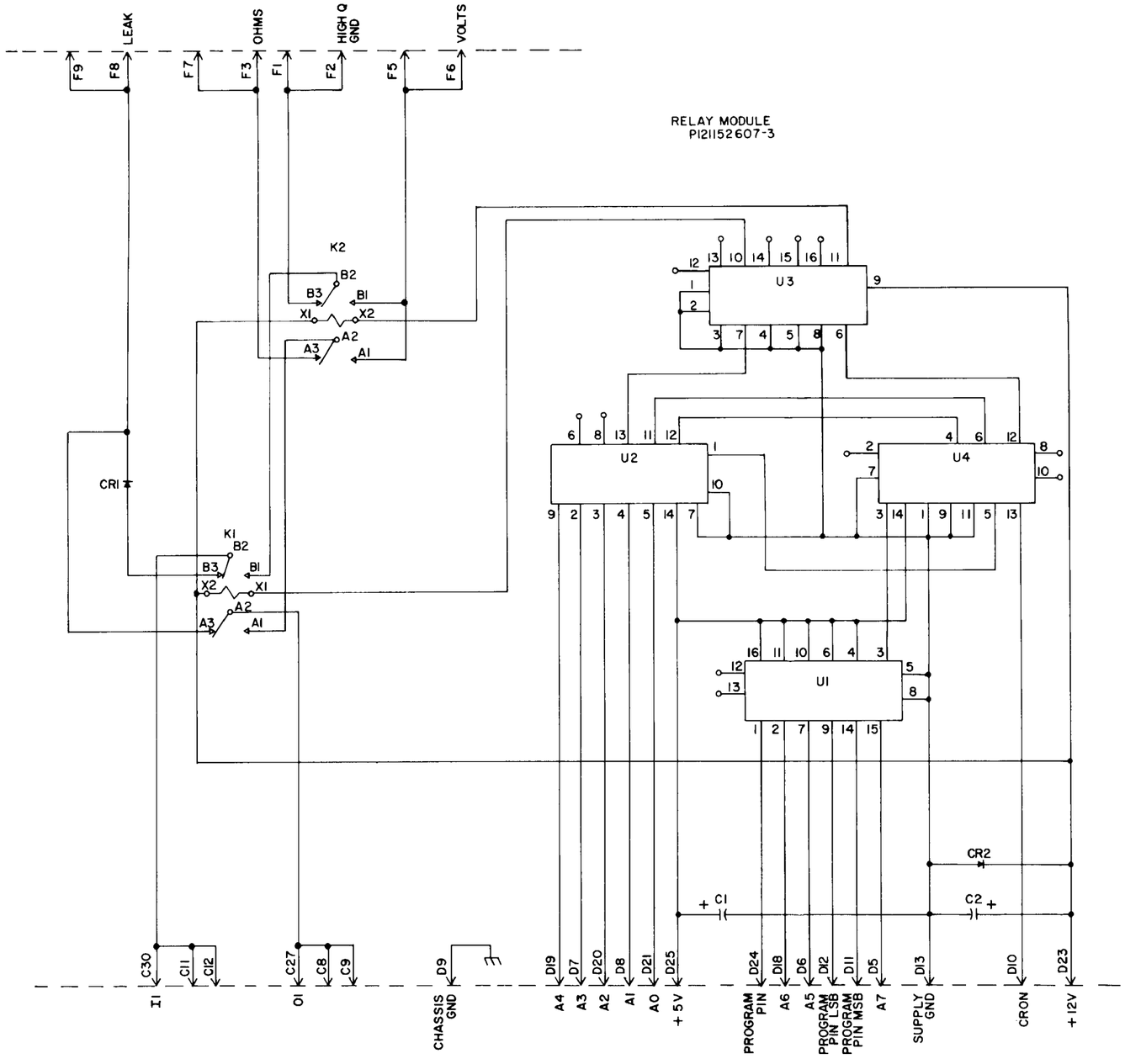
RELAY MODULE P121152607-3

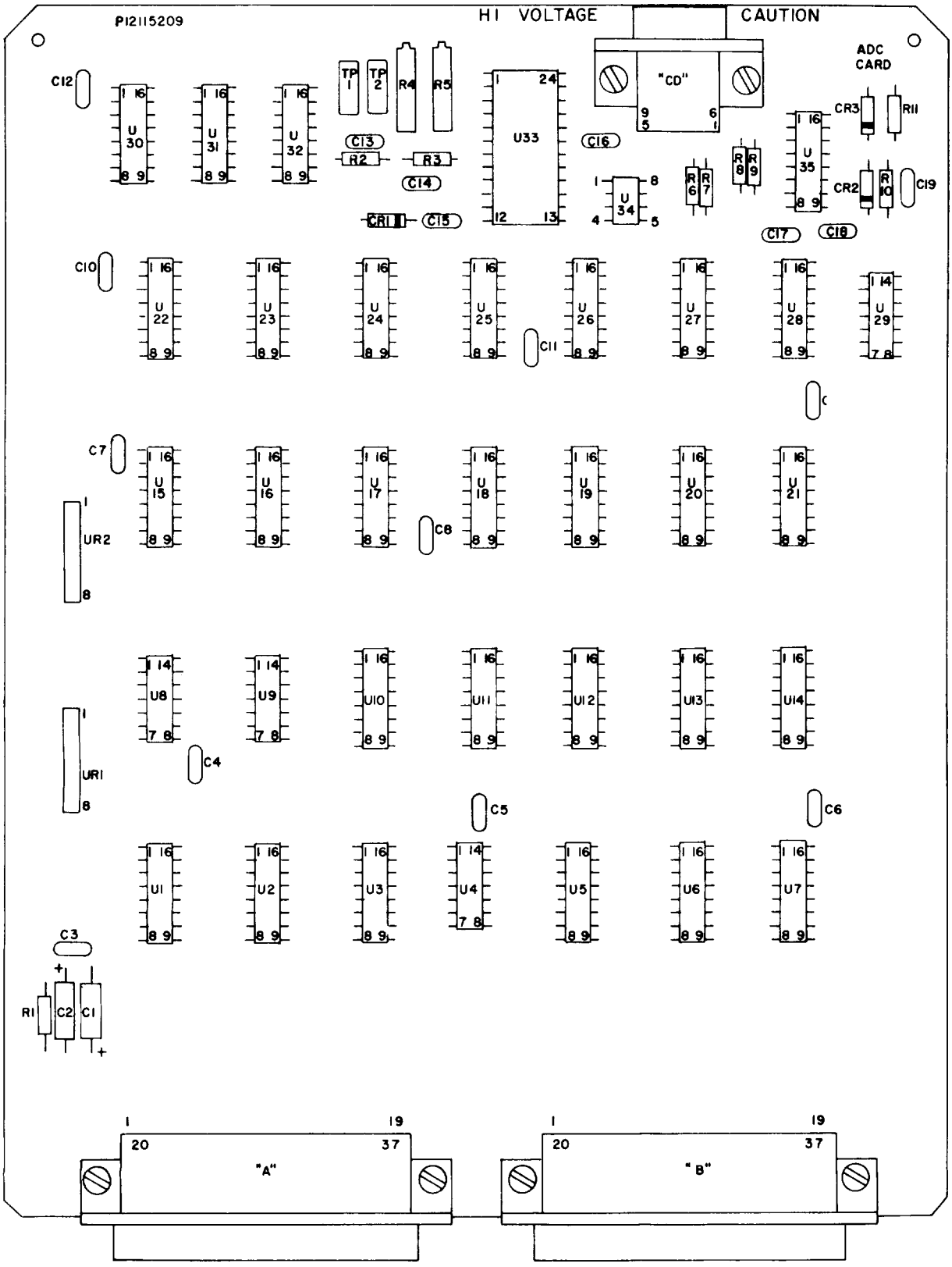
CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
C26	N.C.		
C27	01		
C28	N.C.		
C29	N. C.		
C30	11		
C31	N. C.		
C32	N.C.		
C33	N. C.		
C34	N.C.		
C35	N. C.		
C36	N.C.		
C37	N. C.		
C38	N. C.		

RELAY MODULE

P121152607-3

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
F1	HIGH QUALITY GND		
F2	HIGH QUALITY GND		
F3	OHMS		
F4			
F5	VOLTS		
F6	VOLTS		
F7	OHMS		
F8	LEAK		
F9	LEAK		


F9
LEAK
F8
F7
OHMS
F3
F1
HIGH Q GND
F2
F5
VOLTS
F6
RELAY MODULE
P12115260 7-3
K2
B2
B3
B1
X1
X2
A2
A3
A1
CR1
K1
U3
U2
U4
U1
CR2
C1
C2
C30
C11
C12
C27
C8
C9
D9
D19
D7
D20
D8
D21
D25
D24
D18
D6
D12
D11
D5
D13
D10
D23
I1
O1
CHASSIS GND
A4
A3
A2
A1
A0
+ 5V
PROGRAM PIN
A6
A5
PROGRAM PIN LSB
PROGRAM PIN MSB
A7
SUPPLY GND
CRON
+ 12V


P12115209
HI VOLTAGE
CAUTION
ADC CARD
"CD"
"A"
"B"
C12
C13
C14
C15
C16
C17
C18
C19
C10
C11
C7
C8
C4
C5
C6
C3
R1
C2
C1
TP 1
TP 2
R4
R5
R2
R3
CR1
U33
U34
U35
CR3
R11
CR2
R10
R6
R7
R8
R9
UR2
UR1
U30
U31
U32
U22
U23
U24
U25
U26
U27
U28
U29
U15
U16
U17
U18
U19
U20
U21
U8
U9
U10
U11
U12
U13
U14
U1
U2
U3
U4
U5
U6
U7

Board #4 ADC CARD P12115209

ITEM #	DESCRIPTION	PDC STK #	FSCM	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T31OB1O6KO2OAS
C2	Cap. 10uf, 20V, ±10%	2012	61637	T31OB1O6KO2OAS
C3	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C4	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C5	Cap. .01uf, 200V. ±l0%	2007	61637	C323C103K2R5CA
C6	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C7	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C8	Cap, .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C9	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C10	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C11	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C12	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C13	Cap, .1uf, 100V, ±5%	2002	19396	104JO1MF400A5
C14	Cap. .1uf, 100V, ±5%	2002	19396	104JO1MF400A5
C15	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C16	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C17	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C18	Cap. .01uf, 200V, ±l0%	2007	61637	C323C103K2R5CA
C19	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
CR1	Diode, Zener 5.1V	7008	04713	1N751A
CR2	Diode	7001	04713	1N914
CR3	Diode	7001	04713	1N914

Board # 4 ADC CARD P12115209

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
Conn "A"	Conn 37 Pin, Plug	4004	7G413	H2M37RA28A
Conn "B"	Conn 37 Pin, Plug	4004	7G413	H2M37RA28A
Conn "C"	Conn 9 Pin Plug	4001	7G413	H2M09RA28A
R1	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R2	Res. 5.1K, 1/4W, ±5%	1080	01121	RC07G512J
R3	Res. 51K, 1/4W, ±5%	1104	01121	RC07G513J
R4	Pot. 10K	6064	32997	3006P-1-103
R5	Pot. 10K	6064	32997	3006P-1-103
R6	Res. 20K, 1/8W, ±1%	1061	01121	RNC55H2002FS
R7	Res. 20K, 1/8W, ±1%	1061	01121	RNC55H2002FS
R8	Res. 20K, 1/8W, ±1%	1061	01121	RNC55H2002FS
R9	Res. 20K, 1/8W, ±1%	1061	01121	RNC55H2002FS
R1O	Res. 120Ω 1/4W, ±5% 1/4W, ±5%	1041	01121	RC07GF121J
R11	Res. 5.1K, 1/4W, ±5%	1080	01121	RC07G512J
TP1	P.C. Test Point, Black	MIS1001	83330	#430
TP2	P.C. Test Point, Black	MIS1001	83330	#430
U1	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U2	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U3	Hex D Flip Flop	6022	04713	MC14174BCP
U4	Triple 3-Imput "NAND" Gate	6007	04713	MC14023BCP
U5	Hex D Flip Flop	6022	04713	MC14174BCP

Board #4 ADC CARD P12115209

ITEM #	DESCRIPTION	PDC STK #	FSCM	MFG-P/N
U6	Hex D Flip Flop	6022	04713	MC14174BCP
U7	Hex D Flip Flop	6022	04713	MC14174BCP
U8	Hex Schmitt Trigger	6033	04713	MC14584BCP
U9	Quad 2-Input “NAND” Gate	6020	04713	MC14093BCP
U10	Hex 3 State Buffer	6028	04713	MC14503BCP
U11	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U12	Hex 3 State Buffer	6028	04713	MC14503BCP
U13	Hex 3 State Buffer	6028	04713	MC14503BCP
U14	Hex 3 State Buffer	6028	04713	MC14503BCP
U15	Quad D Flip Flop	6023	04713	MC14175BCP
U16	Quad D Flip Flop	6023	04713	MC14175BCP
U17	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U18	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U19	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U20	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U21	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U22	Quad D Flip Flop	6023	04713	MC14175BCP
U23	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U24	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U25	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U26	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U27	4-Bit Magnitude Comparator	6034	04713	MC14585BCP

Board #4 ADC CARD P12115209

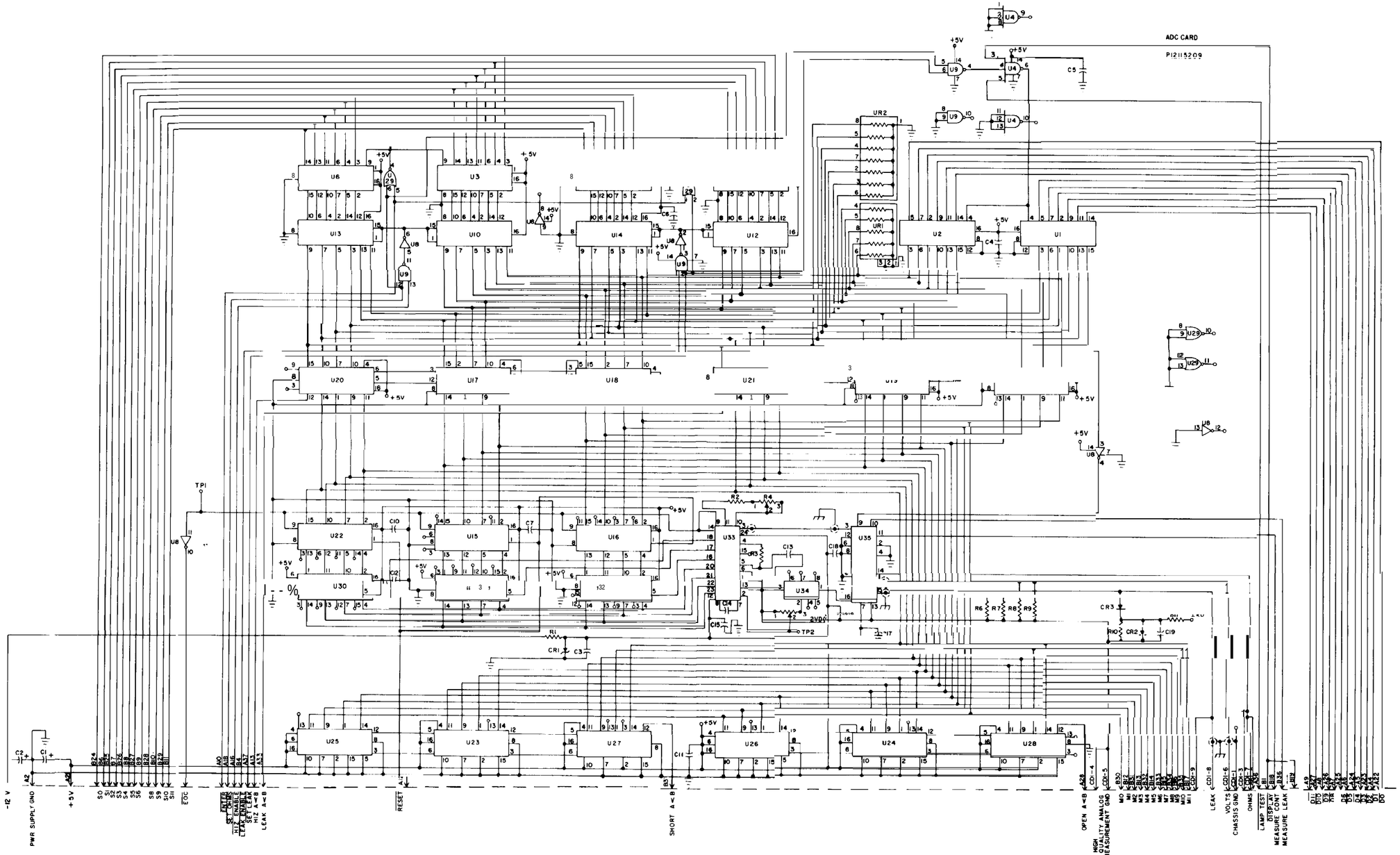
ITEM#	DESCRIPTION	PDC STK#	FSCM	MFG-P/N
U28	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U29	Quad 2-Input “NOR” Gate	6001	04713	MC14001BCP
U30	Quad Latch	6011	04713	MC14042BCP
U31	Quad Latch	6011	04713	MC14042BCP
U32	Quad Latch	6011	04713	MC14042BCP
U33	3-½ Digit A/D Converter	6024	04713	MC14433P
U34	Reference Low Voltage	6000	04713	MC1403U
U35	8-Channel Multiplexer Analog	6013	04713	MC14051BCP
UR1	Resistor, Sip 100K X 7	6062	57027	608-1-104G
UR2	Resistor, Sip 100K X 7	6062	57027	608-1-1O4G
N/A	ADC Card	P12115209-3	64217	P12115209-3
N/A	Screw 4-40 X .250	MS519517-13	N/A	MS519517-13
N/A	Nut 4-40	MS35649-44	N/A	RS35649-44
N/A	Conformal Coating	MIS1OO5	21223	# 65-16

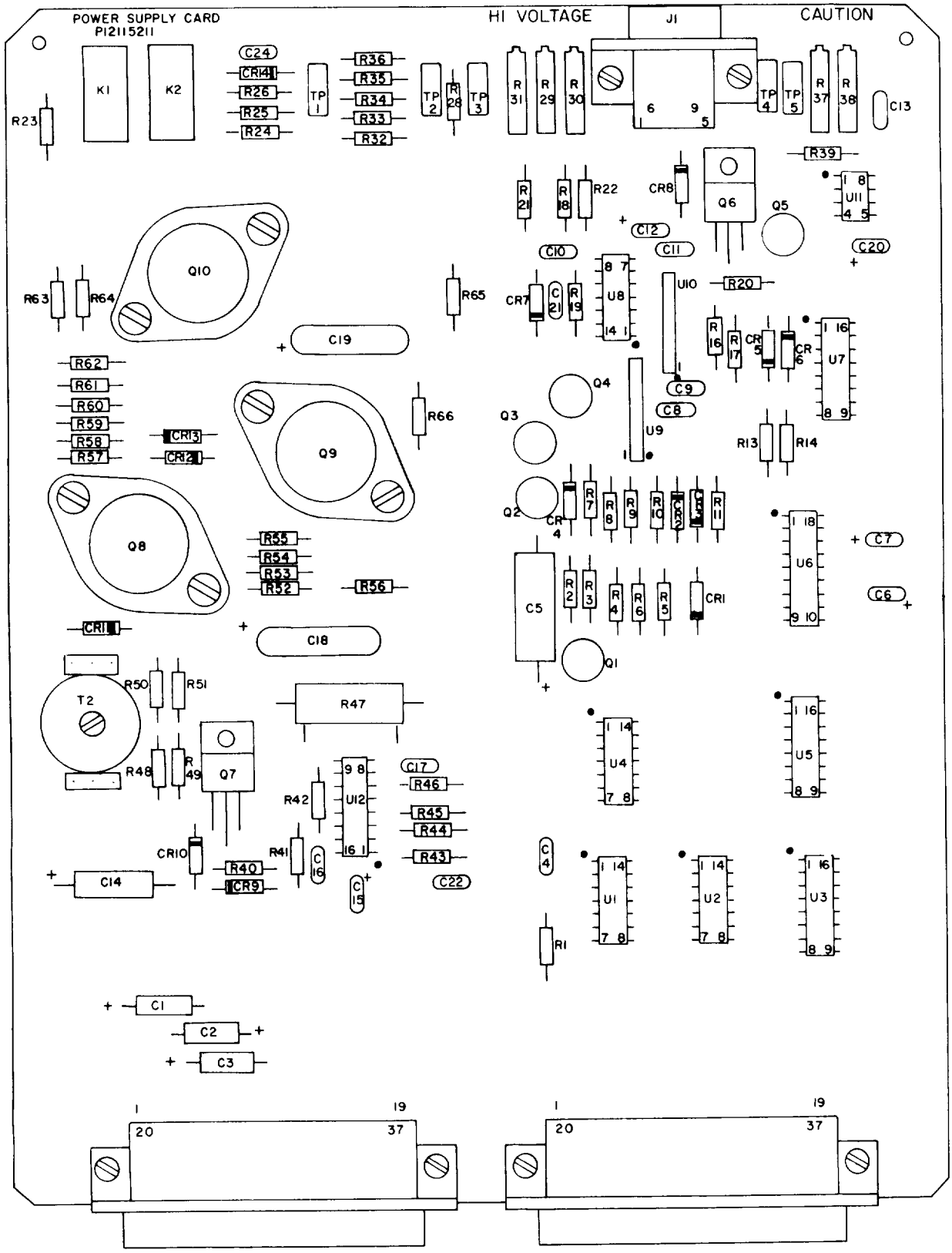
ADC P12115209

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	N.C.	B1	DISPLAY
A2	POWER SUPPLY GND	B2	N.C.
A3	N.C.	B3	N.C.
A4	$\overline{D1}$	B4	$\overline{\text{LEAK ENABLE}}$
A5	$\overline{D3}$	B5	N.C.
A6	$\overline{D5}$	B6	S1
A7	$\overline{D7}$	B7	S3
A8	$\overline{D9}$	B8	S5
A9	$\overline{D11}$	B9	S7
A1O	$\overline{\text{ENTER}}$	B1O	S9
A11	N.C.	B11	S11
A12	$\overline{\text{RESET}}$	B12	M1
A13	HI Z (A < B)	B13	M3
A14	N.C.	B14	M5
A15	N.C.	B15	M7
A16	$\overline{\text{HI Z ENABLE}}$	B16	M9
A17	N.C.	B17	M11
A18	$\overline{\text{SET OHMS}}$	B18	MEASURE CONTINUITY A
A19	N.C.	B19	$\overline{\text{DISPLAY}}$
A20	-12 VOLTS	B20	N.C.
A21	+5 VOLTS	B21	N.C.
A22	$\overline{D Ø}$	B22	N.C.
A23	$\overline{D2}$	B23	EOC
A24	D4	B24	S0
A25	$\overline{D6}$	B25	S2

ADC P12115209

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A26	$\overline{D8}$	B26	S4
A27	$\overline{D10}$	B27	S6
A28	OPEN A<B	B28	S8
A29	N.C.	B29	Sl0
A30	N.C .	B30	MO
A31	N.C.	B31	M2
A32	N.C.	B32	M4
A33	LEAK A <B	B33	M6
A34	N.C.	B34	M8
A35	N .C .	B35	M10
A36	$\overline{\text{LAMP TEST}}$	B36	MEASURE LEAK B
A37	$\overline{\text{SET LEAK}}$	B37	SHORT A<B


ADC CARD
P12115209
+5V
-12 V
PWR SUPPLY GND
TP1
TP2
RESET
EOC
SHORT A<B
OPEN A<B
LEAK A<B
HIGH VOLTAGE MEASUREMENT GND
CHASSIS GND
VOLTS
OHMS
LAMP TEST
DISPLAY
MEASURE CONT
MEASURE LEAK
U1
U2
U3
U4
U6
U8
U9
U10
U12
U13
U14
U15
U16
U17
U18
U20
U21
U22
U23
U24
U25
U26
U27
U28
U29
U30
U33
U34
U35
UR1
UR2


POWER SUPPLY CARD
P12115211
HI VOLTAGE
J1
CAUTION
K1
K2
R23
C24
CR4
R26
R25
R24
TP 1
R36
R35
R34
R33
R32
TP 2
R 28
TP 3
R 31
R 29
R 30
6 9
5
TP 4
TP 5
R 37
R 38
C13
R39
R 21
R 18
R22
CR8
Q6
Q5
C12
C11
C10
C20
U11
1 8
4 5
R63
R64
Q10
R65
C19
CR7
C 21
R 19
8 7
U8
14 1
U10
R20
R 16
R 17
CR 5
CR 6
U7
1 16
8 9
R62
R61
R60
R59
R58
R57
CR3
CR2
Q9
R66
Q4
Q3
C9
C8
U9
R13
R14
Q8
R55
R54
R53
R52
R56
Q2
CR 4
R 7
R 8
R 9
R 10
R 11
U6
1 18
9 10
C7
C6
CR1
C18
C5
R 2
R 3
R 4
R 6
R 5
CR1
Q1
T2
R50
R51
R47
R48
R 49
Q7
U4
1 14
7 8
U5
1 16
8 9
R42
U12
9 8
16 1
C17
R46
R45
R44
R43
C22
CR10
R41
C 16
C 15
R40
CR9
C14
C4
U1
U2
U3
R1
C1
C2
C3
1
19
20
37

Board #7 POWER SUPPLY P/N P12115211

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2014	61637	T310B106K020AS
C2	Cap. 10uf, 20V, ±10%	2014	61637	T310B106K020AS
C3	Cap. 10uf, 20V, ±10%	2014	61637	T103B106K020AS
C4	Cap. .1uf, 50V, ±10%	2010	61637	T323C104K5R5CA
C5	Cap. 47uf, 20V, ±20%	2015	61637	T310C476M020AS
C6	Cap. 10uf, 20V, ±10%	2019	61637	T362B106K020AS
C7	Cap. 10uf, 20V, ±10%	2019	61637	T362B106K020AS
C8	Cap. .1uf, 50V, ±10%	2010	61637	C323C104K5R5CA
C9	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C10	Cap. .1uf, 100V, ±5%	2011	19396	104J01MF400A5
C11	Cap. .1uf, 100V, ±5%	2011	19396	104J01MF400AS
C12	Cap. 10uf, 20V, ±10%	2019	61637	T362B106K020AS
C13	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C14	Cap. 47uf, 20V, ±20%	2015	61637	T310C476M020AS
C15	Cap. 10uf, 20V, ±10%	2019	61637	T362B106K020AS
C16	Cap. .1uf, 50V, ±10%	2010	61637	C323C104K5R5CA
C17	Cap. 1000pf, 200V, ±20%	2005	61637	C323C102M2R5CA
C18	Cap. .05uf, 600V, ±10%	2001	56289	6PS-S50
C19	Cap. .05uf, 600V, ±10%	2001	56289	6PS-S50
C20	Cap. 10uf, 20V, ±10%	2019	61637	T362B106K020AS
C21	Cap. .1uf, 50V, ±10%	2010	61637	C340C104K5R5CA
C22	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C23	N/A			

Board #7 POWER SUPPLY P/N 12115211

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
C24	Cap. .O1uf, 200V, ±10%	2007	61637	C323C103K2R5CA
CR1	Diode	7001	04713	1N914
CR2	Diode	7001	04713	1N914
CR3	Diode	7001	04713	1N914
CR4	Diode	7001	04713	1N914
CR5	Diode	7002	04713	1N4003
CR6	Diode	7002	04713	1N4003
CR7	Diode	7001	04713	1N914
CR8	Diode	7002	04713	1N4003
CR9	Diode, Zener	7006	52306	UZ871O
CR1O	Diode, Zener	7007	52306	UZ8790
CR11	Diode, 600V	7004	52306	1N4946
CR12	Diode	7003	04713	1N4004
CR13	Diode	7003	04713	1N4004
CR14	Diode, 600V	7004	52306	1N4946
Conn“A”	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
Conn“B”	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
J1	Conn. 9 Pin Receptacle	4015	7G413	H2R09RA28A
K1	Relay	9052	02289	M39016/6-116L
K2	Relay	9052	02289	M39016/6-116L
Q1	Transistor NPN	3004	04713	2N2222A
Q2	Transistor NPN	3004	04713	2N2222A

Board #7 POWER SUPPLY P/N12115211

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
Q3	Transistor NPN	3004	04713	2N2222A
Q4	Transistor NPN	3004	04713	2N2222A
Q5	Transistor PNP	3005	04713	2N2907A
Q6	Transistor PNP to-220	3007	04713	TIP 30
Q7	Transistor	3006	06369	1RF532
Q8	Transistor	3012	04713	BU208
Q9	Transistor	3012	04713	BU208
Q1O	Transistor	3012	04713	BU208
R1	Res. 10K, 1/4W, ±5%	1087	01121	RCO7G1O3J
R2	Res. 5.11K, 1/8W, ±1%	1059	01121	RNC55H5111FS
R3	Res. 5.11K, 1/8W, ±1%	1059	01121	RNC55H5111FS
R4	Res. 47K, 1/4W, ±5%	1103	01121	RC07G473J
R5	Res. 5.1K, 1/4W, ±5%	1080	01121	RC07G512J
R6	Res. 10K, 1/4W, ±5%	1087	01121	RCO7G1O3J
R7	Res. 100Ω 1/4W, ±5%	1039	01121	RCO7G1O1J
R8	Res. 2K, 1/4W, ±5%	1070	01121	RC07G202J
R9	Res. 1K, 1/4W, ±5%	1063	01121	RCO7G1O2J
R1O	Res. 39K, 1/4W, ±5%	1101	01121	RC07G393J
R11	Res. 6.8K, 1/4W, ±5%	1083	01121	RC07G682J
R12	N/A			
R13	Res, 1OK, 1/4W, ±5%	1087	01121	RCO7G1O3J
R14	Res. 10K, 1/4W, ±5%	1087	01121	RCO7G1O3J

Board # 7 POWER SUPPLY P/N12115211

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
R15	N/A			
R16	Res. 1K, 1/4W,±5%	1063	01121	RC07G102J
R17	Res. 100Ω 1/4W,±5%	1039	01121	RC07G101J
R18	Res. 10K, 1/4W, ±5%	1087	01121	RC07G103J
R19	Res. 10K 1/4W, ±5%	1087	01121	RC07G103J
R20	Res. 10Ω 1/8W, ±1%	1057	01121	RNC55H10R0FS
R21	Res. 10K, 1/4W, ±5%	1087	01121	RC07G103J
R22	Res. 10K, 1/4W, ±5%	1087	01121	RC07G1O3J
R23	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R24	Res. 7.5K, 1/4W, ±5%	1084	01121	RC07G752J
R25	Res. 7.5K, 1/4W, ±5%	1084	01121	RC07G752J
R26	Res. 7.5K, 1/4W, ±5%	1084	01121	RC07G752J
R27	N/A			
R28	Res. 56K, 1/4W, ±5%	1105	01121	RC07G563J
R29	Pot. 10K	6064	32997	3OO6P-1-1O3
R30	Pot. 1K	6063	32997	3006P-1-102
R31	Pot. 1MEG	6065	32997	3006P-1-105
R32	Res. 1.8MEG, 1/4W, ±5%	1072	01121	RC07G185J
R33	Res. 1.8MEG, 1/4W, ±5%	1072	01121	RC07G185J
R34	Res. 1.8MEG, 1/4W, ±5%	1072	01121	RC07G185J
R35	Res. 1.8MEG, 1/4W, ±5%	1072	01121	RC07G185J
R36	Res. 1.8MEG, 1/4W, ±5%	1072	01121	RC07G185J

Board # 7 POWER SUPPLY P/N12115211

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
R37	Pot. 1K	6063	32997	3006P-1-1O2
R38	Pot. 10K	6064	32997	3006P-1-103
R39	Res. 62K 1/4W, ±5%	1106	01121	RC07G623J
R40	Res. 10Ω 1/4W, ±5%	1015	01121	RCO7G1OOJ
R41	Res. 100Ω 1/4W, ±5%	1039	O1121	RC07G101J
R42	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R43	Res. 10K, 1/8W, ±1%	1060	01121	RNC55H1002FS
R44	Res. 51K, 1/4W, ±5%	1104	01121	RC07G513J
R45	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R46	Res. 22K, 1/4W, ±5% Test Select	1095	01121	RC07G223J
R47	Res. .01Ω 3W, ±2%	MIS1026	4H713	4LPW-3-,01
R48	Res. 499K, 1/4W ±1%	1071	01121	RNC55H4993FR
R49	Res. 499K, 1/4W, ±1%	1071	01121	RNC55H4993FR
R50	Res. 499K, 1/4W, ±1%	1071	01121	RNC55H4993FR
R51	Res. 499K, 1/4W, ±1%	1071	01121	RNC55H4993FR
R52	Res. 20K, 1/4W, ±5%	1094	01121	RC07G203J
R53	Res. 20K, 1/4W, ±5%	1094	01121	RC07G203J
R54	Res. 30K, 1/4W, ±5%	1098	01121	RC07G303J
R55	Res. 30K, 1/4W, ±5%	1098	01121	RC07G303J
R56	Res. 10Ω 1/4W, ±5%	1015	01121	RC07G100J
R57	Res. 1.6K, 1/4W, ±5%	1068	01121	RC07G162J

Board # 7 POWER SUPPLY P/N P12115211

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
R58	Res. 1.6K, 1/4W, ±5%	1068	01121	RC07G162J
R59	Res. 1.5K, 1/4W, ±5%	1067	01121	RC07G152J
R60	Res. 1.5K, 1/4W, ±5%	1067	01121	RC07G152J
R61	Res. 560Ω 1/4W, ±5%	1056	01121	RC07G561J
R62	Res. 560Ω 1/4W, ±5%	1056	01121	RC07G561J
R63	Res. 560 Ω 1/4W, ±5%	1056	01121	RC07G561J
R64	Res. 240Ω 1/4W, ±5%	1047	01121	RC07G241J
R65	Res, 10K, 1/4W, ±5%	1087	01121	RC07G103J
R66	Res. 10K, 1/4W, ±5%	1087	01121	RC07G103J
TP1	P.C. Test Point, Black	MIS1001	83330	#430
TP2	P.C. Test Point, Black	MIS1001	83330	#430
TP3	P.C. Test Point, Black	MIS1001	83330	#430
TP4	P.C. Test Point, Black	MIS1001	83330	#430
TP5	P.C. Test Point, Black	MIS1OO1	83330	#430
T1	N/A			
T2	Transformer	P12115371-1	64217	P12115371-1
U1	Hex Schmitt Trigger	6033	04713	MC14584BCP
U2	Triple 3-Input "NAND" Gate	6007	04713	MC14023BCP
U3	Hex D Flip Flop	6022	04713	MC14174BCP
U4	Triple 3-Input "NOR" Gate	6008	04713	MC14025BCP
U5	Hex D Flip Flop	6022	04713	MC14174BCP
U6	10-Bit Pluse Sign D/A Converter	6038	06665	DAC-05-GX1

Board # 7 POWER SUPPLY P/N P12115211

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U7	Dual D Flip Flop	6040	18324	ULN2003A
U8	OP-AMP, Quad	6021	52063	XR4136 CP
U9	Resistor, Sip 10K X 4	6061	57027	608-3-1O3G
U10	Resistor, Sip 10K X 4	6061	57027	608-3-1O3G
U11	Reference Low Voltage	6000	04713	MC1403U
U12	Pulse Width Modulator	6044	01295	SG3524N
N/A	Screw 4-40 X .250 (6 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (6 Reqd.)	MS35649-44	N/A	MS35649-44
N/A	Conformal Coating	MIS1005	21223	#65-16

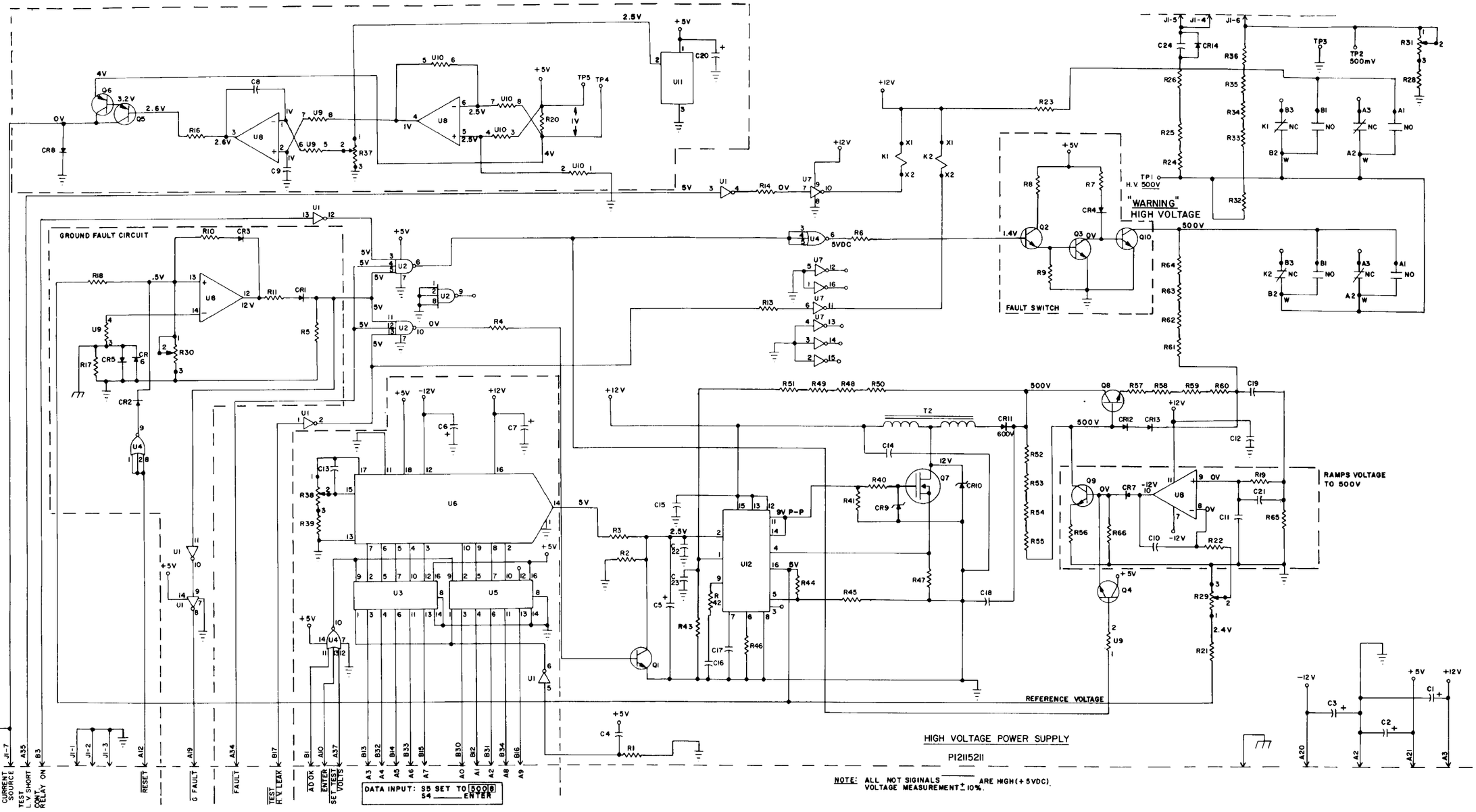
HIGH VOLTAGE POWER SUPPLY P12115211

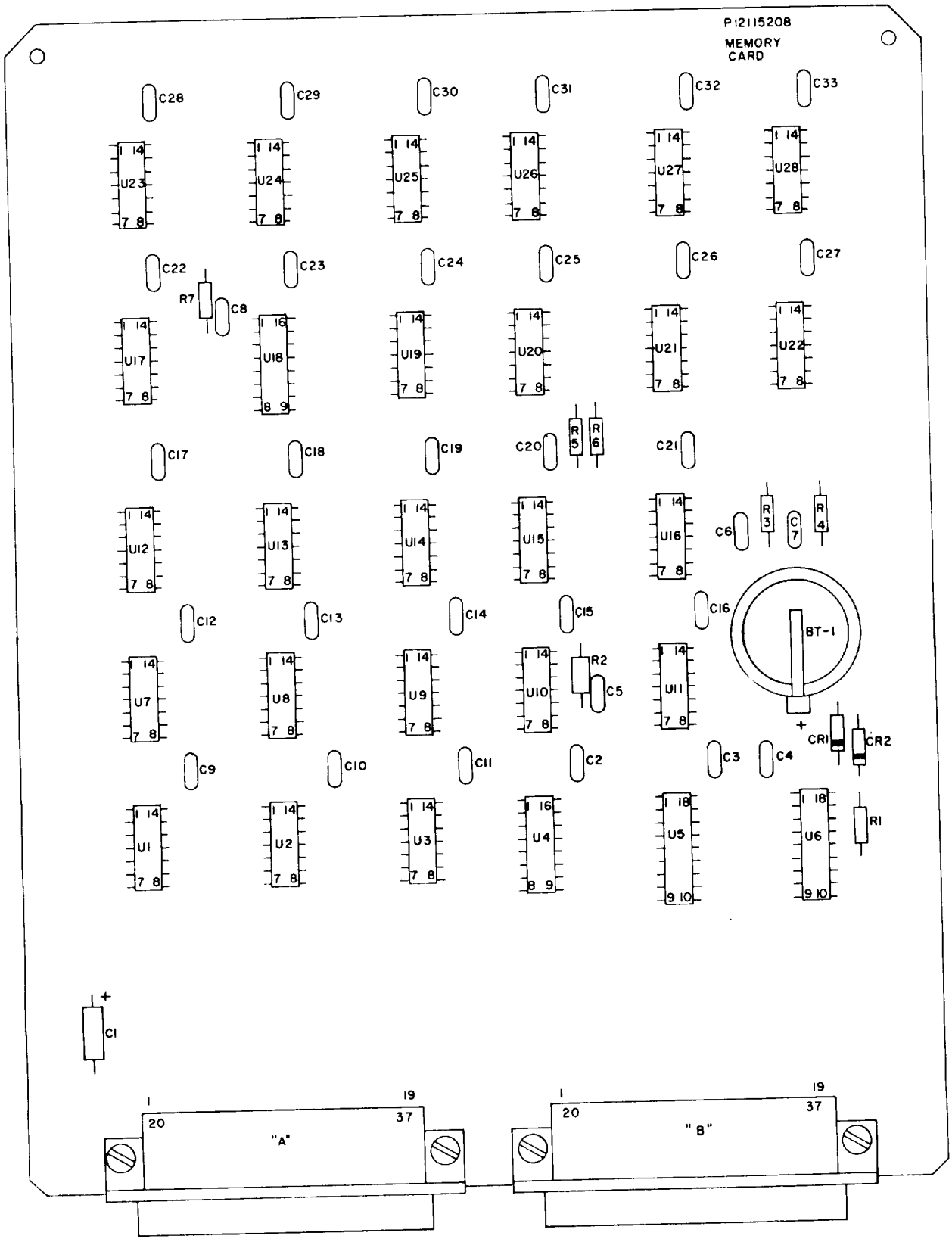
CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	CHASSIS GND	B1	ADOK
A2	GND	B2	N.C.
A3	+12 VOLTS	B3	CONTINUITY RELAY ON
A4	N.C.	B4	N.C.
A5	N.C.	B5	N.C.
A6	N.C.	B6	N.C.
A7	N.C.	B7	N.C.
A8	N.C.	B8	N.C.
A9	N.C.	B9	N.C.
A10	ENTER	B10	N.C.
A11	N.C.	B11	N.C.
A12	RESET	B12	A1
A13	N.C.	B13	A3
A14	N.C.	B14	A5
A15	N.C.	B15	A7
A16	N.C.	B16	A9
A17	N.C.	B17	TEST HIGH VOLTAGE LEAK
A18	N.C.	B18	N.C.
A19	GND FAULT	B19	N.C,
A20	-12 VOLTS	B20	N.C.
A21	+5 VOLTS	B21	N.C.
A22	N.C.	B22	N.C.
A23	N.C.	B23	N.C,
A24	N.C.	B24	N.C.
A25	N.C.	B25	N.C.

