

TM 9-4931-381-14&P-1

TECHNICAL MANUAL

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS)

VOLUME I
OPERATION, INSTALLATION,
AND REFERENCE DATA

VOLUME II
SCHEDULED MAINTENANCE

VOLUME III
TROUBLESHOOTING

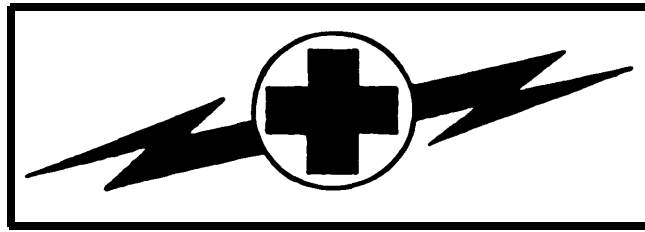
THERMAL SYSTEM TEST SET

(4931-01-119-7092)

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HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1986



WARNING

HIGH 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. He should be familiar with the operation and hazards of the equipment. He should also be competent in giving first aid. When the technician is helped by operators, he must warn them about dangerous areas.

The power supply to the equipment must be shut off before beginning work on the equipment. Take special care to ground every capacitor likely to hold a dangerous potential.

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

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

WARNING

Do not be misled by the term "low voltage." Potentials as low as 50 volts may cause death.

For artificial respiration, refer to FM 21-11.



WARNING

RADIATION HAZARD

The antireflective coating on all infrared optics contains thorium fluoride which is slightly radioactive. The only potential hazard involves ingestion (swallowing or inhaling) of this coating material. Dispose of broken lens, etc., in accordance with AR 385-11.

DON'T TAKE CHANCES!

Change
No. I

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 4 August 1987

**DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL**

**TROUBLESHOOTING, THERMAL IMAGING SYSTEM
TANK, COMBAT, FULL-TRACKED:
105-MM GUN, MI
(2350-01-061-2445)
AND
TANK, COMBAT, FULL-TRACKED:
105-MM GUN, IPMI
(2350-01-1368738)
AND
TANK, COMBAT, FULL-TRACKED:
12-MM GUN, MIAI
(2350-01-087-1095)
GENERAL ABRAMS
SIGHTING AND FIRE CONTROL**

TM 9-4931-381-14&P-1, 31 December 1986, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed information is indicated by a vertical bar in the margin of the page.

Remove Pages

Insert Pages

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4-11 and 4-12
4-15 through 4-20
4-25 and 4-26
4-27 and 4-28
B-3 and B-4

2-9 and 2-10
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Volume III

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4-43 and 4-44
7-49 and 7-50
7-63 and 7-64
7-97 and 7-98
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File this change sheet in back of this publication for reference purposes.

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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 12-41, Direct and General Support Maintenance requirements for Sighting Components, Fire Control, for M1 Tank.

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 31 December 1986

TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL,
DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS
THERMAL SYSTEM TEST SET
(4931-01-119-7092)

RPSTL current as of technical manual date

Software PN 12303273 Revision D, current as of technical manual date.

Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistakes or if you know a way to improve the procedures, please let us know. Mail your letter DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, U.S. Army Armament, Munitions and Chemical Command, Attn: AMSMC-MAS, Rock Island, Illinois 61299-6000. A reply will be furnished to you.

DISTRIBUTION STATEMENT : Approved for public release; distribution is unlimited.

NOTE

This manual is divided into three bindings. The first binding consists of volumes I, II, and III and front matter for all three bindings. The second binding consists of volume IV and an index for volumes I through IV. Test set schematic and functional diagrams are contained in the third binding.

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TM 9-4931-381-14&P-1

TECHNICAL MANUAL

**VOLUME I
OPERATION, INSTALLATION,
AND REFERENCE DATA**

THERMAL SYSTEM TEST SET

CHAPTER 1 INTRODUCTION

1-1. Scope. This manual tells you about the Thermal System Test Set (TSTS). In the rest of the manual, the TSTS may be called the test set. The test set is used to check faulty assemblies that have been removed from the M1 Tank Thermal Imaging System (TIS) and the M60A3 Tank Thermal Sight (TTS) AN/VSG-2. The test set finds faulty components and modules inside these assemblies. The manual tells you how to operate, troubleshoot, and repair the test set. This manual is for use by Direct Support (DS) and General Support (GS) repair persons.

1-2. Maintenance Forms and Records. Maintenance forms, records, and reports, which are to be used by maintenance personnel at all levels, are listed in DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. Equipment Improvement Recommendations (EIR). If your test set 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 your suggestion on an SF 368 (Quality Deficiency Report). Mail the SF 368 to us at: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We will send you a reply.

1-4. Administrative Storage. Administrative storage procedures shall be in accordance with TM 740-90-1, Administrative Storage of Equipment. The placement of the test set in administrative storage for short periods of time, up to six months, requires no special care or maintenance.

1-5. Destruction to Prevent Enemy Use. Destruction of the test set will be done only by order of unit commander. The test set does not contain self destruct devices. Demolition by mechanical means, explosives, gun fire, or burning will make the test set useless to the enemy. To keep the enemy from getting useful information, the test set should be completely destroyed, if possible, in accordance with TM 750-244-2, Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

1-6. Manual Organization. This manual is divided into four volumes. The contents of each volume are described below.

a. Volume 1, Operation, Installation, and Reference Data. This volume has test set functional and physical descriptions to give you general information to help you understand how the test set works and what it does. Detailed operating procedures and a description and use of all operator controls and indicators tell you how to set up, checkout, and operate the test set. A tabulated data sheet tells you the physical, functional, and environmental characteristics of the test set. Appendix A of this volume lists all publications referenced in the manual. Appendix B is the Components of End Item and Basic Issue Items Lists. Appendix C lists all of the expendable supplies that you will need to do test set maintenance.

b. Volume II, Scheduled Maintenance. This volume contains the scheduled verification requirements for the test set. Appendix A to this volume contains the Maintenance Allocation Chart (MAC).

c. Volume III, Troubleshooting. This volume gives you troubleshooting procedures, an operator assisted self test (OAST), and supporting information for troubleshooting a faulty test set. The troubleshooting procedures are shown as a series of illustrated flowcharts. Each flowchart traces a fail code to a replaceable item. The OAST is used to checkout the test set after repairs have been made. Supporting data consists of diagrams and illustrations that will help you in doing the troubleshooting task procedures.

d. Volume IV, Maintenance. This volume contains nonscheduled maintenance task procedures for the test set. Maintenance procedures and information in this volume cover corrective maintenance action to repair the test set. Cleaning, painting, and other general maintenance instructions are also included in the volume. Appendix A of volume IV contains the Repair Parts and Special Tools List (RPSTL). Appendix B lists tools that must be fabricated to do the maintenance tasks.

1-7. Use of English and Metric System Units. All temperature measurements, dimensions, and weights specified in this manual are expressed in English units followed by the metric equivalent in parentheses. A conversion chart is located on the inside of the back cover of this manual.

1-8. Abbreviations: Following is a list of abbreviations contained in this manual.

AC	Alternating Current
ADJ	Adjustment
AMP	Ampere
AMP	Amplifier
ASSY	Assembly
AST	Automatic Self Test
ATTN	Attention
AUX	Auxiliary
AZ	Azimuth
BD	Board
BII	Basic Issue Items
BIT	Built In Test
BITE	Built In Test Equipment
BKT	Bracket
BLK	Black
BX	Box
C	Celsius
C	Crew
CAT.	Category
CB	Circuit Breaker
CCA	Circuit Card Assembly
CCW	Counterclockwise
CD	Card
CKT	Circuit

CLR	Clear
CM	Centimeter
CMDR	Commander
COMB.	Combiner
CON	Continue
CONN	Connector
CRT	Cathode Ray Tube
CTR	Center
CU	Cubic
CW	Clockwise
D	Depot
DEC	Decoder
DMWR	Depot Maintenance Work Requirements
DS	Direct Support
DSS	Digital Subsystem
DVM	Digital Voltmeter
EA	Each
EIR	Equipment Improvement Recommendation
EL	Elevation
ELECT.	Electronic
ELEV	Elevation
EMI	Electromagnetic Interference
ENT	Enter
EQPT.	Equipment
ETC	Et Cetera
EU	Electronics Unit
F	Fahrenheit
F	Direct Support Level
FCS	Fire Control System
FIXT	Fixture
FOLD.	Folding
FOV	Field of View
FP	Front Panel
FSCM	Federal Supply Code for Manufacturer
FSN	Federal Stock Number
FT	Foot
FUNC.	Function
G	Gravity
GEN	Generator
GL	Gallon
GPS	Gunner's Primary Sight
GRC	Gyro Reticle Control
GS	General Support

H	General Support Level
HOLD	Holding
HORIZ	Horizontal
HR	Hour
HV	High Voltage
HVPS	High Voltage Power Supply
HZ	Hertz
ICU	Image Control Unit
IDU	Image Display Unit
IL	Illinois
ILLUS	Illustration
IN	Inch
ISO	Isolation
KG	Kilogram
L	Left
LB	Pound
LED	Light Emitting Diode
LRF	Laser Range Finder
LRU	Line Replaceable Unit
MAC	Maintenance Allocation Chart
MAINT.	Maintenance
MS	Millisecond
MTOE	Modified Tools, Organization, and Equipment
MUX	Multiplexer
NA	Not Applicable
NIIN	National Item Identification Number
NO.	Number
NSN	National Stock Number
O	Organizational Level
OAST	Operator Assisted Self Test
OZ	Ounce
PARA.	Paragraph
PC	Power Converter
PCU	Power Control Unit
PR	Pair
PROC	Processor
PROM	Programmable Read Only Memory
PS	Power Supply
PWB	Printed Wiring Board
PWR	Power

QT	Quart
QTY	Quantity
R	Right
RAM	Random Access Memory
RET.	Reticle
RNG	Range
RPSTL	Repair Parts and Special Tools List
RQR	Required
SIM	Simulator
SMR	Source, Maintenance, and Recoverability
SOP	Standing Operating Procedures
SQ	Square
SS	Subsystem
STOR	Storage
SWP	Sweep
SYNC	Synchronization
TAMMS	The Army Maintenance Management System
TEU	Thermal Electronics Unit
TIS	Thermal Imaging System
TM	Technical Manual
TMDE	Test Measurement and Diagnostic Equipment
TOE	Tools, Organization, and Equipment
TRU	Thermal Receiver Unit
TSTC	Thermal System Test Controller
TST	Test
TSTS	Thermal System Test Set
TTS	Tank Thermal Sight
U/M	Unit of Measure
UUT	Unit Under Test
V AC	Volts Alternating Current
V DC	Volts Direct Current
VDP	Video Data Processor
VERT	Vertical
VID	Video
WHT	White
YD	Yard

CHAPTER 2 DESCRIPTION AND DATA

Section I. FUNCTIONAL DESCRIPTION

2-1. Overall Function.

a. General. The test set is a computer controlled test device used by Direct Support/General Support repairpersons. Its purpose is to find faulty modules or parts within the M I Tank Thermal Imaging System (TIS) and the M60A3 Tank Thermal Sight (TTS) that have been removed from the tank. The test set measures actual voltage and frequency outputs from the assemblies being tested. It then compares these measurements with values stored in the test set computer memory. If the measured value agrees with the stored value, the next test maybe performed. Sometimes the test set will automatically do the next test. At other times you must perform some action before the next test starts. The test set provides short messages to you in the form of information, commands, or questions. These messages appear on the test set MESSAGE DISPLAY. Questions are answered by pressing the YES or NO pushbuttons on the test set control panel. Most commands are carried out by operating switches and controls on the test set panel. However, some commands require that you operate controls on the equipment being tested. If a measured value disagrees with a stored value in the test set computer, the test set display will tell you to replace a faulty module or part.

b. Automatic Self Test. The test set has a built-in automatic self test function. This function tests the digital subsystem in the test set each time the ON-OFF switch is set to ON. If the self test is failed, the test set cannot be used until repaired. If the self test is successful, the MESSAGE DISPLAY will say:

AUTOMATIC SELF TEST COMPLETED
RUN OAST?

This tells you the digital subsystem is working properly. Then you have the option of running the operator assisted self test (OAST).

c. Operator Assisted Self Test (OAST) Function. This function tests the circuit card assemblies, the modules, and the panel controls and indicators in the test set. Although the OAST is optional, it is a good idea to run it every time the TEST SET POWER switch is set to ON. This will ensure that all parts of the test set are working properly. If any corrections are needed, a fail code (volume III, chapter 7) will appear on the MESSAGE DISPLAY telling you what is wrong with the test set and how to fix it. Once the OAST has run completely, the test set is ready to test tank thermal units.

d. External Power Supply. A variable +18 to +30V dc, 50 amp, regulated power supply (model HP6269B or equivalent) is required to operate the test set. Refer to volume III, chapter 3 for test equipment procedures index.

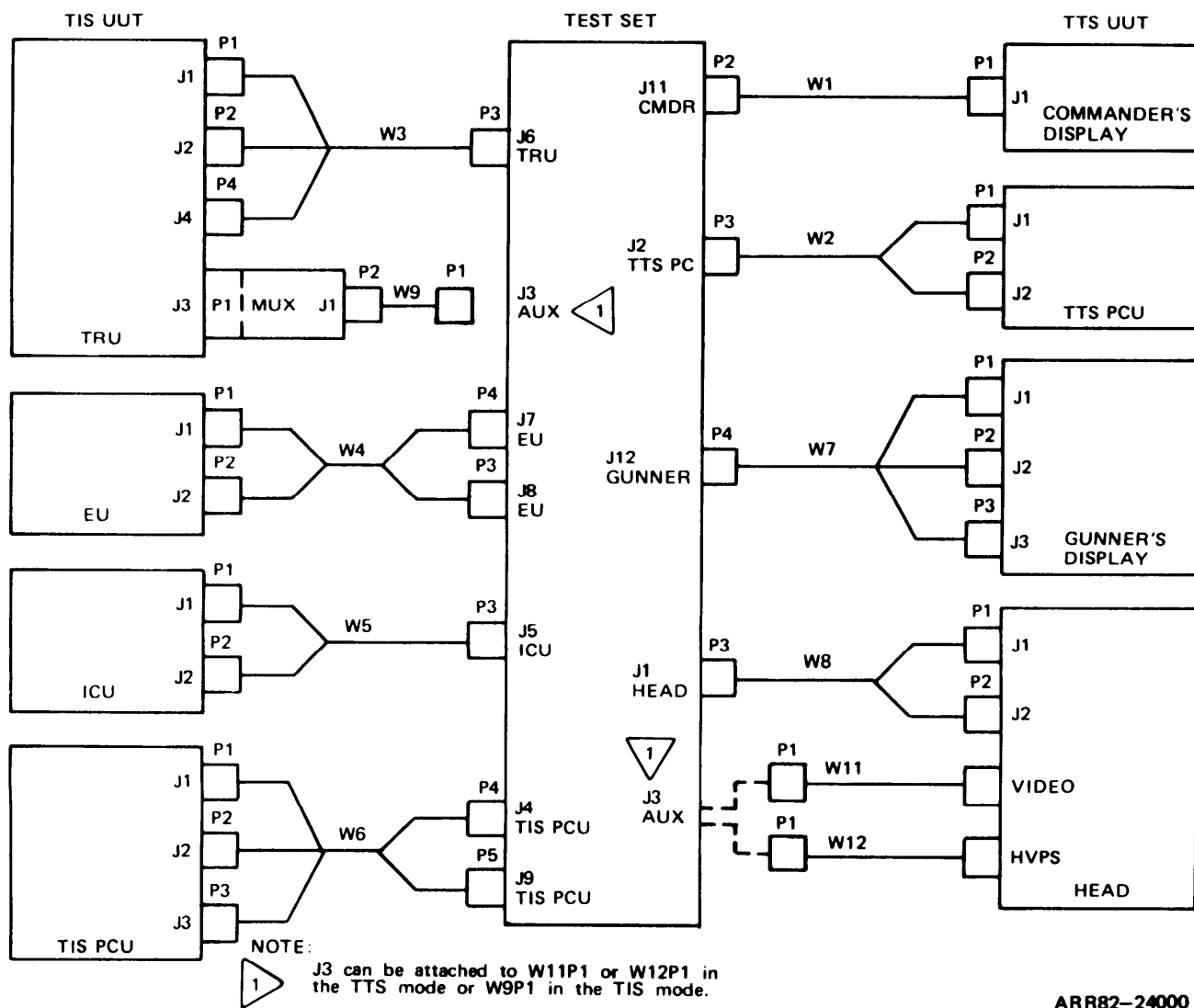


Figure 2-1. Test Set Cable Connections (Sheet 1 of 2)

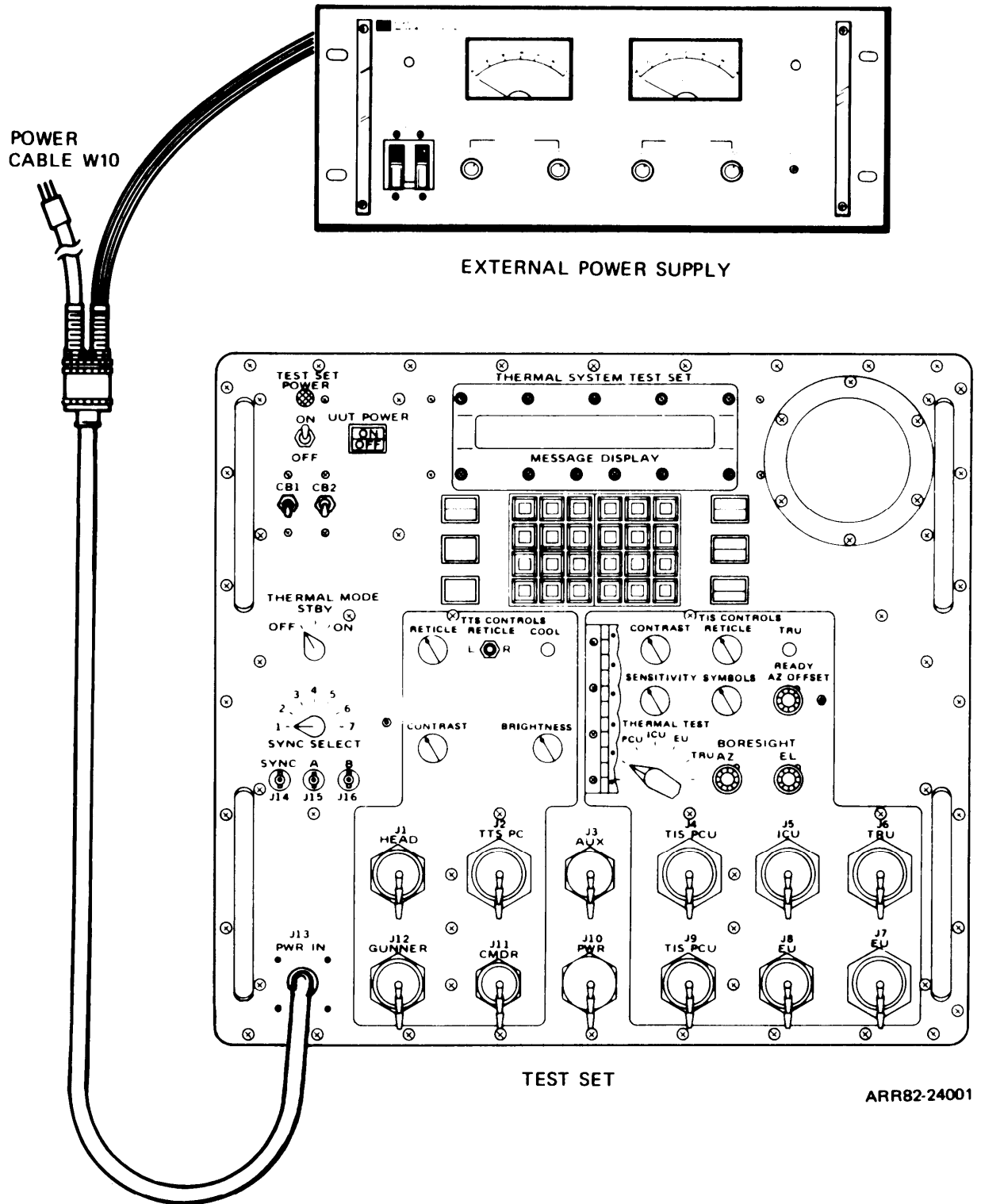


Figure 2-1. Test Set Cable Connections (Sheet 2 of 2)

e. Test Set/Unit Under Test (UUT) Cable Connections. Figure 2-1 shows the test cable connections for testing the TIS and TTS assemblies. Power cable W10 is connected from test set connector J13 to the external power supply. This cable remains connected throughout all testing. Although figure 2-1 shows all eight UUT connected, only one can be tested at a time. The test set MESSAGE DISPLAY will tell you when to connect each cable and which jack to connect it to. It is important that the shorting plugs be installed on the jacks when the jacks are not being used. (Three jacks J3, J10, and J13 do not have shorting plugs.) The test set will not work unless the plugs are installed.

2-2. Test Set Internal Functions. Figure FO-I in the back of this manual is a block diagram that shows the internal functions of the test set. These functions are as follows:

a. Power Supply Function. Four internal power supplies convert the external power to other regulated voltages required by the test set modules. When the TEST SET POWER switch is set to ON, external power is supplied to the internal power supplies.

b. Digital Subsystem (DSS). The DSS contains a microprocessor that performs scanner switching, computer functions, and stimuli setup.

c. Image Display Function. The image display function simulates the M1 tank ICU display.

d. Power Control Unit Simulation Function. The power control unit simulation function in the test set is identical to the PCU in the M1 tank.

e. Electronics Unit Simulation Function. The electronics unit simulation function in the test set is identical to the EU in the M1 tank.

f. TTS Test Function. Used to run tests of the M60A3 tank:

- (1) Head assembly
- (2) Gunner's display unit
- (3) Power converter unit
- (4) Commander's display unit

g. TIS Test Function. Used to run tests of the M1 tank:

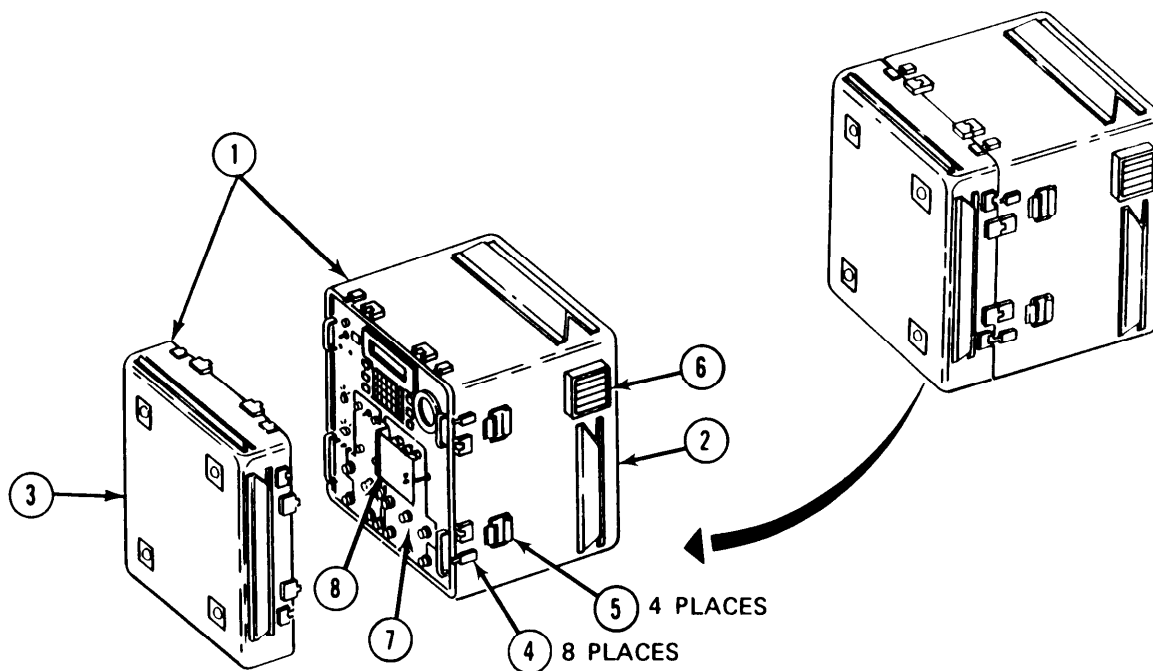
- (1) Image control unit
- (2) Electronics unit
- (3) Power control unit
- (4) Thermal receiver unit

h. Message Display. The MESSAGE DISPLAY can display 80 alphanumeric characters. The message is displayed on 2 lines, 40 characters per line.

Section II. PHYSICAL DESCRIPTION

2-3. General. The test set consists of the thermal system test controller (TSTC), the accessory case, the thermal sight collimator, the head/gunner/TRU holding fixture, and the commander's display holding fixture.

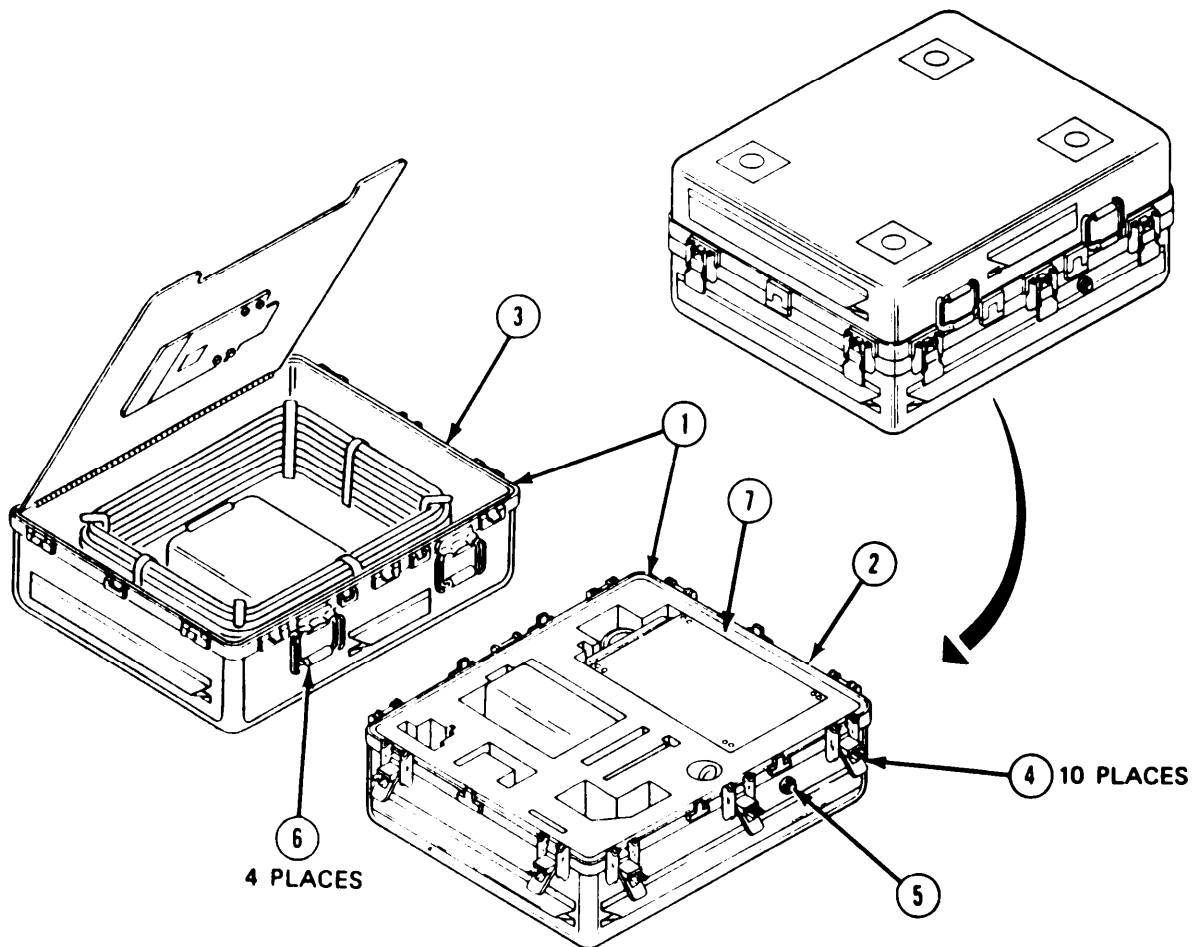
a. Thermal System Test Controller (figure 2-2). The TSTC is contained in a portable case assembly (1). The case assembly (1) consists of a case (2) and case cover (3) which are joined by eight latches (4). When the cover (3) is in position and the latches (4) are closed, the case assembly (1) is sealed. Four handles (5) on the case (2) permit easy handling. There is also a fan assembly (6) built into the TSTC case (2). This fan (6) is used to cool the test set. For TSTC national stock number refer to the components of end item list in volume 1, appendix B. When the eight latches (4) on the case assembly are unsealed, the case cover (3) may be removed, exposing the TSTC front panel (7). All TSTC controls, switches, indicators, and test cable connectors are mounted on the front panel (7). In the center of the front panel (7) there is a hinged flap (8) which is used to cover either the TIS or the TTS controls. If the operator is working on the TIS controls, he covers the TTS controls. If the operator is working on the TTS controls, he covers the TIS controls.



ARR82-24002

Figure 2-2. Thermal System Test Controller

b. **Accessory Case (figure 2-3).** The accessory case is another portable case assembly (1) consisting of a case (2) and case cover (3) which are joined by ten latches (4). When the cover (3) is in position and the latches (4) are closed, the case assembly (1) is sealed and is water and air tight. A manual pressure relief valve (5) is mounted on the case (2) to vent internal air pressure during air flight. Four handles (6) on the case cover (3) Permit easy handling. When the ten latches (4) are unsealed, the case assembly (1) may be opened, exposing the equipment. Some of the equipment is contained in the case (2) and some is contained in the case cover (3). The equipment contained in the case (2) fits in holes in a polyurethane cushion (7). For the accessory case national stock number, refer to the components of end item list in volume 1, appendix B.

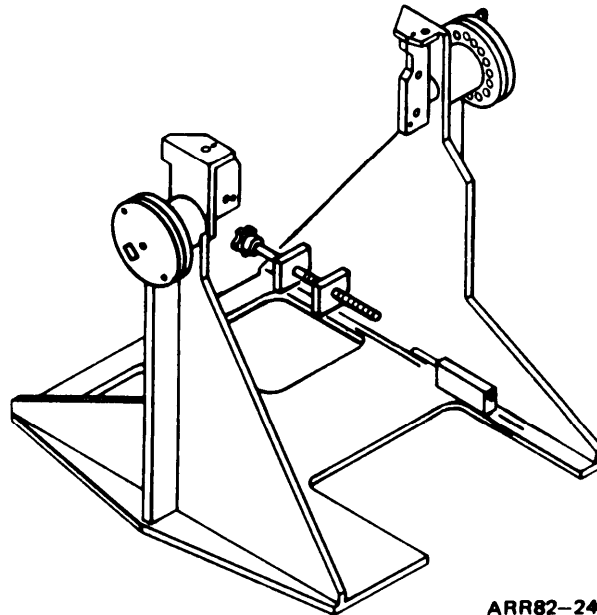


ARR82-24003

Figure 2-3. Accessory Case

c. **Thermal Sight Collimator.** The physical characteristics of the thermal sight collimator are contained in TM 11-5855-255-14&P, Operator's, Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List, for Test Set, Night Vision Sight AN/TAM-3 and Test Set, Night Vision Sight AN/TAM-3A or the thermal sight collimator national stock number, refer to the components of end item list in volume 1, appendix B.

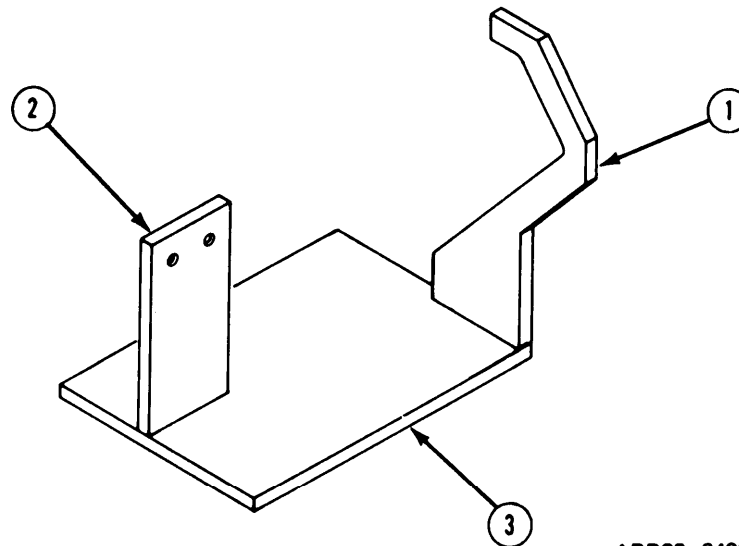
d. **Holding Fixture Assembly (figure 2-4).** The holding fixture assembly is built as a multi-use support for the TTS head assembly, TTS gunner's display, and TIS TRU. For the head/gunner/TRU holding fixture national stock number, refer to the components of end item list in volume 1, appendix B.



ARR82-24004

Figure 2-4. Holding Fixture

e. **Command Holding Fixture Assembly (figure 2-5).** The command holding fixture assembly consists of a front bracket (1) and a rear bracket (2) connected to a baseplate (3). The TTS commander's display unit is supported between the two brackets during test. For the commander's display holding fixture national stock number, refer to the components of end item list in volume 1, appendix B.



ARR82-24005

Figure 2-5. Command Holding Fixture Assembly

2-4. Test Set Cable Assemblies. Twelve test cables are included with the test set. Each cable is identified by a number-letter name. The number of pins in the cable connectors varies from 5 to 128. Each cable connector is mechanically keyed so that it will fit only one test set front panel connector. The following list describes each cable.

CMDR W1	Length: 6 feet Test set connector: Commander's display connector:	CMDR J 11, 66 contacts CMDR J1, 19 contacts
TTS PCU W2	Length: 6 feet Test set connector: PCU connectors:	TTSPC J2, 128 contacts PCU J1, 5 contacts PCU J2, 55 contacts
TRU W3	Length: 6 feet Test set connector: TRU connectors:	TRU J6, 128 contacts TRU J1, 41 contacts TRU J2, 55 contacts TRU J4, 15 contacts
EU W4	Length: 6 feet Test set connectors: EU connectors:	EU J7, 128 contacts EU J8, 66 contacts EU J1, 55 contacts EU J2, 61 contacts
ICU W5	Length: 6 feet Test set connector: ICU connectors:	ICU J5, 128 contacts ICU J1, 61 contacts ICU J2, 55 contacts
TIS PCU W6	Length: 6 feet Test set connectors: PCU connectors:	TIS PCU J4, 128 contacts TIS PCU J9, 85 contacts PCU J 1, 55 contacts PCU J2, 55 contacts PCU J3, 4 I contacts
Gunner W7	Length: 6 feet Test set connector: Gunner's display connector:	GUNNER J12, 100 contacts Gunner J1, 41 contacts Gunner J2, 23 contacts Gunner J3, 18 contacts
Head W8	Length: 6 feet Test set connector: Head connectors:	HEAD J 1, 100 contacts Head J 1, 11 contacts Head J2, 55 contacts

TRU W9	Length: 6 feet Video multiplexer connector: TRU connector:	MUX J1, 100 contacts TRU J3, 66 contacts	
	TRU video multiplexer: Length: 6-3/4 inches Test set connector: W9 connector:	AUX J3, 100 contacts P2, 100 contacts	
Input power W10	Length: 10 feet Test set connector: DC power supply connections: AC source connections:	J 13 PWR IN, 19 contacts 1 terminal lug, positive 1 terminal lug, negative 1 terminal lug, ground 3-conductor ac connector, 115V 60HZ Fuse, electrical F03A250V10A (one required)	
Head video test W 11	Length: 14 feet Test set connector: Head connections: PRESS FOR POST AMP TEST switch:	AUX J3, 55 contacts VIDEO, banana plug and alligator clip Pushbutton switch	
Head high voltage power supply W12	Length: 12 feet Test set connector: HVPS connections: PRESS FOR SELF TEST switch: Terminal board assembly:	AUX J3, 55 contacts HVPS, HV connection and alligator clip Pushbutton switch One integrated circuit, two resistors, one capacitor, one diode	

Test cable W9 is connected to the TRU video multiplexer during storage and operation. However, the multiplexer is not part of W9.

Section III. TABULATED DATA**2-5. Test Set Operating Characteristics.**

Power Input	Variable +18 to '30 V dc regulated, 20 amp
Internal Power supply	4 internal power supplies: PS1 - +24 V dc PS2 - -15 V dc PS3 - +15 V dc PS4 - +5 V dc
Display	Vacuum fluorescent type with 80-character capacity (2 lines, 40 characters per line)
Microcomputer	Microprocessor with a capacity of 22,000 permanent storage locations (PROM) and 1, 125 temporary storage locations (RAM)
Shielding	Power cable and signal cables are shielded and the test set case provides shielding of internal circuits to prevent radio interference

2-6. Test Set Environmental Characteristics.

Operating Temperature Range	+32 to +131°F (0 to +55°C)
Storage Temperature Range	-80 to + 185°F (-62 to +85°C)

2-7. Thermal System Test Controller Case Assembly.

Construction	Two-piece aluminum case with four carrying handles and eight cover-to-case latches.
Dimensions	30 inches (76 centimeters) long, 22 inches (56 centimeters) wide, and 26 inches (66 centimeters) high.
Weight	Case assembly with TSTC weighs 185 pounds (84 kilograms)

2-8. Accessory Case Assembly.

Construction	Two-piece aluminum case with four carrying handles and ten cover-to-case latches.
Dimensions	32 inches (81 centimeters) long, 25 inches (64 centimeters) wide, and 17 inches (43 centimeters) high.
Weight	Case assembly with all equipment and this technical manual stored inside is 170 pounds (77 kilograms).

CHAPTER 3 SERVICE UPON RECEIPT OF EQUIPMENT

Section 1. SITE AND SHELTER REQUIREMENTS

3-1. **General.** The test set will function properly in severe temperature extremes. It will operate properly while located in temperatures from 32°F (0°C), which is the lowest temperature expected in cold regions, to +131°F (+55°C), which is the highest temperature expected in desert regions. The TSTC front panel is moisture repellent.

Section II. SERVICE UPON RECEIPT OF EQUIPMENT

3-2. **General.** The TSTC case must be packed in a shipping container to give adequate protection against corrosion and physical damage during shipment and to ensure delivery at destination in a satisfactory condition. The accessory case gives adequate protection against corrosion and physical damage during shipment and will ensure delivery at destination in a satisfactory condition.

3-3. **Checking Test Set Contents.**

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report. Look at commander's holding fixture and head/gunner/TRU holding fixture for scratches or missing or broken parts. If any damage is found, repair item or return item to depot; refer to volume IV, chapter 4.

b. Check the equipment against volume I, appendix B, components of end items and basic issue items lists to see if the shipment is complete. Report all discrepancies in accordance with the instructions in AR 710-2, Materiel Management for Using Units.

Section III. INSTALLATION INSTRUCTIONS

3-4. **Installation.** There are no special installation instructions for the test set.

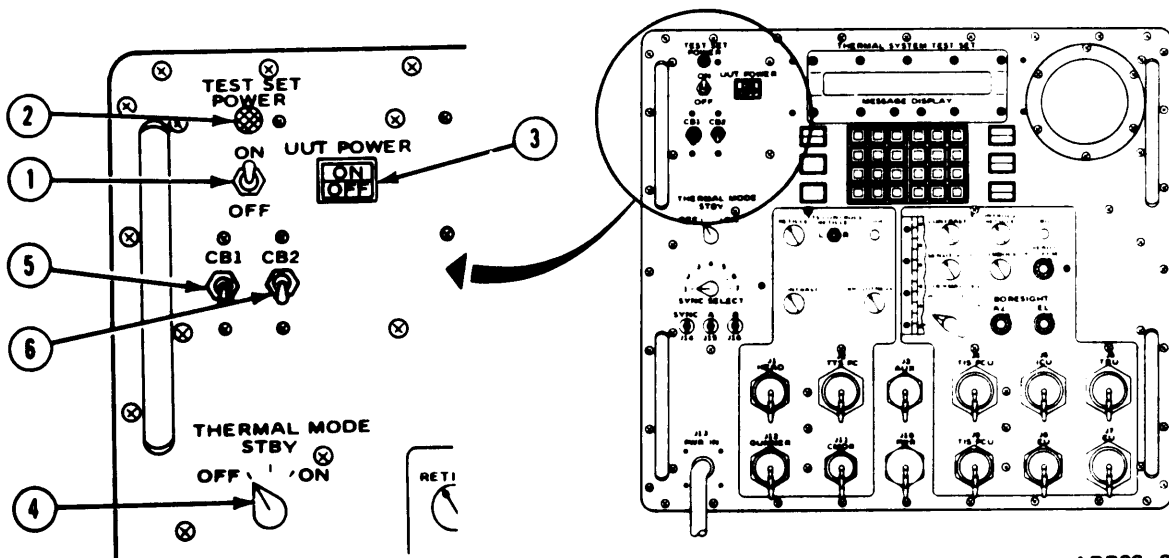
CHAPTER 4 OPERATING PROCEDURES

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

4-1. General. This chapter tells what each control and indicator on the TSTS does. This chapter also tells how to inspect, start up, and shut down the TSTS under normal operating conditions.

4-2. TSTC-Power Control.

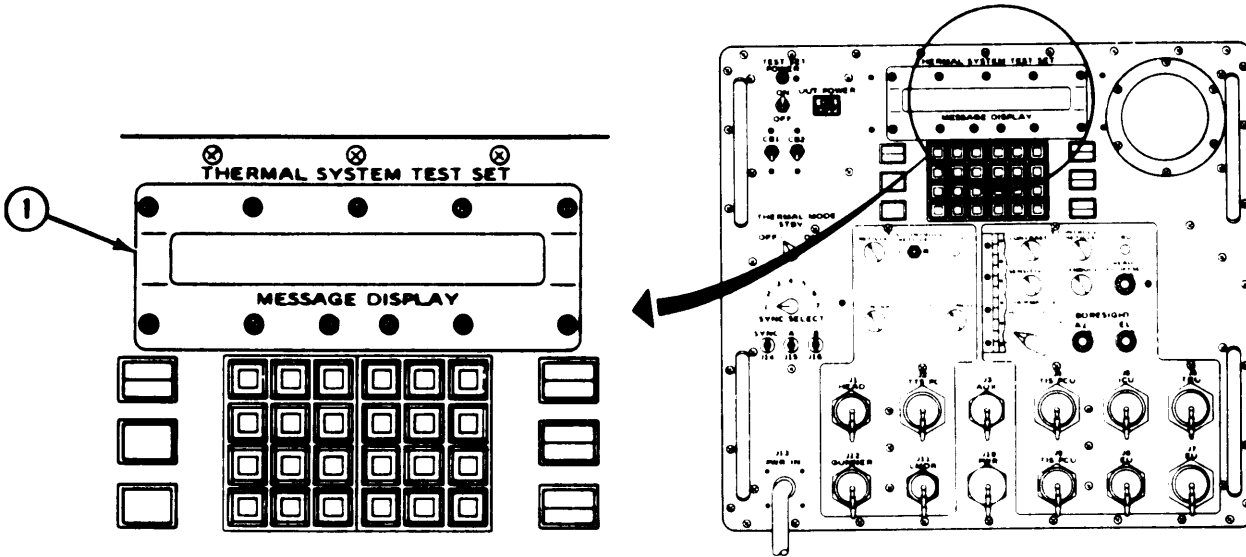
- | | | |
|----|---------------------------|---|
| a. | TEST SET POWER switch (1) | Puts TSTC in operation and starts TSTC automatic self test. |
| b. | TEST SET POWER lamp (2) | Shows TSTC is operating. |
| c. | UUT POWER switch/lamp (3) | When pressed, sends electrical power to unit under test. |
| d. | THERMAL MODE switch (4) | Chooses off, standby, or on mode of operation. |
| e. | CB1 circuit breaker (5) | Provides protection in case of 115 V, 60 Hz power overload. |
| f. | CB2 circuit breaker (6) | Provides protection in case of +28 V power overload. |



4-3. TSTC-Alphanumeric Display.

MESSAGE DISPLAY (1)

Shows when test has passed or failed, number of test block, and number of fault isolation procedure; tells operator what to do to continue testing.



ARR82-24007

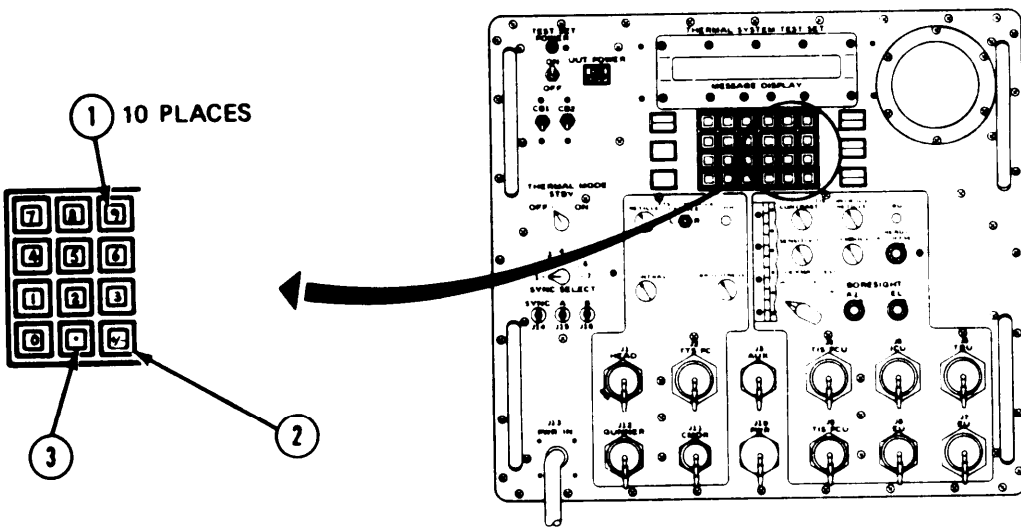
4-4. TSTC-Numeric Keyboard.

- a. 0 thru 9 keys (1)
- b. +/- key (2)
- c. ● key (3)

Enter data on MESSAGE DISPLAY after ENT key is pressed.

Not functional

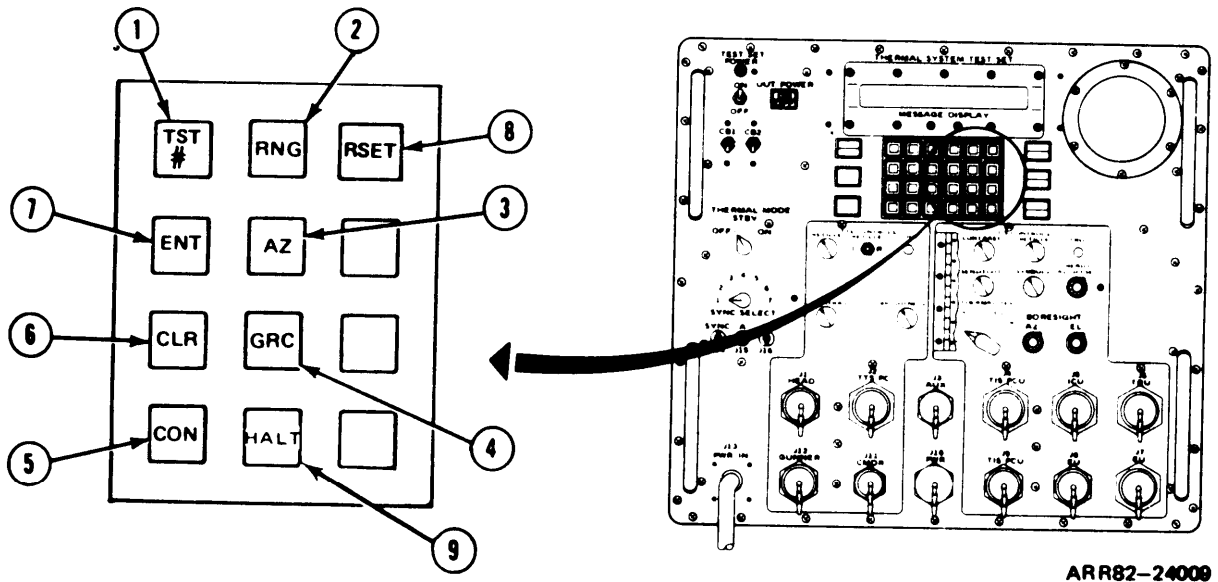
Changes test set to fault isolation mode.



ARR82-24008

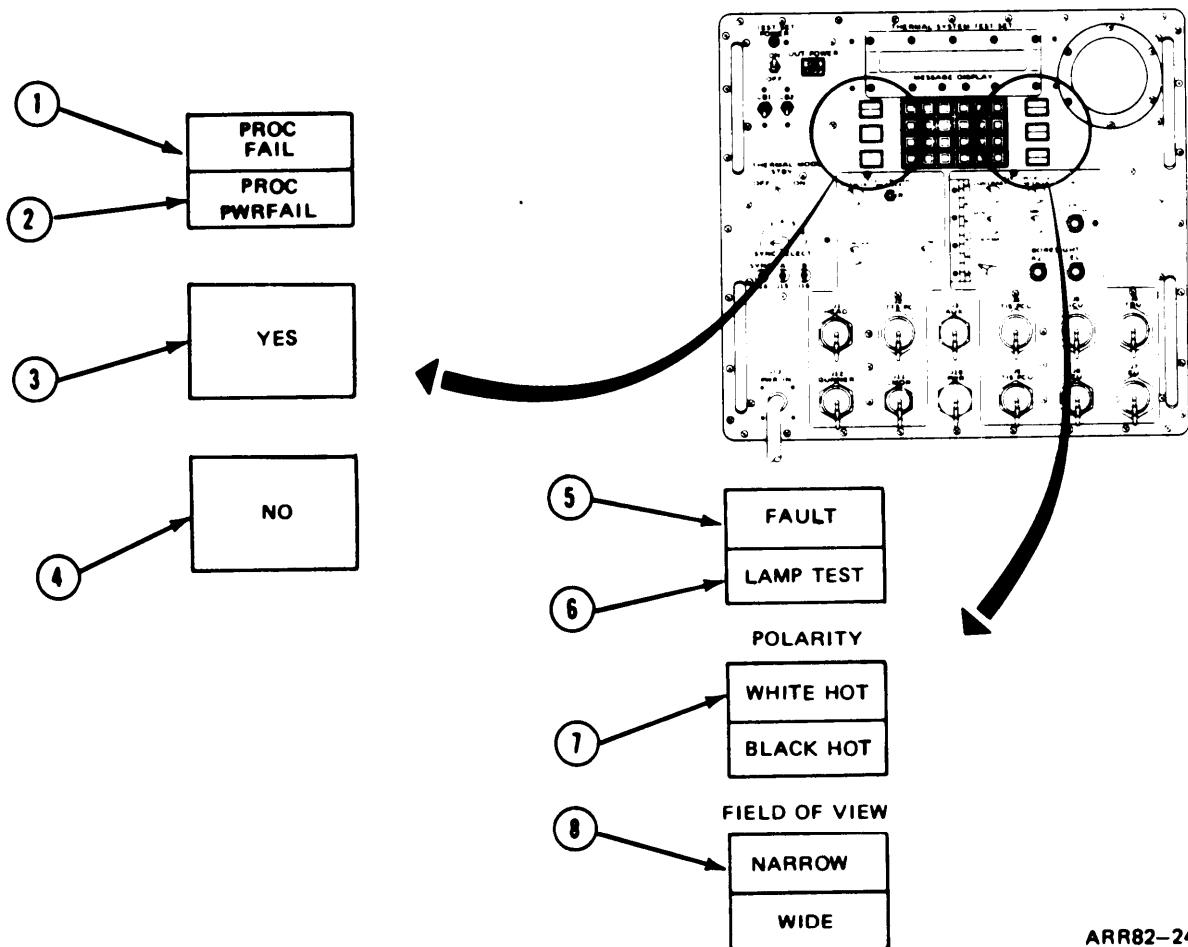
4-5. TSTC-Function Keyboard.

- | | |
|------------------|---|
| a. TST # key (1) | Enters test block number on MESSAGE DISPLAY. |
| b. RNG key (2) | Not functional. |
| c. AZ key (3) | Not functional. |
| d. GRC key (4) | Not functional. |
| e. CON key (5) | Causes test set to continue on to next phase of testing. Test set waits for CON response by displaying a cursor (-). |
| f. CLR key (6) | Clears MESSAGE DISPLAY of any manual entry numbers before ENT key (6) has been pressed; display resets to original numbers. Also used to correct an incorrect manual entry if used before ENT key (7) is pressed. |
| g. ENT key (7) | Enters data on MESSAGE DISPLAY. |
| h. RSET key (8) | Halts whatever test set is doing and resets test set so a new UUT can be tested. |
| i. HALT key (9) | Not used. |



4-6. TSTC-Lamps 4 pushbutton Controls.

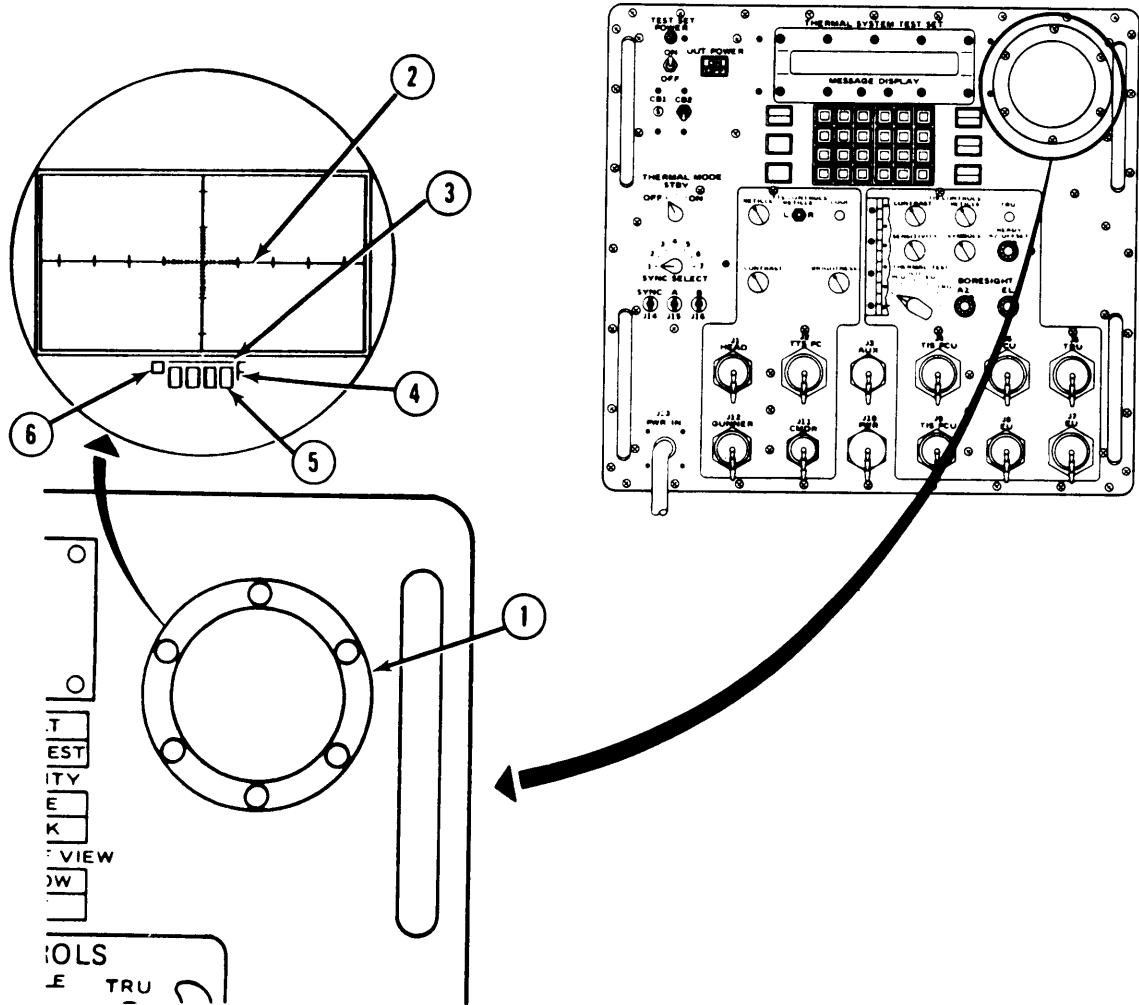
- | | |
|--|---|
| <p>a. PROC FAIL
lamp (1)</p> <p>b. PROC PWR FAIL
lamp (2)</p> <p>c. YES switch/lamp (3)</p> <p>d. NO switch/lamp (4)</p> <p>e. FAULT lamp (5)</p> <p>f. LAMP TEST switch/lamp (6)</p> <p>g. POLARITY switch/lamp (7)</p> <p>h. FIELD OF VIEW switch/lamp (8)</p> | <p>Lights red when failure has occurred in TSTC microprocessor.</p> <p>Lights red when +5 V or +15 V DSS power is not within specification.</p> <p>Lights white when positive operator response to MESSAGE DISPLAY is chosen.</p> <p>Lights white when negative operator response to MESSAGE DISPLAY is chosen.</p> <p>Lights white when UUT malfunctions.</p> <p>Pressing and holding this switch lights lamps on rent panel and allows operator to check that they are working.</p> <p>Lights white when either white hot or black hot image on TSTC viewer is chosen.</p> <p>Lights white when either narrow (10x) or wide (3x) field of view is chosen.</p> |
|--|---|



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4-7. TSTC-IDU Viewer.

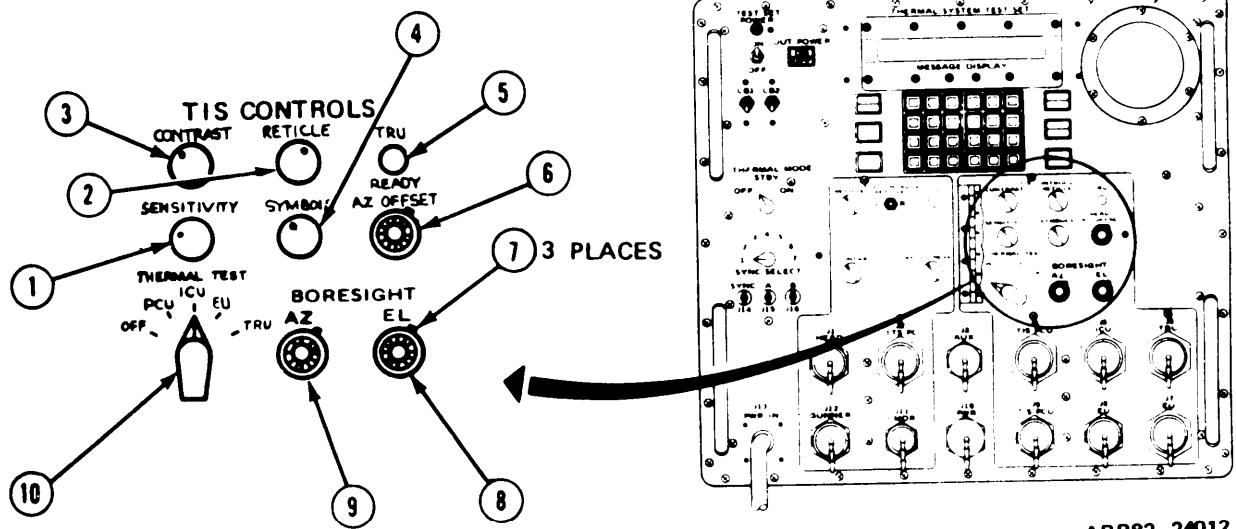
- | | |
|---|---|
| <p>a. Viewer (1)</p> <p>b. Graticule (2)</p> <p>c. Multiple return bar (3)</p> <p>d. Fault symbol (4)</p> <p>e. Range symbol (5)</p> <p>f. Ready to fire symbol (6)</p> | <p>Simulates ICU display; displays test pattern.</p> <p>Aids in correct alinement of patterns. Graticule crosshairs are in 1 milliradian and 10 milliradian divisions.</p> <p>Indicates multiple returns from laser range finder (LRF).</p> <p>Indicates a fault in the fire control system.</p> <p>Indicates range measured by laser range finder (LRF).</p> <p>Indicates when fire control system is ready to fire.</p> |
|---|---|



ARR82-24011

4-8. TSTC-TIS Controls.

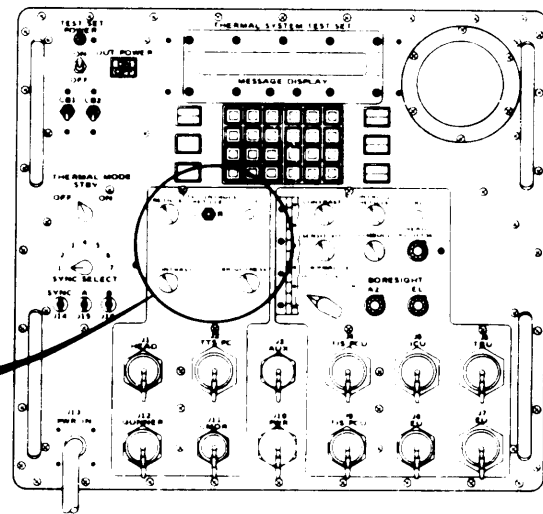
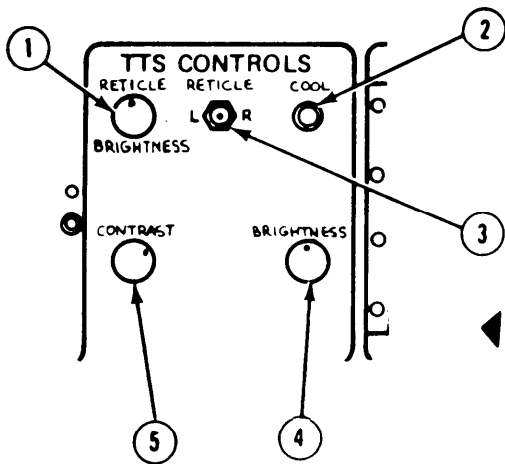
- | | |
|---|--|
| <ul style="list-style-type: none"> a. SENSITIVITY potentiometer (1) b. RETICLE potentiometer (2) c. CONTRAST potentiometer (3) d. SYMBOLS potentiometer (4) | <p>Controls brightness of viewer display.</p> <p>Makes reticle viewer display brighter or darker.</p> <p>Controls contrast of viewer display.</p> <p>Controls brightness of range, multiple returns, ready -to- fire symbol, and fire control fault "F" symbol in the GPS field of view.</p> |
| <ul style="list-style-type: none"> e. TRU READY lamp (5) | <p>Lights green when thermal receiver unit is ready for operation.</p> |
| <ul style="list-style-type: none"> f. AZ OFFSET potentiometer (6) | <p>Changes azimuth offset scale factor between TIS and FCS azimuth offset signal.</p> |
| <ul style="list-style-type: none"> g. Lock levers (7) | <p>Hold AZ OFFSET (6) and BORESIGHT EL (8) and AZ (9) potentiometers.</p> |
| <ul style="list-style-type: none"> h. BORESIGHT EL potentiometer (8) | <p>Sets TIS reticle in elevation when alining TIS reticle with GPS reticle during boresighting.</p> |
| <ul style="list-style-type: none"> i. BORESIGHT AZ potentiometer (9) | <p>Sets TIS reticle in azimuth when alining TIS reticle with GPS reticle during boresighting.</p> |
| <ul style="list-style-type: none"> j. THERMAL TEST switch (10) | <p>Selects thermal test pattern for each TIS unit.</p> |



ARR82-24012

4-9. TSTC-TTS Controls.

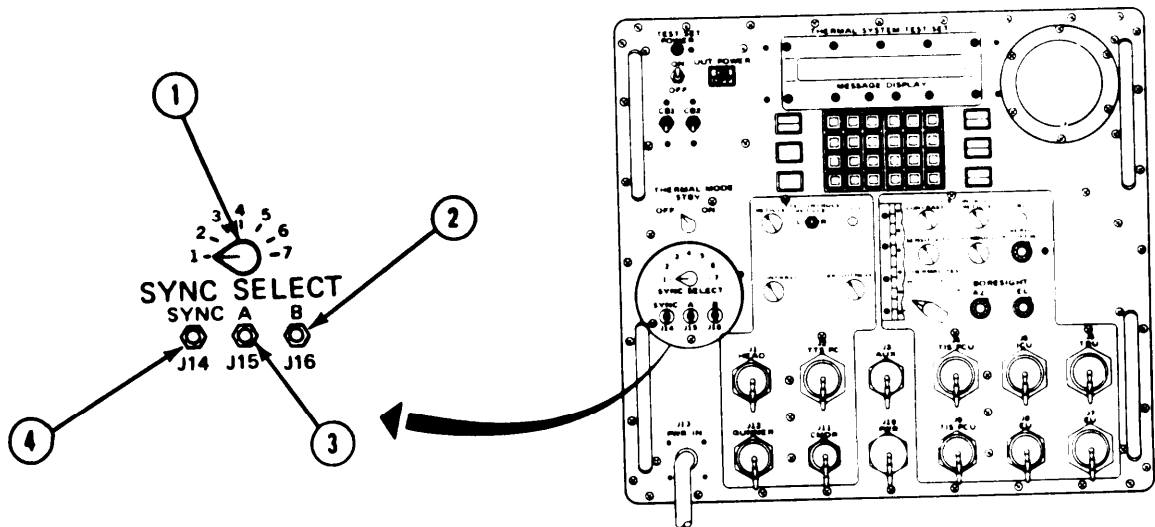
- a. RETICLE BRIGHTNESS potentiometer (1) Controls brightness of reticle in LED display.
- b. COOL lamp (2) Lights to show status of TTS cooler.
- c. RETICLE switch (3) Moves reticle in gunner's display to left or right for fault isolation of the reticle projector unit.
- d. BRIGHTNESS potentiometer (4) Controls brightness of TTS image by changing output of LED display.
- e. CONTRAST potentiometer (5) Controls contrast of TTS image by changing output of LED display.



ARR82-24013

4-10. TSTC - Sync.

- | | |
|---------------------------|--|
| a. SYNC SELECT switch (I) | Selects sync signal for oscilloscope |
| b. B jack J16 (2) | Signal output jack for oscilloscope channel B. |
| c. A jack J15 (3) | Signal output jack for oscilloscope channel A. |
| d. SYNC jack J14 (4) | Sync signal output jack for oscilloscope. |

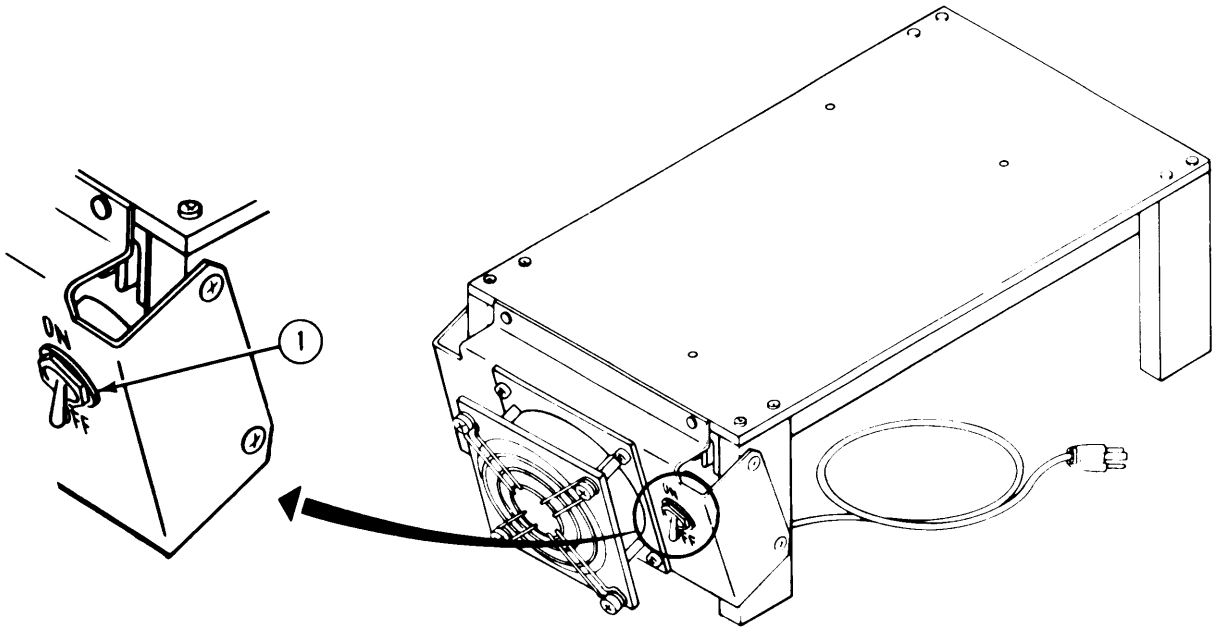


ARR82-24014

4-11. PCU Heat Sink.

ON-OFF switch (1)

Turns PCU heat sink fan on or off.

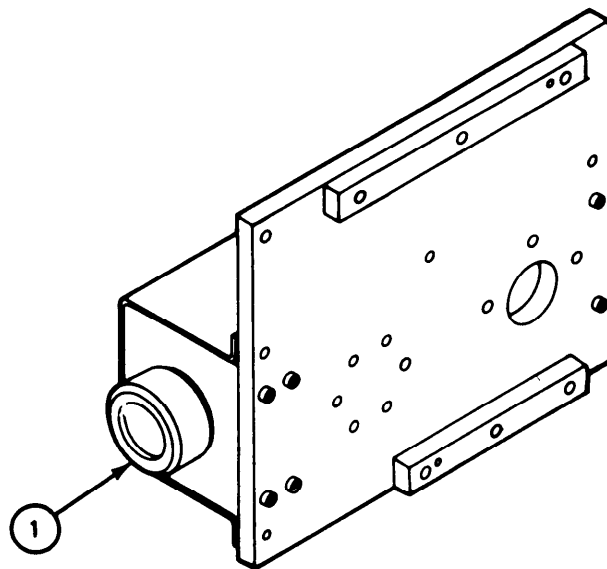


ARR82-24015

4-1 2. ICU Viewer Assembly.

Focus lens (1)

Moves in or out to focus test pattern image.

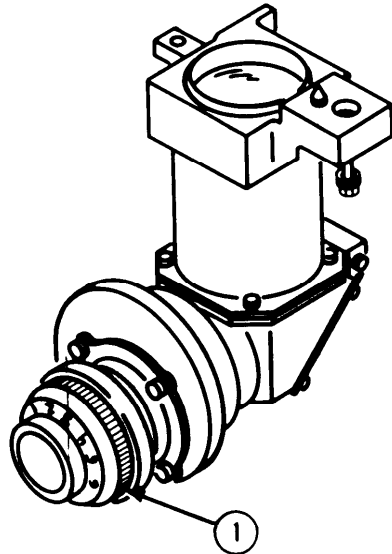


ARR82-24016

4-13. LED Viewer Assembly.

Diopter adjustment (1)

Moves image in or out of focus.

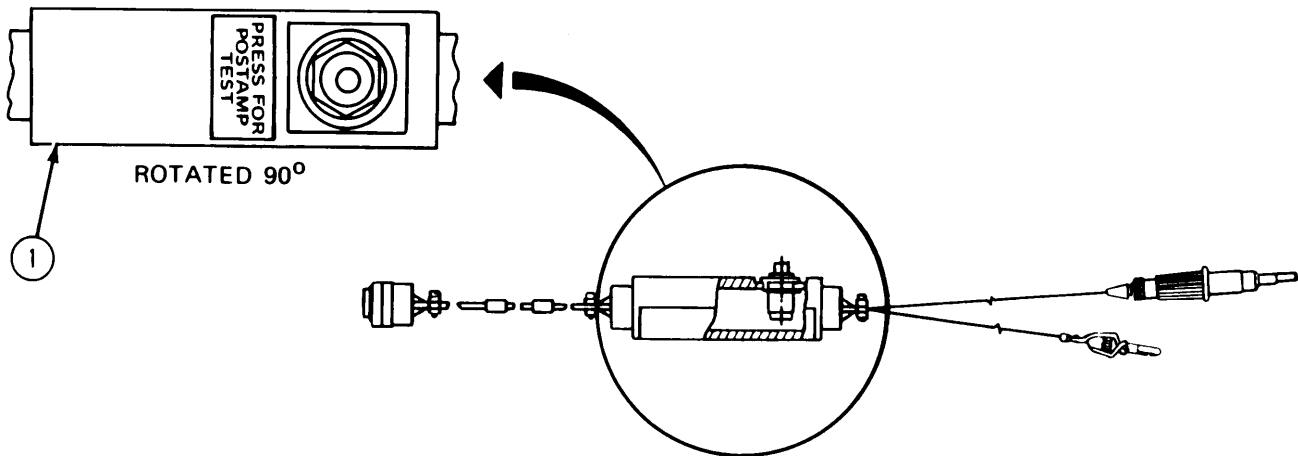


ARR82-24017

4-14. Cable W11.

PRESS FOR POST AMP TEST switch (1)

Sends test signals to head unit post amplifier and preamplifier to check video paths.

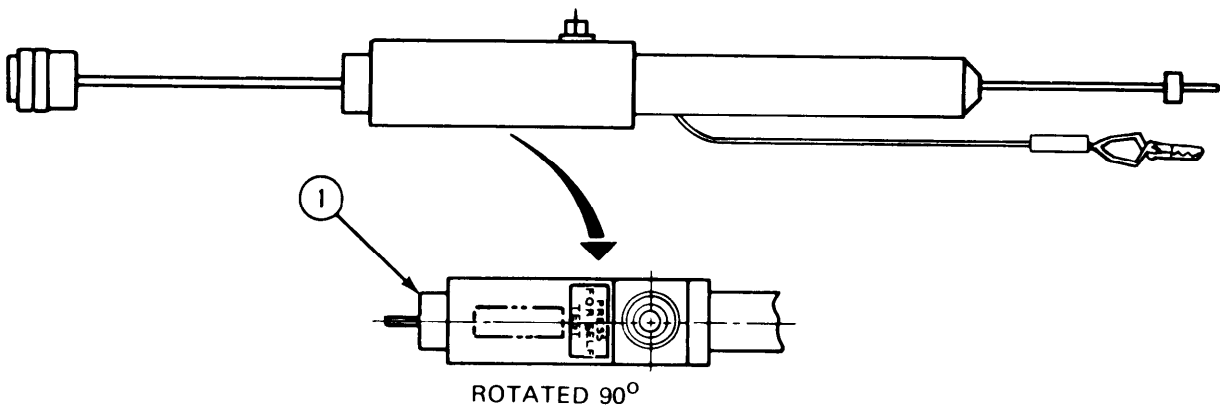


ARR82-24018

4-15. Cable W12.

PRESS FOR SELF TEST
switch (1)

Sends test signals from high voltage power
supplies to TSTC.



ARR82-24019

SECTION II. OPERATION UNDER USUAL CONDITIONS

4-16. General. This section provides step-by-step instructions for setting up, checking out, and placing the test set in operation. Operating instructions covering the use of the test set in troubleshooting units under test of the M1 and M60A3 Tanks are not covered in this manual. Refer to TM 9-1200-206-34- I -2 for troubleshooting the TIS and TM 9-5855-267-24 for troubleshooting the TTS. The procedures in this section show the test set display messages that appear when there is nothing wrong with the test set. If the test set fails the self test operation a message telling how to correct the problem will show on the display. When this happens, go to volume III, chapter 6 and find the displayed message in the fail code index, Table 6-3 or Table 6-4 and perform the troubleshooting procedure to isolate the trouble to a replaceable or repairable item and determine the maintenance action required.

NOTE

Frames I through 13 in para. 4-17 are for initial preparation for operation of the test set. Frames 14 and 15 are for preparation for operation as part of a troubleshooting procedure.

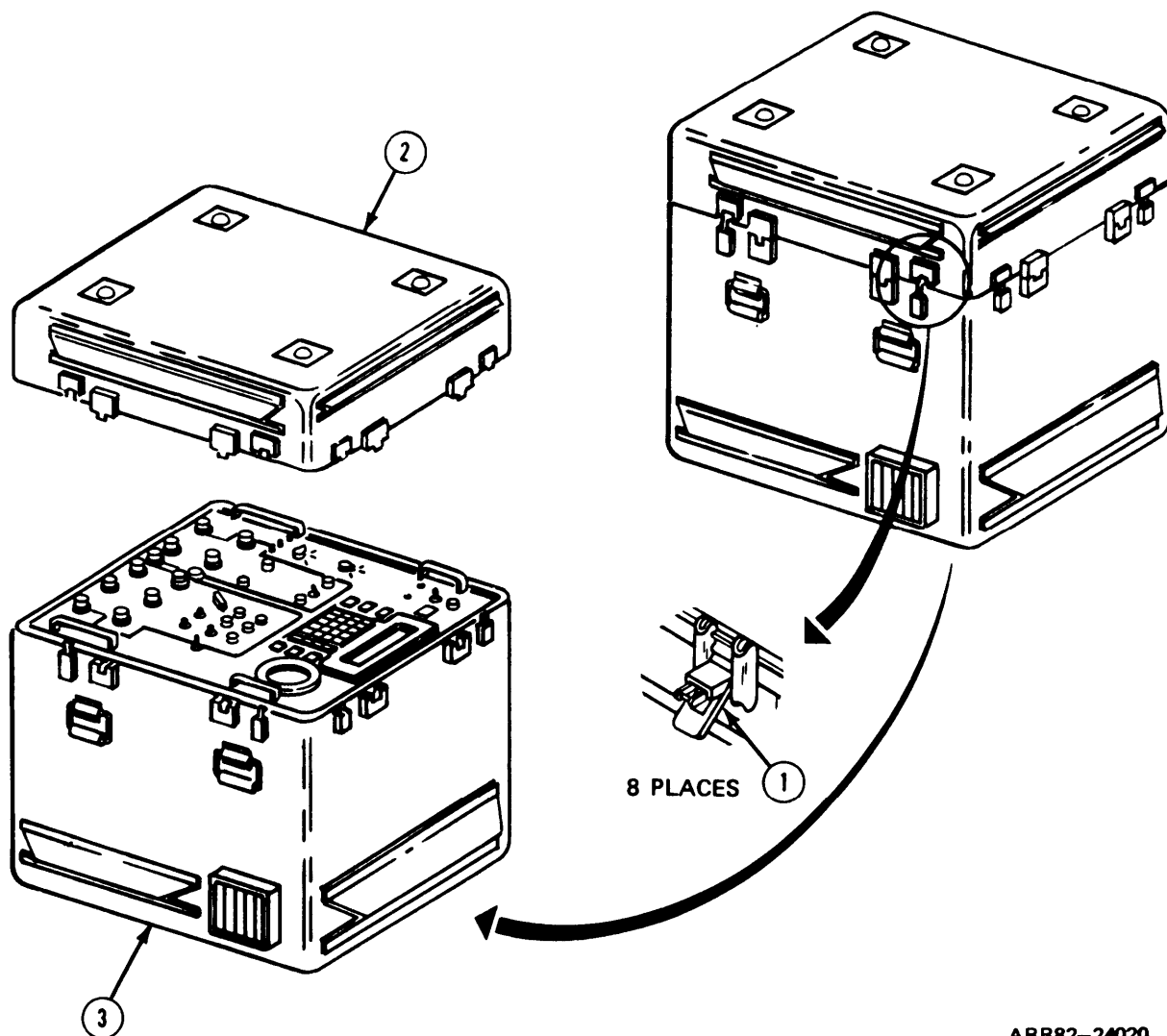
4-17. Preparation for Operation. Frames I through 13 tell you how to set up the test set for operation. The steps cover case cover removal, visual inspection, cable connection, power on, automatic self-test, and test routine selection. Refer to Operator's Manual for setup and adjustment procedures for the external 24 V dc power supply. Frames 14 and 15 tell you how to set up the test set for operation as part of a troubleshooting or maintenance procedure. The steps cover cable connection, power on, and automatic self-test.

FRAME 1

Remove TSTC Case Cover:

1. Pull and release each of eight latches (1).
2. Lift up and take off case cover (2) from case (3).
3. Look at case (3) for any cracks or breaks. If any part is bad, replace part; refer to volume IV, para. 2-5.
4. Look at case cover (2) for any cracks or breaks. If cover (2) is bad, replace cover (2).

GO TO FRAME 2



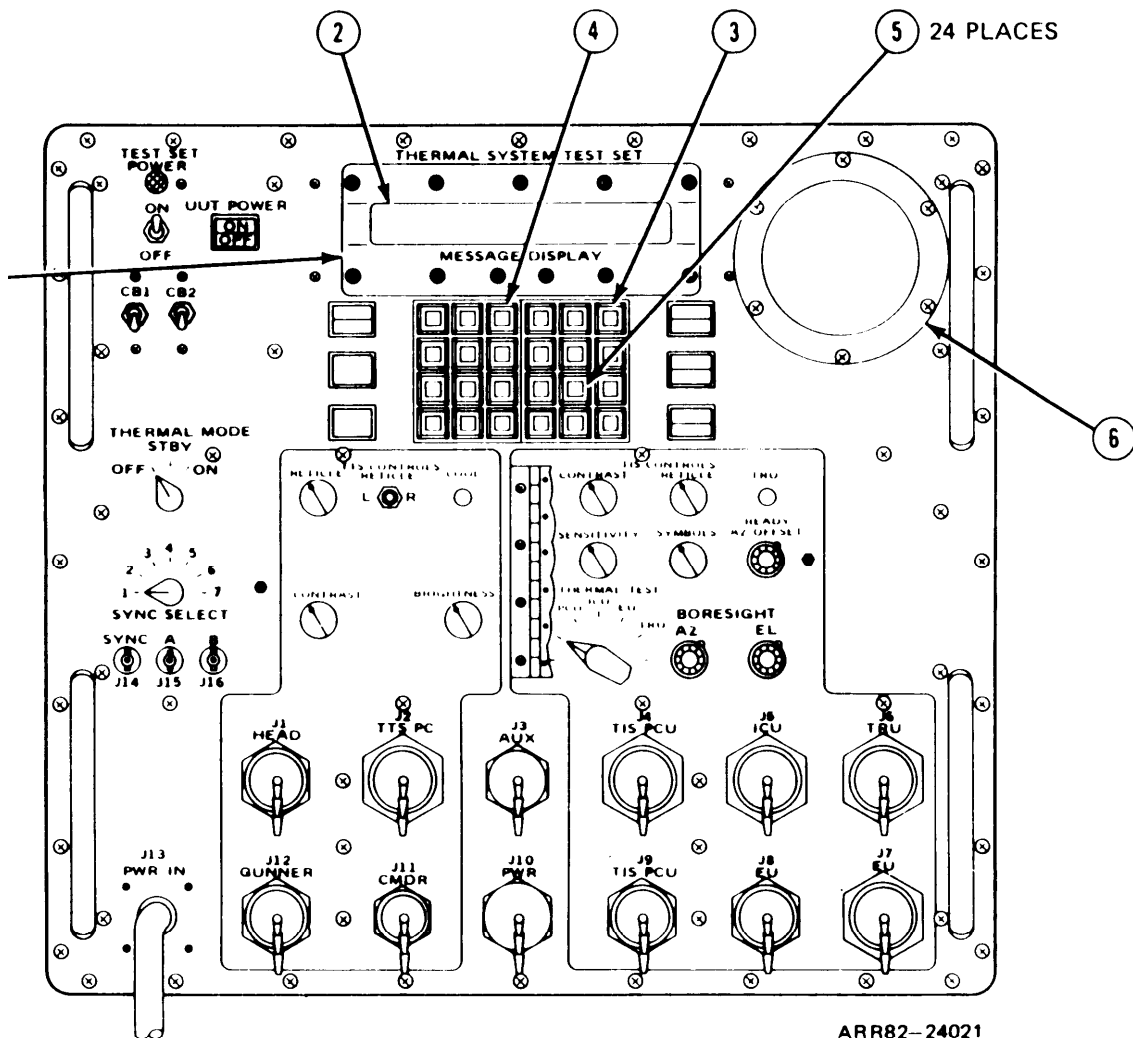
ARR82-24020

FRAME 2

Inspect TSTC Front Panel:

1. Look at MESSAGE DISPLAY (1) for cracked or broken window (2). If bad, replace display; refer to volume IV, para. 2-6.
2. Look at function keyboard (3) assembly and numeric keyboard (4) assembly for damage or looseness or improper action of 24 pushbutton keys (5). If bad, repair keyboard assembly; refer to volume IV, para. 2-6.
3. Look at IDU window (6) for cracks or breakage. If bad, replace window; refer to volume IV, para. 2-6.

GO TO FRAME 3

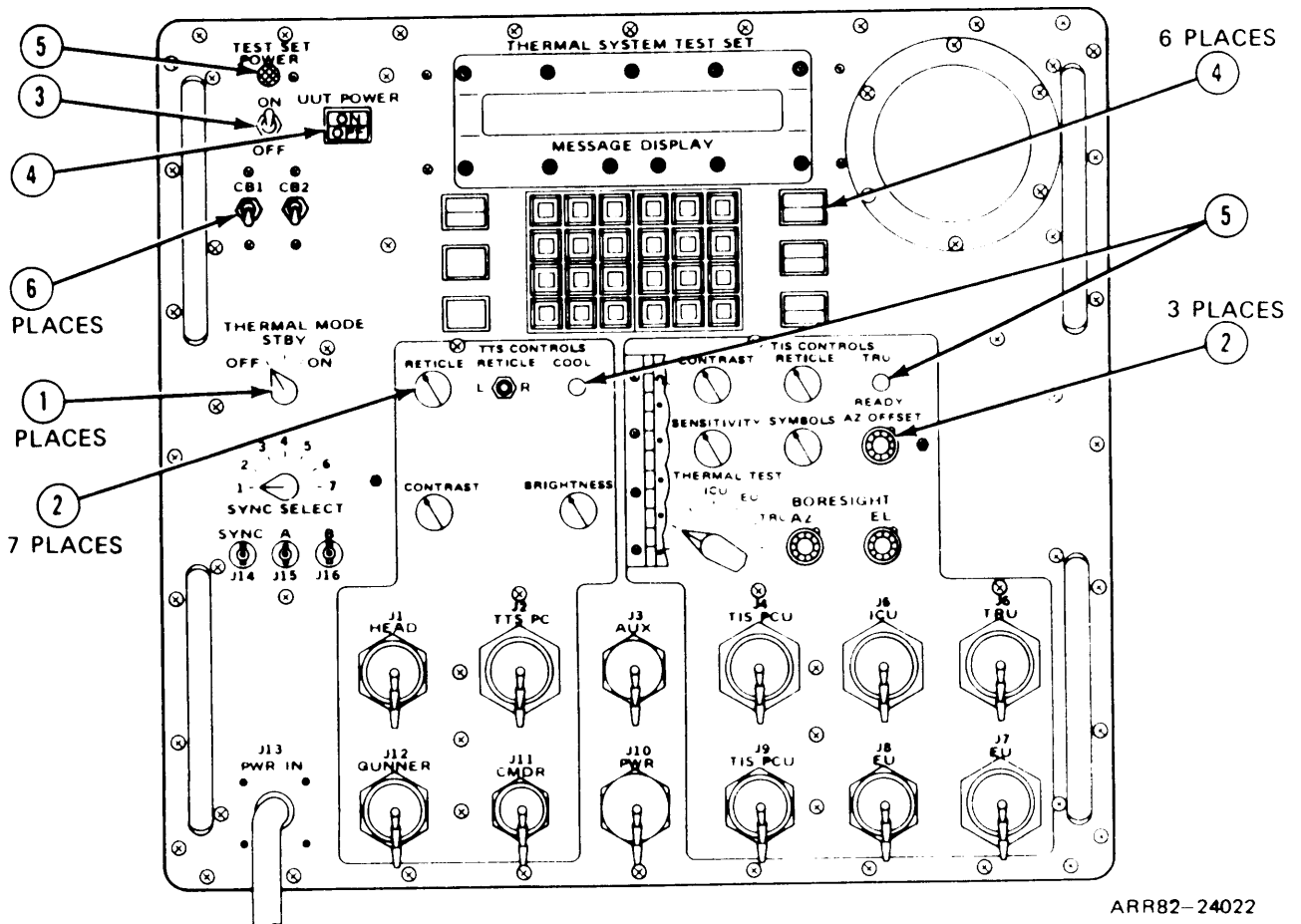


FRAME 3

Inspect TSTC Front Panel (Continued):

1. Look at three panel rotary switches (1) for damage or looseness or improper action. If bad, replace switches; refer to volume IV, para. 2-6.
2. Look at ten panel potentiometers (2) for damage or looseness or improper action. If bad, replace potentiometers; refer to volume IV, para. 2-6.
3. Look at panel toggle switch (3) for damage or looseness or improper action. If bad, replace switch; refer to volume IV, para. 2-6.
4. Look at seven panel lamps and pushbutton controls (4) for damage. If bad, replace switch/indicators; refer to volume IV, para. 2-6.
5. Look at three panel lamps (5) for damage or looseness. If bad, replace lamps; refer to volume IV, para. 2-6.
6. Look at two panel circuit breakers (6) for damage or looseness. If bad, replace circuit breakers; refer to volume IV, para. 2-6.

GO TO FRAME 4



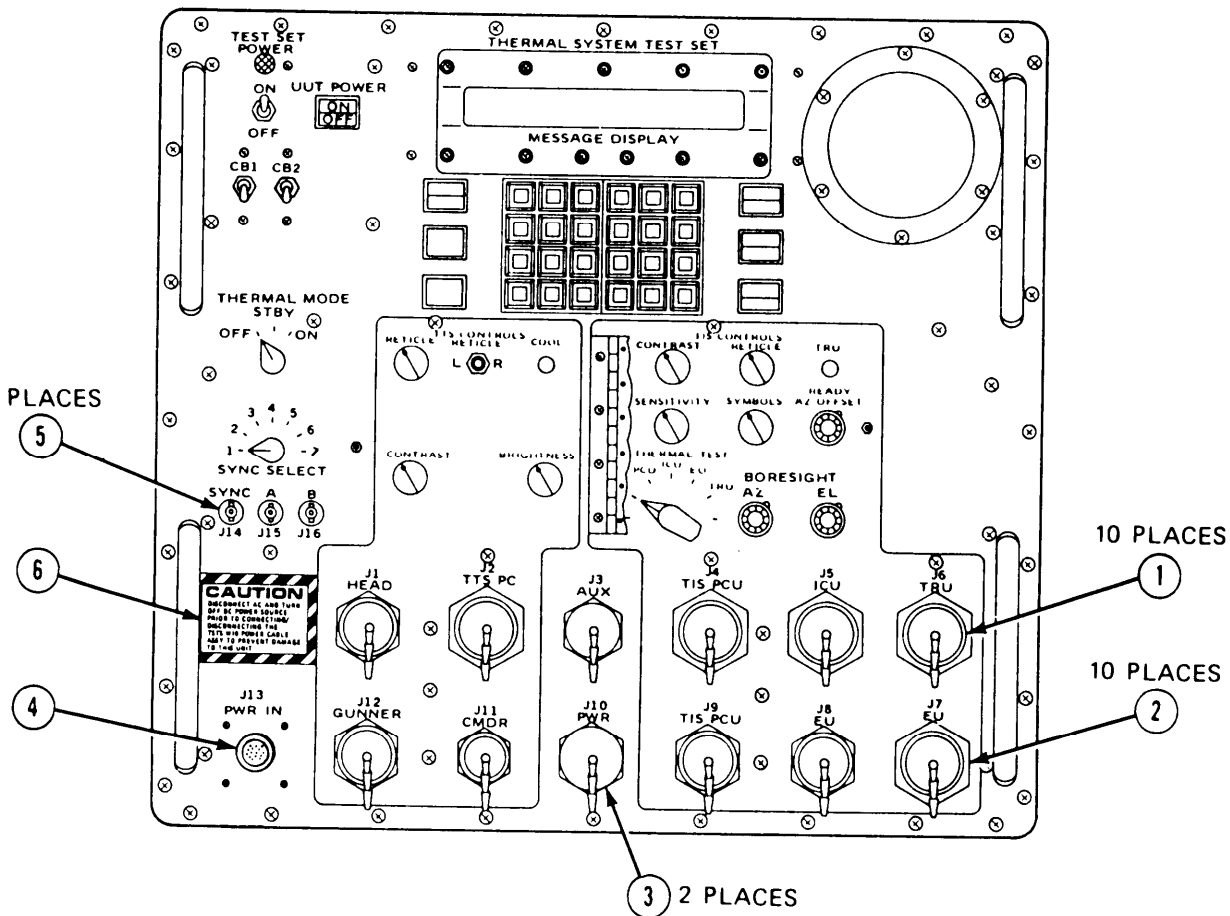
ARR82-24022

FRAME 4

Inspect TSTC Front Panel (Continued):

1. Unscrew and take off 10 shorting plugs (1) from 10 panel connectors (2).
2. Look at 10 shorting plugs (1) for any damage to threads or attaching chains. If bad, remove plugs and turn in; refer to volume IV, para. 2-6.
3. Look at 13 panel connectors (2), (3), and (4) for bent, pushed in, corroded, or missing pins. If bad, replace pins; refer to volume IV, para. 2-4.
4. Look at 13 panel connectors (2), (3), and (4) for broken shells, cracked inserts, or stripped threads. If bad, turn in TSTC. Screw on all 10 shorting plugs (1).
5. Look at three panel coaxial connectors (5) for broken or bent shells or contacts. If bad, replace connectors; refer to volume IV, para. 2-6.
6. Look at front panel decal (6). If missing or damaged, replace decal; refer to volume IV, para. 2-6.

GO TO FRAME 5

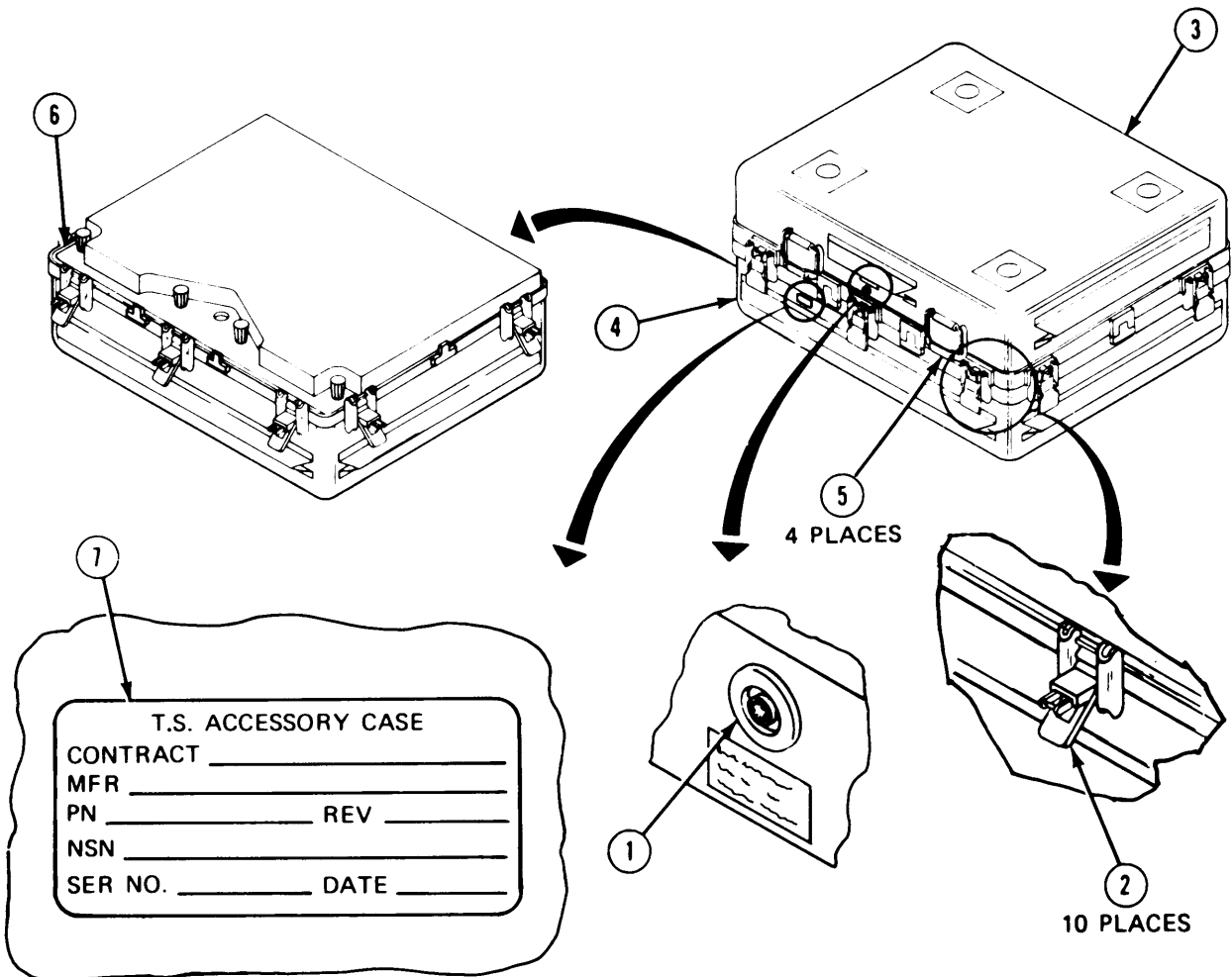


FRAMES 5

Remove Accessory Case Cover:

1. Press and release relief valve (1) to open valve.
2. Pull and release each often latches (2).
3. Lift up and take off case cover (3) from case (4).
4. Look at case (4), four case handles (5), case cover (3), cover latches (2), cover seal (6) and identification plate (7) for damage. If any damage is found, replace accessory case; refer to volume IV, para. 3-5.

GO TO FRAME 6



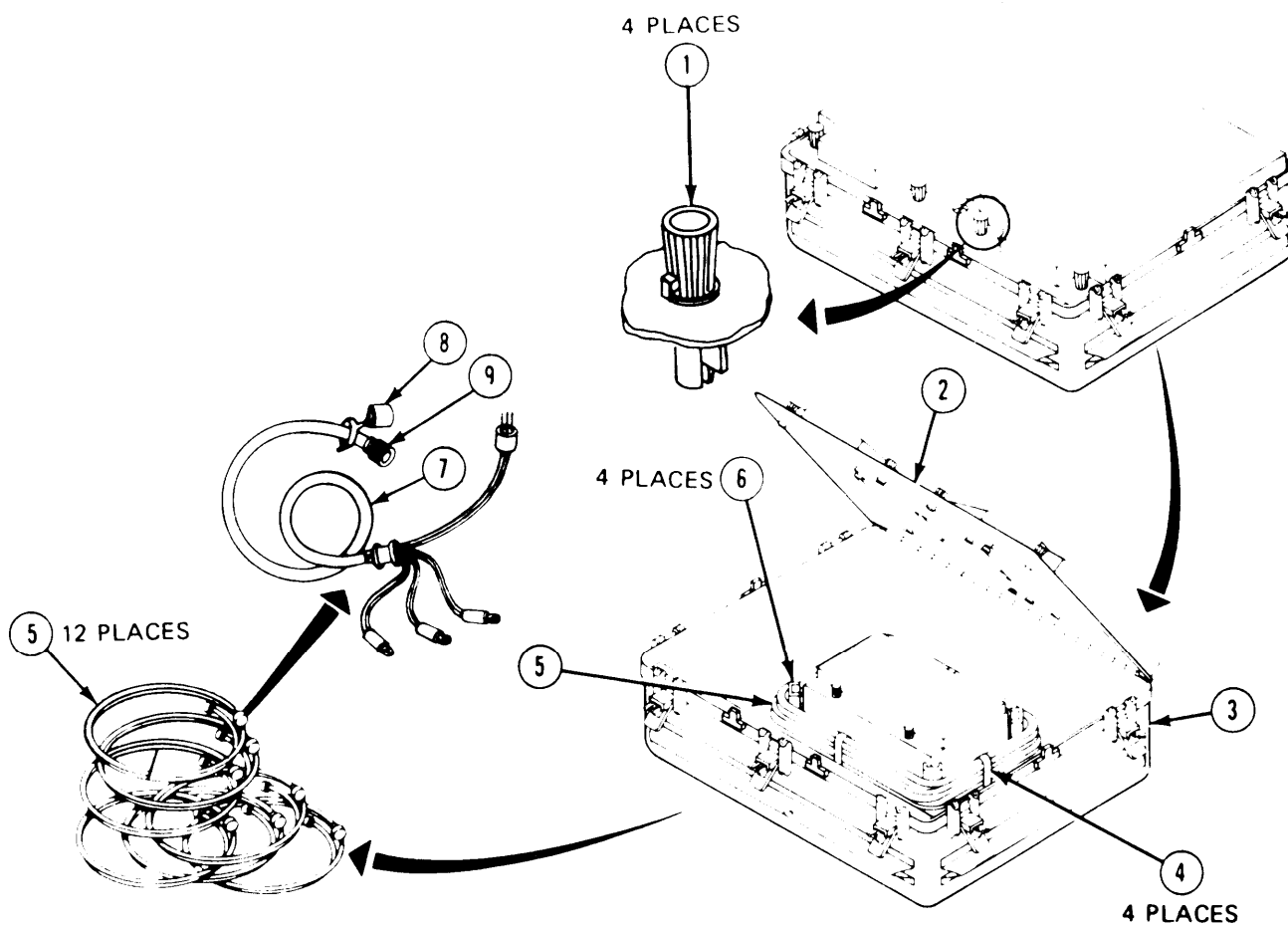
ARR82-24024

FRAME 6

Remove Power Cable Assembly W10:

1. Turn four fasteners (1) on lid (2).
2. Lift inner retaining lid (2) on accessory/storage assembly cover (3).
3. Unfasten four cable straps (4).
4. Remove test set cables (5) from four cable brackets (6).
5. Find W10 cable (7). Look at W10 cable (7) and check for cuts and breaks in insulation. If bad, repair cable; refer to volume IV, para. 3-6.
6. Pull off dust cover (8) from connector (9). Look at connector (9) for bent, pushed in, corroded, or missing pins. If any damage is found, refer to volume IV, para. 3-6.

GO TO FRAME 7



ARR82-2402E

FRAME 7

Connect Power Cable W10:

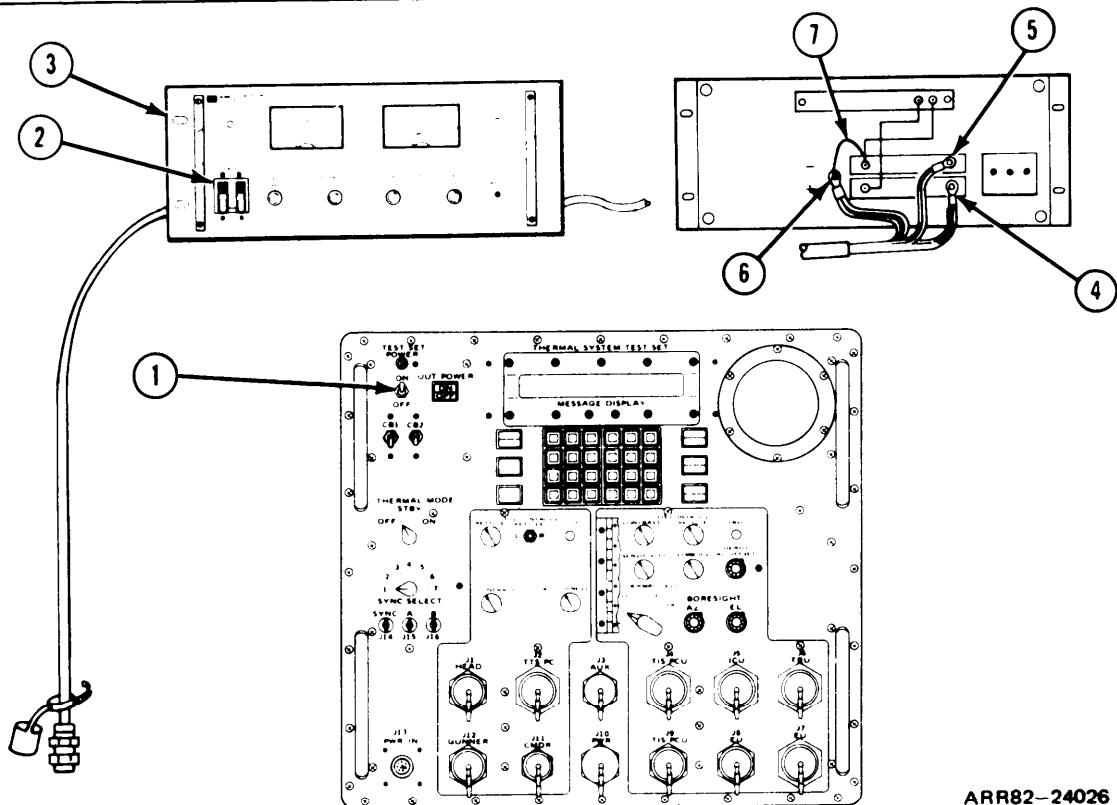
1. Set TEST SET POWER switch (1) to OFF.
2. Set power supply ON-OFF switch (2) to OFF.
3. Disconnect power supply (3) from 115 V ac power source.

NOTE

Make sure CB1 and CB2 are in up position.

4. Connect lug (4) which terminates 3 white +24 VDC leads to positive terminal on power supply.
5. Connect lug (5) which terminates 3 red +24 VDC RTN leads to negative terminal on power supply.
6. Connect lug (6) which terminates 3 or 4 black CHASSIS GND leads to power supply ground.
7. Connect ground wire (7) between negative terminal of power supply and power supply ground.

GO TO FRAME 8



ARR82-24026

FRAME 8

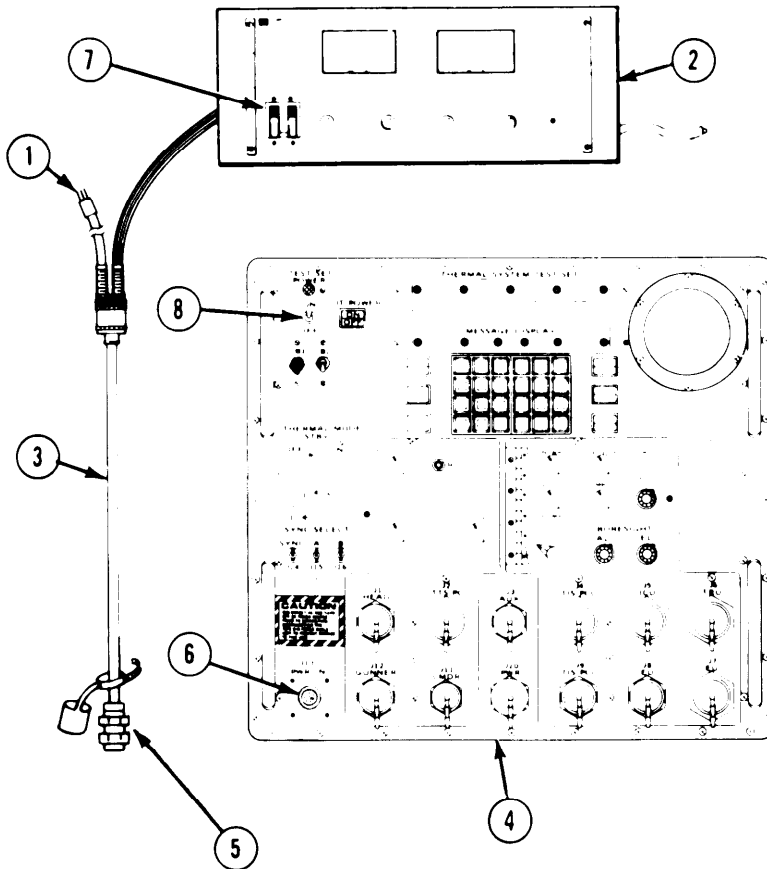
Connect W10 Cable (Continued):

CAUTION

Make sure connector (1) is unplugged from 115 V ac source and power supply (2) is set to OFF before connecting W10 cable (3) to TSTS (4) to prevent damage to the TSTS (4).

1. Connect W10 cable connector P1(5) to test set connector J13 PWR IN (6).
2. Plug connector (1) into 115 V ac source.
3. Plug power supply (2) into 115 V ac source.
4. Set power supply ON/OFF switch (7) to ON.
5. Set power supply voltage to 28 ± 1 V dc and power supply current to maximum.
6. Set TEST SET POWER switch (8) to ON. Automatic self-test will now run. Wait 15 seconds.

GO TO FRAME 9



ARR82-24556

FRAME 9

Automatic Self Test:

1. If MESSAGE DISPLAY (1) reads:
THERMAL MODE - OFF
immediately set THERMAL MODE switch (2) to OFF.
if MESSAGE DISPLAY (1) reads:
THERMAL TEST - OFF
immediately set THERMAL TEST switch (3) to OFF.

NOTE

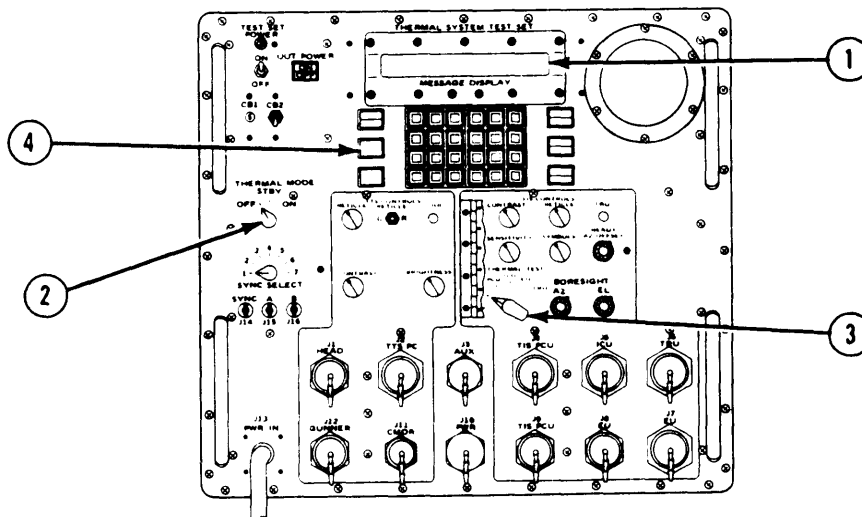
If MESSAGE DISPLAY (1) reads:
HAS SWITCH BEEN REPOSITIONED?,
press YES switch/lamp (4) and continue.

2. If MESSAGE DISPLAY (1) reads any of the following or any combination of the following, then it is a fail code. Refer to Automatic Self Test Fail Code Index, volume III figure 6-2,

A	E	I	M	4	8
B	F	J	1	5	
C	G	K	2	6	
D	H	L	3	7	

3. If MESSAGE DISPLAY (1) is blank, refer to Fault Symptom Index, volume III, figure 4-1.

GO TO FRAME 10



ARR82-24027

FRAME 10

Automatic Self Test (Continued):

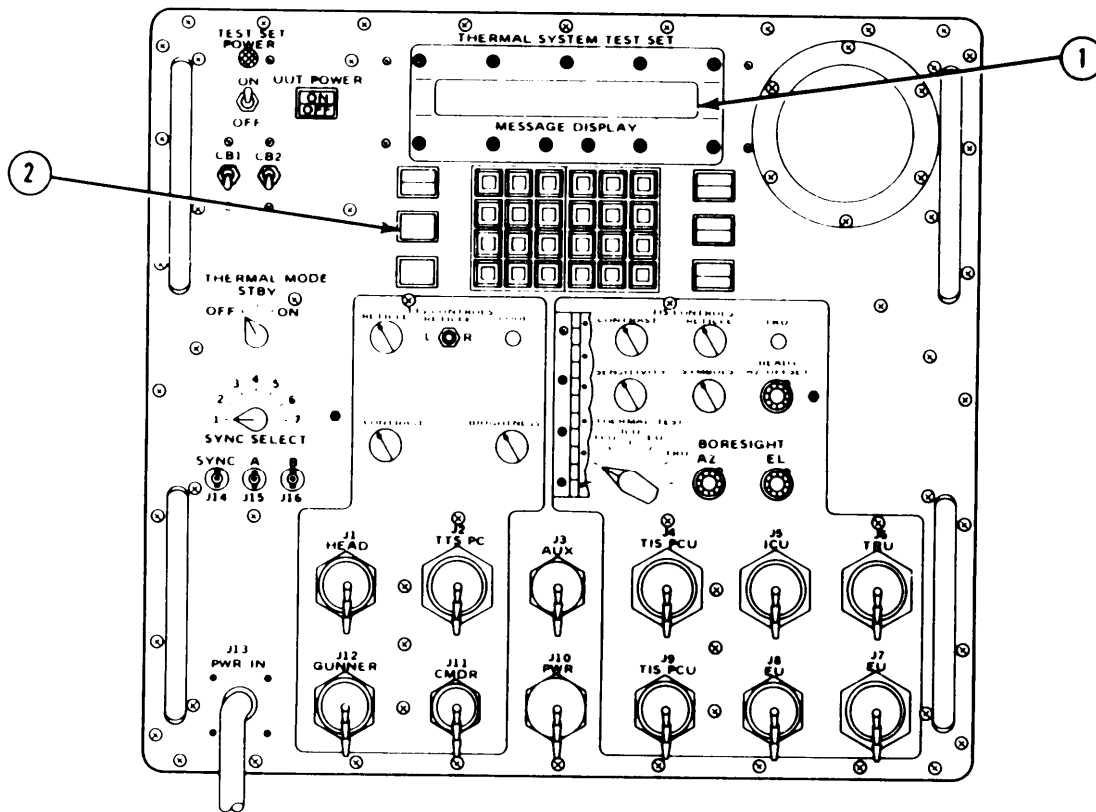
1. If MESSAGE DISPLAY (1) reads:

AUTOMATIC SELF TEST COMPLETED
 RUN OAST?

then run Operator Assisted Self Test. Press YES key (2); refer to volume III, figure 6-2, step 2.

2. If MESSAGE DISPLAY (1) reads anything else but messages in frame 9 and frame 10; refer to Fault Symptom Index, volume III, figure 4-1.