CONTINUED CONTINUED

HIGH VOLTAGE POWER SUPPLY P12115211

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A26	N.C.	B26	N.C.
A27	N.C.	B27	N.C.
A28	N.C.	B28	N.C.
A29	N. C.	B29	N.C,
A30	N.C.	B30	A0
A31	N. C .	B31	A2
A32	N.C.	B32	A4
A33	N.C.	B33	A6
A34	$\overline{\text{FAULT}}$	B34	A8
A35	$\overline{\text{TEST LOW VOLTAGE SHORT}}$	B35	N.C.
A36	N.C.	B36	N.C.
A37	$\overline{\text{SET TEST VOLTS}}$	B37	N.C.


GROUND FAULT CIRCUIT
FAULT SWITCH
"WARNING" HIGH VOLTAGE
RAMPS VOLTAGE TO 500V
REFERENCE VOLTAGE
DATA INPUT: S5 SET TO 5000
S4 ENTER
HIGH VOLTAGE POWER SUPPLY
P1211521I
NOTE: ALL NOT SIGNALS ARE HIGH(+5VDC).
VOLTAGE MEASUREMENT ± 10%.
100 MA CURRENT SOURCE
TEST L.V SHORT CONT. RELAY ON
RESET
G FAULT
FAULT
TEST H.V LEAK
ADDR
ENTER SET TEST VOLTS
TP1 H.V 500V
TP2 500mV
TP3
TP4
TP5


P12115208
MEMORY
CARD
C28
C29
C30
C31
C32
C33
U23
U24
U25
U26
U27
U28
C22
C23
C24
C25
C26
C27
R7
C8
U17
U18
U19
U20
U21
U22
C17
C18
C19
C20
R5
R6
C21
U12
U13
U14
U15
U16
C6
R3
C7
R4
C12
C13
C14
C15
C16
BT-1
U7
U8
U9
U10
R2
C5
U11
CR1
CR2
C9
C10
C11
C2
C3
C4
U1
U2
U3
U4
U5
U6
R1
C1
"A"
"B"

Board # 3 MEMORY CARD P12115208

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K020AS
C2	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C3	Cap, .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C4	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C5	Cap. .01uf, 100V, ±l0%	2006	61637	C323C103K1R5CA
C6	Cap. .01uf, 100V, ±10%	2006	61637	C323C103K1R5CA
C7	Cap. .01uf, l00V, ±l0%	2006	61637	C323C103K1R5CA
C8	Cap. .1uf, 50V, ±l0%	2009	61637	C323C104K5R5CA
C9	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
Cl0	Cap. .1uf, 50V, ±l0%	2009	61637	C323C104K5R5CA
Cll	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C12	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C13	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C14	Cap. .luf, 60V, ±10%	2009	61637	C323C104K5R5CA
C15	Cap. .1uf, 50V, ±l0%	2009	61637	C323C104K5R5CA
C16	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C17	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C18	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C19	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C20	Cap. .1uf, 50V, ±l0%	2009	61637	C323C104K5R5CA
C21	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C22	Cap. .1uf, 50V, ±10%	2009	61637	C323C104K5R5CA

Board # 3 MEMORY CARD P12115208

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
C23	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C24	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C25	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C26	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C27	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C28	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C29	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C30	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C31	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C32	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
C33	Cap. . 1uf, 50V, ±10%	2009	61637	C323C104K5R5CA
CR1	Diode	7001	04713	1N914
CR2	Diode	7001	04713	1N914
R1	Res. 100K, 1/4W, ±5%	1111	01121	RC07G104J
R2	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R3	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R4	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R5	Res. 100K, 1/4W, ±5%	1111	01121	RC07G102J
R6	Res. l00K, 1/4W, ±5%	1111	01121	RC07G104J
R7	Res. 10K, 1/4W, ±5%	1087	01121	RC07G103J
BT1	Battery, 3 Volt	MIS1004	2N182	DL2032
BH1	Battery Holder	MIS1003	2N182	BH 906

Board # 3 MEMORY CARD P121152Q8

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U1	Triple 3-Input "NOR" Gate	60Q8	04713	MC14025BCP
U2	Hex Schmitt Trigger	6033	04713	MC14584BCP
U3	Hex Schmitt Trigger	6033	04713	MC14584BCP
U4	Hex D Flip Flop	6022	04713	MC14174BCP
U5	4096 X 1 Ram	6035	4R497	HM36504-9
U6	4096- X 1 Ram	6035	4R497	HM36504-9
U7	Triple 3-Input "NAND" Gate	6007	04713	MC14023BCP
U8	Quad Exclusive or Gate	6017	04713	MC14070BCP
U9	Triple 3-Input "NAND" Gate	6007	04713	MC14023BCP
U10	Hex Schmitt Trigger	6033	04713	MC14584BCP
U11	Hex Schmitt Trigger	6033	04713	MC14584BCP
U12	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U13	Quad 2-Input "NAND" Schmitt Trigger	6020	04713	MC14093BCP
U14	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U15	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U16	Triple 3-Input "OR" Gate	6019	04713	MC14075BCP
U17	Dual D Flip Flop	6005	04713	MC14013BCP
U18	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U19	Dual D Flip Flop	6005	04713	MC14013BCP
U20	Dual d Flip Flop	6005	04713	MC14013BCP
U21	Triple 3-Input "NOR" Gate	6008	04713	MC14025BCP

Board #3 MEMORY CARD P12115208

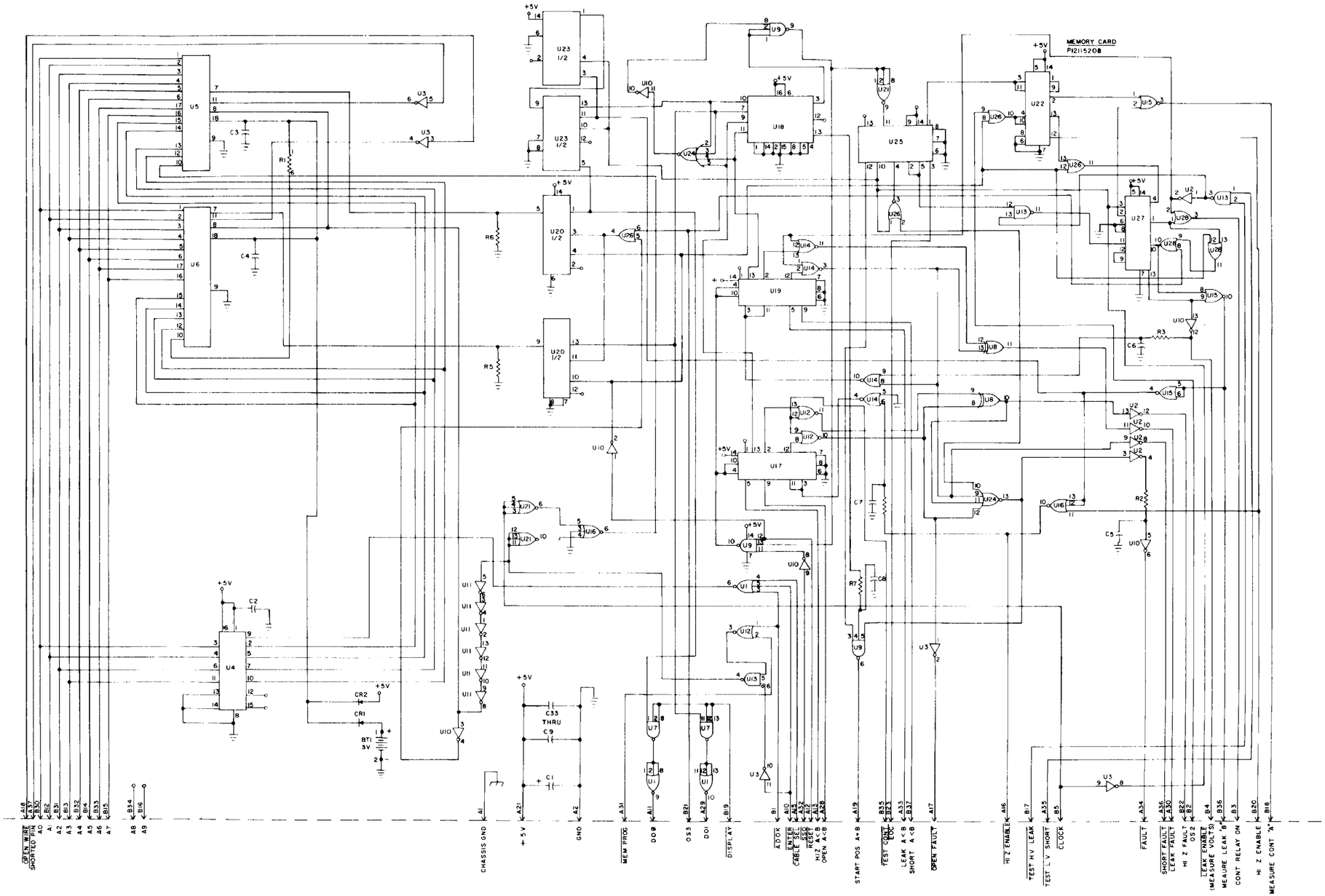
ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U22	Dual D Flip Flop	6005	04713	MCI4013BCP
U23	Dual D Flip Flop	6005	04713	MC14013BCP
U24	Dual 4-Input "NOR" Gate	6002	04713	MC14002BCP
U25	Dual D Flip Flop	6005	04713	MC14013BCP
U26	Quad 2-Input "OR" Gate	6018	04713	MC14071BCP
U27	Dual D Flip Flop	6005	04713	MC14013BCP
U28	Quad 2-Input "OR" Gate	6018	04713	MC14071BCP
N/A	Memory Module Card	P12115208-3	64217	P12115208-3
N/A	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
N/A	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
N/A	Screw 4-40X .250 (4 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (4 Reqd.)	MS35649-44	N/A	MS35649-44
N/A	Conformal Coating	MIS 1OO5	21223	# 65-16

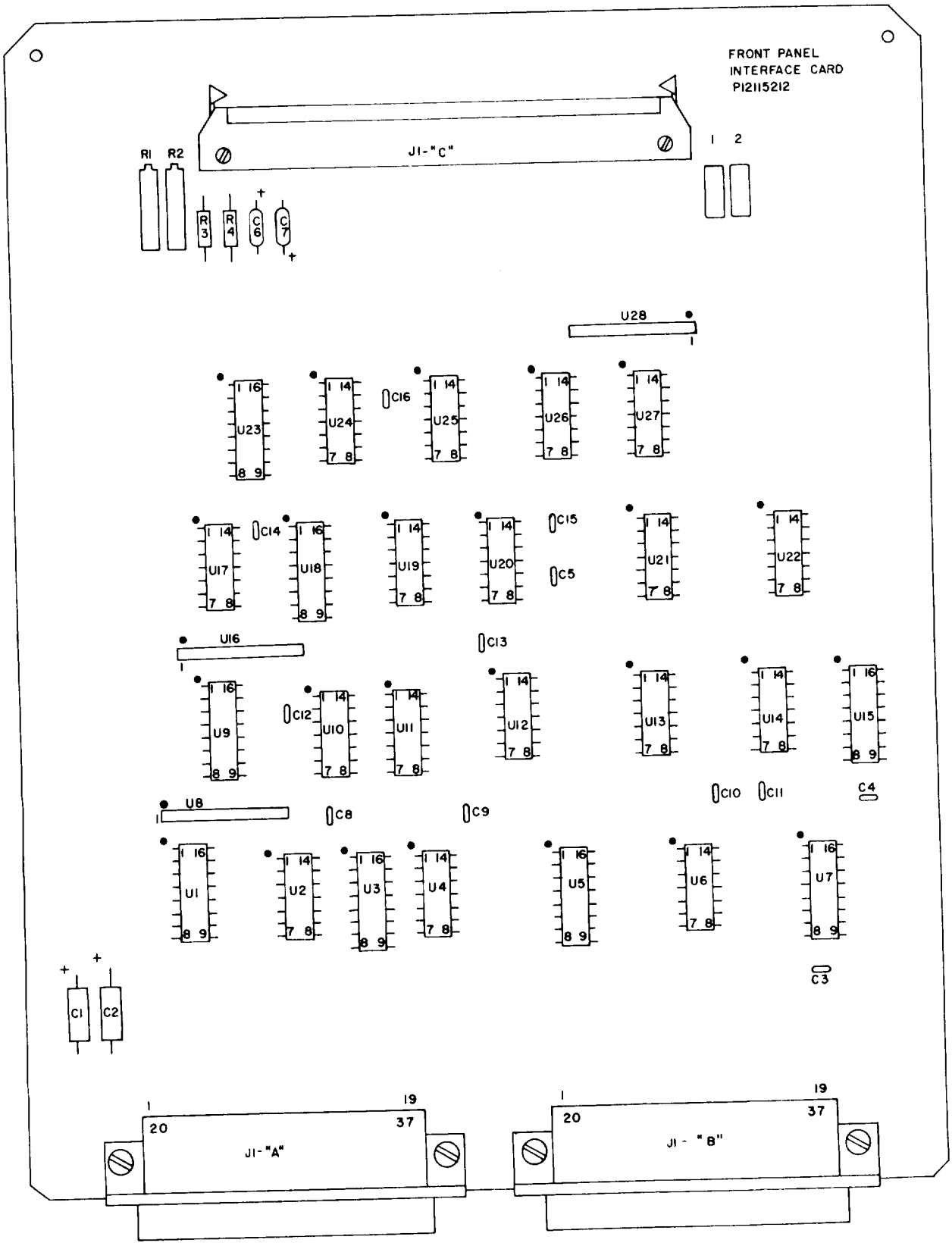
CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	CHASSIS GND	B1	$\overline{\text{ADOK}}$
A2	GND	B2	$\overline{\text{OS2}}$
A3	N.C.	B3	CONTINUITY RELAY ON
A4	N.C.	B4	$\overline{\text{LEAK ENABLE}}$
A5	N.C.	B5	$\overline{\text{CLOCK PULSE}}$
A6	N.C.	B6	N.C.
A7	N.C.	B7	N.C.
A8	N.C.	B8	N.C.
A9	N.C.	B9	N.C.
A1O	$\overline{\text{ENTER}}$	B1O	N.C.
A11	DOO	B11	N.C.
A12	$\overline{\text{RESET}}$	B12	A1
A13	HI Z AB	B13	A3
A14	N.C.	B14	A5
A15	$\overline{\text{CABLE SELECT}}$	B15	A7
A16	$\overline{\text{LEAK ENABLE}}$	B16	A9
A17	$\overline{\text{OPEN FAULT}}$	B17	$\overline{\text{HI TEST VOLTAGE LEAK}}$
A18	$\overline{\text{OPEN WIRE}}$	B18	MEASURE CONTINUITY A
A19	START POSITION A=B	B19	$\overline{\text{DISPLAY}}$
A20	N.C.	B20	$\overline{\text{HI Z ENABLE}}$
A21	+5 VOLTS	B21	0S3
A22	N.C.	B22	$\overline{\text{HI Z FAULT}}$
A23	N.C.	B23	$\overline{\text{EOC}}$
A24	N.C.	B24	N.C.
A25	N.C.	B25	N.C.

CONTINUED CONTINUED

MEMORY P12115208

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A26	N.C.	B26	N.C.
A27	N.C.	B27	N.C.
A28	OPEN A<B	B28	N.C.
A29	D01	B29	N.C.
A30	$\overline{\text{LEAK FAULT}}$	B30	A0
A31	$\overline{\text{MEMORY PROGRAM}}$	B31	A2
A32	$\overline{\text{SS}\phi}$	B32	A4
A33	LEAK A<B	B33	A6
A34	$\overline{\text{FAULT}}$	B34	A8
A35	$\overline{\text{TEST LOW VOLTAGE SHORT}}$	B35	$\overline{\text{TEST CONTINUITY}}$
A36	$\overline{\text{SHORT FAULT}}$	B36	MEASURE LEAK B
A37	$\overline{\text{SHORTED PIN}}$	B37	SHORT A<B
CD1/1.	CHASSIS GND		
2.	OHMS		
3.	OHMS		
4.	HI QUALITY ANALOG MEAS. GND		
5.	HI QUALITY ANALOG MEAS. GND		
6.	VOLTS		
7.	OHMS		
8.	LEAK		
9.	LEAK		


MEMORY CARD
P1211520B
OPEN WIRE
SHORTED PIN
A0
A1
A2
A3
A4
A5
A6
A7
B34
B16
A8
A9
CHASSIS GND
+5V
GND
MEM PROG
DOB
OSS
DOI
DISPLAY
ADDX
ENTER CABLE SEC
RESET
HI Z A<B
OPEN A<B
START POS A+B
TEST CONT LOOP
LEAK A<B
SHORT A<B
OPEN FAULT
HI Z ENABLE
TEST H.V. LEAK
TEST L.V. SHORT
CLOCK
FAULT
SHORT FAULT
LEAK FAULT
HI Z FAULT
LEAK ERROR (MEASURE VOLTS)
MEASURE LEAK 'B'
CONT RELAY ON
HI Z ENABLE
MEASURE CONT 'A'
U5
U6
U4
U23 1/2
U20 1/2
U18
U19
U17
U25
U22
U27
R1
R2
R3
R5
R6
R7
C1
C2
C3
C4
C5
C6
C7
C8
C9
C33 THRU
CR1
CR2
BT1 3V


FRONT PANEL
INTERFACE CARD
P12115212
J1-"C"
1 2
R1 R2
R3 R4 C6 C7
U28
U23 U24 C16 U25 U26 U27
U17 C14 U18 U19 U20 C15 C5 U21 U22
U16 C13
U9 C12 U10 U11 U12 U13 U14 U15
C10 C11 C4
U8 C8 C9
U1 U2 U3 U4 U5 U6 U7
C3
C1 C2
J1-"A"
J1-"B"

Board # 2 FRONT PANEL INTERFACE MODULE P12115212

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K020AS
C2	Cap. 10uf, 20V, ±10%	2012	61637	T310B106K020AS
C3	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C4	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C5	Cap. .1uf, 50V, ±10%	2010	61637	C323C104K2R5CA
C6	Cap. 1uf, 20V, ±10%	2016	61637	T362A105K020AS
C7	Cap. 1uf, 20V, ±10%	2016	61637	T362A105K020AS
C8	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C9	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C10	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C11	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C12	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C13	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C14	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C15	Cap. .O1uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C16	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
R1	Pot. 10K	6064	32997	3006P-1-1O3
R2	Pot. 10K	6064	32997	3006P-1-1O3
R3	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R4	Res. 1K, 1/4W, ±5%	1063	01121	RC07G1O2J
J1A	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
J1B	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A

Board # 2 FRONT PANEL INTERFACE MODULE P12115212

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
TP1	P.C. Test Point, Black	MIS1OO1	83330	# 430
TP2	P.C. Test Point, Black	MIS1OO1	83330	# 430
U1	Hex Buffer NonInverting	6012	04713	MC14050BCP
U2	Hex Schmitt Trigger	6033	04713	MC14584BCP
U3	BCD-To-Decimal Decoder	6009	04713	MC14028BCP
U4	Hex Schmitt Trigger	6033	04713	MC14584BCP
U5	Resistor, Dip Network	6050	56845	MPD1601-104G
U6	Hex Schmitt Trigger	6033	04713	MC14584BCP
U7	Hex Contact Bounce Eliminator	6025	04713	MC14490FP
U8	Resistor, Sip Network 10K	6053	56845	MSP1OAO1-104G
U9	Hex Buffer NonInverting	6012	04713	MC14050BCP
U10	Triple 3-Input "NOR" Gate	6008	04713	MC14025BCP
U11	Hex Schmitt Trigger	6033	04713	MC14584BCP
U12	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U13	Hex Schmitt Trigger	6033	04713	MC14584BCP
U14	Hex Schmitt Trigger	6033	04713	MC14584BCP
U15	Hex Contact Bounce Eliminator	6025	04713	MC14490FP
U16	Resistor, Sip Network 10K	6053	56845	MSP1OAO1-104G
U17	Hex Schmitt Trigger	6033	04713	MC14854BCP
U18	Strobed Hex Inverter/Buffer	6027	04713	MC14502BCP
U19	Quad 2-Input "NAND" Gate	6003	04713	MC14011UBCP

Board #2 FRONT PANEL INTERFACE MODULE P12115212

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U20	Hex Schmitt Trigger	6033	04713	MC14584BCP
U21	Quad 2-Input "NAND" Schmitt Trigger	6020	04713	MC14093BCP
U22	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U23	Dual One-Shot	6041	04713	SN-74C221N-1O
U24	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U25	Dual 4-Input "NAND" Gate	6004	04713	MC14012BCP
U26	Hex Schmitt Trigger	6033	04713	MC14584BCP
U27	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U28	Resistor, Sip Network 10K	6053	56845	MSP1OAO1-104G
J1-C	Conn. 60 Pin, Plug J1	4006	76381	3372/1202
N/A	Screw 4-40 X .250 (6 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (6 Reqd.)	MS35649-44	N/A	MS35649-44
N/A	Conformal Coating	MIS1OO5	21223	#65-16
N/A	Front Panel Interface Card	P12115212-2	64127	P12115212-2

FRONT PANEL INTERFACE CARD P12115212

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	CHASSIS GND	B1	$\overline{\text{TEST LOW VOLTAGE SHORT}}$
A2	GND	B2	$\overline{\text{SHORT FAULT}}$
A3	+12 VOLTS	B3	$\overline{\text{SHORTED PIN}}$
A4	$\overline{\text{D1}}$	B4	$\overline{\text{X0.01 SECOND}}$
A5	$\overline{\text{D3}}$	B5	$\overline{\text{CP}}$
A6	$\overline{\text{D5}}$	B6	S1
A7	$\overline{\text{D7}}$	B7	S3
A3	$\overline{\text{D9}}$	B8	S5
A9	$\overline{\text{D11}}$	B9	S7
A10	$\overline{\text{ENTER}}$	B10	S9
A11	$\overline{\text{D0}}$	B11	S11
A12	$\overline{\text{RESET}}$	B12	N.C.
A13	$\overline{\text{RUN}}$	B13	N.C.
A14	$\overline{\text{LAMP TEST}}$	B14	N.C.
A15	$\overline{\text{CABLE SELECT}}$	B15	N.C.
A16	N.C.	B16	N.C.
A17	$\overline{\text{G FAULT}}$	B17	$\overline{\text{TEST HI VOLTAGE LEAK}}$
A18	$\overline{\text{LAMP TEST}}$	B18	DISPLAY LEAK
A19	$\overline{\text{SET LEAK}}$	B19	DISPLAY OHMS
A20	N.C.	B20	$\overline{\text{OPEN FAULT}}$
A21	+5 VOLTS	B21	$\overline{\text{OPEN WIRE}}$
A22	$\overline{\text{D0}}$	B22	$\overline{\text{HI Z FAULT}}$
A23	$\overline{\text{D2}}$	B23	$\overline{\text{ERROR}}$
A24	$\overline{\text{D4}}$	B24	S0
A25	$\overline{\text{D6}}$	B25	S2

CONTINUED CONTINUED

FRONT PANEL INTERFACE CARD P12115212

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A26	$\overline{D3}$	B26	S4
A27	$\overline{D10}$	B27	S6
A28	$\overline{X1\ SECOND}$	B28	S8
A29	D01	B29	S10
A30	$\overline{LEAK\ FAULT}$	B30	N.C.
A31	$\overline{MEMORY\ PROGRAM}$	B31	N.C.
A32	$\overline{SS0}$	B32	N.C.
A33	$\overline{SET\ START\ POSITION}$	B33	N.C.
A34	$\overline{FAULT}$	B34	N.C.
A35	$\overline{SET\ TEST\ VOLTS}$	B35	$\overline{TEST\ CONTINUITY}$
A36	$\overline{HOLD}$	B36	$\overline{READ}$
A37	$\overline{SET\ OHMS}$	B37	DISPLAY VOLTS

FRONT PANEL INTERFACE CARD P12115212

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
J1/1.	+12 VOLTS		
2.	+12 VOLTS		
3.	GND		
4.	GND		
5.	+5 VOLTS		
6.	+5 VOLTS		
7.	GND		
8.	GND		
9.	+5 VOLTS		
10.	CROSSED WIRES		
11.	DS4		
12.	DS11		
13.	DS8		
14.	DS7		
15.	DS9		
16.	DS6		
17.	DS10		
18.	DS2		
19.	DS0		
20.	DS5		
21.	DS1		
22.	DS3		
23.	DISPLAY STROBE		
24.	SHORT		
25.	(LEAK DP)		

CONTINUED

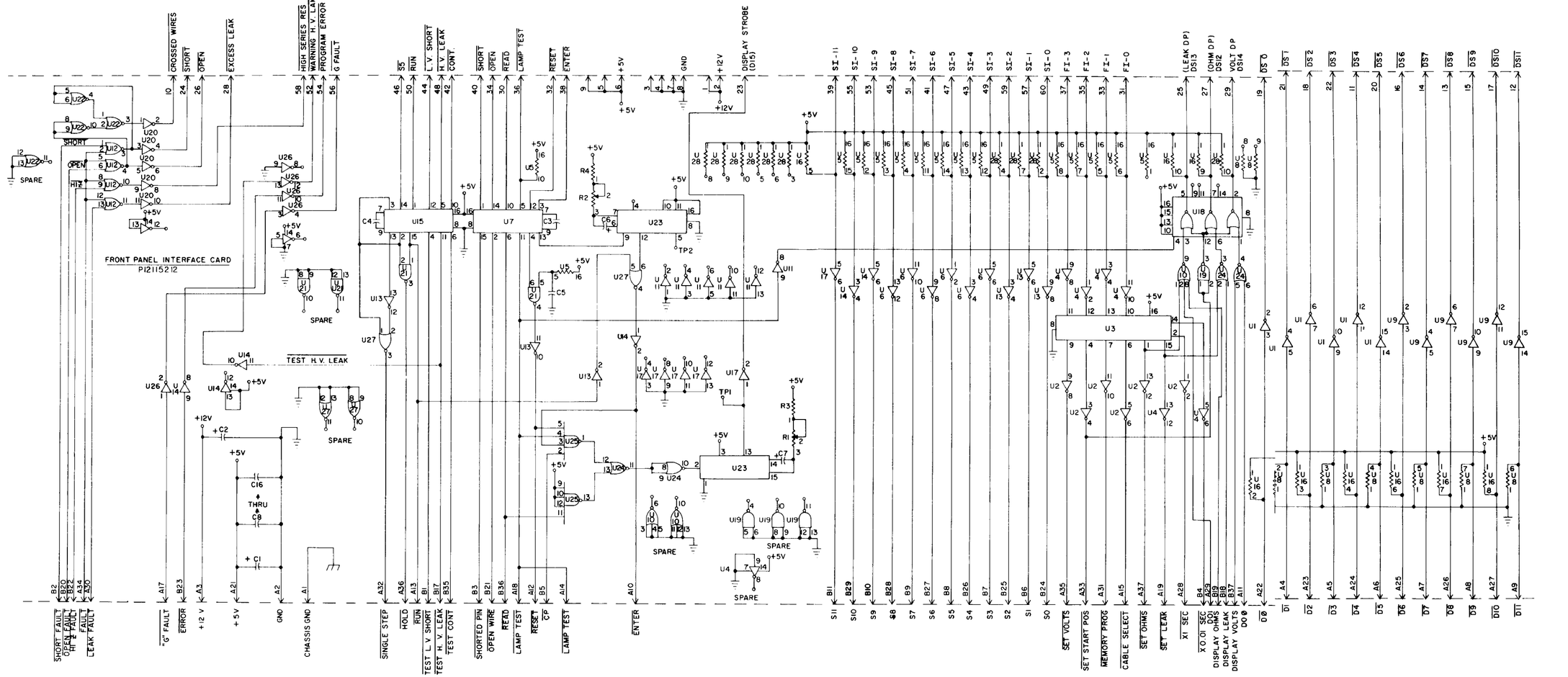
FRONT PANEL INTERFACE CARD P12115212

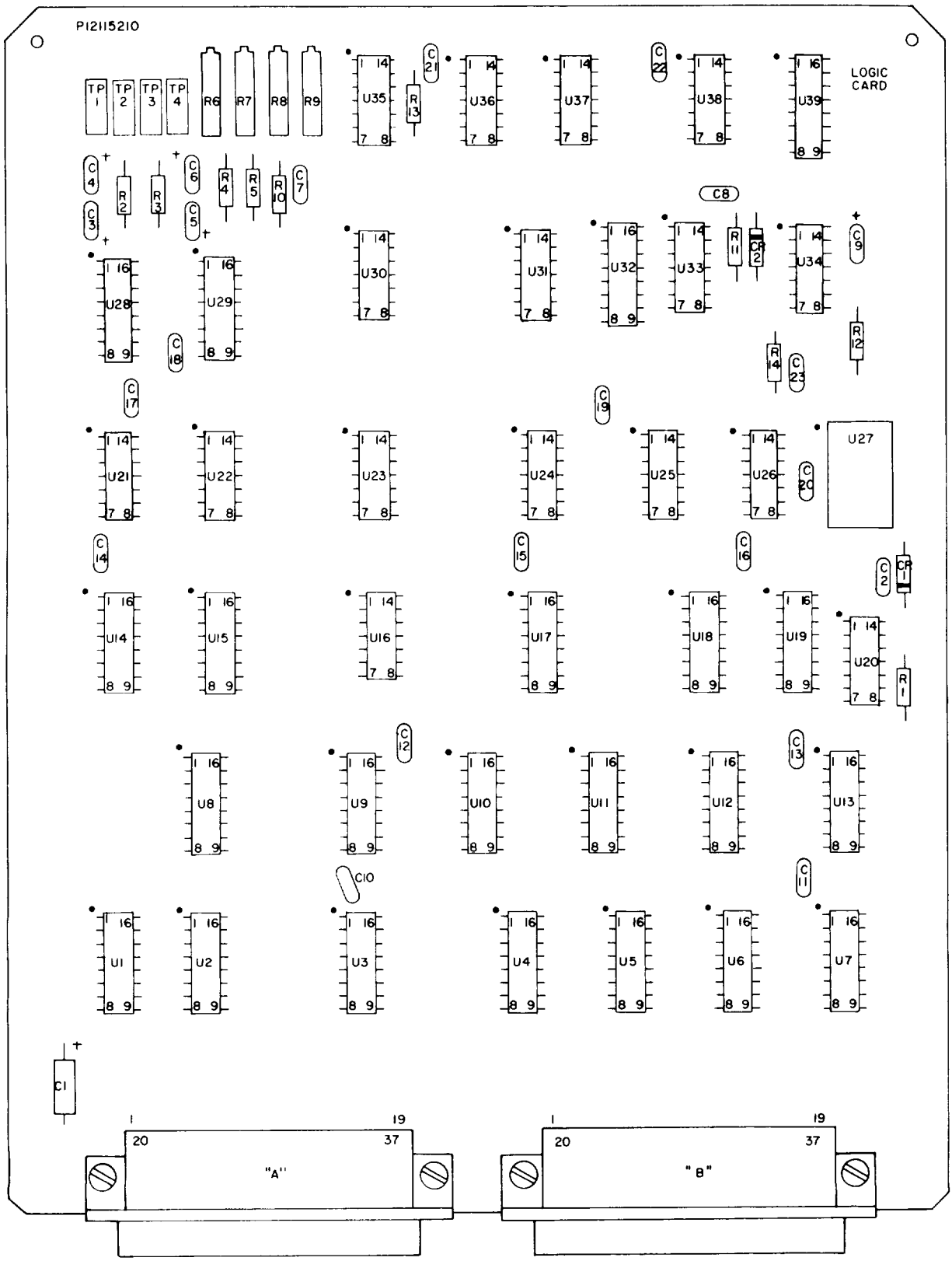
CONNECTOR	FUNCTI0N	CONNECTOR	FUNCTION
J1/26.	OPEN		
27.	(OHMS DP)		
28.	EXCESS LEAKAGE		
29.	(VOLT DP)		
30.	READ		
31.	F10		
32.	REST		
33.	FI1		
34.	OPEN		
35.	FI2		
36.	LAMP TEST		
37.	FI3		
38.	ENTER		
39.	SI11		
40.	SHORT		
41.	SI6		
42.	CONTINUITY		
43.	SI4		
44.	LOW VOLTAGE SHORT		
45.	SI8		
46.	SINGLE STEP		
47.	SI5		
48.	HI VOLTAGE LEAK		
49.	SI3		
50.	RUN		

CONTINUED

FRONT PANEL INTERFACE CARD P12115212

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
J1/51.	S17		
52.	WARNING HI VOLTAGE LAMP		
53.	S19		
54.	PROGRAM ERROR		
55.	SI10		
56.	G FAULT		
57.	SI1		
58.	HI SERIES RESISTANCE		
59.	SI2		
60.	SI0		


FRONT PANEL INTERFACE CARD
P12115212
SHORT FAULT
OPEN FAULT
HI Z FAULT
LEAK FAULT
"G" FAULT
ERROR
+12 V
+5V
GND
CHASSIS GND
SINGLE STEP
HOLD
RUN
TEST L.V. SHORT
TEST H.V. LEAK
TEST CONT
SHORTED PIN
OPEN WIRE
READ
LAMP TEST
RESET
CP
LAMP TEST
ENTER
DISPLAY STROBE (DS15)
SET VOLTS
SET START POS
MEMORY PROG
CABLE SELECT
SET OHMS
SET LEAK
X1 SEC
X10 OR SEC DP
DISPLAY OHMS
DISPLAY LEAK
DISPLAY VOLTS
(LEAK DP) DS13
(OHM DP) DS12
VOLT DP DS14
TEST H.V. LEAK
SPARE
TP1
TP2


P12115210
LOGIC CARD
TP 1
TP 2
TP 3
TP 4
R6
R7
R8
R9
U35
U36
U37
U38
U39
C21
C22
R13
C4
C3
R2
R3
C6
C5
R4
R5
R10
C7
C8
U28
U29
U30
U31
U32
U33
U34
R11
C22
C9
R12
R14
C23
C18
C17
C19
U21
U22
U23
U24
U25
U26
U27
C20
C14
C15
C16
C2
CR1
U14
U15
U16
U17
U18
U19
U20
R1
C12
C13
U8
U9
U10
U11
U12
U13
C10
C11
U1
U2
U3
U4
U5
U6
U7
C1
1
19
20
37
"A"
"B"

Board # 1 LOGIC CARD P1211521O

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2012	61637	T31OB106K020AS
C2	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C3	Cap. .33uf, 20V, ±10%	2003	61637	196D334X9035HA1
C4	Cap. 1uf, 20V, ±10%	2016	61637	T362A105K020AS
C5	Cap. 10uf, 20V, ±10%	2018	61637	T362B106K020AS
C6	Cap. 2.2uf, 20V, ±10%	2017	61637	T362A225K020AS
C7	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C8	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C9	Cap. .1uf, 35V, ±10%	2008	61637	C323C104K5R5CA
C10	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C11	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C12	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C13	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C14	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C15	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C16	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C17	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C18	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C19	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C20	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C21	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C22	Cap. .01uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C23	Cap. 47pf, 200V, ±10%	2004	61637	C323C470K2G5CA

Board # 1 LOGIC CARD P1211521O

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
CR1	Diode	7001	04713	1N914
CR2	Diode	7001	04713	1N914
J1	Conn. 37 Pin, Male Plug	4004	7G413	H2M37RA28A
J1B	Conn. 37 Pin, Male Plug	4004	7G413	H2M37RA28A
R1	Res. 100K, l/4W, ±5%	1047	01121	RCO7G1O4J
R2	Res. 2K, 1/4W, ±5%	1021	01121	RC07G202J
R3	Res. 2K, 1/4W, ±5%	1021	01121	RC07G202J
R4	Res. 2K, 1/4W, ±5%	1021	01121	RC07G202J
R5	Res. 2K, 1/4W, ±5%	1021	01121	RC07G202J
R6	Pot. 10K	6064	32997	3006P-1-103
R7	Pot. 10K	6064	32997	3006P-1-103
R8	Pot. 10K	6064	32997	3006P-1-103
R9	Pot. 10K	6064	32997	3006P-1-103
R1O	Res. 1K, 1/4W, ±5%	1063	01121	RC07G102J
R11	Res. 10K, 1/4W, ±5%	3031	01121	RC07G1O3J
R12	Res. 100K, 1/4W, ±5%	1047	01121	RCO7G1O4J
R13	Res, 10K, 1/4W, ±5%	1031	01121	RCO7G103J
R14	Res. 10K, 1/4W, ±5%	1031	01121	RC07G103J
TP1	P.C. Test Point, Black	MIS1001	83330	# 430
TP2	P.C. Test Point, Black	MIS1001	83330	# 430
TP3	P.C. Test Point, Black	MIS1OO1	83330	# 430
TP4	P.C. Test Point, Black	MIS1OO1	83330	# 430

Board #1 LOGIC CARD P12115210

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U1	Strobed Hex Inverter Buffer	6027	04713	MC14502BCP
U2	Strobed Hex Inverter Buffer	6027	04713	MC14502BCP
U3	Programmable BCD Divider By-N-Counter	6031	04713	MC14522BCP
U4	Programmable BCD Divider By-N-Counter	6031	04713	MC14522BCP
U5	Programmable BCD Divider By-N-Counter	6031	04713	MC14522BCP
U6	Hex Buffer Noninverter	6012	04713	MC14050BCP
U7	Hex Buffer Noninverter	6012	04713	MC14050BCP
U8	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U9	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U10	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U11	Hex D Flip Flop	6022	04713	MC14174BCP
U12	Hex D Flip Flop	6022	04713	MC14174BCP
U13	12-Bit Binary Counter	6010	04713	MC14040BCP
U14	Dual BCD Up Counter	6030	04713	MC14518BCP
U15	Dual BCD Up Counter	6030	04713	MC14518BCP
U16	8-Input "NAND" Gate	6016	04713	MC14068BCP
U17	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U18	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U19	4-Bit Magnitude Comparator	6034	04713	MC14585BCP
U20	Quad 2-Input "NAND" Schmitt Trigger	6020	04713	MC14093BCP

Board #1 LOGIC CARD P1211521O

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
U21	Dual D Flip Flop	6005	04713	MC14013BCP
U22	Hex Schmitt Trigger	6033	04713	MC14584BCP
U23	8-Input "NAND" Gate	6016	04713	MC14068BCP
U24	Triple 3-Input "NAND" Gate	6007	04713	MC14023BCP
U25	Quad 2-Input "NAND" Schmitt Trigger	6020	04713	MC14093BCP
U26	Quad 2-Input "NAND" Gate	6003	04713	MC14011BCP
U27	Crystal Clock Oscillator	MIS1901	04713	K115A 2.5MEG Hz
U28	Dual Monostable Multivibrator	6041	12040	SN74C221N-10
U29	Dual Monostable Multivibrator	6041	12040	SN74C221N-10
U30	Hex Schmitt Trigger	6033	04713	MC14584BCP
U31	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U32	Dual BCD Up Counter	6030	04713	MC14518BCP
U33	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U34	Hex Schmitt Trigger	6033	04713	MC14584BCP
U35	Quad 2-Input "NAND" Schmitt Trigger	6020	04713	MC14093BCP
U36	Quad 2-Input "NAND" Gate	6003	04713	MC14011BCP
U37	Quad 2-Input "NAND" Gate	6003	04713	MC14011BCP
U38	8-Input "NAND" Gate	6016	04713	MC14068BCP
U39	12-Bit Binary Counter	6010	04713	MC14040BCP
N/A	Printed Circuit Card	P1211521O-2	64217	P1211521O-2