GO TO FRAME 11



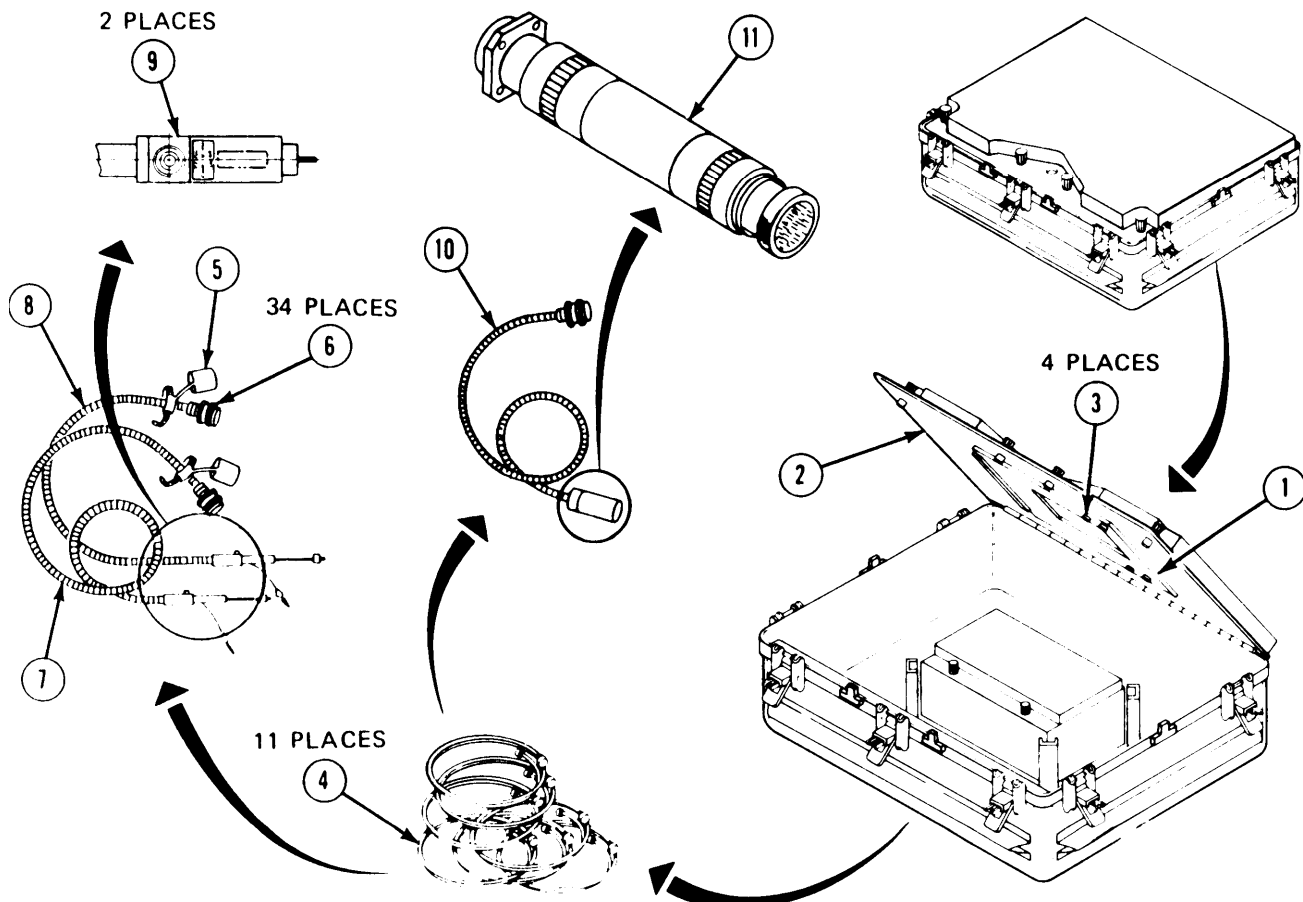
ARR82-24028

FRAME 11

Inspect Accessory/Storage Assembly Cover Equipment:

1. Remove TRU holding plate assembly (1) from inner retaining lid (2) by removing four bolts (3).
2. Look at plate (1) for scratches and broken or missing hardware. If bad, repair plate; refer to volume IV, para. 3-9.
3. Look at each cable assembly, W1 through W9, W11, and W12 (4) for cuts and breaks in insulation. If bad, repair cable; refer to volume IV, para. 3-6.
4. Pull off dust cap (5) and look at each cable connector (6) for bent, pushed in, or missing pins. If any damage is found, repair cable; refer to volume IV, para. 3-6.
5. Find cable assemblies W11 (7) and W12 (8). Look at pushbutton switch (9) on each cable for damage or looseness. If bad, replace switch; refer to volume IV, para 3-6.
6. Find cable assembly W9 (10). Takeoff video multiplexer assembly (11) from cable assembly W9 (10). Look at video multiplexer assembly (11) for bent or broken pins. If bad, turn in.

GO TO FRAME 12



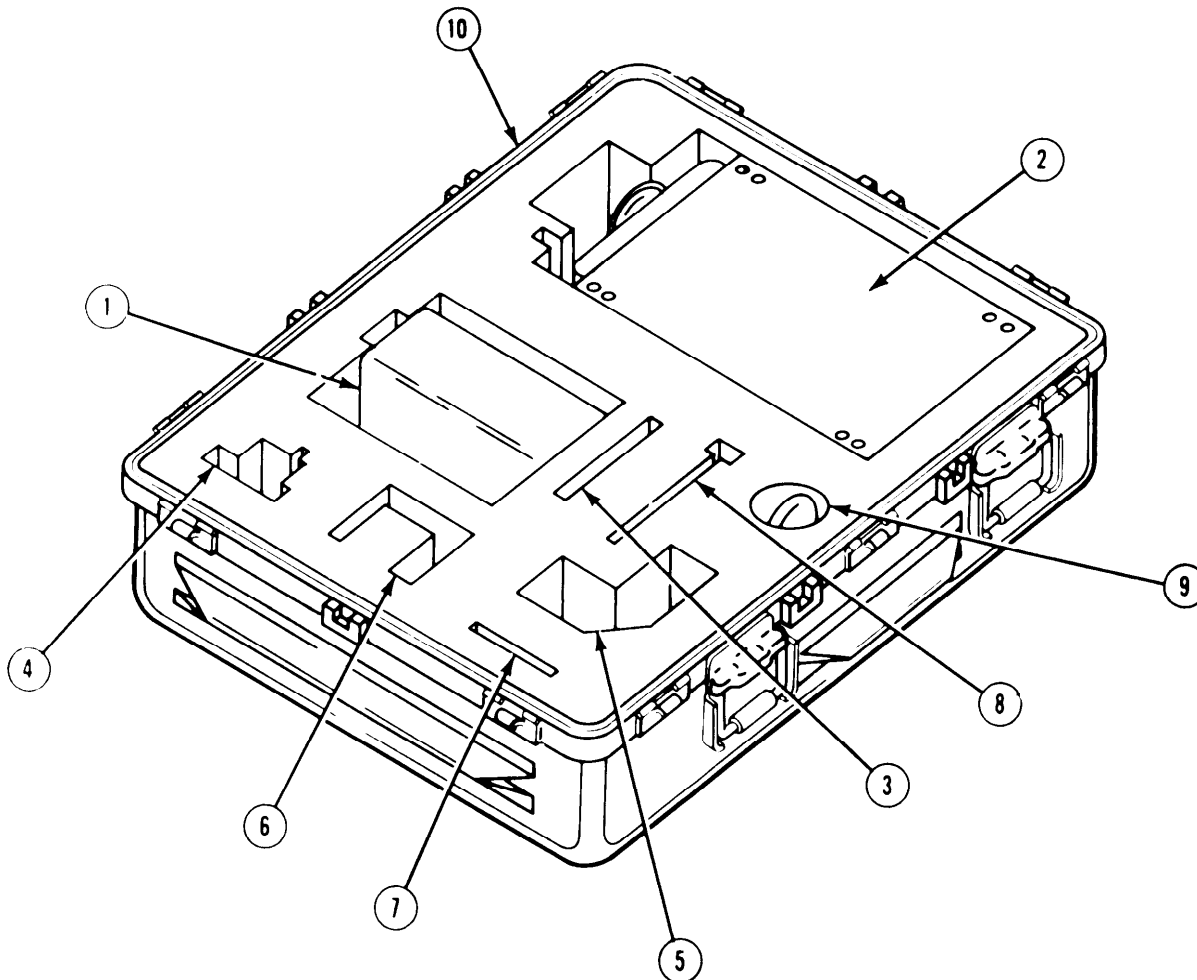
ARR82-24029

FRAME 12

Inspect Accessory/Storage Assembly Equipment:

1. Remove ICU viewer assembly (1), PCU heat sink holding fixture (2), elec. extender card (3), test target reticle (4), LED viewer assembly (5), adapter cover (6), handle puller (7), focal alignment tool (8), and spanner wrench (9) from accessory case (10).
2. Look at each item for scratches or missing or broken parts. If any damage is found, repair item or return item to depot; refer to volume IV, chapter 3, as required.
3. Put items 1 through 9 back in accessory case (10).

GO TO FRAME 13



ARR82-24030

FRAME 13

Inspect PCU Heat Sink Holding Fixture:

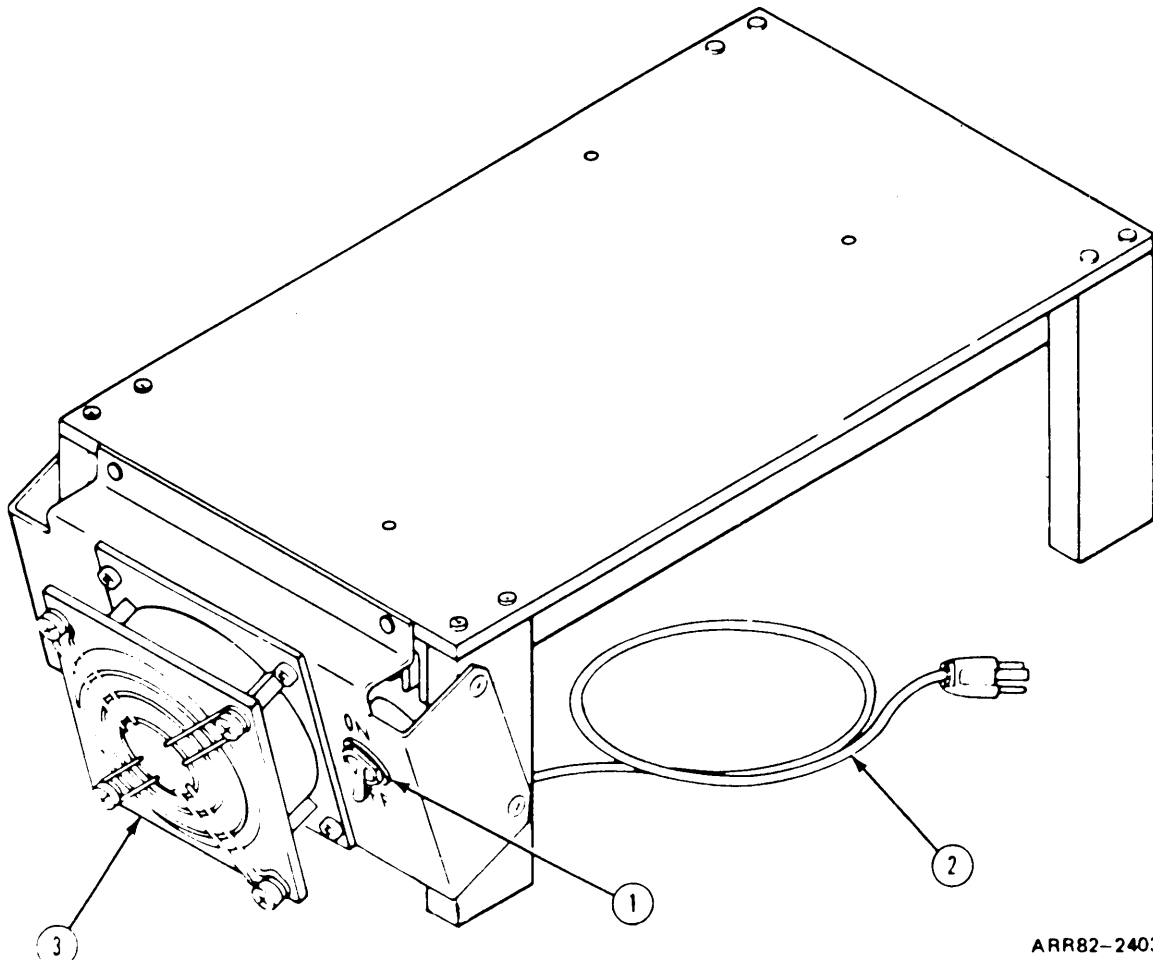
1. Make sure PCU heat sink holding fixture ON-OFF switch (1) is set to OFF.
2. Connect PCU heat sink fan cable (2) to 115 V 60 Hz power.

WARNING

Be careful when handling the PCU heat sink when the fan is working. You could injure yourself if you touch the fan blades. Keep your fingers outside the finger guard at all times.

3. Set ON-OFF switch (1) to ON.
4. Make sure fan (3) is working right. If bad, replace fan, cable or switch (as required); refer to volume IV, para. 3-7.

END OF PREPARATION FOR OPERATION PROCEDURES



ARR82-24031

FRAME 14

Connect W10 Cable:

CAUTION

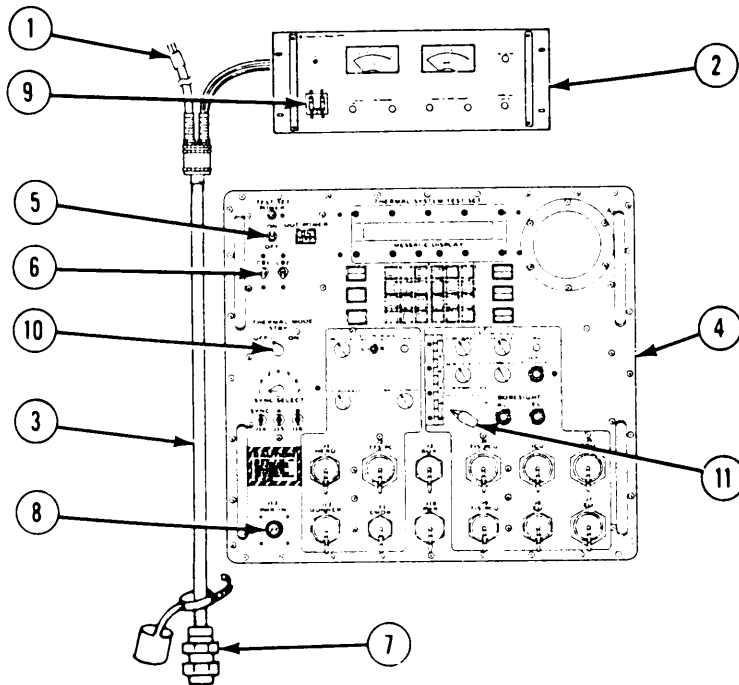
Make sure connector (1) is unplugged from 115 V ac source and power supply (2) is set to OFF before connecting W 10 cable (3) to TSTS (4) to prevent damage to the TSTS (4).

NOTE

Frames 14 and 15 are for preparation for operation as part of a troubleshooting procedure.

1. Make sure TEST SET POWER switch (5) is set to OFF. Make sure circuit breaker CB1 (6) is closed.
2. Connect W10 cable connector P1 (7) to test set connector J13 PWR IN (8).
3. Plug connector (1) into 115 V ac source. Plug power supply (2) into 115 V ac source.
4. Set power supply ON/OFF switch (9) to ON. Set power supply voltage to 28 ±1 V dc and power supply current to maximum.
5. Make sure THERMAL MODE switch (10) and THERMAL TEST switch (11) are set to OFF.
6. Set TEST SET POWER switch (5) to ON. Automatic self-test will now run. Wait 15 seconds.

GO TO FRAME 15



FRAME 15

Automatic Self-Test:

1. If MESSAGE DISPLAY (1) reads any of the following or an combination of the following, then it is a fail code. Refer to Automatic Self Test Fail Code Index, volume III, figure 6-2, Table 6-3.

A E I M 4 8
 B F J 1 5
 C G K 2 6
 D H L 3 7

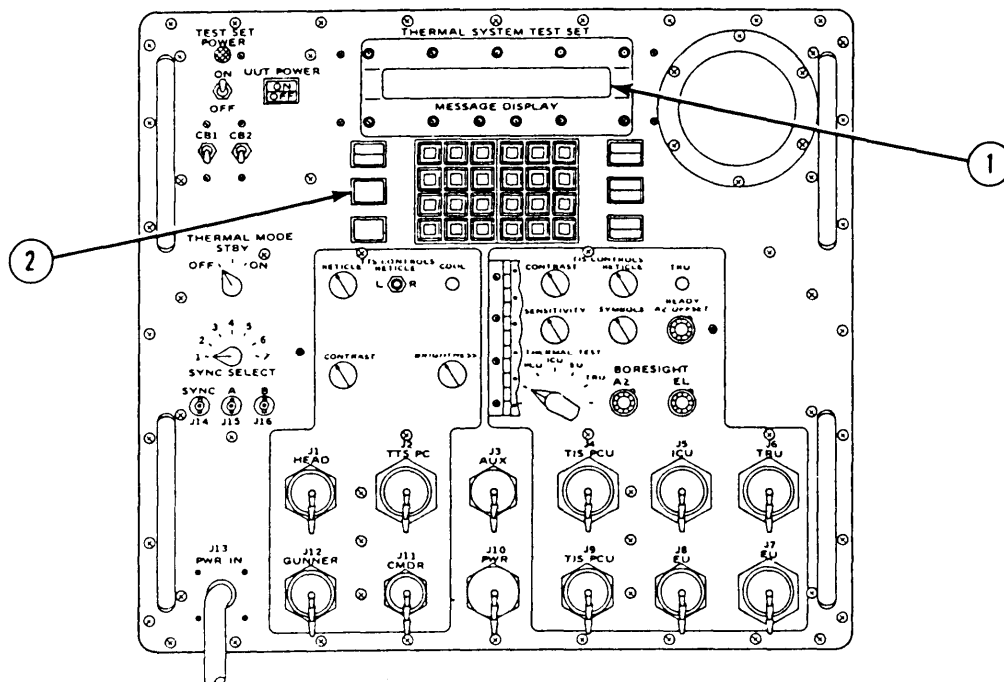
2. If MESSAGE DISPLAY (1) is blank, refer to Fault Symptom Index, volume III, figure 4-1.
3. If MESSAGE DISPLAY (1) reads:

AUTOMATIC SELF TEST COMPLETED
 RUN OAST?

and you are in the middle of a troubleshooting procedure, then return to the block in the troubleshooting procedure that sent you here; if not, and you were directed to run Operator Assisted Self-Test, press YES key (2) and refer to figure 6-2.

4. If MESSAGE DISPLAY (1) reads anything else but messages in frame 15; refer to Fault Symptom Index, volume III, figure 4-1.

END OF PREPARATION FOR OPERATION DURING TROUBLESHOOTING PROCEDURES



ARR82-24031.2

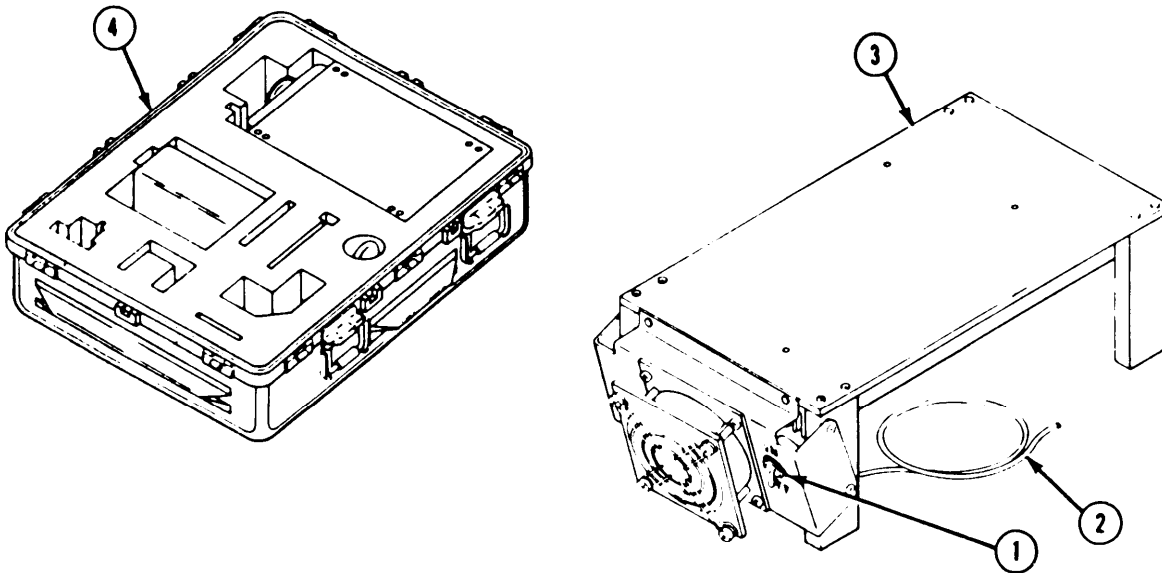
4-18. Shutdown Procedure. Frames 1 through 5 tell you how to place the test set in shutdown condition after completion of operation.

FRAME 1

Turn Off PCU Heat Sink:

1. Set PCU heat sink ON-OFF switch (1) to OFF.
2. Disconnect cable (2) from 115 V 60 Hz power.
3. Put PCU heat sink (3) back in accessory case (4).

GO TO FRAME 2



FRAME 2

Disconnect W10 Cable:

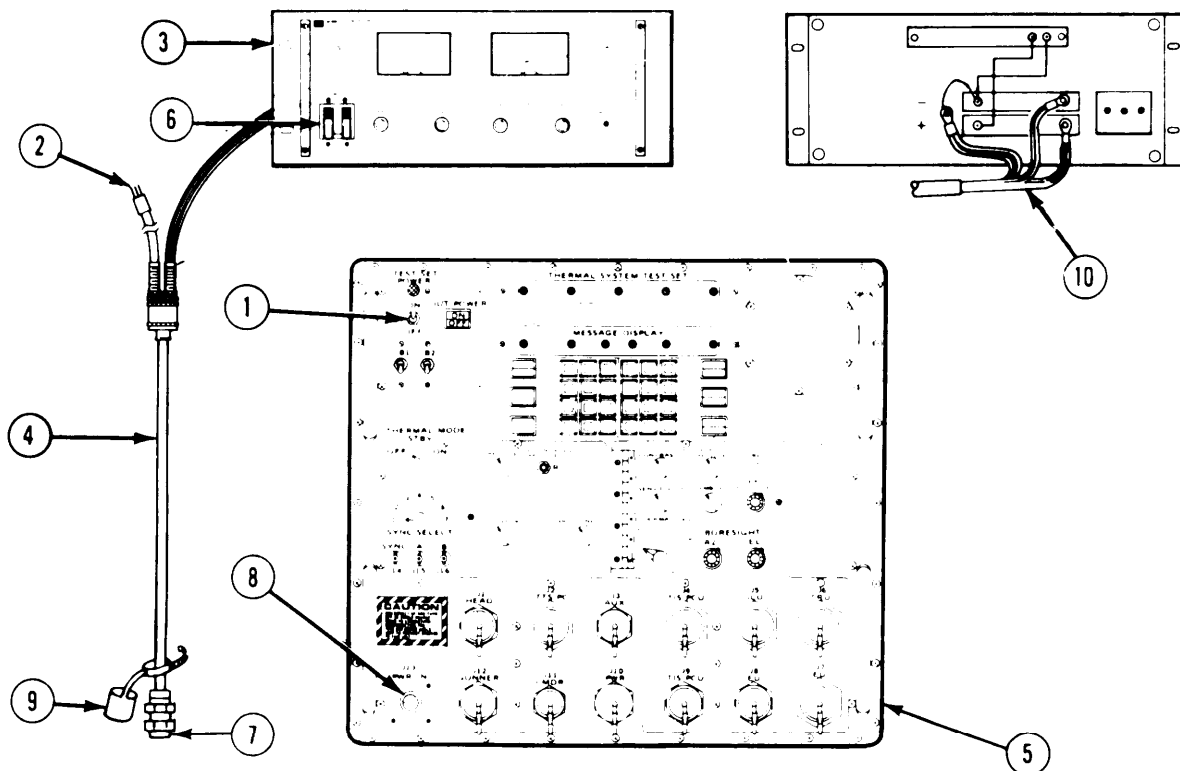
1. Set TEST SET POWER switch (1) to OFF.

CAUTION

Make sure connector (2) is unplugged from 115 V ac source and power supply (3) is set to OFF before disconnecting W10 cable (4) from TSTS (5) to prevent damage to the TSTS (5).

2. Set power supply ON/OFF switch (6) to OFF.
3. Unplug power supply (3) from 115 V ac source.
4. Unplug connector (2) from 115 V ac source.
5. Disconnect W10 cable connector P1 (7) from test set connector J13 PWR IN (8). Put dust cap (9) on connector P1 (7).
6. Disconnect W10 cable leads (10) from power supply output bus terminals on rear of power supply (3).

GO TO FRAME 3



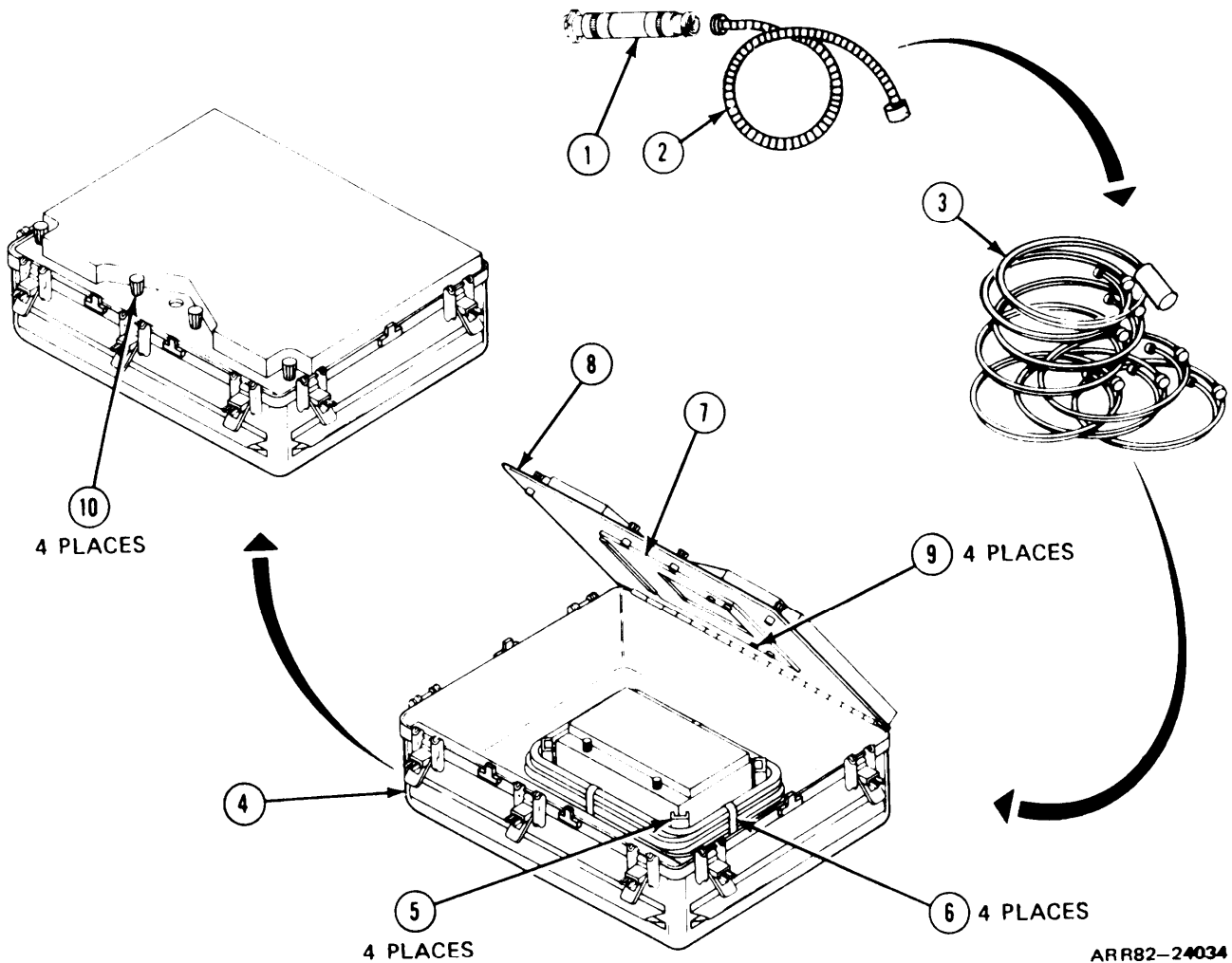
ARR82-24033

FRAME 3

Install Accessory Case Cover Equipment:

1. Put video multiplexer assembly (1) on cable assembly W9 (2).
2. Put test cable assemblies W1 through W12 (3) back into case (4).
3. Be sure test cable assemblies (3) are wrapped securely around four cable brackets (5).
4. Fasten test cables with four cable straps (6).
5. Put TRU holding plate (7) back on inner retaining lid (8) and screw in four bolts (9).
6. Close inner retaining lid (8) and turn four fasteners (10).

GO TO FRAME 4

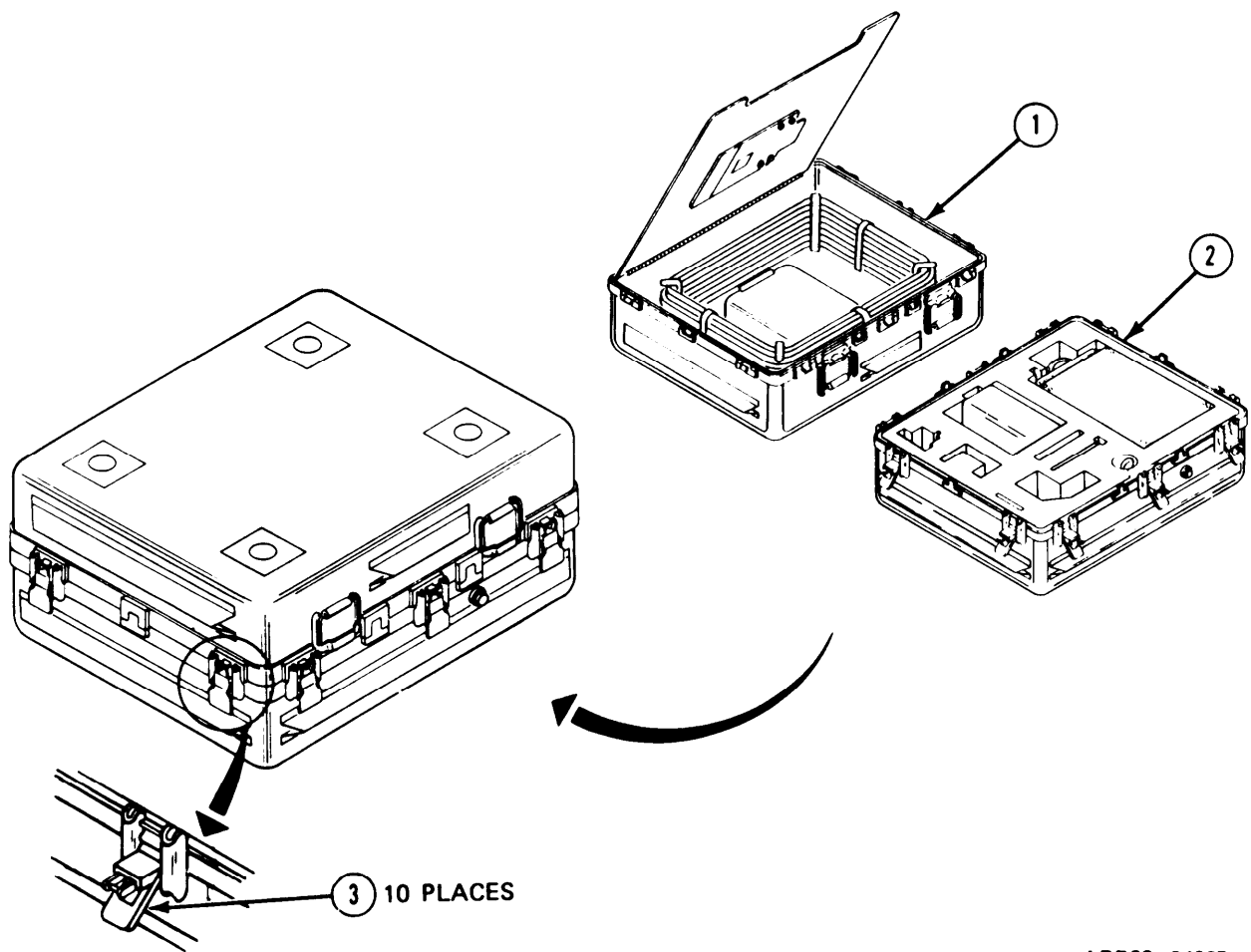


FRAME 4

Reassemble Accessory Case:

1. Place accessory case cover (1) on accessory case (2).
2. Secure cover (1) on case (2) using ten latches (3).

GO TO FRAME 5



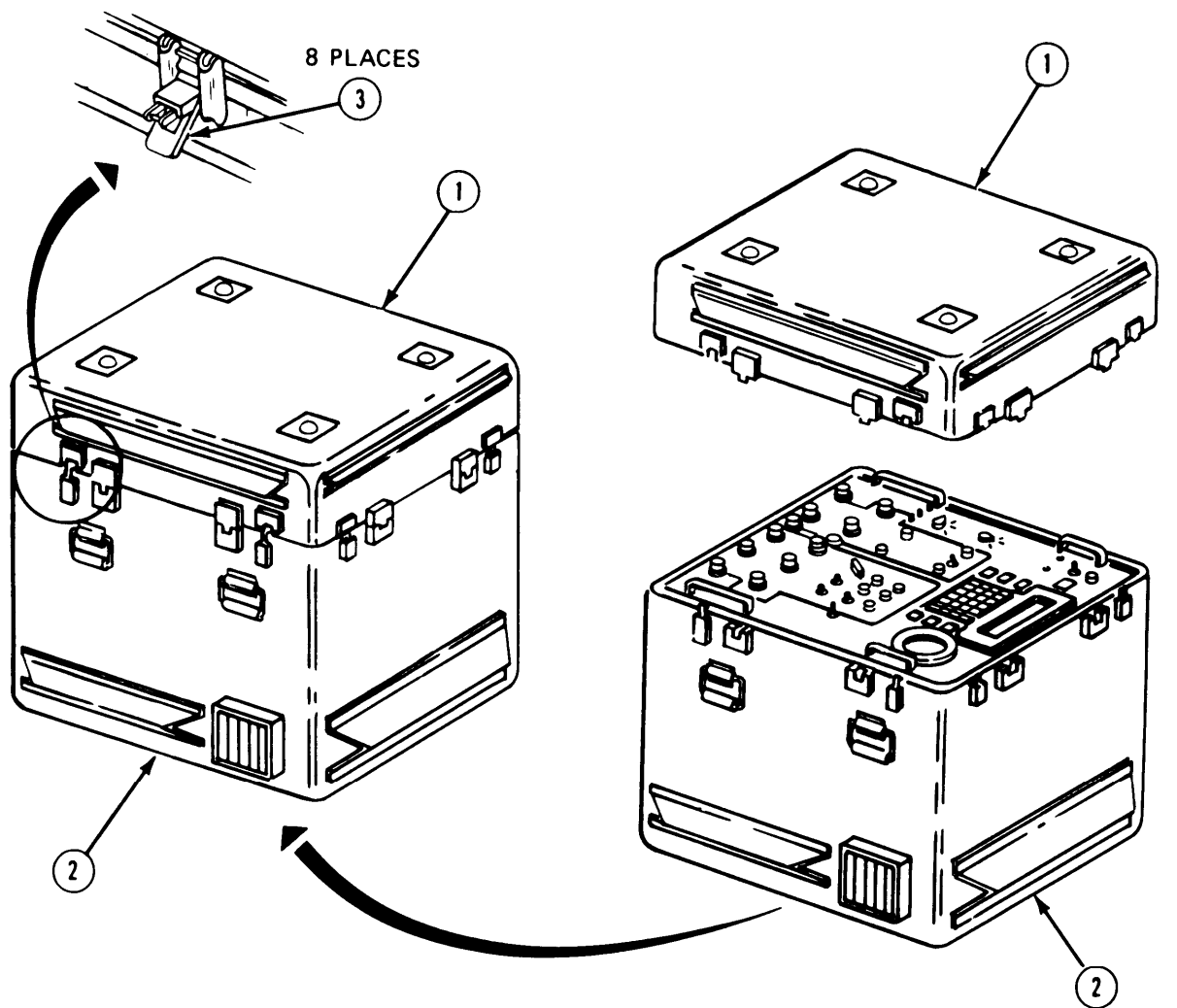
ARR82-24035

FRAME 5

Reassemble TSTC Case:

1. Put TSTC case cover (1) back on TSTC case (2).
2. Secure cover (1) on case (2) using eight latches (3).

END OF SHUTDOWN PROCEDURES



ARR82-24036

**APPENDIX A
REFERENCES**

TITLE	MANUAL NUMBER
Administrative Storage of Equipment	TM 740-90-1
Direct Support and General Support Maintenance Manual, Volume II, Part 2 of 2	TM 9-1200-206-34-2-2
Organizational, Direct Support, and General Support Maintenance Manual	TM 9-5855-267-24
Direct Support and General Support Maintenance Manual, Volume I -Part 2, Troubleshooting	TM 9-1200-206-34-1-2
Disposal of Unwanted Radioactive Materiel	AR 385-11
Expendable Items (Except Medical, Class V. Repair Parts and Heraldic Items)	CTA 50-970
Federal Supply for Manufacturer from Name to Code or Code to Name	SB 708-41/42
First Aid for Soldiers	FM 21-11
General Maintenance Procedures for Fire Control Materiel	TM 9-254
Material. Management for Using Units	AR 710-2
Operator's, Organizational, Direct Support, and General Support Maintenance Manual including Repair Parts and Special Tools List for Test Set, Night Vision Sight AN/TAM-3 and Test Set, Night Vision Sight AN/TAM-3A	TM 11-5855-255-14&P
Operator's, Organizational, Direct Support, and General Support Maintenance Manual of Multimeter AN/USM-451	TM 11-6625-2953-14
Painting Instructions	TM 43-0139
Painting instructions for Field Use	TM 9-213
Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)	TM 750-244-2
The Army Maintenance Management System (TAMMS)	DA PAM 738-750
When and How to Use DD Form 6, Packing Improvement Report	DA Pamphlet 700-3

**APPENDIX B
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST**

Section I. INTRODUCTION

B-1. Scope. This appendix lists components of end items and basic issue items for the Thermal System Test Set (TSTS) to help you inventory items required for safe and efficient operation.

B-2. General. These Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of the End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the TSTS in operation, to operate it, and to do emergency repairs. Although shipped separately packed, they must accompany the Test Set during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. Explanation of Columns. The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the national stock number assigned to the item and will be used for requisitioning purposes.

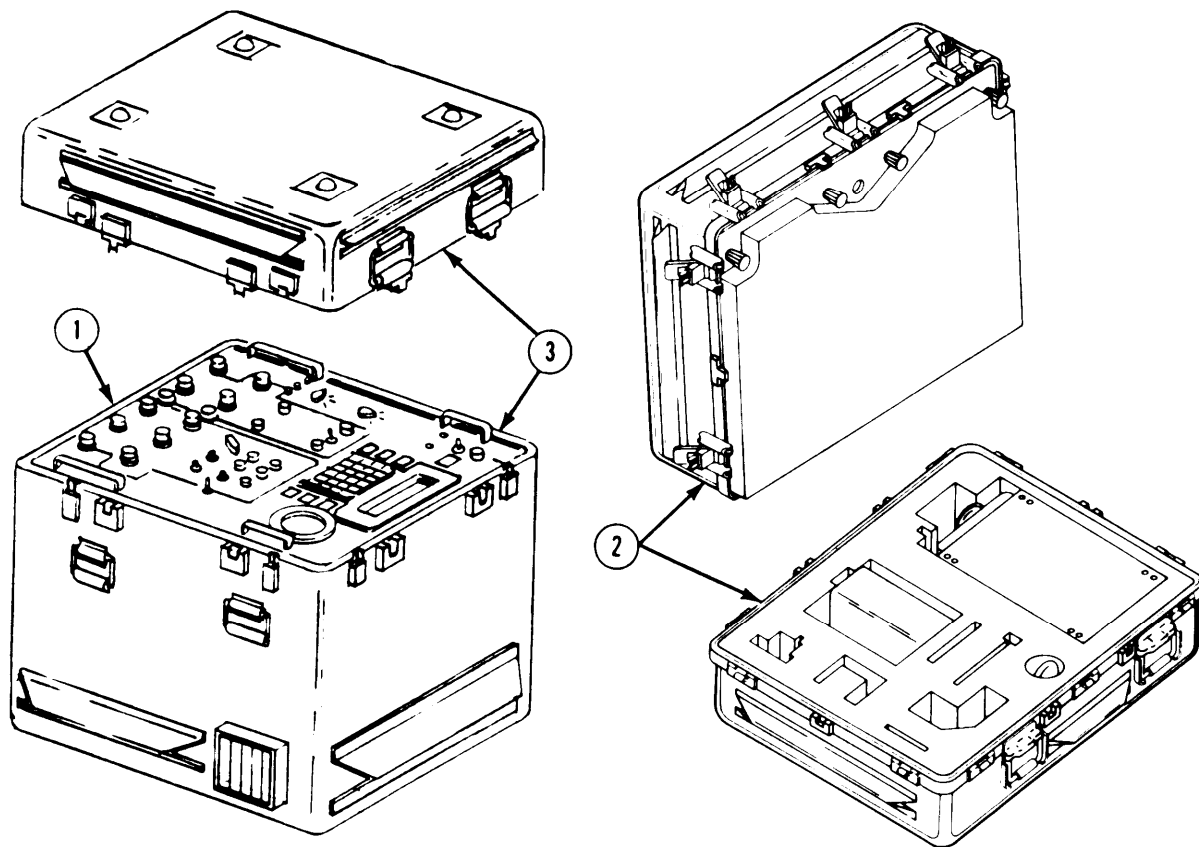
c. Column (3) - Description. Indicates the national item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the number of FSCM in parentheses with part number.

d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity Required (QTY RQR). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM

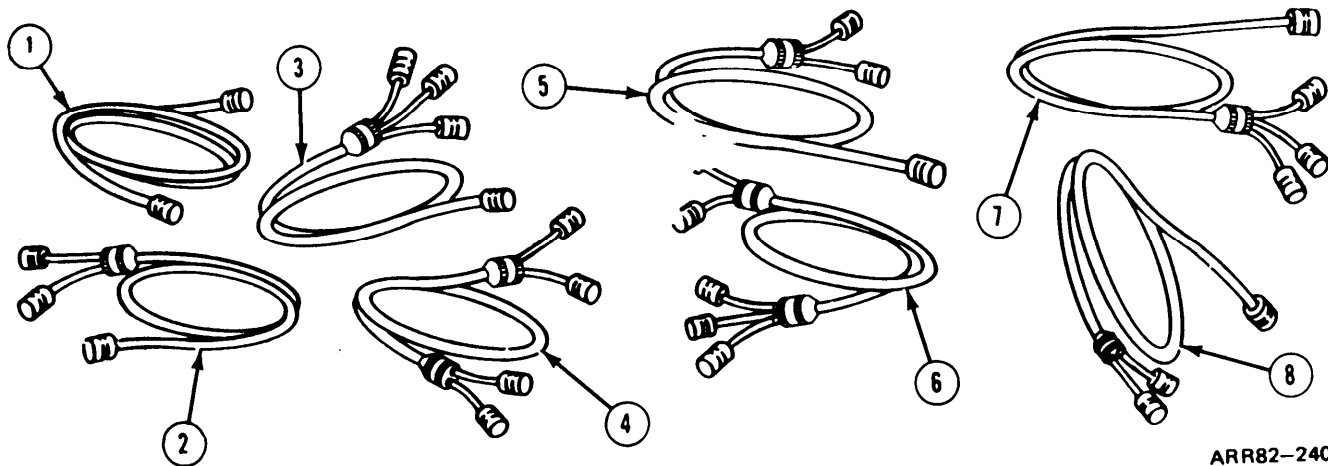
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USEABLE ON CODE	(4) U/M	(5) QTY RQR
1	4931-01- 130-5695	Thermal System Test Controller (82577) 12303531	-	EA	1
2		Accessory Storage Assembly (82577) 12303424	-	EA	1
3	4931-01 136-7257	Case (82577) 12303496	-	EA	1



ARR82-24037

Section II. COMPONENTS OF END ITEM (Continued)

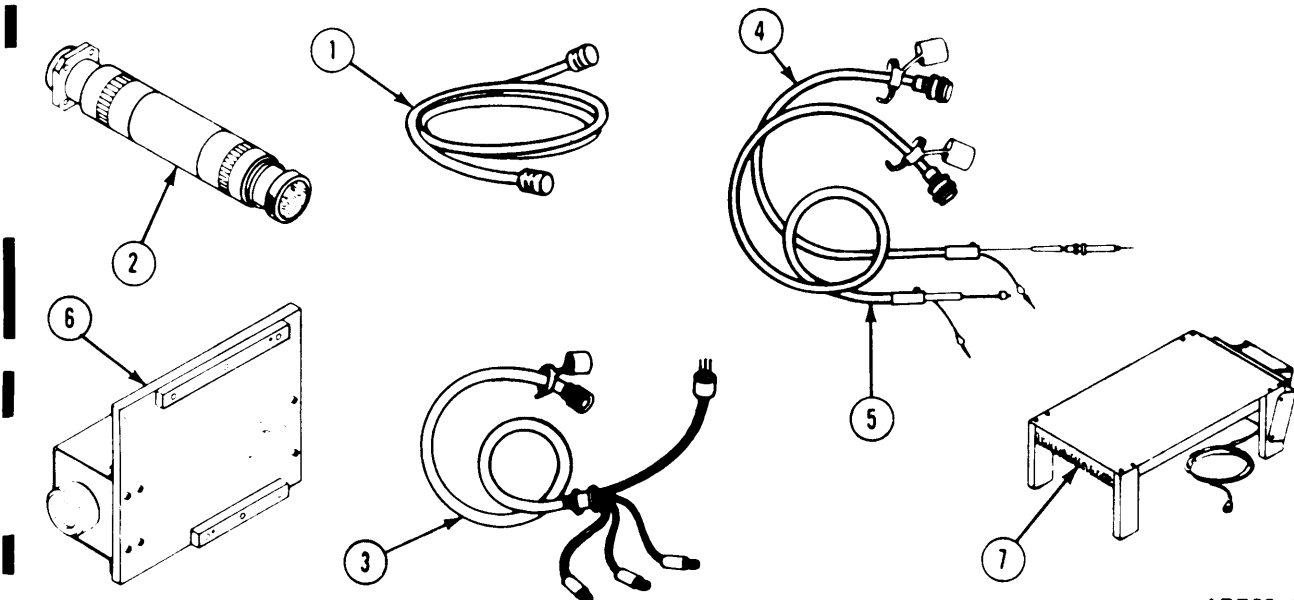
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	(4) USEABLE ON CODE U/M	(5) QTY RQR
1	4931-01- 137-4977	Cable Assembly W1 (19200) 12303425	EA	1
2	4931-01- 137-5161	Cable Assembly W2 (19200) 12303426	EA	1
3	4931-01- 137-5162	Cable Assembly W3 (19200) 12303427	EA	1
4	4931-01- 137-5163	Cable Assembly W4 (19200) 12303428	EA	1
5	4931-01- 137-5164	Cable Assembly W5 (19200) 12303429	EA	1
6	4931-01- 137-5165	Cable Assembly W6 (19200) 12303430	EA	1
7	4931-01- 137-5166	Cable Assembly W7 (19200) 12303431	EA	1
8	4931-01- 137-5167	Cable Assembly W8 (19200) 12303432	EA	1



ARR82-24038

Section II. COMPONENTS OF END ITEM (Continued)

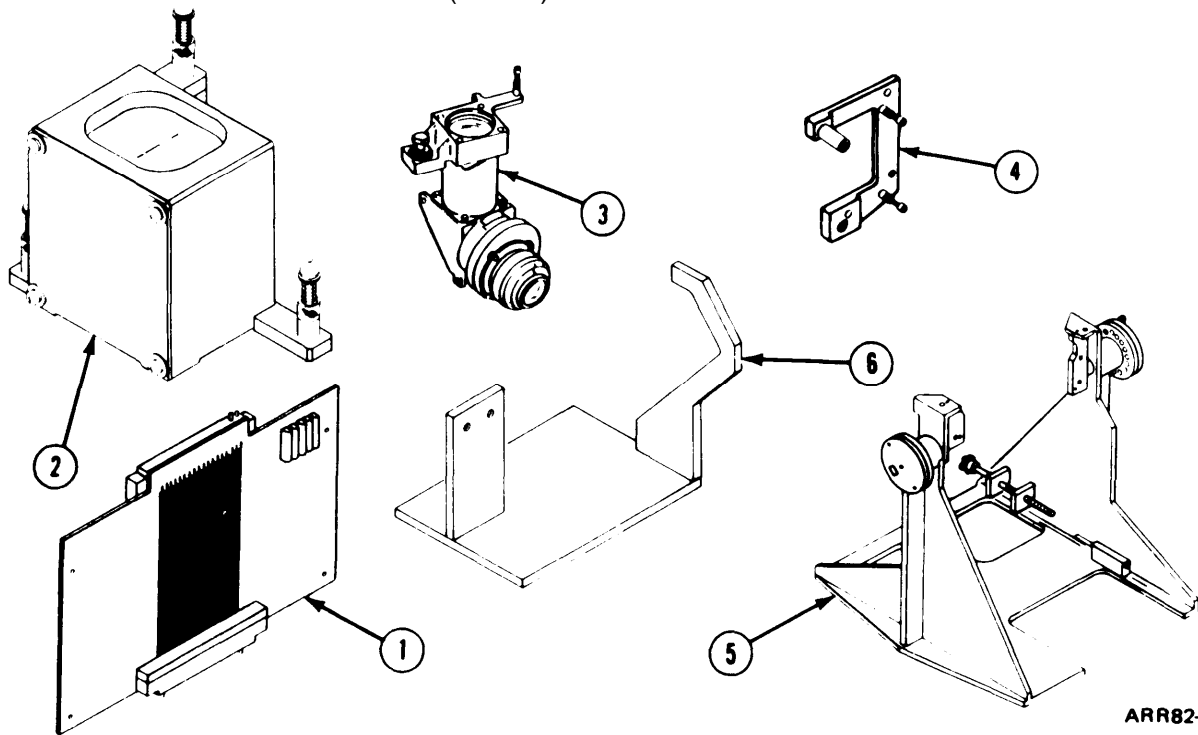
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USEABLE ON CODE	(4) U/M	(5) QTY RQR
1	4931-01- 137-4978	Cable Assembly W9 (19200) 12303433	-	EA	1
2	5935-01- 142-3435	Video Multiplexer Assembly (19200) 12303541	-	EA	1
3	---	Cable Assembly W10 (19200) 9377392	-	EA	1
4	4931-01- 137-4980	Cable Assembly W11 (19200) 12303446	-	EA	1
5	4931-01- 137-5168	Cable Assembly W12 (19200) 12303447	-	EA	1
6	4931-01- 137-4892	Image Control Unit Viewer Assembly (19200) 12303376	-	EA	1
7	4931-01- 138-3877	Power Control Unit Heatsink Holding Fixture (19200) 12303377	-	EA	1



ARR82-24039

Section II. COMPONENTS OF END ITEM (Continued)

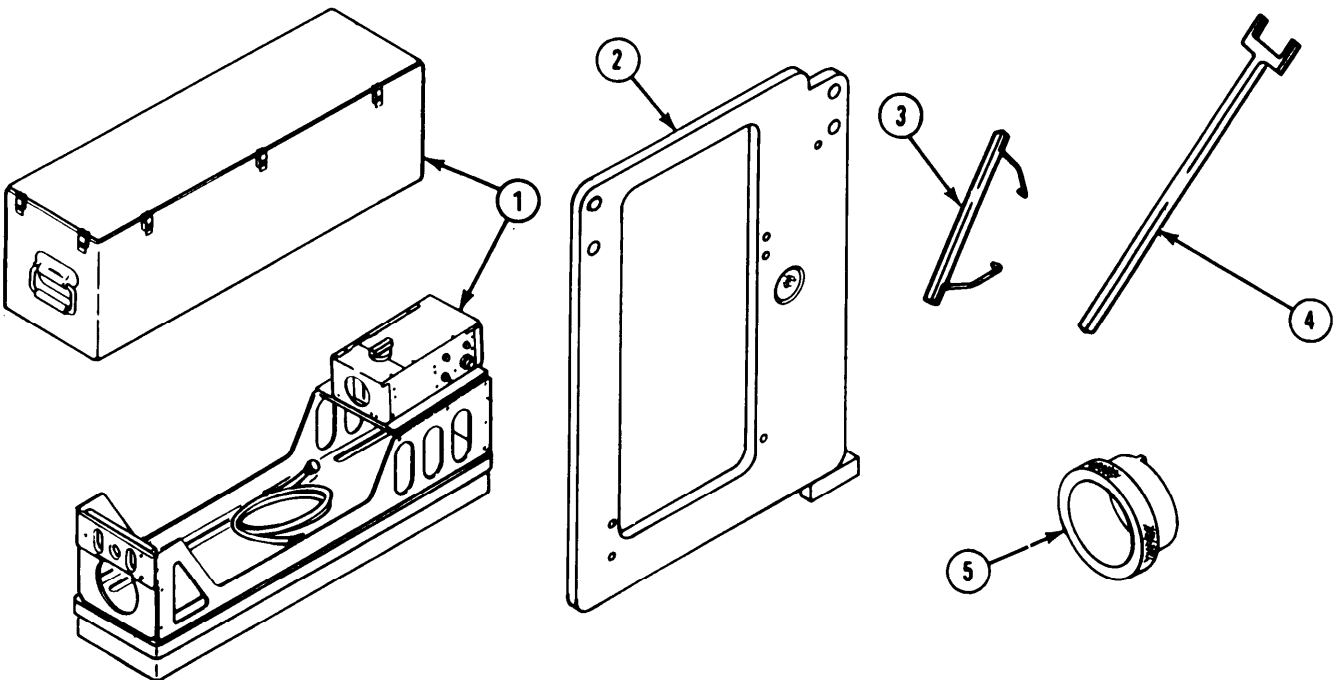
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USEABLE ON CODE	(4) U/M	(5) QTY RQR
1	5999-01- 138-7199	Extender Card, Elec. (19207) 12303160	-	EA	1
2	4931-01- 063-6129	TestTarget/Reticle Combiner Assembly (80063) SM-C-805408	-	EA	1
3	4931-01- 063-6137	LED Viewer Assembly (80063) SM-D-805768	-	EA	1
4	5855-01- 082-3693	Head Cover Adapter (80063) SM-D-805853	-	EA	1
5	4931-01- 063-6132	Head/Gunner/Thermal Receiver Unit Holding Fixture Assembly (80063) SM-D-805806	-	EA	1
6	4931-01- 063-6133	Commander's Display Holding Fixture (80063) SM-D-807163	-	EA	1



ARR82-24040

Section II. COMPONENTS OF END ITEM (Continued)

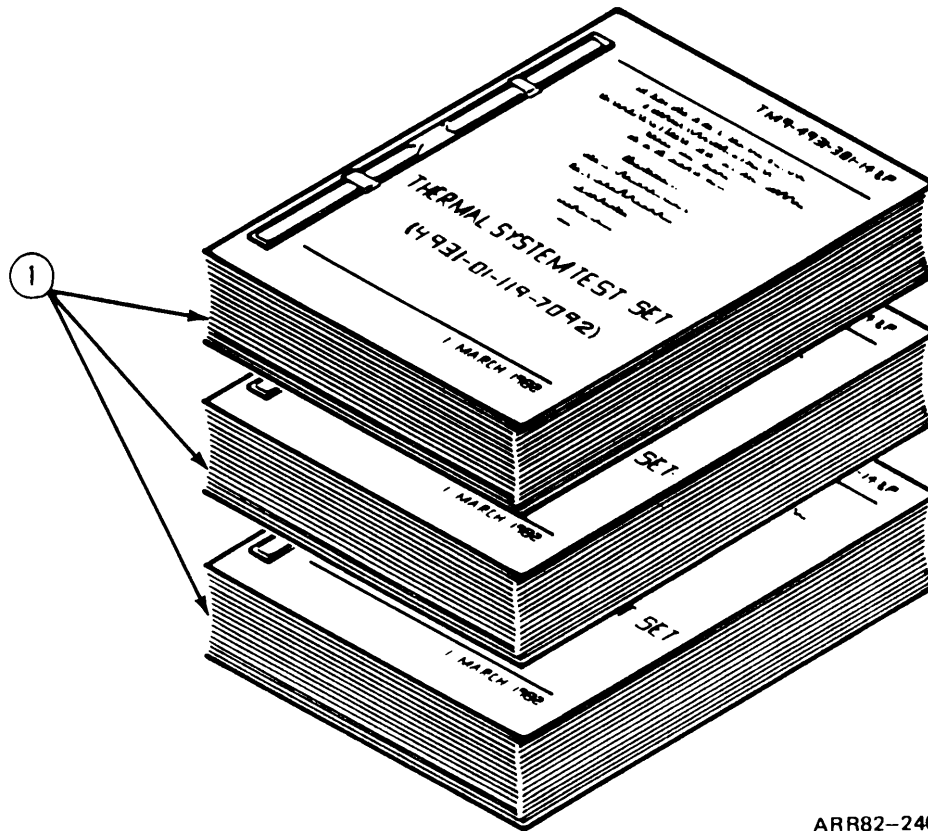
(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USEABLE ON CODE	(4) U/M	(5) QTY RQR
1	5855-01- 077-4523	Thermal Sight Collimator (80063) SM-D-805691		EA	1
2	4931-01- 137-4891	Thermal Receiver Unit Holding Plate Assembly (54490) 5002660		EA	1
3	5120-01- 064-1379	Handle Puller (80063) SM-C-807183		EA	1
4	5855-01- 083-0593	Focal Alignment Tool (80063) SM-C-805850		EA	1
5	5120-01- 068-3719	Spanner Wrench (80063) SM-C-807161		EA	1



ARR82-24041

Section III. BASIC ISSUE ITEMS

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION FSCM AND PART NUMBER	USEABLE ON CODE	(4) U/M	(5) QTY RQR
1		Operator's Organizational, Direct Support, and General Support Maintenance Manual Including Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools), Thermal System Test Set (4931-01-119-7092) (19207) TM 9-4931-381-14&P		EA	1



ARR82-24042

**APPENDIX C
EXPENDABLE SUPPLIES AND MATERIALS LIST**

Section I. INTRODUCTION

C-1. Scope. This appendix lists expendable supplies and materials you will need to operate and maintain the test set. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V. Repair Parts and Heraldic Items).