Board # 1 LOGIC CARD P1211521O

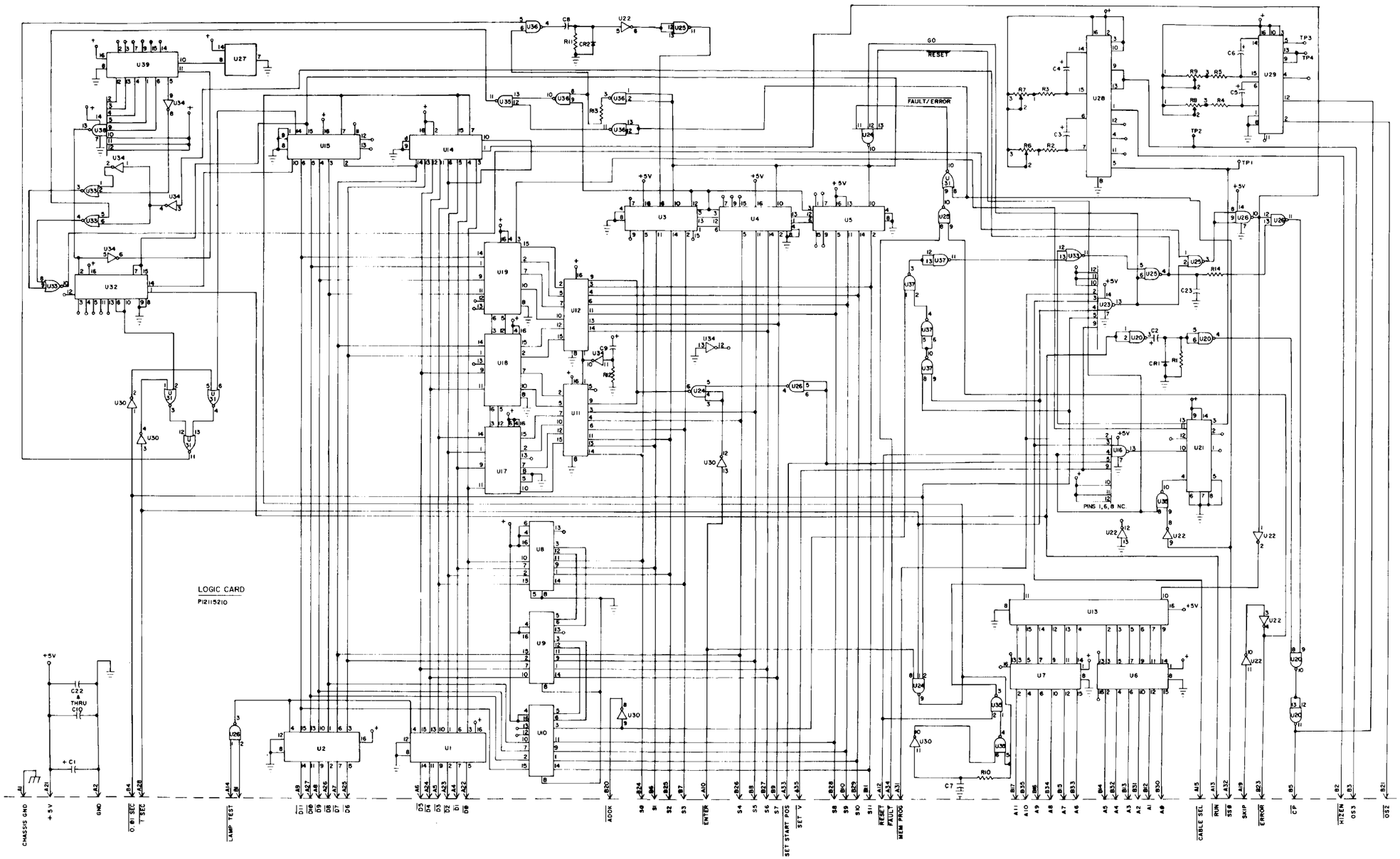
ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
N/A	Screw 4-40X .250 (4 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (4 Reqd.)	MS35649-44	N/A	MS35649-44
N/A	Conformal Coating	MIS1005	21223	# 65-16

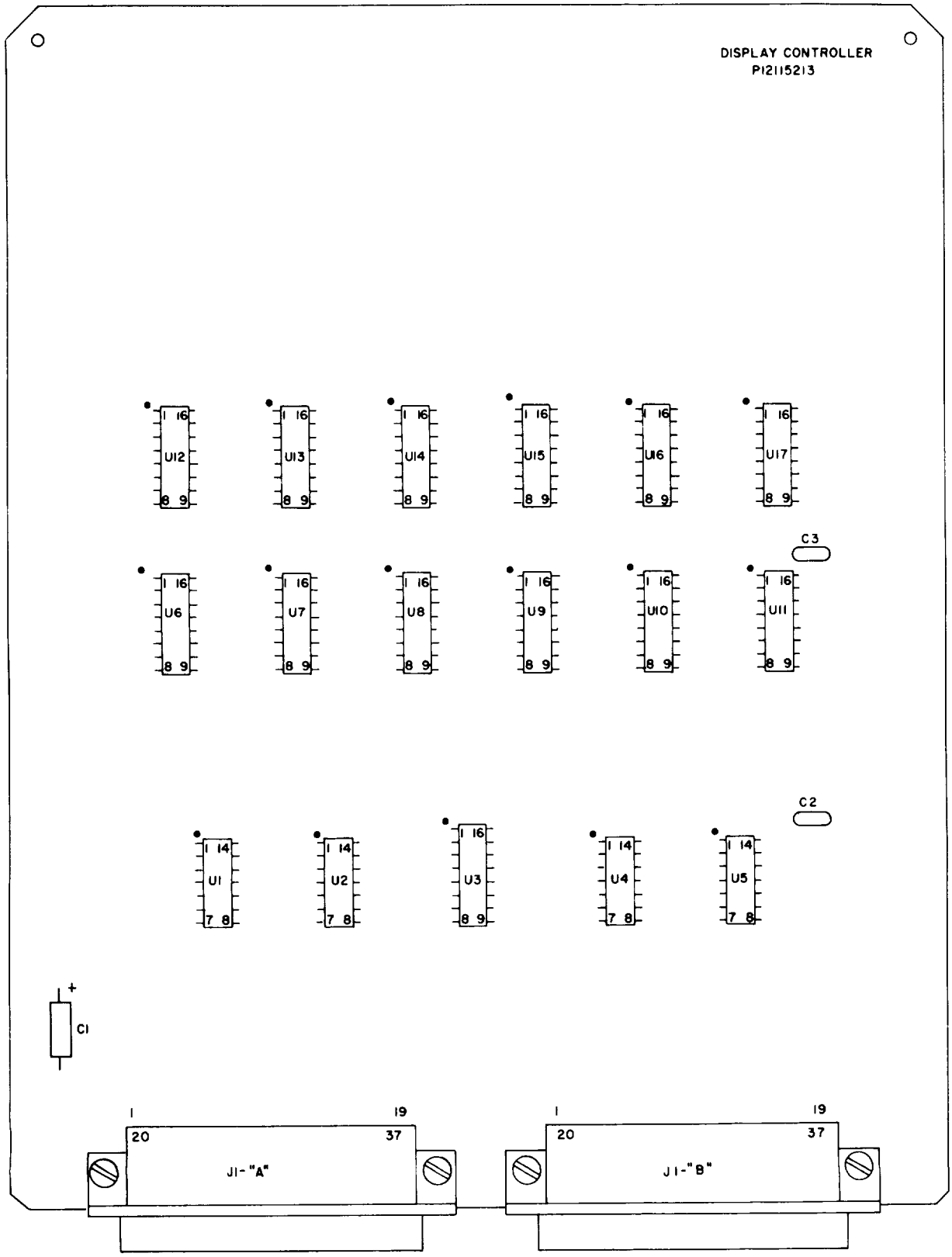
LOGIC P12115210

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	CHASSIS GND	B1	$\overline{\text{DISPLAY}}$
A2	GND	B2	$\overline{\text{HI Z ENABLE}}$
A3	N.C.	B3	OS3
A4	$\overline{\text{D1}}$	B4	$\overline{\text{X0.01 SECOND}}$
A5	$\overline{\text{D3}}$	B5	$\overline{\text{CP (CLOCK PULSE)}}$
A6	$\overline{\text{D5}}$	B6	S1
A7	$\overline{\text{D7}}$	B7	S3
A8	$\overline{\text{D9}}$	B8	S5
A9	$\overline{\text{D11}}$	B9	S7
A10	$\overline{\text{ENTER}}$	B10	S9
A11	N.C.	B11	S11
A12	$\overline{\text{RESET}}$	B12	A1
A13	$\overline{\text{RUN}}$	B13	A3
A14	$\overline{\text{LAMP TEST}}$	B14	A5
A15	$\overline{\text{CABLE SELECT}}$	B15	A7
A16	N.C.	B16	A9
A17	N.C.	B17	A11
A18	N.C.	B18	N.C.
A19	SKIP	B19	N.C.
A20	N.C.	B20	$\overline{\text{ADOK}}$
A21	+5 VOLTS	B21	$\overline{\text{OS2}}$
A22	$\overline{\text{D0}}$	B22	N.C.
A23	$\overline{\text{D2}}$	B23	$\overline{\text{ERROR}}$
A24	$\overline{\text{D4}}$	B24	S0
A25	$\overline{\text{D6}}$	B25	S2

LOGIC P12115210

CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A26	$\overline{D8}$	B26	S4
A27	$\overline{D10}$	B27	S6
A28	$\overline{X1\ SECOND}$	B28	S8
A29	N. C.	B29	Sl0
A30	N.C.	B30	AO
A31	$\overline{MEMORY\ PROGRAM}$	B31	AZ
A32	$\overline{SSO}$	B32	A4
A33	$\overline{START\ POSITION}$	B33	A6
A34	$\overline{FAULT}$	B34	A8
A35	$\overline{SET\ TEST\ VOLTS}$	B35	AlO
A36	N.C.	B36	N.C.
A37	N.C.	B37	N.C.


LOGIC CARD
PI211521O
GO
RESET
FAULT/ERROR
+5V
PINS 1, 6, 8 NC.
CHASSIS GND
+5V
GND
LAMP TEST
AOOK
ENTER
SET START POS
SET V
RESET FAULT
MEM PROG
CABLE SEL
RUN
SSB
SHIP
ERROR
CP
HIZEN
OS3
OS2


DISPLAY CONTROLLER
P12115213
U12
U13
U14
U15
U16
U17
C3
U6
U7
U8
U9
U10
U11
C2
U1
U2
U3
U4
U5
C1
J1-"A"
J1-"B"

Board #5 DISPLAY Controller P12115213

ITEM #	DESCRIPTION	PDC STK#	FSCM	MFG-P/N
C1	Cap. 10uf, 20V, ±10%	2014	61637	T31OB1O6KO2OAS
C2	Cap. .O1uf, 200V, ±10%	2007	61637	C323C103K2R5CA
C3	Cap. .O1uf, 200V, ±10%	2007	61637	C323C103K2R5CA
J1A & J1B	Conn. 37 Pin, Plug	4004	7G413	H2M37RA28A
U1	Hex Schmitt Trigger	6033	04713	MC14584BCP
U2	Triple 3-Input "NOR" Gate	6008	04713	MC14025BCP
U3	Decade Counter/Divider	6006	04713	MC14017BCP
U4	Quad 2-Input "OR" Gate	6018	04713	MC4071BCP
U5	Quad 2-Input "NOR" Gate	6001	04713	MC14001BCP
U6	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U7	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U8	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U9	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U10	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U11	Strobe Hex Inverter/Buffer	6027	04713	MC14502BCP
U12	Hex D Flip Flop	6022	04713	MC14174BCP
U13	Hex D Flip Flop	6022	04713	MC14174BCP
U14	Hex D Flip Flop	6022	04713	MC14174BCP
U15	Hex D Flip Flop	6022	04713	MC14174BCP
U16	Hex D Flip Flop	6022	04713	MC14174BCP
U17	Hex D Flip Flop	6022	04713	MC14174BCP

Board # 5 DISPLAY CONTROLLER P12115213

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
N/A	Display Controller Module	P12115213-3	64217	P12115213-3
N/A	Screw 4-40 X .250 (4 Reqd.)	MS51957-13	N/A	MS51957-13
N/A	Nut 4-40 (4 Reqd.)	MS51957-44	N/A	MS35649-44
N/A	Conformal Coating	MIS1005	21223	#65-16

DISPLAY CONTROLLER P12115213

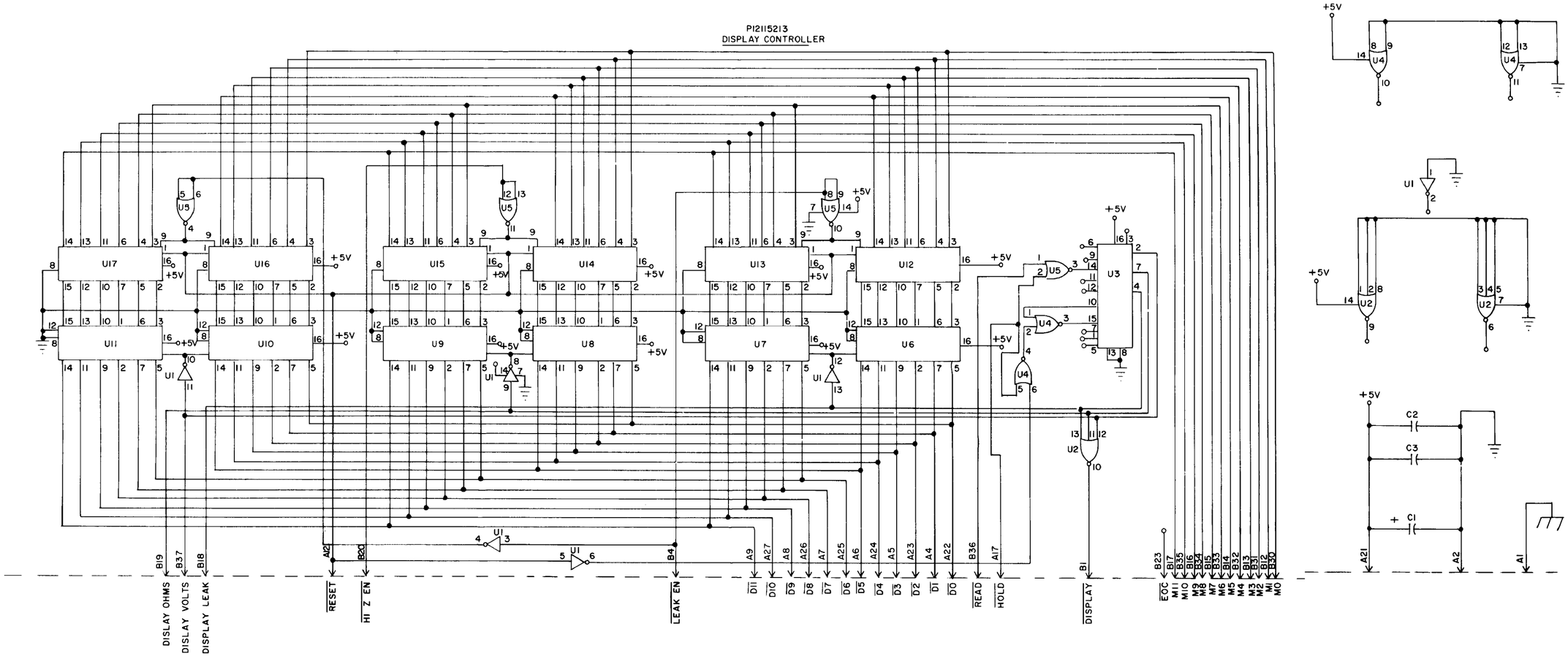
CONNECTOR	FUNCTION	CONNECTOR	FUNCTION
A1	CHASSIS GND	B1	$\overline{\text{DISPLAY}}$
A2	GND	B2	N.C.
A3	N.C.	B3	N.C.
A4	$\overline{\text{D 1}}$	B4	LEAK ENABLE
A5	$\overline{\text{D3}}$	B5	N.C.
A6	D 5	B6	N.C.
A7	$\overline{\text{D7}}$	B7	N.C.
A8	$\overline{\text{D 9}}$	B8	N.C.
A9	$\overline{\text{D 1 1}}$	B9	N.C.
A10	N.C.	B10	N.C.
A11	N.C.	B11	N.C.
A12	$\overline{\text{RESET}}$	B12	M1
A13	N.C.	B13	M3
A14	N.C.	B14	M5
A15	N.C.	B15	M7
A16	N.C.	B16	M9
A17	HOLD	B17	M11
A18	N.C.	B18	DISPLAY 12 SHORT
A19	N.C.	B19	DISPLAY OHMS
A20	N.C.	B20	HI Z ENABLE
A21	+5 VOLTS	B21	N.C.
A22	$\overline{\text{DØ}}$	B22	N.C.
A23	$\overline{\text{D2}}$	B23	$\overline{\text{EOC}}$
A24	$\overline{\text{D4}}$	B24	N.C.
A25	$\overline{\text{D6}}$	B25	N.C.

CONTINUED

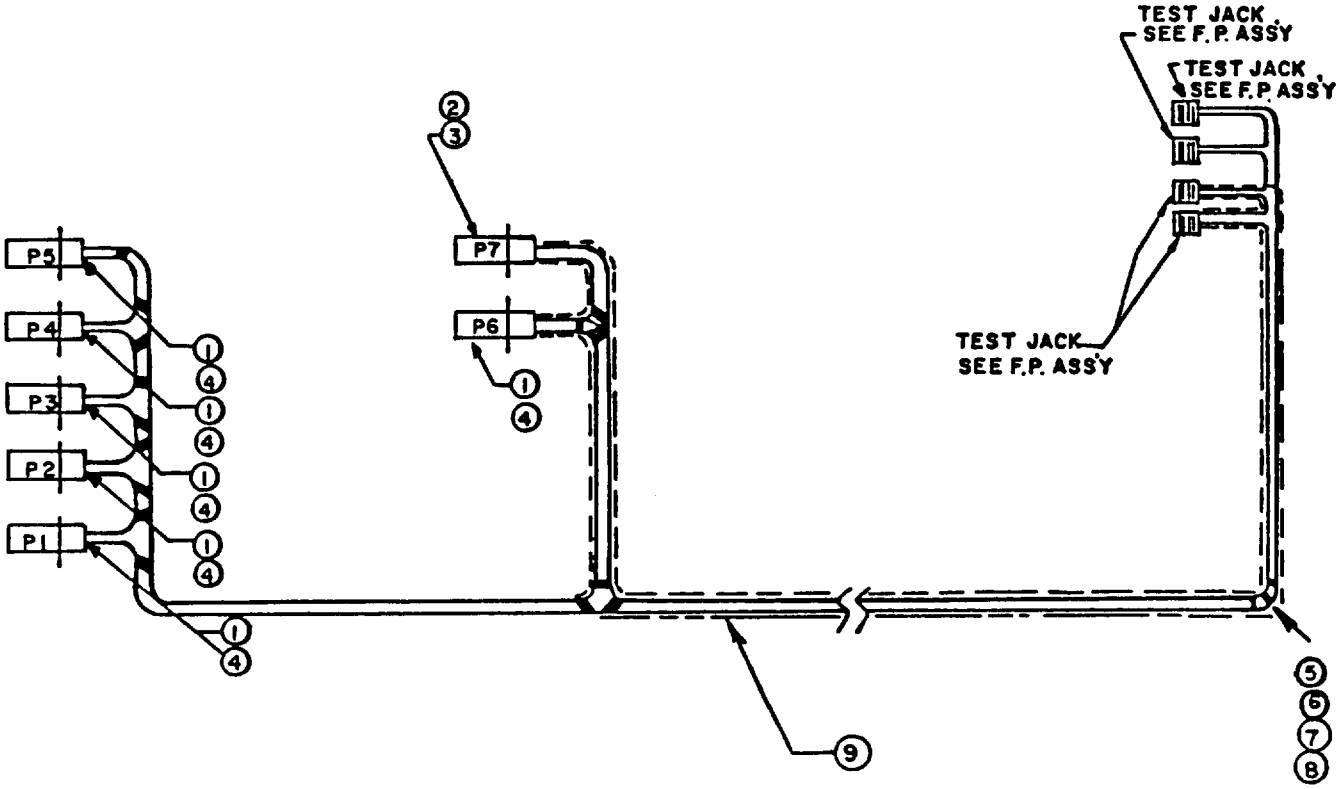
CONTINUED

DISPLAY CONTROLLER P12115213

CONNECTOR	FUNCTION	CONTROLLER	FUNCTION
A26	$\overline{D8}$	B26	N.C.
A27	D10	B27	N.C.
A28	N.C.	B28	N.C.
A29	N.C.	B29	N.C.
A30	N.C.	B30	MO
A31	N.C.	B31	K2
A32	N C.	B32	M4
A33	N.C.	B33	M6
A34	N.C,.	B34	M8
A35	N.C .	B35	M10
A36	N.C.	B36	READ
A37	N.C.	B37	DISPLAY VOLTS

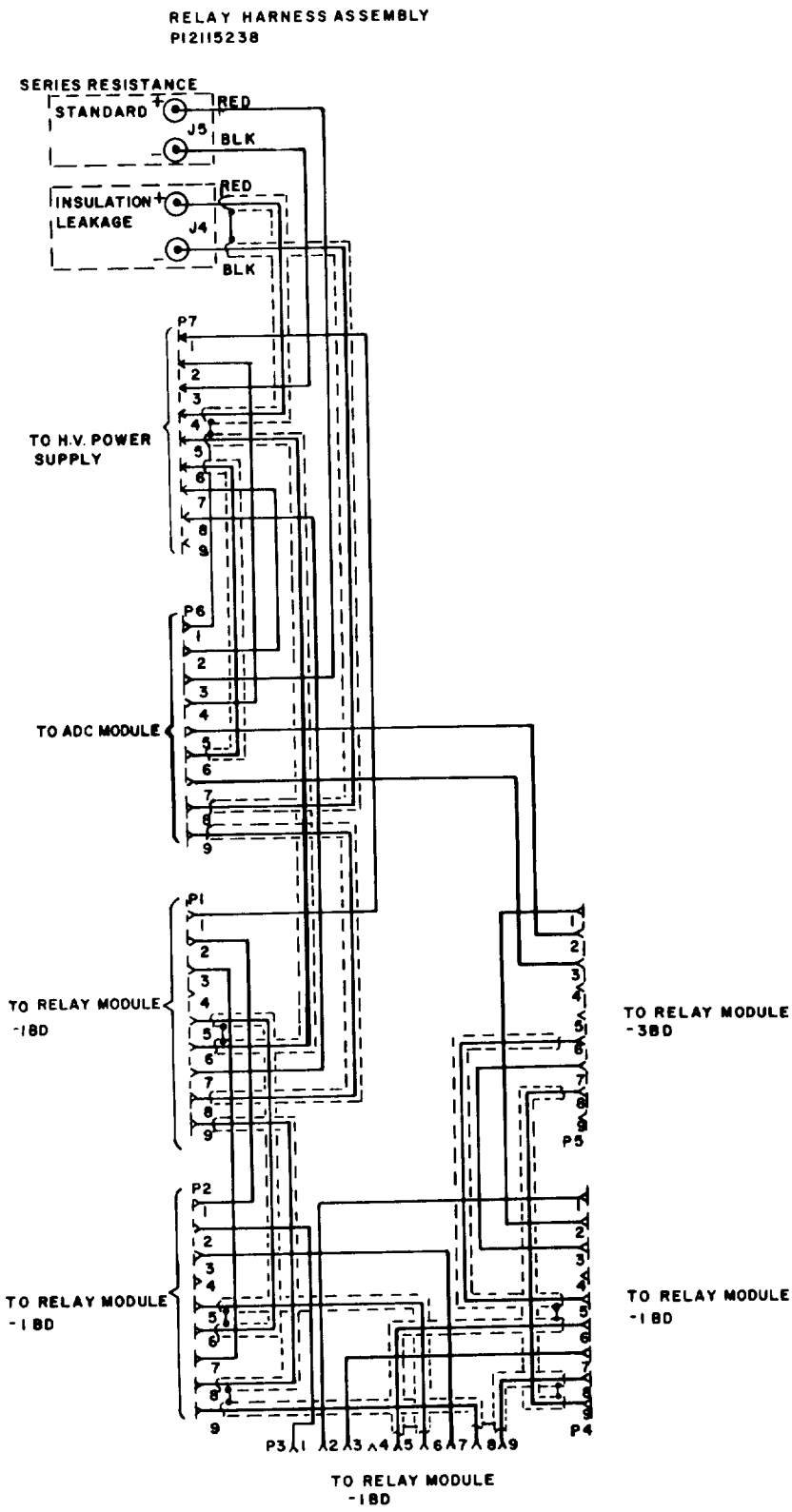

P12115213
DISPLAY CONTROLLER
U17
U16
U15
U14
U13
U12
U11
U10
U9
U8
U7
U6
U1
U2
U3
U4
U5
+5V
C1
C2
C3
DISLAY OHMS
DISLAY VOLTS
DISPLAY LEAK
RESET
HI Z EN
LEAK EN
READ
HOLD
DISPLAY
EOC

RELAY HARNESS ASSEMBLY
P12115238



ASSEMBLY RELAY HARNESS P12115238

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
1	Receptacle (6 Reqd.)	4036	04618	205203-1
2	Plug (1 Reqd.)	4037	04618	205204-1
3	Pins (36 Reqd.)	4038	04618	1-66506-0
4	Socket (36 Reqd.)	4035	04618	1-66504-0
5	Wire #22 AWG/EE MIL-W-16878	4034	4G874	2875
6	Lacing Tape	4021	4G874	LC-136
7	Shielded Wire	4104	4G874	1471
8	Flexible Protective Sheath (Qty.-A/R)	4103	06383	T-38N
9	Braid Shielding	4105	4G874	#2164


RELAY HARNESS ASSEMBLY
P12115238
SERIES RESISTANCE
STANDARD
INSULATION LEAKAGE
J5
J4
RED
BLK
RED
BLK
P7
TO H.V. POWER SUPPLY
P6
TO ADC MODULE
P1
TO RELAY MODULE -18D
P2
TO RELAY MODULE -18D
TO RELAY MODULE -38D
P5
TO RELAY MODULE -18D
P4
P3
TO RELAY MODULE -18D

RELAY HARNESS ASSEMBLY P12115238

RUNNING LIST

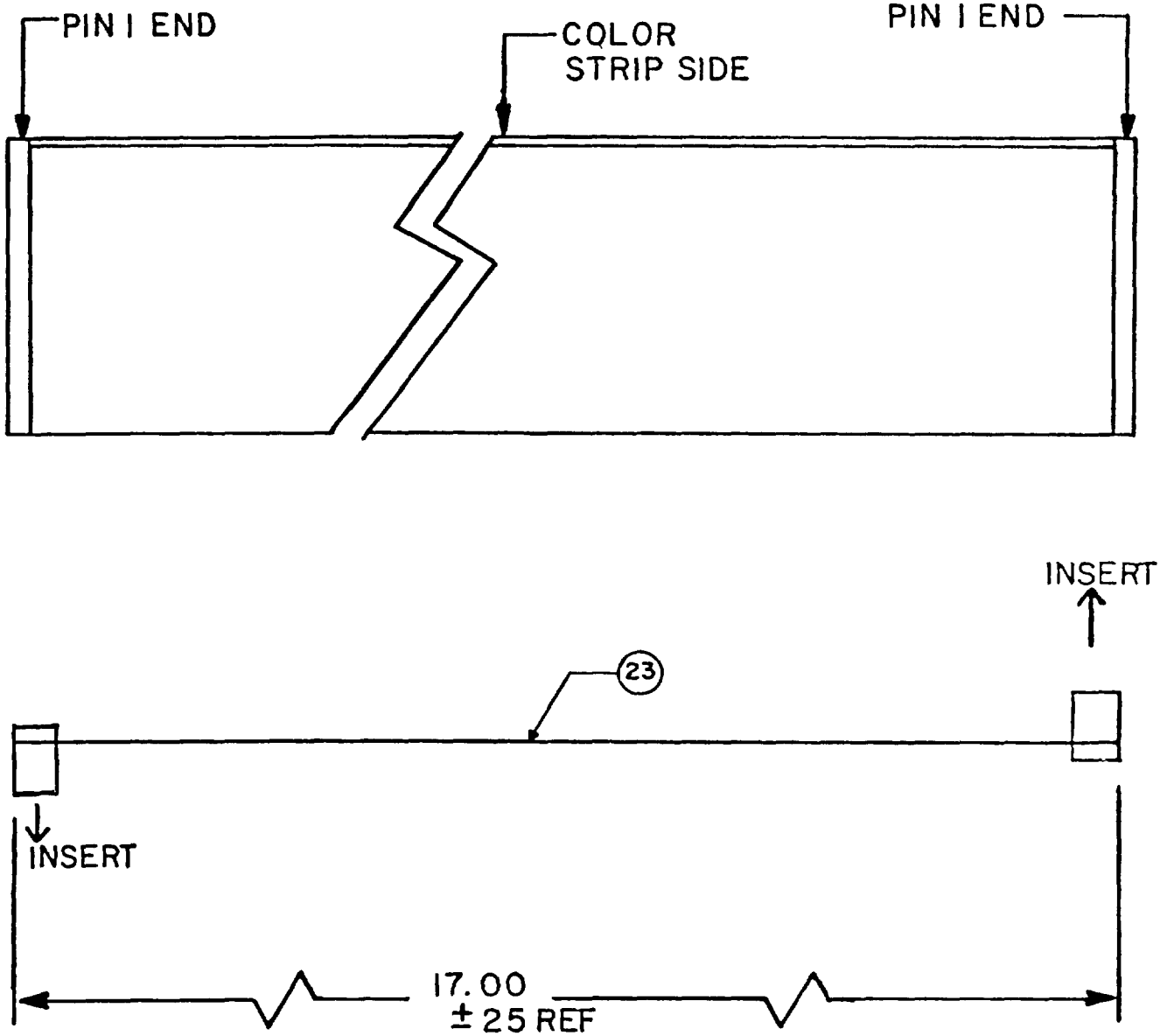
P1-1	TO	P7-1
P1-2		P2-1
P1-3		P2-7
P1-5		P2-6 Shielded Cover
P1-6		P7-5 " "
P1-7		P7-8
P1-8		P6-9 Shielded Cover
P1-9		P2-8 " "
P2-1		P1-2
P2-2		P3-1
P2-3		P3-7
P2-5		P3-6 Shielded Cover
P2-6		P1-5
P2-7		P1-3
P2-8		P1-9
P2-9		P3-8
P3-1		P2-2
P3-2		P4-1
P3-3		P4-7
P3-5		P4-6
P3-6		P2-5
P3-7		P2-3
P3-8		P2-9
P3-9		P4-8
P4-1		P3-2
P4-2		P5-1
P4-3		P5-7
P4-5		P5-6
P4-6		P3-5
P4-7		P3-3
P4-8		P3-9
P4-9		P5-8

Continued

P12115238

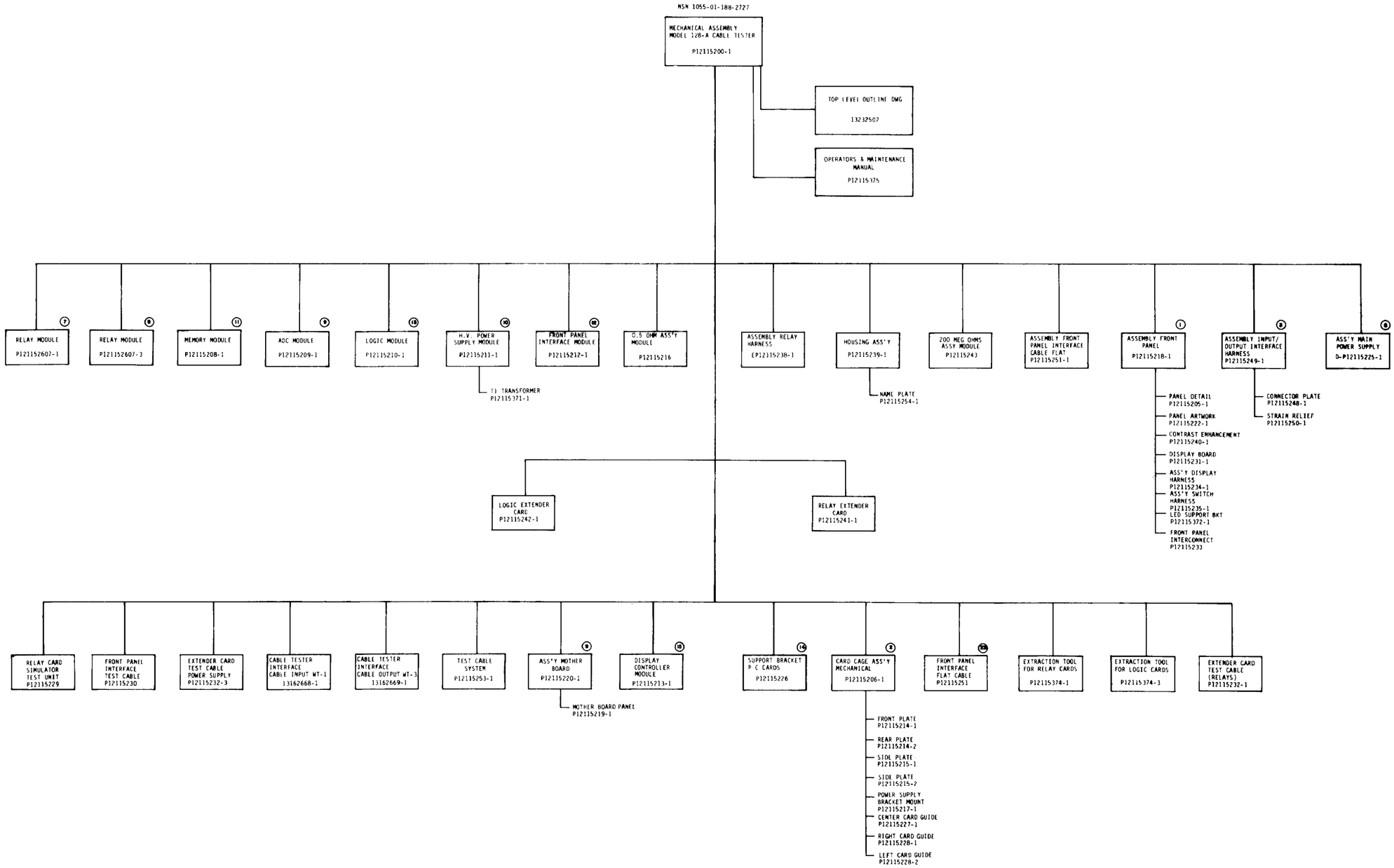
P5-1		P4-2
P5-2		P6-5
P5-3		P6-7
P5-6		P4-5
P5-7		P4-3
P5-8		P4-9
P6 - 1		P7 Shielded Cover Termination
P6-2		P7-7
P6-3		J5 RED (+)
P6-4		P7-2
P6-5		P5-2
P6-6		P7-6
P6-7		P5-3
P6-8		J4 BLACK (-)
P6-9		P1-8
P7-1		P1-1
P7-2		P6-4
P7-3		J5 BLACK (-)
P7-4		J4 RED (+)
P7-5		P1-6
P7-6		P6-6
P7-7		P6-2
P7-8	TO	P1-7

FRONT PANEL INTERFACE
FLAT CABLE
P12115251



Assembly FRONT PANEL INTERFACE FLAT CABLE P/N P12115251

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Connector 60 PIN	4006	76381	3334
2	Connector 60 PIN	4006	76381	3334
3	Flat Cable	4013	06865	171-60-28GA


NSN 1055-01-188-2727
MECHANICAL ASSEMBLY MODEL 128-A CABLE TESTER P12115200-1
TOP LEVEL OUTLINE DWG 13232507
OPERATORS & MAINTENANCE MANUAL P12115375
RELAY MODULE P121152607-1
RELAY MODULE P121152607-3
MEMORY MODULE P12115208-1
ADC MODULE P12115209-1
LOGIC MODULE P12115210-1
H.V. POWER SUPPLY MODULE P12115211-1
T1 TRANSFORMER P12115371-1
FRONT PANEL INTERFACE MODULE P12115212-1
0.5 OHM ASS'Y MODULE P12115216
ASSEMBLY RELAY HARNESS EP12115238-1
HOUSING ASS'Y P12115239-1
NAME PLATE P12115254-1
200 MEG OHMS ASSY MODULE P12115243
ASSEMBLY FRONT PANEL INTERFACE CABLE FLAT P12115251-1
ASSEMBLY FRONT PANEL P12115218-1
PANEL DETAIL P12115205-1
PANEL ARTWORK P12115222-1
CONTRAST ENHANCEMENT P12115240-1
DISPLAY BOARD P12115231-1
ASS'Y DISPLAY HARNESS P12115234-1
ASS'Y SWITCH HARNESS P12115235-1
LED SUPPORT BKT P12115372-1
FRONT PANEL INTERCONNECT P12115233
ASSEMBLY INPUT/ OUTPUT INTERFACE HARNESS P12115249-1
CONNECTOR PLATE P12115248-1
STRAIN RELIEF P12115250-1
ASS'Y MAIN POWER SUPPLY D-P12115225-1
LOGIC EXTENDER CARD P12115242-1
RELAY EXTENDER CARD P12115241-1
RELAY CARD SIMULATOR TEST UNIT P12115229
FRONT PANEL INTERFACE TEST CABLE P12115230
EXTENDER CARD TEST CABLE POWER SUPPLY P12115232-3
CABLE TESTER INTERFACE CABLE INPUT WT-1 13162668-1
CABLE TESTER INTERFACE CABLE OUTPUT WT-3 13162669-1
TEST CABLE SYSTEM P12115253-1
ASS'Y MOTHER BOARD P12115220-1
MOTHER BOARD PANEL P12115219-1
DISPLAY CONTROLLER MODULE P12115213-1
SUPPORT BRACKET P C CARDS P12115226
CARD CAGE ASS'Y MECHANICAL P12115206-1
FRONT PLATE P12115214-1
REAR PLATE P12115214-2
SIDE PLATE P12115215-1
SIDE PLATE P12115215-2
POWER SUPPLY BRACKET MOUNT P12115217-1
CENTER CARD GUIDE P12115227-1
RIGHT CARD GUIDE P12115228-1
LEFT CARD GUIDE P12115228-2
FRONT PANEL INTERFACE FLAT CABLE P12115251
EXTRACTION TOOL FOR RELAY CARDS P12115374-1
EXTRACTION TOOL FOR LOGIC CARDS P12115374-3
EXTENDER CARD TEST CABLE (RELAYS) P12115232-1

RECOMMENDED SPARE PART KITS PDC MODEL 128-A CABLE TESTER

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Relay Module	P121152607-1	64217	P121152607-1
2	Relay Module	P121152607-3	64217	P121152607-3
3	Logic Circuit Card	P12115210	64217	P12115210
4	FPI Circuit Card	P12115212	64217	P12115212
5	Fault Ref Memory Circuit Card	P12115208	64217	P12115208
6	ADC Circuit Card	P12115209	64217	P12115209
7	Display Circuit Card	P12115213	64217	P12115213
8	Front Panel Circuit Card	P12115231	64217	P12115231
9	Power Supply	P12115211	64217	P12115211
10	Ckt Breaker APF	4017	2N432	100 CET
11	Switch	4042	96170	T06-121
12	Switch	4040	96170	T06-127
13	Switch	4041	96170	T06-131
14	AC Power Cord	4048	70903	17608
15	LED Display	4027	3G533	AML45RKA2RR
16	Display Lens	4028	3G533	AML59RK1OR
17	Calibrated/Resistor Jack 0.50 OHMS	P12115374	64217	P12115374
18	Calibrated/Resistor Jack 100 Meg OHMS	P12115243	64217	P12115243
19	Extender Board (Relay)	P12115241-1	64217	P12115241-1
20	Extender Board (Logic)	P12115242-1	64217	P12115242-1
21	Test Cable	P12115253-1	64217	P12115253-1

SECTION 7

GENERAL INFORMATION

THIS SECTION OF THE MANUAL CONTAINS GENERALIZED USER INFORMATION AS WELL AS SUPPLEMENTAL INFORMATION TO THE LIST OF REPLACEABLE PARTS CONTAINED IN SECTION THE FOLLOWING INFORMATION IS PRESENTED IN THIS SECTION:

1. LIST OF ABBREVIATIONS
2. FEDERAL SUPPLY CODES FOR MANUFACTURES
3. STATIC PRECAUTIONS
4. DATA SHEETS FOR PART IDENTIFICATION
5. SPECIAL TEST HARDWARE AND TOOLING
   - A. Test Cable System
   - B. 200 Megohm Module
   - C. 0.05 OHM Module
   - D. Relay Extender Card
   - E. Logic Extender Card
   - F. Extractor Tools

LIST OF ABBREVIATIONS AND SYMBOLS

A or amp	Ampere
assy	assembly
AWG	american wire gauge
BCD	binary coded decimal
cap	capacitor
CCw	counterclockwise
ckt	circuit
Cent	continue
Cw	clockwise
dc	direct current
ext	external
freq	frequency
FSN	federal stock number
gnd	ground
H	Henry
Hz	hertz
IC	Integrated circuit
LED	light-emitting diode
LSB	least significant bit
LSD	least significant digit
max	maxmium
mf	metal film
MSB	most significant bit.
MSD	most significant digit
MTBF	meantime between failures
MTTR	meantime to repair
mV	millivolt(s)
M	megohm(s)
N/Z	nor applicable
NC	normally closed
(-) or neg	negative
NO	normally open
P	pico (10-12)
para	paragraph
pcb	printed circuit board
pF	picofarad
pn	part number
(+)	positive
pos	positive
pot	potentiometer
p-p	peak-to-peak
ppm	parts per million
PROM	programmable read-only memory
s	second (time)
sec	second (time)
scope	oscilloscope
S/N	serial number
TP	test point
u or	micro (10-6)
uut	unit under test
v	voltage
var	variable
w	watt(s)
ww	wire wound
T	transformer
Q	transistor
n	ohm(s)
u	micro(10-6)

SOURCE, ADDRESS

AND

FSCM MANUFACTURE CODE

CODE #	MANUFACTURE & ADDRESS
4G874	Alpha Wire Corporation 711 Lidgerwood Ave. P.o. Box 711 Elizabeth, N.J 02707
01121	Allen Bradley Company 1201 South Second Street Milwaukee, WI 17105
04618	AMP Incorporated Eisenhower Blvd. Harrisburg, PA 17105
16428	Belden Corp., Electronics Div. P.O. Box 1331 Richmond, IN 42134
81851	Bentley-Harris Mfg. Co. 241 Welsh Pool Rd. Lionville, PENN 19353
32997	Bourns Inc. Resistive Components 1200 Columbia Ave. Riverside, CA 92507
71218	Bud Industries Inc. 4605 East 355th St. Willoughby, OH 44094
71468	ITT Cannon Electronics Division Division 1 Cannon Place Lake Success, N.Y. 11042
20829	Cornell Dubilier Elec. Division Federal Pacific Elec. Co. 1605 Rodney French Blvd. Newbedford, MA 02741
56845	Dale Electronics Inc. 2064 12th Ave. P.O. Box 609 Columbus, NE 68601
2N182	Duracell Products Inc. Berkshire Industrial Park Bethel, CT 06801

SOURCE, ADDRESS

AND

FSCM MANUFACTURE CODE

CODE #	MANUFACTURE & ADDRESS
96170	Eaton Controls Div. West Plains Plant 210 Allen St. 80X 170 West Plaints, MO 65775
97515	EECO Incorporated 1601 East Chestnut Ave. Sana Ana, CA 92701
7G278	Div. Emhart Ind. Inc. 225 Episcopal Rd. Berlin, CT 06037
52063	Exar Integrated Systems, Inc. 750 Palamor Ave. Sunnyvale, CA 94088
OD426	General Electric Co. Silicone Products Business Waterford, N.Y. 12188
1F221	Hallmark/Huntsville 4900 Bradford Dr. Huntsville, AL 35805
4R497	Harris Semiconductor P.O. Box 883 Melburn, FL 32901
2G336	Hewlett-Packard 3000 Hanover Street Palo Alto, CA 94304
02289	HI-G Company Inc. 101 Locust Street Hartford, CT 06114
7G413	Holmberg Electronics Corp. P.O. Box37 Inman, S.C. 29349
3G533	Honeywell Inc. Microswitch Div. 11 W. Spring Street Freeport, ILL 61032
21223	Injectorall Electronics Corp. 98-100 Glenn St. Glen Cove, N.Y. 11542

SOURCE, ADDRESS

AND

FSCM MANUFACTURE CODE

CODE #	MANUFACTURE & ADDRESS
06369	International Rectifier Semiconductor Div. 233 Kansas Street El Segundo, CA 90245
61637	Kemet Carbide Corporation Electronics Division P. O. Box 5928 Greenville, S.C. 29606
76381	3-M Electronics Division 3-M Center 225-IN-06 St. Paul, MN 55144
07699	Magnetic Core Corp. John Street N.W. P.O. Box 368 Newburg, N.Y. 12550
06540	MITE Corp. Elec. Hardware Div. 446 Blake St. New Haven, CONN 06515
04713	Motorola Semiconductor Products P.O. Box 209-12 Phoenix, AZ. 85036
12040	National Semiconductor Corp. 2900 Semiconductor Drive M/S 16250 Santa Clara, CA 95051
19396	Paktron Div. Illinois Tool Works 1205 McConville Road Lynchburg. VA 24502
06383	Panduit Corporation 17301 Ridgeland Ave. Tinley Park, ILL. 60477
52657	Panelgraphic Corp. 10 Henderson Dr. West Caldwell, N.J. 07006
64217	PDC, Inc. 104 Wholesale Ave. P.O. Box 3309 Huntsville, AL 35810

SOURCE, ADDRESS

AND

FSCM MANUFACTURE CODE

CODE #	MANUFACTURE & ADDRESS
2N432	Potter & Brumfield Div. AM Robey Street Franklin, KY 42134
54407	Power-One D.C. Power Supplies 740 Cane Pano Camarillo, CA 93010
06665	Precision Monolithics Inc 1500 Space Park Drive Santa Clara, CA 95050
5A332	S G S (Silicon General Systems) 875 North, 28th Street Philadelphia, PA 19130
18324	Signetics Corp. 811 Arques Ave. P.O. 80X 409 Sunnyvale, CA 94086
56289	Sprague Electric Company 125 Marshall Street North Adams, MA 01247
83330	H.H. Smith Inc 812 Snediker Ave. Brooklyn, N.Y. 11207
01295	Texas Instruments Incorporated P.O. BoX 2250 12 MS 368 Dallas, TX 75265
06865	Thomas & Betts 920 RTE 202 Raitan, N.J. 08854
57027	TRW Resistive Products Division 401 N. Broad Street Philadelphia, PA 19108
18076	UMPCO, Inc. 123000 Industry St. Garden Grove, CA 92641

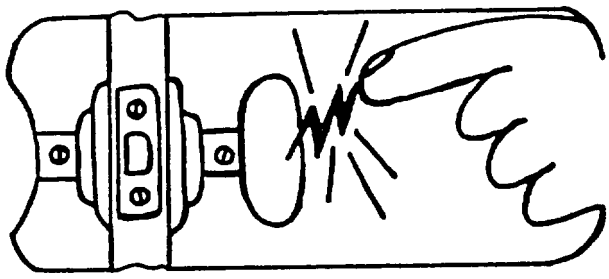
SOURCE, ADDRESS

AND

FSCM MANUFACTURE CODE

CODE #	MANUFACTURE & ADDRESS
52306	Unitrode Corporation 5 Forbes Road Lexington, MA 02173
1L667	Spyraflo Inc. P. O. Box 2249 Peachtree City, Ga. 30269
24253	ITT Pomona Electronics Test Accessories 1500 East Ninth Street Pomona, California 91769

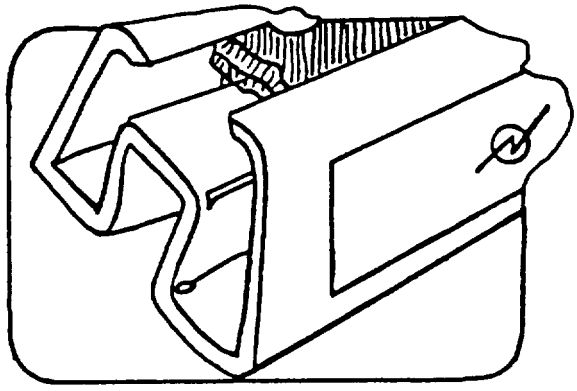
STATIC PRECAUTIONS



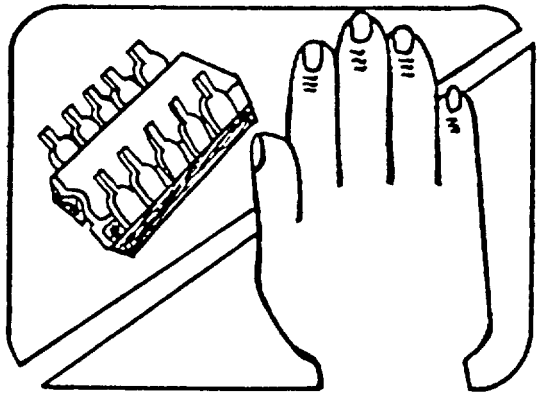
Some semiconductors and custom IC's can be damaged by electrostatic discharge during handling. This notice explains how you can minimize the chances of destroying such devices by:

1. Knowing that there is a problem.
2. Learning the guidelines for handling them.
3. Using the procedures, and packaging and bench techniques that are recommended.