C-2. Explanation of Columns.

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use adhesive, item 5, Appendix C").

b. Column 2- Level. This column identifies the lowest level of maintenance that requires the listed item.

c. Column 3- National Stock Number. This is the National Stock Number assigned to the item; use it to request or requisition the item.

d. Column 4- Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column 5- Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST				
(1)	(2)	(3)	(4)	(5)
Item Number	Level	National Stock Number	Description	U/M
1			-DELETE-	
2	F	8030-00-152-0013	ADHESIVE: MIL-S-8802 CL B-2	OZ
3	F	8040-00-118-2695	ADHESIVE SEALANT: MIL-A-46146 TYPE I	OZ
4	F	8040-00-880-7332	ADHESIVE, LIQUID RUBBER, TYPE II, 12-OUNCE CAN: (81348) MIL-A-46106A	OZ
5	F	8040-00-070-9510	ADHESIVE, RUBBER BASE: MMM-A-12	OZ
6	F	8040-01-009-1562	ADHESIVE, TYPE II: (71984) MIL-A-46146	OZ
7	F	8040-00-266-0828	BONDING: (81349)MIL-A-3920	OZ
8	F	7920-00-514-2417	BRUSH, ACID SWABBING, BOX OF 144: (81348)H-B-643	BX
9	F	8305-00-286-5461	CLOTH, BATISTE (LINT-FREE) WHITE, 39 1/2 INCHES WIDE: (81349) MIL-C-40129	YD
10	F	8040-01-027-4900	ADHESIVE, SYNTHETIC RUBBER, MIL-A-25457	OZ
11	F	6850-00-285-8011	DRY CLEANING SOLVENT, TYPE II, 55-GALLON DRUM: (81348)P-D-680	GL
12	F	8030-01-027-4892	FILM, CHEMICAL: MIL-C-5541 CL-IA	OZ
13	F	6850-00-142-9247	FREON, TYPE II: MIL-C-81302B	QT
14	F	9150-01-007-4384	GREASE, AIRCRAFT AND INSTRUMENT, KRYTOX, 240 AZ: (83248) MIL-G-27617	EA
15	F	1015-01-139-6761	GREASE, APIEZON H, 1 POUND PK.	EA
			VOLUME 1 PARA.C-1	

(1)	SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST (Continued)			(5)
Item Number	Level	National Stock Number	Description	U/M
16	F	5970-00-791-3716	INSULATING COMPOUND, ELECTRICAL TYPE II, 2-OUNCE TUBE: (71984) 3140-RTV	OZ
17	F	6810-00-983-8551	ISOPROPYL ALCOHOL, TECHNICAL, 1-QUART CONTAINER: (81348) TT-1-735	QT
18	F	6810-00-281-2762	METHYL-ETHYL-KETONE, 5 GALLON CAN: (81348) TT-M-261	GL
19	F	7510-00-189-7881	PENCIL, WRITING, PACKAGE OF 12: (81348) SS-P-1605	BX
20	F	8030-00-297-6677	POTTING COMPOUND: MIL-S-8516E	OZ
21	F	8040-01-038-1029	PRIMER, RUBBER: HMS 20-1756	QT
22	F	8040-01-109-3371	PRIMER, TYPE II: (80244) MIL-A-46106A	QT
23	F	8010-00-899-0931	PRIMER, ZINC CHROMATE: TT-P-1757	QT
24	F	7920-00-205-1711	RAG, WIPING, 50-POUND BALE: (58536) A-A-531	LB
25	F	3439-00-255-4571	ROSIN, FLUX, TYPE 1: O-F-506	OZ
26	F	8030-00-964-7537	SEALING COMPOUND, GRADE C: (81349) MIL-S-22473	OZ
27	F	8030-00-080-1549	SEALING COMPOUND, TYPE 1, CLASS B-1/2: (05027) MIL-S-8802	OZ
28	F	6850-00-880-7616	SILICONE COMPOUND: MIL-S-8660	OZ
29	F	3439-00-986-8746	SOLDER, TIN ALLOY, 0.063-INCH DIAMETER, 1-POUND ROLL: (81348) QQ-S-571	LB
30	F	6750-00-142-9247	SOLVENT CLEANING COMPOUND, MIL-C-81302C	OZ
31			-DELETE-	
			VOLUME 1	
			PARA. C-1	

(1)	SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST (Continued)			(5)
Item Number	Level	National Stock Number	Description	U/M
32	F	5975-00-074-2072	STRAP, TIEDOWN, ELECTRICAL COMPONENTS, ADJUSTABLE, SELF-CLINCHING, PLASTIC, TYPE 1, CLASS 1: MS3367-1-9	BX
33	F	6515-00-303-8250	SWAB, COTTON	
34	F	9905-00-537-8954	TAG, MARKER, 50 EACH: (81349) MIL-T-12755	BX
35	F	4020-00-753-6555	TAPE, LACING, 500-YARD SPOOL: (81349) MIL-T-43435	YD
36	F	9505-00-221-2650	WIRE, NONELECTRIC (SAFETY WIRE) 0.020-INCH DIAMETER, 1-POUND ROLL: (96906) MS20995C20	LB

VOLUME 1
 PARA.C-1

TM 9-4931-381-14&P-1

TECHNICAL MANUAL

**VOLUME II
SCHEDULED MAINTENANCE**

THERMAL SYSTEM TEST SET

CHAPTER 1 GENERAL

1-1. Scope. This volume contains information to help you perform scheduled maintenance.

1-2. Scheduled Maintenance Information. Scheduled maintenance consists of reference voltage verification.

a. Chapter 2, Verification. This chapter explains how to perform a reference voltage verification check on the test set.

b. Appendix A, Maintenance Allocation Chart. This appendix contains the Maintenance Allocation Chart (MAC) which identifies the level of responsibility for maintenance of each test set assembly.

CHAPTER 2 VERIFICATION

2-1. General. This chapter tells you when to do the verification check on the test set. The verification check is done semiannually (every 6 months) indicated by (S), to make sure the test set voltage reference is within tolerance. The verification check is also done after any maintenance that requires removal of the electronics unit.

2-2. Reference Voltage Verification Check.

Applicability: All Models

Common Tools:

Multimeter, Digital AN/USM-451B
Power Supply HP/6269B

Special Tools: TA-1 test probe set

Supplies: None

Personnel: One

Equipment Condition:

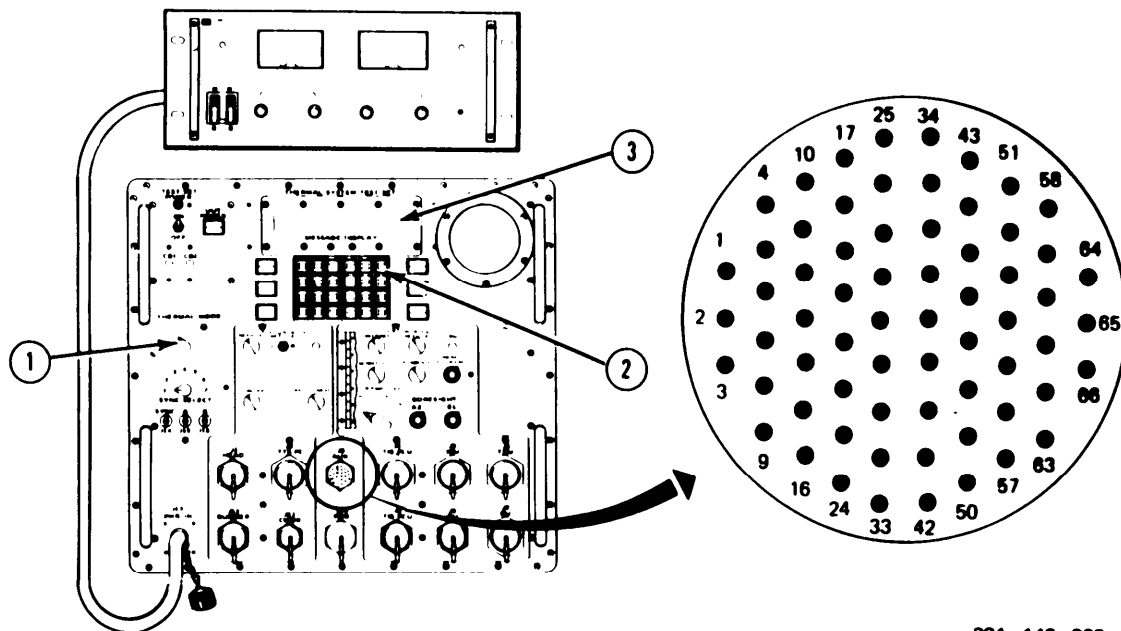
Thermal system test controller on a clean work surface.

Preliminary Procedures:

1. Prepare test set for operation; refer to volume 1, para. 4-17.
2. Set THERMAL MODE switch to ON.

FRAME 1

INTERVAL	PROCEDURE	REFERENCE
	<p>1. Set THERMAL MODE switch (1) to ON. Press RESET (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">MESSAGE DISPLAY (3) must read: THERMAL MODE-OFF to measure reference voltage.</p>	
S	<p>2. Measure reference DC voltage at connector J3, pin 65(+) and 66(-) using digital multimeter. Measured voltage must be 1.2 ± 0.1 V dc.</p>	
	<p>3. If measured voltage is not 4.450 ± 0.020 V dc, digital voltmeter card A4.</p>	Volume IV, para. 2-7, task 3.
S	<p>4. Measure reference AC voltage at connector J3, pin 21 and 22, using digital multimeter. Measured voltage must be 13.00 ± 0.5 V ac.</p>	
	<p>5. If measured voltage is not 14.00 ± 0.03 V ac, perform PCU simulator test (fail code 0.3.0.1).</p>	Volume III, figure 7-2.
<p>END OF REFERENCE VOLTAGE VERIFICATION CHECK</p>		



381-142-202-1C

APPENDIX A MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

A-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) section II designates overall authority and responsibility for the performance of maintenance functions on the TSTS. Application of the maintenance functions will be consistent with the capacities and capabilities of the designated maintenance categories.
- c. Section III lists the tools and test equipment required for each maintenance function as referenced from section II.
- d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

A-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, or 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 preserve, 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. **Align.** 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 equipments 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/Install.** To remove and install the same item when required to perform service or maintenance functions. Install 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. The act of substituting a serviceable liketype part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, aline, calibrate, and/or replace) including fault location/troubleshooting, removal/installation, disassembly /assembly, and/or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, and resurfacing) to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally 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. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

A-3. Explanation of Columns in Section II.

a. Column 1, Group Number. Column 1 lists functional group code 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 names 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 A-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 varies 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, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting 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 al location chart. The symbol designations for the various maintenance categories are as follows:

C	Operator or Crew.
O	Organizational maintenance.
F	Direct support maintenance.
H	General support maintenance.
D	Depot maintenance.

e. Column 5, Tools and 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) that is keyed to the remarks contained in section IV.

A-4. Explanation of Columns in Section III.

a. Column 1, Reference Code. The tool 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.

A-5. Explanation of Columns in 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 section II.

A-6. Explanation of Special Identifiers Used in Section II.

Maintenance functions identified by an asterisk (*) will have work times and tools included in the appropriate DMWR.

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
00	THERMAL SYSTEM TEST SET	TEST SERVICE REPAIR			0.5 2.2 0.3				*
01	THERMAL SYSTEM TEST CONTROLLER (TSTC)	INSPECT TEST REPLACE REPAIR			0.1 0.3 0.1 1.0			3,4,7 3	*
0101	CHASSIS ASSEMBLY	REMOVE/ INSTALL REPAIR			0.5 4.5			23 6,8,23	*
010101	PANEL ASSEMBLY A1	REMOVE/ INSTALL REPAIR			0.5 4.3			6,8,23 3,7,23,26	*
010101 01	DIGITAL INDICATOR	REPLACE REPAIR			0.5			23	*
010101 011	CLAMP	REPLACE REPAIR						27 27	* *
010101 02	KEYBOARD ASSEMBLY	REPLACE REPAIR			0.2 0.2			27 27	
010101 03	KEYBOARD ASSEMBLY	REPLACE REPAIR			0.2 0.2				
010101 04	BOARD ASSEMBLY A1TB1	REPLACE REPAIR			1.1 0.25			23 3,23	
010101 05	CONNECTOR P1	REPLACE REPAIR			0.6 0.2				
010101 06	CONNECTOR P5	REPLACE REPAIR			0.6 0.2				
010101 07	CONNECTOR P3	REPLACE REPAIR			0.6 0.2				
010101 08	CONNECTOR P4	REPLACE REPAIR			0.6 0.2				

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
010102	DIGITAL SUBSYSTEM (DSS) ASSEMBLY A3	REPLACE REPAIR			0.3 1.9	0.7		27 13,14,23,27	
010102 01	ELECTRICAL CARD HOLDER	REPLACE REPAIR			0.1 0.4			23 23	
010102 02	PROCESSOR BOARD ASSEMBLY A2	REPLACE REPAIR			0.2		*		
010102 03	PANEL INTERFACE CIRCUIT CARD ASSEMBLY A3	REPLACE REPAIR			0.2				
010102 04	DVM-ISO CIRCUIT CARD ASSEMBLY A4	REPLACE REPAIR			0.2		*		
010102 05	SCANNER CIRCUIT CARD ASSEMBLY A5, A6, A7	REPLACE REPAIR			0.2		*		
010102 06	STIMULI CIRCUIT CARD ASSEMBLY A9, A10	REPLACE REPAIR			0.2		*		
010102 07	TRU-FCS SIMULATOR CIRCUIT CARD ASSEMBLY A13	REPLACE REPAIR			0.2		*		
010102 08	VIDEO DATA PROCESSOR CIRCUIT CARD ASSEMBLY A14	REPLACE REPAIR			0.2		*		
010102 09	TERMINAL BOARD	REPLACE REPAIR			0.7 0.4		*	23 10,13,14,23	
010102 10	DIGITAL CARD CAGE	REPLACE REPAIR			0.7 0.1	0.9		23 23,27	
010102 101	END PLATE	REPLACE REPAIR			0.1 0.5			23 27	
010102 102	CENTER PLATE	REPLACE REPAIR					0.6 0.5	27 27	

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
010103	IMAGE DISPLAY UNIT (IDU) A2	REPLACE REPAIR ALIGN ADJUST			0.2 6.1 0.5 0.5	1.3		23,27 1,2,3,4,6,7,23,27	
010103 01	BIT VERTICAL DEFLECTION GENERATOR CIRCUIT CARD ASSEMBLY A2	REPLACE REPAIR			0.3 0.2		*	2,23,27	
010103 02	HORIZONTAL SWEEP/ VIDEO AMPLIFIER CIRCUIT CARD ASSEMBLY A1	REPLACE REPAIR			0.3		*	2,23,27	
010103 03	ELECTRON TUBE ASSEMBLY A3	REPLACE REPAIR			0.5 1.8			23,27 5,6,12,21,23,27	
010103 04	SUPPORT, CRT	REPLACE REPAIR			0.6 0.3			23,27	
010103 05	EYEPIECE ASSEMBLY	REPLACE REPAIR			0.7		*	23,27	
010103 06	IDU CABLE ASSEMBLY W1	REPLACE REPAIR			0.6 3.8			6,23,27 3,5,6,7,23,27	
010103 0601	BRACKET 12303417	REPLACE REPAIR			0.6 0.3			23,27	
010103 0602	ELECT. BRACKET 12303523	REPLACE REPAIR			2.5		*	23,27	
010103 07	HOUSING 12303416	REPLACE REPAIR				1.3 1.2	*		
010103 0701	HOLDER	REPAIR				0.3			
010103 0702	PLATE	REPAIR				0.3			

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
010104	POWER MODULE A6	REPLACE REPAIR			0.3		1.6	23,27 3,6,7,9,10,11, 15,16,17,23,26,27	
010104 01	POWER CONTROL UNIT (PCU) A6A1	REPLACE REPAIR			0.2 *			23,26,27	
010104 02	BRACKET, CONNECTOR	REPLACE REPAIR			1.0 0.5			15,17,23,27 6,10,11,23,27	
010104 03	BRACKET, RELAY	REPLACE REPAIR			1.0 0.5				
010104 04	CIRCUIT CARD ASSEMBLY A2	REPLACE REPAIR			0.6		*	15,17,23,27	
010104 05	ENCLOSURE	REPLACE REPAIR			2.0 0.5			6,15,17,23,26,27	
010105	LOAD BANK, ELECTRICAL A5	REPLACE REPAIR			0.3 0.5		3.6	23 10,11,15,16,17, 23,27	
010105 01	CONNECTOR BRACKET	REPLACE REPAIR					2.0 0.2	23	
010105 02	TERMINAL BOARD ASSEMBLY TB2	REPLACE REPAIR					0.9 0.2	23,24 23	
010105 03	TERMINAL BOARD ASSEMBLY TB1	REPLACE REPAIR					0.9 0.2	23,24 23	
010106	THERMAL ELECTRON- ICS UNIT (EU) A4	REPLACE REPAIR			0.1 *		*	23,24	
010113	BRACKET, FRONT PANEL CONNECTORS	REPLACE REPAIR			0.3 0.5			23,27 27	
010114	CHASSIS	REMOVE/ INSTALL REPAIR			1.5 0.8			6,8,23,27 18,19,20,23,27	
0102	CASE ASSEMBLY CONTROLLER	REPLACE REPAIR			0.5 0.5			22 5,9,22	

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0103	COOLING FAN ASSEMBLY	REPLACE REPAIR			0.5 0.7			23,27 5,6,23,27	
02	ACCESSORY STORAGE ASSEMBLY	REPLACE REPAIR			0.1 2.2			26	
0201	CASE ACCESSORY	REPLACE REPAIR			0.2 0.4			23,26,27	
0202	CABLE ASSEMBLY W1	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0203	CABLE ASSEMBLY W2	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0204	CABLE ASSEMBLY W3	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0205	CABLE ASSEMBLY W4	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0206	CABLE ASSEMBLY W5	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0207	CABLE ASSEMBLY W6	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0208	CABLE ASSEMBLY W7	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0209	CABLE ASSEMBLY W8	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0210	CABLE ASSEMBLY W9	REPLACE REPAIR			0.1 1.0			3,6,7,23	
0211	MULTIPLEXER ASSEMBLY	REPLACE REPAIR			0.1				*
0212	CABLE ASSEMBLY W10	REPLACE REPAIR			0.1 1.0			3,4,6,7,23	
0213	CABLE ASSEMBLY W11	REPLACE REPAIR			0.1 1.2			3,6,7,23,27	

Volume II

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0214	CABLE ASSEMBLY W12	REPLACE REPAIR			0.1 2.4			3,6,7,23,27	
021401	HIGH VOLTAGE PROBE	REPLACE REPAIR			0.3 0.1			23 23	
0215	VIEWER ASSEMBLY, ICU	REPLACE REPAIR			0.1		*		
0216	PCU HOLDING FIXTURE	REPLACE REPAIR			0.1 1.3			5,23,27	
021601	BASE, HOLDING FIXTURE	REPLACE REPAIR			0.2 0.3			23 23	
0217	EXTENDER CARD, ELECTRICAL	REPLACE REPAIR			0.1		*		
0218	TEST TARGET RETICLE	REPLACE REPAIR					*		
021801	HOUSING	REPLACE REPAIR			0.1		*		
0219	LED VIEWER ASSEMBLY	REPLACE REPAIR			0.1 0.2		*	23,27	
021901	EYEPIECE ASSEMBLY	REPLACE REPAIR			0.1		*	23	
021902	RETICLE ASSEMBLY	REPLACE REPAIR					*		
021903	MOUNT, HOUSING	REPLACE REPAIR			0.2 0.1		*	23,27	
021904	HOUSING ASSEMBLY	REPLACE REPAIR					*		
021905	MIRROR HOUSING	REPLACE REPAIR					*		
021905 01	HOUSING	REPLACE REPAIR					*		

Section II. MAINTENANCE ALLOCATION CHART FOR THERMAL SYSTEM TEST SET (Continued)

(1) GROUP NO.	(2) COMPONENT/ ASSEMBLY	(3) MAINT. FUNC.	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
0220	ADAPTER, COVER	REPLACE REPAIR			0.1				*
0221	PLATE ASSEMBLY, TRU HOLDING	REPLACE REPAIR			0.1 0.3			23,25,27	
03	TRU HOLDING FIXTURE ASSEMBLY	REPLACE REPAIR			0.1 0.4			23	
0301	ADJUSTMENT ASSEMBLY, ELEV	REPLACE REPAIR			0.1 0.1			23 23	
030101	BLOCK	REPLACE REPAIR			0.1 0.3			23	
030102	BLOCK	REPLACE REPAIR			0.1 0.3			23	
0302	ELEVATING PLUNGER	REPLACE REPAIR			0.1 0.1			23 23	
030201	GUIDE	REPLACE REPAIR			0.1 0.3				
04	COMMANDER HOLDING FIXTURE	REPLACE REPAIR			0.1 0.1			23	
05	COLLIMATOR THERMAL SIGHT	INSPECT SERVICE ALIGN REPLACE REPAIR			0.1 0.2 0.1 0.2		0.3		

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
THERMAL SIGHT TEST SET

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
1	F	OSCILLISCOPE	6625-00-106-9962	AN/USM 281C
2	F	HANDLE, PULLER	5120-01-064-1379	SM-C-807183
3	F	DIGITAL MULTIMETER	6625-00-999-6282	AN/USM 4513
4	F	POWER SUPPLY	6130-00-148-1796	HP6269B
5	F	GUN, THERMAL	4940-00-561-1002	8031088
6	F	REPAIR KIT, ELECTRICAL CONNECTOR	4931-01-119-7103	12285360
7	F	TEST PROBE SET, TA-1		12303822
8	F	PLIERS, WIRE TWISTER		
9	F	TOOL, INSERT/EXTRACT	5120-01-015-4209	M24308/18-2
10	F	TOOL, CRIMP	5120-01-019-0812	
11	F	TOOL, REMOVAL	5120-01-019-0803	
12	F	POSITIONER	5120-00-127-4688	
13	F	TOOL, EXTRACTOR (PG 2-138)	5120-01-162-9472	
14	F	TOOL, WIRE WRAPPING (PG 2-138)	5130-00-919-3486	
15	F	WRENCH SET, SOCKET		12285468
16	F	BIT, CROSSTIP #1 1/4-IN. DRIVE	5120-00-180-0876	
17	F	BIT, CROSSTIP #2 1/4-IN. DRIVE	5120-00-879-3547	
18	F	EXTRACTOR, INSERT	5120-00-723-6833	
19	F	INSERTER, INSERT	5120-00-797-2404	

VOLUME II

FOR SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
 THERMAL SIGHT TEST SET (CONTINUED)

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/ NATO STOCK NUMBER	TOOL NUMBER
20	F	PRESS	3444-00-243-2654	
21	F	FACESHIELD, INDUSTRIAL (PG 2-168) TOOL KITS		
22	F	TOOL KIT TURRET MECHANIC	5180-00-695-0139	
23	F	TOOL KIT, ELECTRICAL EQUIPMENT TK105G	5180-00-610-8177	
24	F	SPECIALIZED SHOP EQUIPMENT, FIRE CONTROL MAINTENANCE AND REPAIR	4931-00-574-6433	
25	F	TOOL KIT, PRECISION INSTRUMENT	5180-00-596-1538	
26	F	TOOL KIT, SHOP EQUIPMENT	4931-00-754-0740	
27	F	TOOL KIT, ELECTRONIC EQUIPMENT, TK100G	5180-00-605-0079	
		VOLUME II		

TM 9-4931-381-14&P-1

TECHNICAL MANUAL

**VOLUME III
TROUBLESHOOTING**

THERMAL SYSTEM TEST SET

CHAPTER 1 GENERAL

1-1. Scope. This volume contains the troubleshooting information that will help find out why the test set is not working properly. The procedures will lead to a replaceable item or part that is bad, and tell you what to do with it.

1-2. Organization of Troubleshooting Information. If the test set breaks down during operation, it will not act the way the procedures say it is supposed to. This is called a fault symptom. To find out what to do about a fault symptom, go to the fault symptom index in chapter 4 and look for a symptom that describes the way the test set is acting. The second column of the fault symptom index gives a figure number for a troubleshooting procedure that will help locate the bad part. Other chapters in this volume give the following information.

a. Chapter 2. Troubleshooting Approach. This chapter explains how to use troubleshooting information in chapters 3 through 8 of this volume.

b. Chapter 3. Troubleshooting Roadmap. This chapter lists all the replaceable items in the test set that can be checked by using the troubleshooting procedures of this volume.

c. Chapter 4. Fault Symptom Index. The fault symptom index lists the fault symptoms that can be seen when the test set breaks down. For each fault symptom listed in the index, a troubleshooting procedure is given (figures 4-2 through 4-11) which will locate the bad item in the test set.

d. Chapter 5. Sample Troubleshooting Procedure. A sample troubleshooting procedure is given in this chapter. Instructions are included to explain how to use the procedures.

e. Chapter 6. Operator Assisted Self Test Procedure. This chapter contains the test set operator assisted self test procedure. It is used to find out if the test set is working right. It should be used anytime the test set has been repaired, or after any part of the test set is replaced. Chapter 6 also contains a fail code index. This index lists the fail codes that may appear during operator assisted self test and refers the operator to the appropriate troubleshooting procedure in chapter 7.

f. Chapter 7. Troubleshooting Procedures. Chapter 7 contains troubleshooting procedures for fail code outputs in chapter 6.

g. Chapter 8. Test Set Diagrams. This chapter contains electrical diagrams and wiring lists for use with the troubleshooting procedures.

CHAPTER 2 TROUBLESHOOTING APPROACH

2-1. General. To troubleshoot the test set with this volume the following three steps must be done:

a. Run the operator assisted self test (chapter 6). If the operator assisted self test will not run, then find that fault symptom in the fault symptom index (chapter 4).

b. Find the fail code in the fail code index (chapter 6), then go to the troubleshooting procedure that is listed with the fail code.

c. Do the troubleshooting procedure. It will tell you what parts to replace. It will also tell you when and where to return to the operator assisted self test (chapter 6).

2-2. Identifying the Problem. Test set problems are usually found by doing the operator assisted self test procedure. Even if a problem is found while the test set is being used to check the tank electrical system components, the test set operator assisted self test should be done to make sure which part is causing trouble. The operator assisted self test refers to the fail code index (chapter 6) when a problem is found. The fail code index will refer you to the proper troubleshooting procedure. The troubleshooting procedure will take you through the steps to find and repair the fault. The sequence of steps to be done is as follows:

a. Do the operator assisted self test (chapter 6). If a fail code appears on the message display, go to the fail code index (chapter 6).

b. Find the fail code in the fail code index (chapter 6). The second column of the fail code index gives the corrective action. Sometimes the corrective action is listed in the fail code index; otherwise you will be referred to a figure number and sheet number in troubleshooting (chapter 7).

c. Go to the indicated troubleshooting procedure (chapter 7). Perform the procedure. Replace any parts that the troubleshooting procedure tells you to replace. When test equipment is required for a troubleshooting procedure or in the course of the operator assisted self test, refer to operator's manual for test equipment being used. The troubleshooting procedures will refer you to the proper maintenance procedure in volume IV that tells you how to replace apart.

d. The troubleshooting procedure will send you back to the operator assisted self test after you have replaced the bad part or the procedure will end with a decision to send the test set to depot maintenance.

CHAPTER 3 TROUBLESHOOTING ROADMAP

- 3-1. Troubleshooting Roadmap.** The troubleshooting roadmap (figure 3-1) lists the replaceable items of the test set that can be checked by using the fault symptom index in chapter 4 and Operator Assisted Self Test in chapter 6.

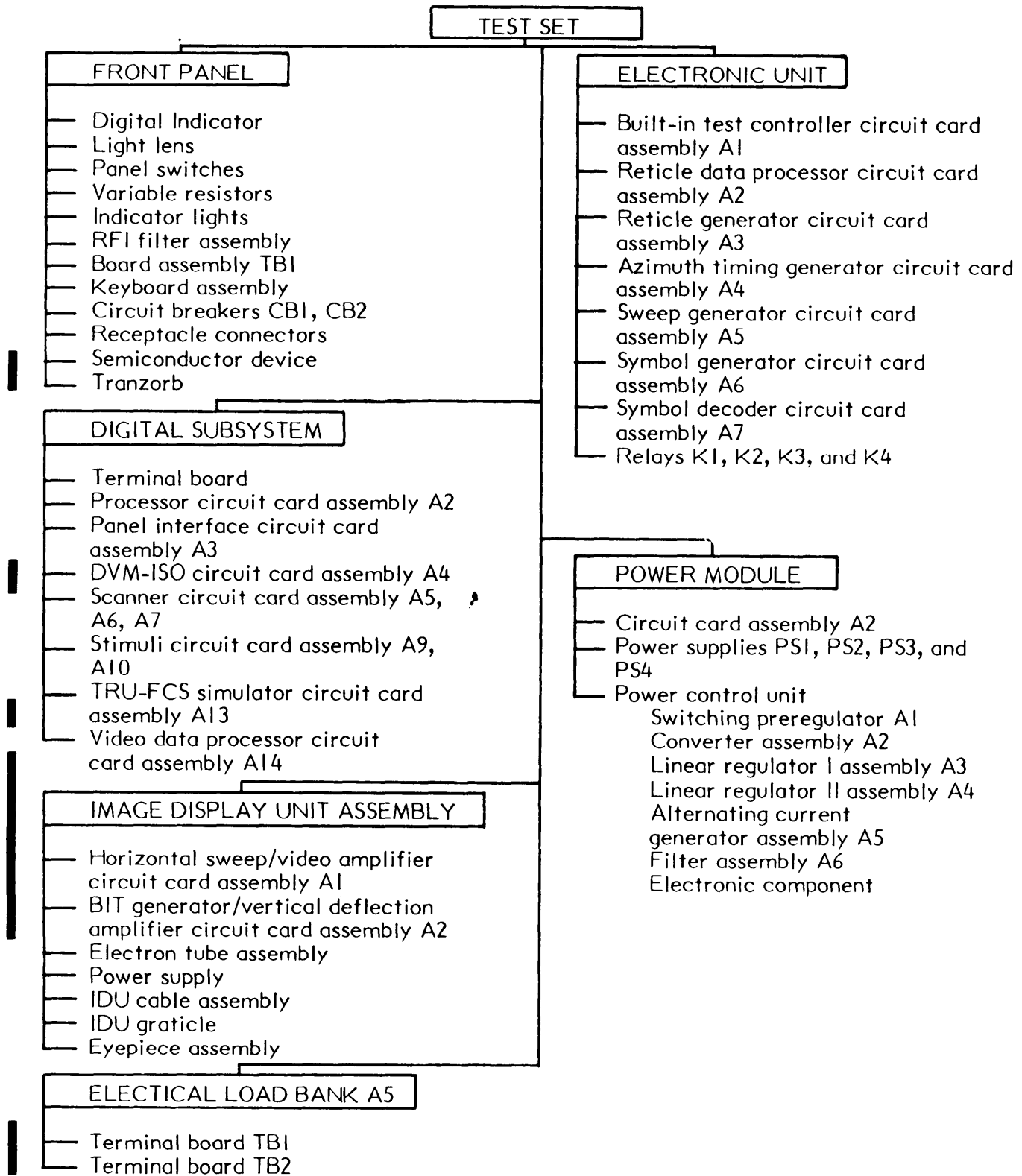


Figure 3-1. Test Set Troubleshooting Roadmap

CHAPTER 4 FAULT SYMPTOM INDEX

4-1. General. The Fault Symptom Index (figure 4-1) is a list of faults that may arise during normal operation of the test set.

4-2. Use of the Index. The first column (symptom) of the fault symptom index describes what happens when the test set fails. The second column (corrective action) lists a troubleshooting procedure which tells the operator how to proceed. The troubleshooting procedures are listed in figures 4-2 thru 4-11. The third and fourth columns tell how many persons and the approximate time in manhours that are required to do the procedure.

4-3. Fault Symptom Index. The following fault symptom index lists fault symptoms that can occur during normal operation of the test set.

FAULT SYMPTOM INDEX

SYMPTOM	CORRECTIVE ACTION	PERSONNEL REQUIRED	TIME* REQUIRED
1. No power to test set with TEST SET POWER switch ON. (All lamps off. Display dark.)	Refer to figure 4-2.	1	2.5
2. No power to test set with TEST SET POWER switch ON. (All lamps off except POWER lamp. Display dark.)	Refer to figure 4-3.	1	2.2
3. MESSAGE DISPLAY still reads-	Refer to figure 4-4.	1	0.6
AUTOMATIC SELF TEST COMPLETED RUN OAST? after pressing YES switch.			
4. MESSAGE DISPLAY is blank, but TEST SET POWER switch is ON.	Remove scanner circuit card assembly A7. Refer to Remove Circuit Card Assembly A2, A3, A4, A5, A6, A7, A9, A10, A13, or A14; volume IV, para. 2-7. Install good scanner circuit card assembly A7. Refer to Install Circuit Card Assembly A2, A3, A4, A5, A6, A7, A9, A10, A13 or A14; volume IV, para. 2-7.	1	0.3

*Time given in hours (6 minutes per tenth).

Figure 4-1. Fault Symptom Index (Sheet 1 of 3)

FAULT SYMPTOM INDEX (Continued)

SYMPTOM	CORRECTIVE ACTION	PERSONNEL REQUIRED	TIME* REQUIRED
5. PROCESSOR FAIL lamp is lit red (except during Automatic Self Test).	Replace processor circuit card assembly A2. Refer to Remove Circuit Card Assembly A2, A3, A4, A5, A6, A7, A9, A10, A13, or A14; volume IV, para. 2-7.	1	0.3
6. MESSAGE DISPLAY reads-	Refer to figure 4-5.	1	1.5
	REFER TO PROCEDURE #0.0.0.2 CONNECT ERROR PLUG/CABLE		
7. Suspected bad test cable.	Refer to figure 4-6.	1	2.0
8. MESSAGE DISPLAY reads-	Refer to figure 4-7.	1	0.5
	REFER TO PROCEDURE #0.0.0.3 CONTINUITY FAULT		
9. MESSAGE DISPLAY reads- K and PROC POWER FAIL lamp is lit.	Refer to figure 4-8.	1	0.5
10. Front Panel blank except TEST SET POWER lamp lit, UUT POWER lamp lit, MESSAGE DISPLAY shows only blinking cursor.	Refer to figure 4-9.	1	0.5
11. Front panel blank except TEST SET POWER lamp lit, PROC PWR FAIL lamp lit, PROC FAIL lamp lit. UUT POWER lamp lit. POLARITY and FOV lamp lit.	Refer to figure 4-10.	1	0.5

*Time given in hours (6 minutes per tenth).

Figure 4-1. Fault Symptom Index (Sheet 2 of 3)

FAULT SYMPTOM INDEX (Continued)

SYMPTOM	CORRECTIVE ACTION	PERSONNEL REQUIRED	TIME* REQUIRED
12. Message display reads-	Refer to figure 4-11.	1	0.5
REFER TO PROCEDURE #0.0.0.4 And one of the following messages: ADJUST 28 VDC PRIME POWER SUPPLY PRIME POWER SUPPLY OVERVOLTAGED PRIME POWER SUPPLY REVERSED			
13. Message display reads-	Refer to figure 7-14.1.	1	0.8
REFER TO PROCEDURE #0.0.0.4 SYSTEM POWER MALFUNCTION			
14. Message display reads-	Replace DSS circuit card as indicated below. Refer to Remove Circuit Card Assembly A2, A3, A4, A5, A6, A7, A9, A10, A13, or A14, volume IV, para. 2-7.	1	0.5
TEST CONTROL FAULT 4.10.0.L			
L = 100-103	A10 card		
104-107	A9 card		
113	A4 card		
116	A7 card		
117	A6 card		
118	A5 card		

*Time given in hours (6 minutes per tenth).

Figure 4-1. Fault Symptom Index (Sheet 3 of 3)

4-4. **Troubleshooting Procedures.** These troubleshooting procedures are used to locate and fix the faults identified in the Fault Symptom Index, figure 4-1.

SYMPTOM

NO POWER TO TEST SET WITH TEST SET POWER SWITCH 'ON' (ALL LAMPS OFF, DISPLAY DARK).

- Test Equipment/Special Tools:**
- Multimeter, digital.
 - Set, soldering and unsoldering.
 - Universal test lead set, 6625-00-444-4045.

- Equipment Condition:**
- Test set testing on clean work surface.
 - Power supply connected to test.

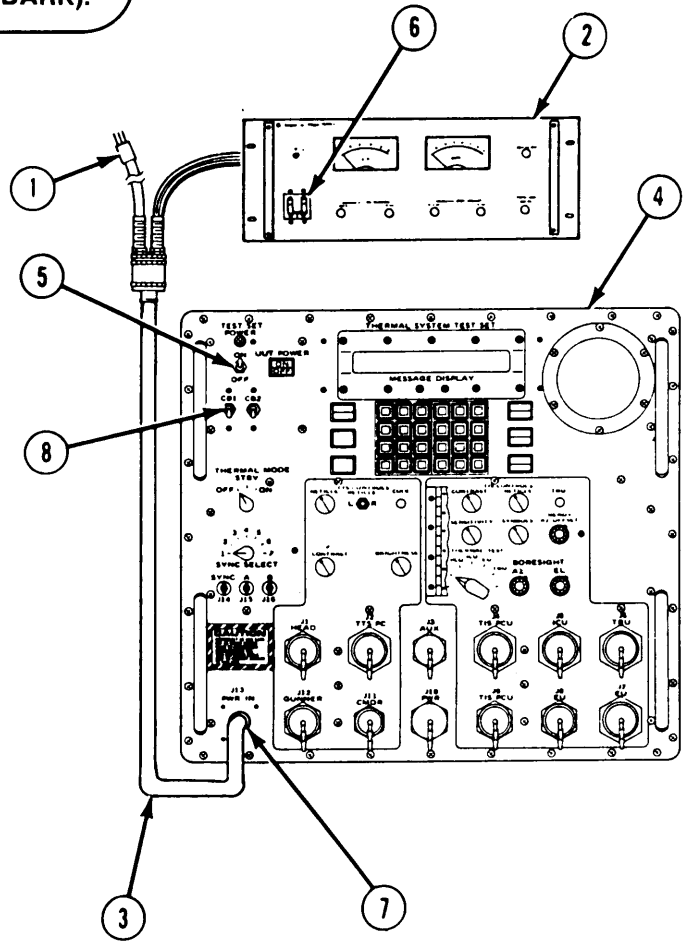
CAUTION
 Make sure connector (1) is unplugged from 115 V ac source and power supply (2) is set to OFF before disconnecting W10 cable (3) from TSTS (4) to prevent damage to the TSTS (4).

NOTE
 Circuit breaker is closed when in up position.

- 1
- Set TEST SET POWER switch (5) to OFF.
 - Set power supply ON/OFF switch (6) to OFF.
 - Unplug connector (1) from 115 V ac power source.
 - Preliminary checks:
 - Check that cable assembly W10 (3) is connected to test set connector J13 PWR IN (7).
 - Check that W10 cable leads are tight on power supply output bus terminals.
 - Check that circuit breaker CB1 (8) is closed.

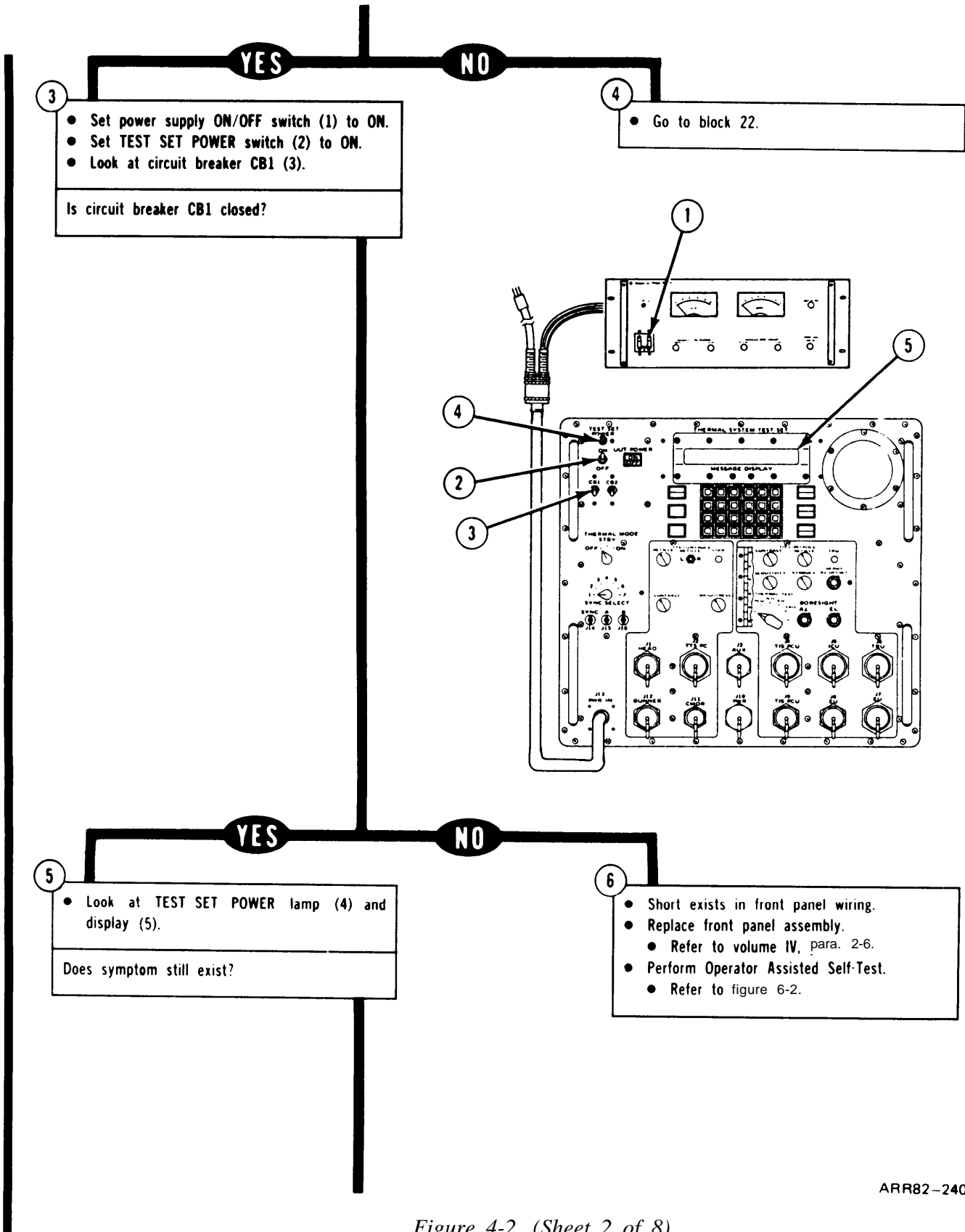
- 2
- Plug connector (1) into 115 V ac source.
 - Look at circuit breaker CB1 (8).

Is circuit breaker CB1 closed?



ARR82-24044

Figure 4-2. (Sheet 1 of 8)



ARR82-24045

Figure 4-2. (Sheet 2 of 8)
 Volume III
 Para. 4-4

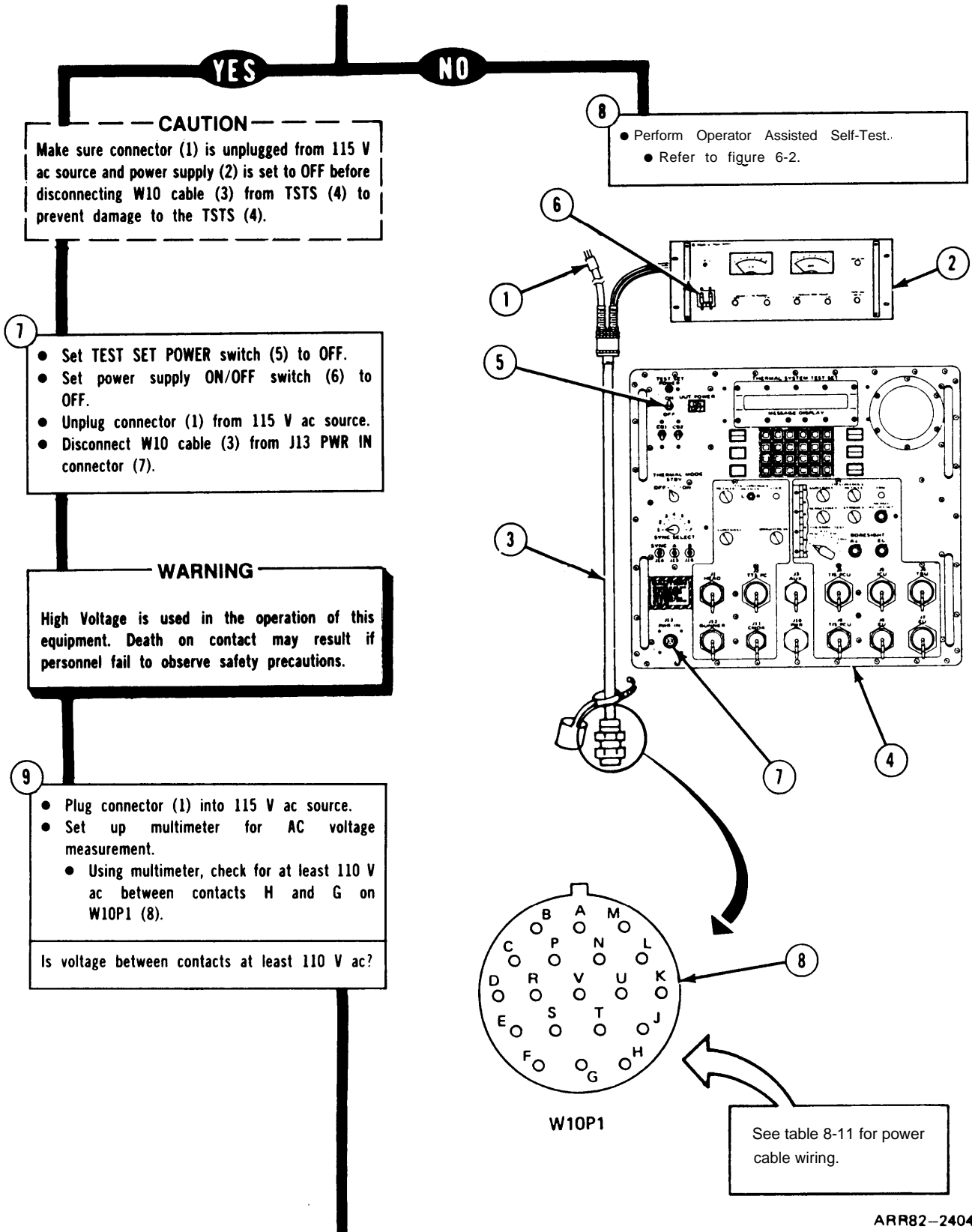


Figure 4-2. (Sheet 3 of 8)
 Volume III
 Para. 4-4

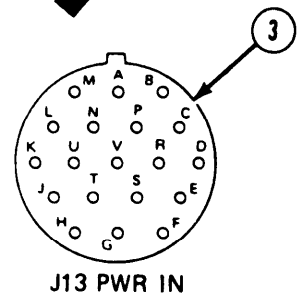
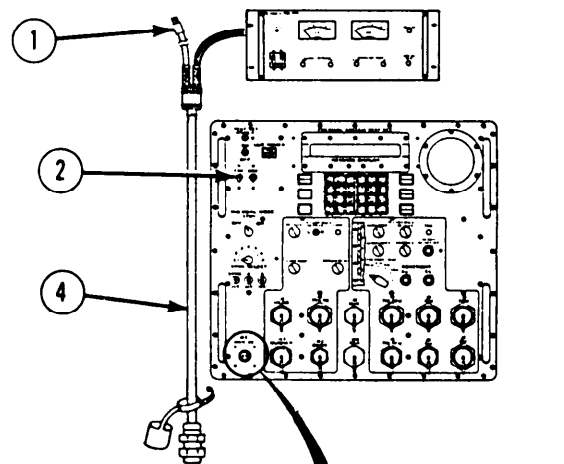
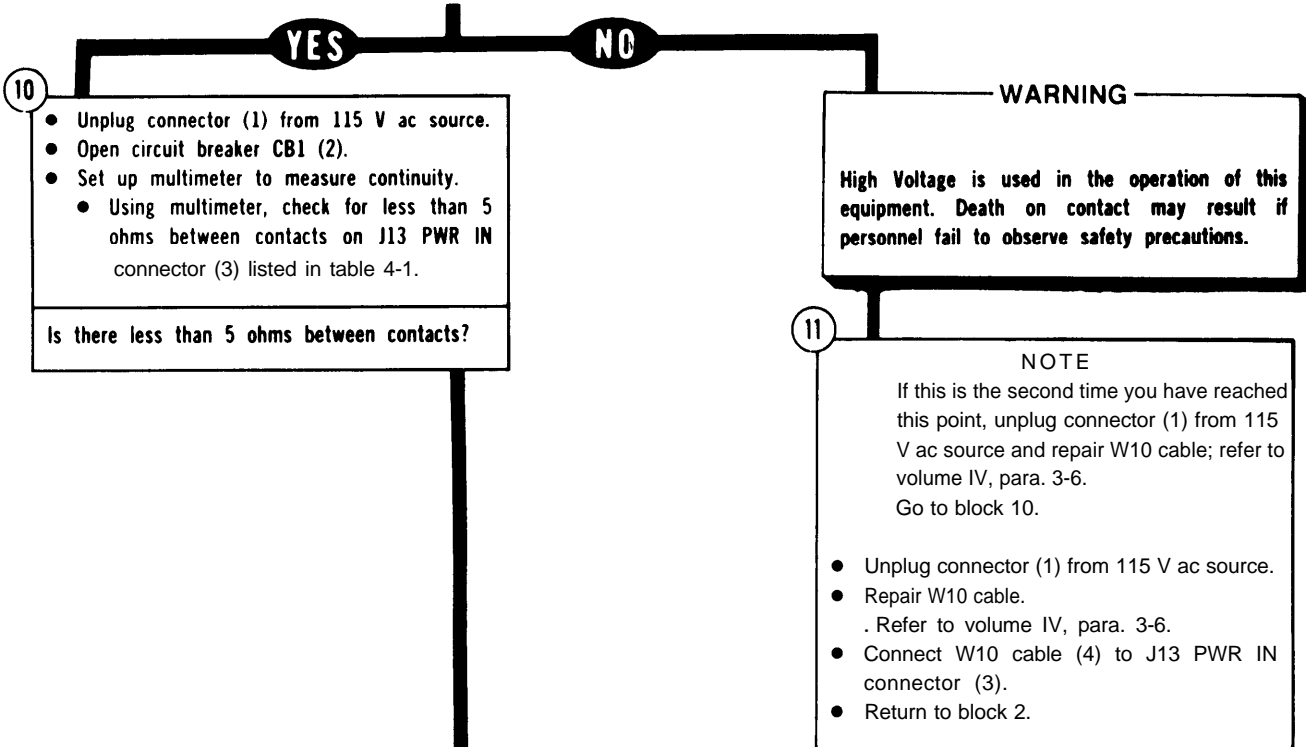
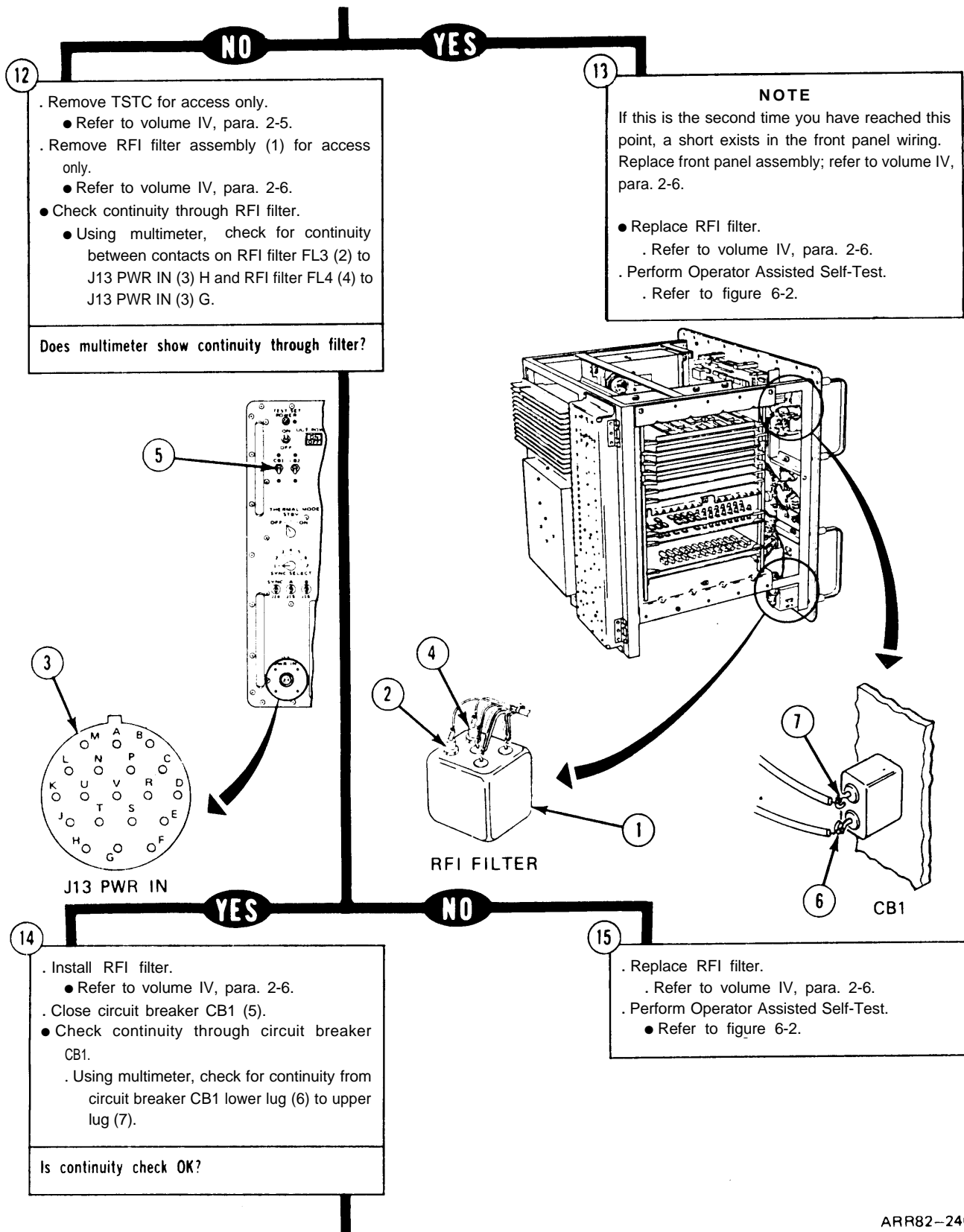


TABLE 4-1

FROM	TO
H	G
H	F
G	F

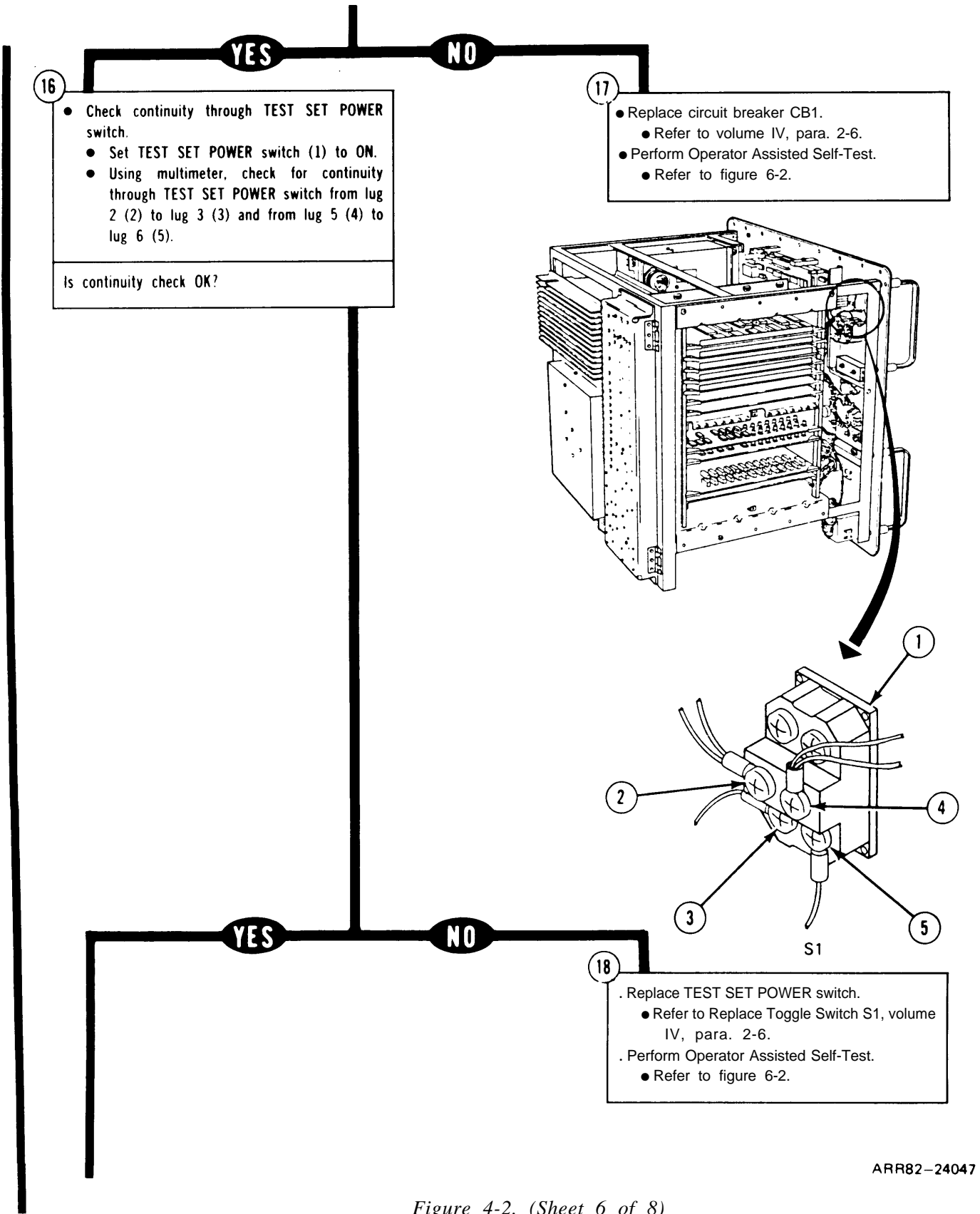
ARR82-24046

Figure 4-2. (Sheet 4 of 8)
 Volume III
 Para. 4-4



ARR82-24046.1

Figure 4-2. (Sheet 5 of 8)
 Volume III
 Para. 4-4



ARR82-24047

Figure 4-2. (Sheet 6 of 8)

Volume III
 Para. 4-4

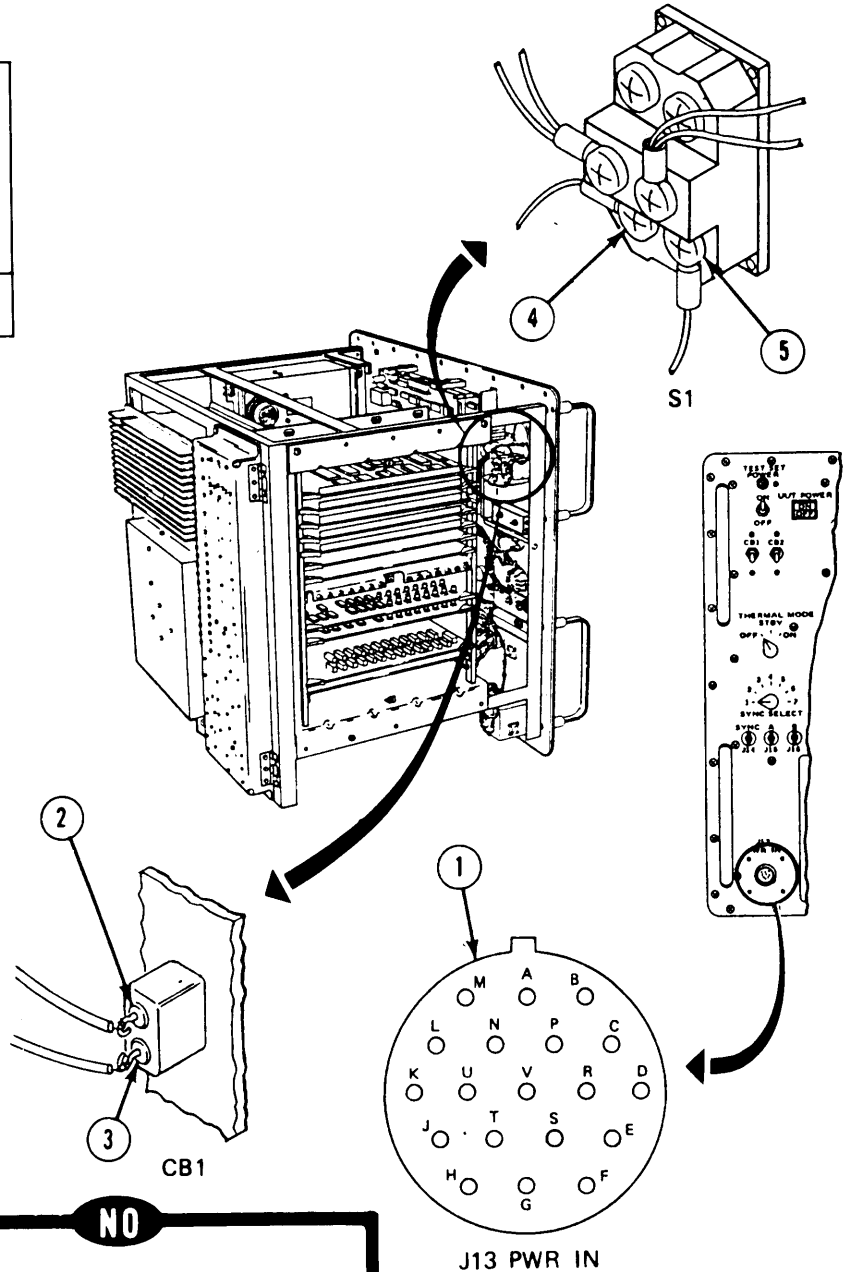
19

- Remove RFI filter (1) for access only.
 - Refer to volume IV, para. 2-6.
- Check for continuity through input power wiring.
 - Using multimeter, check for continuity between points listed in table 4-1.1.

Is continuity check OK?

TABLE 4-1.1

FROM	TO
J13 PWR IN (1) H	CB1 - UPPER LUG (2)
CB1 - LOWER LUG (3)	S1 - LUG 3 (4)
S1 - LUG 6 (5)	J13 PWR IN (1) G



YES

20

- Replace front panel assembly.
 - Refer to volume IV, para 2-6
- Perform Operator Assisted Self Test.
 - Refer to figure 6-2.

NO

21

- Replace wire between points with no continuity.
 - Refer to volume IV para. 2-4.
- Install RFI filter.
 - Refer to volume IV, para. 2-6.
- Perform Operator Assisted Self-Test.
 - Refer to figure 6-2.

ARR82-24047.1

Figure 4-2. (Sheet 7 of 8)
 Volume III
 Para. 4-4

From block 4

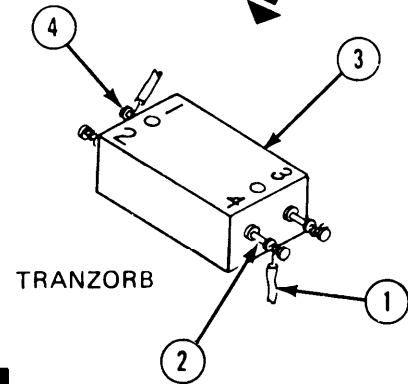
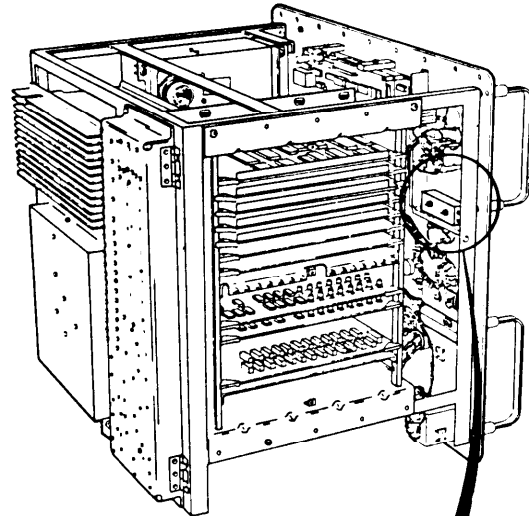
22

- Remove tranzorb for access only.
- Refer to volume IV, para. 2-6.

NOTE
 Read volume IV, para. 2-4 on tagging and soldering wires before doing any work.

- Tag and unsolder wire (1) from lug 4 (2) on tranzorb (3).
- Set up multimeter to measure continuity.
- Using multimeter, check for less than 5 ohms through tranzorb from lug 1 (4) to lug 4 (2).

Is there less than 5 ohms between lugs?



YES

NO

23

- Replace tranzorb.
- Refer to volume IV, para. 2-6.
- Perform Operator Assisted Self-Test.
- Refer to figure 6-2.

24

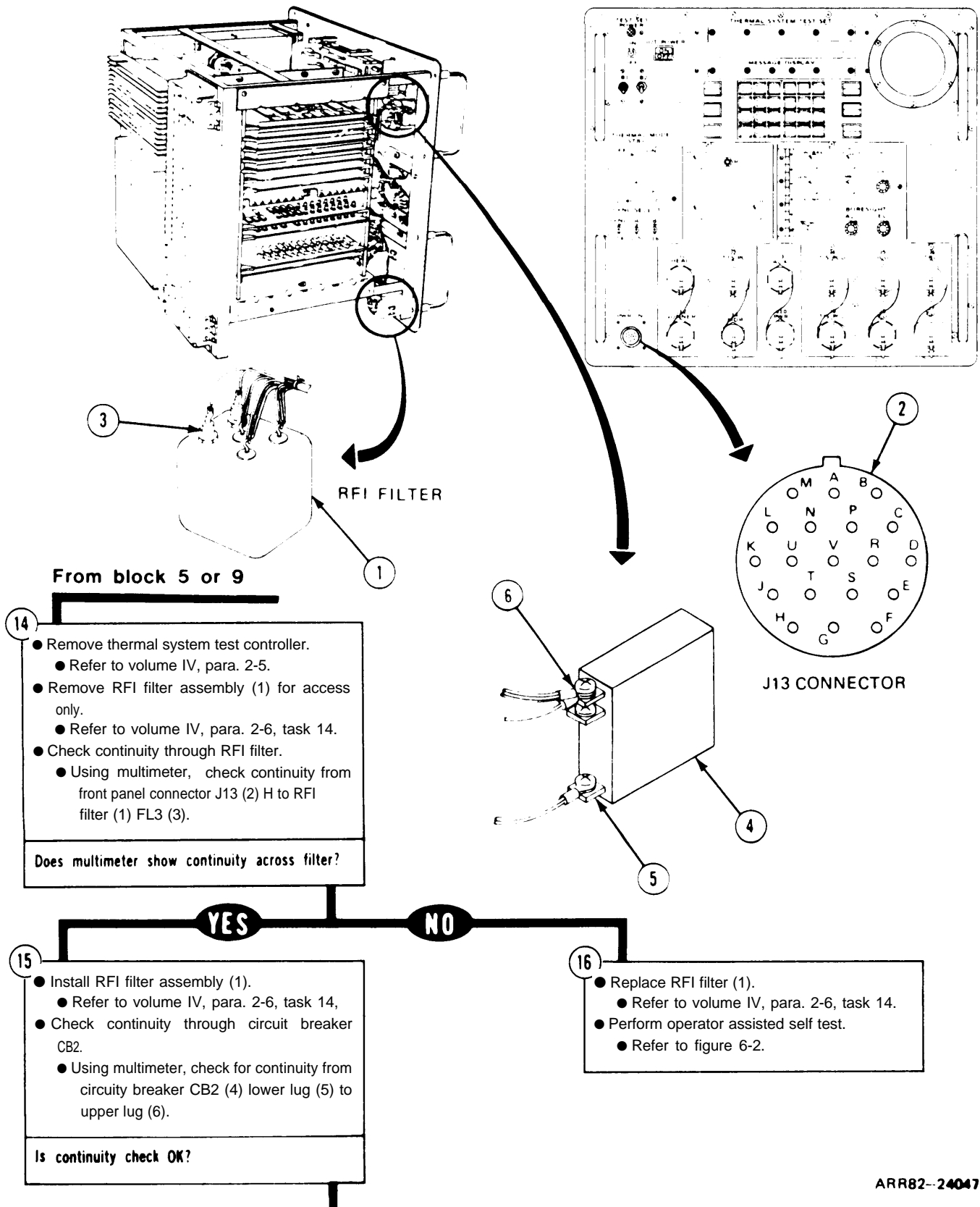
- Short exists in front panel wiring.
- Replace front panel assembly.
- Refer to volume IV, para. 2-6.
- Perform Operator Assisted Self-Test.
- Refer to figure 6-2.

ARR82 -24048

Figure 4-2. (Sheet 8 of 8)
 Volume III
 Para. 4-4

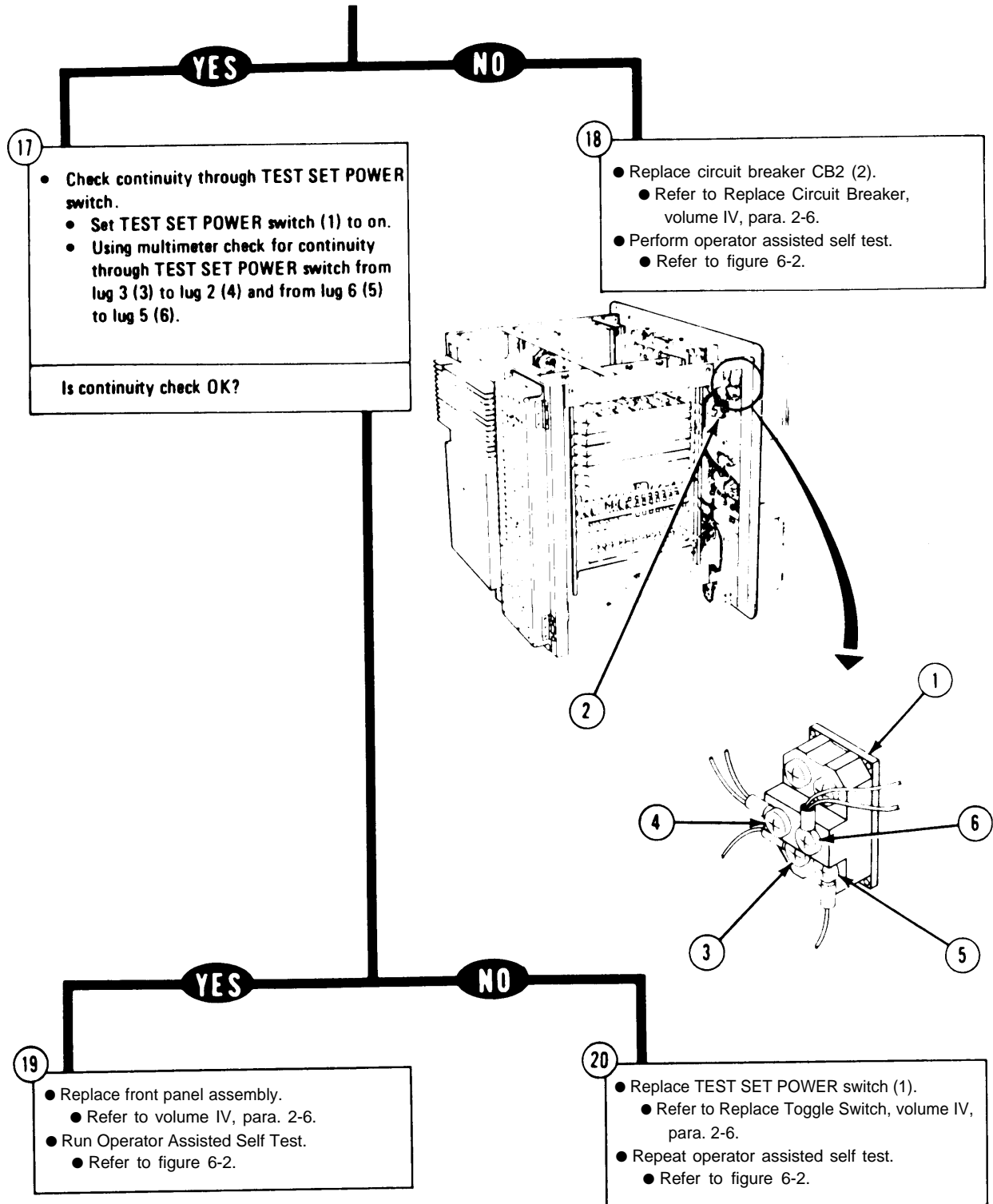
Change 1 4-9

FAULT SYMPTOM INDEX



ARR82-24047

Figure 4-2. (Sheet 6 of 7)



ARR82-24048

Figure 4-2. (Sheet 7 of 7)

SYMPTOM

NO POWER TO TEST SET WITH TEST SET POWER SWITCH "ON" (ALL LAMPS OFF EXCEPT POWER LAMP. DISPLAY DARK).

Test Equipment/Special Tools:

- Multimeter.
- Test probe set TA-1.

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Remove TSTC for access only.
 - Refer to volume IV, para. 2-5.
 - Check continuity from TEST SET POWER switch to A1P1.
 - Check continuity from TEST SET POWER switch (1) to front panel connector A1P1 (2) per table 4-2.
- Is continuity check OK?

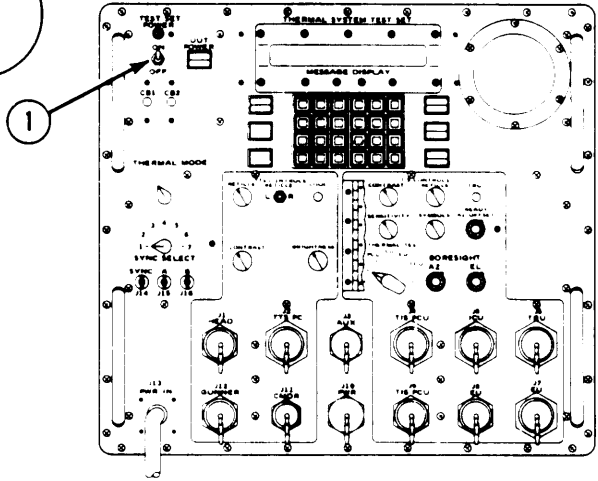
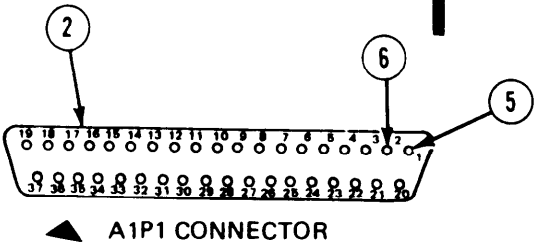
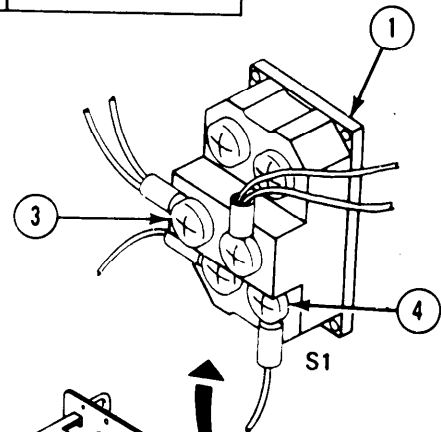


TABLE 4-2

TEST SET POWER SWITCH (1) S1 pin:	FRONT PANEL CONNECTOR (2) A1P1 pin:
CONTACT 2 (3) CONTACT 5 (4)	A1P1 PIN 1 (5) A1P1 PIN 2 (6)



A1P1 CONNECTOR



S1

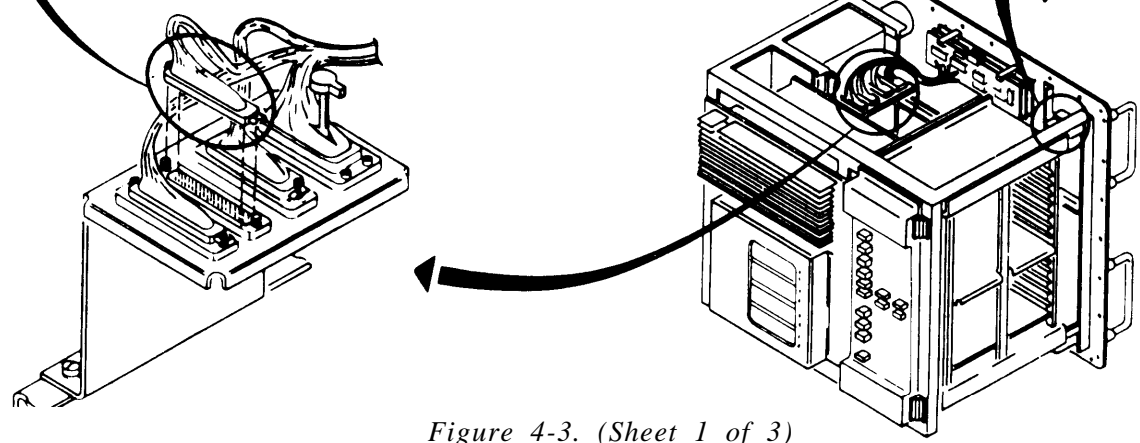


Figure 4-3. (Sheet 1 of 3)
 Volume III
 Para. 4-4

ARR82-24049

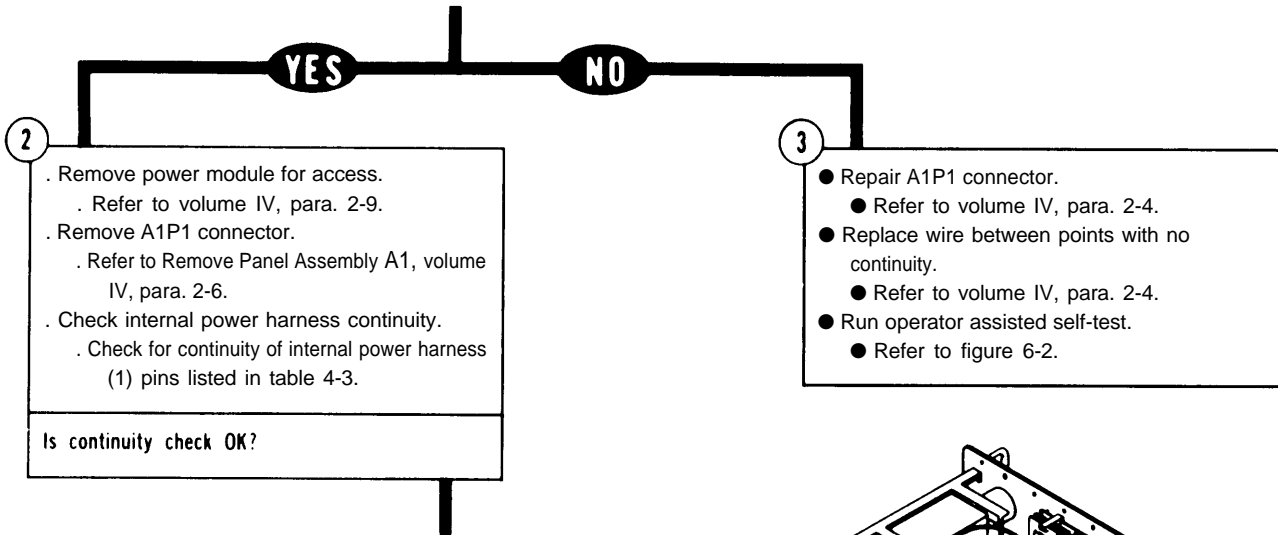
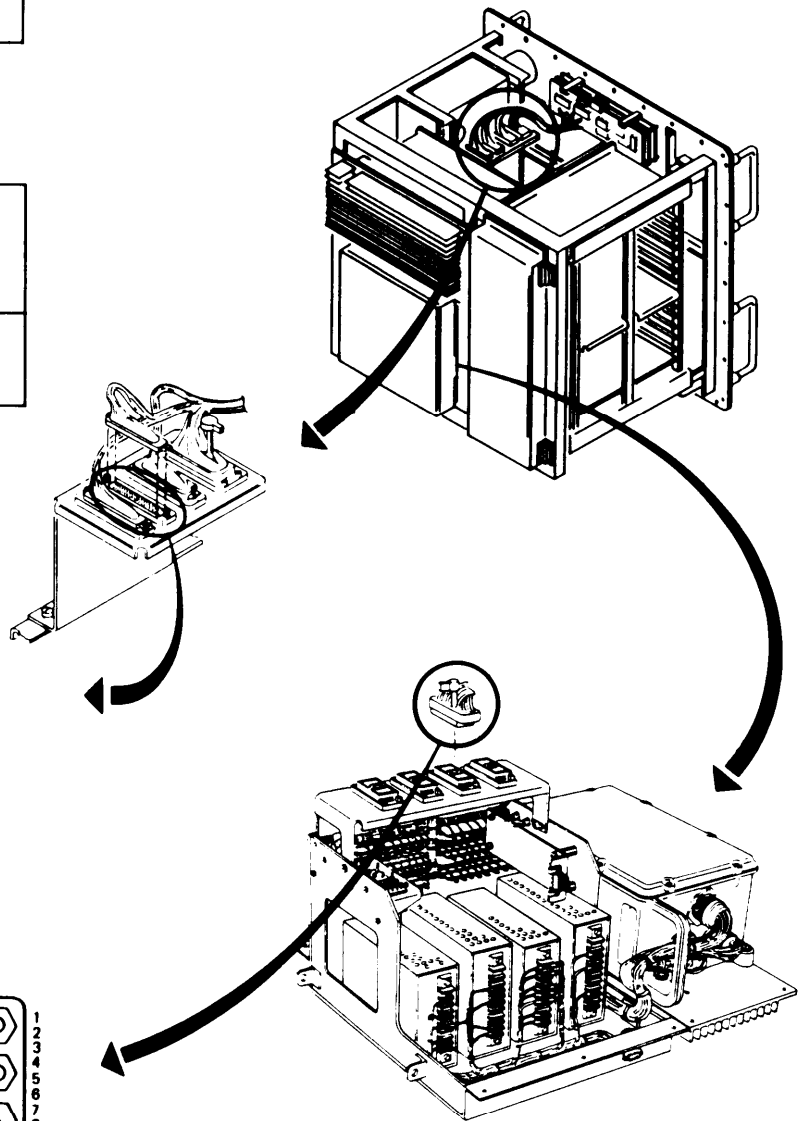
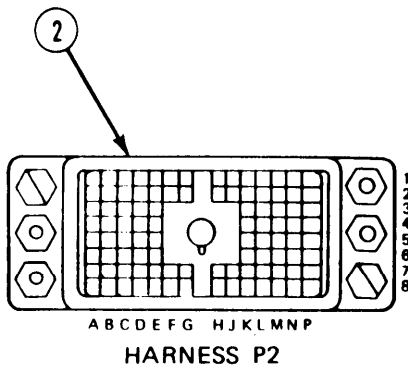
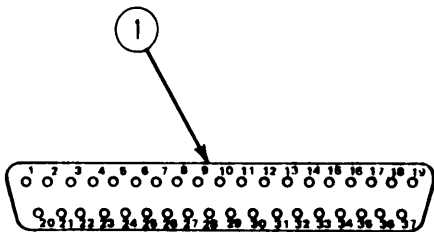


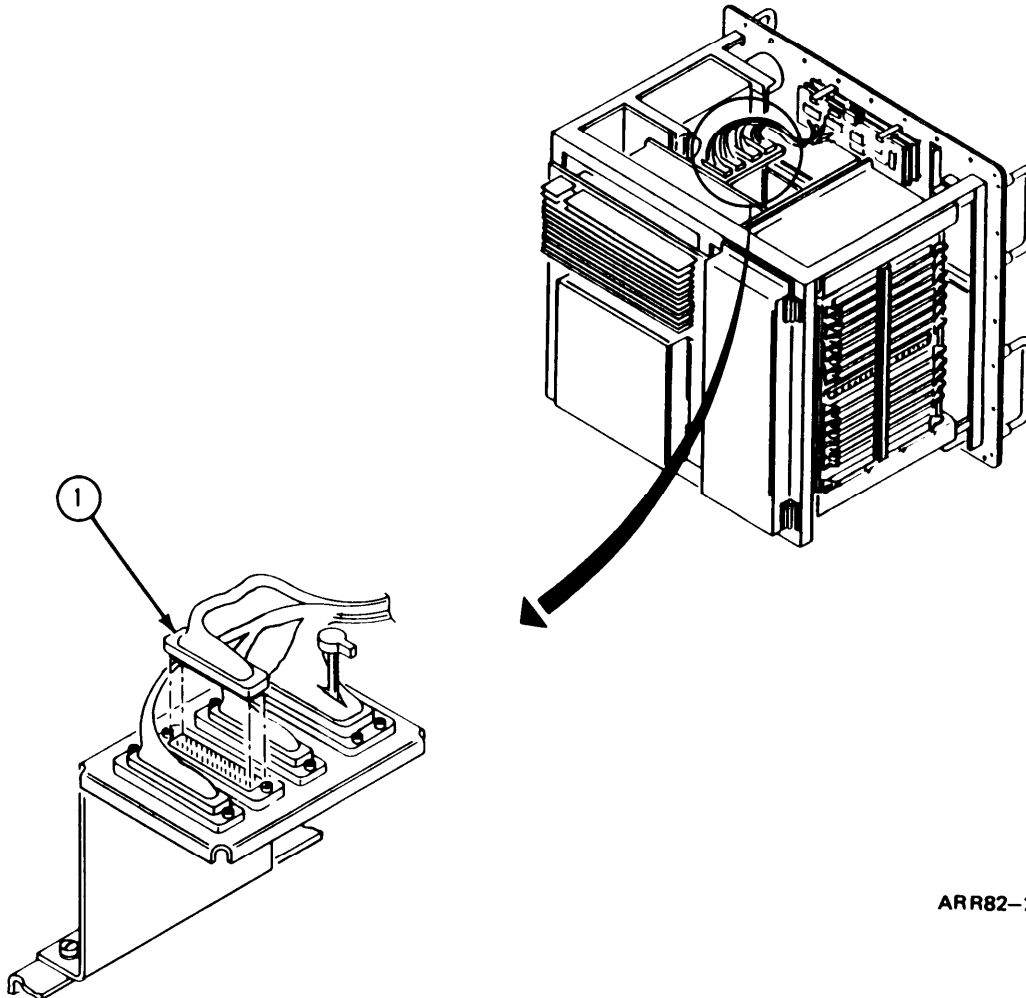
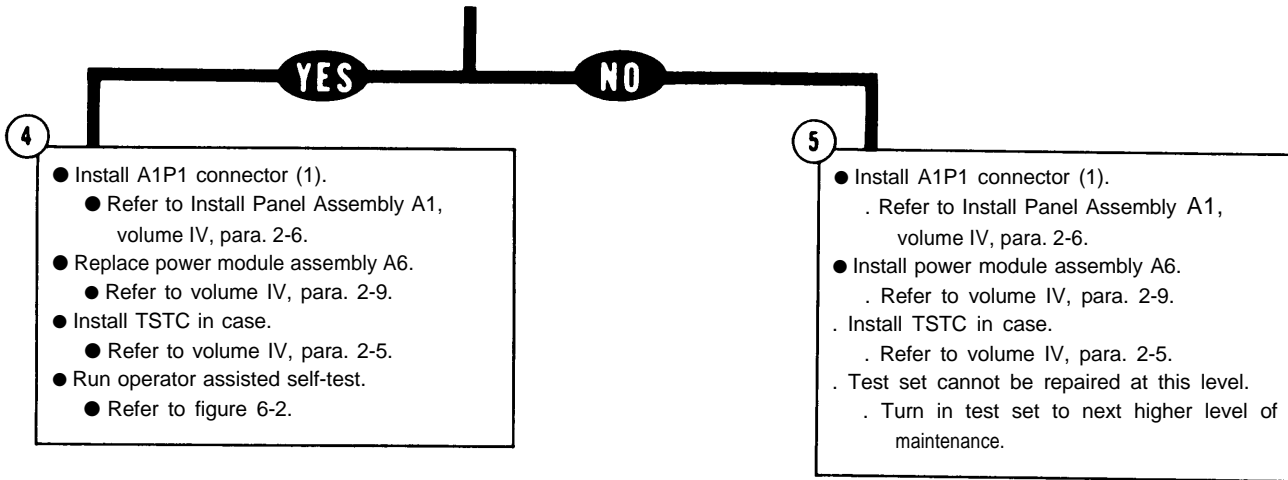
TABLE 4-3

FROM INTERNAL POWER HARNESS J1 (1):	TO INTERNAL POWER HARNESS P2 (2):
W17J1-1	W17P2-A3
W17J1-2	W17P2-A4



ARR82-24050

TM 9-4931-381-14&P-1
FAULT SYMPTOM INDEX



ARR82-24051

Figure 4-3. (Sheet 3 of 3)

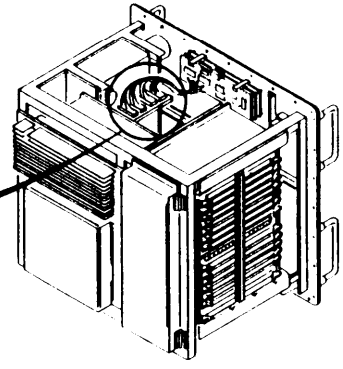
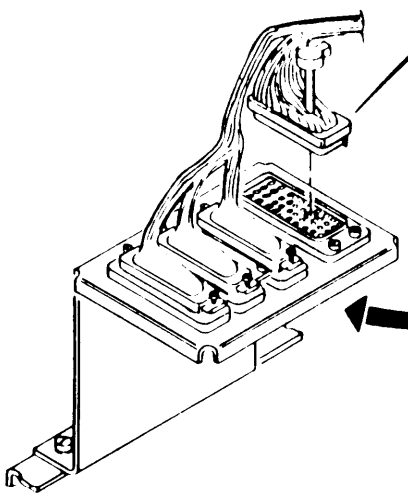
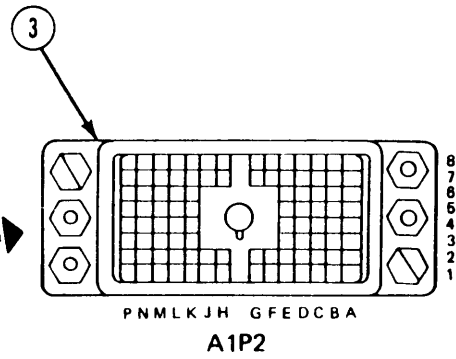
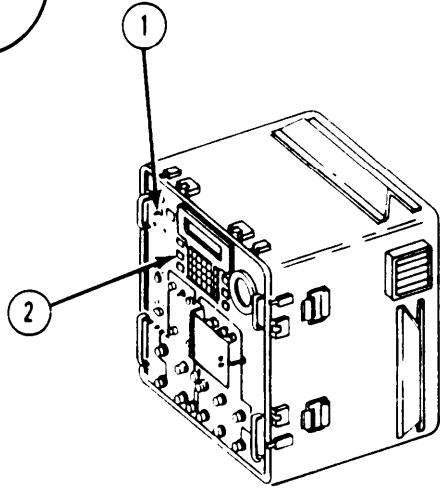
SYMPTOM

**DISPLAY STILL READS -
 AUTOMATIC SELF TEST COMPLETED
 RUN OAST?
 AFTER PRESSING YES SWITCH.**

Test Equipment/Special Tools:

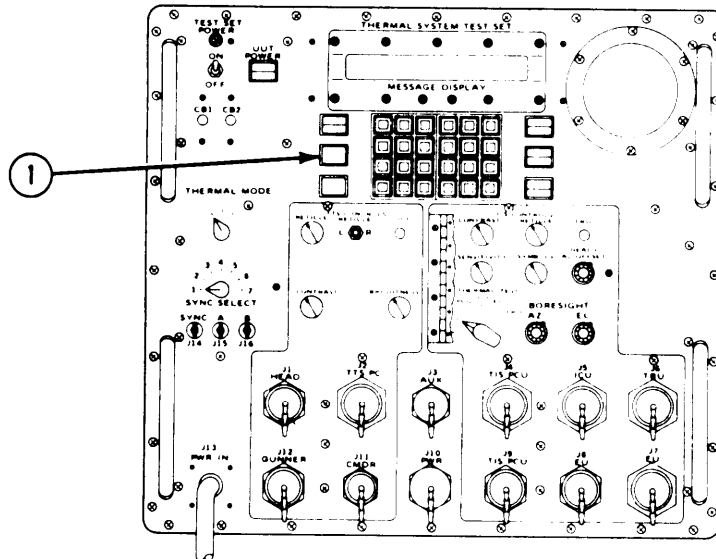
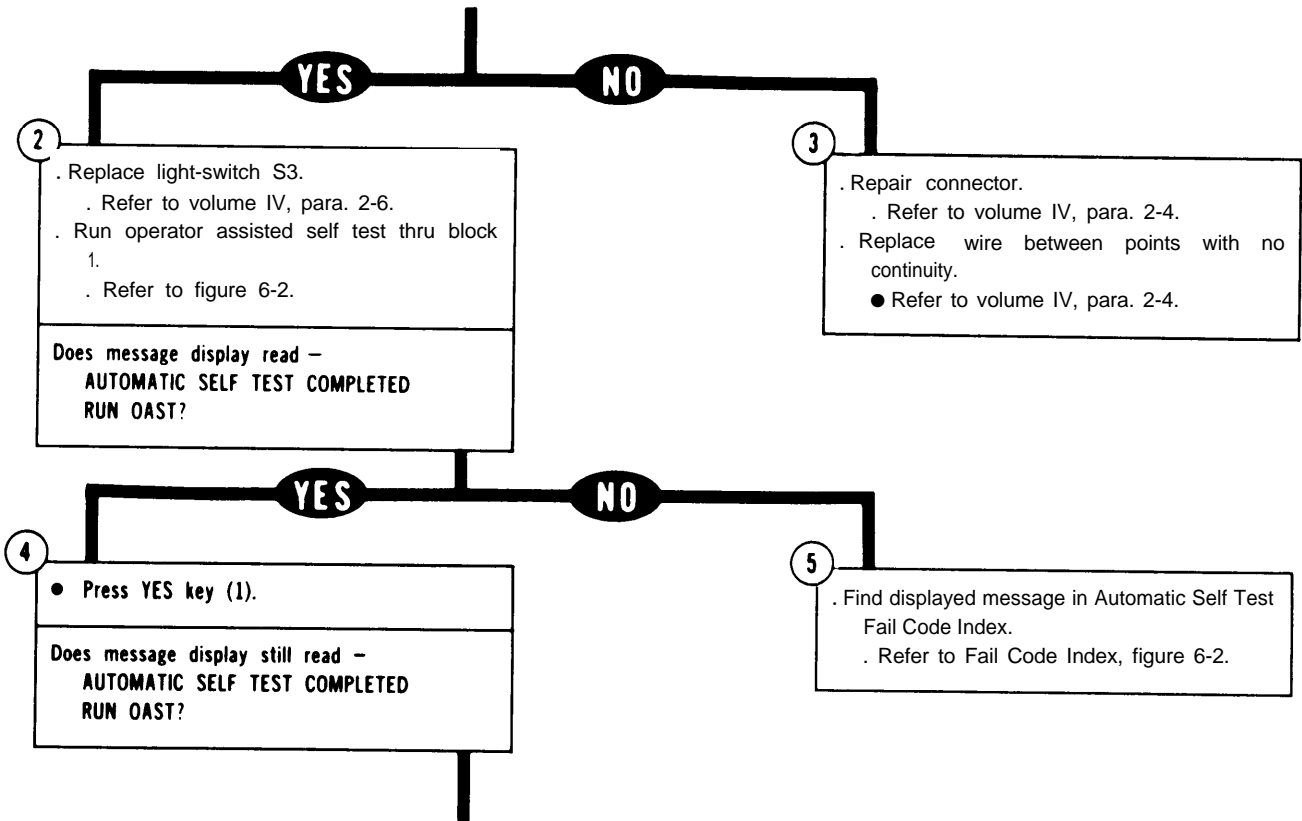
- Multimeter.
- Test probe set TA-1.

- 1
- Power down test set.
 - . Set TEST SET POWER switch (1) to OFF.
 - Remove TSTC for access only.
 - Refer to volume IV, para. 2-5.
 - Check YES switch for continuity.
 - . Depress and hold YES switch (2).
 - . Check for continuity between A1P2 (3) F7 and A1P2 (3) J1.
- Is continuity OK?**



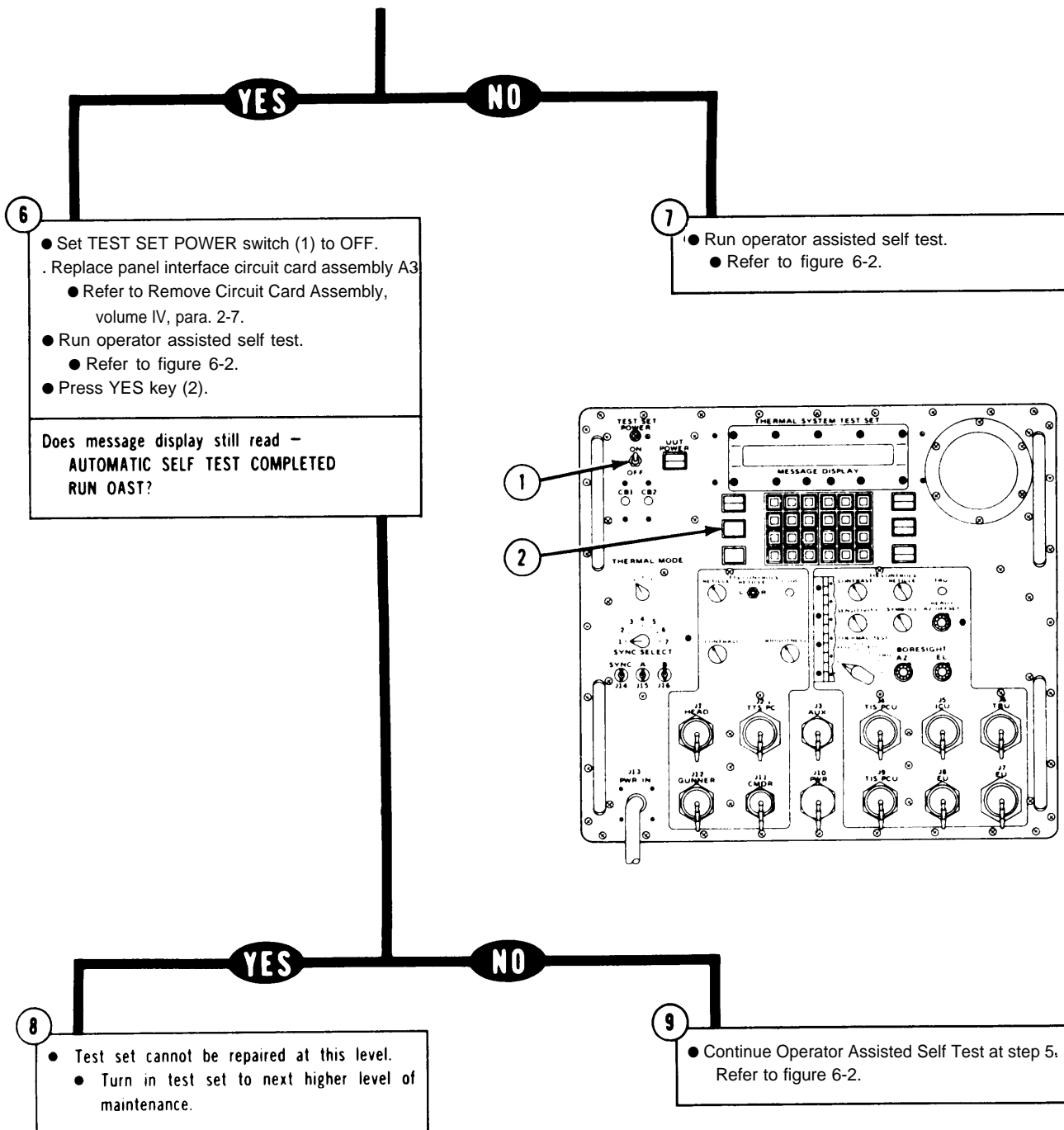
ARR82-24052

Figure 4-4. (Sheet 1 of 3)



ARR82-24053

Figure 4-4. (Sheet 2 of 3)



ARR82-24054

Figure 4-4. (Sheet 3 of 3)

SYMPTOM

**MESSAGE DISPLAY READS:
 REFER TO PROCEDURE #0.0.0.2
 PLUG/CABLE CONNECT ERROR**

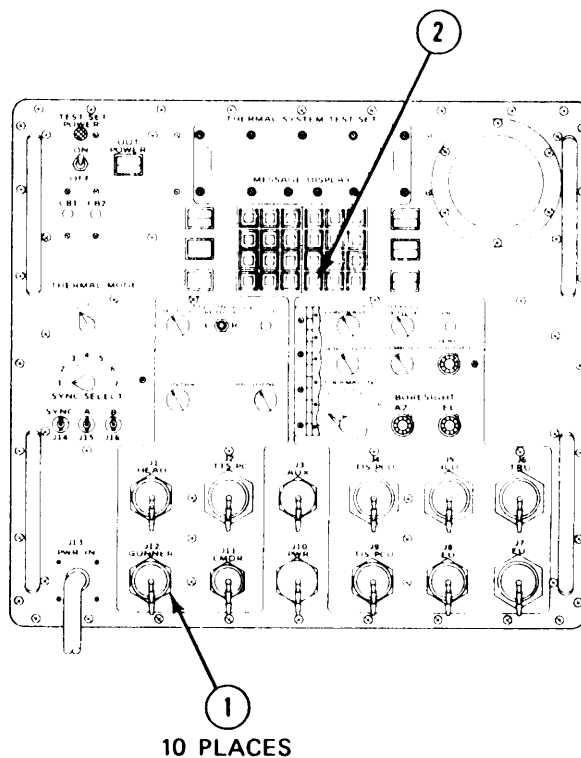
Test Equipment/ Special Tools:

- Multimeter
- Test Probe Set TA-1.

1

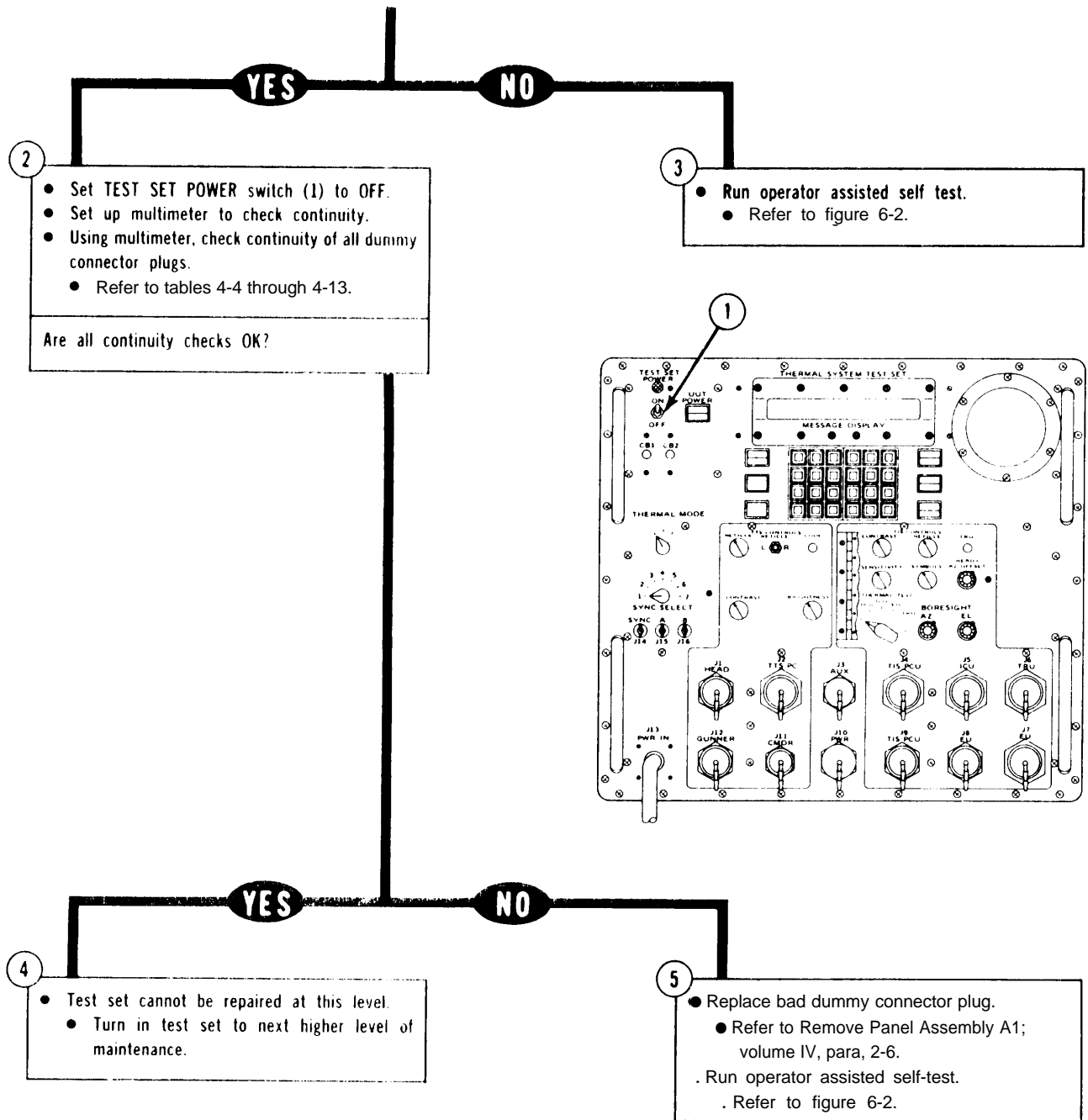
- Check that all dummy connector plugs (1) and any UUT cable connectors are tight and properly connected.
- Press CON key (2).