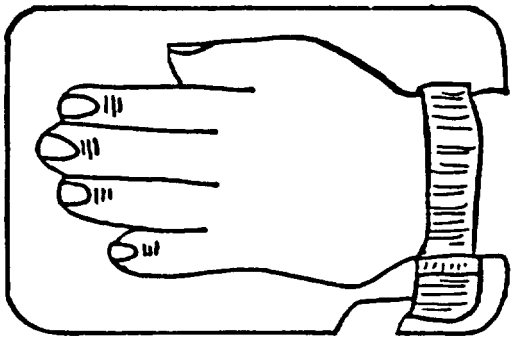
The Static Sensitive (S.S.) devices are identified in the PDC technical manual parts list with the symbol



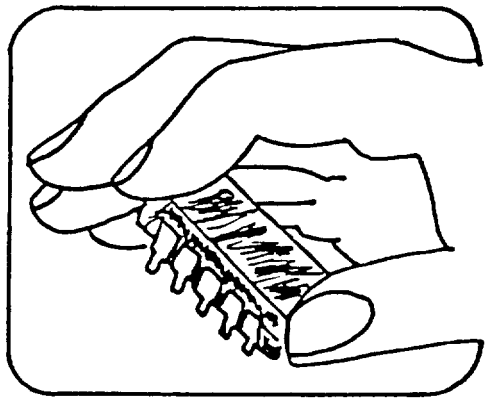
1. KEEP PARTS IN ORIGINAL CONTAINERS UNTIL READY FOR USE.



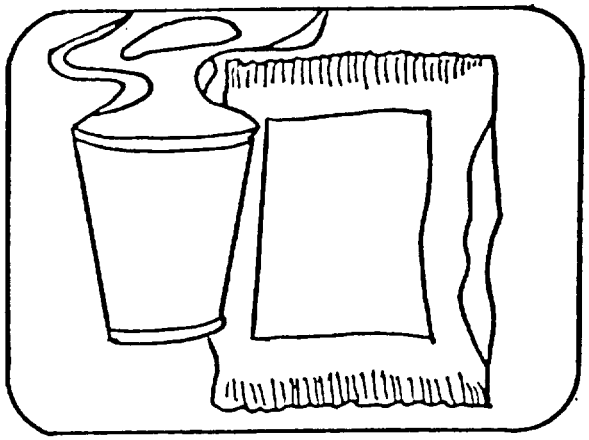
3. MINIMIZE HANDLING



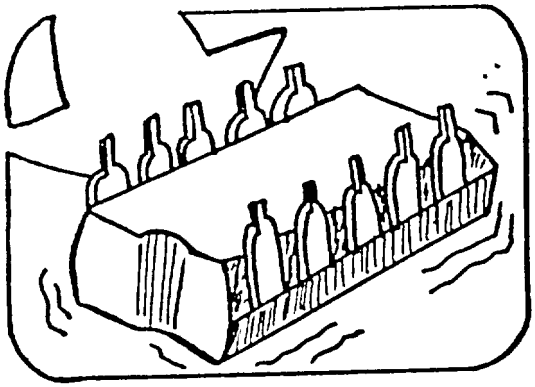
2. DISCHARGE PERSONAL STATIC BEFORE HANDLING DEVICES



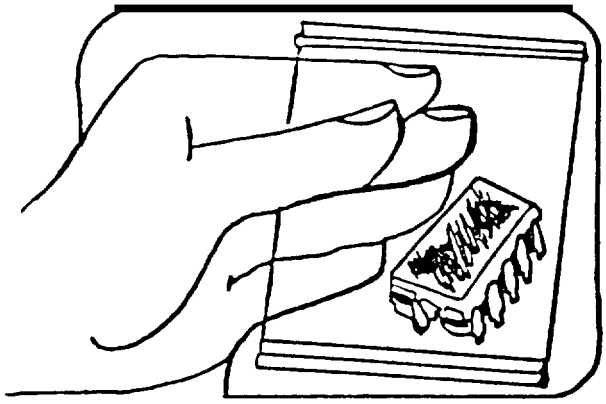
4. HANDLE S.S. DEVICES BY THE BODY



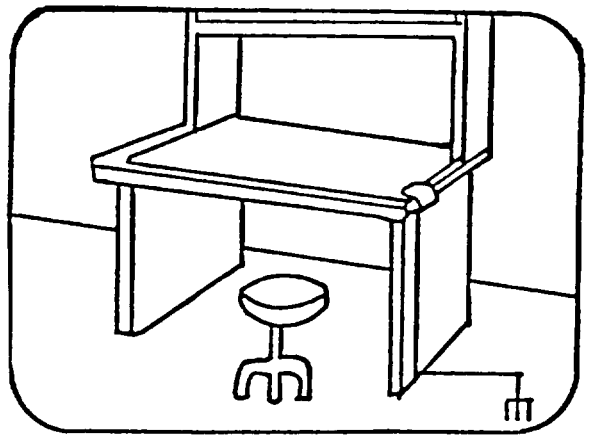
5. AVOID PLASTIC, VINYL AND STYROFOAM IN WORK AREA



6. DO NO SLIDE S.S. DEVICES OVER ANY SURFACE.



7. USE ANTI-STATIC CONTAINERS FOR HANDLING AND TRANSPORT



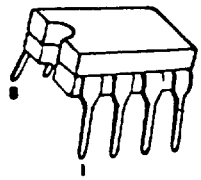
8. HANDLE S.S. DEVICES ONLY AT STATIC-FREE WORK STATION

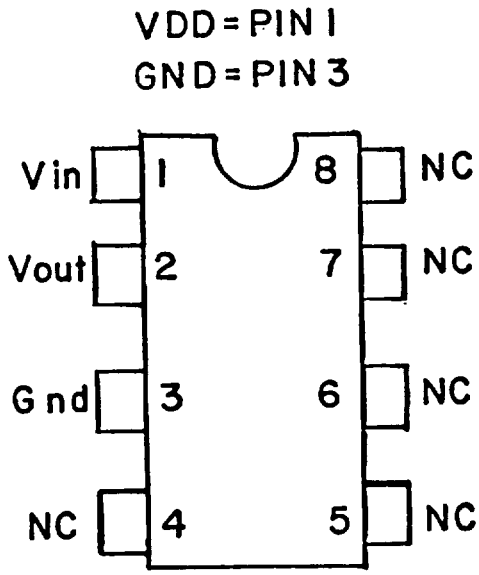
9. ONLY ANTI-STATIC TYPE SOLDER SUCKERS SHOULD BE USED

10. ONLY GROUNDED TIP SOLDERING IRONS SHOULD BE USED.

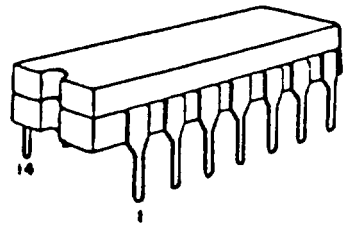
Anti-static bags, for storing S.S. devices or pcbs with these devices on them, can be ordered from PDC INC..Use the following part numbers when ordering these special bags.

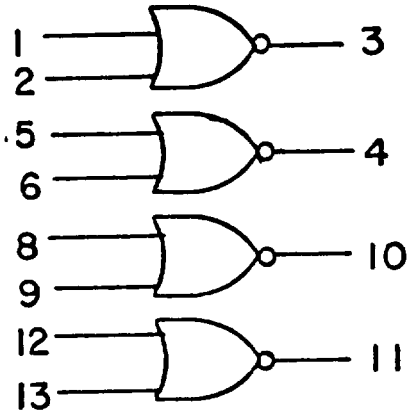
PDC Part No.	Bag Size
13011	6" X 8"
13022	8" X 12"
13023	16"X24"
13024	12″ x 15″



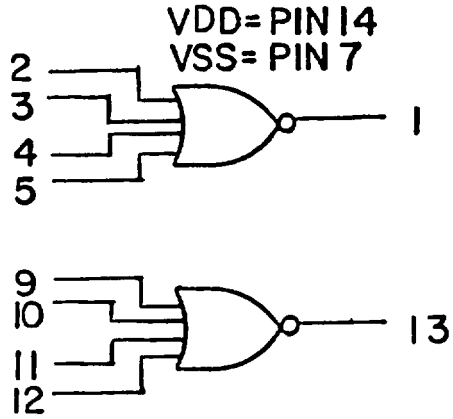


REFERENCE LOW VOLTAGE
MC 14034 8 PINS

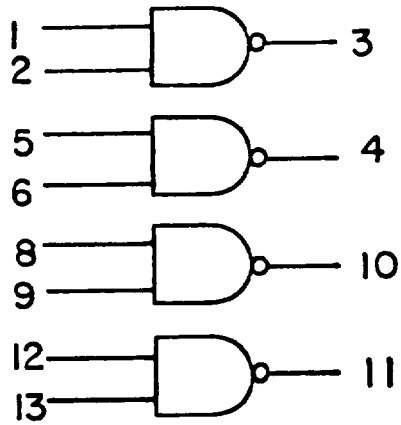




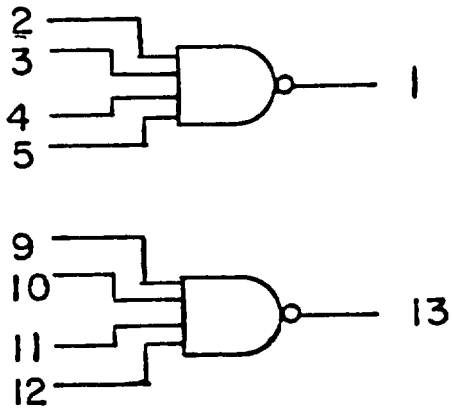
QUAD 2-INPUT NOR GATE
MC14001BCP OR HCF4001BE



DUAL 4 INPUT NOR GATE
MC14002BCP OR HCF4002BE

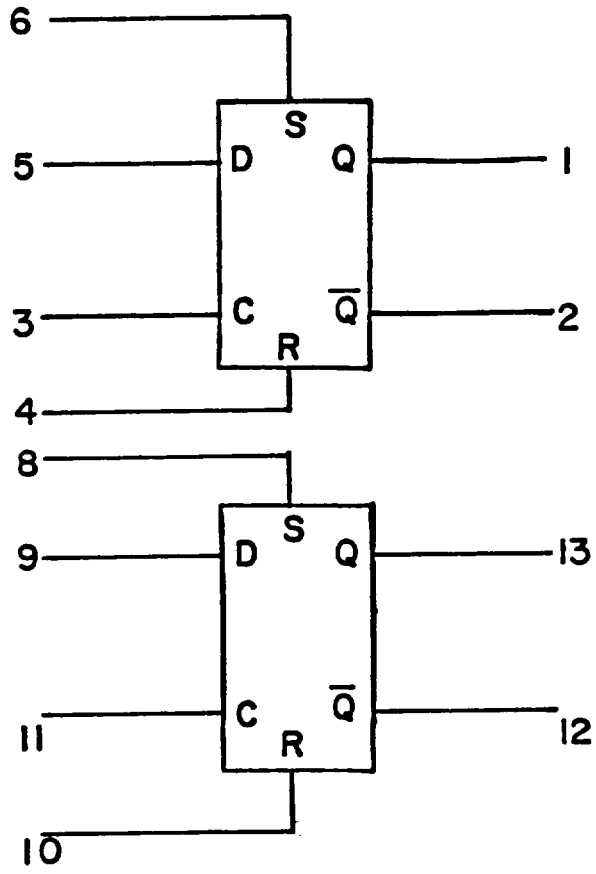


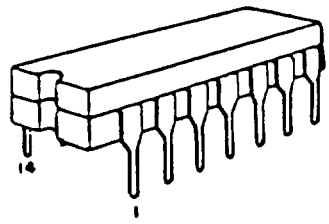
QUAD 2 INPUT NAND GATE
MC14011BCP OR HCF4011BE



DUAL 4 INPUT NAND GATE
MC14012BCP OR HCF4012BE

BLOCK DIAGRAM

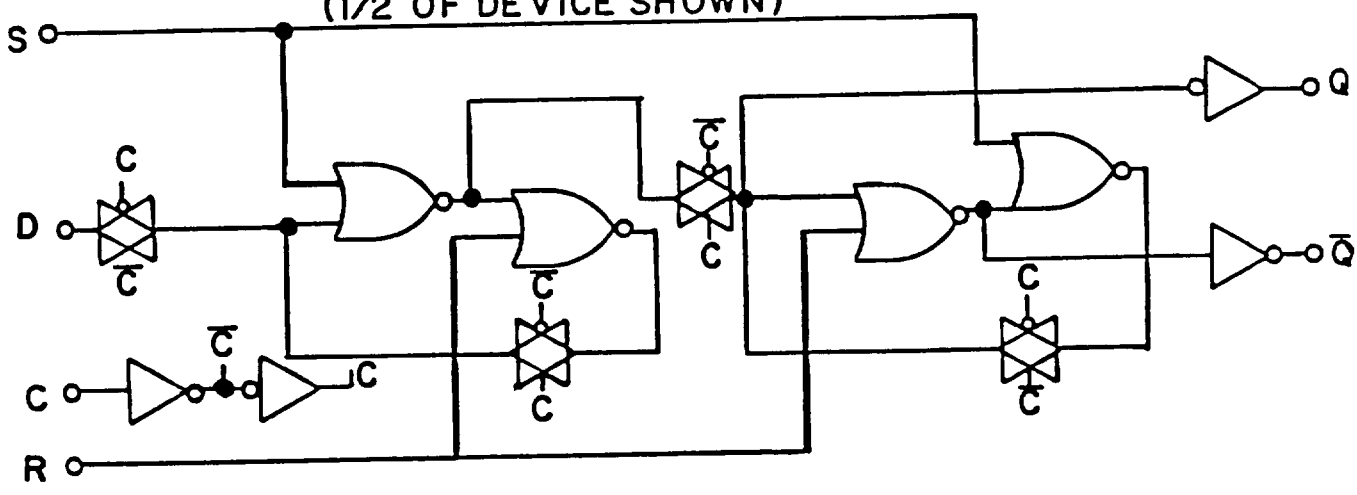


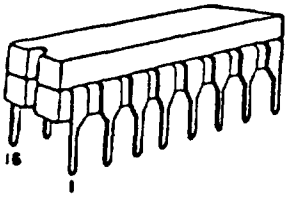


DUAL TYPE D FLIP-FLOP
MC14013BCP OR SCL4013BE
OR SN75468N

VDD= PIN 14
VSS=PIN 7

LOGIC DIAGRAM
(1/2 OF DEVICE SHOWN)





DECADE COUNTER/DIVIDER
MC14017BCP OR HCF4017BE

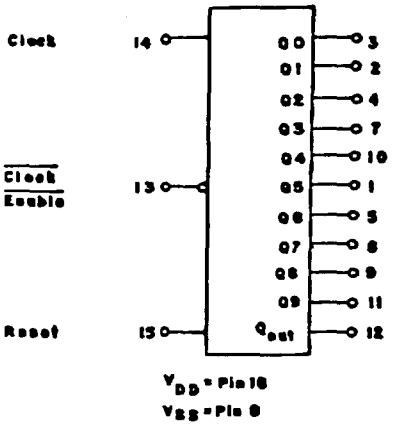
FUNCTIONAL TRUTH TABLE

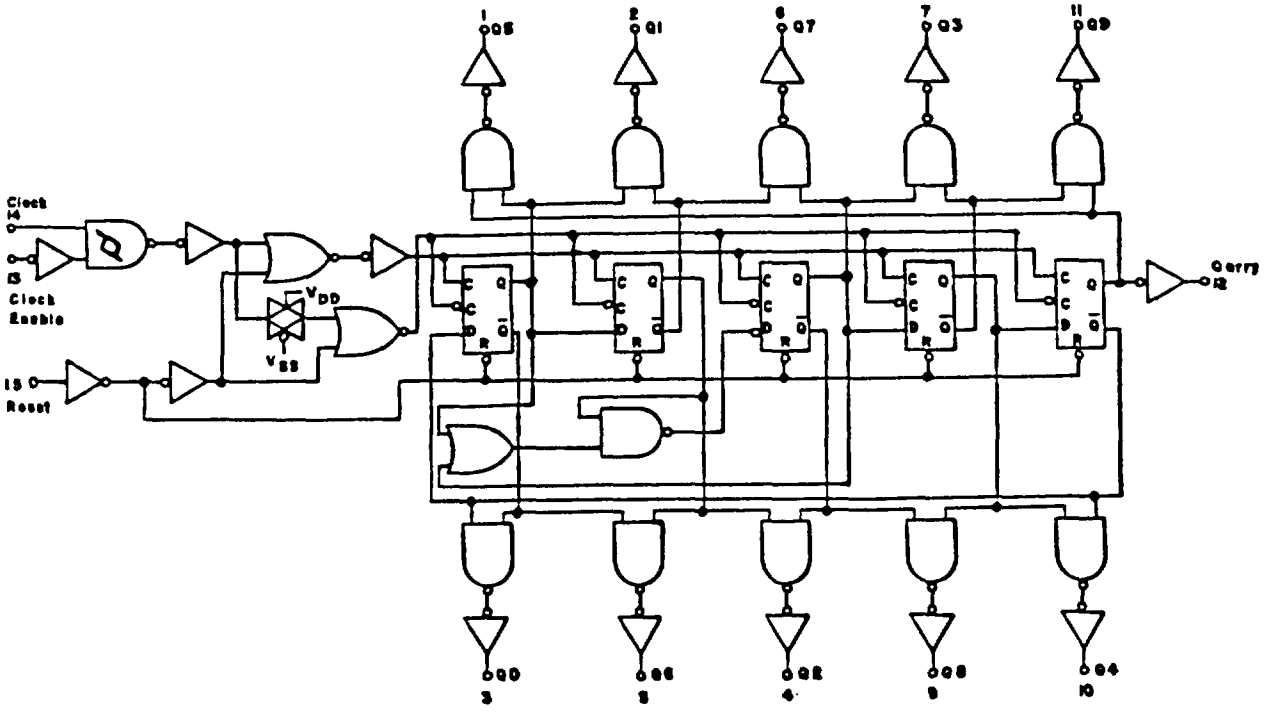
(Positive Logic)

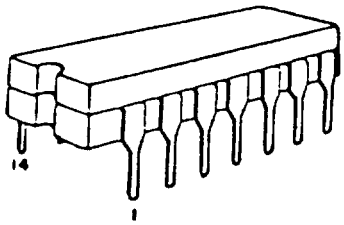
CLOCK	$\overline{\text{CLOCK}}$ / ENABLE	RESET	DECODE OUTPUT = n
0	X	0	n
X	1	0	n
X	X	1	Q0
⌐	0	0	n+1
⌐	X	0	n
X	⌐	0	n
1	⌐	0	n+1

X = Don't Care If n<5 Carry = "1", Otherwise = "0"

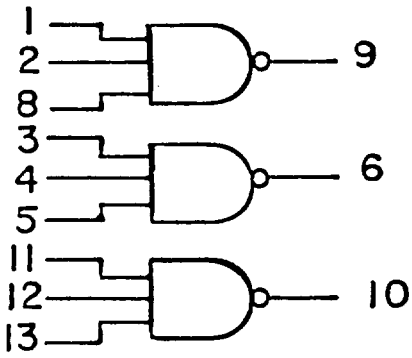
BLOCK DIAGRAM



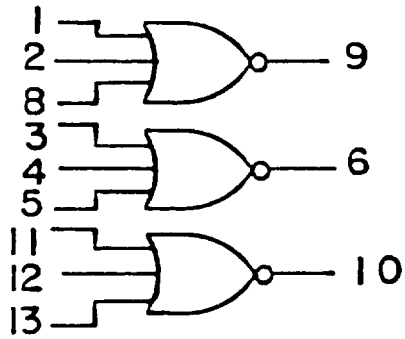




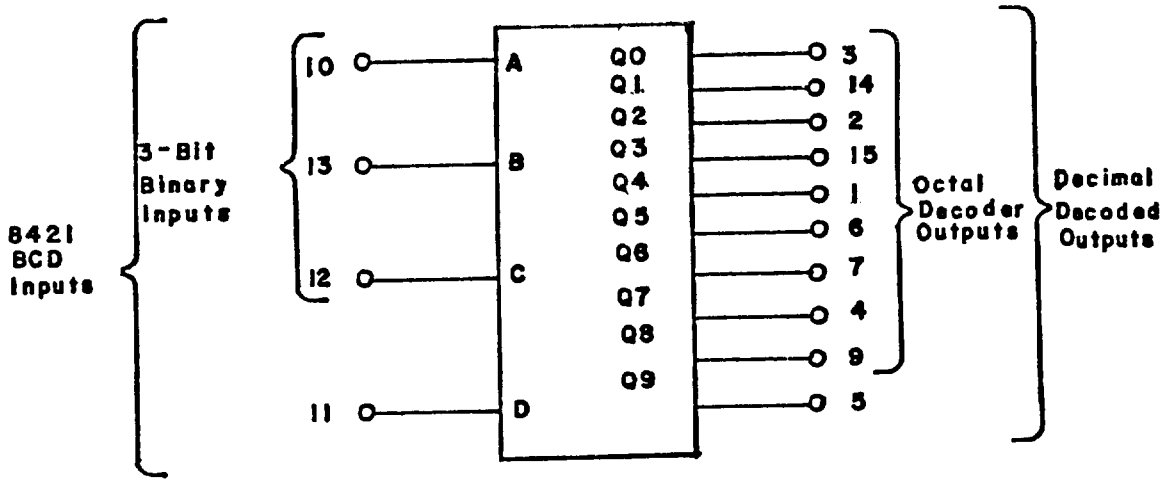
VDD=PIN14
VSS=PIN7



TRIPLE 3-INPUT NAND GATE
MC14023BCP OR HCF4023BE

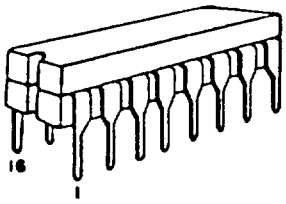


TRIPLE 3-INPUT NOR GATE
MC14025BCP



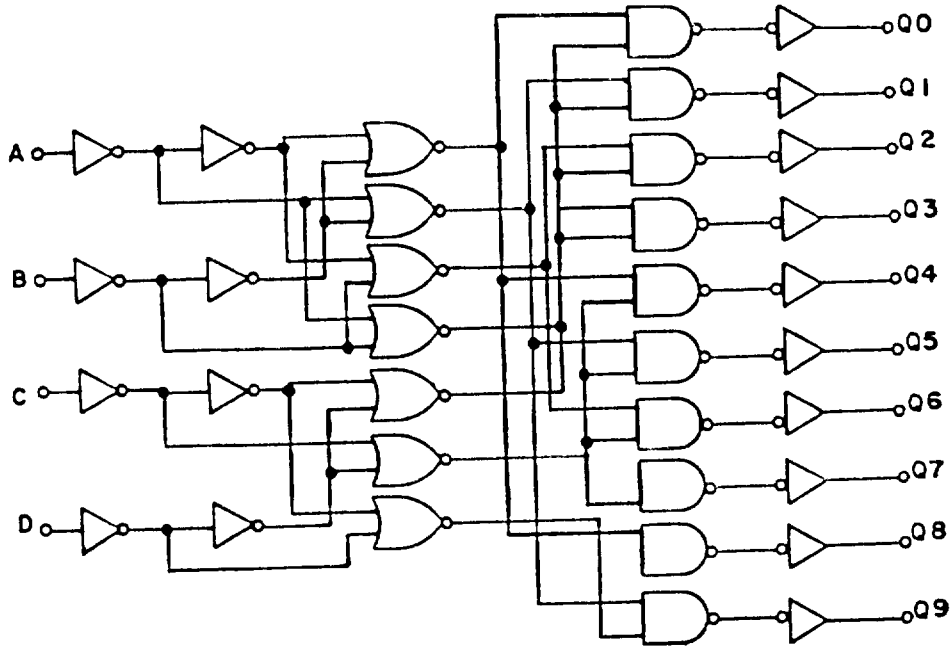
TRUTH TABLE

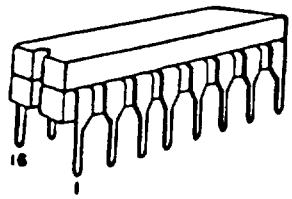
INPUT				OUTPUT									
D	C	B	A	Q9	Q8	Q7	Q6	Q5	Q4	Q3	Q2	Q1	Q0
0	0	0	0	0	0	0	0	0	0	0	0	0	1
0	0	0	1	0	0	0	0	0	0	0	0	1	0
0	0	1	0	0	0	0	0	0	0	0	1	0	0
0	0	1	1	0	0	0	0	0	0	1	0	0	0
0	1	0	0	0	0	0	0	0	1	0	0	0	0
0	1	0	1	0	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	0	1	0	0	0	0	0	0
0	1	1	1	0	0	1	0	0	0	0	0	0	0
1	0	0	0	0	1	0	0	0	0	0	0	0	0
1	0	0	1	1	0	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0	0	0	0
1	0	1	1	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	0	0	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	0	0	0	0	0	0	0	0	0	0



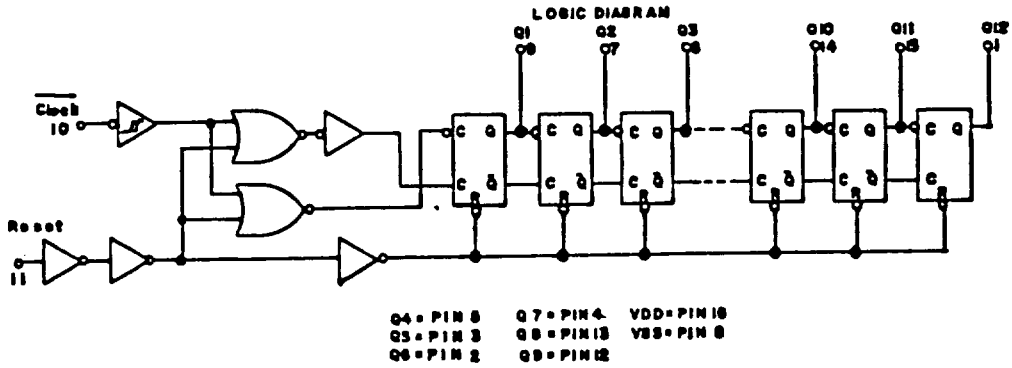
BCD TO-DECIMAL DECODER
MC14028B OR HCF4028BE

LOGIC DIAGRAM

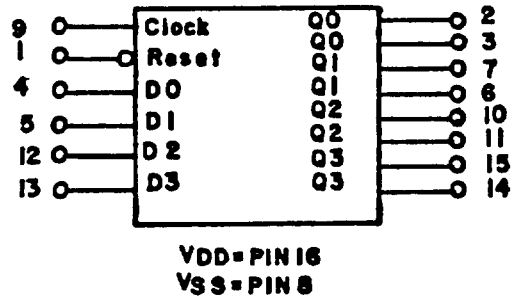




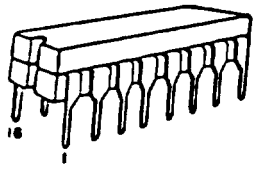
12 BIT BINARY COUNTER
MC14040BCP



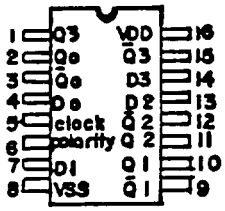
BLOCK DIAGRAM



QUAD D FLIP-FLOP
MC 14175 BCP



Pin Assignment

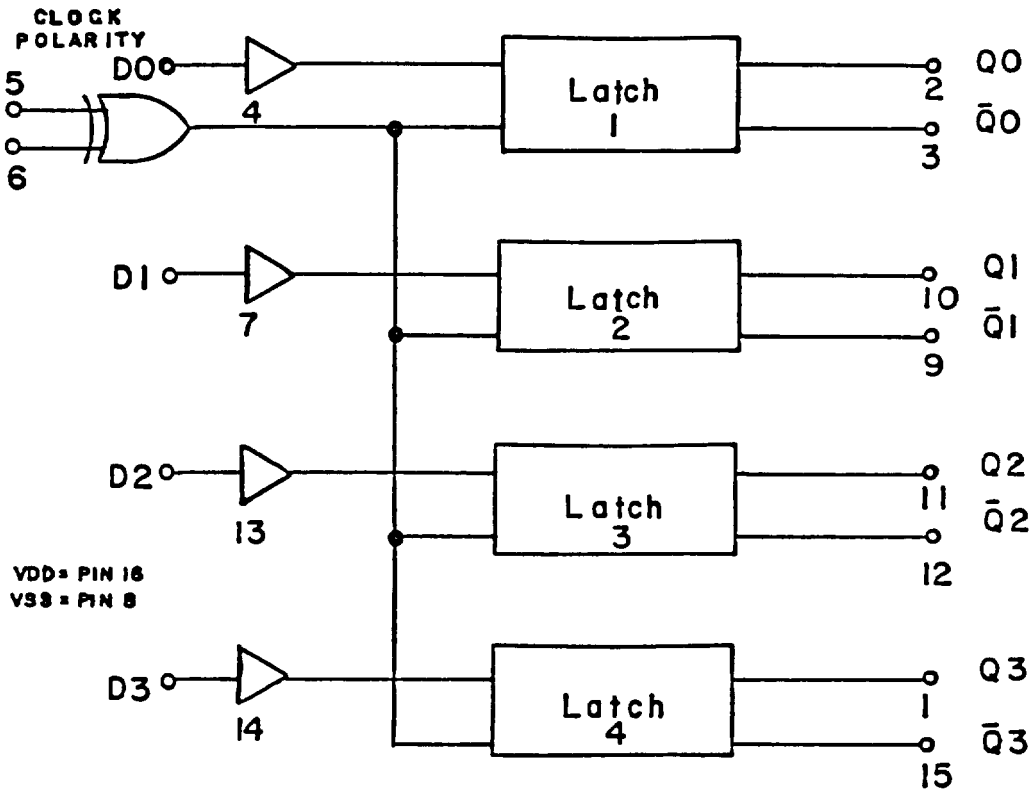


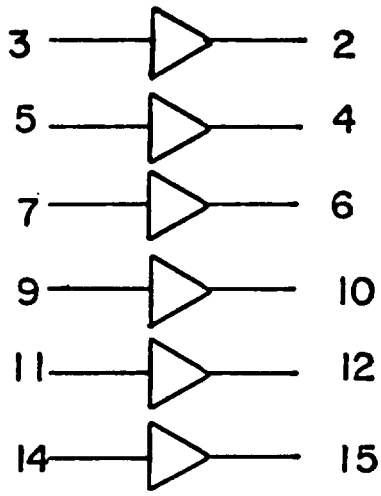
QUAD LATCH
MC 14042BCP

TRUTH TABLE

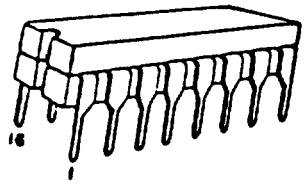
clock	polarity	Q
0	0	Data
↑	0	Latch
1	1	Data
↓	1	Latch

LOGIC DIAGRAM

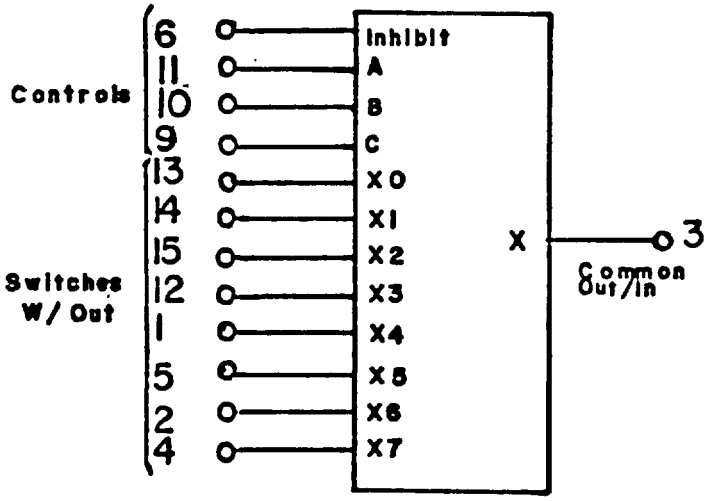




NC = PIN 13, 16
VSS = PIN 8
VCC = PIN 1
LOGIC DIAGRAM

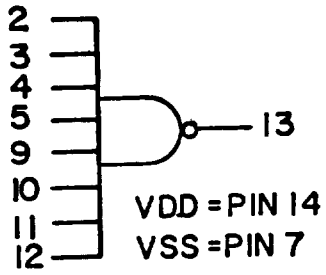


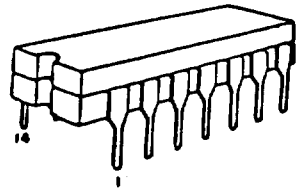
HEX BUFFER, NON INVERTING
MC14050 BCP



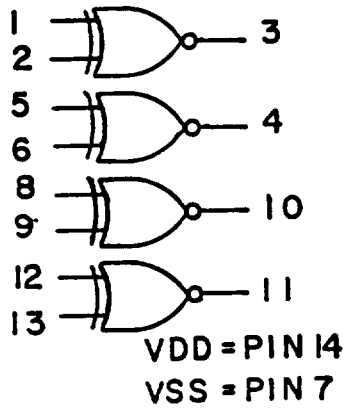
8 CHANNEL ANALOG MULTIPLEXER
MC14051BCP OR SCC4051BE

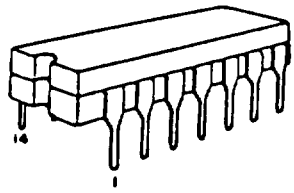
VDD = PIN 16
VSS = PIN 8
VEE = PIN 7



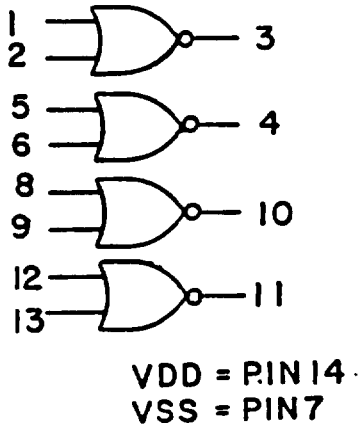


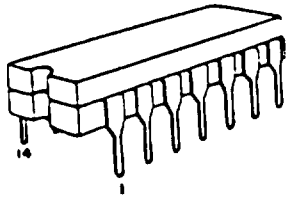
8 INPUT NAND GATE
HCF4068BE OR MC14068BCP