Does message display read —
 REFER TO PROCEDURE #0.0.0.2
 PLUG/CABLE CONNECT ERROR



ARR82-24055

Figure 4-5. (Sheet 1 of 12)



ARR82-24056

Figure 4-5. (Sheet 2 of 12)

TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX

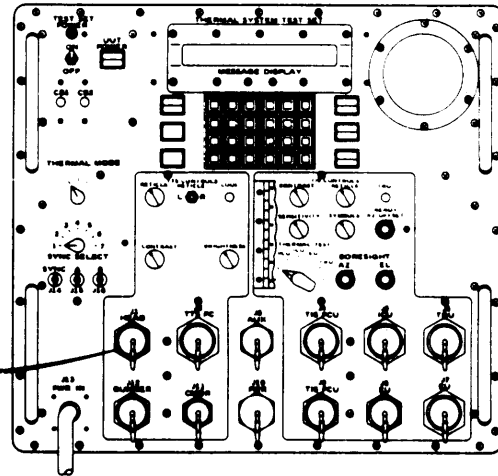
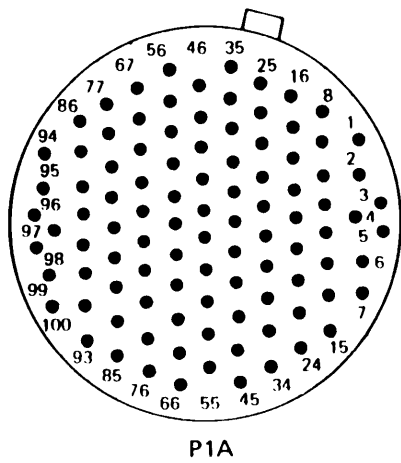


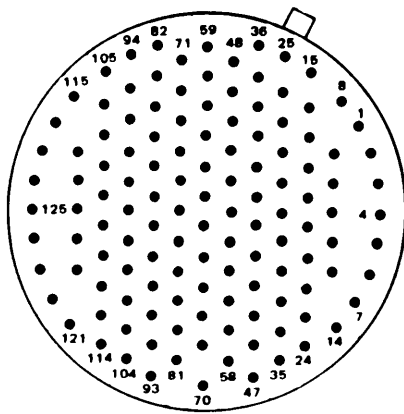
TABLE 4-4

FROM CONTACT	TO CONTACT
P1A-1	P1A-2
↑ -3	↑ -4
-97	-96
-99	-98
-11	-10
-5	-12
-17	-19
-29	-20
-23	-22
-15	-24
-27	-26
-39	-28
-21	-30
-33	-32
-45	-34
-35	-36
-37	-38
-31	-40
-43	-42
-53	-44
-57	-46
-49	-48
-41	-50
-51	-52
-55	-54
-65	-66
-47	-58
-89	-90
↓ -91	↓ -92
P1A-93	P1A-100
CONTACTS 6 THRU 9, 13, 14, 16, 18, 25, 56, 59 THRU 64, 67 THRU 88, 94, 95 NOT USED	

Figure 4-5. (Sheet 3 of 12)

Volume III
 Para. 4-4

ARR82-24057



P2A

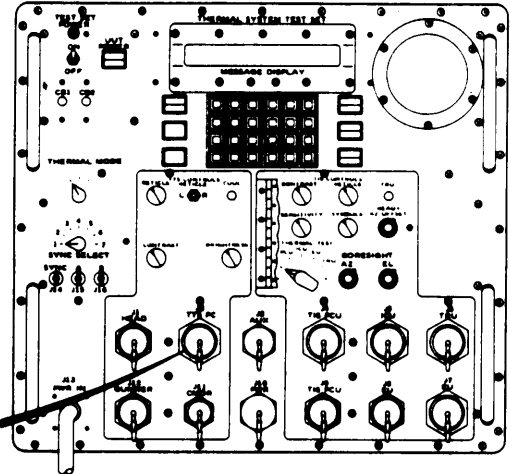


TABLE 4-5

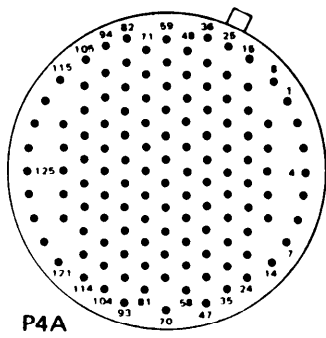
FROM CONTACT	TO CONTACT
P2A-1	P2A-2
↑ -3	↑ -4
-5	-6
-9	-8
-11	-10
-13	-12
-7	-14
-15	-16
-17	-18
-19	-20
-21	-22
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-33	-34
-37	-36
-39	-38
-41	-40
-43	-42
-45	-44
-35	-46
-49	-48
↓ -65	↓ -66
P2A-67	P2A-68

FROM CONTACT	TO CONTACT
P2A-83	P2A-82
↑ -85	↑ -84
-87	-86
-89	-88
-91	-90
-81	-92
-95	-94
-97	-96
-99	-98
-71	-72
-73	-74
-79	-80
-113	-114
-75	-76
-77	-78
-111	-112
-57	-56
-69	-58
-63	-64
↓ -61	↓ -62
P2A-59	P2A-60
CONTACTS 47, 50 THRU 55, 70, 93, 100 THRU 110, 115 THRU 128 NOT USED	

ARR82-24058

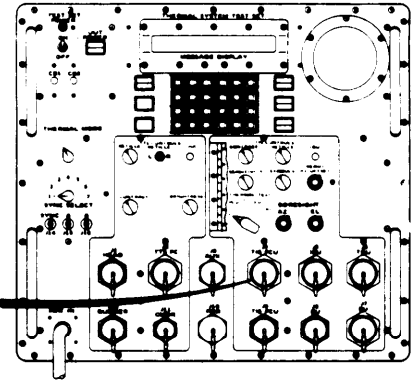
Figure 4-5. (Sheet 4 of 12)

FAULT SYMPTOM INDEX



P4A

TABLE 4-6



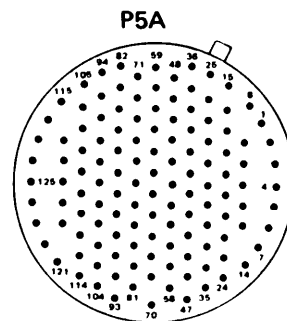
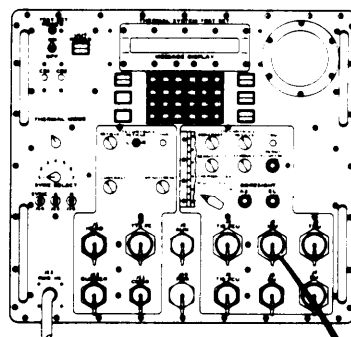
FROM CONTACT	TO CONTACT
P4A-1	P4A-2
↑ -3	↑ -4
-5	-6
-9	-8
-11	-10
-13	-12
-7	-14
-15	-16
-17	-18
-19	-20
-21	-22
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-33	-34
-37	-36
-39	-38
-41	-40
-43	-42
-45	-44
-35	-46
-49	-48
-51	-50
-53	-52
-55	-54
-57	-56
-69	-58
↓ -59	↓ -60
P4A-61	P4A-62

FROM CONTACT	TO CONTACT
P4A-63	P4A-64
↑ -65	↑ -66
-67	-68
-71	-72
-73	-74
-75	-76
-77	-78
-79	-80
-83	-82
-85	-84
-87	-86
-89	-88
-91	-90
-81	-92
-95	-94
-97	-96
-99	-98
-101	-100
-103	-102
-105	-104
-107	-106
-109	-108
-111	-110
-113	-112
-121	-114
-115	-116
-117	-118
-119	-120
-125	-124
↓ -123	↓ -122
P4A-127	P4A-126
P4A-70	P4A-128
CONTACTS 47, 93 NOT USED	

Figure 4-5. (Sheet 5 of 12)

TABLE 4-7

FROM CONTACT	TO CONTACT
P5A-1	P5A-2
↑ -3	↑ -4
-5	-6
-9	-8
-11	-10
-13	-12
-7	-14
-15	-16
-17	-18
-19	-20
-21	-22
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-33	-34
-37	-36
-39	-38
-41	-40
-43	-42
-45	-44
-35	-46
-49	-48
-51	-50
-53	-52
-55	-54
-57	-56
-69	-58
-59	-60
-61	-62
-63	-64
-65	-66
-67	-68
-71	-72
-73	-74
↓ -75	↓ -76
P5A-77	P5A-78



FROM CONTACT	TO CONTACT
P5A-79	P5A-80
↑ -82	↑ -83
-85	-84
-101	-100
-91	-90
-89	-88
-87	-86
-95	-94
-97	-96
-99	-98
-103	-102
-105	-104
-107	-106
-109	-108
-111	-110
-113	-112
-81	-92
-70	-93
↓ -115	↓ -117
P5A-47	P5A-114
CONTACTS 116, 118 THRU 128 NOT USED	

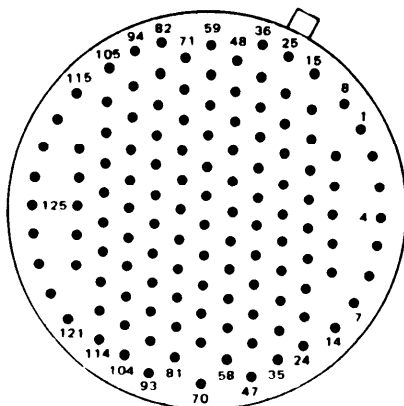
ARR82-24060

Figure 4-5. (Sheet 6 of 12)

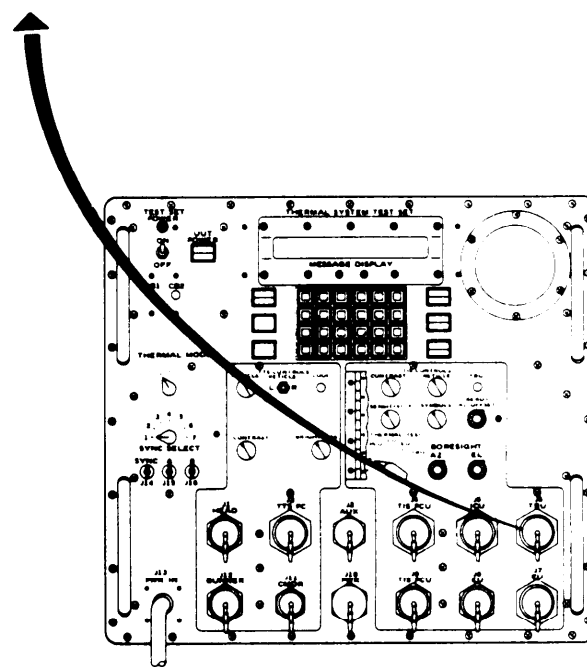
TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX

TABLE 4-8

FROM CONTACT	TO CONTACT
P6A-1	P6A-2
↑ -3	↑ -4
-5	-6
-9	-8
-41	-98
-13	-12
-7	-14
-15	-16
-17	-18
-19	-20
-21	-22
-79	-78
-75	-76
-74	-77
-31	-30
-33	-32
-35	-34
-73	-72
-37	-38
-39	-40
-43	-42
-45	-44
-47	-46
-67	-68
-65	-66
-63	-64
-55	-54
-57	-56
-81	-58
↓ -59	↓ -60
P6A-61	P6A-62
CONTACTS 10, 11, 23 THRU 29, 36, 48 THRU 53, 69, 70, 71, 80, 82 THRU 97, 99 THRU 128 NOT USED	



P6A



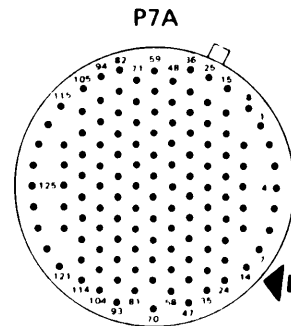
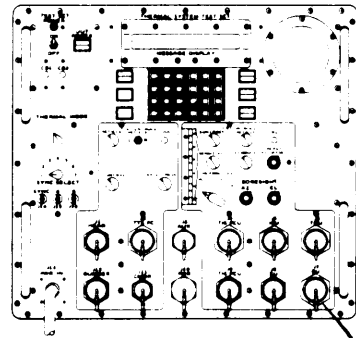
ARR82-24061

Figure 4-5. (Sheet 7 of 12)

TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX

TABLE 4-9

FROM CONTACT	TO CONTACT
P7A-1	P7A-2
▲ -3	▲ -4
-5	-6
-9	-8
-11	-10
-13	-12
-7	-14
-15	-16
-17	-18
-19	-20
-21	-22
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-33	-34
-37	-36
-39	-38
-41	-40
-43	-42
-45	-44
-35	-46
-49	-48
-51	-50
-53	-52
-55	-54
-57	-56
-69	-58
-59	-60
-61	-62
-63	-64
-65	-66
-67	-68
-71	-72
-73	-74
-75	-76
▼ -79	▼ -80
P7A-83	P7A-82



FROM CONTACT	TO CONTACT
P7A-85	P7A-84
▲ -87	▲ -86
-89	-88
-91	-90
-81	-92
-103	-102
-105	-104
-77	-78
-95	-94
-97	-96
-99	-98
-101	-100
-107	-106
-109	-108
-112	-116
-119	-118
-121	-120
▼ -123	▼ -122
P7A-125	P7A-124
CONTACTS 47, 70, 93, 110, 111, 113, 114, 115, 117, 126, 127, 128 NOT USED	

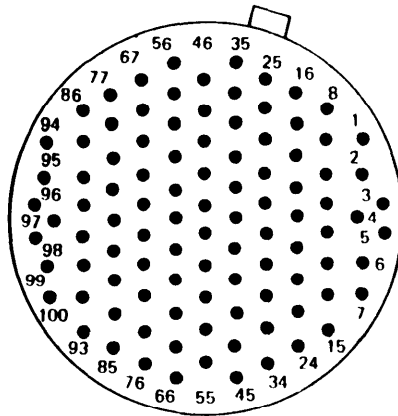
ARR82-24062

Figure 4-5. (Sheet 8 of 12)

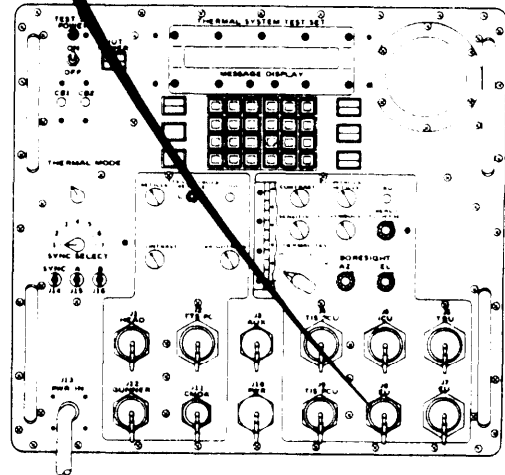
TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX

TABLE 4-10

FROM CONTACT	TO CONTACT
P8A-1	P8A-2
↑ -5	↑ -4
-7	-6
-3	-8
-9	-16
-13	-12
-15	-14
-33	-42
-17	-18
-19	-20
-21	-22
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-35	-34
-37	-36
-39	-38
-41	-40
-43	-44
-45	-46
-47	-48
-49	-50
-51	-52
-53	-54
-55	-56
-57	-62
-61	-60
↓ -59	↓ -58
P8A-64	P8A-66
CONTACTS 10, 11, 63, 65, 67 THRU 100 NOT USED	



P8A



ARR82-24063

Figure 4-5. (Sheet 9 of 12)

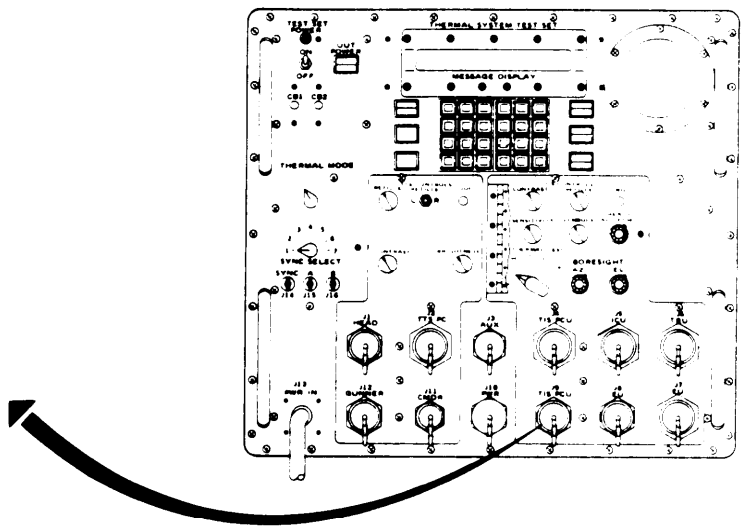
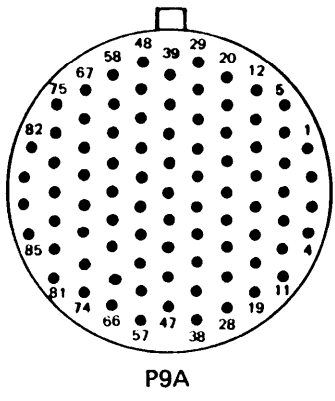


TABLE 4-11

FROM CONTACT	TO CONTACT
P9A-1	P9A-2
↑ -3	↑ -4
-5	-6
-7	-14
-9	-8
-13	-12
-15	-16
-17	-18
-11	-10
-19	-20
-23	-24
-25	-26
-27	-28
-29	-30
-31	-32
-33	-34
-35	-36
-37	-38
-39	-40
-41	-42
-43	-44
-21	-22
-47	-46
↓ -49	↓ -48
P9A-50	P9A-54
CONTACTS 45, 51, 52, 53, 55 THRU 85 NOT USED	

ARR82-24064

Figure 4-5. (Sheet 10 of 12)

TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX

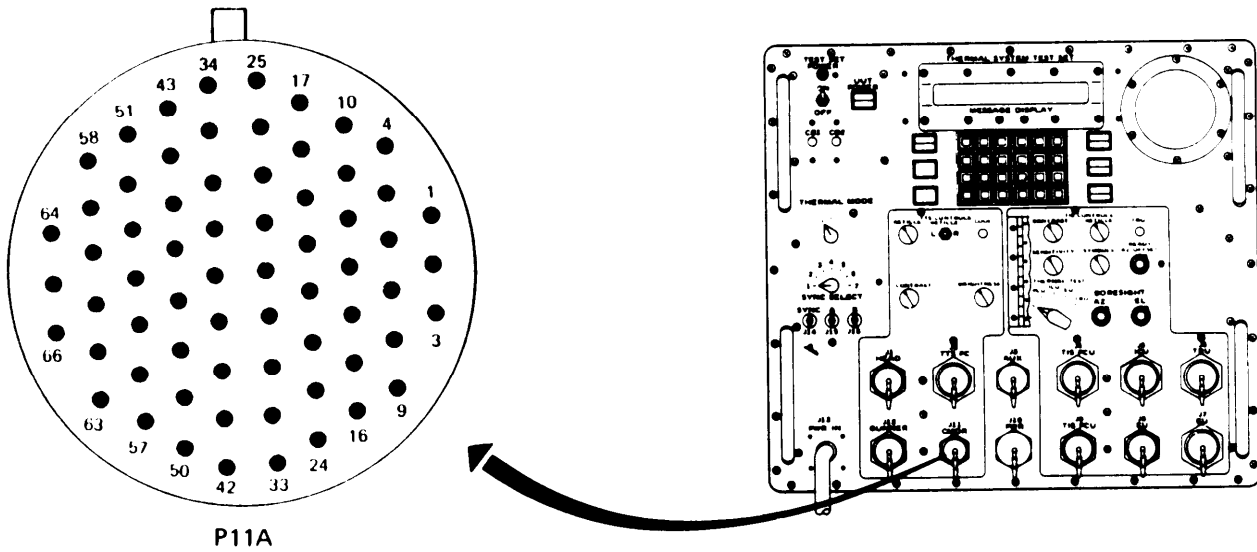


TABLE 4-12

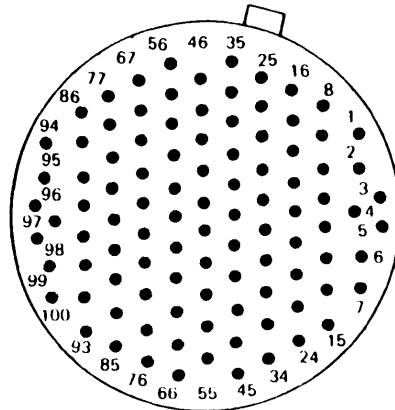
FROM CONTACT	TO CONTACT
P11A-3	P11A-2
↑ -5	↑ -4
-7	-6
-9	-8
-11	-10
-13	-12
-15	-14
-23	-16
-17	-18
-19	-20
-21	-22
-27	-32
↓ -25	↓ -26
P11A-64	P11A-66
CONTACTS 1, 24, 28 THRU 31, 33 THRU 63, 65 NOT USED	

ARR82-24065

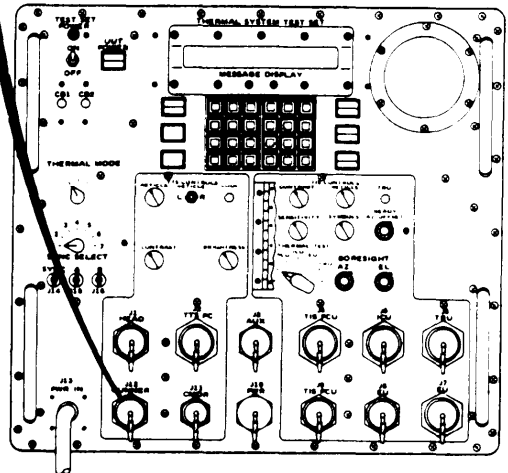
Figure 4-5. (Sheet 11 of 12)

TABLE 4-13

FROM CONTACT	TO CONTACT
P12A-1	P12A-2
↑ -3	↑ -4
-5	-6
-17	-8
-9	-10
-11	-12
-13	-14
-25	-16
-19	-18
-21	-20
-23	-22
-15	-24
-27	-26
-29	-28
-63	-64
-65	-66
-67	-68
-69	-70
-45	-44
-47	-46
-49	-48
-51	-50
-53	-52
-55	-54
-57	-56
-59	-58
-61	-60
-71	-72
-73	-74
-86	-87
↓ -89	↓ -90
P12A-98	P12A-100
CONTACTS 7, 30 THRU 43, 62, 75 THRU 85, 88, 91 THRU 97, AND 99 NOT USED	



P12A



ARR82-24066

Figure 4-5. (Sheet 12 of 12)

SYMPTOM

SUSPECTED BAD TEST CABLE

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1.

Equipment Condition:

- Test cable removed from test set and resting on clean work surface.

1

Preliminary checks.

- Look at cable connectors (1) for broken or cracked inserts.
- Look at cable connectors (1) for bent, broken, pushed in, or corroded contacts.

Are there any broken parts; bent, corroded, or missing contacts?

NO

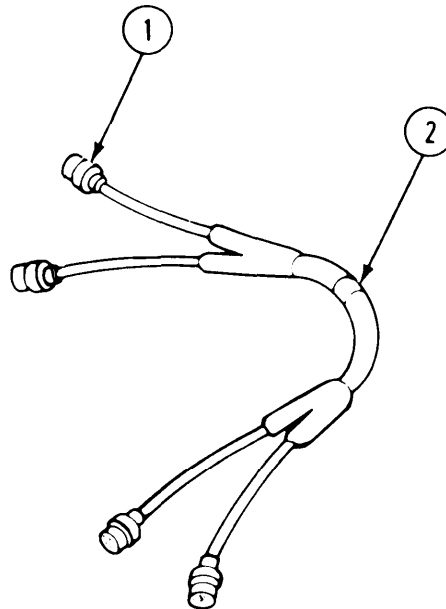
YES

2

Check continuity of test cable.

- Look at cable identification band (2) to identify cable.
- Go to chapter 8, and find the wiring list for the identified cable.
- Using multimeter, check continuity of all wires listed in wiring list.

Are all continuity checks OK?



TYPICAL TEST CABLE

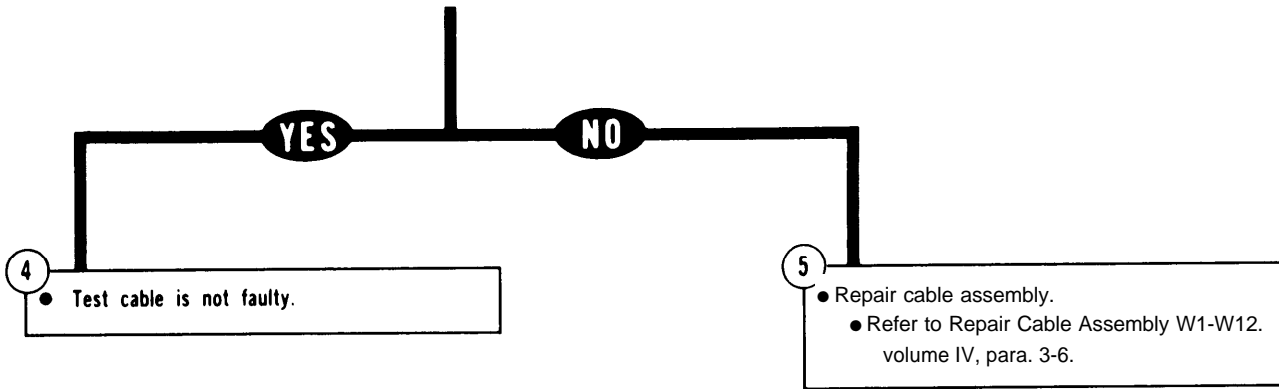
3

- Repair bad cable connectors.

. Refer to volume IV, para. 2-4.

ARR82-24067

Figure 4-6. (Sheet 1 of 2)



ARR82-24068

Figure 4-6. (Sheet 2 of 2)

SYMPTOM

**MESSAGE DISPLAY READS -
 REFER TO PROCEDURE #0.0.0.3
 CONTINUITY FAULT**

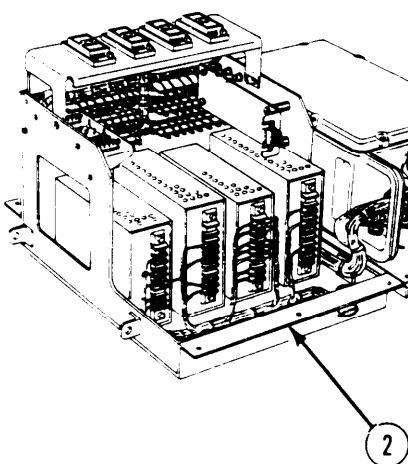
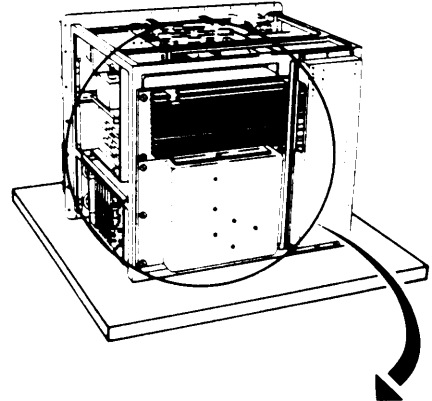
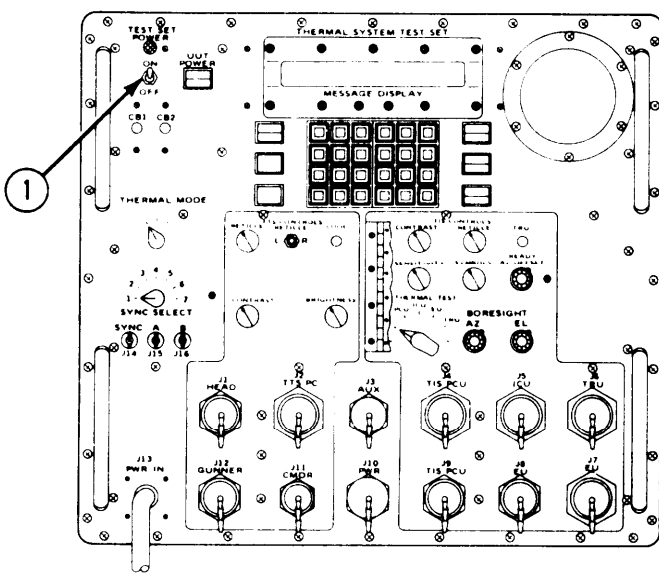
Test Equipment/Special Tools:

- Multimeter, digital
- Test probe set TA-1.

WARNING

High Voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

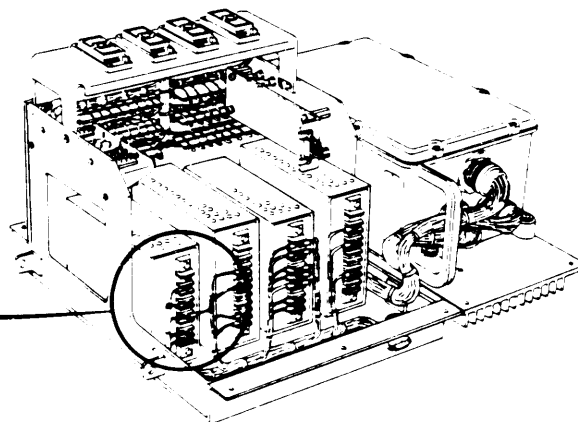
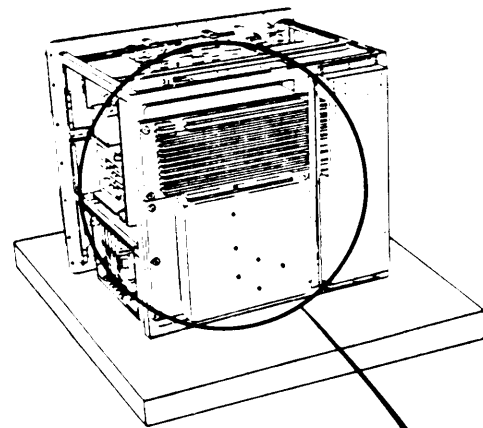
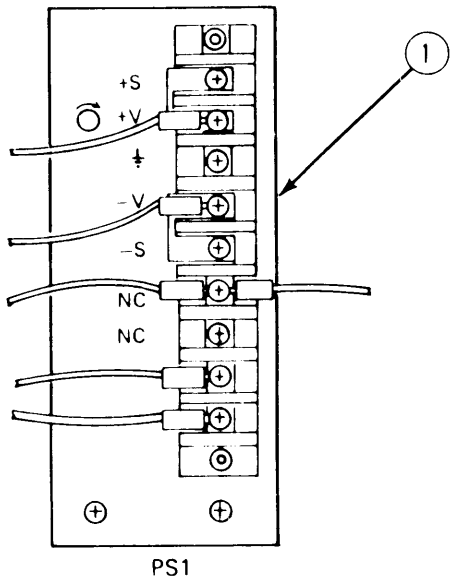
1. Power down test set.
 - . Set TEST SET POWER switch (1) to OFF.
- . Remove TSTC for access only.
 - . Refer to volume IV, para. 2-5.
- Remove power module (2) for access only.
 - . Refer to Remove Power Module A6, volume IV, para. 2-9.
- Prepare test set for operation.
 - . Refer to volume 1, para. 4-17.



ARR82-24554

Figure 4-7. (Sheet 1 of 4)
 Volume III
 Para. 4-4

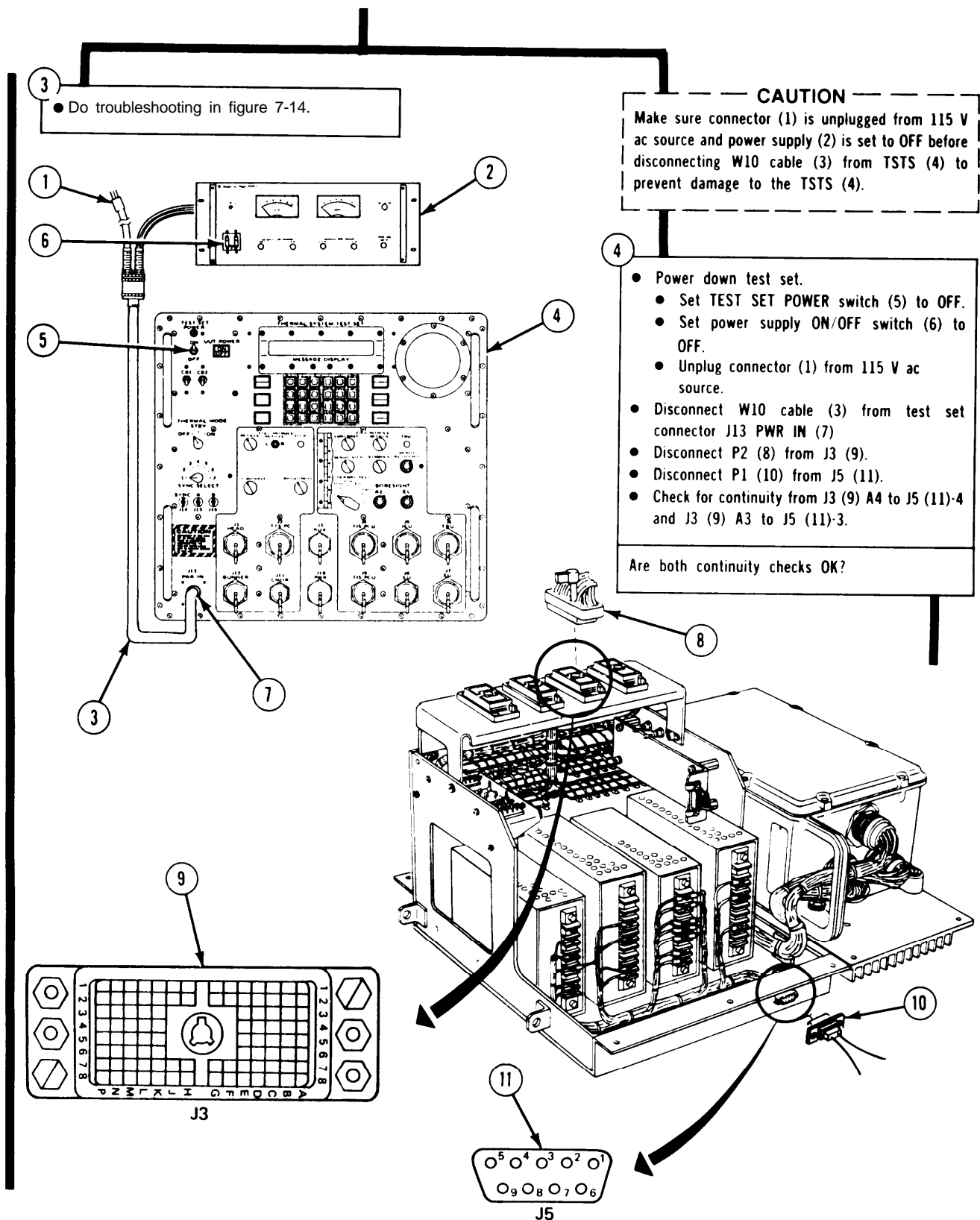
- 2
- Set up multimeter for DC voltage measurement.
 - Using multimeter, check for 24 volts between +V and -V terminals of 24 volt power supply (1).
- Is voltage OK?



ARR82-24069

Figure 4-7. (Sheet 2 of 4)

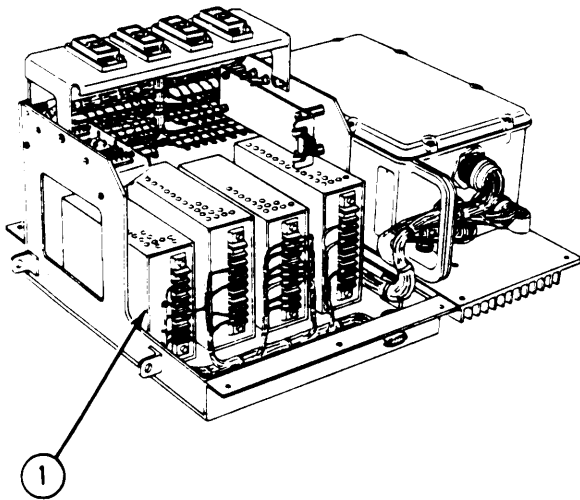
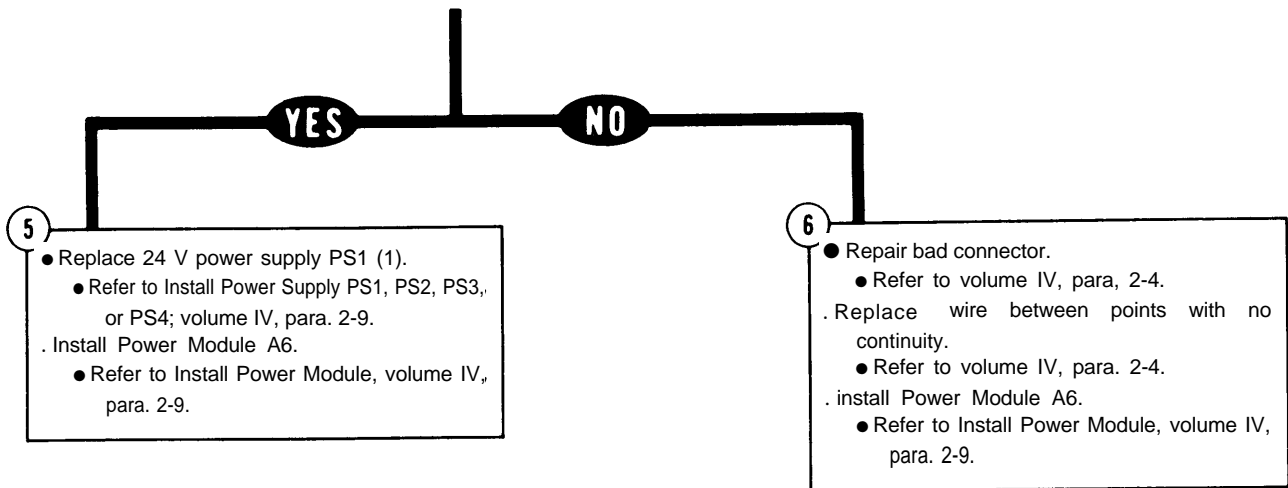
TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX



ARR82-24070

Figure 4-7. (Sheet 3 of 4)

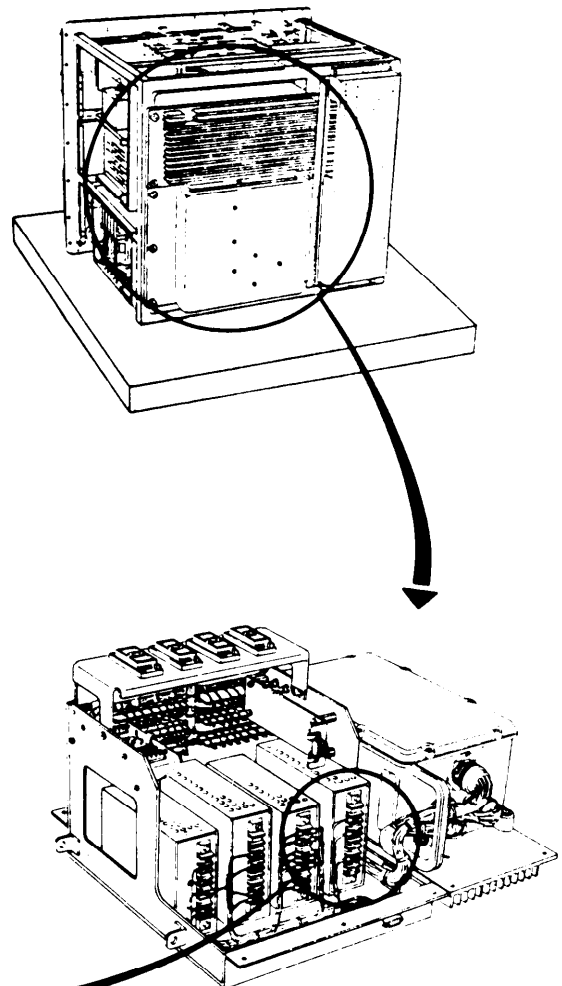
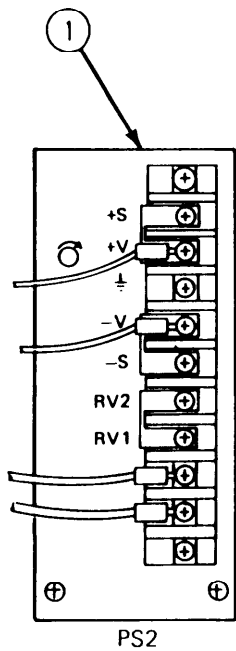
Volume III
 Para. 4-4



ARR82-24071

Figure 4-7. (Sheet 4 of 4)

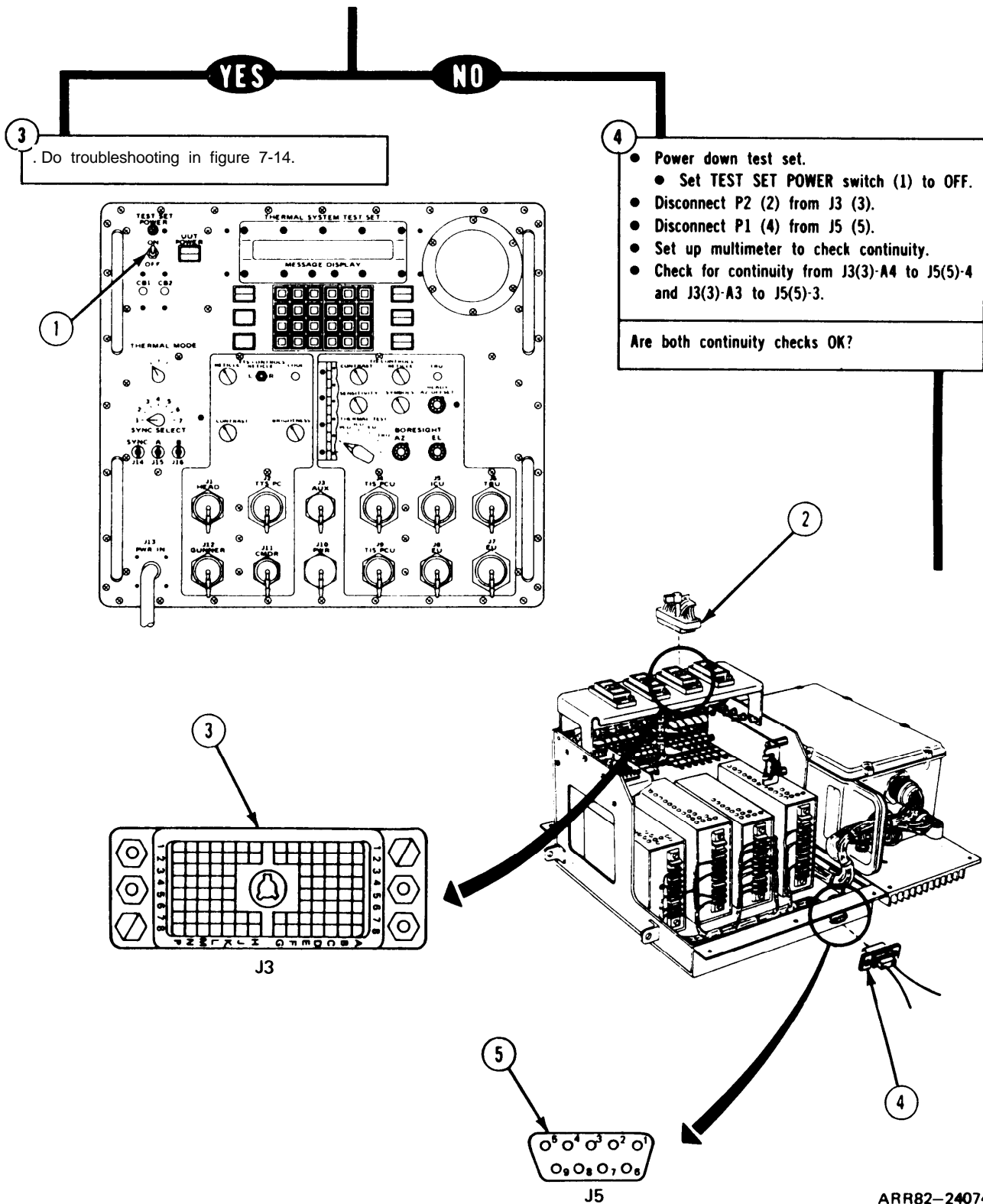
- 2
- Set up multimeter for DC voltage measurement.
 - Using multimeter, check for -15 volts between +V and -V terminals of -15 volt power supply (1).
- Is voltage OK?



ARR82-24073

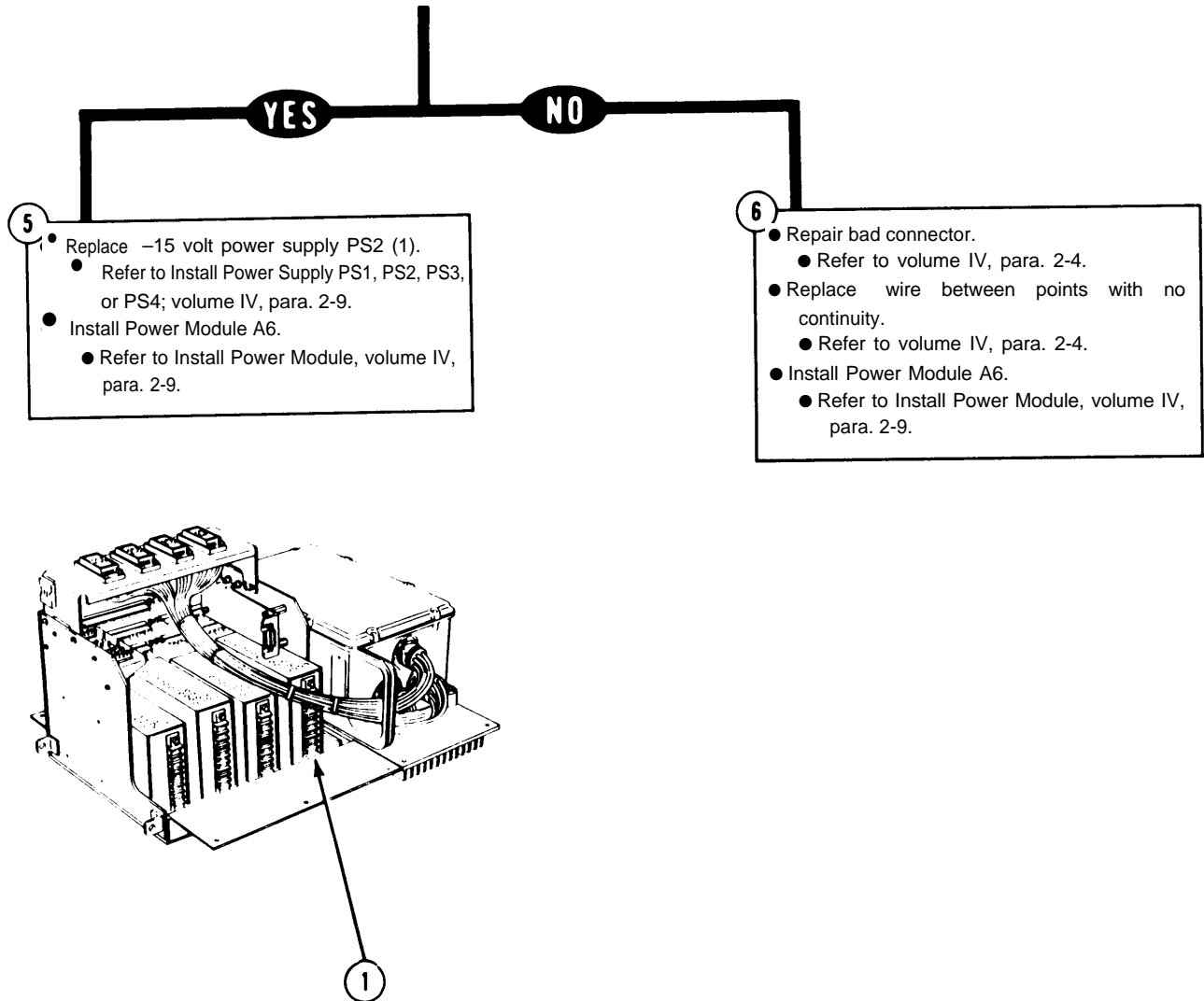
Figure 4-8. (Sheet 2 of 4)

TM 9-4931-381-14&P-1
 FAULT SYMPTOM INDEX



ARR82-24074

Figure 4-8. (Sheet 3 of 4)



ARR82-24075

Figure 4-8. (Sheet 4 of 4)

SYMPTOM

**FRONT PANEL BLANK EXCEPT
 TEST SET POWER LAMP LIT,
 UUT POWER LAMP LIT,
 MESSAGE DISPLAY SHOWS
 BLINKING CURSOR**

Test Equipment/Special Tools:

- Multimeter, digital
- Test probe set TA-1.

WARNING

High Voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Remove TSTC for access only.
 - Refer to volume IV, para. 2-5.
 - Remove power module (2) for access only.
 - Refer to Remove Power Module A6, volume IV, para. 2-9.
 - Prepare test set for operation.
 - Refer to volume 1, para. 4-17.

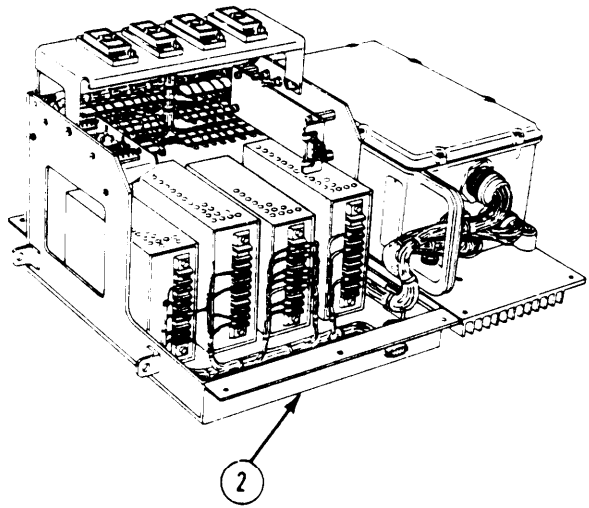
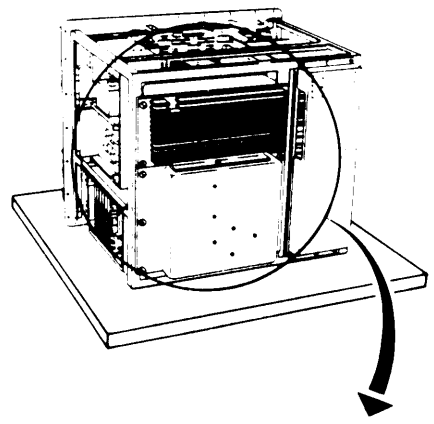
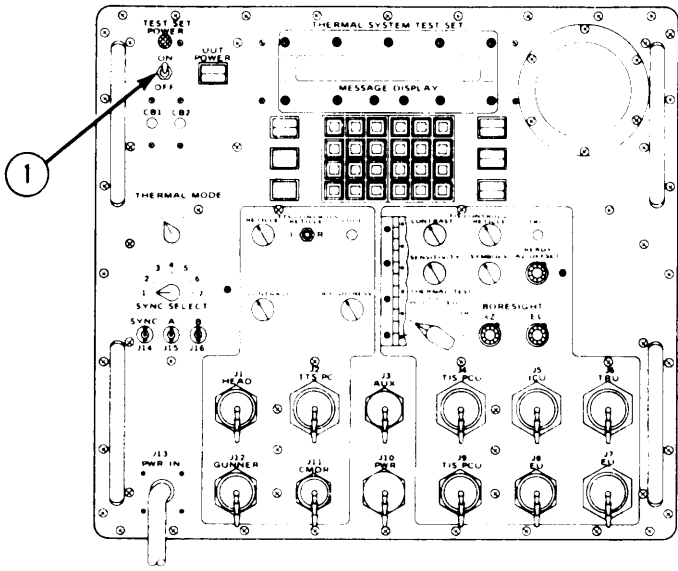


Figure 4-9. (Sheet 1 of 4)
 Volume III
 Para. 4-4

ARR82-24076

- 2
- Set up multimeter for DC voltage measurement.
 - Using multimeter, check for +15 volts between +V and -V terminals of +15 volt power supply (1).
- Is voltage OK?

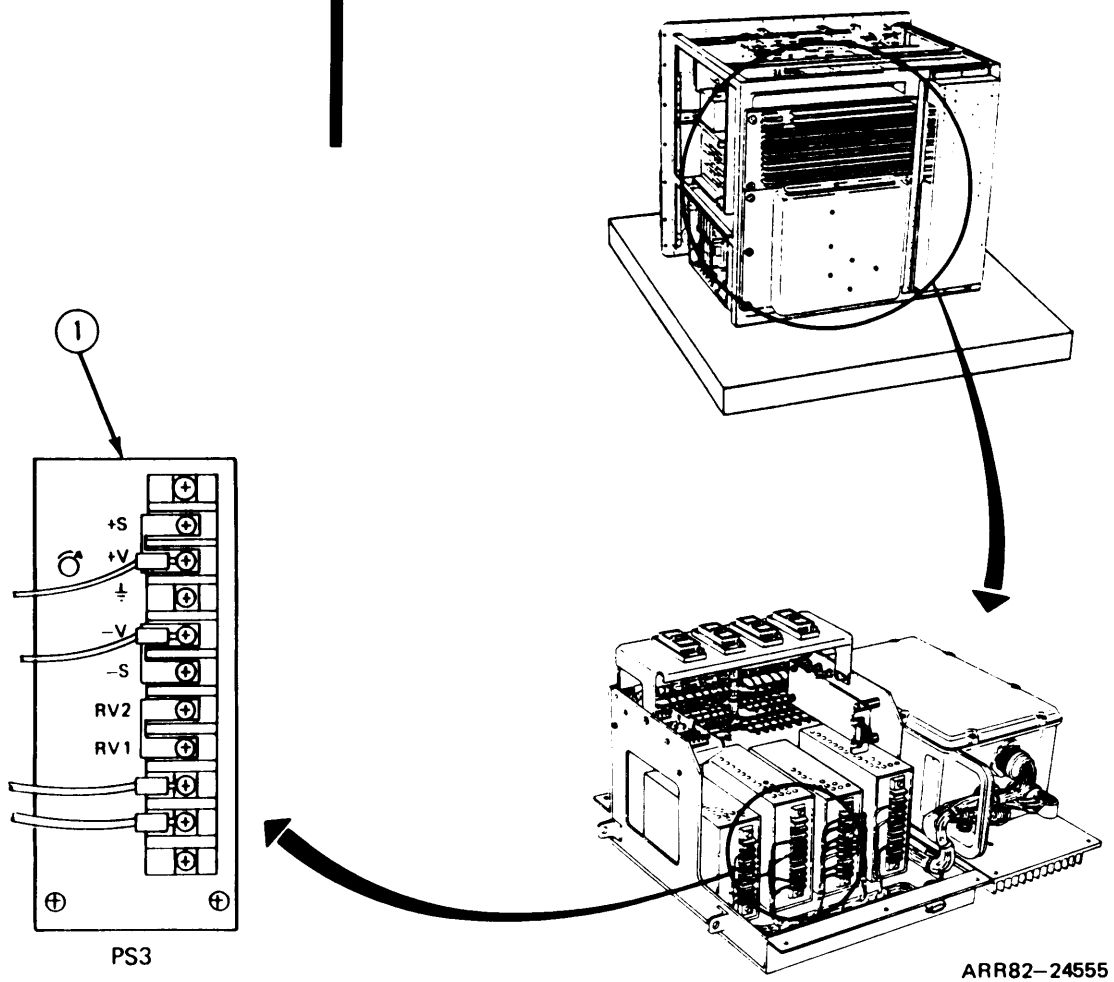
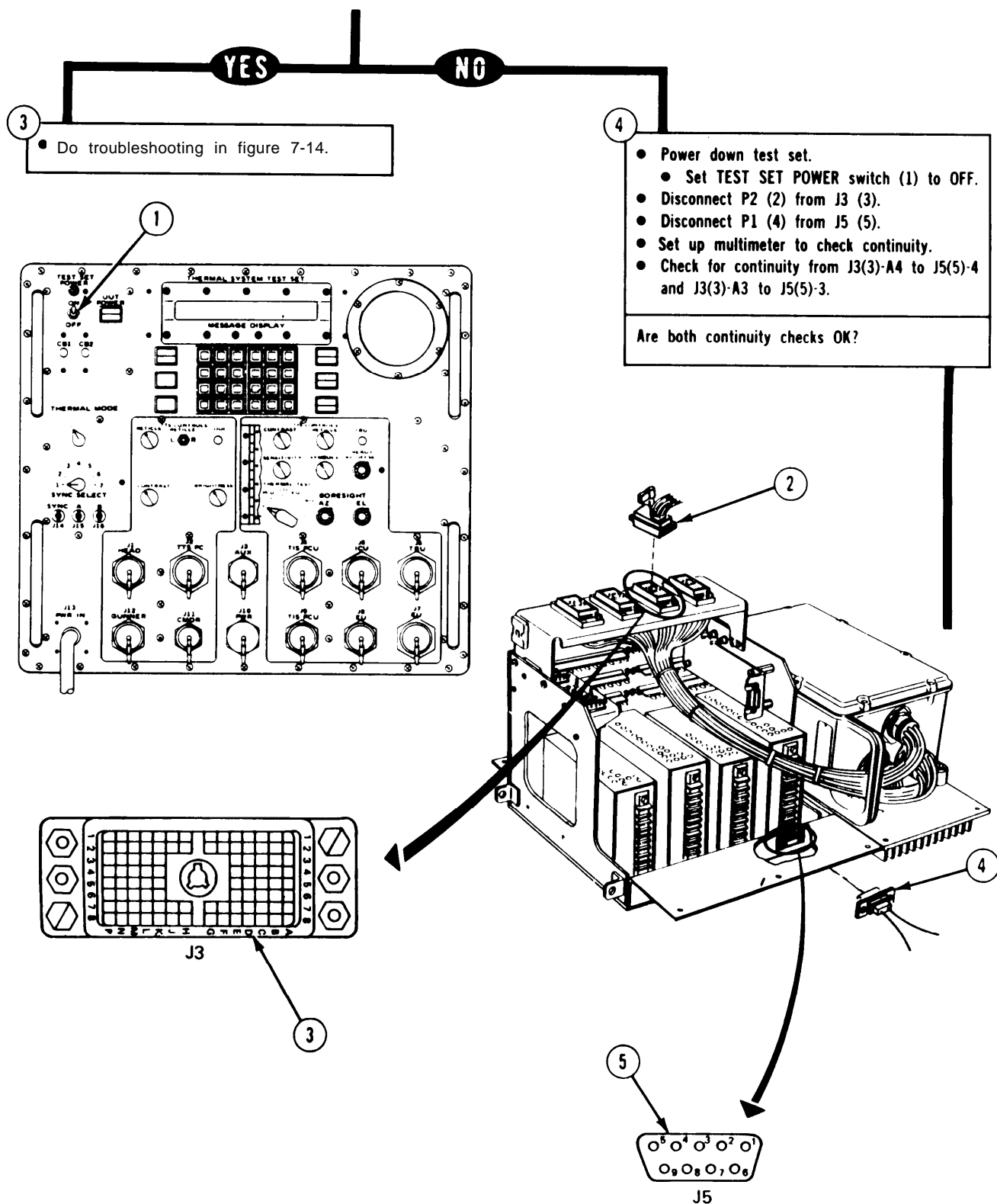
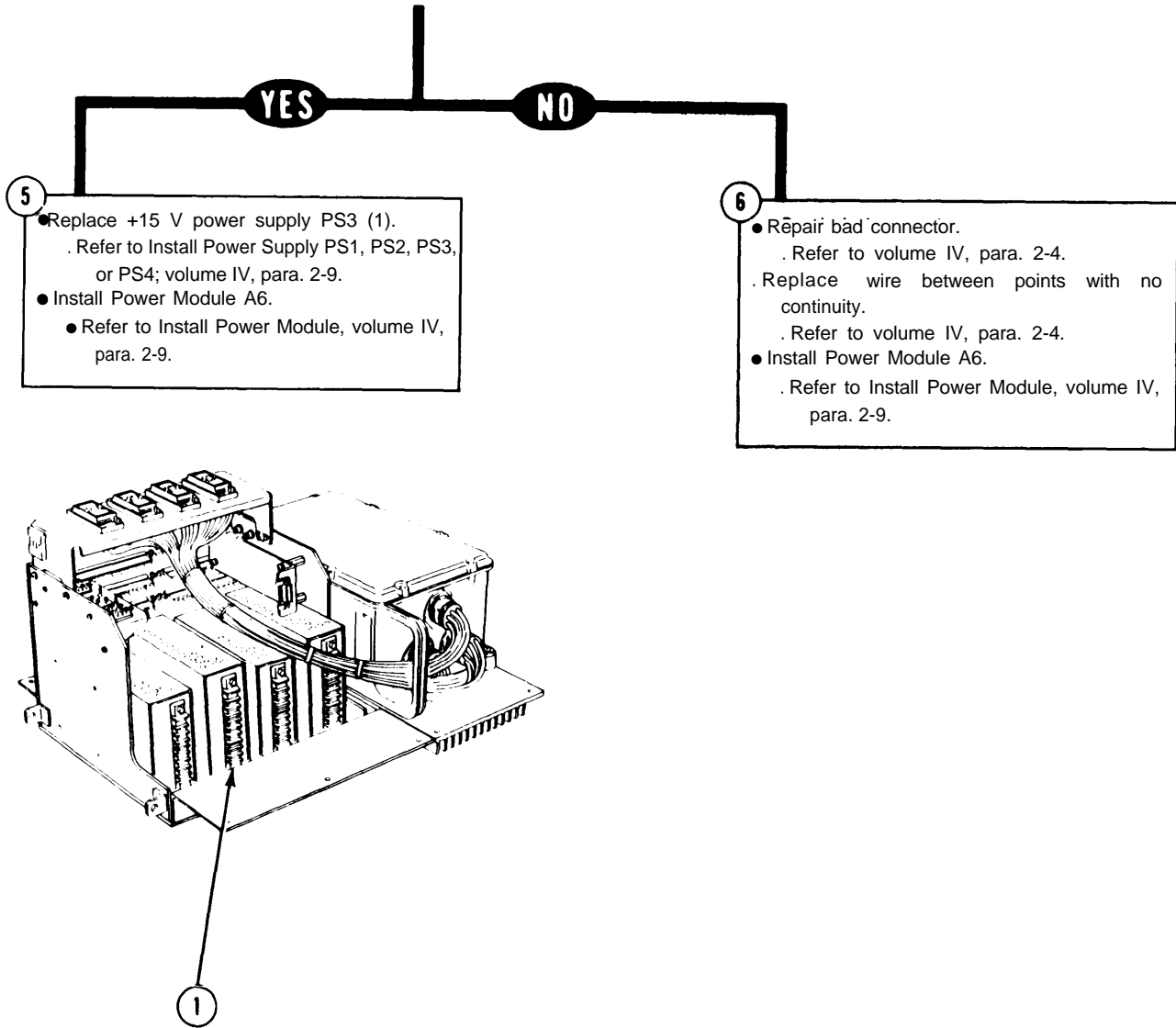


Figure 4-9. (Sheet 2 of 4)



ARR82-24077

Figure 4-9. (Sheet 3 of 4)



ARR82-24078

Figure 4-9. (Sheet 4 of 4)

SYMPTOM

FRONT PANEL BLANK EXCEPT TEST SET POWER LAMP LIT, PROC PWR FAIL LAMP LIT, AND PROC FAIL LAMP LIT, UUT POWER LAMP LIT, POLARITY AND FOV LAMP LIT.

- Test Equipment/Special Tools:**
- Multimeter, digital
 - Test probe set TA-1

WARNING

High Voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe safety precautions.

- 1
- . Power down test set.
 - . Set TEST SET POWER switch (1) to OFF.
 - . Remove TSTC for access only.
 - Refer to volume IV, para. 2-5.
 - Remove power module (2) for access.
 - . Refer to Remove Power Module A6, volume IV, para, 2-9.
 - Prepare test set for operation.
 - . Refer to volume 1, para. 4-17.