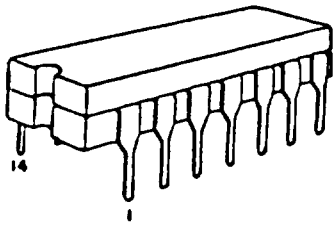


QUAD EXCLUSIVE OR GATE
HCF4070BE OR MC14070BCP

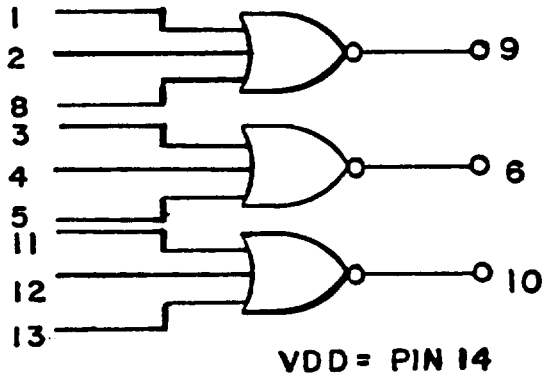




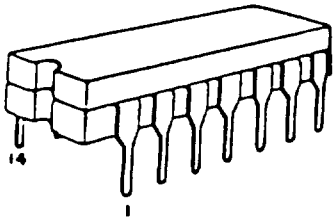
QUAD 2 INPUT OR GATE
MC14071BCP



TRIPLE 3-INPUT OR GATE
MC14075BCP

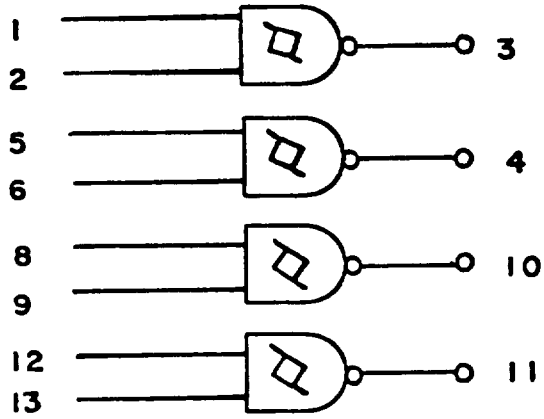


VDD = PIN 14
VSS = PIN 7
for All Devices



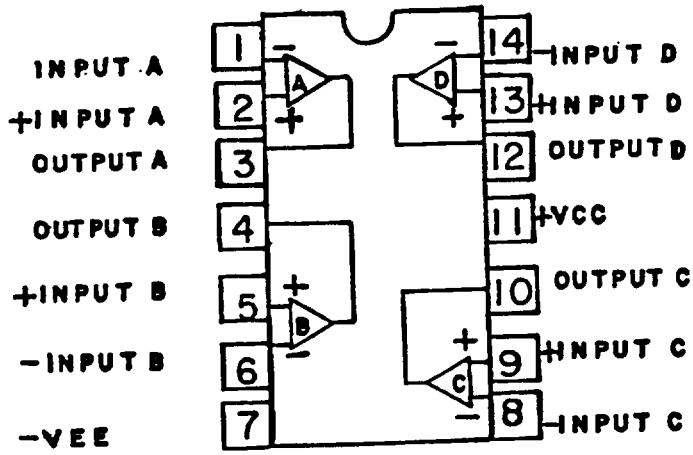
QUAD 2-INPUT HAND SCHMITT TRIGGER
HCF4093BE OR MC14093BCP

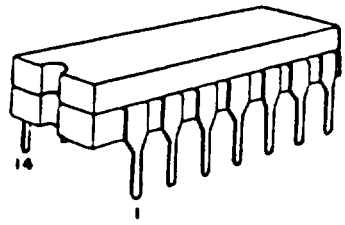
LOGIC DIAGRAM



VDD = PIN 14
VSS = PIN 7

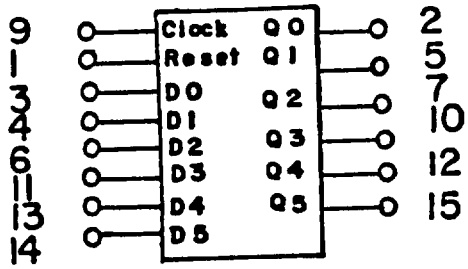
Functional BLOCK DIAGRAM

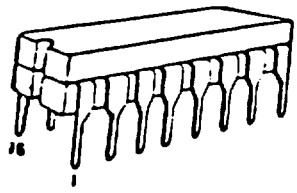




XR-4136 OP. AMP. QUAD

BLOCK DIAGRAM

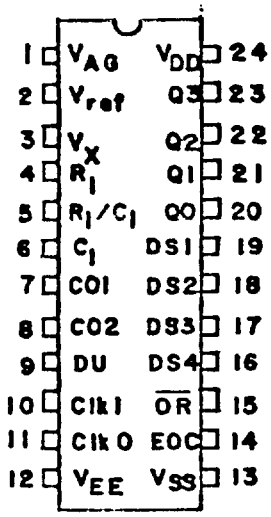


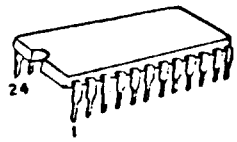


VDD= PIN 16
VSS= PIN 8

HEX D FLIP-FLOP
MC 14174 BCP

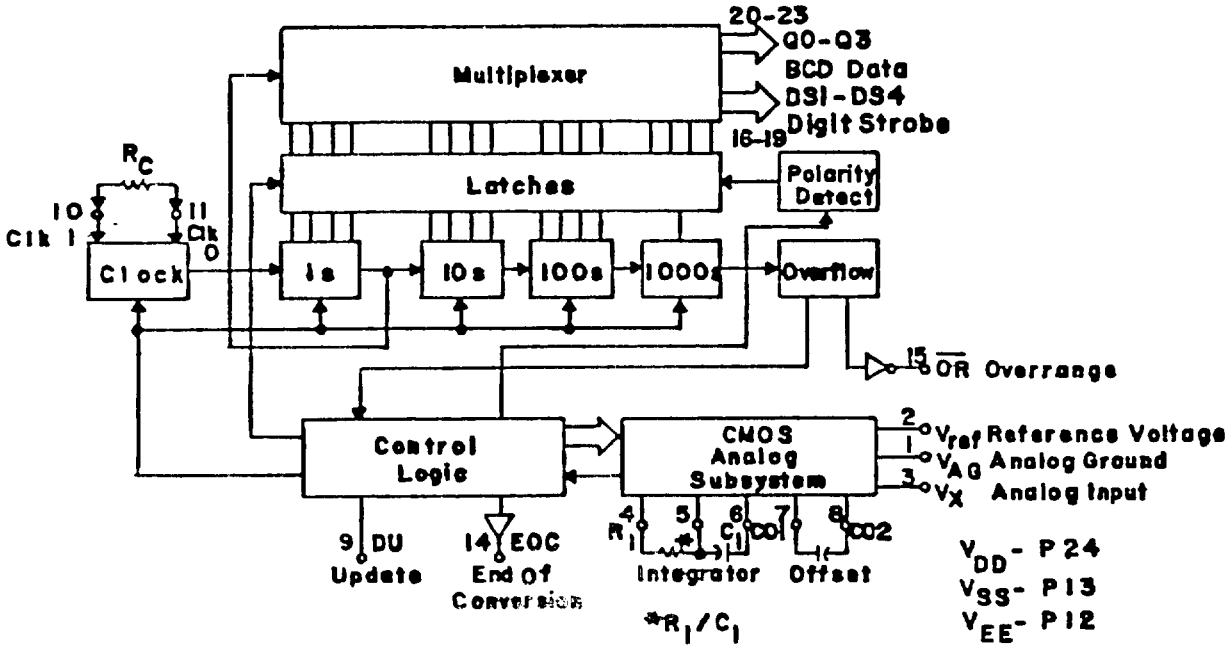
PIN ASSIGNMENT

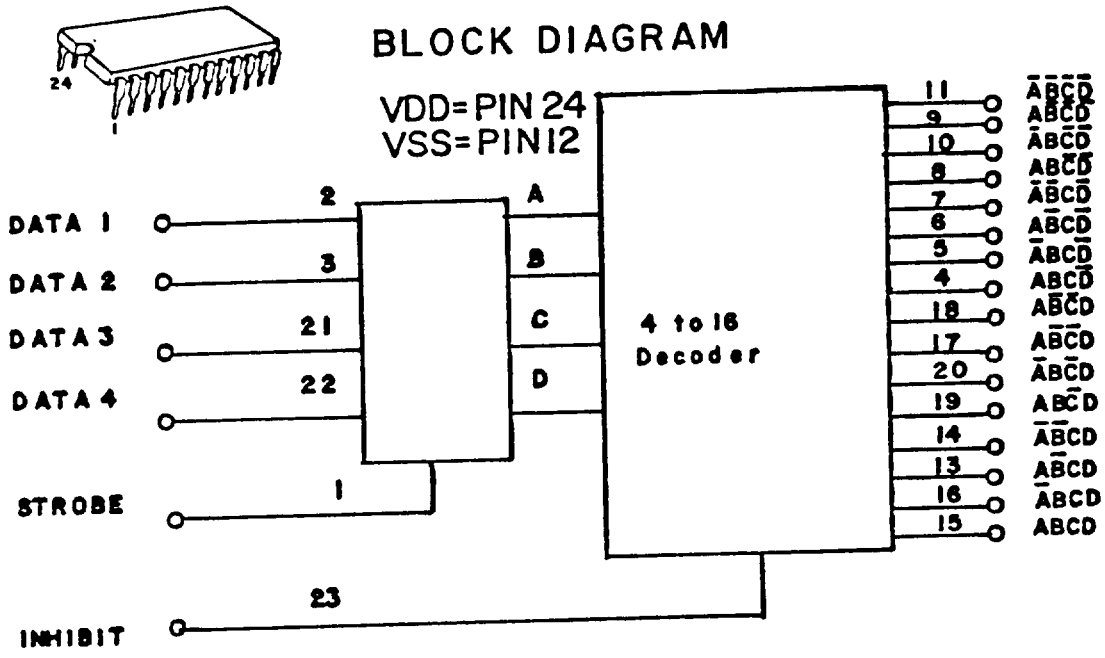




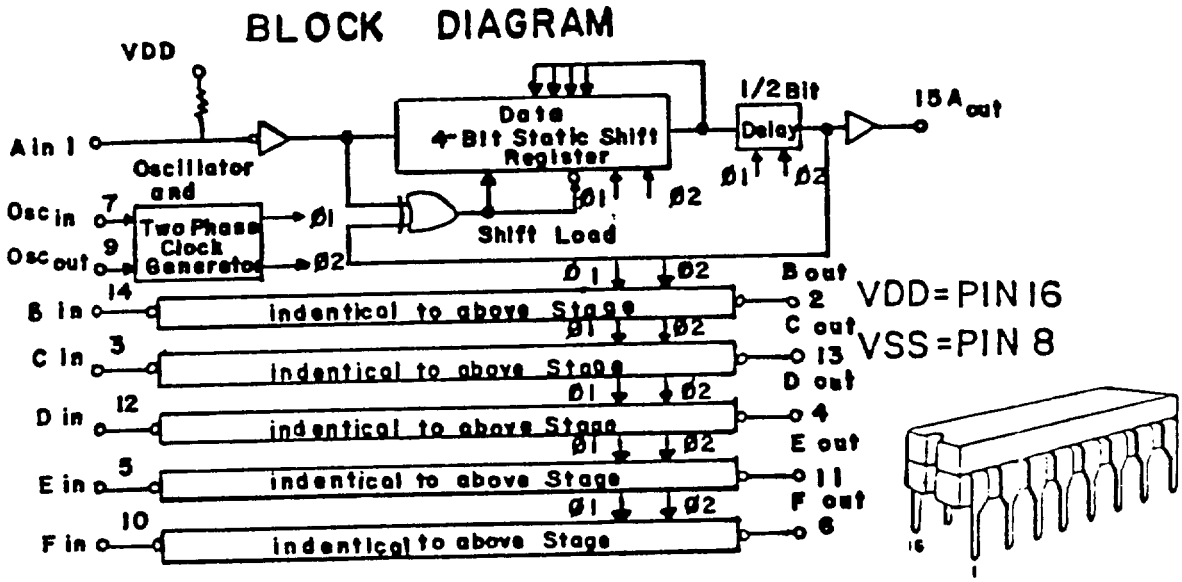
3½ DIGIT A/D CONVERTER
MC14433P

BLOCK DIAGRAM



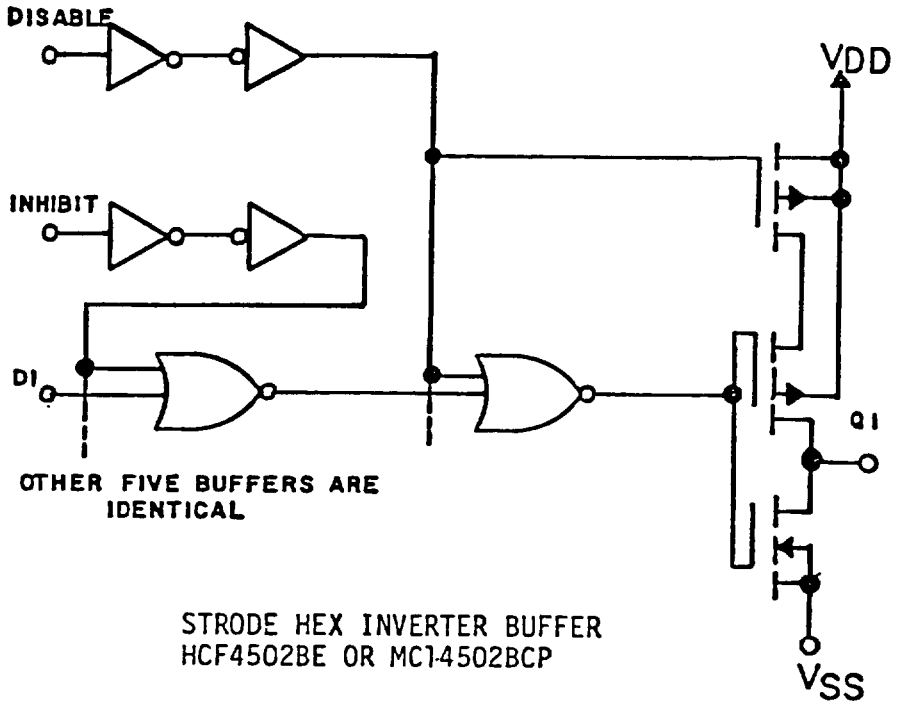


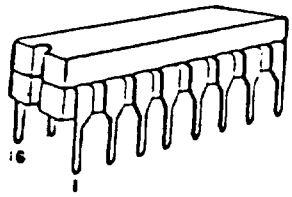
4-BIT LATCH/4-TO-16 LINE DECODER
(HIGH) MC14514BCP OR HCF4514BE



HEX CONTACT BOUNCE ELIMINATOR
MC14490FP

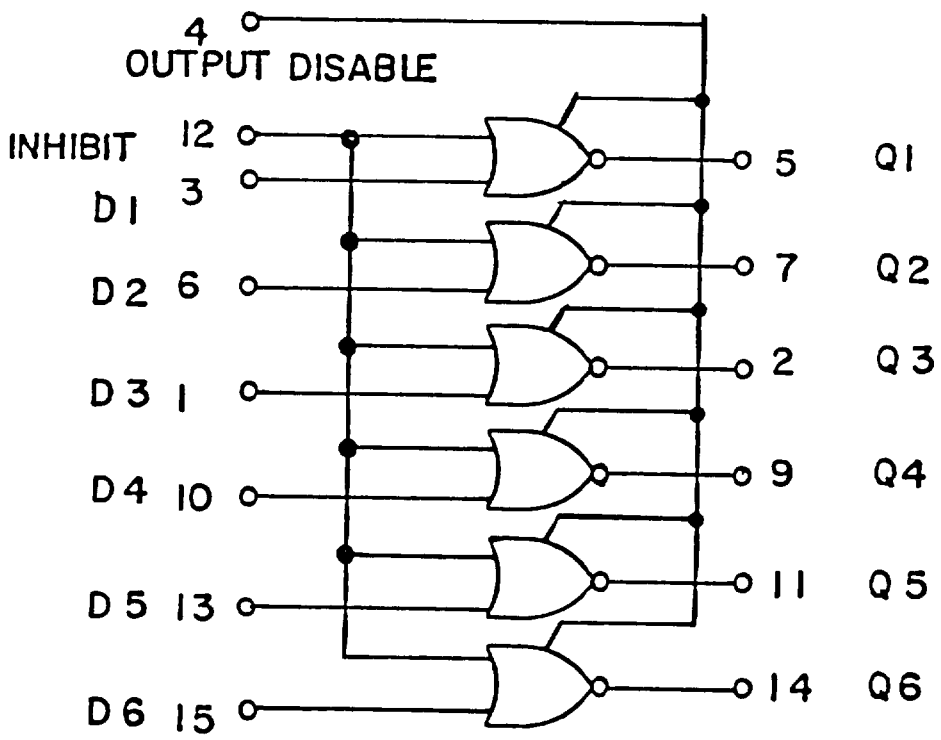
CIRCUIT DIAGRAM





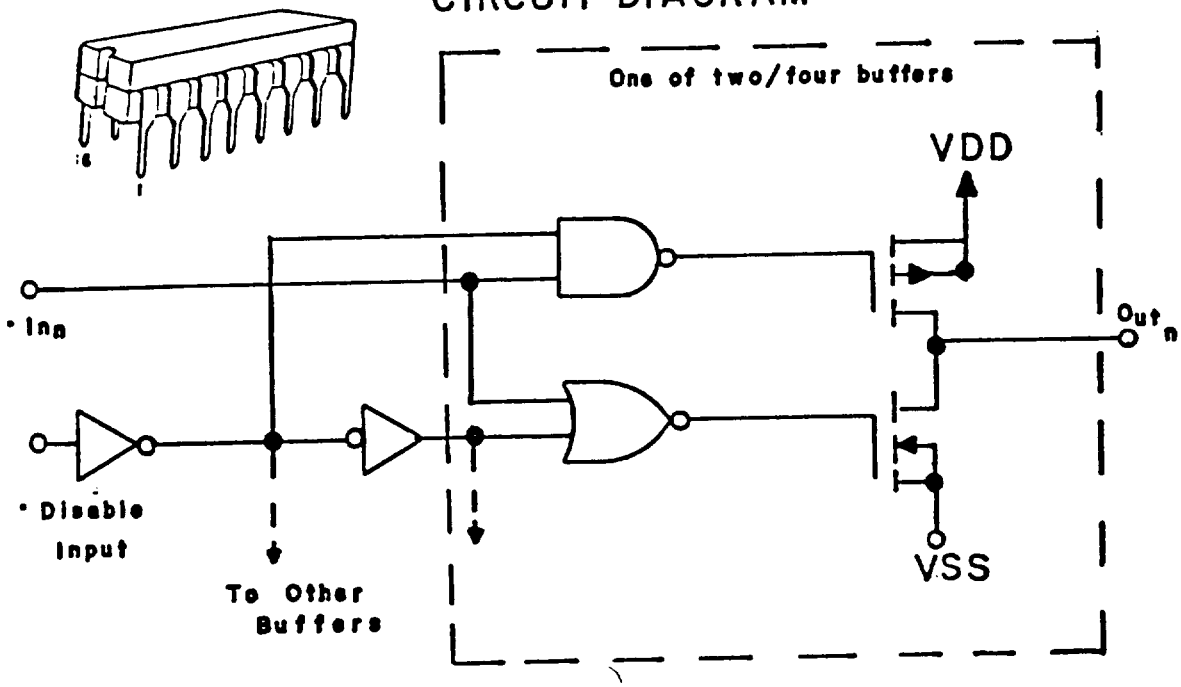
STRODE HEX INVERTER BUFFER
HCF4502BE OR MC14502BCP

LOGIC DIAGRAM



VDD=PIN 16
VSS=PIN 8

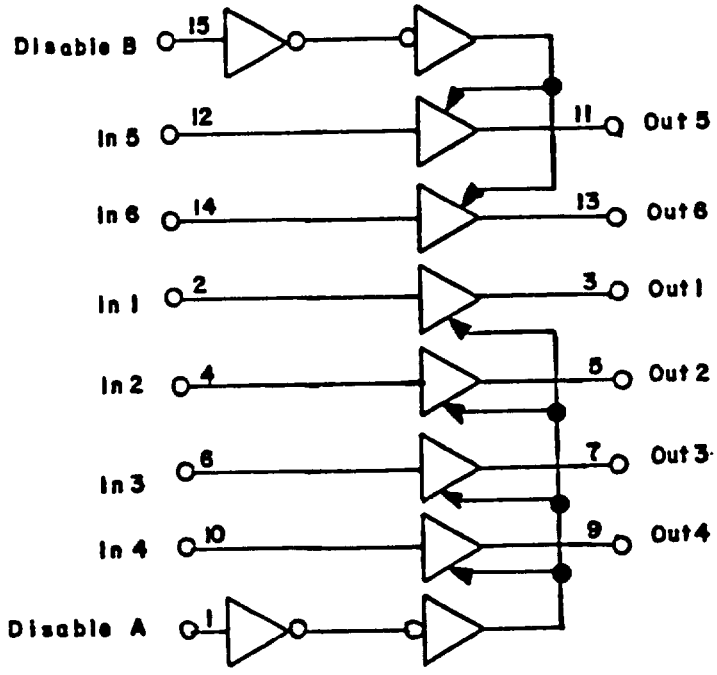
CIRCUIT DIAGRAM



Diode protection on all inputs (not shown)

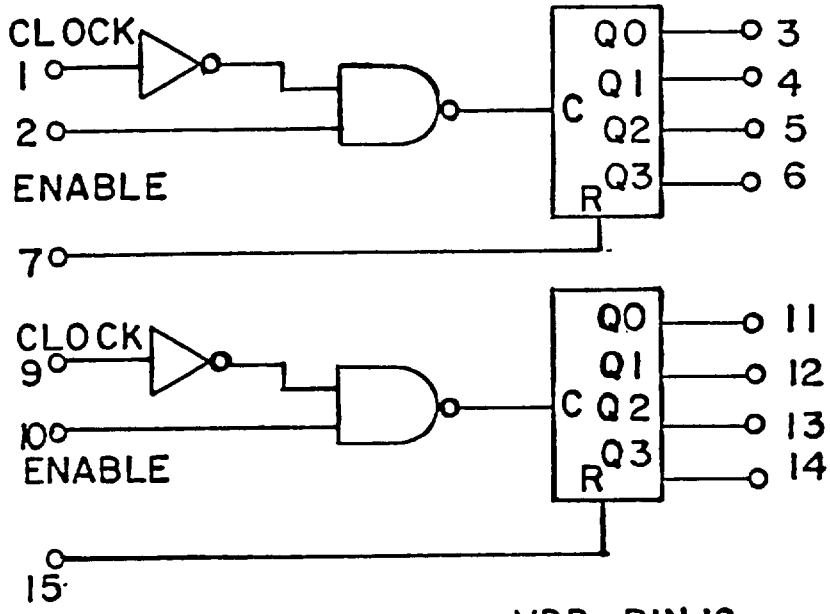
HEX 3-STATE BUFFER
MC14503BCB

LOGIC DIAGRAM



VDD = PIN 16
VSS = PIN 8

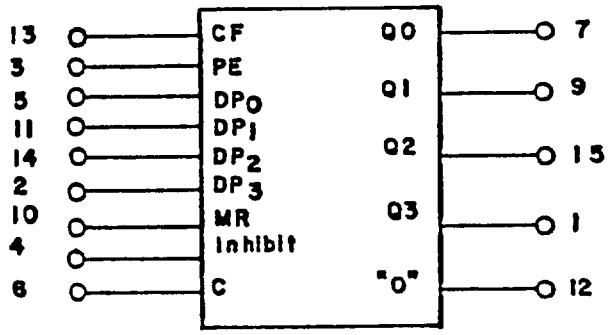
BLOCK DIAGRAM



DUAL BCD UP COUNTER
MC14518 BCP OR HCF4518BE

VDD = PIN 16
VSS = PIN 8

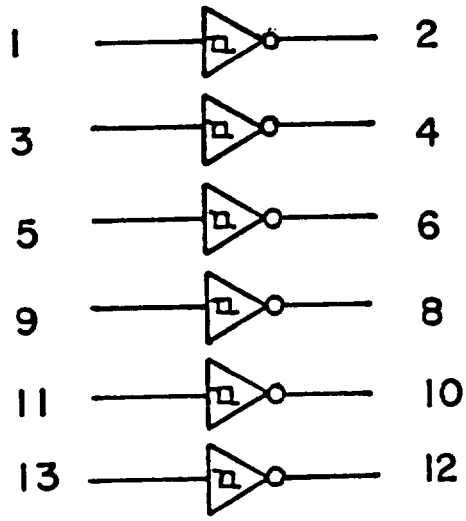
BLOCK DIAGRAM

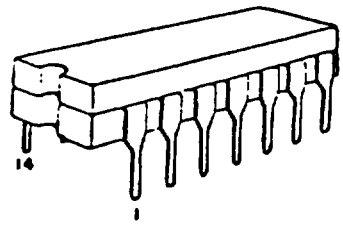


PROGRAMMABLE BCD DIVIDE-BY-4 BIT COUNTERS MC14522BCP OR SCL4522BE

VDD = PIN 16
VSS = PIN 8

LOGIC DIAGRAM

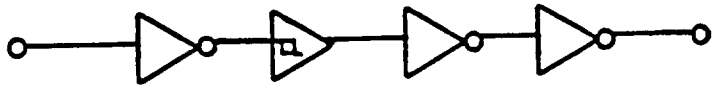




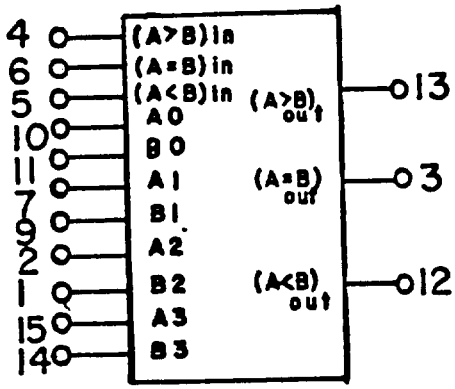
HEX SCHMITT TRIGGER MC14584BCP
OR SCL4584BE

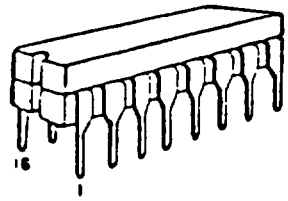
VDD = PIN 14
VSS = PIN 7

EQUIVALENT CIRCUIT SCHEMATIC (1/6 OF CIRCUIT SHOWN)



BLOCK DIAGRAM

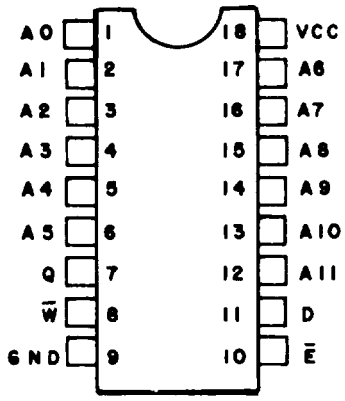




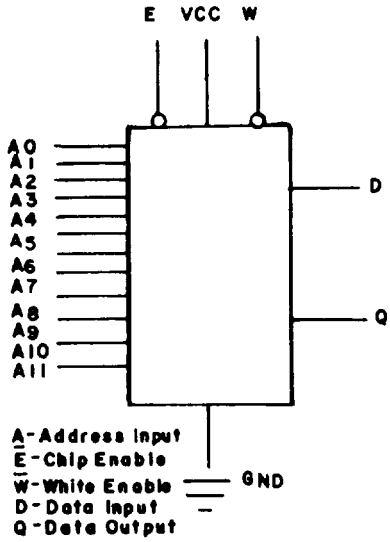
4-BIT MAGNITUDE COMPARATOR
MC14585BCP

VDD = PIN 16
VSS = PIN 8

PINOUT
TOP VIEW



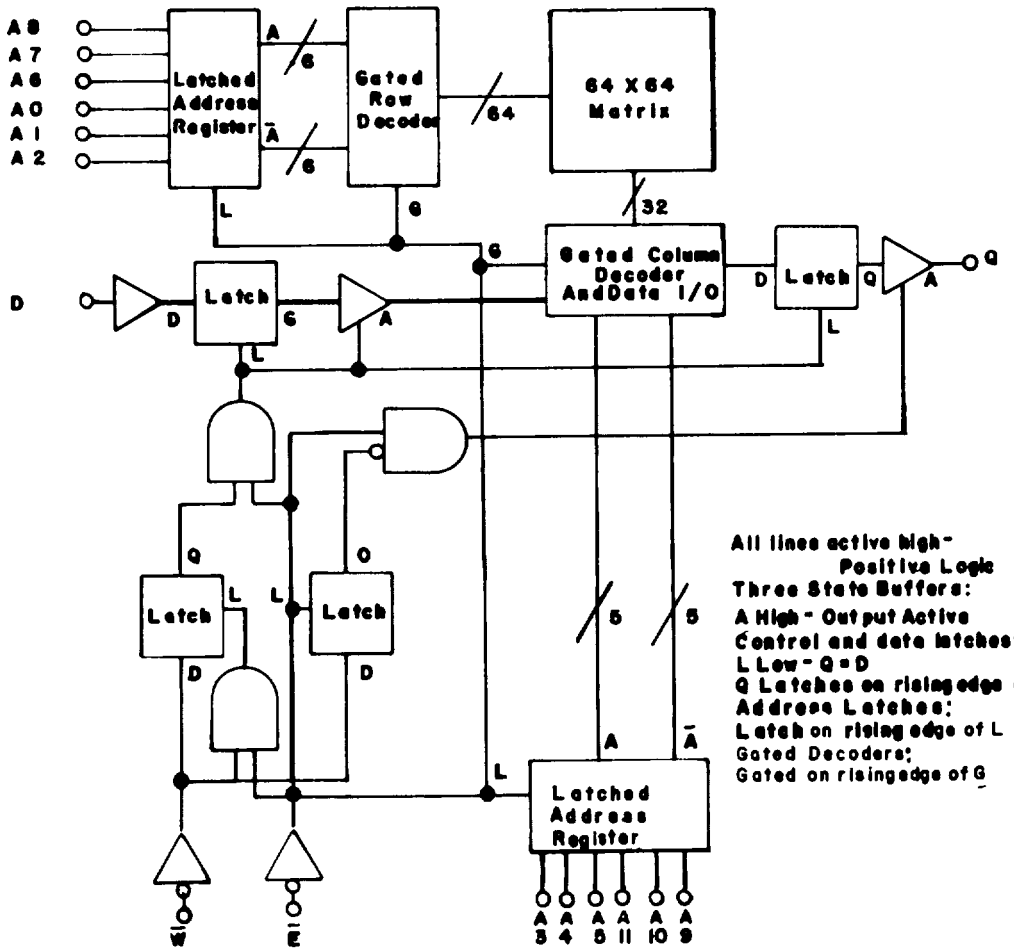
LOGIC SYMBOL



A-Address Input
Ē-Chip Enable
W̄-White Enable
D-Data Input
Q-Data Output

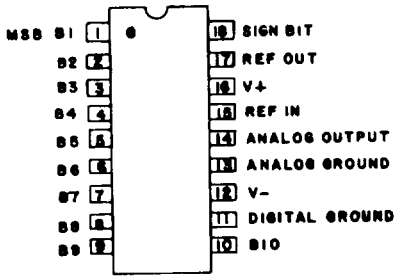
HM16504-9 or
HM36504-9

FUNCTIONAL DIAGRAM

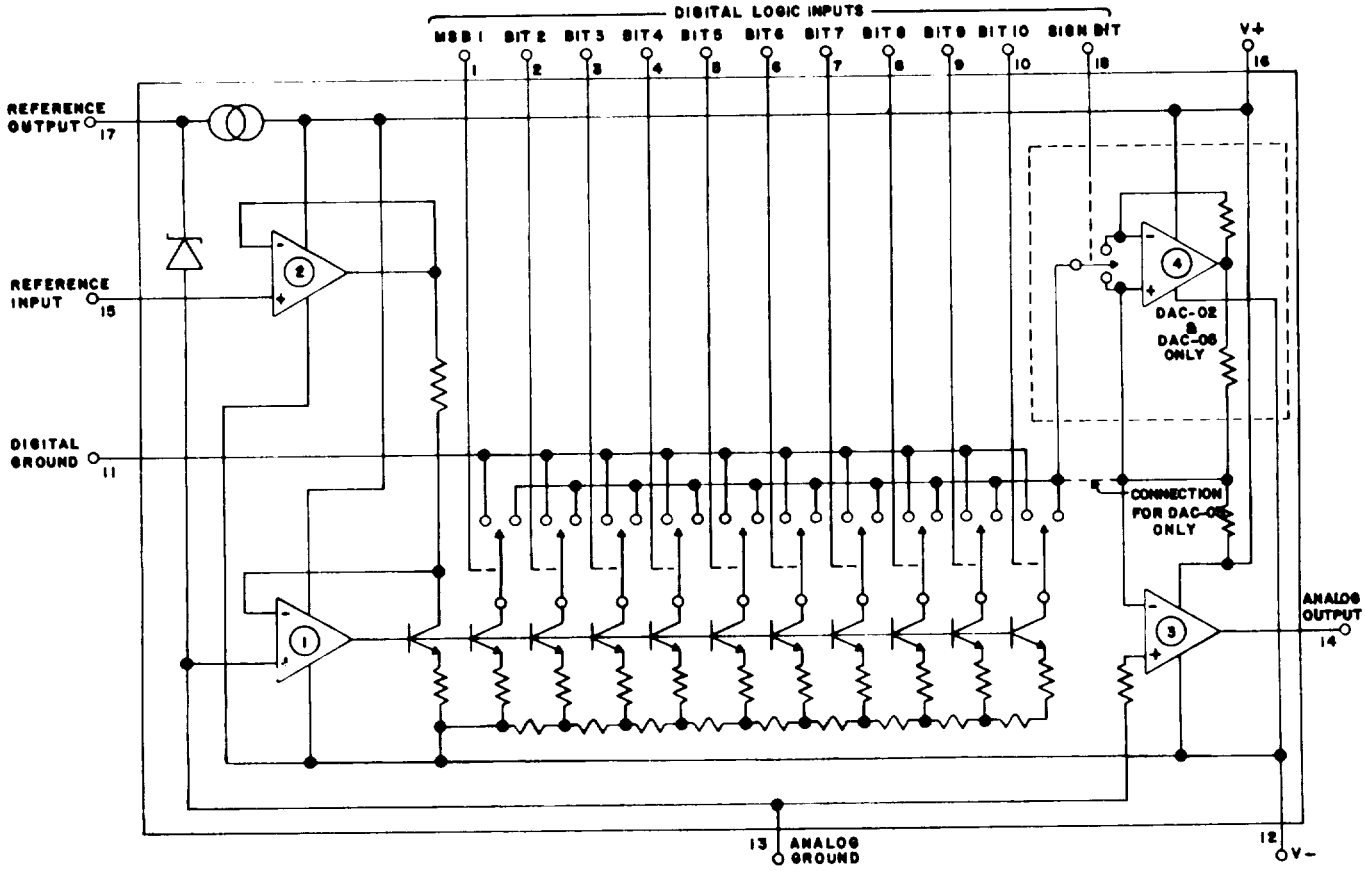


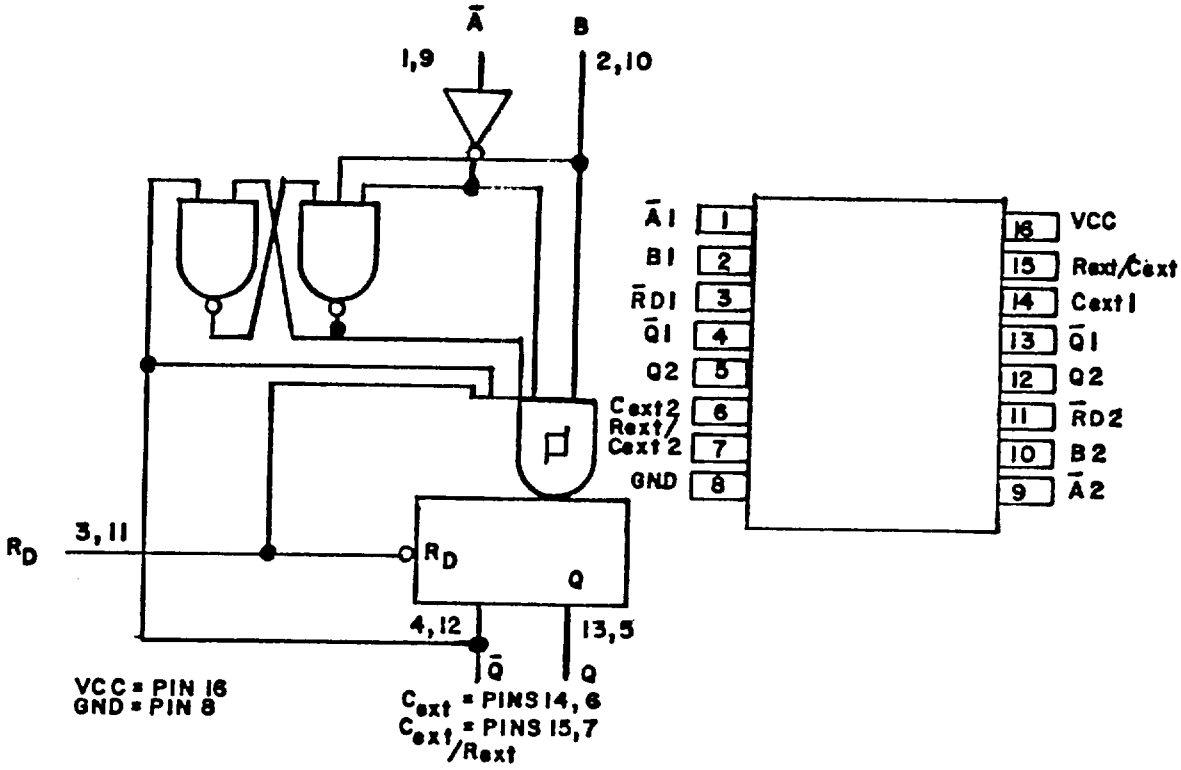
All lines active high-
Positive Logic
Three State Buffers:
A High - Output Active
Control and data latches:
L Low - Q = D
Q Latches on rising edge of L
Address Latches:
Latch on rising edge of L
Gated Decoders:
Gated on rising edge of G

18-PIN DIP (X-Suffix)

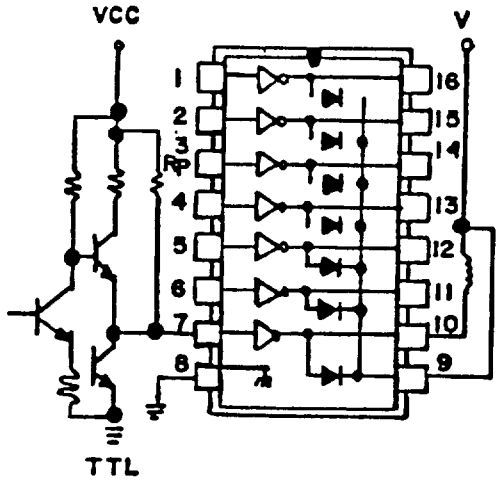


DIGITAL TO ANALOG CONVERTOR
DAC 05-GX1 OR DAC 03-GX1

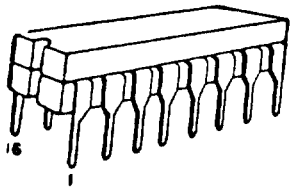


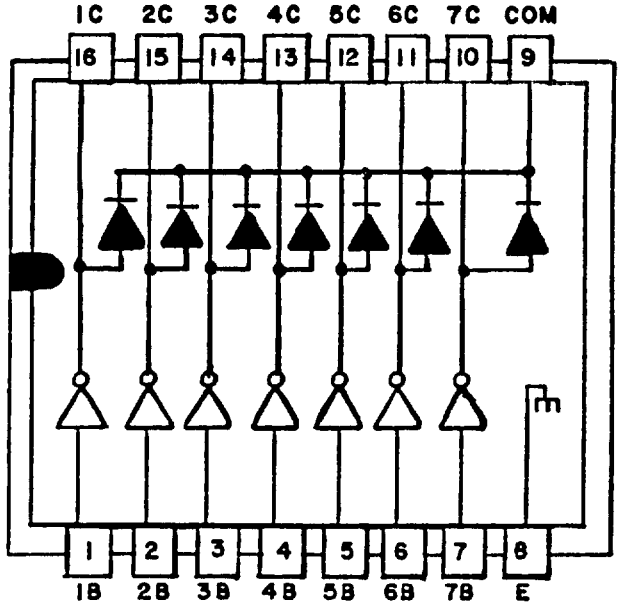


DUAL MONOSTABLE MULTIVIBRATOR
SN74C221N

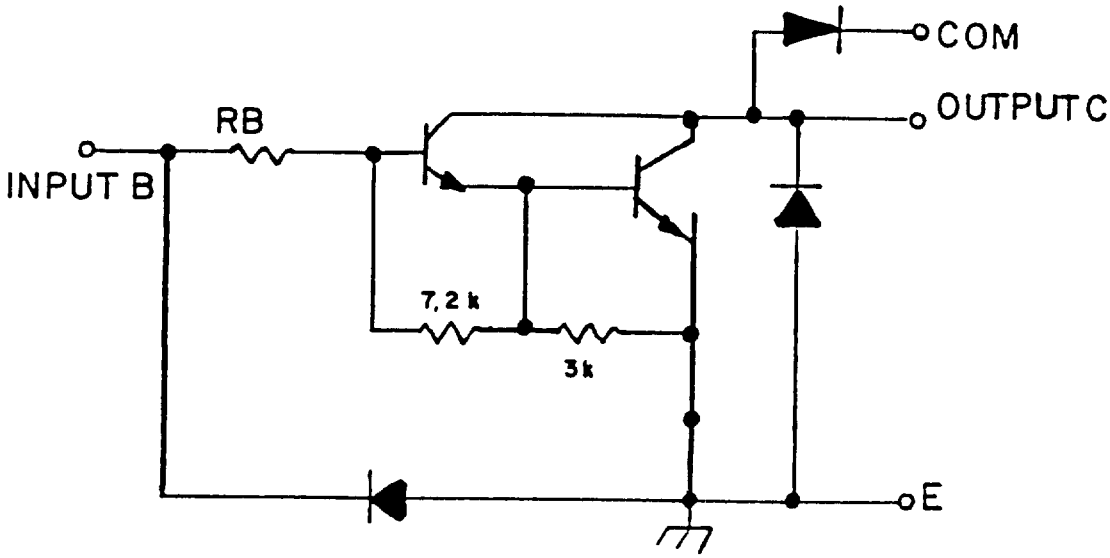


HIGH VOLTAGE DRIVER
ULN2003A OR ULN2003N

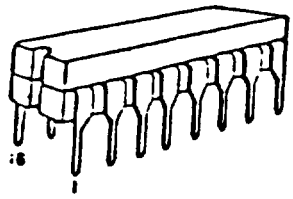




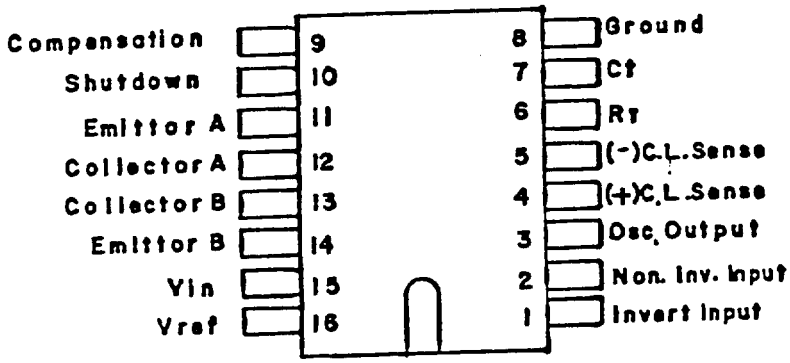
HIGH VOLTAGE DRIVER
SN75468N OR SN75469N



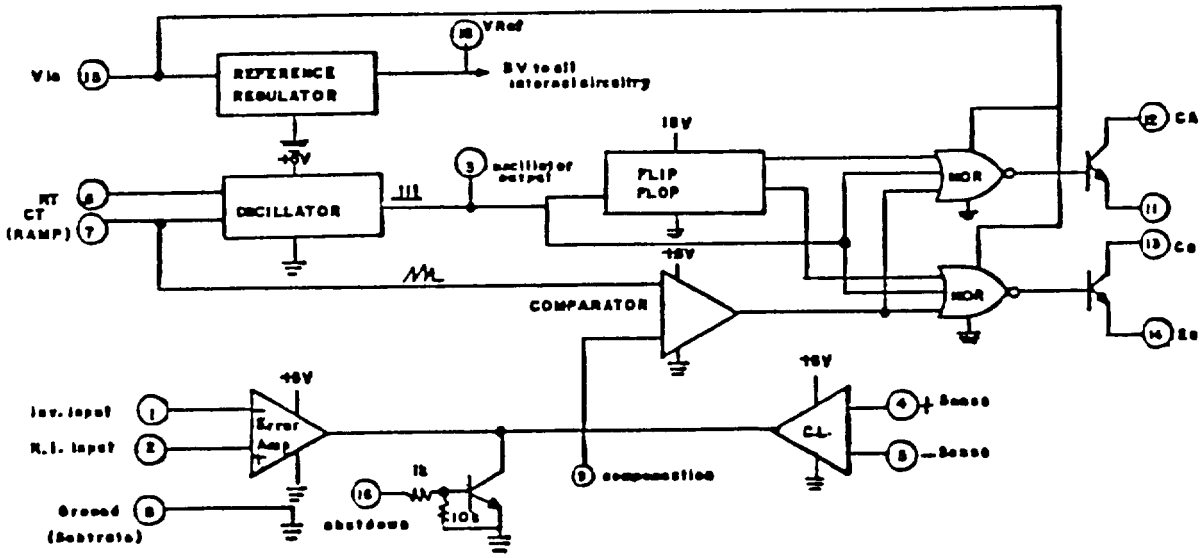
SN75468: RB=2.7 k
SN75469: RB=10.5k

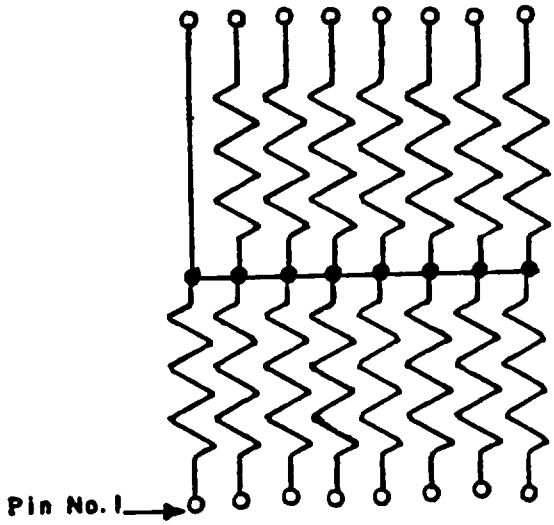


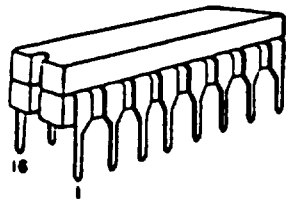
TOP VIEW



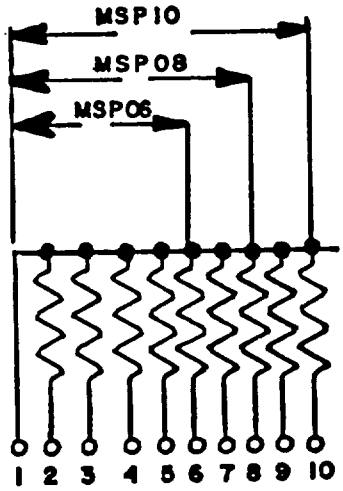
REGULATING PULSE WIDTH MODULATOR
SG3524N OR SG1524N





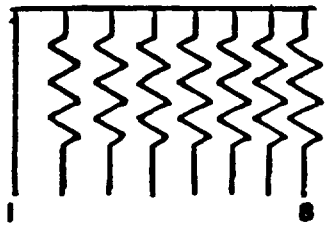


DUAL-IN-LINE DIP NETWORK
MDP 1601-104G

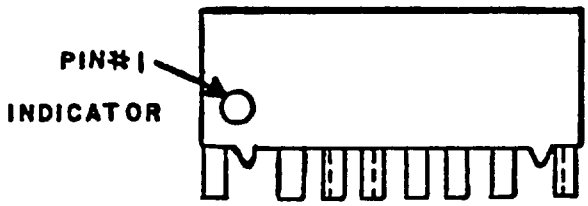


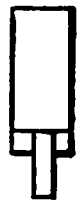
SINGLE-IN-LINE 10K SIP
MSP10A01-104G

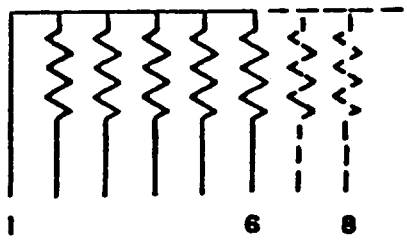
CIRCUIT 1



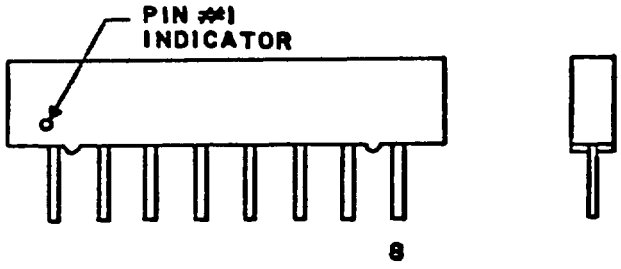
10KX4 SIP NETWORK
608-3-103G OR 764-3-R10F

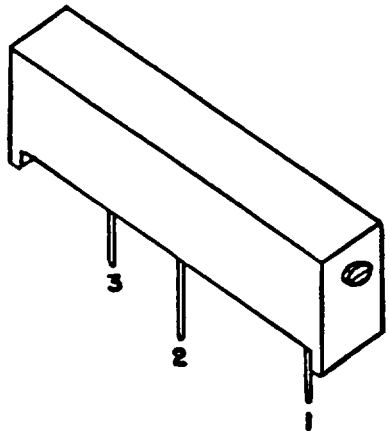




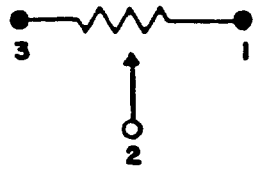


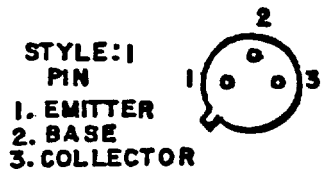
100KX 7 SIP NETWORK
608-1-104G

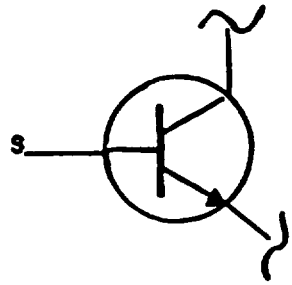




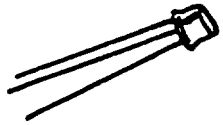
3006P-1-102 -1K POT.
3006P-1-103 -10K POT.
3006P-1-105 -1MEG POT.

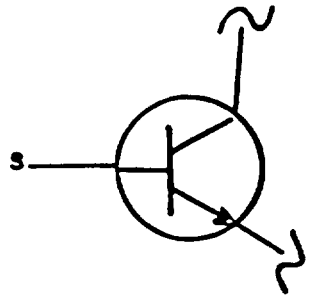






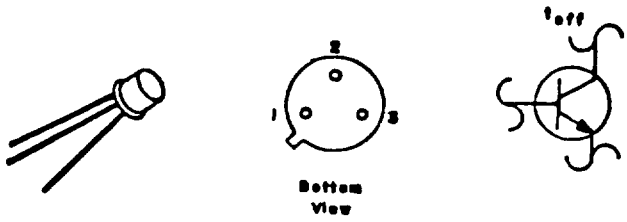
TO-5 2N2905





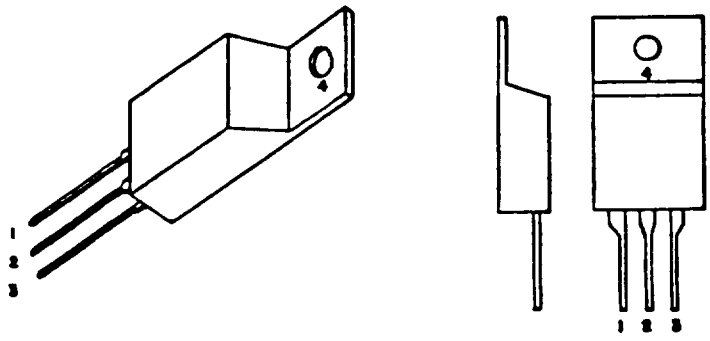
TO-18 2N2222A

TO-18 2N2907A



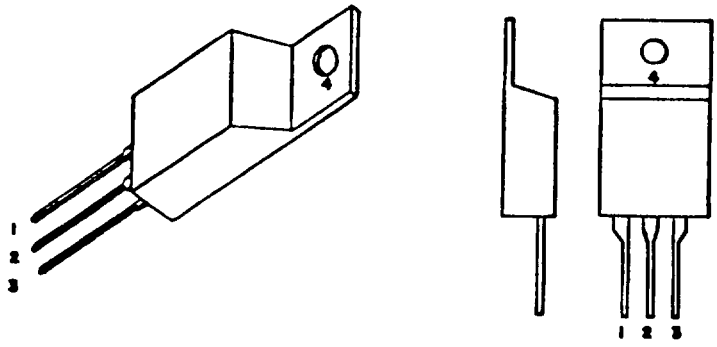
STYLE 1
PIN 1. EMITTER
2. BASE
3. COLLECTOR

IRF532



STYLE 3
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

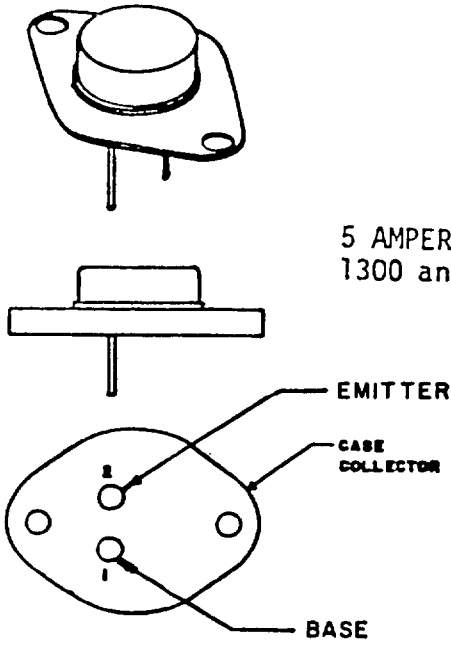
STYLE 1
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR



STYLE 1
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

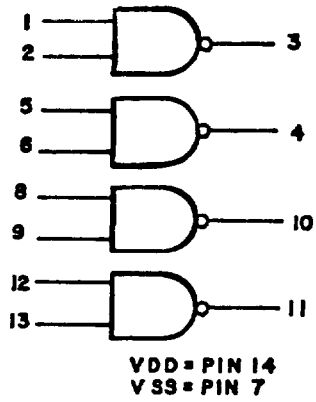
STYLE 2
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

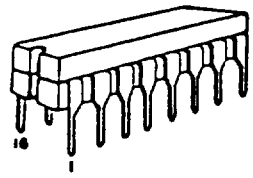
POWER TRANSISTOR
PNP TO-220
TIP 30



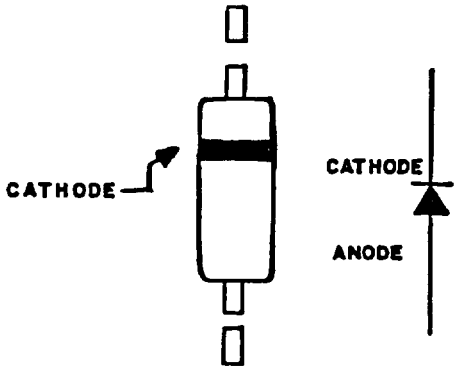
5 AMPERE
1300 and 1500 VOLTS

HORIZONTAL DEFLECTION TRANSISTOR
BU208

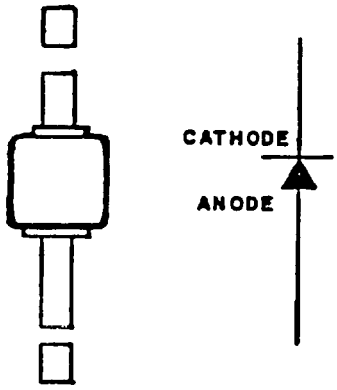




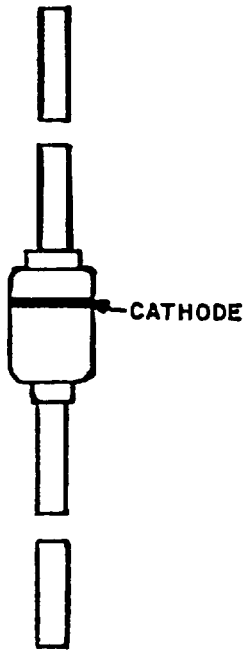
QUAD 2-INPUT NAND GATE
MC14011UBC



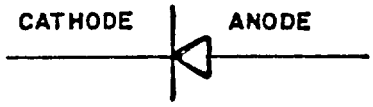
HIGH CONDUCTANCE ULTRA FAST
SWITCHING DIODE
IN914

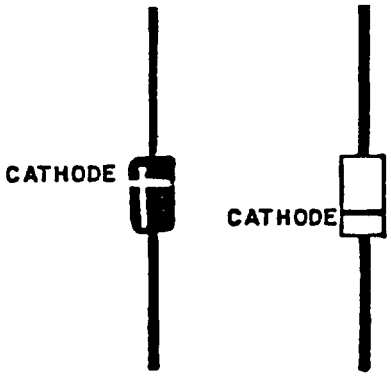


SILICON RECTIFIERS
14003 200V

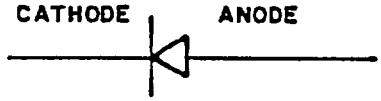


SILICON RECTIFIERS
IN4004 400V

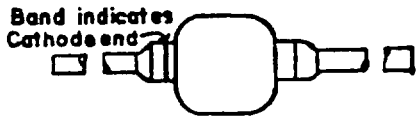


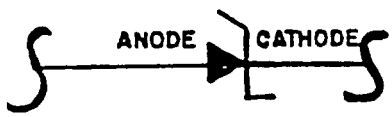


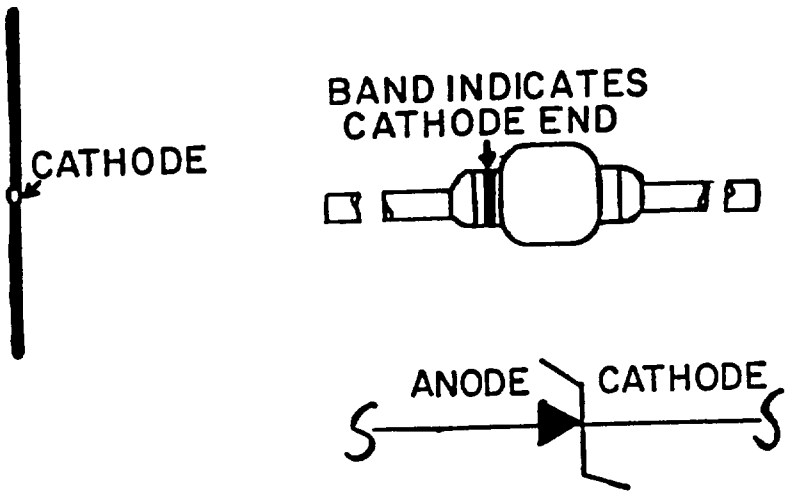
FAST RECOVERY RECTIFIER
600 V IN4946 OR IN5619



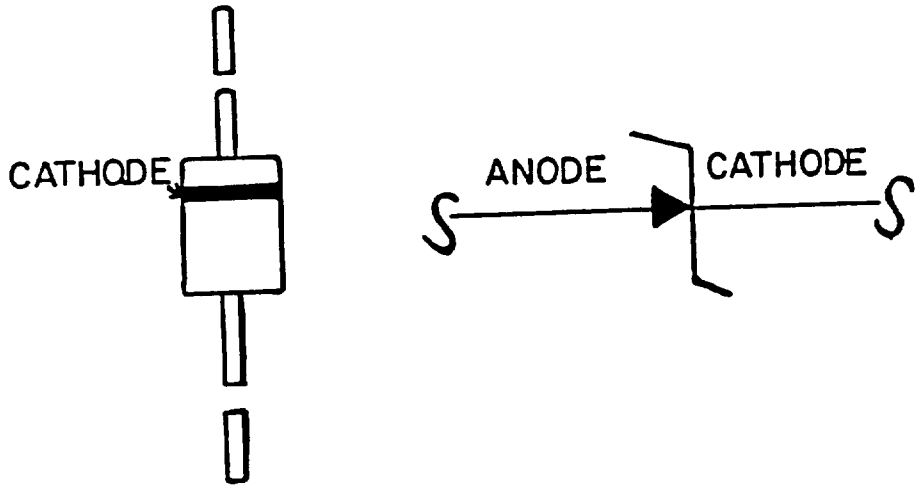
POWER ZENER
UZ8710



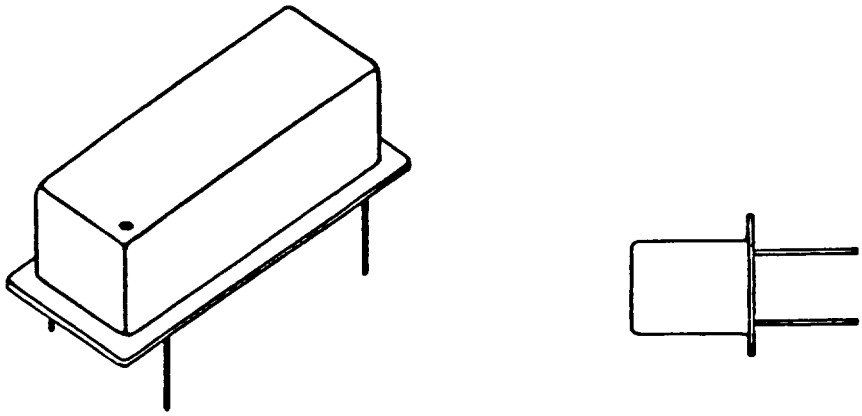




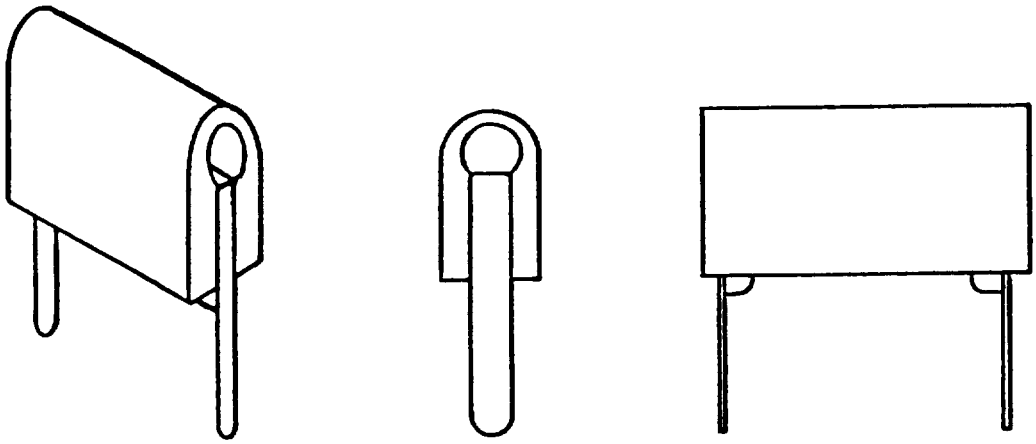
POWER ZENER
UZ8790



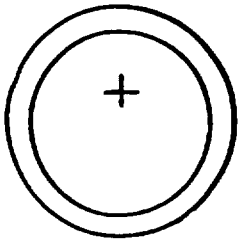
ZENER DIODE
IN751A 5.1V



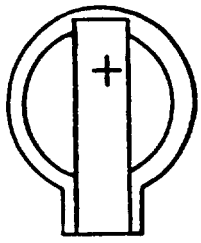
K115A 2.5 MEG.
CRYSTAL OSCILLATOR.



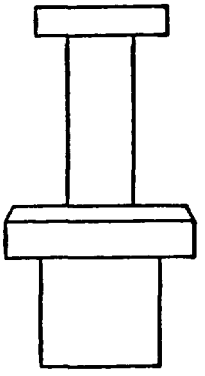
TEST POINTS
BLK
#430



3V BATTERY
DL2032

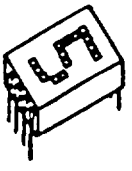


BATTERY HOLDER
BH906



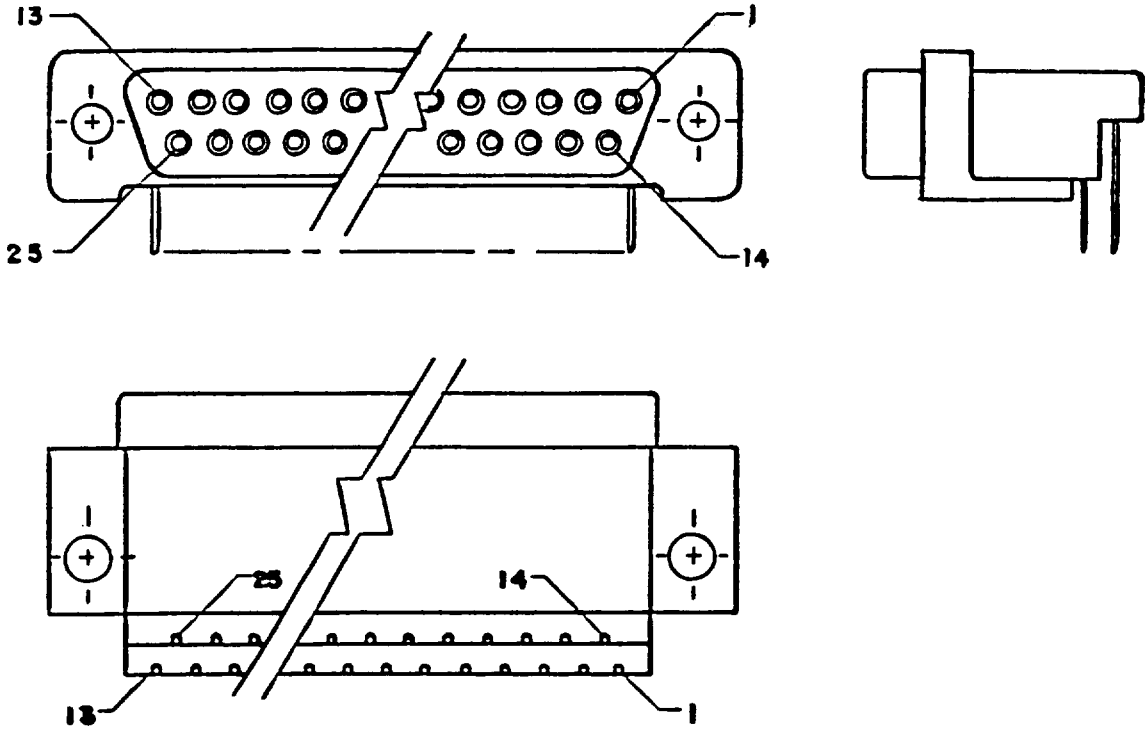
SWAGE TURRET TERMINAL
2027C

NUMERIC DISPLAY
5082-7300

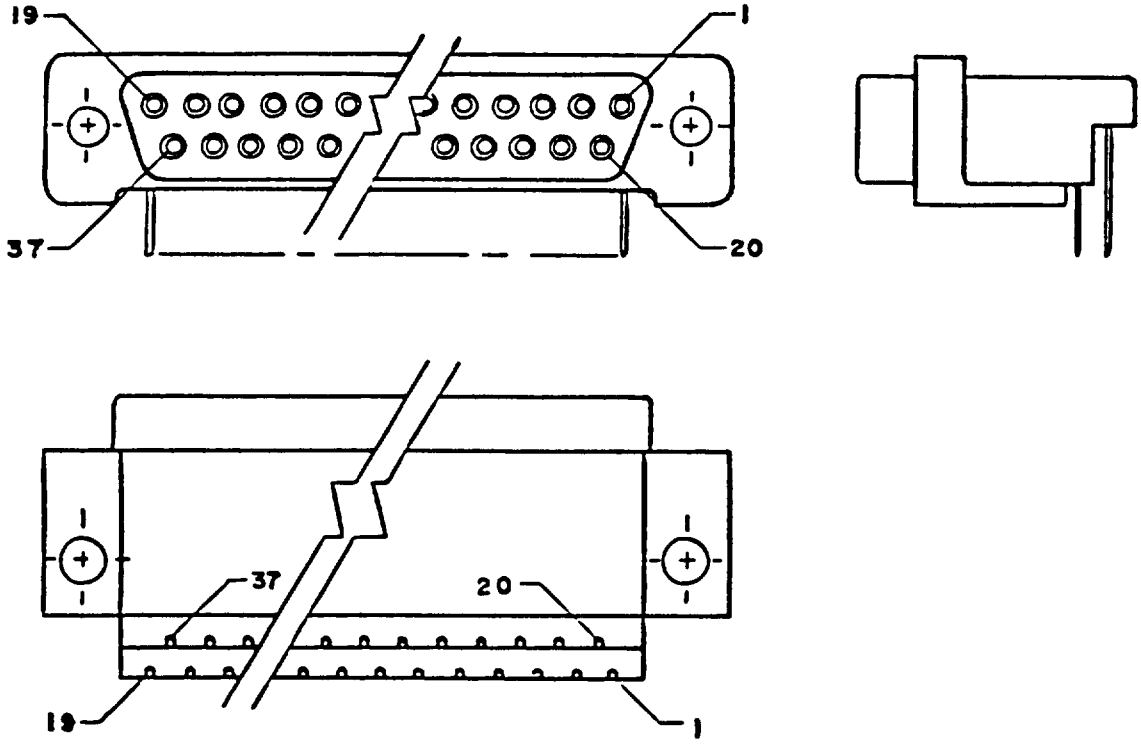


PIN	FUNCTION	
	5082	
	7300 and 7302 Numeric	7340 Hexadecimal
1	Input 2	Input 2
2	Input 4	Input 4
3	Input 8	Input 8
4	Decimal Point	Blanking Control
5	Latch Enable	Latch Enable
6	Ground	Ground
7	V_{CC}	V_{CC}
8	Input 1	Input 1

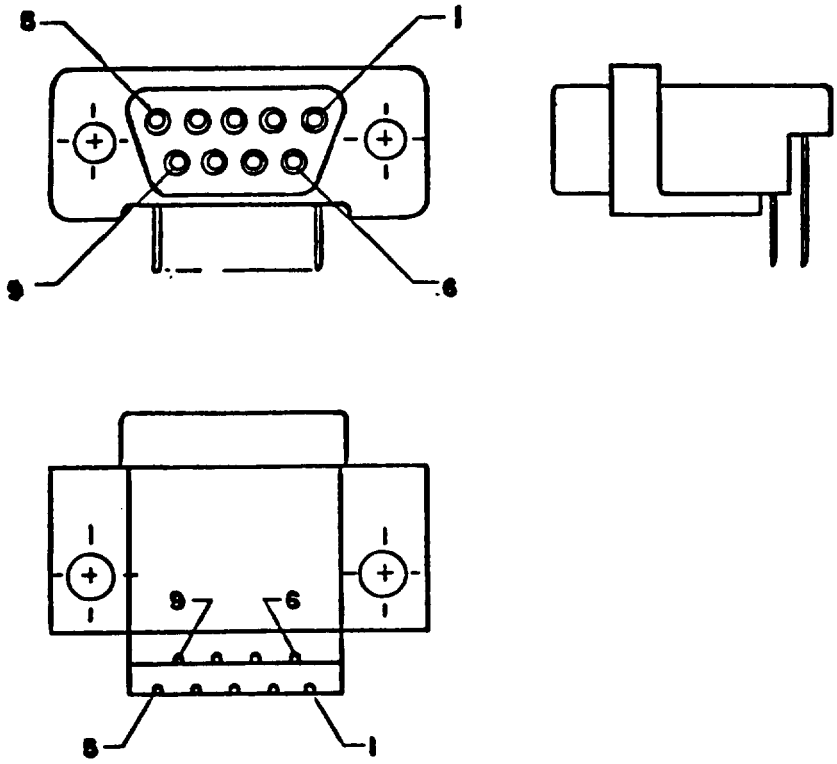
CONN. FEMALE PIN 25
H2R255T28A



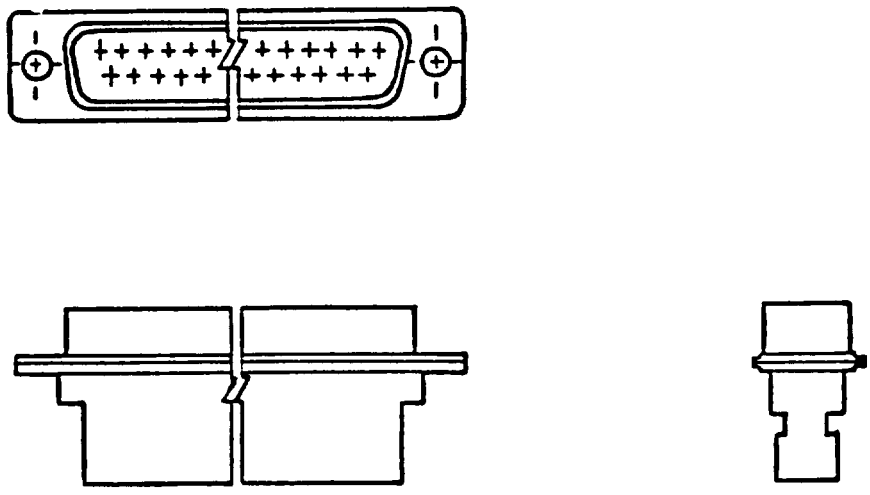
CONN. FEMALE PIN 37
H2R375T28A



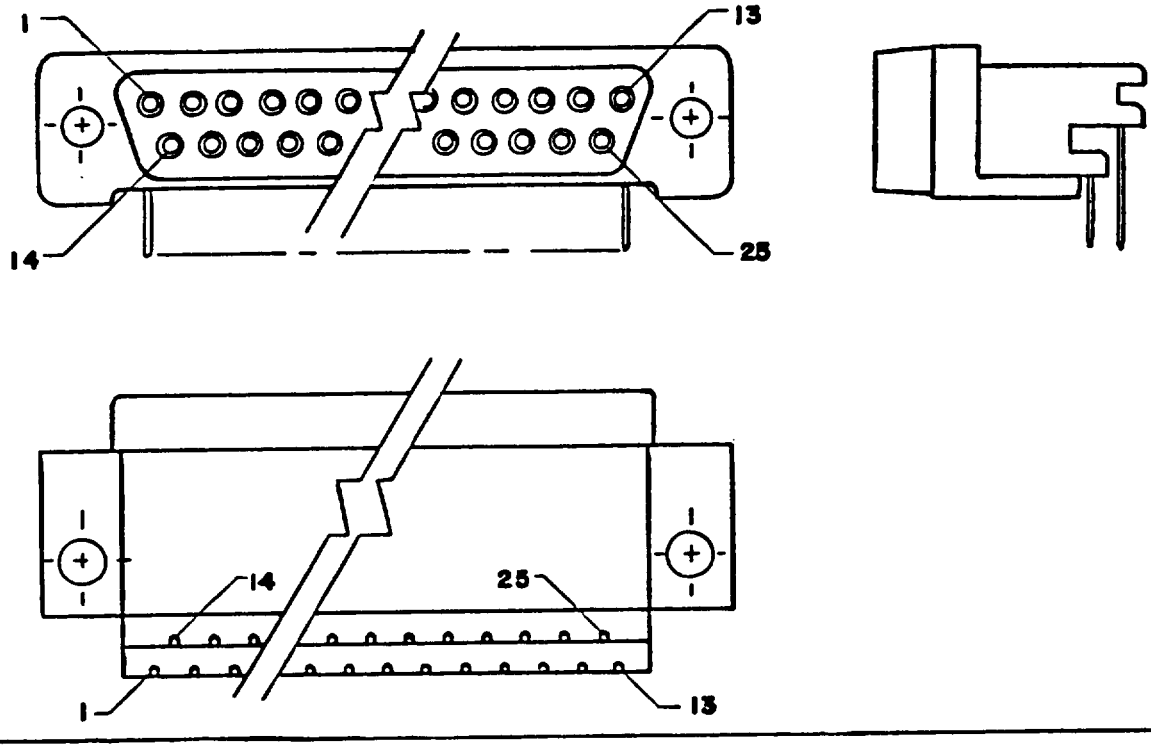
CONN. FEMALE PIN 9
H2R09RA28A



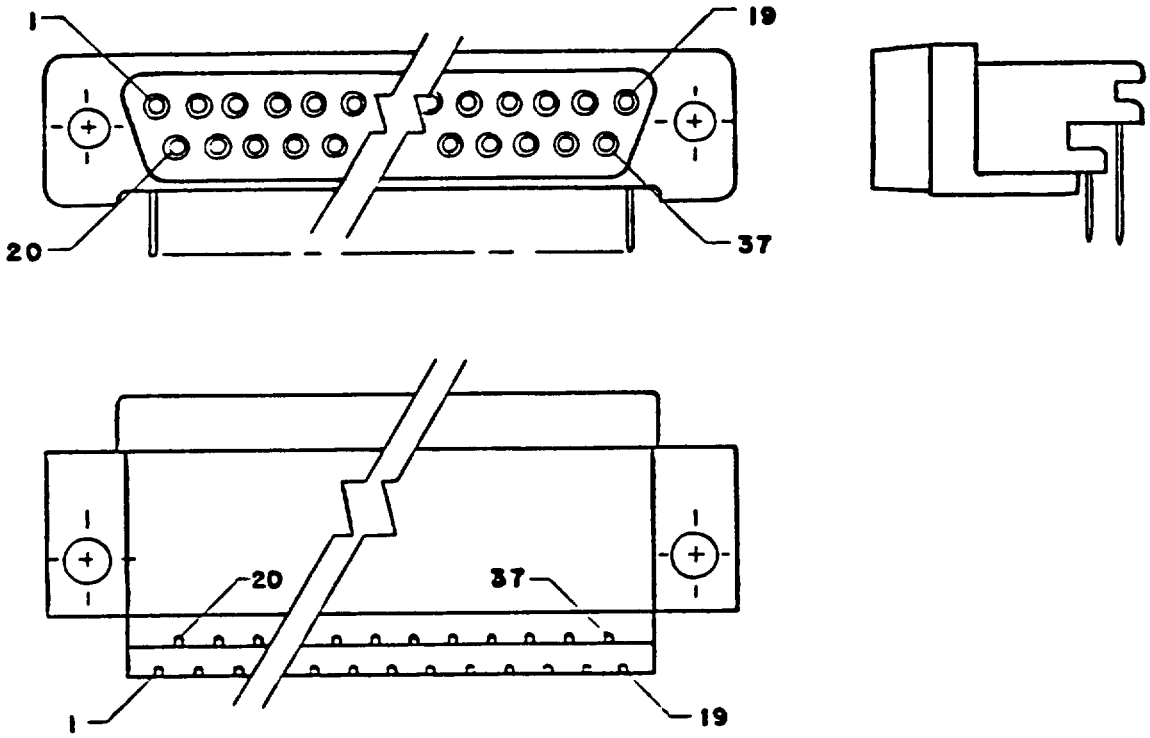
CONN. FEMALE
745203-6



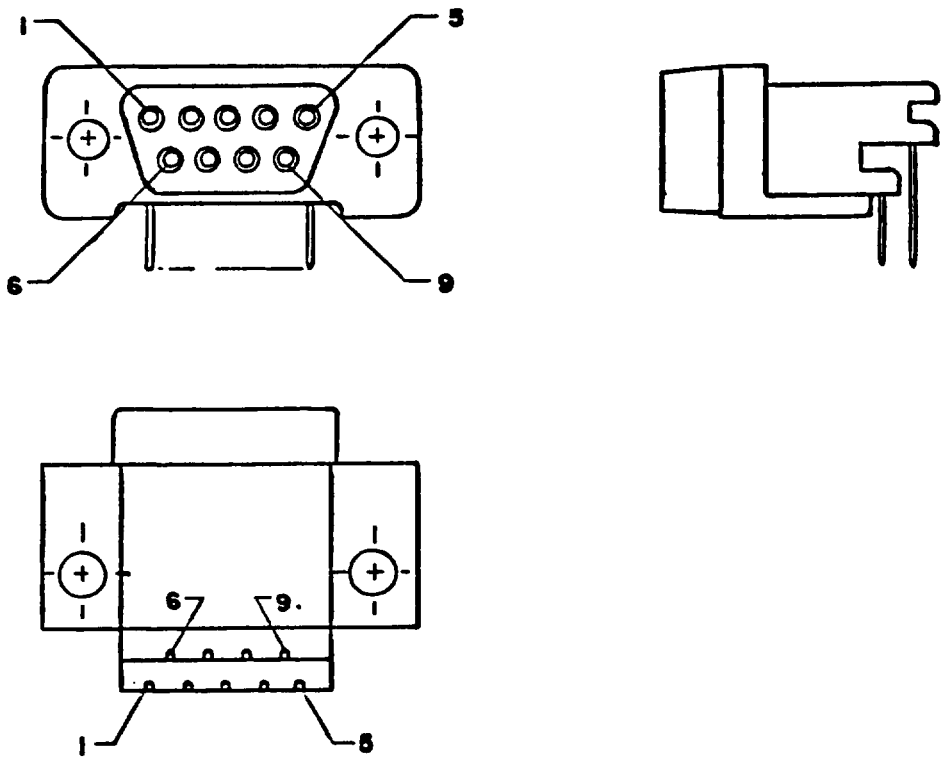
CONN. MALE 25 PINS
H2M25RA28A

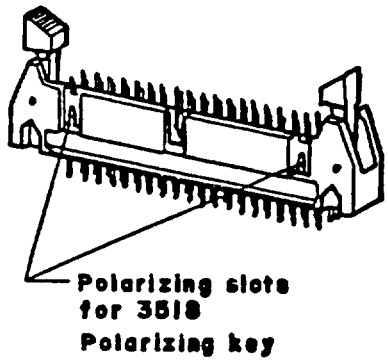


CONN. MALE 37 PINS
H2M37RA28A

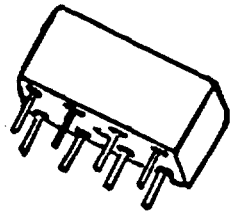


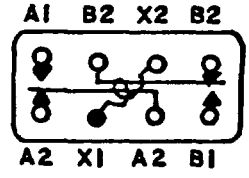
CONN. MALE 9 PINS
H2M09RA28A





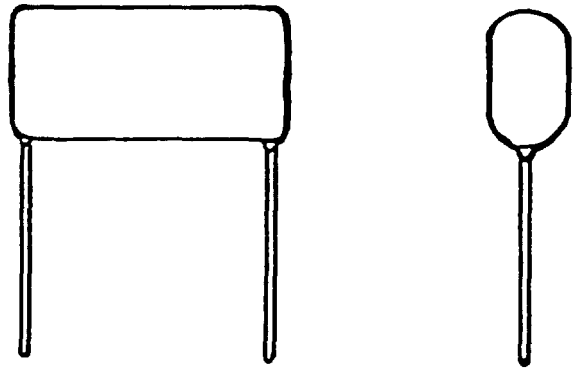
RA HEADER 60 PIN
3372/1202

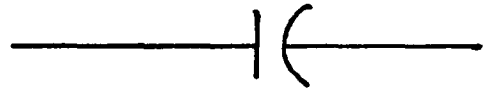




BOTTOM VIEW

RELAY
M39016/16-116L

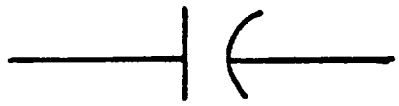


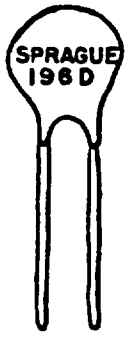


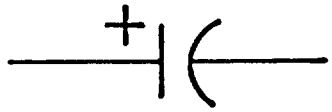
CAP. .05AF 600V±10%
6PS-S50

NON POLAR

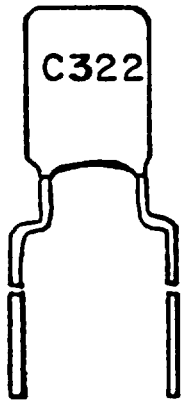
CAPACITOR TYPE MF
.1UF 100V±5%
104J0LMF400A5



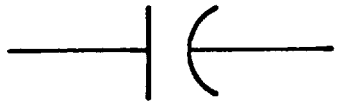




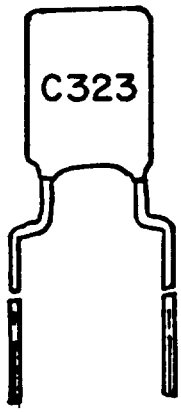
TANTALUM CAPACITORS
.33UF, 20V±10%
196D334X9035HAL



NON POLAR

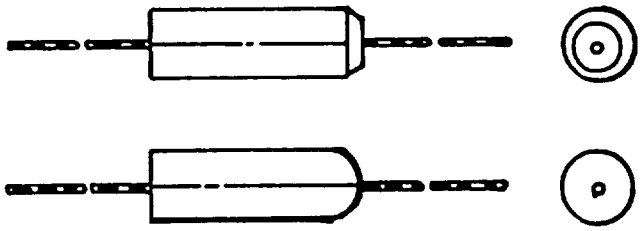


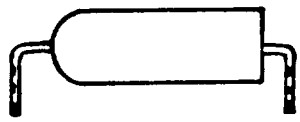
CERAMIC CAPACITORS
47 PF, 200V±10%
C322C470K2G5CA

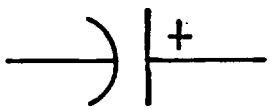


NON POLAR

C323C102M2R5CA
1000PF, 200V,±20%
C323C103K1R5CA
.01UF, 100V,±10%
C323C103K2R5CA
.01UF, 200V,±10%
C323C104K5R5CA
.1UF, 35V, ±10%
C323C104K5R5CA
.1UF, 50V, ±10%

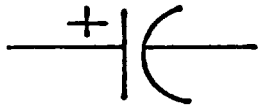






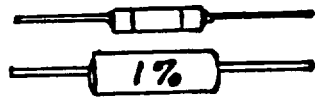
SOLID TANTALUM CAPACITORS
T310B106K020AS
10UF, 20V, ±10%
T310B106M020AS
10UF, 20V, ±20%
T310c476M020AS
47UF, 20V, ±20%