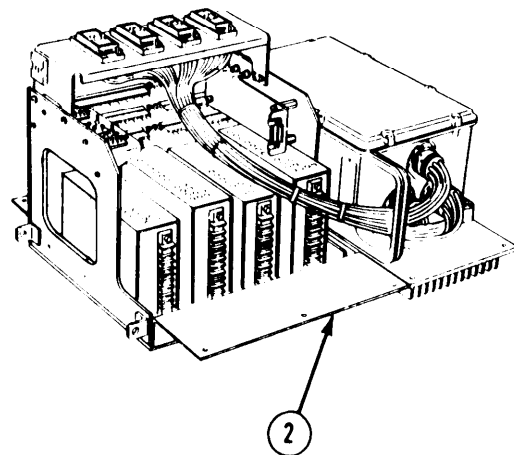
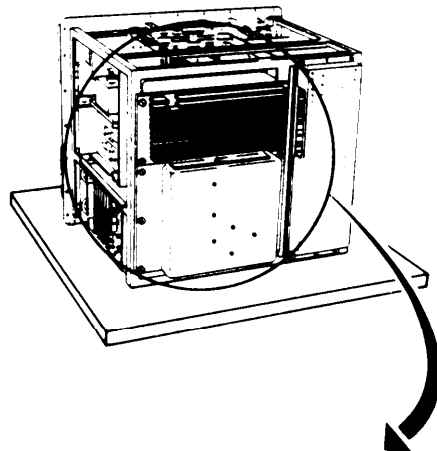
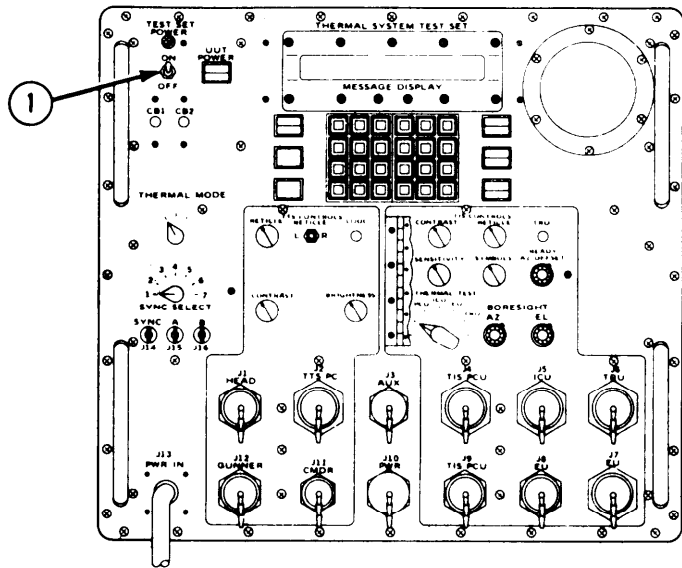
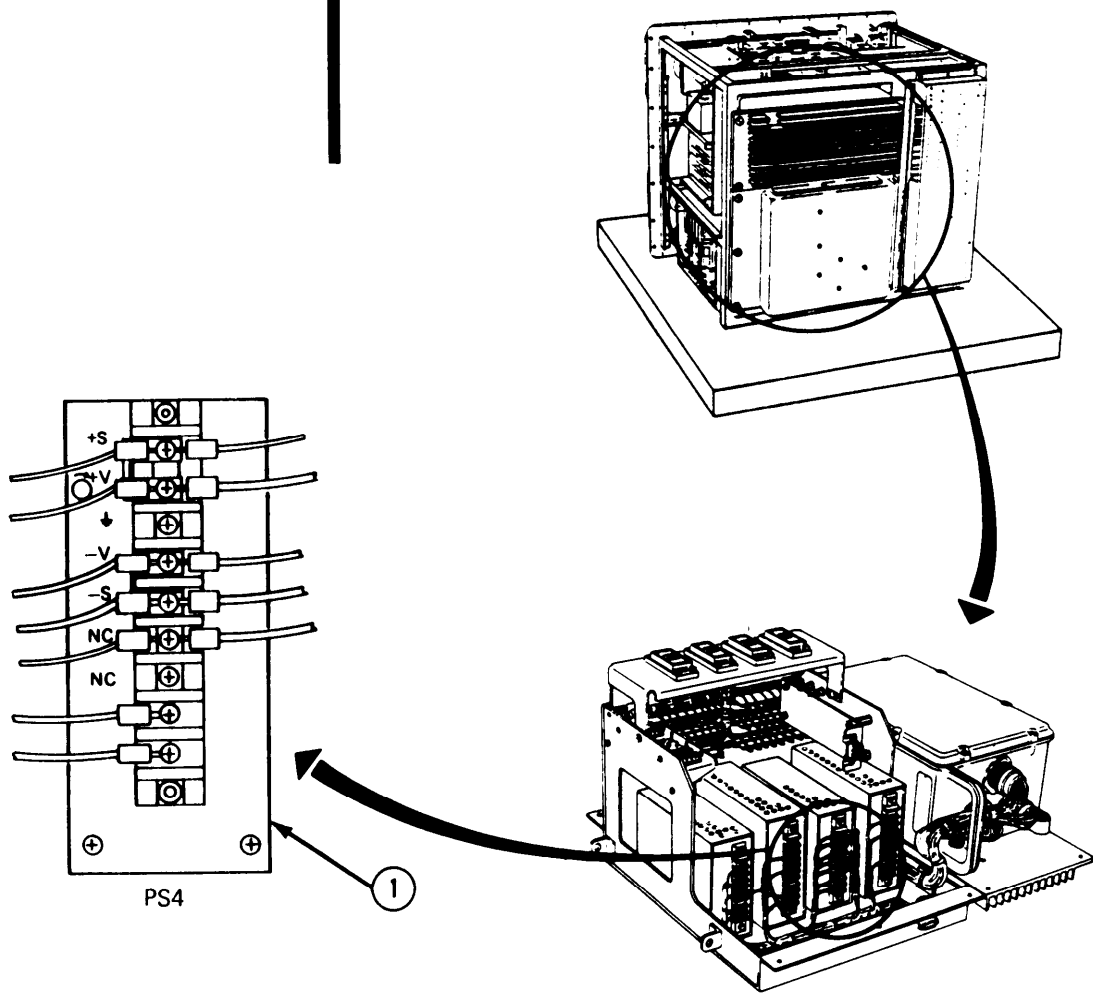


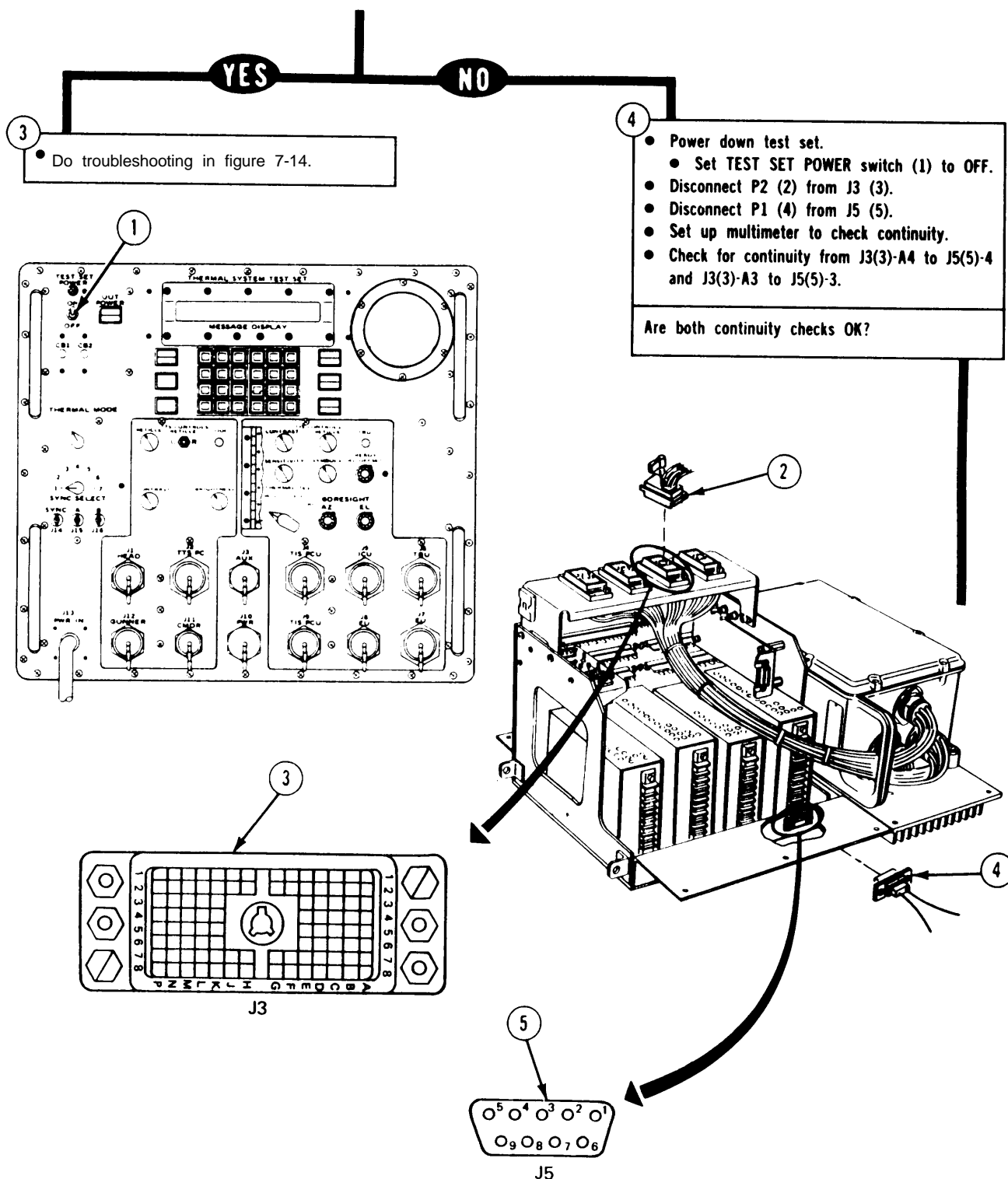
Figure 4-10. (Sheet 1 of 4)
 Volume III
 Para. 4-4

- 2
- Set up multimeter for DC voltage measurement.
 - Using multimeter, check for 5 volts between +V and -V terminals of 5 volt power supply (1).
- Is voltage OK?



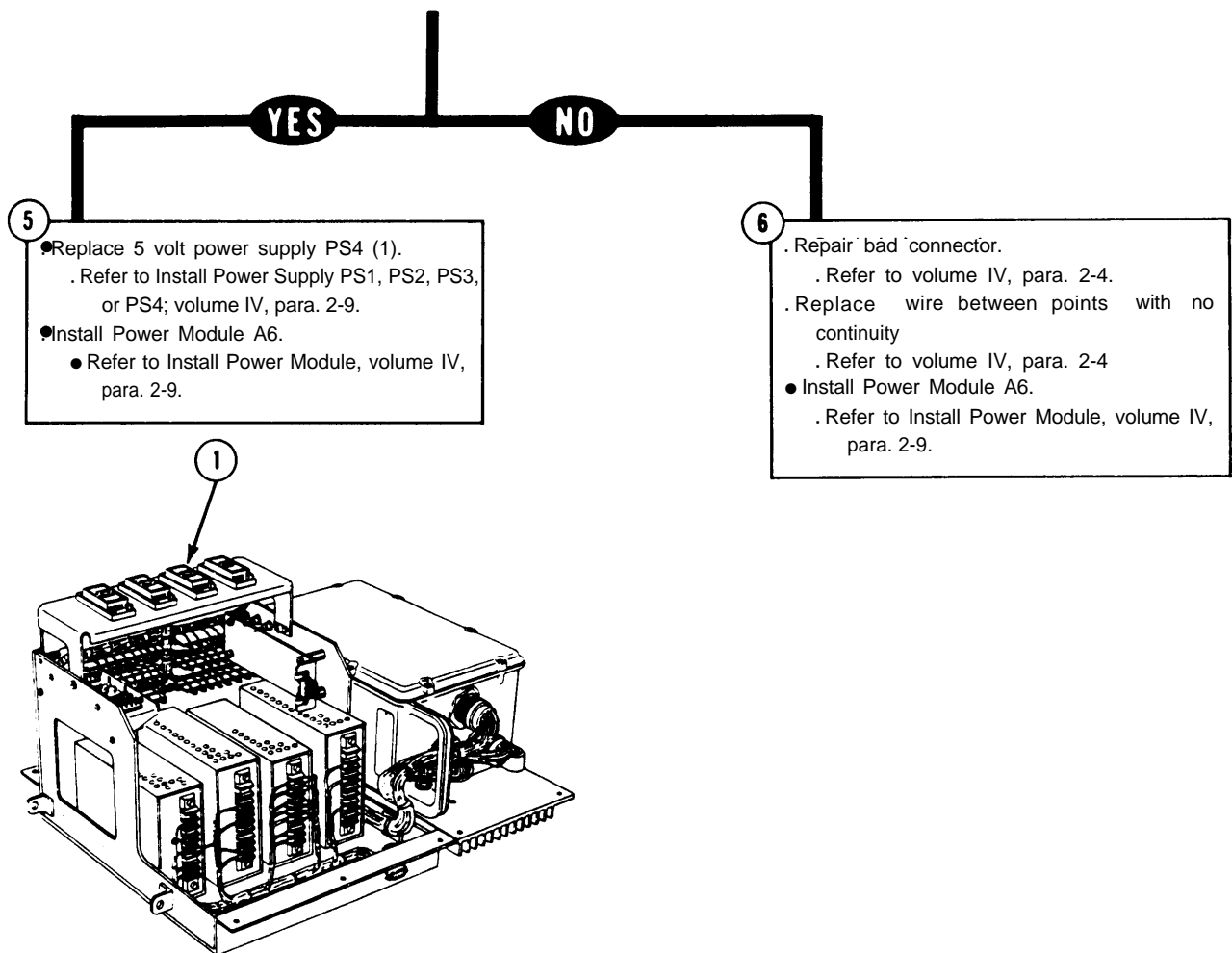
ARR82-24080

Figure 4-10. (Sheet 2 of 4)



ARR82-24081

Figure 4-10. (Sheet 3 of 4)



ARR82-24082

Figure 4-100 (Sheet 4 of 4)

SYMPTOM

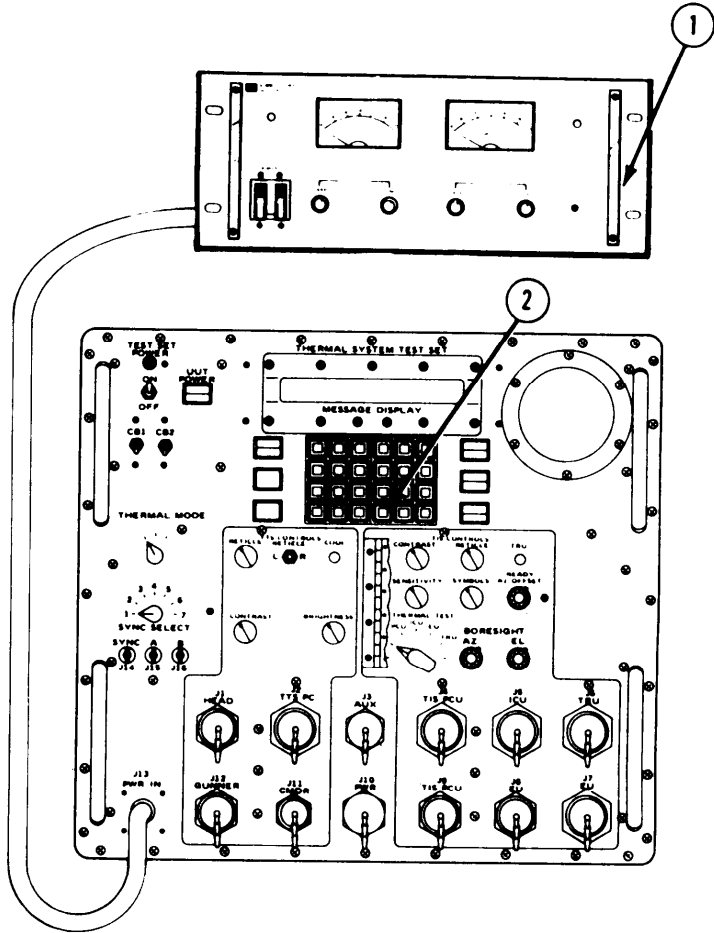
**MESSAGE DISPLAY READS —
 REFER TO PROCEDURE #0.0.0.4**
 And one of the following messages: *

***ADJUST 28 VDC PRIME POWER SUPPLY
 PRIME POWER SUPPLY OVERVOLTAGED
 PRIME POWER SUPPLY REVERSED**

1

- Check power supply (1) hookup.
 - Refer to Preparation for operation; Volume 1, para. 4-17.
 - Press CON key (2).

Does message display read —
**REFER TO PROCEDURE #0.0.0.4
 ADJUST 28 VDC PRIME POWER SUPPLY**



YES

NO

2

- Do troubleshooting in figure 4-2.

3

- Run operator assisted self-test.
 - Refer to figure 6-2.

ARR82-24083

Figure 4-11.

CHAPTER 5
SAMPLE TROUBLESHOOTING PROCEDURE

5-1. General. The sample procedure (figure 5-1) in this chapter is included to explain how to use the troubleshooting procedures (chapter 7) and the operator assisted self test (chapter 6). An actual troubleshooting procedure from chapter 7 is reproduced and the procedure is explained in detail.

5-2. Using the Procedures. The following sample should restudied carefully before attempting to perform the procedures of chapters 6 and 7. When performing the procedures, each instruction should be followed carefully.

1. **Procedure Title.** Identifies the procedure as a troubleshooting (or checkout) procedure.
2. **Fault Symptom.** Describes the fault symptom for which the procedure is used. In the checkout procedure, this block describes the test being performed. The number of the fail code is exactly the same as given in the Fail Code Index.
3. **Flow Line.** Follow this line while performing the procedure. When the line is on the left side of the page, it indicates that tests are being made. When on the right, it indicates corrective action. If the line is in the center, it leads to either a YES or NO branch in the procedure.
4. **Test Equipment/Special Tools.** Identifies any special tools or test equipment you must use to perform the procedure.
5. **Test Block.** The test blocks are arranged on the left side of the page and are connected to the test flow line. The upper part of the block tells you what to do and, if necessary, how to do it. The lower part of the block asks a question. You must answer the question with a YES or NO based on the outcome of the test.

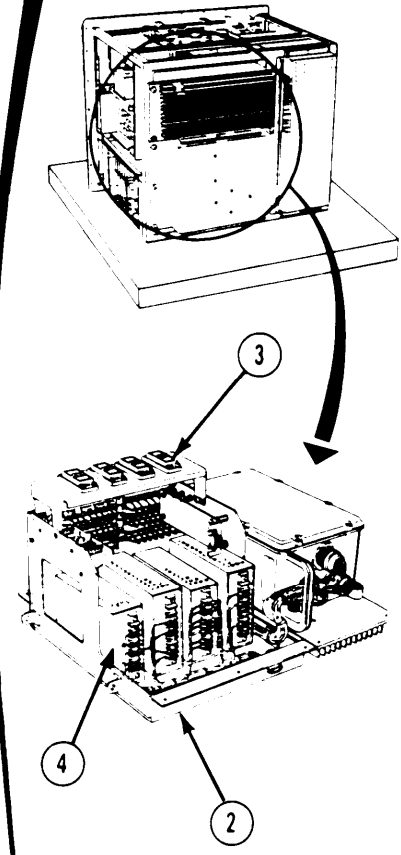
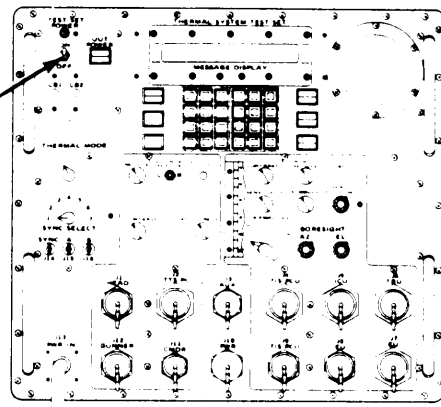
SYMPTOM

MESSAGE DISPLAY READS - REFER TO PROCEDURE #0.0.0.3 CONTINUITY FAULT

Test Equipment Special Tools:
 • Multimeter

1
 • Power down test set
 • Set TEST SET POWER switch (1) TO OFF
 • Remove power module (2) but do not remove power module connector (3)
 • Refer to Remove Power Module A6, volume IV, para 2-9.
 • Power up test set
 • Set TEST SET POWER switch (1) to ON

2
 • Set up multimeter for dc voltage measurement
 • Using multimeter, check for 24 V between - V and V terminals of 24 V power supply (4)
 Is voltage OK?



6. **Procedure Reference Illustration.** This illustration identifies the test set controls, indicators, and power connector. It also identifies the test set power source. Circled numbers help to identify controls, indicators, and connectors that are in the procedure.

ARR82-24084

Figure 5-1. Sample Troubleshooting Procedure (Sheet 1 of 2)
 Volume III
 Para. 5-2

Decision Flow Line. This line is always in the center portion of the flow chart. It comes from a block which asks a question and indicates that you must make a YES or NO decision.

NO Decision. The NO decision usually leads to a corrective action block on the right side of the flow chart, indicating that the trouble has been found. However, sometimes, additional testing may be required before the trouble can be located. In this case, the NO decision would lead to another test block.

YES Decision.

- a. If the YES decision leads to the left, the trouble has not yet been found and more tests must be made.
- b. If the YES decision leads to the right, the trouble has been found and you will be instructed to take some corrective action.

Detailed Supporting Illustrations. These illustrations are located next to the procedure block. They show a special item or action relating to that block. Circled numbers point out items referred to in the block.

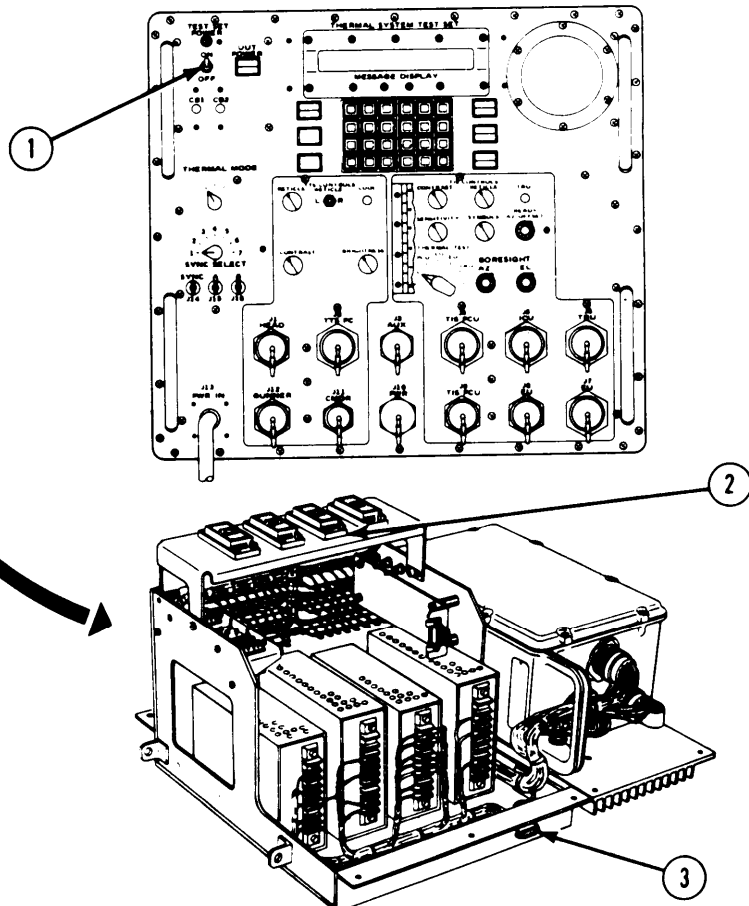
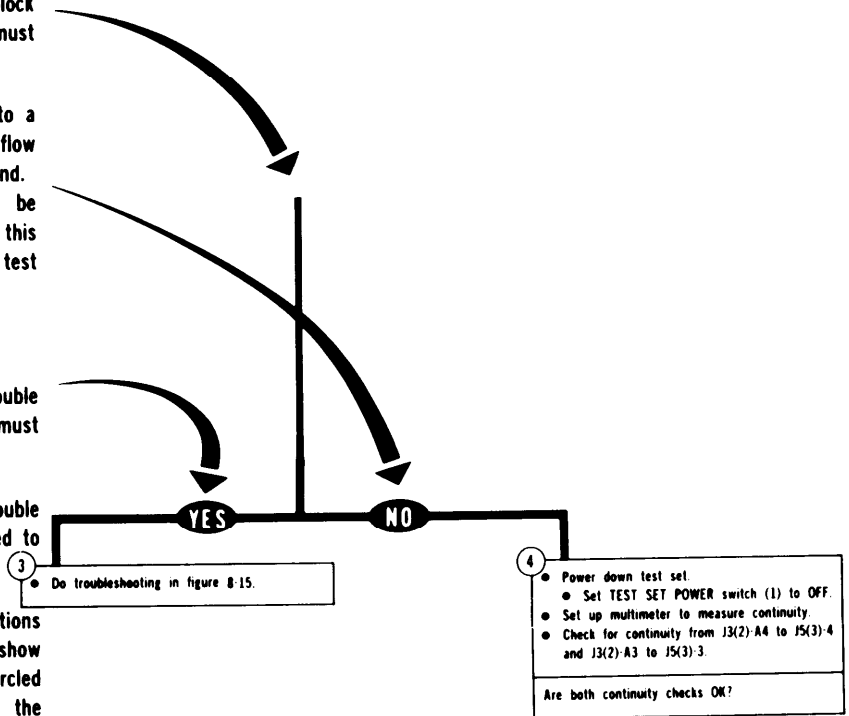


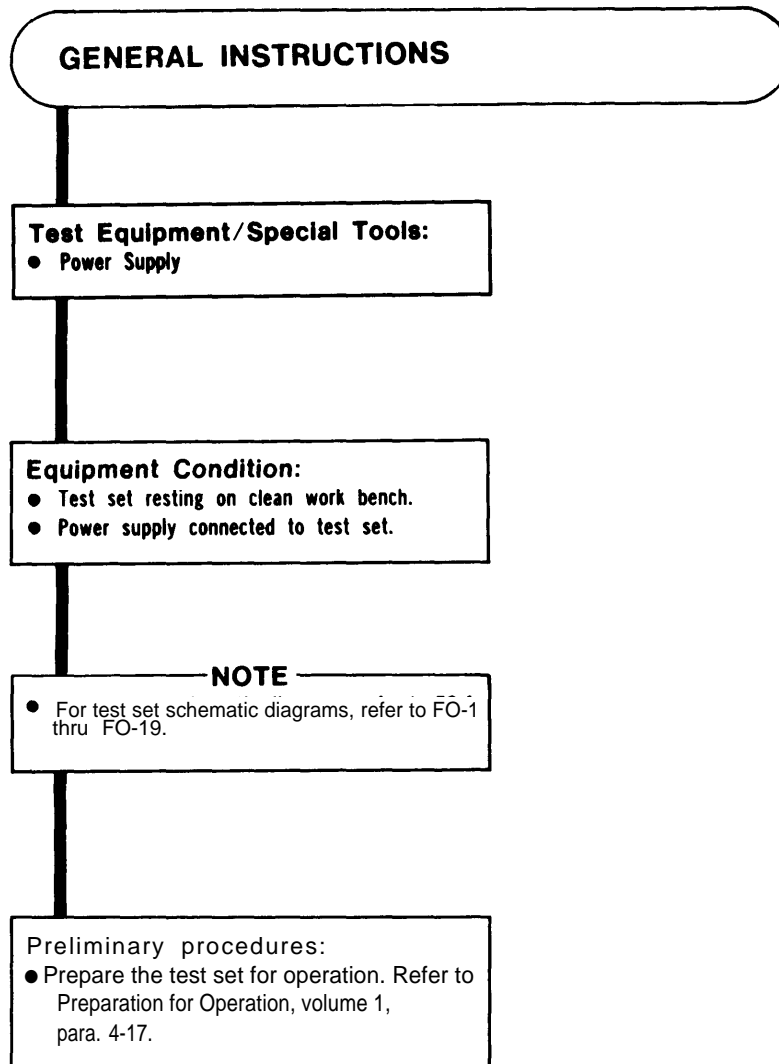
Figure 5-1. Sample Troubleshooting Procedure (Sheet 2 of 2)
 Volume III
 Para. 5-1

ARR82-24085

5-3/(5-4 blank)

CHAPTER 6
OPERATOR ASSISTED SELF TEST PROCEDURE

The operator assisted self test procedure (figures 6-1 and 6-2) is used to locate and identify fault symptoms. It is also used to verify a fault symptom. If the test set continues to show the same fault symptom after corrective maintenance has been performed, turn in the test set. The fail codes referred to in the procedure are listed in the fail code index (figure 6-2, table 6-3 and table 6-4).



ARR82-24086

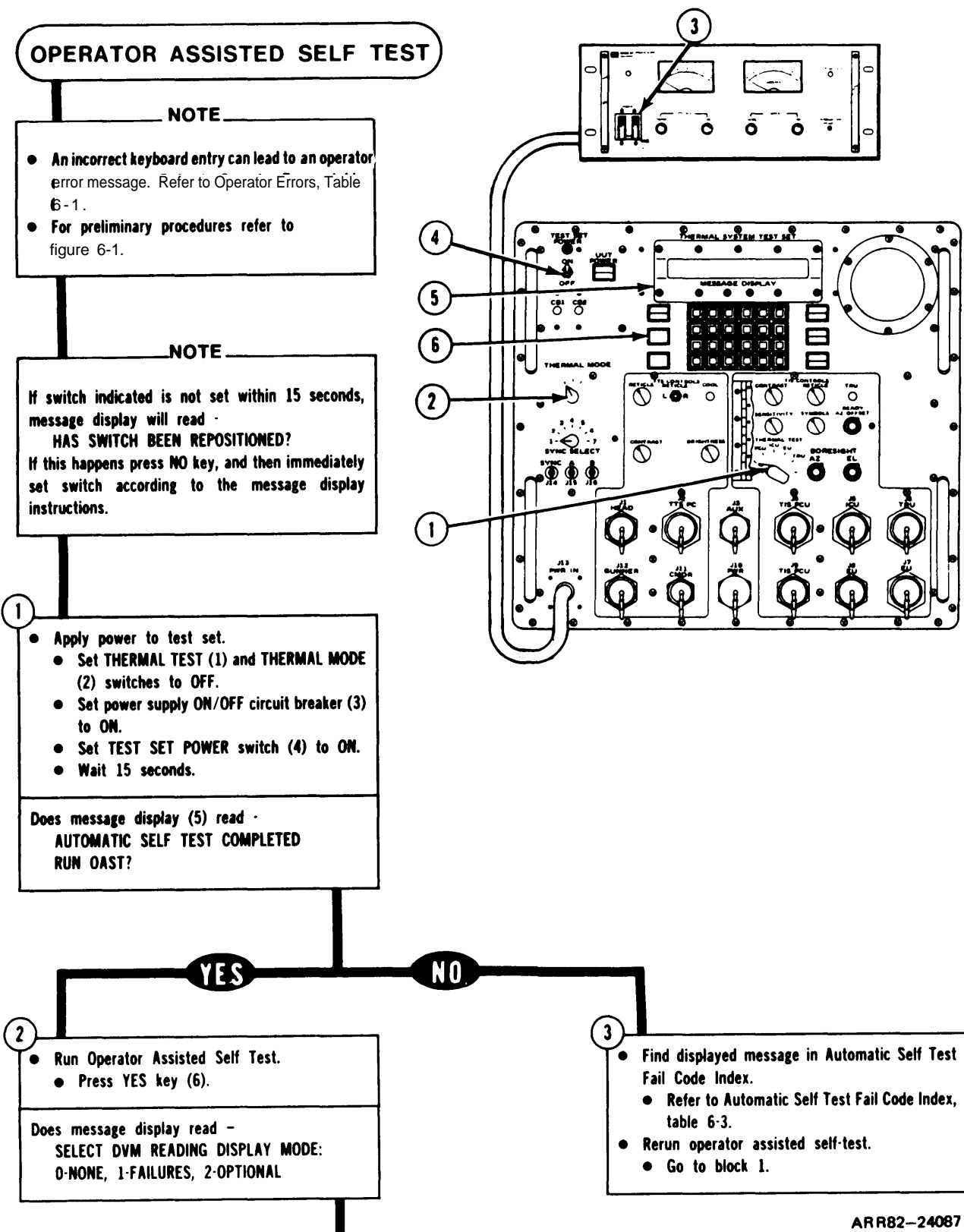
Figure 6-1. Preparation for Operator Assisted Self-Test (Sheet 1 of 2)

**TM 9-4931-381-14&P-1
OPERATOR ASSISTED SELF TEST PROCEDURE**

Table 6-1. OPERATOR ERRORS

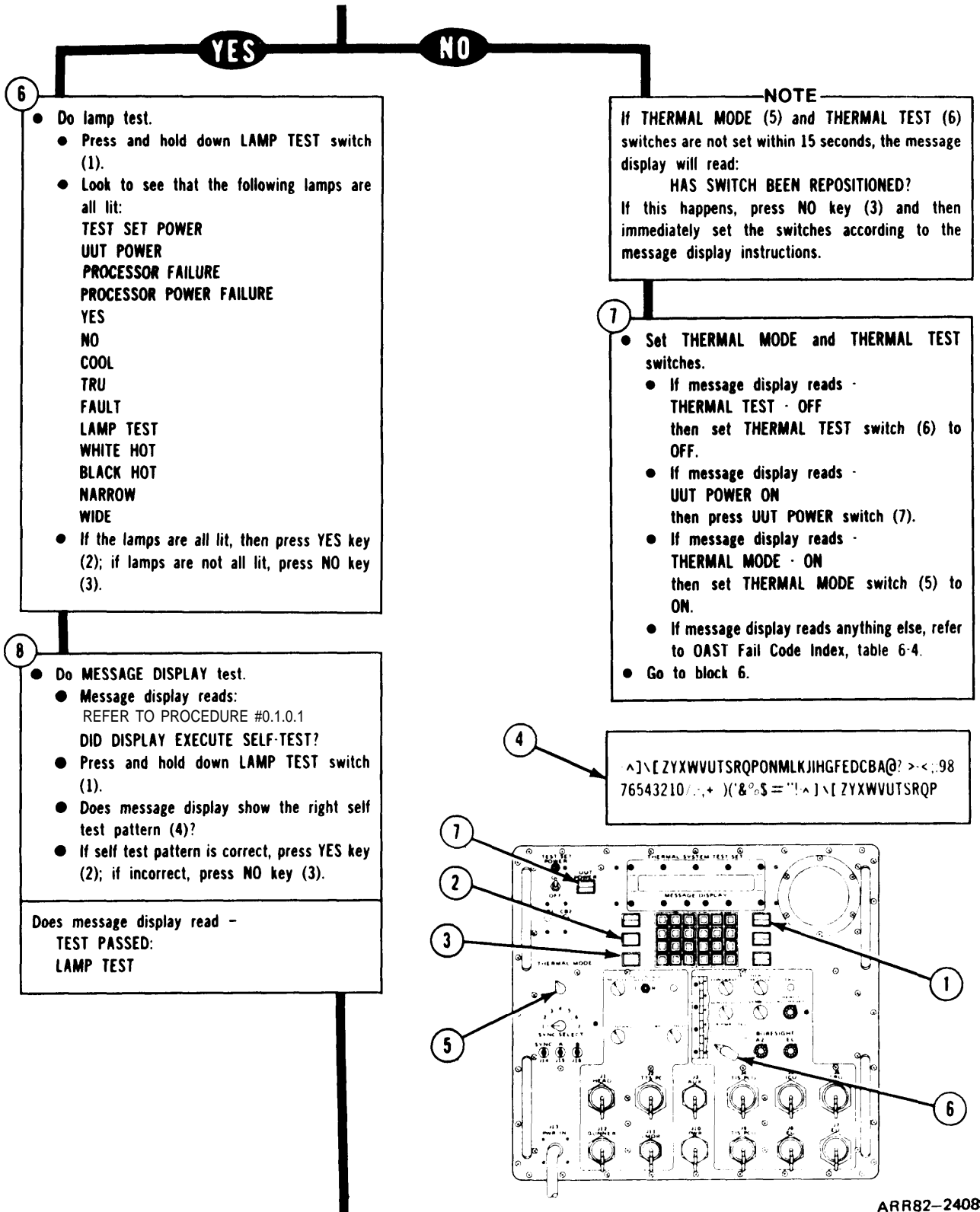
Displayed Message	Corrective Action
UUT# OUT OF RANGE ENTER UUT #	You have entered a UUT number that isn't between 1 and 8. Enter UUT# again.
TB# OUT OF RANGE KEY TST# COMMAND	You have entered a TB number that is not in the range of TB's for that UUT. Press the TST# key and reenter the TB number or range.
FIP# OUT OF RANGE KEY TST# COMMAND	You have entered a FIP number that doesn't exist in the TB. Press the TST# key, then the . key, then the correct FIP number.
ILLEGAL TB EXECUTION ATTEMPT KEY TST# COMMAND	You have entered an illegal TB or series of TB's. Press TST# key and reenter TB number/numbers.
ILLEGAL FIP EXECUTION ATTEMPT KEY TST# COMMAND	You have entered an illegal FIP number. Press TST# key and reenter FIP.
REFER TO PROCEDURE # 0.0.0.1	TSTS does not sense a correct UUT cable setup. Make sure all UUT cables are connected tightly.
REFER TO PROCEDURE # 0.0.0.2 PLUG/CABLE CONNECT ERROR	TSTS does not sense a correct dummy connector plug configuration. Make sure all dummy connector plugs are on tightly.
REFER TO PROCEDURE # 0.0.0.3 CONTINUITY FAULT	First, make sure that power supply is ON and properly connected. Then, check to make sure PCU, IDU, EU or TRU cables are connected properly.
TEST CONTROL FAULT	Press RSET and run test again.
ILLEGAL CODE	You have entered an illegal or incorrect number code. Reenter the code.
INCORRECT OP CODE READ	Reset the test set and rerun the test. Be careful not to press the buttons too quickly.

Figure 6-1. Preparation for Operator Assisted Self-Test (Sheet 2 of 2)



ARR82-24087

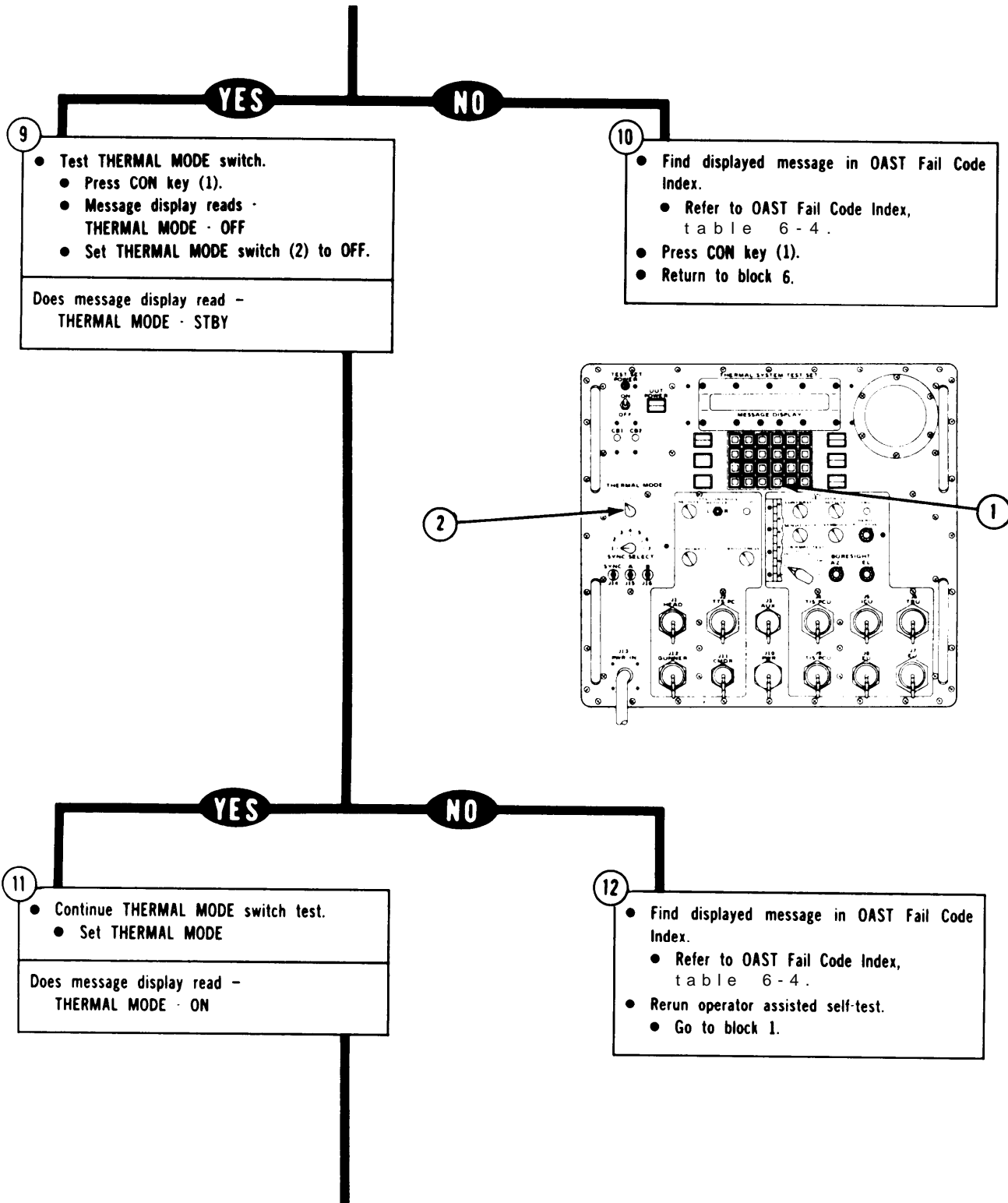
Figure 6-2. Operator Assisted Self-Test (Sheet 1 of 29)



ARR82-24089

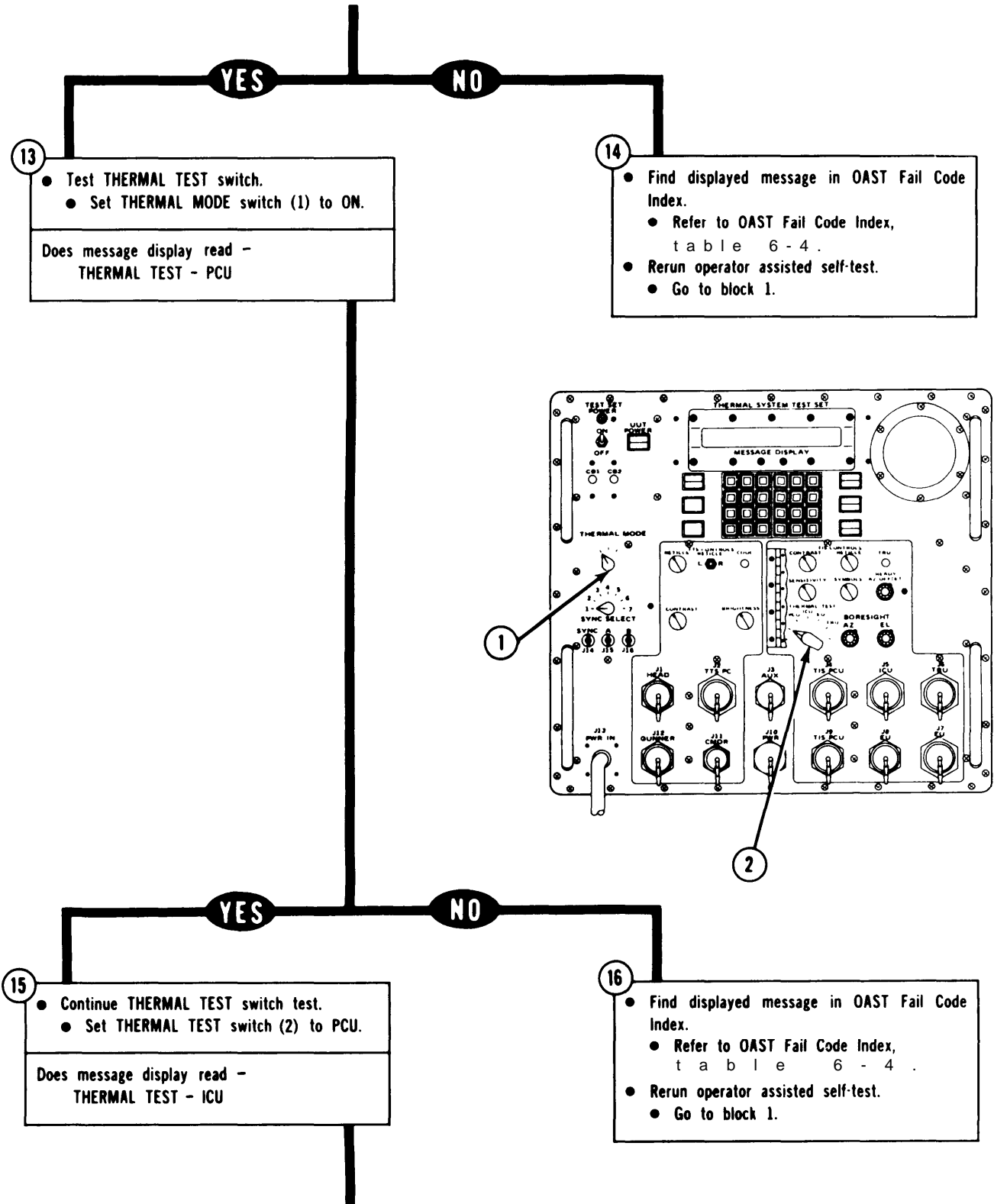
Figure 6-2. Operator Assisted Self-Test (Sheet 3 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



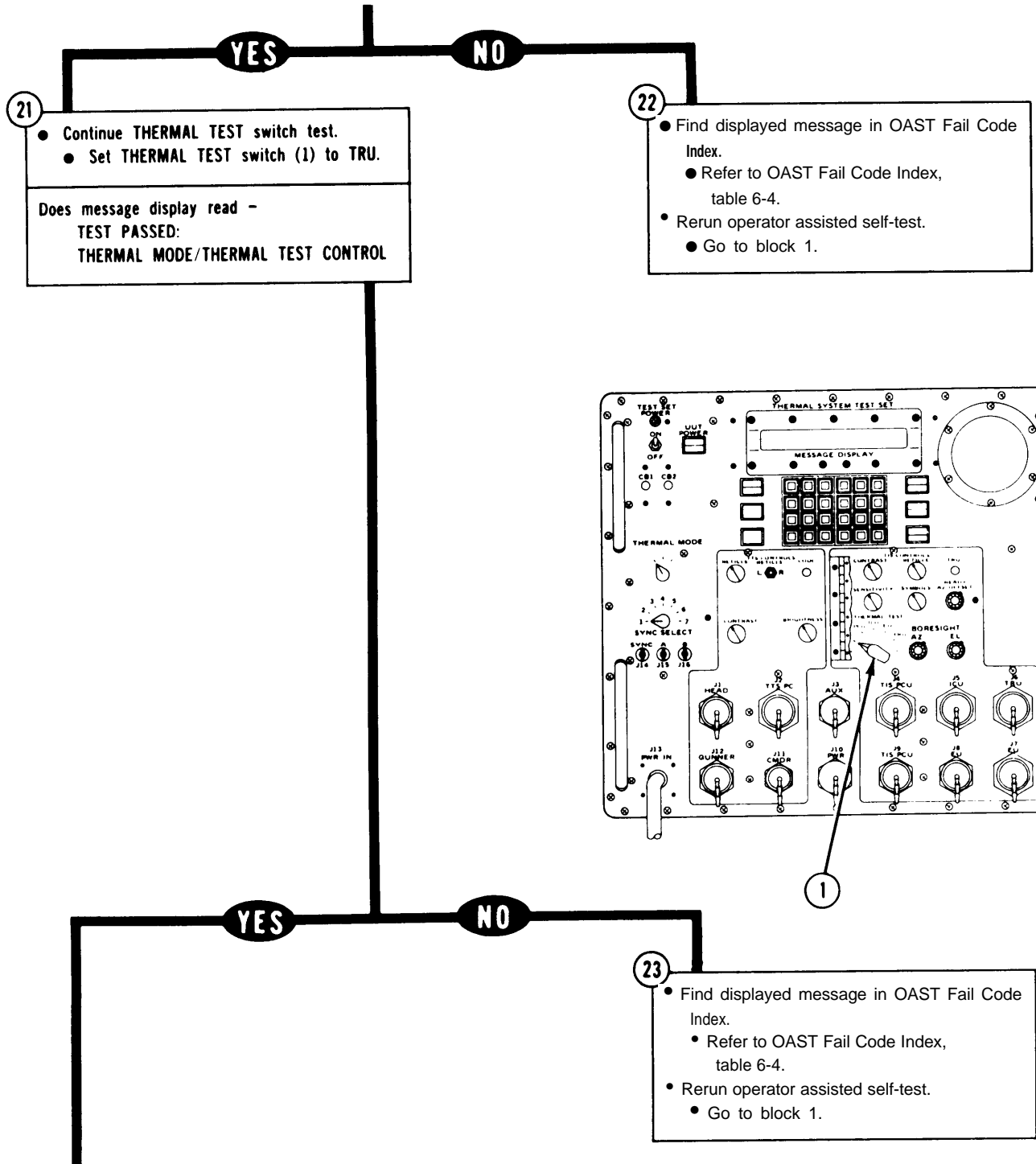
ARR82-24090

Figure 6-2. Operator Assisted Self-Test (Sheet 4 of 29)



ARR82-24091

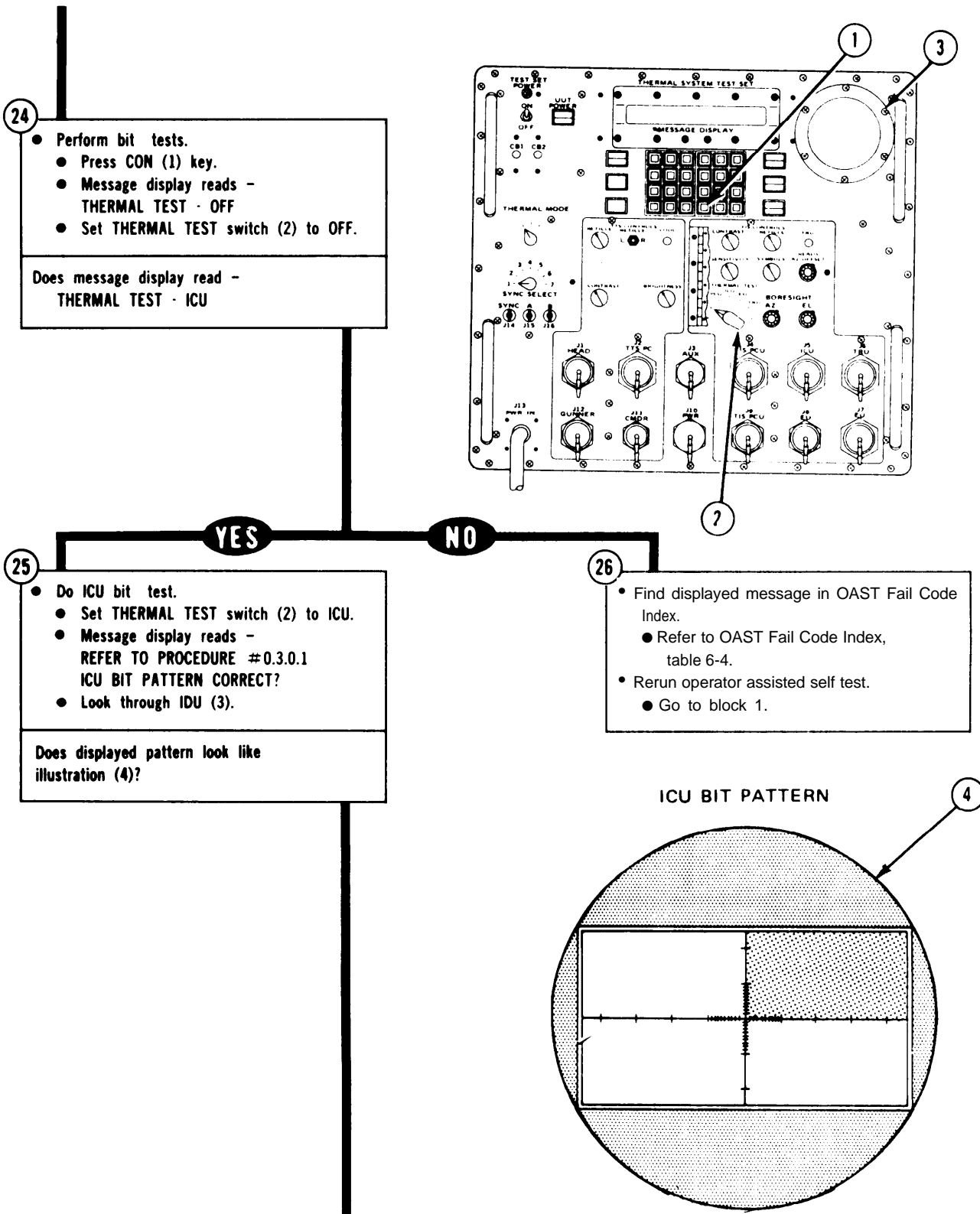
Figure 6-2. Operator Assisted Self-Test (Sheet 5 of 29)



ARR82-24093

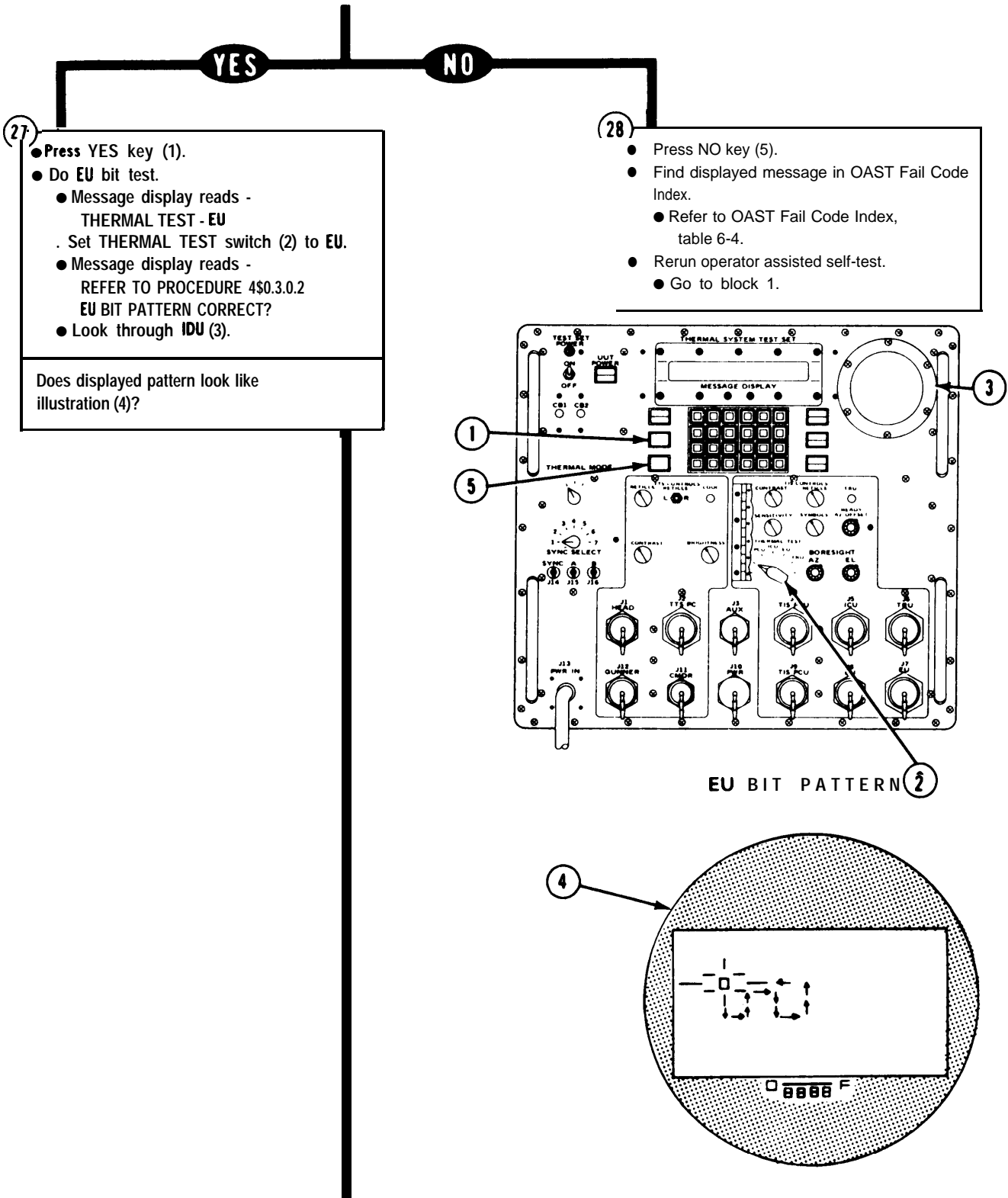
Figure 6-2. Operator Assisted Self-Test (Sheet 7 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