SOLID TANTALUM CAPACITORS
T362A105K020AS
1UF, 20V, ±10%
T362A225K020AS
2.2UF, 20V, ±10%
T362B106K020AS
10UF, 20V, ±10%



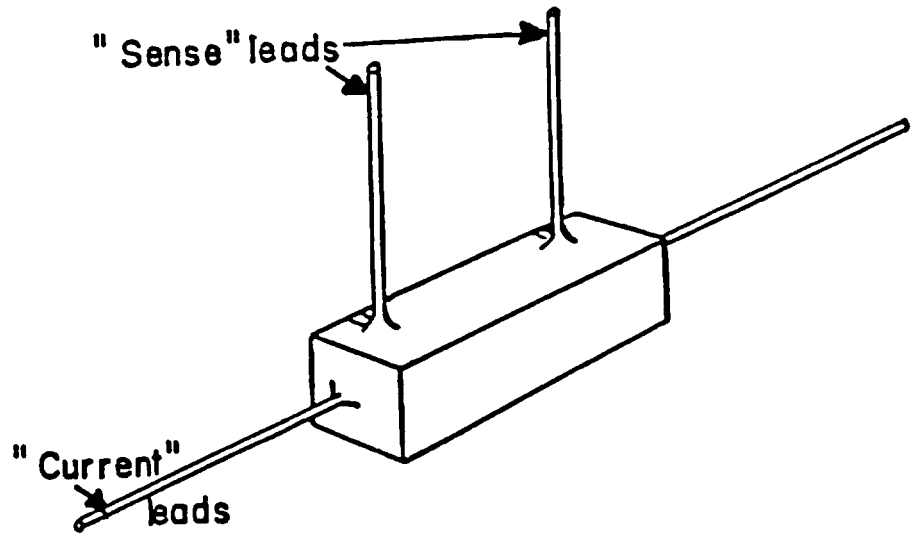
CARBON COMPOSTION RESISTORS

RC07G100JS 10Ω, ¼W, ± 5%	RC07G152J 1.5K, ¼W, ± 5%
RC07GF470J 47Ω, ¼W, ± 5%	RC07G162J 1.6K, ¼W, ± 5%
RC07GF101J 100Ω, ¼W, ± 5%	RC07G202J 2K, ¼W, ± 5%
RC07GF121J 120Ω, ¼W, ± 5%	RC07G512J 5.1K, ¼W, ± 5%
RC07G241J 240Ω, ¼W, ± 5%	RC07G682J 6.8K, ¼W, ± 5%
RC07G561J 560Ω, ¼W, ± 5%	RC07G752J 7.5K, ¼W, ±5%
RC07G102J 1K, ¼W, ± 5%	RC07G103J 10K, ¼W, ± 5%
RC07G203J 20K, ¼W, ± 5%	RC07G513J 51K, ¼W, ± 5%
RC07G223J 22K, ¼W, ± 5%	RC07G563J 56K, ¼W, ± 5%
RC07G303J 30K, ¼W, ± 5%	RC07G623J 62 K, ¼W, ± 5%
RC07G393J 39K, ¼W, ± 5%	RC07G104J 100K, ¼W, ± 5%
RC07G473J 47K, ¼W, ± 5%	RC07G185J 1.8 MEG, ¼W, ± 5%

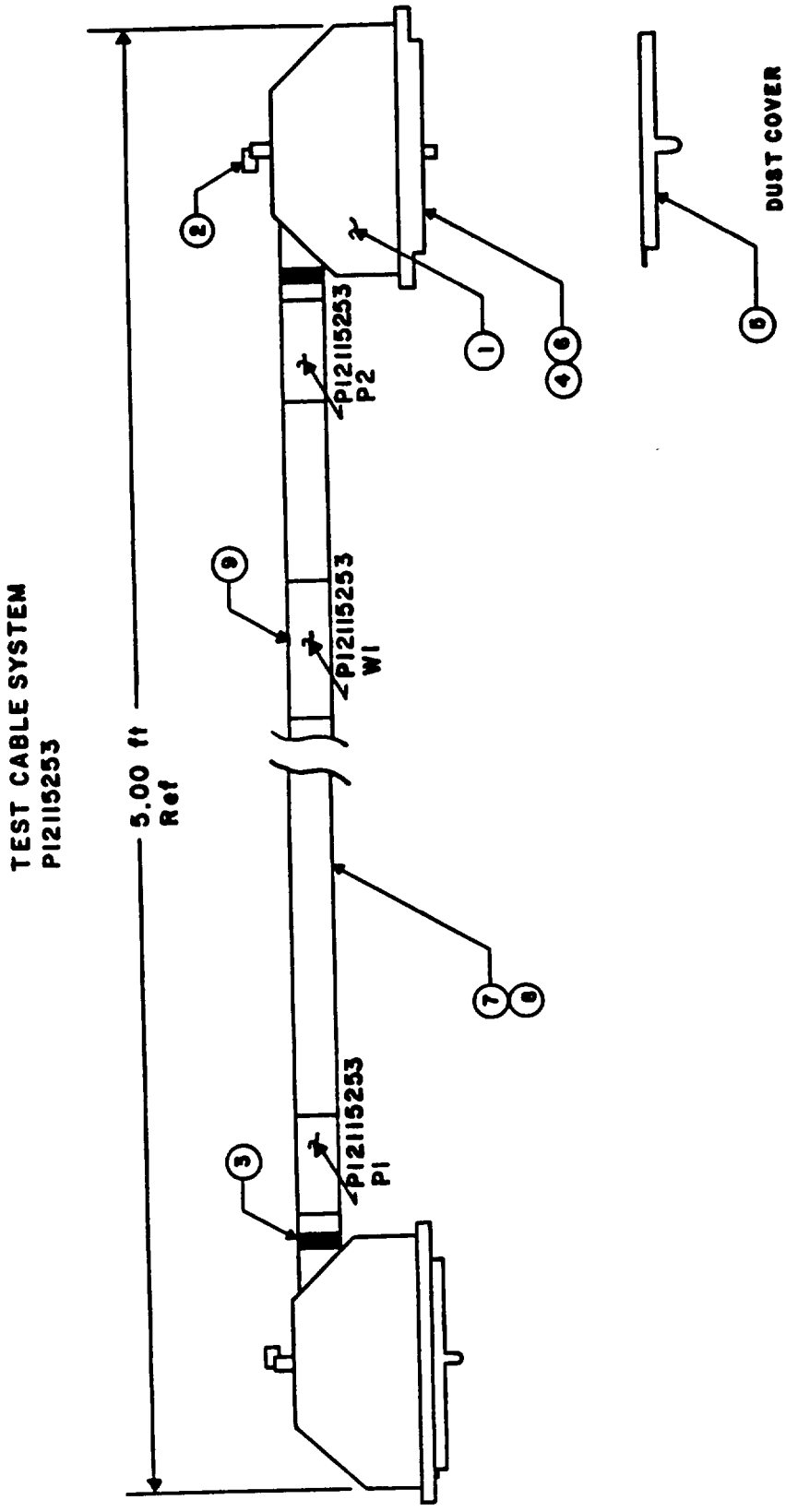


Precision Resisitors

RNC55H10RDFS
10Ω, 1/8W, ± 1%
RNC55H4993FS
499K, ½W, ±1%
RNC55H11FS
5.11K, 1/8W, ±1%
RNC55H1002FS
10K, 1/8W, ±1%
RNC55H2002FS
20K, 1/8W, ±1%

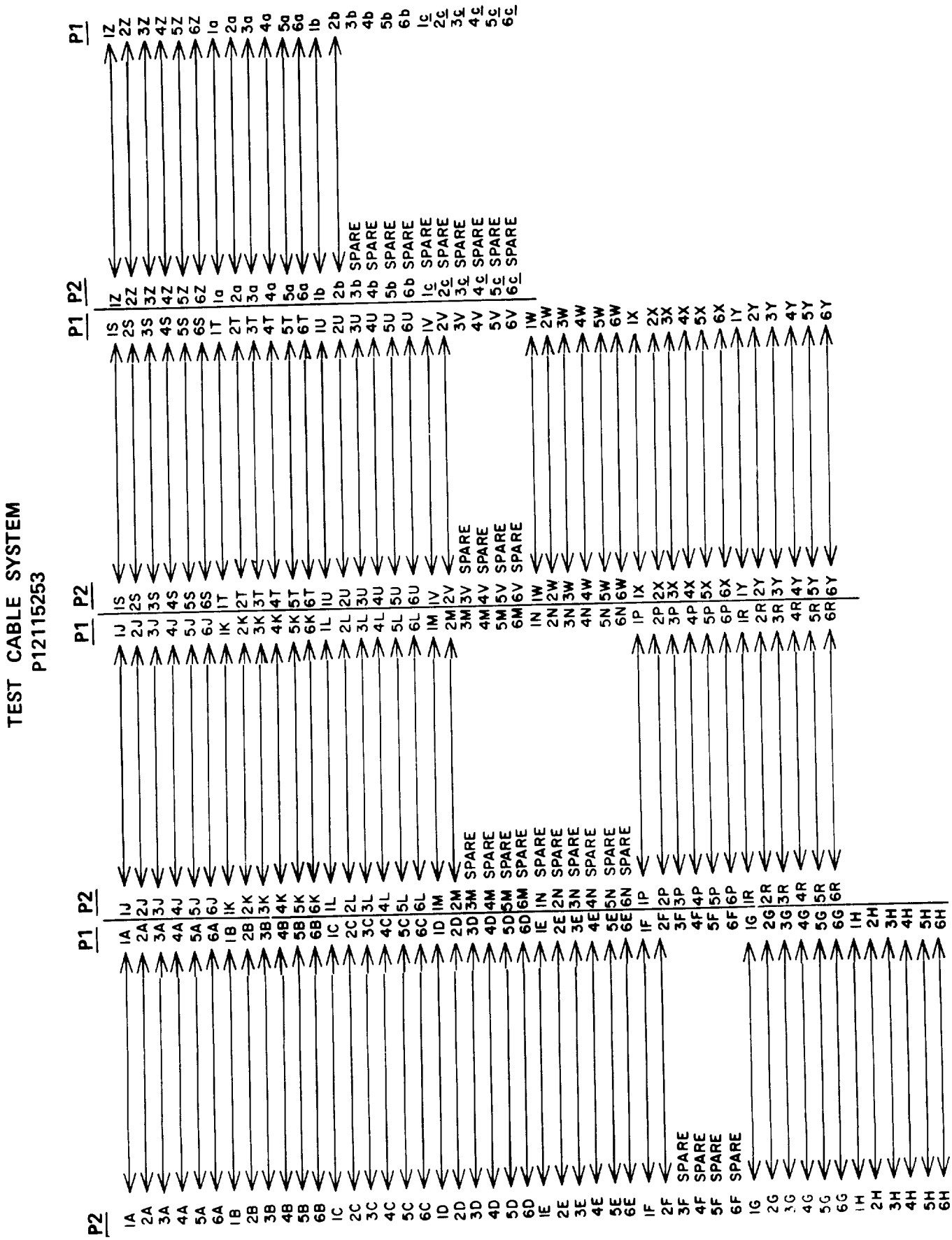


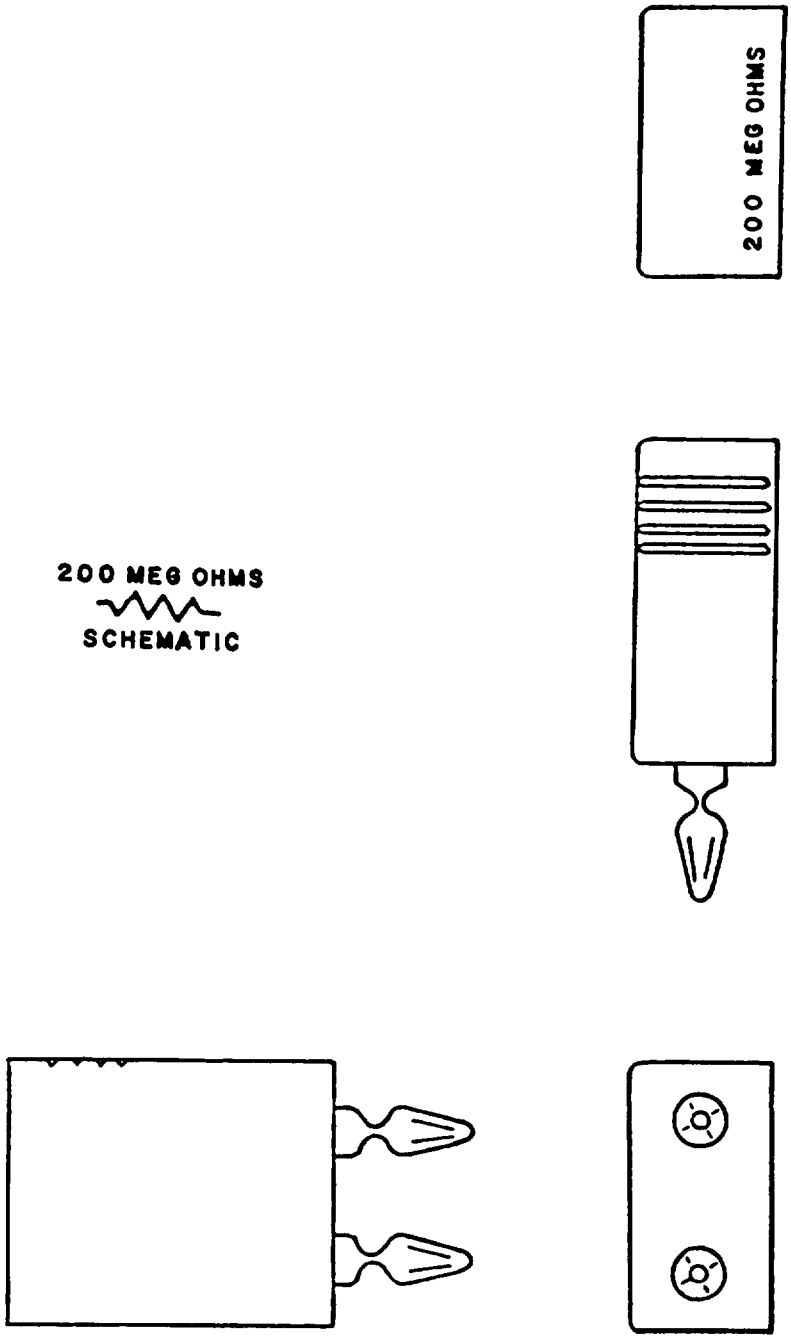
FOUR-TERMINAL CURRENT-SENSING WIREWOUNDS
4LPW-3-.01Ω


TEST CABLE SYSTEM
P12115253
5.00 ft
Ref
P12115253
P2
P12115253
W1
P12115253
P1
DUST COVER
1
2
3
4
5
6
7
8
9

SYSTEM CABLE SYSTEM P/N 12115253

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Connector Junction Shell	4050	71468	DL1-J/S
1	Connector Junction Shell	4050	71468	DL1-J/S
2	Handle, Actuating	4051	71468	DL-Handle
2	Handle, Actuating	4051	71468	DL-Handle
3	Cable Clamp	4052	71468	DL1-C/C
3	Cable Clamp	4052	71468	DL1-C/C
4	Standard Plug	4054	71468	DL1-156P
4	Standard Plug	4054	71468	DL1-156P
5	Dust Cover	4053	71468	DL1P-D/C
5	Dust Cover	4053	71468	DL1P-D/C
6	Contacts (256 each)	4055	71468	030-2064-014
7	Wire #22AWG/EE	4034	4G874	EE2219-9
8	Sleeving, Black	4056	81851	PT STD 1-1/4
9	Marker, Cable	4057	06383	MP 150 C
9	Marker, Cable	4057	06383	MP 150 C

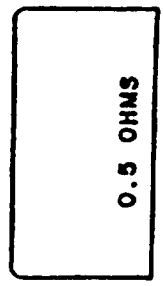

TEST CABLE SYSTEM
P12115253
P1
P2
P1 P2
P1 P2
P1 P2
P1 P2
P2
SPARE
SPARE
SPARE
SPARE

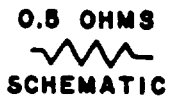


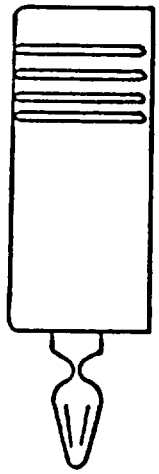
200 MEG OHMS MODULE ASSEMBLY
P 12115243

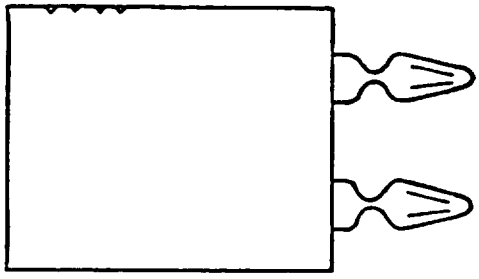
200 MEGOHM MODULE ASSEMBLY P12115243-1

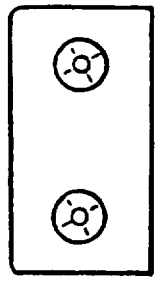
ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
1	Module	4107	24253	2096
2	10 MEG Resistors (20 Reqd.)	4108	01121	CF 1/4 10 MEG









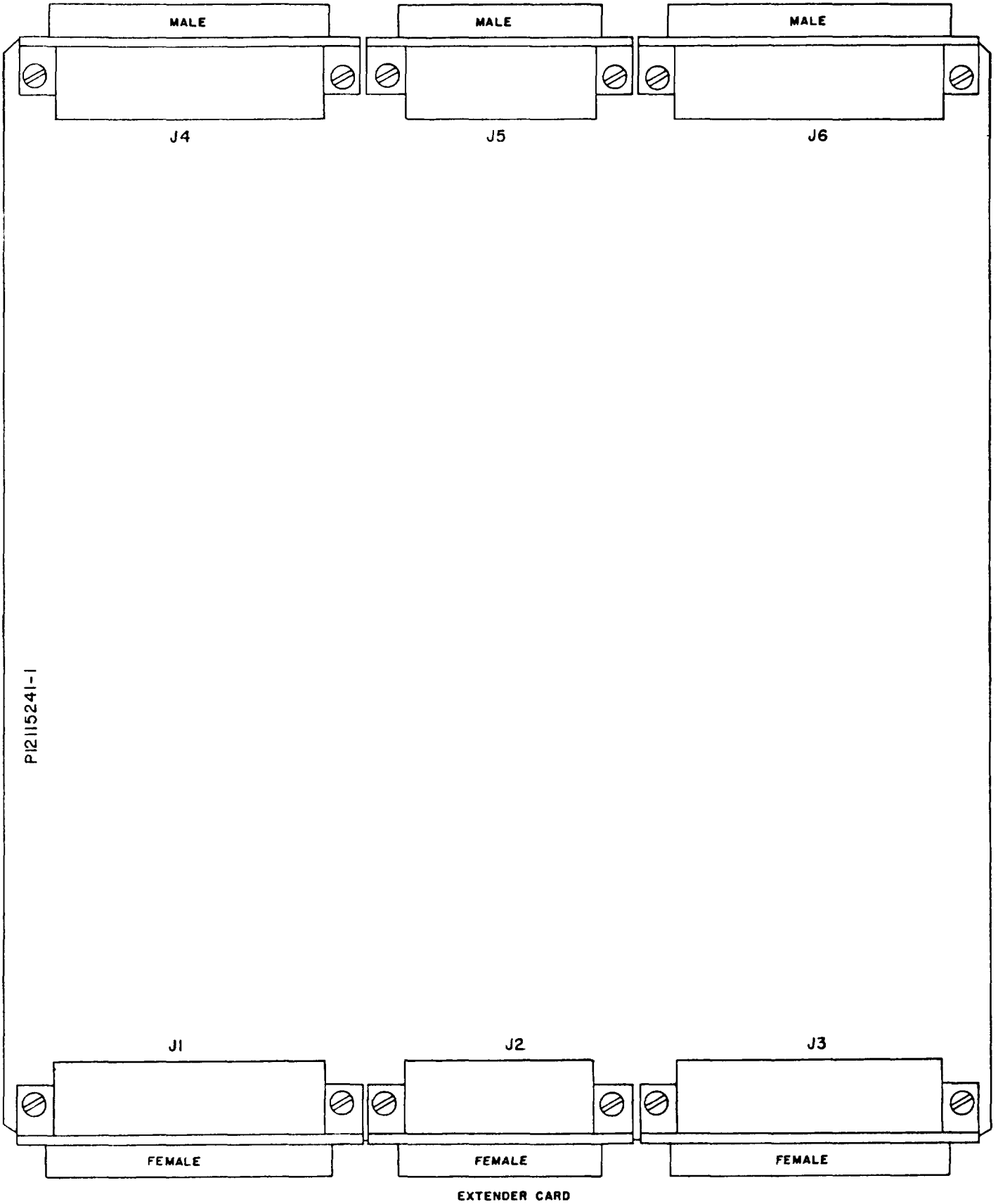


0.5 OHM ASSEMBLY MODULE

P12115216-1

0.5 OHM ASSEMBLY MODULE P12115216-1

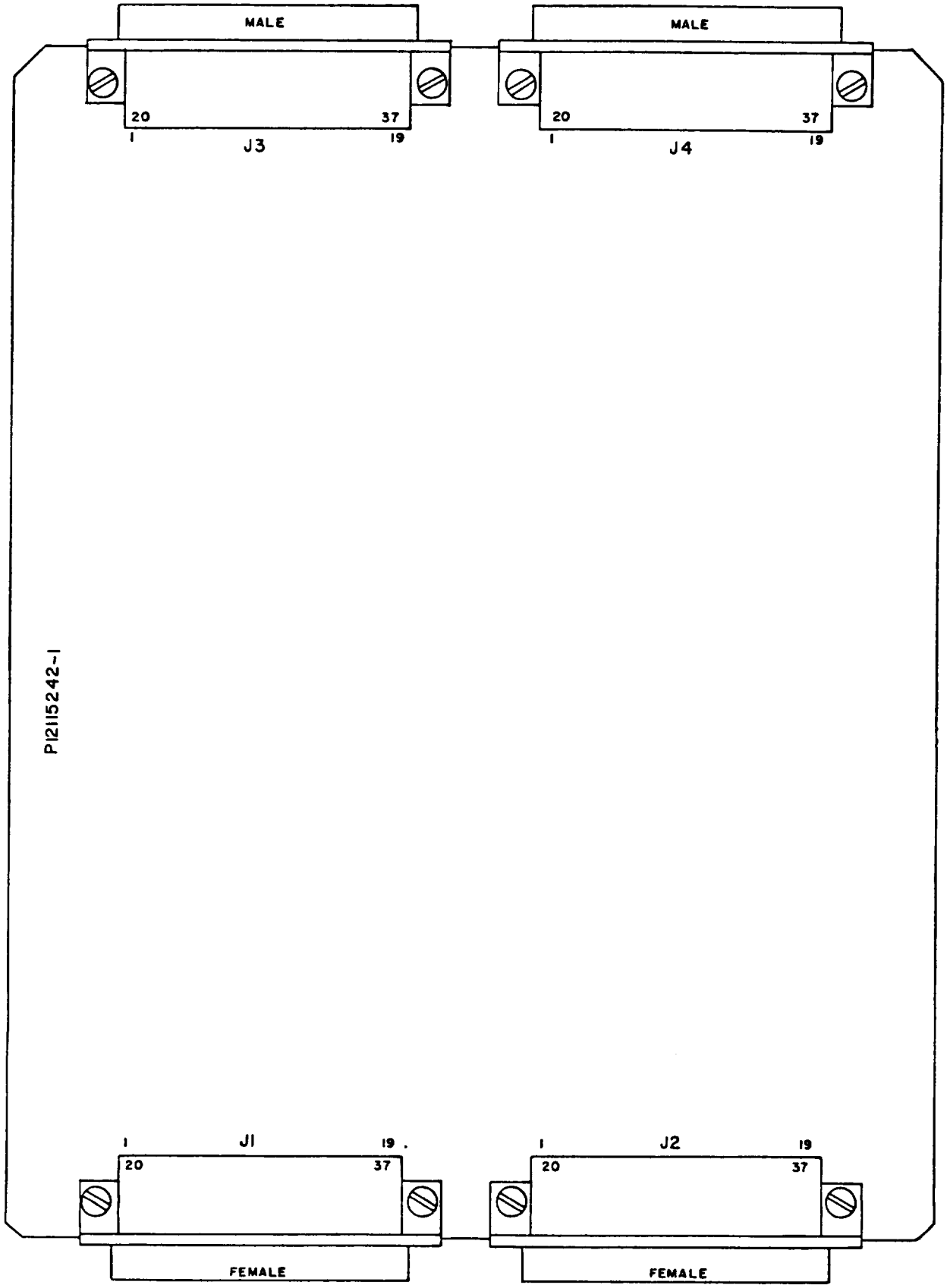
ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
1	Module	4107	24253	2096
2	0.5 OHM Resistor (1 Reqd.)	4106	01121	TX155, .5Ω,1%



EXTENDER CARD
RELAY CIRCUITS

EXTENDER CARD (RELAY) P/N P12115241

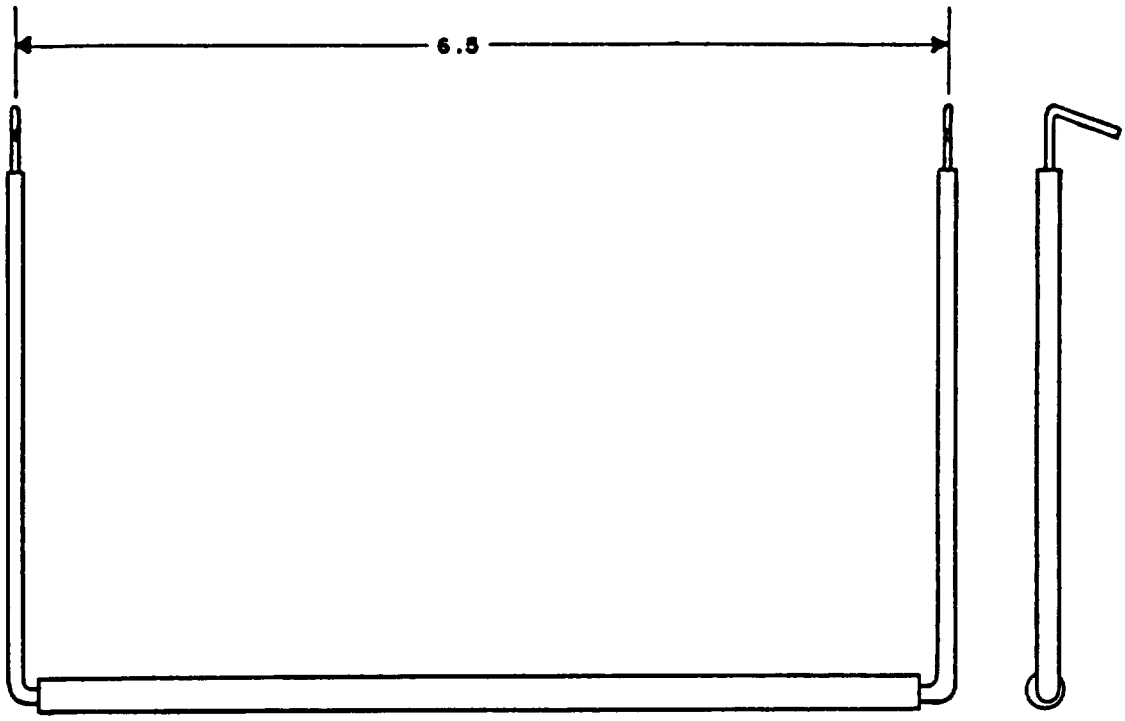
ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
J1	Conn. 37 Pin Recpt.	4005	7G413	H2R37RA28A
J2	Conn. 25 Pin Recpt.	4003	7G413	H2R25RA28A
J3	Conn. 37 Pin Recpt.	4005	7G413	H2R37RA28A
J4	Conn. 37 Pin Plug	4004	7G413	H2M37RA28A
J5	Conn. 25 Pin Plug	4002	7G413	H2M25RA28A
J6	Conn. 37 Pin Plug	4004	7G413	H2M37RA28A
N/A	Extender Card	P12115241-3	64217	P12115241-3
N/A	Screw 2-56 X .250 (12 Reqd.)	MS51957-3	N/A	MS51957-3
N/A	Nut 2-56 (12 Reqd.)	MS35649-24	N/A	MS35649-24
N/A	Conformal Coating	MIS1O05	21223	# 65-16



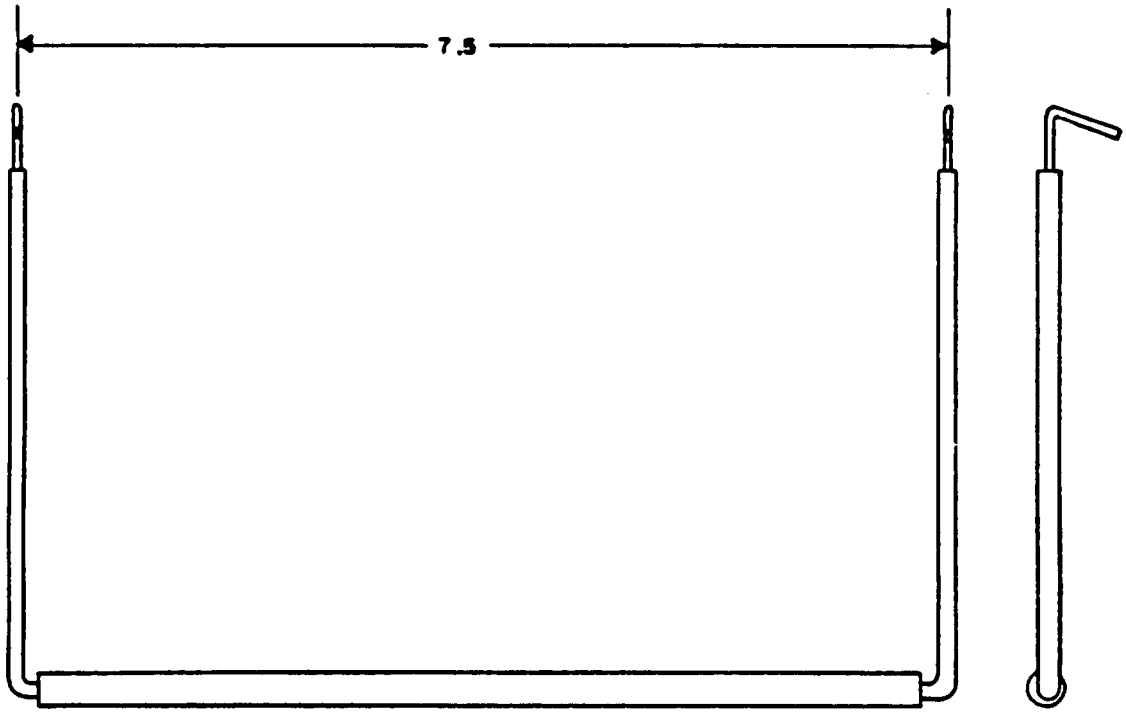
EXTENDER CARD
LOGIC CIRCUITS

EXTENDER CARD (LOGIC) P/N P12115242

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
J1	Conn. 37 Pin Recpt.	4005	7G413	H2R37RA28A
J2	Conn. 37 Pin Recpt.	4005	7G413	H2R37RA28A
J3	Conn. 37 Pin Plug	4004	7G413	H2M37RA28A
J4	Conn. 37 Pin Plug	4004	7G413	H2M37RA28A
N/A	Extender Card	P12115242-3	64217	P12115242-3
N/A	Screw 2-56 X .250 (8 Reqd.)	MS51957-3	N/A	MS51957-3
N/A	Nut 2-56 (8 Reqd.)	MS35649-24	N/A	MS35649-24
N/A	Conformal Coating	MIS1OO5	21223	# 65-16

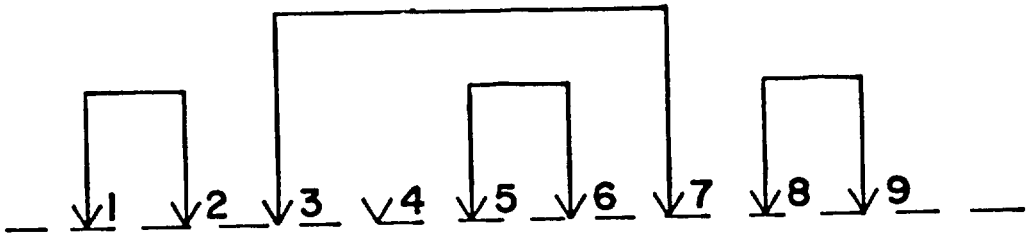


P12115374-1 EXTRACTION TOOL FOR RELAY CARDS

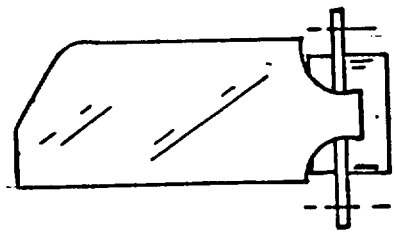


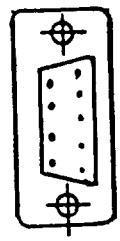
P 12115374-3 EXTRACTION TOOL FOR LOGIC CARDS

ASSEMBLY
RELAY CARD SIMULATOR
TEST UNIT
P12I15229



ELECTRICAL SCHEMATIC



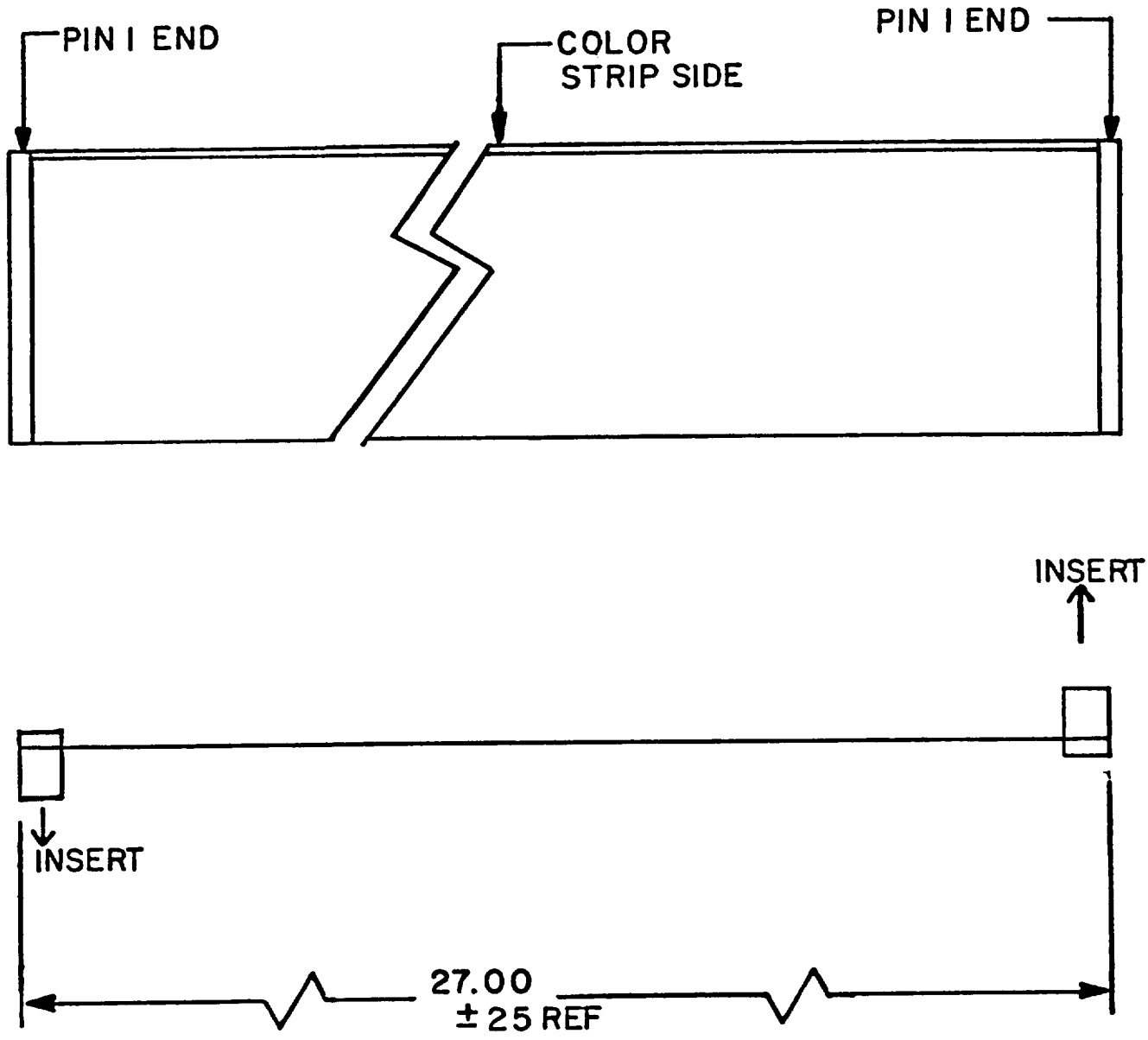


ASSEMBLY RELAY CARD SIMULATOR TEST UNIT P12115229

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Plug (9 Pin)	4037	04618	205204-1
2	Pins (8 Reqd.)	4038	04618	1-6605-6-0
3	Wire #22 AWG/EE MIL-W-16878	4034	4G874	3051
4	Cable Clamp Ass'y	4098	04618	1-206478-1

FRONT PANEL INTERFACE TEST CABLE

P12115230



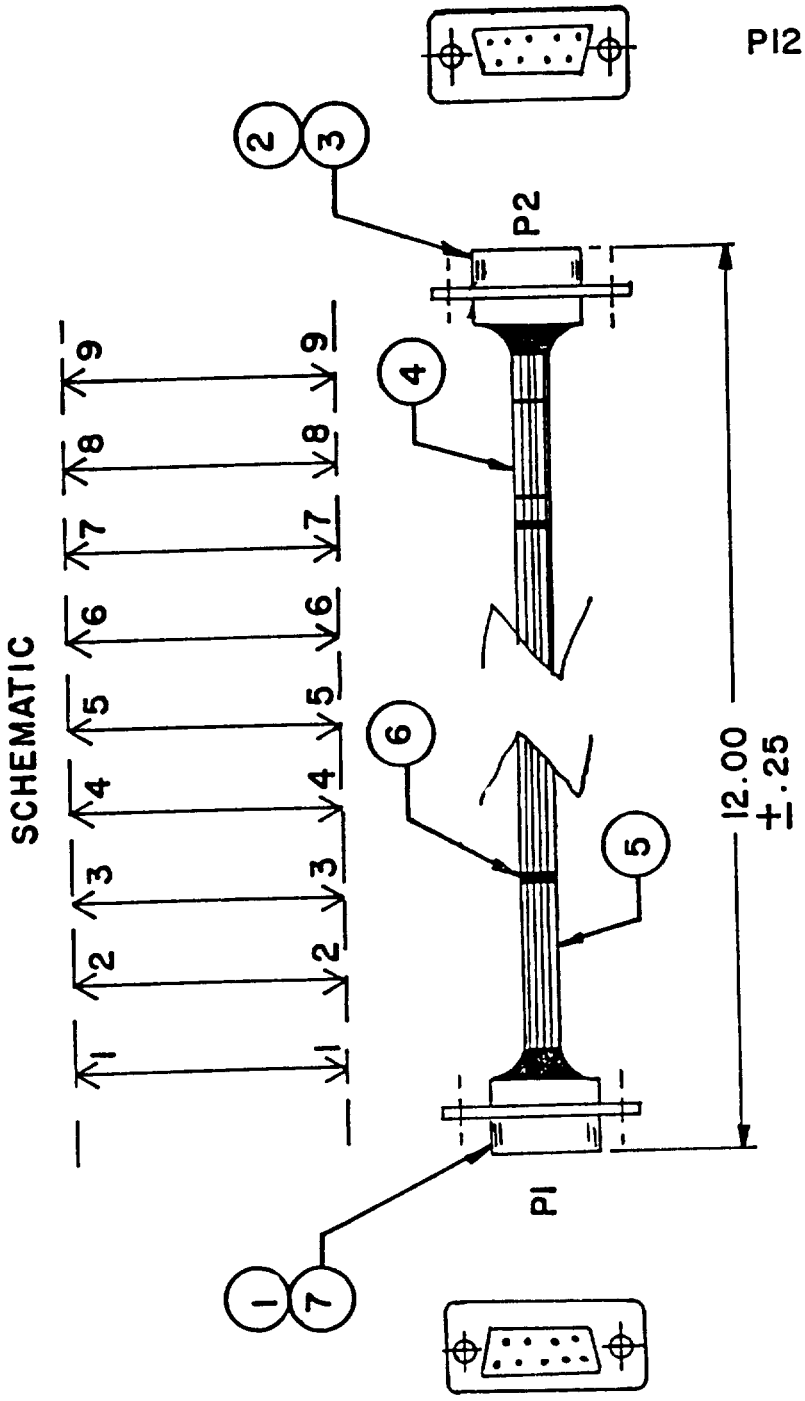
NOTE: THIS TEST CABLE IS TO BE USED
WITH EXTENDER CARD FOR TROUBLESHOOTING
FRONT PANEL INTERFACE CARD.

Assembly FRONT PANEL INTERFACE TEST CABLE P12115230

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Connector 60 Pin	4006	76381	3334
2	Connector 60 Pin	4006	76381	3334
3	Flat Cable	4013	06865	171-60-28GA

EXTENDER CARD TEST CABLE

P12115232-3



This Test Cable can be used when Troubleshooting
High Voltage Power Supply Card.

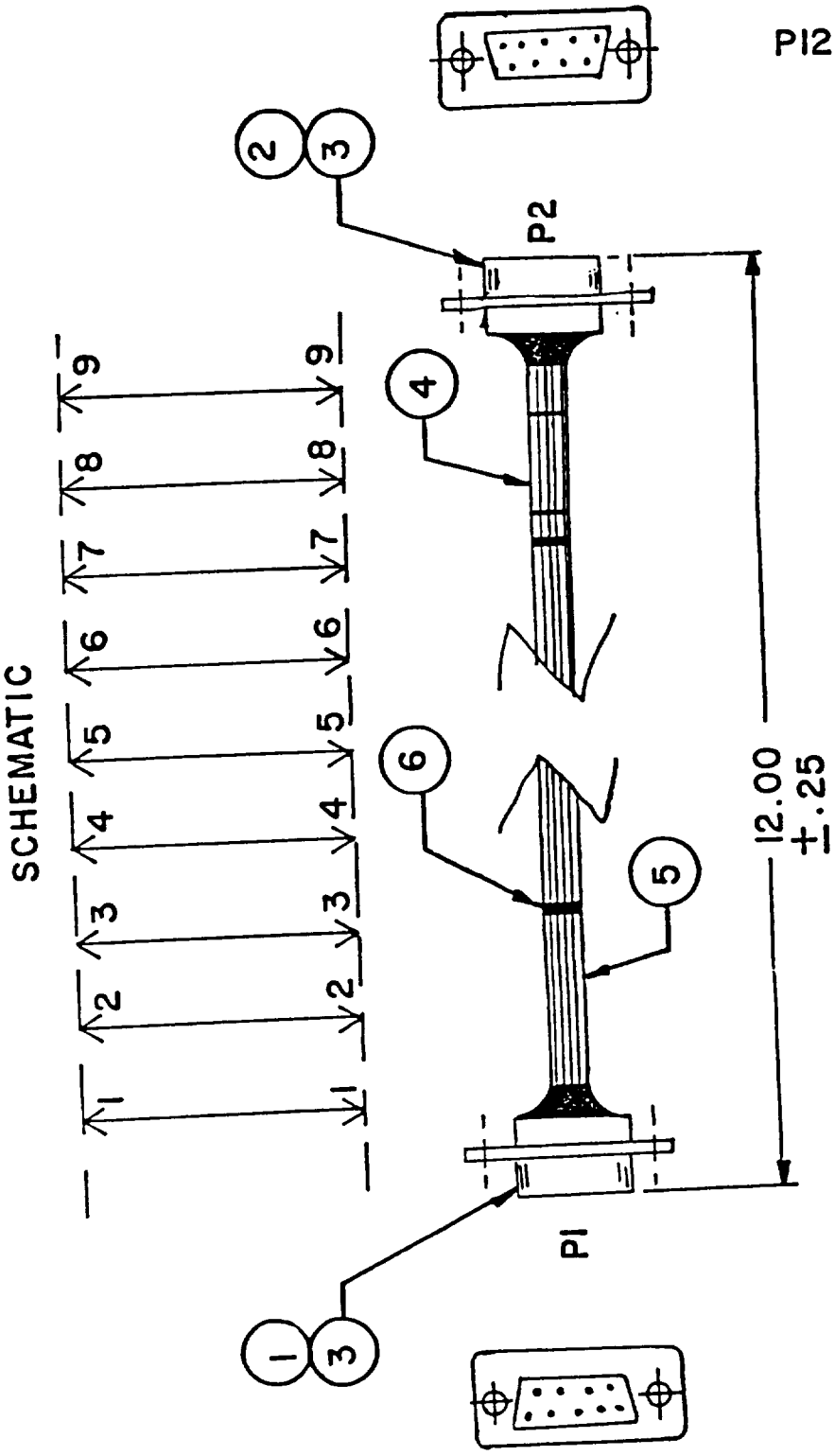
"WARNING" High Voltage Will be present when testing.

ASSEMBLY EXTENDER CARD TEST CABLE P12115232-3

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	P2 Plug (1 Reqd.)	4037	04618	205204-1
2	P1 Receptable (1 Reqd.)	4036	04618	205203-1
3	Pins (9 Reqd.)	4038	04618	1-66506-0
4	Cable Marker	4057	4G874	MP150C
5	Wire #22 AWG/EE MIL-W16878	4034	4G874	2875
6	Lacing Tape	4021	4G874	LC-136
7	Socket (9 Reqd.)	4035	04618	1-66504-0

EXTENDER CARD TEST CABLE

P12115232-1



NOTE: This Test Cable can be used when Troubleshooting Relay Cards.

ASSEMBLY EXTENDER CARD TEST CABLE P12115232-1

ITEM #	DESCRIPTION	PDC STK #	FSCM #	MFG-P/N
1	P1 Plug (1 Reqd.)	4037	04618	205204-1
2	P2 Plug (1 Reqd.)	4037	04618	205204-1
3	Pins (18 Reqd.)	4035	04618	166506-1
4	Cable Marker	4057	4G874	MP1506
5	Wire #22 AWG/EE MIL-W-16878	4034	4G874	2875
6	Lacing Tape	4021	4G874	LC-136

WARRANTY

Not withstanding any provision of any agreement the following warranty is exclusive:

PDC INC. warrants each Tester it manufactures to be free from defects in material and workmanship under normal use and service for the period of l-year from date of purchase. This warranty extends only to the original purchaser. This warranty shall not apply to fuses, disposable batteries (rechargeable type batteries are warranted for 90-days), or any product or parts which have been subject to misuse, neglect, accident or abnormal conditions of operations.

In the event of failure of a product covered by this warranty, PDC INC., will repair and calibrate Tester returned to Service Faciltiy within 1 year of the original purchase; provided the warrantor's examination discloses to their satisfaction that the product was defective. The warrantor's may, at their option, replace the product in lue of repair. With regard to Tester returned within one year of the original purchase, said repairs or replacement will be made without charge. If the failure has been caused by misuse, neglect, accident or abnormal conditions of operations, repairs will be billed at a nominal cost. In such case, an estimate will be submitted before work is started, if requested.

THE FOREGOING WARRANTY IS IN LUE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY FITNESS OR ADEQUACY FOR ANY PARTICULAR PURPOSE OR USE. PDC INC., SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT OR OTHERWISE.

If any failure occurs, the following steps should be taken:

1. Notify PDC INC., giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument, transportation prepaid. Repairs will be made at the Service Facility and the instrument returned, transportation prepaid.

SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT

All shipments of PDC INC., Testers should be made via United Parcel Service or "Best Way" prepaid. The Tester should be shipped in the original packing carton; or if it is not available, use any suitable

container that is rigid and of adequate size. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT TO ORIGINAL PURCHASER

The Tester should be thoroughly inspected immediately upon original delivery to purchaser. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument is damaged in any way, a claim should be filed with the carrier immediately. (To obtain a quotation to repair shipment damage, contact PDC INC.). Final claim and negotiations with the carrier must be completed by the customer.

PDC INC., will be happy to answer all application or use questions, which will enhance your use of this Tester. Please address your requests or correspondence to: PDC INC. P.O. BOX 3309, 104 Wholesale Ave., Huntsville Alabama 35810

*For European customers, Air Freight prepaid

PDC INC. P.O. BOX 3309 HUNTSVILLE, ALABAMA 35810

RECORD OF CHANGES

CHANGE NO.	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY

SECTION 11

1. MLRS ADAPTER SYSTEM PROCEDURES FOR TESTING
2. MLRS INTERCONNECTS FOR TESTING
3. SCHEMATICS & PARTS LIST
4. CABLES
5. MEGOHM CHARTS

"CAUTION" TEST STATUS SWITCHES S6, S7, AND S8 IN CENTER OR OFF POSITION WHEN ENTERING DATA OR FUNCTIONS WITH THUMBWHEEL SWITCH S5 OR WHEN APPLYING OR REMOVING A C POWER

MLRS ADAPTER SYSTEM PROCEDURE FOR TESTING

With the completion of 3.2.A See Page 3-l, the Model 128-A Tester is ready to attach and test the Adapter System.

STEP 1 HOOK-UP

S1)Power Switch) _____ Set to OFF

MAKE ALL CONNECTIONS AS SHOWN BETWEEN TESTER AND ADAPTER SYSTEM, (See Page 11-4) .

S3 (Memory) _____ Set to CLEAR position (center)
S5 (Thumbwheel Switch) _____ Set as shown 001 1
S6 (Test Status Switch) _____ Set to OFF position
S7 (Test Status Switch) _____ Set to HOLD position
S8 (Test Status Switch) _____ Set to OFF position

STEP 2 POWER ON PROCEDURE

S1 (Power Switch) _____ Set to ON position
METER/DISPLAY WILL ILLUMINATE
S8 (Test Status Switch) _____ Press DOWN position
This will verify all lamps will illuminate and
METER/DISPLAY will indicate (8.8.8.)

STEP 3 LEAKAGE LEVEL

S5 (Thumbwheel Switch) _____ Set as shown 025 3
S4 _____ Press ENTER to enter
METER/DISPLAY WILL INDICATE (02.5)

STEP 4 ENTERING DATA FOR CHECKOUT OF ADAPTER SYSTEM

S5 (Thumbwheel Switch) _____ Set as shown 100 4
S4 _____ Press ENTER to enter
S5 (Thumbwheel Switch) _____ Set as shown 001 5
S4 _____ Press ENTER to enter
S5 (Thumbwheel Switch) _____ Set as shown 001 7
S4 _____ Press ENTER to enter
S5 (Thumbwheel Switch) _____ Set as shown 500 8 500 VDC
S4 _____ Press ENTER TO ENTER
S5 (Thumbwheel Switch) _____ Set as shown 010 2
S6 (Test Status Switch) _____ Set HIGH VOLTAGE LEAKAGE (UP)
S8 (Test Status Switch) _____ Set to SERIES RESISTANCE CONTINUITY (UP)
S4 _____ Press RESET to reset
S7 _____ Set to RUN (Position UP)

The tester will now automatically step through 128 test positions and look for any leakage to 200 megohms in the adapter system.

STEP 4 CONTINUED

When Tester reaches circuit 129 (end of test,will show open) set switches as follows:

S7 _____ Set to hold
S6 _____ Set to OFF position
S8 _____ Set to OFF position
S4 _____ Press to reset

THE ADAPTER SYSTEM IS NOW CHECKED OUT AND THE SERIES RESISTANCE IS READY TO BE DEFINED.

STEP 5 DETERMINING SERIES RESISTANCE

INSERT 0.5 OHM RESISTOR (SEE PAGE 8-5) INTO JACKS TP-1 AND TP-2, LOCATED ON ADAPTER SYSTEM BOX (INPUT).

S5 (Thumbwheel Switch) ____ Set as shown [100|7]
Start Position 100

S4 _____ Press ENTER twice to enter

METER/DATA DISPLAY WILL INDICATE (000)

S5 (Thumbwheel Switch) ____ Set as shown [010 2]
S4 _____ Press RESET twice
METER/DISPLAY WILL INDICATE (100) (Position 100)
DEPRESS S2 DOWN 3 TIMES UNTIL DECIMAL POINT IS INDICATED ABOVE THE OHMS ARROW.

EXAMPLE: METER/DATA DISPLAY (OHMS READING)
(X.XX)

READING DISPLAYED ON METER/DISPLAY, SHOULD BE ENTERED INTO TESTER. (See Example).

EXAMPLE:

1.54 Series Resistance Measuring From Meter/Display
0.05 Tolerance
1.59 Total Series Resistance

ENTER SERIES RESISTANCE MEASURMENT INTO TESTER AS FOLLOWS:

S5 (Thumbwheel Switch) ____ Set as shown [159|4]
S4 _____ Press ENTER twice to enter
METER/DISPLAY WILL INDICATE (1.59)

After determining total series resistance (step 5) and entering total series resistance into tester, (see example), return start position to [001|7] as follows.

S5 (Thumbwheel Switch) ____ Set as shown [001|7]
S4 _____ Press ENTER twice to enter
METER/DISPLAY WILL INDICATE (000)

STEP 6 CABLE TESTING

Remove 0.50 resistor from Adapter System (input) Test Jacks TP-1 and TP-2.

Cable Test Memory can be verified or altered by using Memory Procedures Page 3-5 And 3-6

HOOK-UP CABLE TO BE TESTED

S5 (Thumbwheel Switch)_____ Set as shown 010 2
S6_____ Set to HIGH VOLTAGE LEAKAGE
S8_____ Set to SERIES RESISTANCE CONTINUI
S4_____ Press RESET to reset
S7_____ Set to RUN position

STEP 7 COMPLETION OF TESTING

At end of test, set switches as follows:

S7_____ Set to HOLD position
S6_____ Set to OFF position
S8_____ Set to OFF position
S4_____ Press to reset

NOTE: Operator is now ready for more tests.

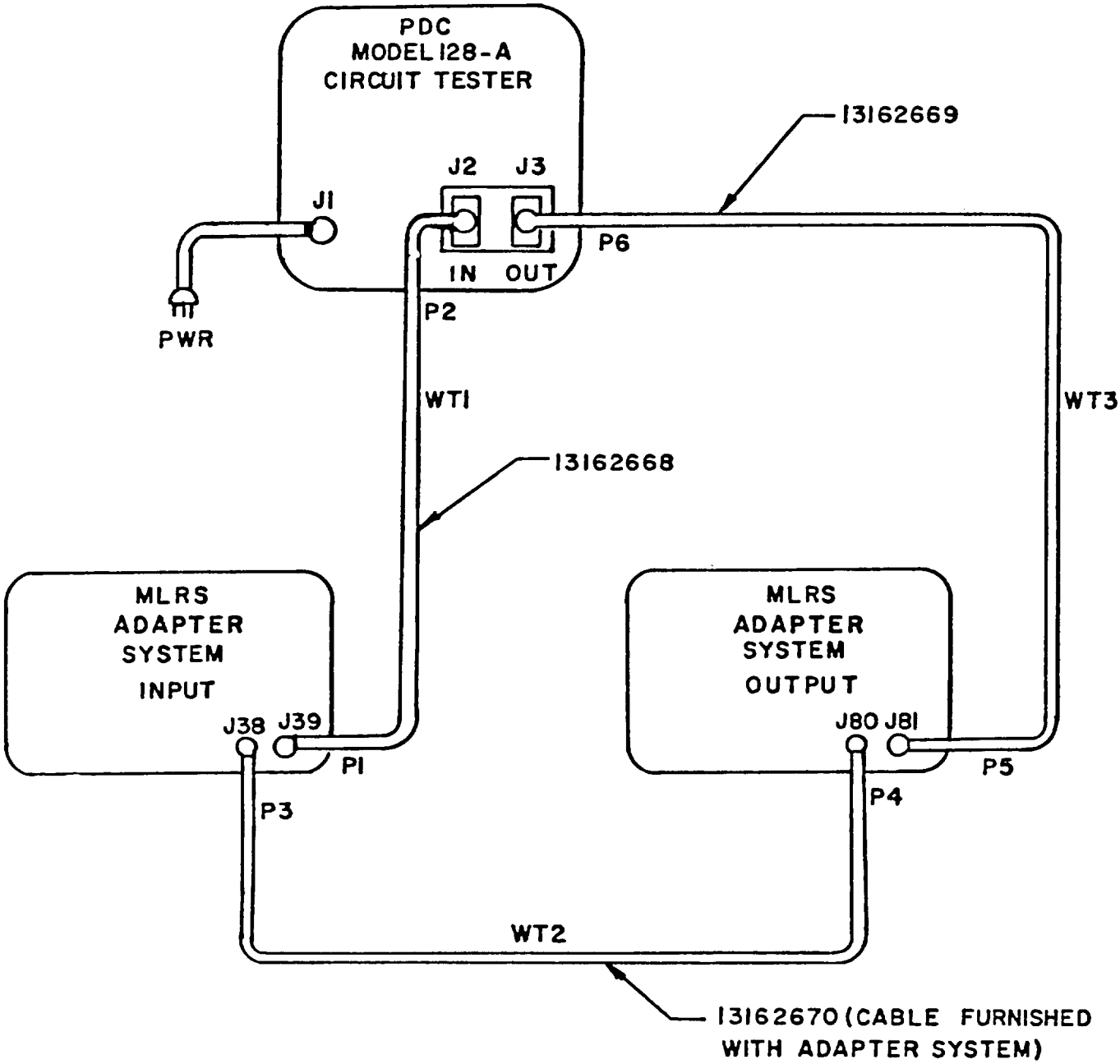
STEP 8 TURNING UNIT OFF

After completion of testing for the day.

S7_____ Set to HOLD
S6_____ Set to OFF
S8_____ Set to OFF
S1_____ Set to OFF

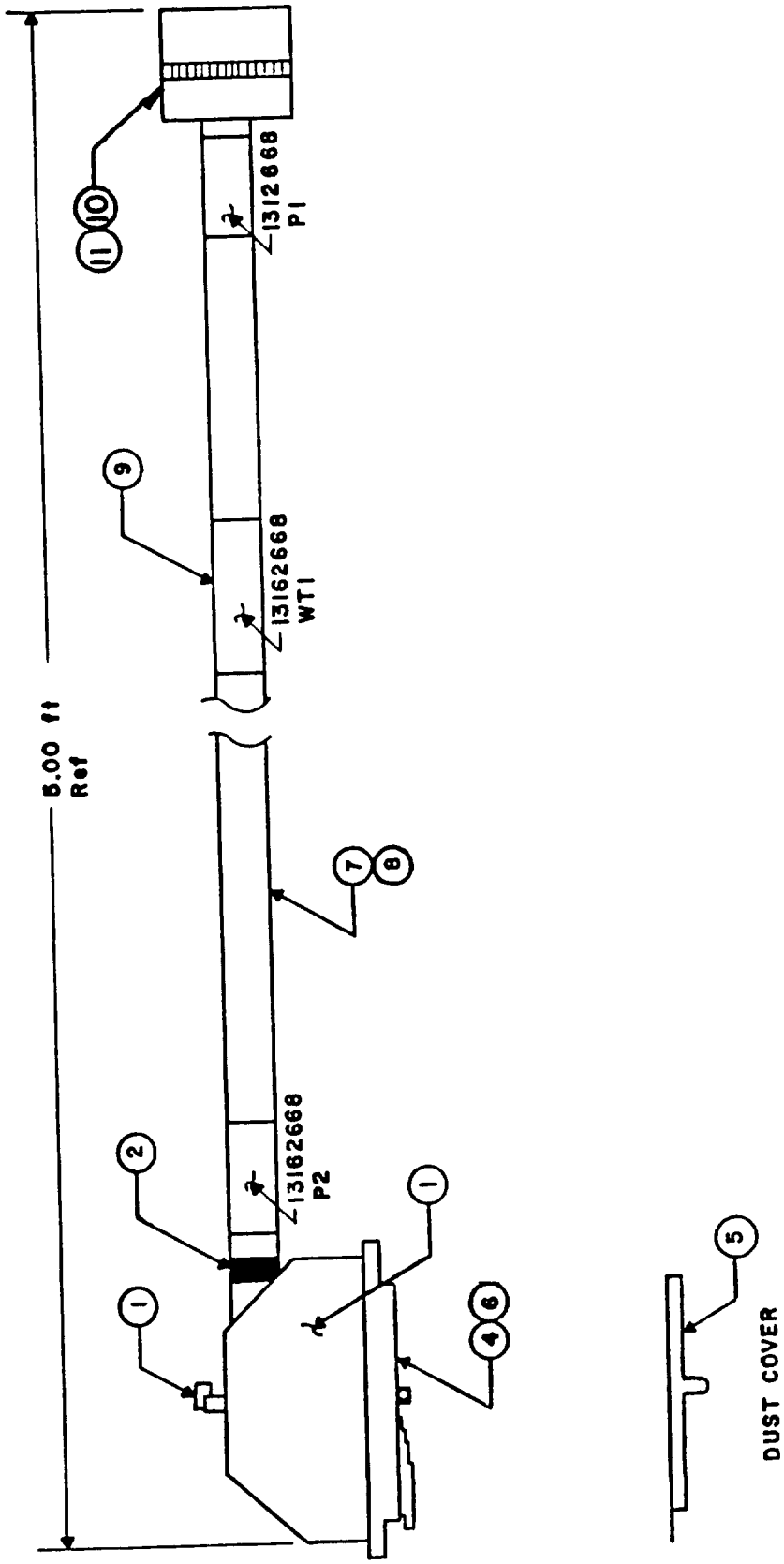
UNPLUG POWER CORD

NOTE: The TESTER COVER must be mounted in place when not in use to insure keeping Tester free of dirt, dust and foreign material.



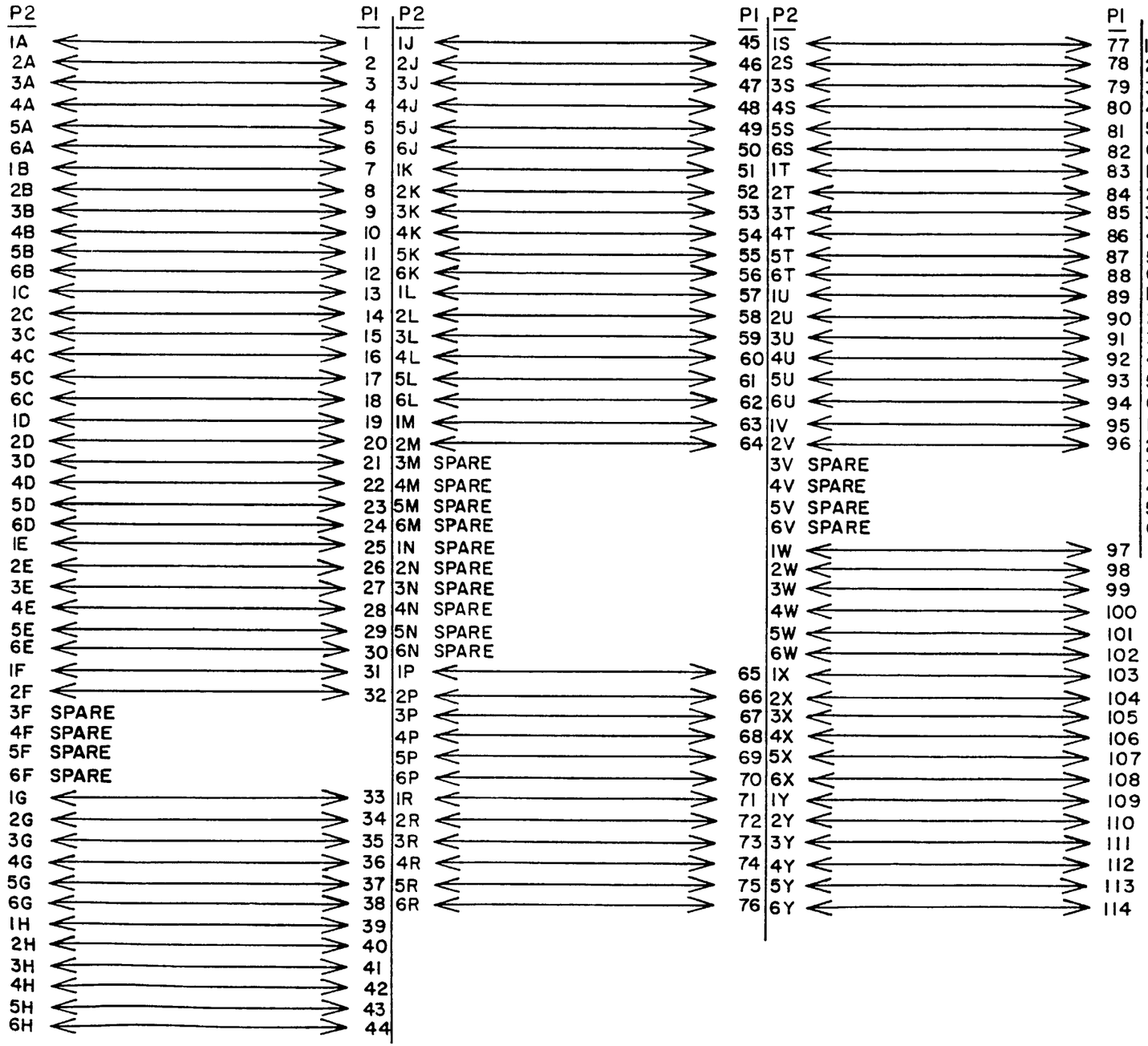
MLRS
INTERCONNECT CABLES

CABLE TESTER, INTERFACE
CABLE, INPUT
WT-1 P13162668

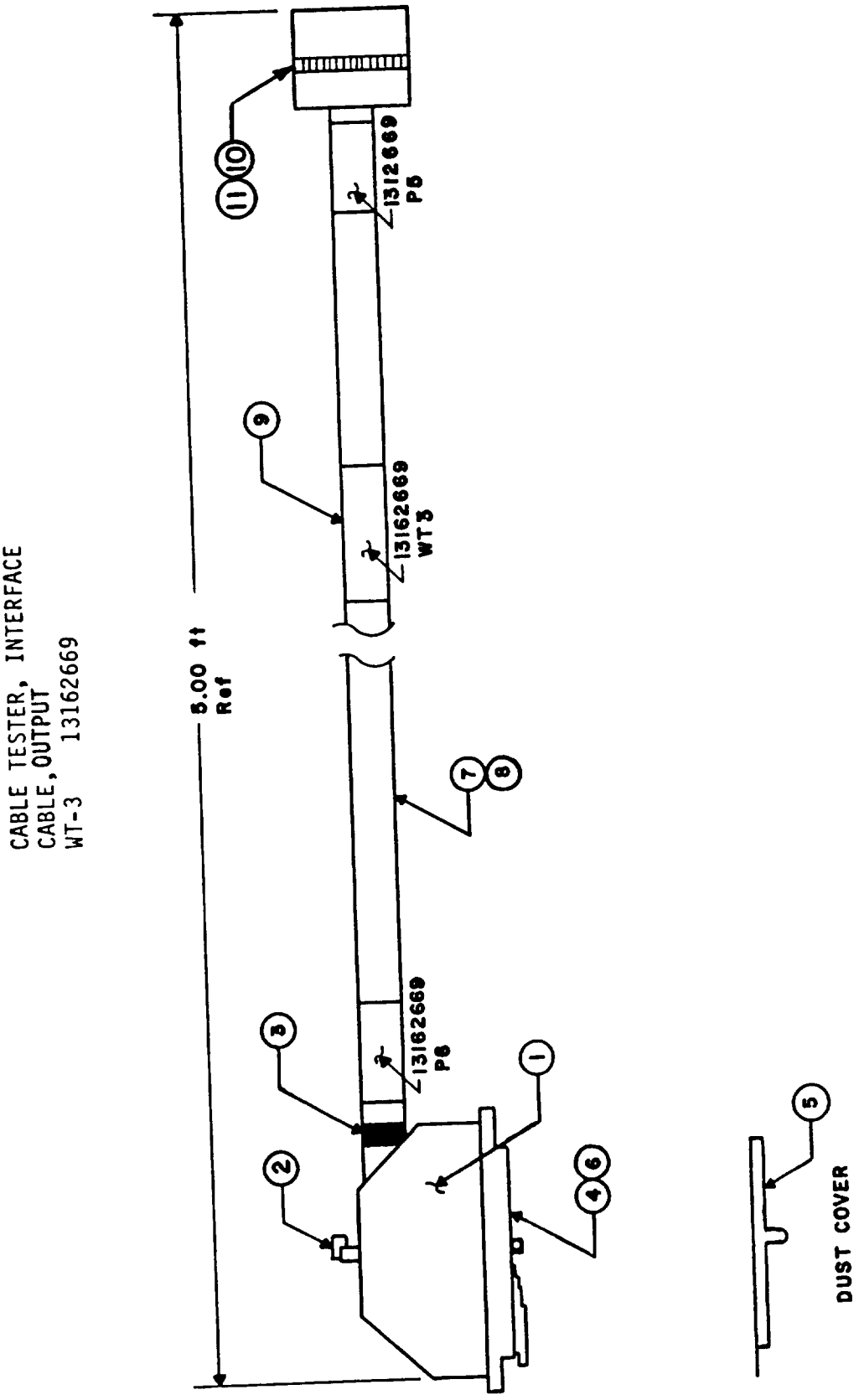


CABLE TEST INTERFACE CABLE INPUT WT-1 13162668

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Connector Junction Shell	4050	71468	DL1-J/S
2	Handle, Activating	4051	71468	DL-Handle
3	Cable Clamp	4052	71468	DL1-C/C
4	Standard Plug	4054	71468	DL1-156P
5	Dust Cover	4053	71468	DL2P-D/C
6	Contacts (156 each)	4055	71468	030-2064-014
7	Wire #22 AWG/EE	4034	4G874	EE 2219-9
8	Sleeving Black	4056	81851	PT STD1-1/4
9	Marker Cable	4057	06383	MP 150 C
10	Connector, Elec 128 Pin Circular	4112	N/A	MS27467T25B35P
11	Backshell S/R	4114	N/A	MS2750625B-1

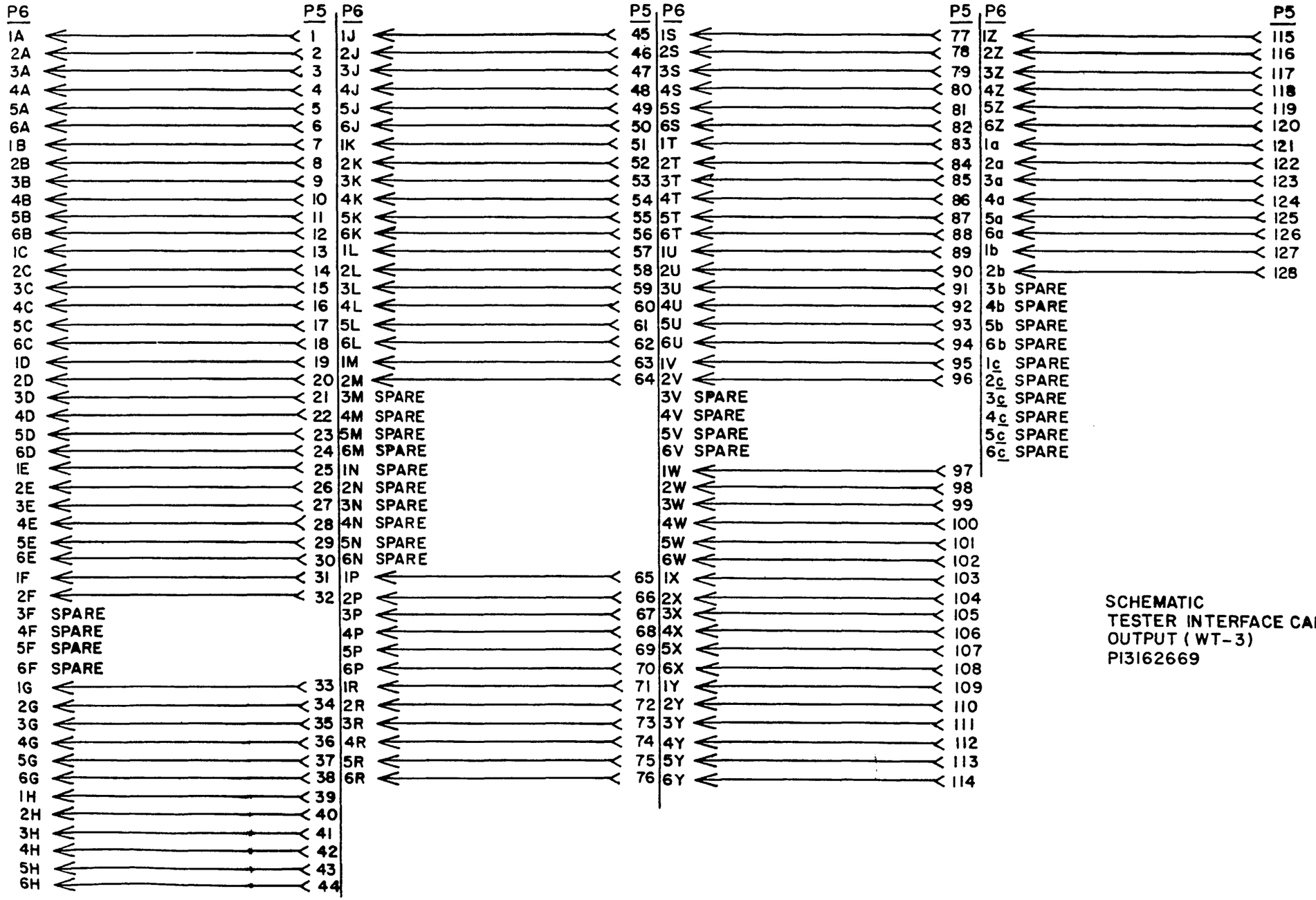


SCHEMATIC
TESTER INTERFACE CABLE
INPUT (WT-1) P13162668


CABLE TESTER, INTERFACE
CABLE, OUTPUT
WT-3 13162669
5.00 ft
Ref
13162669
P5
13162669
WT3
13162669
P6
DUST COVER
1
2
3
4
5
6
7
8
9
10
11

CABLE TESTER INTERFACE CABLE, OUTPUT WT-3 13162669

ITEM#	DESCRIPTION	PDC STK#	FSCM#	MFG-P/N
1	Connector Junction Shell	4050	71468	DL1-J/S
2	Handle Actuating	4051	71468	DL Handle
3	Cable Clamp	4052	71468	DL1-C/C
4	Standard Plug	4054	71468	DL1-156P
5	Dust Cover	4053	71468	DL1P-D/C
6	Contracts (156 each)	4055	71468	030-2064-014
7	Wire #22 AWG/EE 4034	4034	4G874	EE 2219-9
8	Sleeving Black	4056	81851	PTSTD1-¼
9	Marker Cable	4057	06383	030-2064014
10	Connector Elect 128 Pin Circular	4113	N/A	MS27467T25B35S
11	Backshell S/R	4114	N/A	MS2750625B-1



SCHEMATIC
TESTER INTERFACE CABLE
OUTPUT (WT-3)
P13162669

INDICATED MEGOHM READINGS AT 500 VDC TEST VOLTAGE

UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS	UA	MOHMS
01.0	500	03.0	167	05.0	100	07.0	71.4	09.0	55.6	12.0	41.7	16.0	31.3	20.0	25.0	35.0	14.3
01.1	455	03.1	161	05.1	98.0	07.1	70.4	09.1	54.9	12.2	41.0	16.2	30.9	20.5	24.4	36.0	13.9
01.2	417	03.2	156	05.2	96.2	07.2	69.4	09.2	54.3	12.4	40.3	16.4	30.5	21.0	23.8	37.0	13.5
01.3	385	03.3	152	05.3	94.3	07.3	68.5	09.3	53.8	12.6	39.7	16.6	30.1	21.5	23.3	38.0	13.2
01.4	357	03.4	147	05.4	92.6	07.4	67.6	09.4	53.2	12.8	39.1	16.8	29.8	22.0	22.7	39.0	12.8
01.5	333	03.5	143	05.5	90.9	07.5	66.7	09.5	52.6	13.0	38.5	17.0	29.4	22.5	22.2	40.0	12.5
01.6	313	03.6	139	05.6	89.3	07.6	65.8	09.6	52.1	13.2	37.9	17.2	29.1	23.0	21.7	41.0	12.2
01.7	294	03.7	135	05.7	87.7	07.7	64.9	09.7	51.5	13.4	37.3	17.4	28.7	23.5	21.3	42.0	11.9
01.8	278	03.8	132	05.8	86.2	07.8	64.1	09.8	51.0	13.6	36.8	17.6	28.4	24.0	20.8	43.0	11.6
01.9	263	03.9	128	05.9	84.7	07.9	63.3	09.9	50.5	13.8	36.2	17.8	28.1	24.5	20.4	44.0	11.4
02.0	250	04.0	125	06.0	83.3	08.0	62.5	10.0	50.0	14.0	35.7	18.0	27.8	25.0	20.0	45.0	11.1
02.1	238	04.1	122	06.1	82.0	08.1	61.7	10.2	49.1	14.2	35.2	18.2	27.5	26.0	19.2	46.0	10.9
02.2	227	04.2	119	06.2	80.6	08.2	61.0	10.4	48.1	14.4	34.7	18.4	27.2	27.0	18.5	47.0	10.6
02.3	217	04.3	116	06.3	79.4	08.3	60.2	10.6	47.2	14.6	34.2	18.6	26.9	28.0	17.9	48.0	10.4
02.4	208	04.4	114	06.4	78.1	08.4	59.5	10.8	46.3	14.8	33.8	18.8	26.6	29.0	17.2	49.0	10.2
02.5	200	04.5	111	06.5	76.9	08.5	58.8	11.0	45.5	15.0	33.3	19.0	26.3	30.0	16.7	50.0	10.0
02.6	192	04.6	109	06.6	75.6	08.6	58.1	11.2	44.6	15.2	32.9	19.2	26.0	31.0	16.1	51.0	9.80
02.7	185	04.7	106	06.7	74.6	08.7	57.5	11.4	43.9	15.4	32.5	19.4	25.8	32.0	15.6	52.0	9.62
02.8	179	04.8	104	06.8	73.5	08.8	56.8	11.6	43.1	15.6	32.1	19.6	25.1	33.0	15.2	53.0	9.43
02.9	172	04.9	102	06.9	72.5	08.9	56.2	11.8	42.4	15.8	31.6	19.8	25.3	34.0	14.7	54.0	9.26

NOTE 1: UA is MICROAMPS read from METER/DATA DISPLAY during read leak mode.

NOTE 2: M OHMS is MEGOHMS calculated using the formula $\frac{\text{VOLTS}}{\text{MICROAMPS}}$ = MEGOHMS $\frac{E}{I}$ = R (OHMS LAW)

for EXAMPLE 2.5 MICROAMPS and 500 VOLTS is $\frac{500}{2.5}$ = 200 MEGOHMS E = VOLTS I = AMPS R = OHMS

H.V. LEAKAGE FAILURE LEVEL CHART

EXAMPLE $\frac{500V}{2.8}$ = 178 M OHMS

S5 DATA ENTRY SWITCH SETTING	FAIL LEVEL MEG OHMS	S5 DATA ENTRY SWITCH SETTING	FAIL LEVEL MEG OHMS	S5 DATA ENTRY SWITCH SETTING	FAIL LEVEL MEG OHMS
010 3	500 M OHMS	024 3	208 M OHMS	038 3	132 M OHMS
011 3	455	025 3	200	039 3	128
012 3	415	026 3	192	040 3	125
013 3	385	027 3	185	041 3	122
014 3	357	028 3	178	042 3	119
015 3	333	029 3	172	043 3	116
016 3	312	030 3	166	044 3	114
017 3	294	031 3	161	045 3	111
018 3	278	032 3	156	046 3	109
019 3	263	033 3	151	047 3	106
020 3	250	034 3	147	048 3	104
021 3	238	035 3	143	049 3	102
022 3	227	036 3	139	050 3	100 M OHMS
023 3	217 M OHMS	037 3	135 M OHMS		

APPENDIX A

REFERENCES

The list of publications applicable to the PDS Model 128A Circuit Tester can be found in TM 9-1425-646-L, List of Applicable Publications (LOAP) for Multiple Launch Rocket System.

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I

INTRODUCTION

B-1 . GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special and common) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS. Maintenance Functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to perserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared .

g. Remove/Insta11. To remove and install the same item when required to perform service or other maintenance fuctions. Insta11. may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace . To remove an unserviceable item and install a serviceable counterpart in its place .

i. Repair. The app1ication of maintenance services [1], including Fault location/ troubleshooting[2], remova1/insta1lation, and disassembly/assembly[3], to identify troubles and restore serviceability to an item by correcting specfic damage, fault, malfunction, or fai1ure in a part, subassemb1y, module (component or assembly) , end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a complete1y serviceable-operationa1 condition as required by maintenance standards in appropriate technica1 publications. Overhaul is normally the highest degree of maintenance performed by the army. overhaul does not normal1y return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment and is normally reserved for the depot category of maintenance. The rebuild operation includes the act of returning to zero those age measurements (hours /miles , etc.) consid ered in c1assfying Army equipment/components.

[1]Services - inspect, test, service, adjust, aline, calibrate, and/or replace.

[2]Fault locate/troubleshoot - the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or Unit under Test (UUT).

[3]Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a repairable assembly (group numbered item) to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies , and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the Part No. of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (for detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C----------Operator or Crew

O----------Organizational Maintenance

F----------Intermediate Direct Support

H----------Intermediate General Support

D----------Depot Maintenance

e. Column 5, Tools and Test Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National Stock Number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANTION OF COLUMNS IN REMARKS, SECTION IV.

a. Column 1, Reference Code. The code recorded in Column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

SECTION II. MAINTENANCE ALLOCATION CHART

FOR

PDC 128A CABLE TESTER

(1)	(2)	(3)	(4)					(5)	(6)
GROUP NUMBER	COMPONENT/ASSEMBY PART #	MAINTENANCE FUNCTION	MAINTENANCE CATEGORY *					TOOLS AND EQPT	REMARKS
			C	O	F	H	D		
Pg 6-1	PDC 128A Cable Tester 12115200	Inspect Test Rep/Adj Repair		.5 .5	.5 .5	.5 .5 1.0	 1.5	1-13	A B C D E
Pg 6-40	Main Power Supply 12115225	Inspect Replace Repair			.5	.5 2.0	 2.0	1-13	A B C D E
Pg 6-49	Relay Module 121152607-1	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-60	Relay Module 121152607-3	Inspect Replace Repair			. 5	.5 .5	 1.5	1-13	A B C D E
Pg 6-66	ADC Circuit Card 12115209	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-74	Power Supply Card 12115211	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-85	Memory Card 12115208	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-93	Front Pnl Interface 12115212	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-103	Logic Card 12115210	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-112	Display Controller 12115213	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E
Pg 6-16	Display Board 12115231	Inspect Replace Repair			.5	.5 .5	 1.5	1-13	A B C D E

*C-operator/crew; O-organizational; F-intermediate DS; H-intermediate GS; D-depot

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

FOR

CABLE TESTER PDC 128A

TOOL OR TEST EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	H,D	Cable Tester	1055-01-188-2727	12115200
2	H,D	Test Cable System		12115253
3	H,D	200 Meg Ohms Mod Assy		12115243
4	H,D	0.5 Ohm Module Assy		12115216-1
5	H,D	Extender Card Relay Circuits		12115241-1
6	H,D	Extender Card Logic Circuits		12115242-1
7	H,D	Extraction Tool for Relay Cards		12115374-1
8	H,D	Extraction Tool for Logic Cards		12115374-3
9	H,D	Simulator Test Relay Unit		12115229
10	H,D	Front Panel Interface Test Cable		12115230
11	D	Extender Card Test Cable		12115232-3
12	D	Extender Card Test Cable		12115232-1
13	H,D	JTK17LAL, 35H Tool Kit	4931-01-073-3845	

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	Organizational maintenance will be accomplished by the organization owning and using the equipment.
B	All special tools and test equipment are called out in Section III.
c	There will be a repair parts kit issued initially with each piece of TMDE. Resupply of parts will be through normal supply channels.
D	A recommended repair parts list is published with this manual.
E	DS/GS maintenance will be accomplished by organizational elements of USA TMDE Support Group.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR
General, United States Army
Chief of Staff

Official:

R L. DILWORTH
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-32, Direct Support and General Support Maintenance requirements for the Multiple Launch Rocket System.

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
CDR, 1st Bn, 65th ADA
ATTN: SP4 John Doe
Key West, FL 33040

DATE SENT
14 January 1979

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-1430-550-34-1	7 Sep 72	Unit of Radar Set AN/MPQ-50 Tested at the HFC

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
9-19		9-5	
21-2	step 1C		21-2

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

"B" Ready Relay K11 is shown with two #9 contacts. That contact which is wired to pin 8 of relay K16 should be changed to contact #10.

Reads: Multimeter B indicates 600 K ohms to 9000 K ohms.

Change to read: Multimeter B indicates 600 K ohms minimum.

Reason: Circuit being checked could measure infinity. Multimeter can read above 9000 K ohms and still be correct.

NOTE TO THE READER:

Your comments will go directly to the writer responsible for this manual, and he will prepare the reply that is returned to you. To help him in his evaluation of your recommendations, please explain the reason for each of your recommendations, unless the reason is obvious.

All comments will be appreciated, and will be given immediate attention. Handwritten comments are acceptable.

For your convenience, blank "tear out" forms, preprinted, addressed, and ready to mail, are included in this manual.

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER
SP4 John Doe, Autovon 222-222

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