ARR82-24094

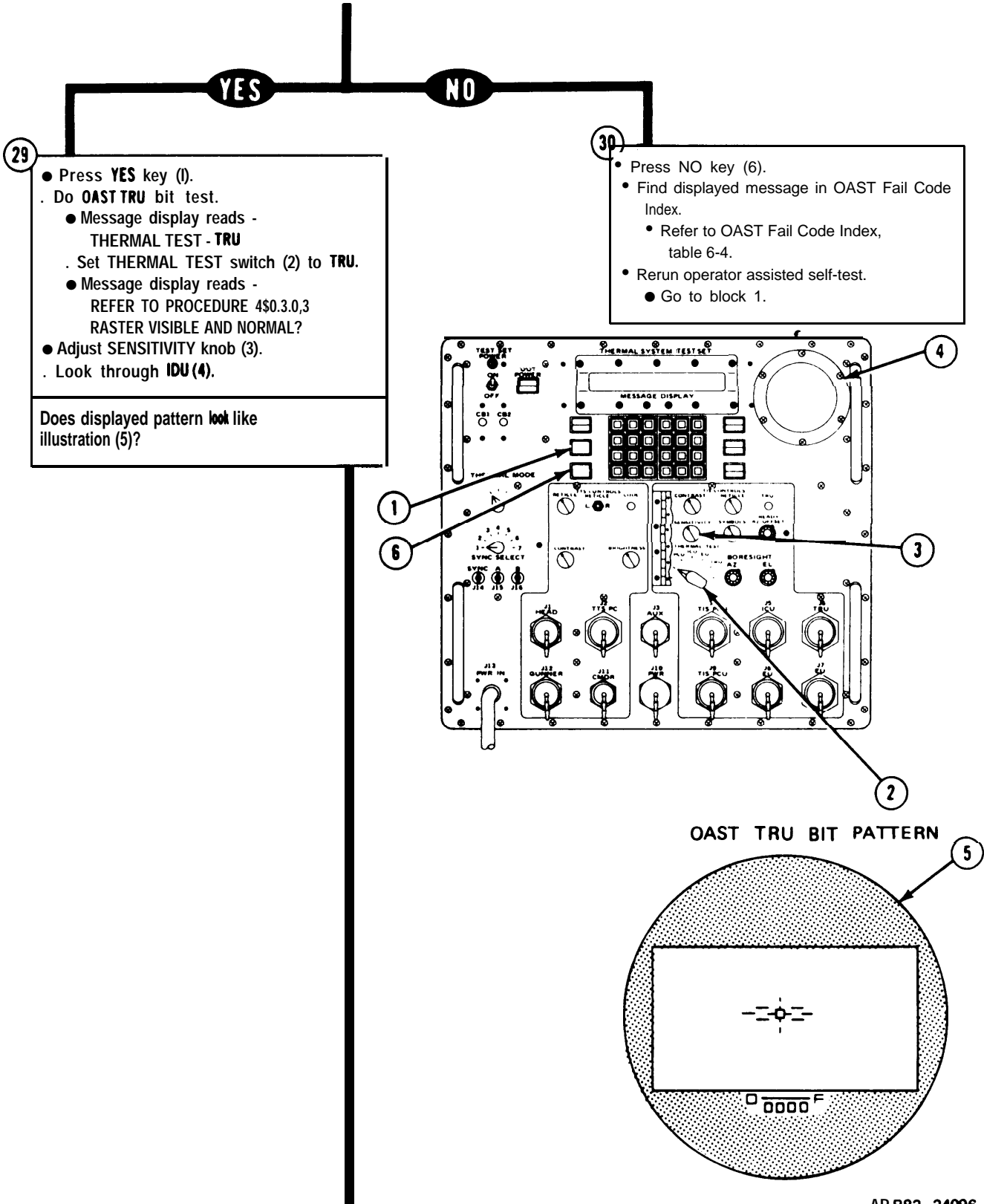
Figure 6-2. Operator Assisted Self-Test (Sheet 8 of 29)



ARR82-24095

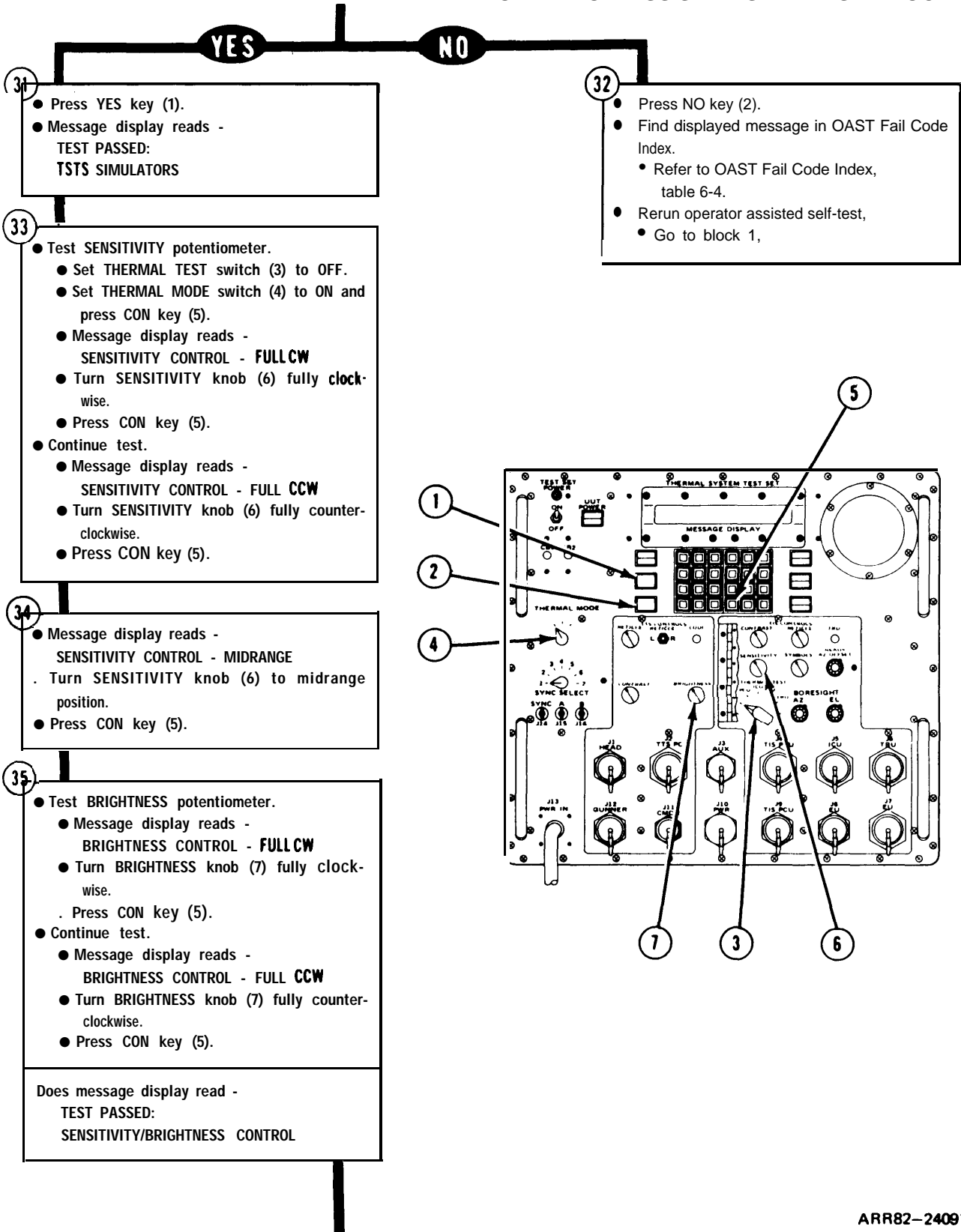
Figure 6-2. Operator Assisted Self-Test (Sheet 9 of 29)

TM 9-4931 -381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



AR R82-24096

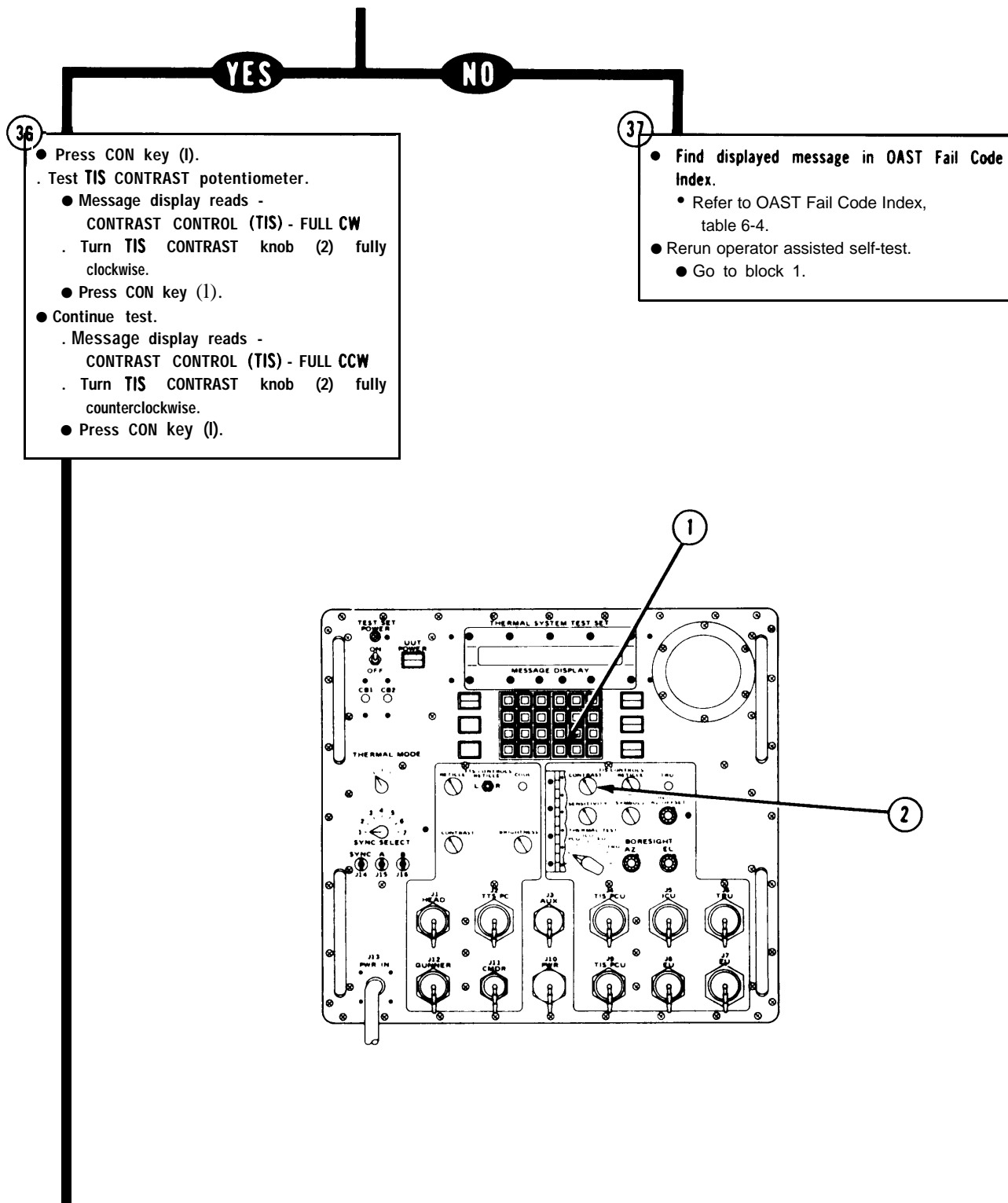
Figure 6-2. Operator Assisted Self-Test (Sheet 10 of 29)



ARR82-24097

Figure 6-2. Operator Assisted Self-Test (Sheet 11 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



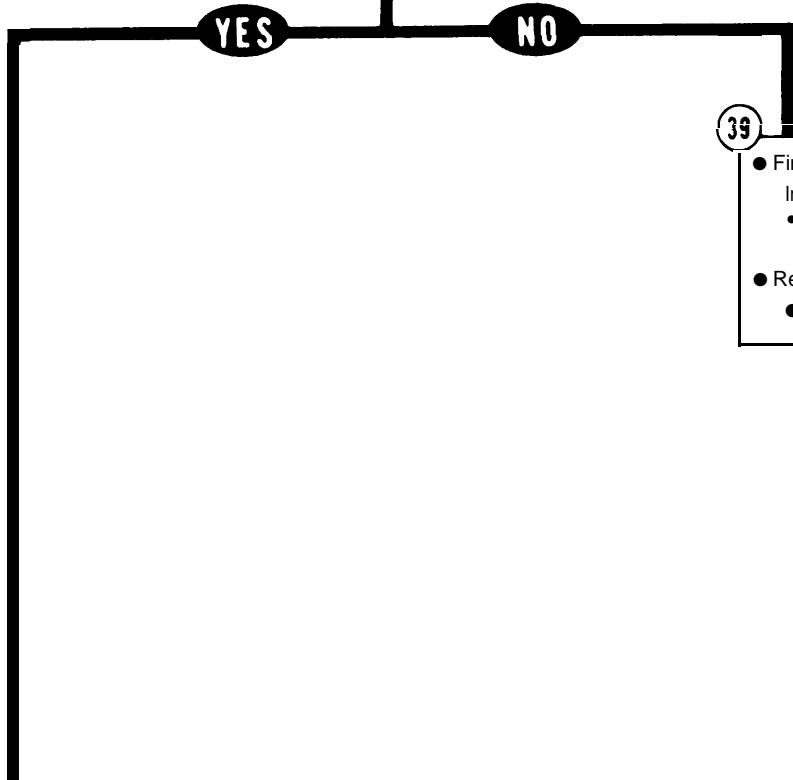
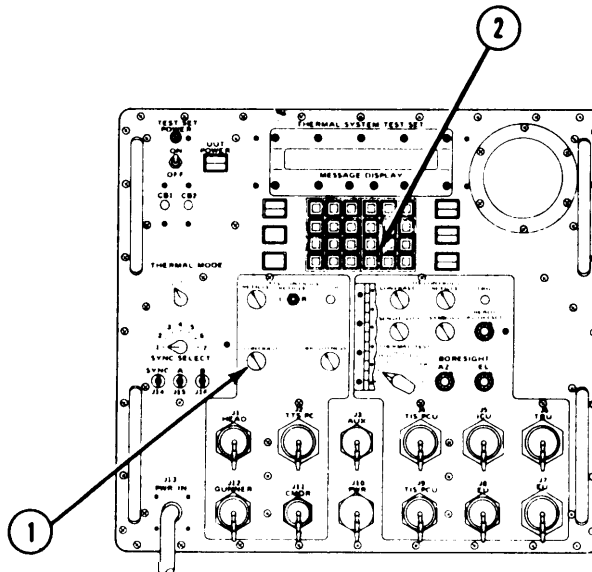
ARR82-24098

Figure 6-2. Operator Assisted Self-Test (Sheet 12 of 29)

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- Test TTS CONTRAST potentiometer.
 - Message display reads -
 CONTRAST CONTROL (TTS) - FULL CW
 - Turn TTS CONTRAST knob (1) fully clockwise.
 - Press CON key (2).
- Continue test.
 - Message display reads -
 CONTRAST CONTROL (TTS) - FULL CCW
 - Turn TTS CONTRAST knob (1) fully counterclockwise.
 - Press CON key (2).

Does message display read -
 TEST PASSED:
 CONTRAST CONTROL

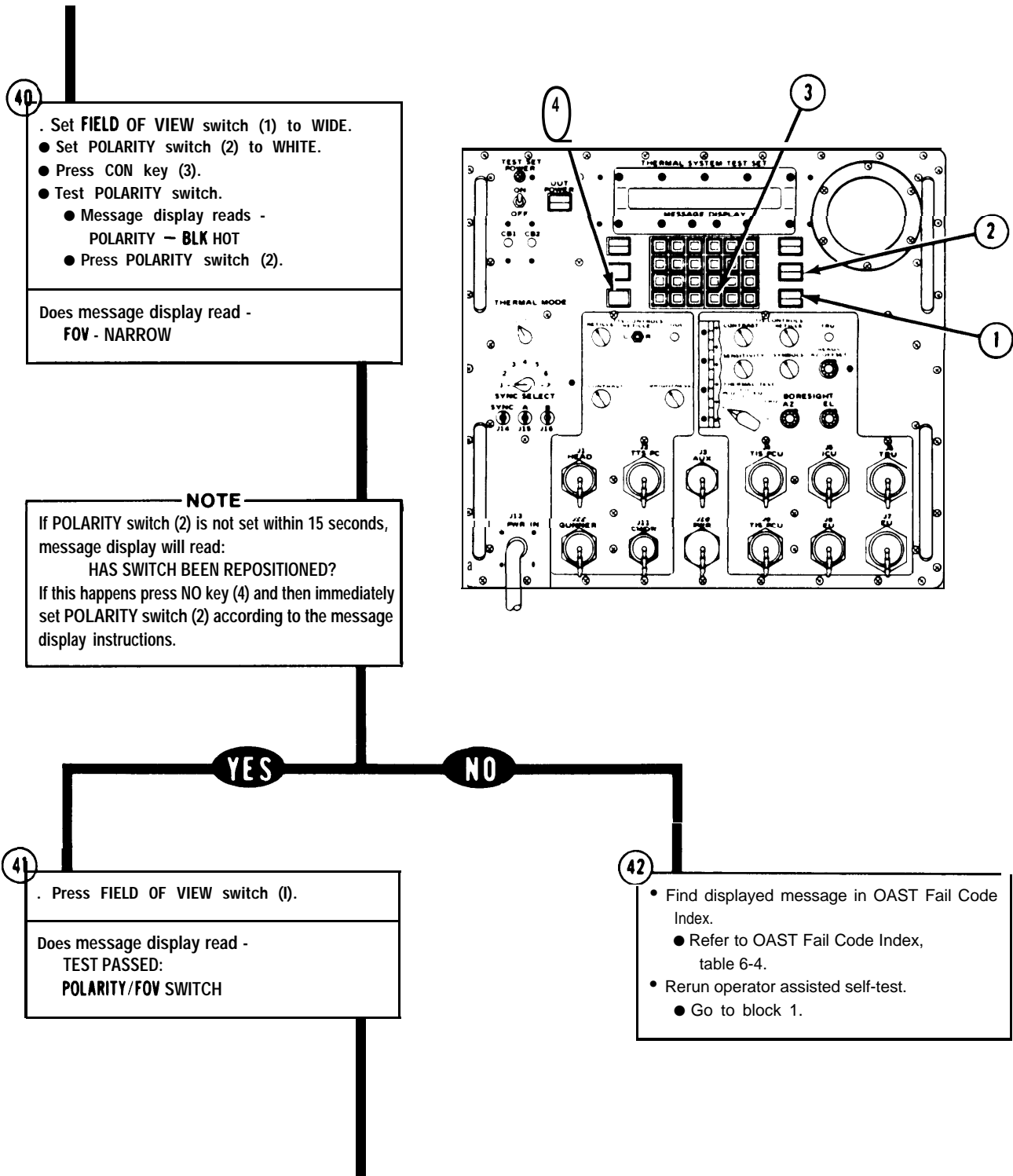


39

- Find displayed message in OAST Fail Code Index.
 - Refer to OAST Fail Code Index, table 6-4.
- Rerun operator assisted self-test.
 - Go to block 1.

Figure 6-2. Operator Assisted Self-Test (Sheet 13 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



AR R82-24100

Figure 6-2. Operator Assisted Self-Test (Sheet 14 of 29)

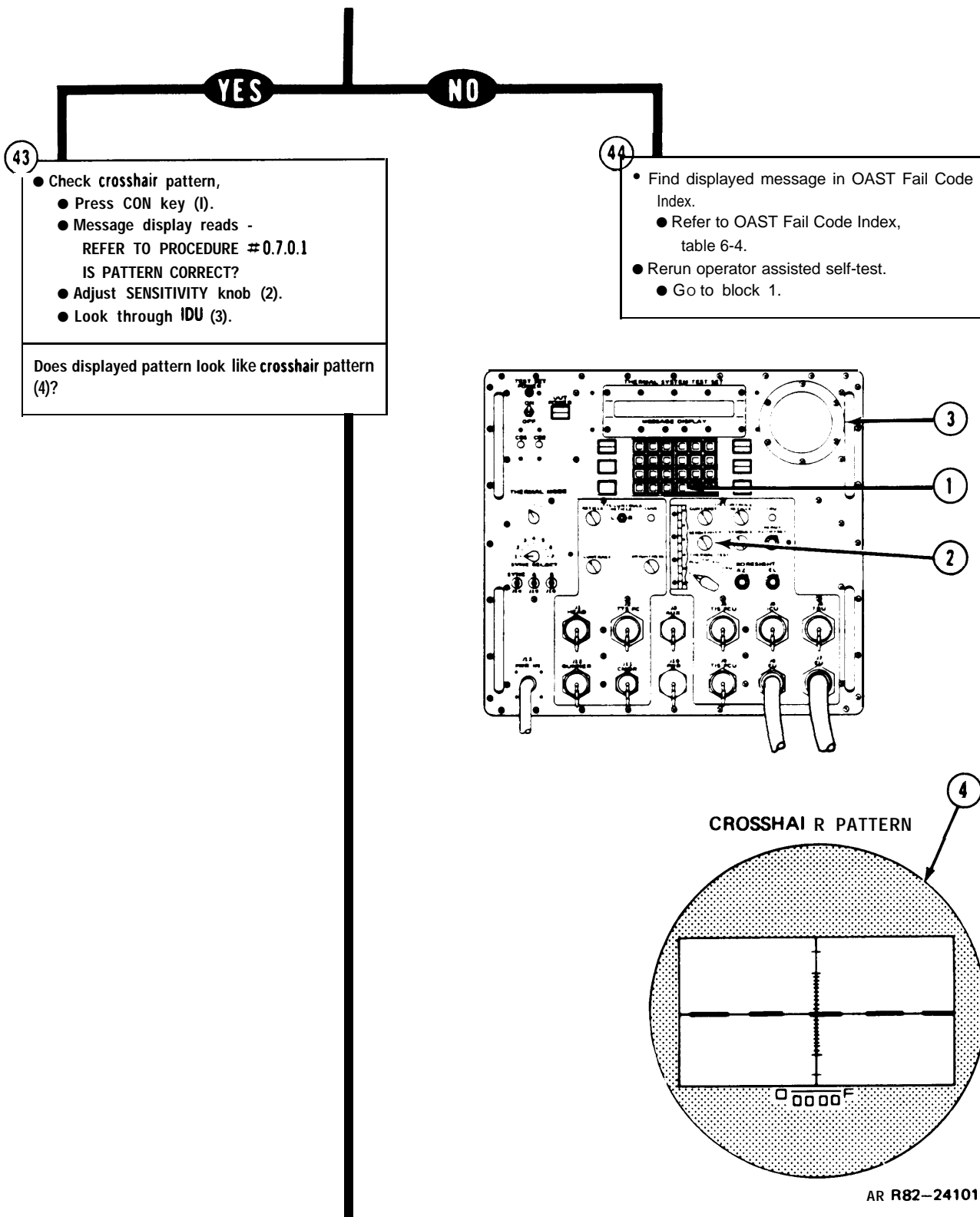


Figure 6-2. Operator Assisted Self-Test (Sheet 15 Of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE

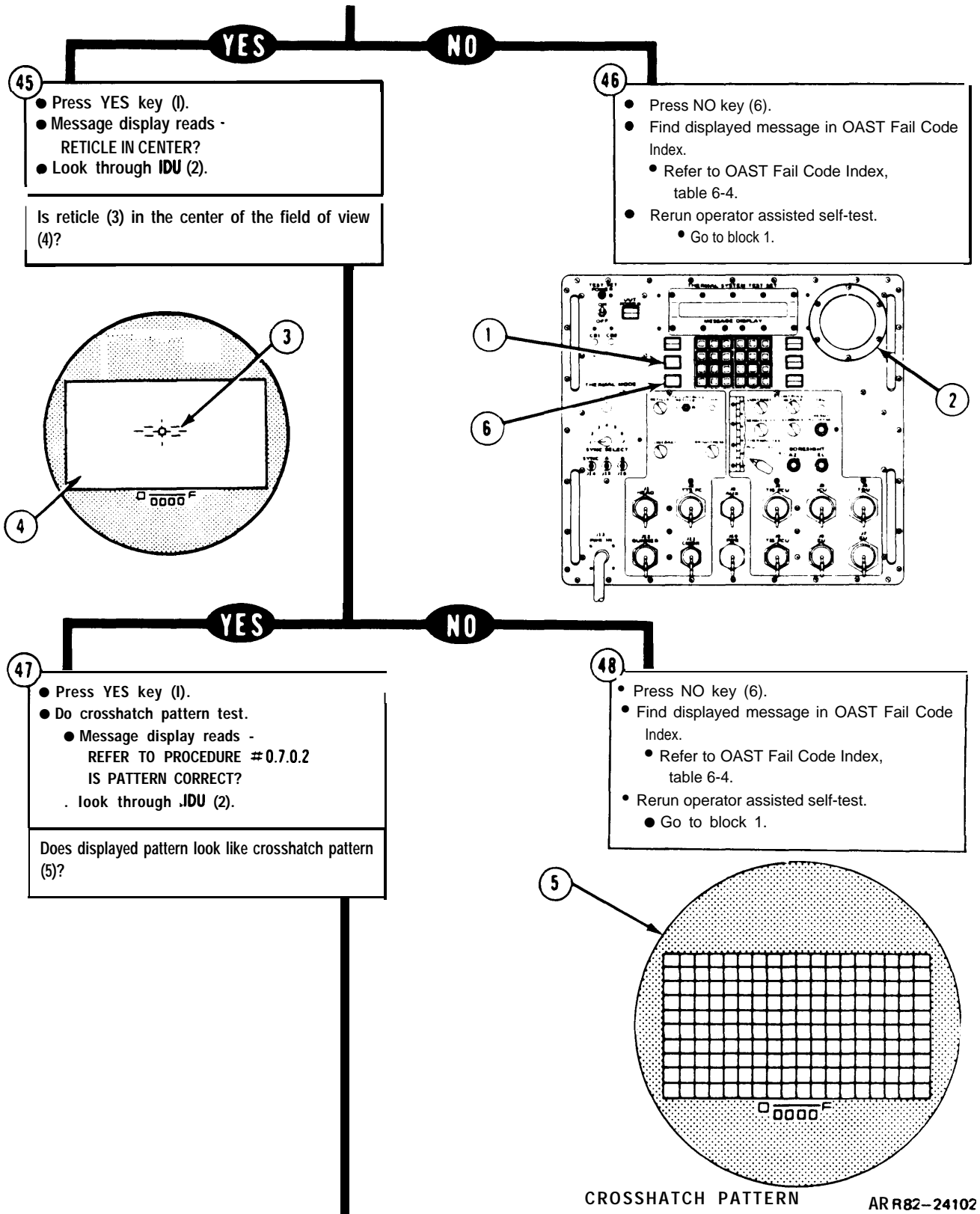
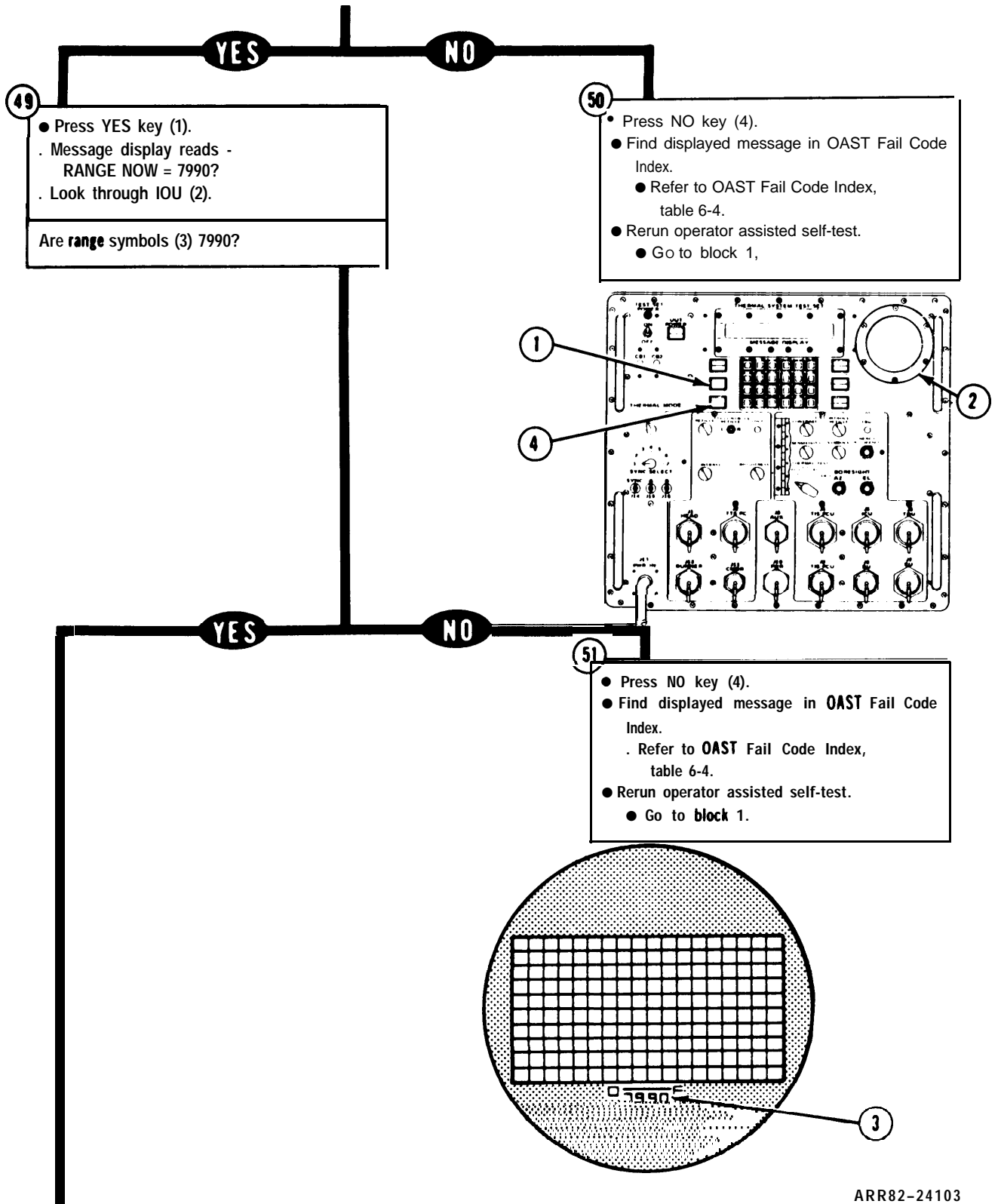


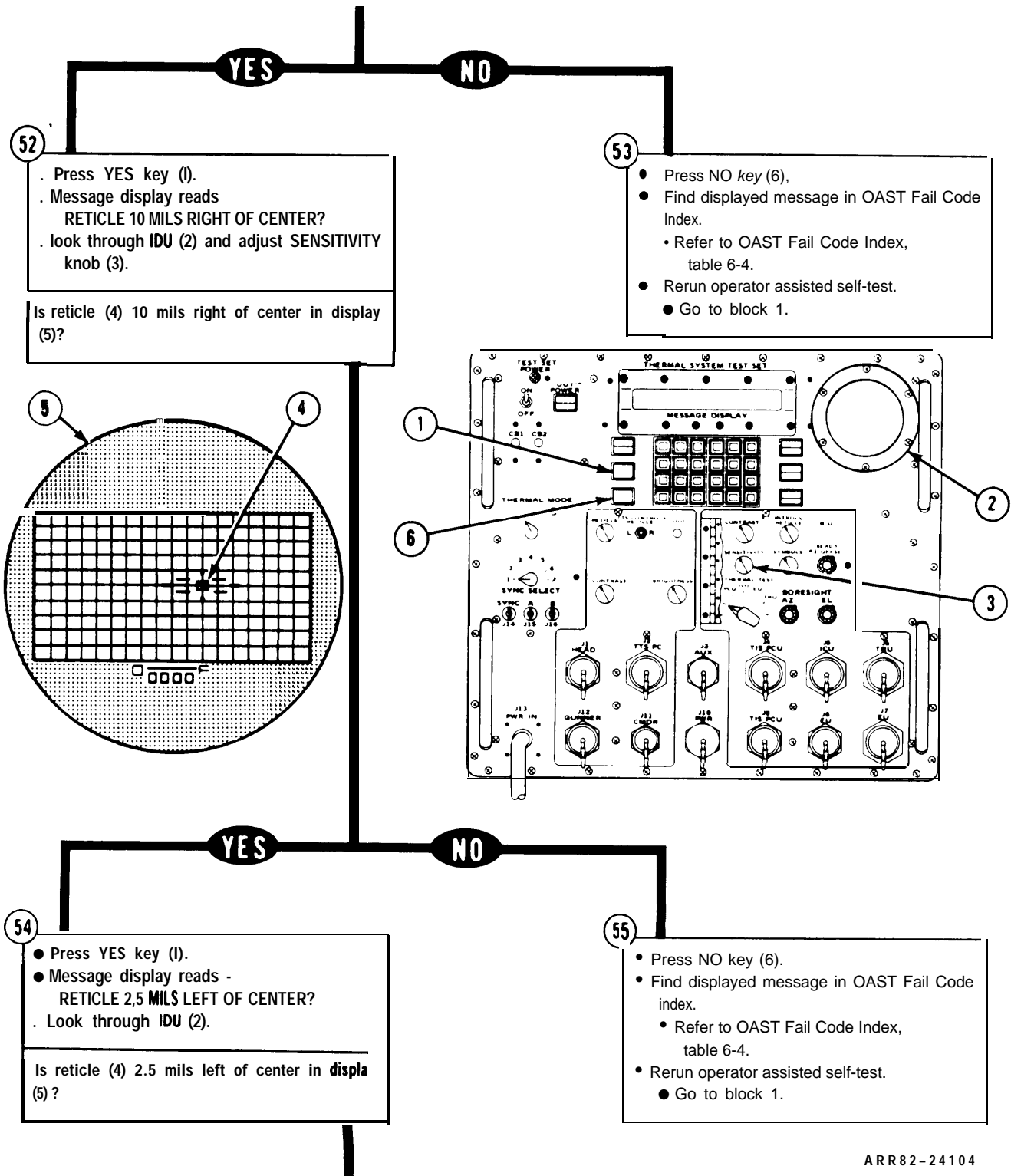
Figure 6-2. Operator Assisted Self-Test (Sheet 16 of 29)



ARR82-24103

Figure 6-2. Operator Assisted Self-Test (Sheet 17 of 29)

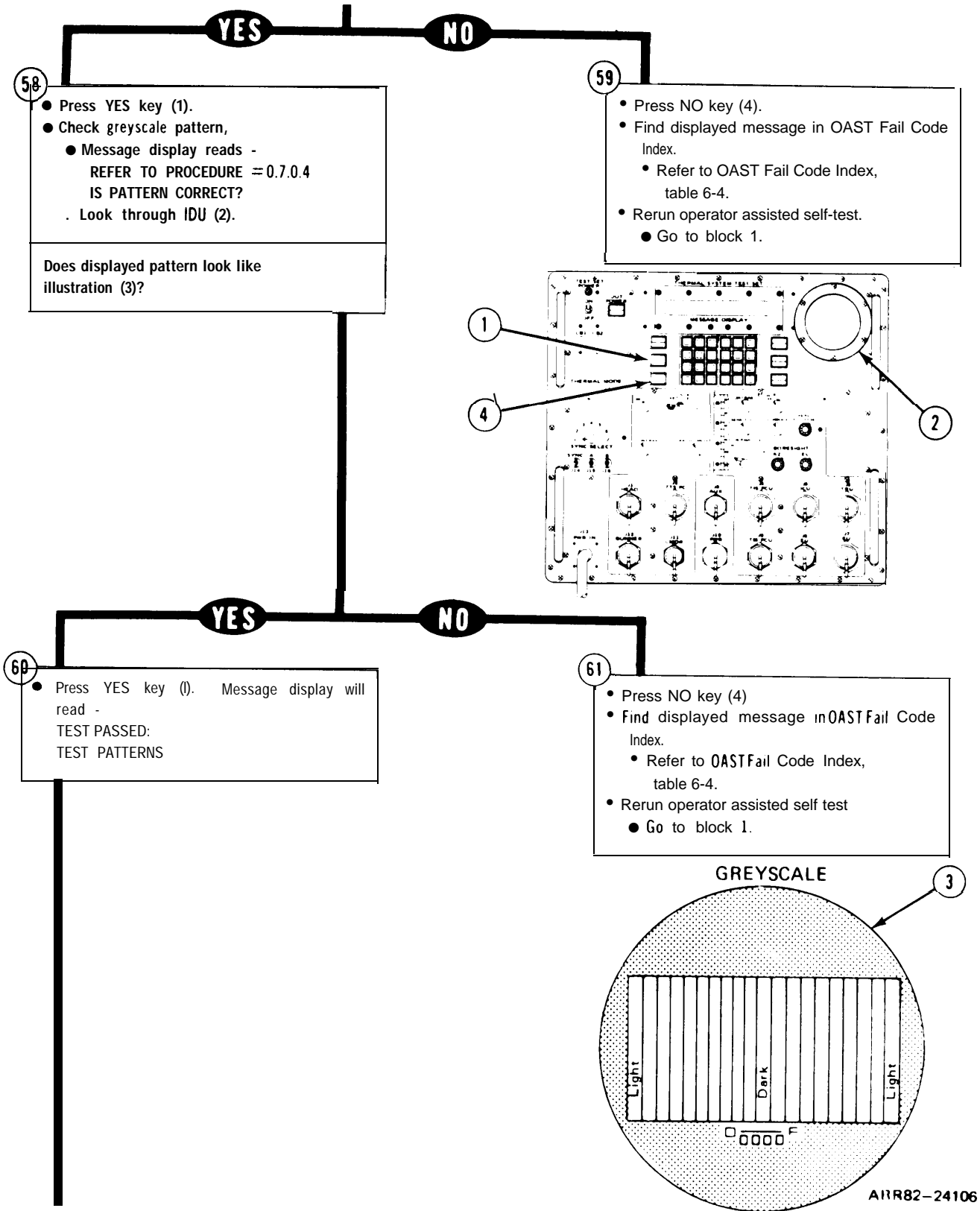
TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



ARR82-24104

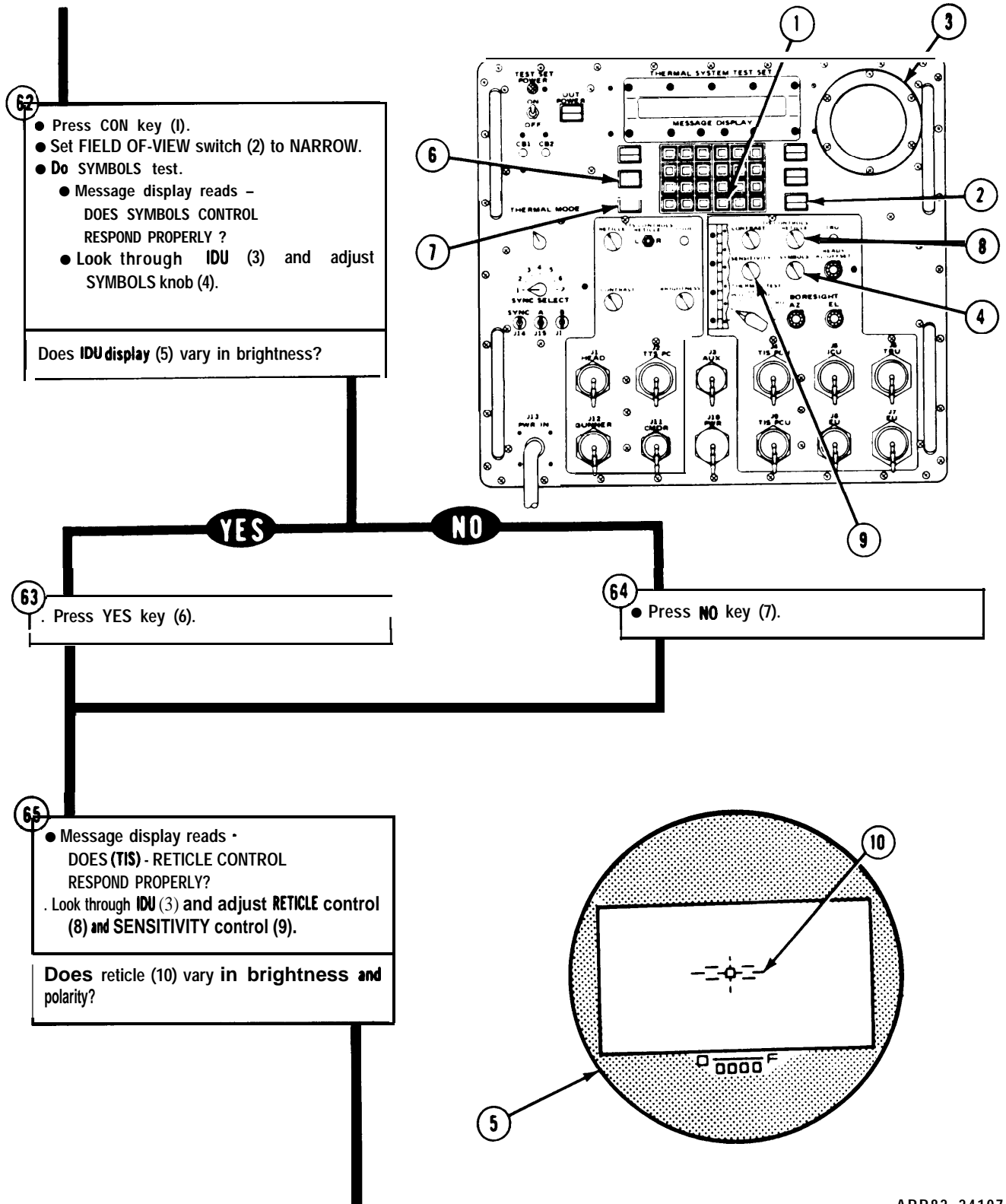
Figure 6-2. Operator Assisted Self-Test (Sheet 18 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



A11R82-24106

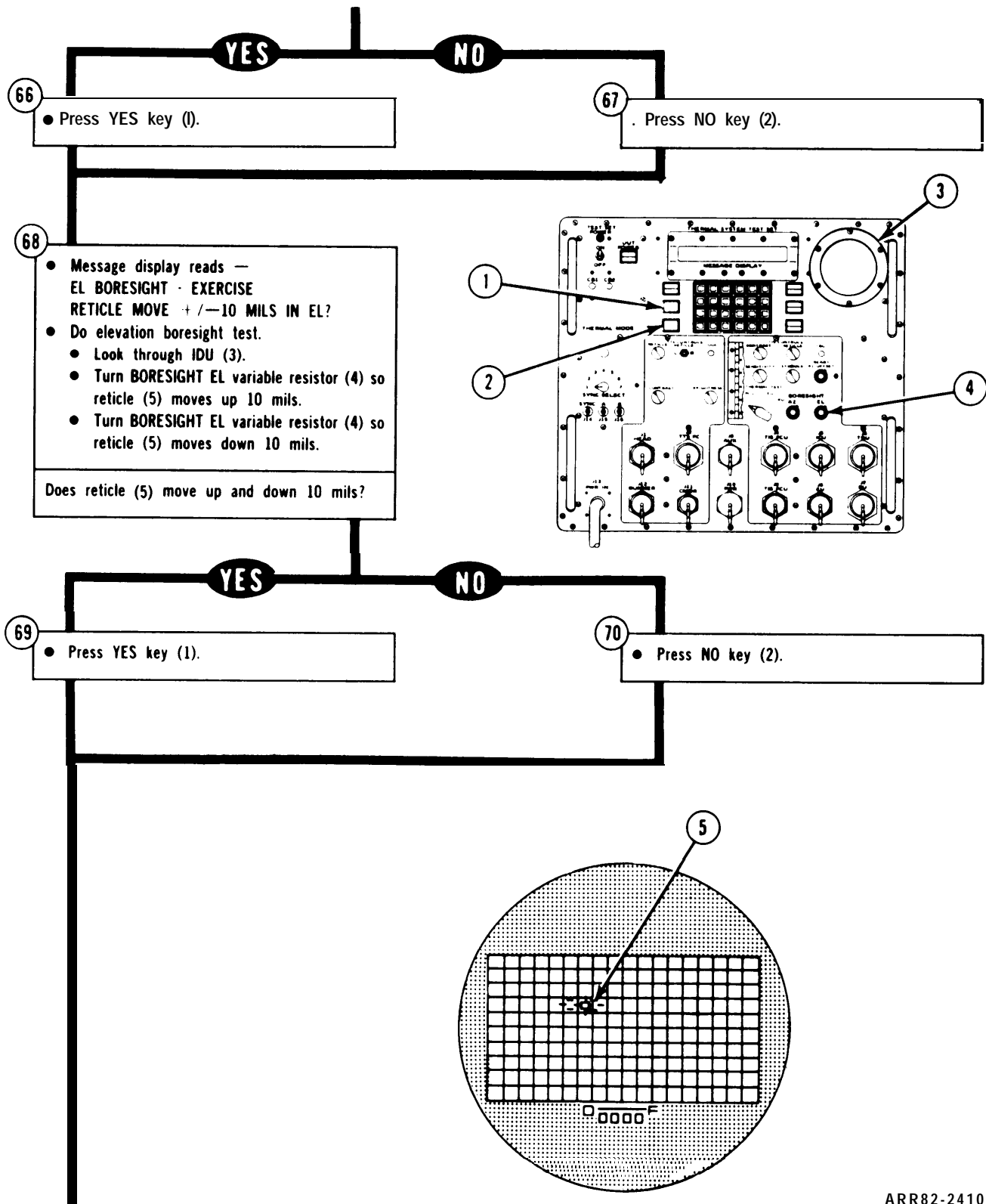
Figure 6-2. Operator Assisted Self-Test (Sheet 20 of 29)



ARR82-24107

Figure 6-2. Operator Assisted Self-Test (Sheet 21 of 29)

TM 9-4931-381-14&P-1
 OPERATOR ASSISTED SELF TEST PROCEDURE



ARR82-24108

Figure 6-2. Operator Assisted Self-Test (Sheet 22 of 29)

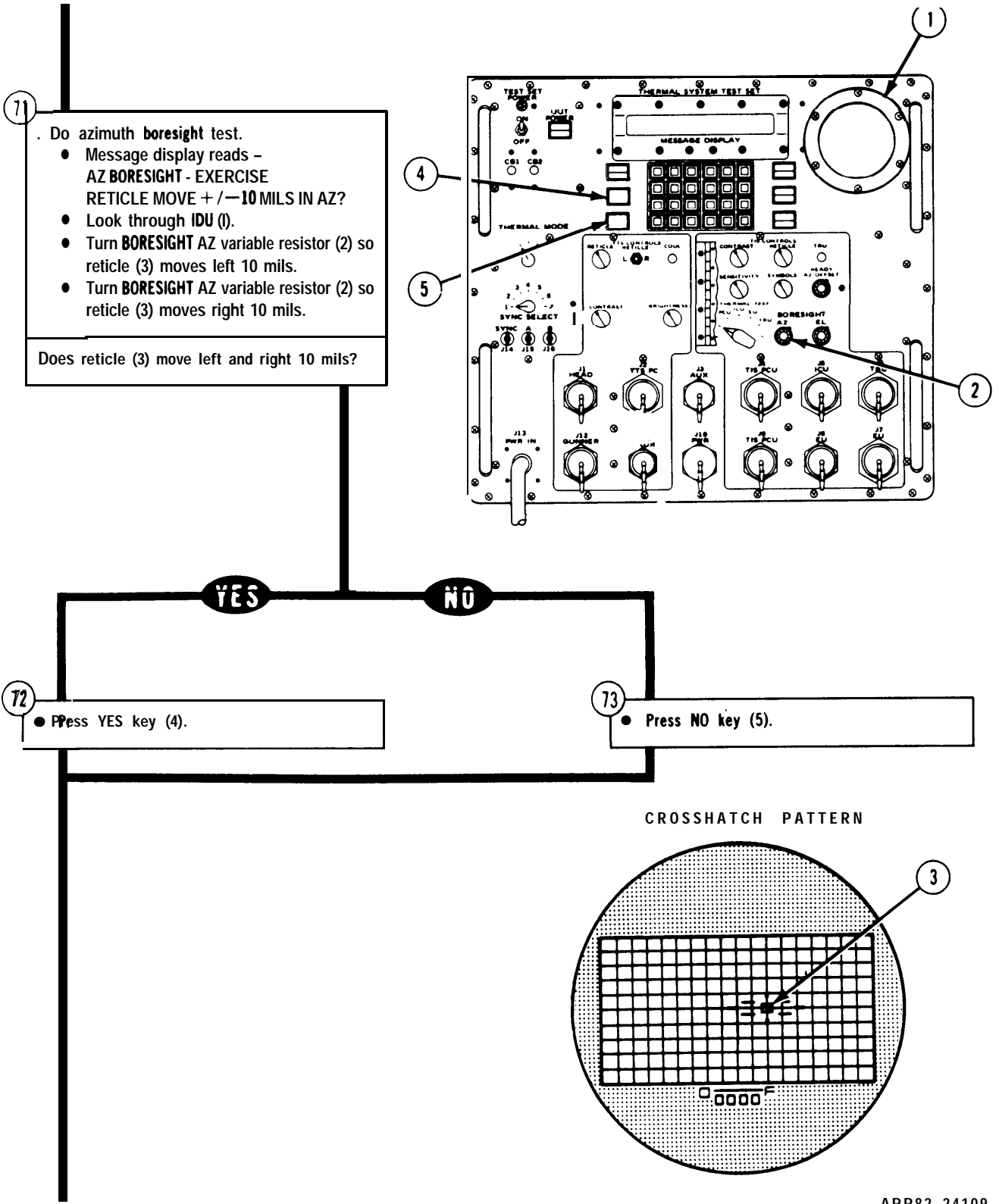


Figure 6-2. Operator Assisted Self-Test (Sheet 23 of 29)

ARR82-24109

OPERATOR ASSISTED SELF TEST PROCEDURE

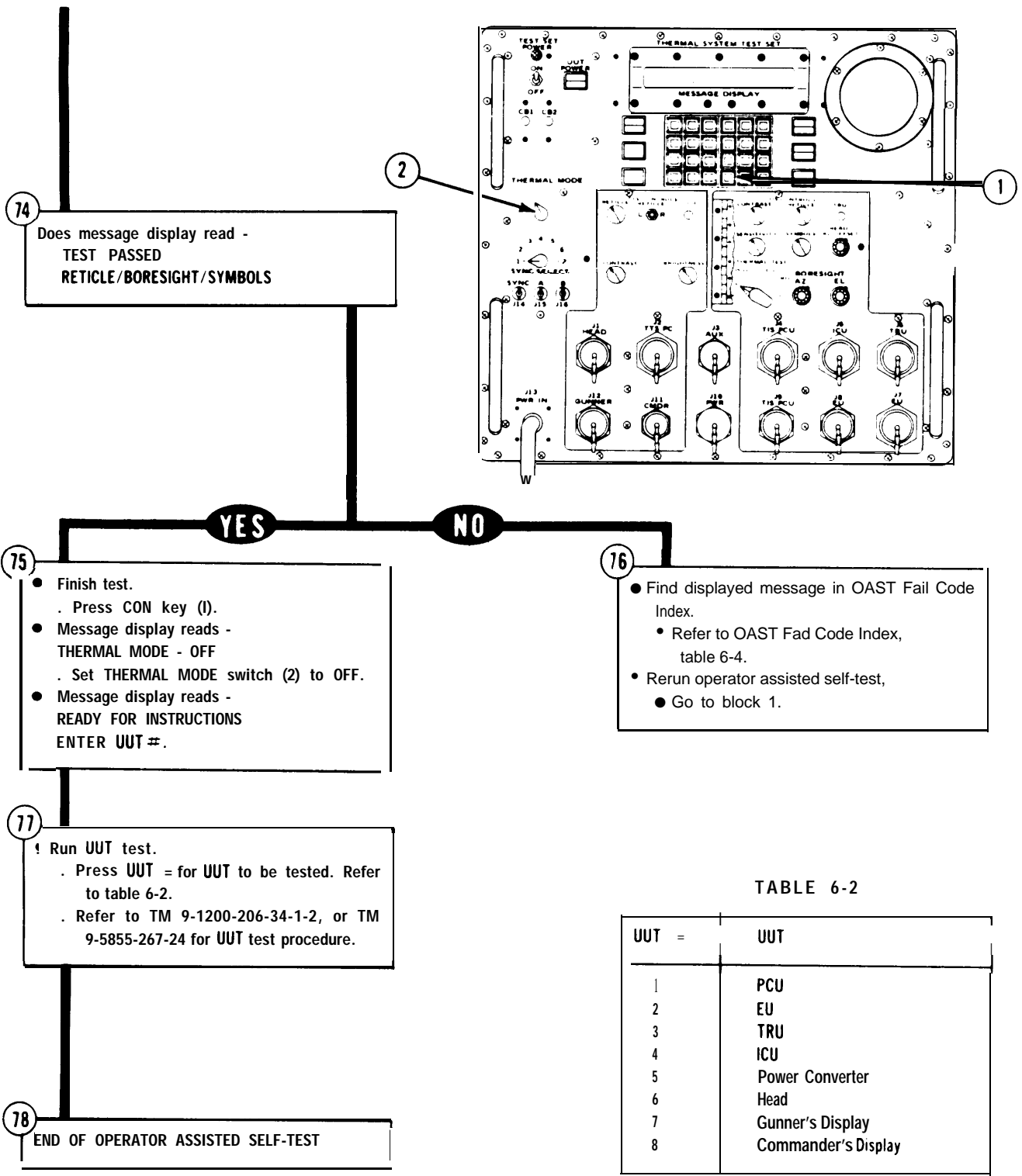


TABLE 6-2

UUT =	UUT
1	PCU
2	EU
3	TRU
4	ICU
5	Power Converter
6	Head
7	Gunner's Display
8	Commander's Display

ARR82-24110

Figure 6-2. Operator Assisted Self-Test (Sheet 24 of 29)

Table 6-3. AUTOMATIC SELF TEST FAIL CODE INDEX

Code Display	Corrective Action
A	Replace processor circuit card assembly A2; refer to Remove and Install Circuit Card Assembly, Volume IV, para 2-7.
B	Replace panel interface circuit card assembly A3; refer to Remove and install Circuit Card Assembly, Volume IV, para. 2-7.
C	Replace stimuli circuit card assembly A10; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
D	Replace stimuli circuit card assembly A9; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
E	Replace panel interface circuit card assembly A3; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
F	Replace processor circuit card assembly A2; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
G	Replace digital voltmeter circuit card assembly A4; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
H	Replace scanner circuit card assembly A7; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
I	Replace scanner circuit card assembly A6; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
J	Replace scanner circuit card assembly AS; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
K	Same as fault symptom #9; refer to Fault Symptom Index, chapter 4.
L	Replace video data processor printed circuit board assembly A14; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
M	Replace TRU-FCS simulator circuit card assembly A13; Refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.

Figure 6-2. Operator Assisted Self-Test (Sheet 25 of 29)

OPERATOR ASSISTED SELF TEST PROCEDURE

Table 6-3. AUTOMATIC SELF TEST FAIL CODE INDEX (Continued)

Code Display	Corrective Action
1	<p>1st time: Make sure digital voltmeter circuit card assembly A4 is securely seated in digital subsystem and rerun AST.</p> <p>2nd time: Replace digital voltmeter circuit card assembly A4; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p> <p>3rd time: Digital subsystem cannot be repaired at DS/GS level. Replace digital subsystem. Refer to Volume IV, para. 2-7.</p>
2	<p>1st time: Make sure scanner circuit card assembly A5 is securely seated in digital subsystem and rerun AST.</p> <p>2nd time: Replace scanner circuit card assembly A5, refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>
3	<p>Replace scanner circuit card assembly A6; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>
4	<p>Replace scanner circuit card assembly A7; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>
5	<p>Replace stimuli circuit card assembly A9; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>
6	<p>Replace stimuli circuit card assembly A 10, refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>
7	<p>Replace TRU-FCS simulator circuit card assembly A13; refer to Remove and Install circuit Card Assembly, Volume IV, para. 2-7.</p>
8	<p>Replace video data processor printed circuit board A14; refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.</p>

Figure 6-2. Operator Assisted Self-Test (Sheet 25 of 29)

Table 6-4. OAST FAIL CODE INDEX

Code Display	Corrective Action
UNRESOLV- ABLE FAULT	TSTS cannot be repaired at this level. Turn in TSTS to next higher level of maintenance.
0.0.00.1	Do procedure in figure 7-1.
0.0.0.2	Do procedure in figure 7-2.
0.0.0.3	Do procedure in figure 7-3.
0.0.0.4	Do procedure in figure 7-4.
0.0.0.5	Do procedure in figure 7-5.
0.0.0.7	Do procedure for fail code 0.0.0.1.
0.0.0.8	Do procedure for fail code 0.0.0.2.
0.0.0.9	Do procedure for fail code 0.0.0.3.
0.0.0.10	Do procedure for fail code 0.0.0.4.
0.0.0.11	Do procedure for fail code 0.0.0.5.
0.0.0.13	Do procedure for fail code 0.0.0.1.
0.0.0.14	Do procedure for fail code 0.0.0.2.
0.0.0.15	Do procedure for fail code 0.0.0.3.
0.0.0.16	Do procedure for fail code 0.0.0.4.
0.0.0.17	Do procedure for fail code 0.0.0.5.
0.1.0.0	TSTS cannot be repaired at this level. Turn in TSTS to next higher level of maintenance.
0.1.0.1	Replace unlit bulb with a good bulb refer to Volume IV, para 2-6. Press CON key. Go to figure 6-2, block 2.
0.1.0.2	Do procedure in figure 7-6.
0.1.0.3	Replace message display. Refer to Remove and Install Digital Indicator, Volume IV, para. 2-6. Run OAST; refer to figure 6-2.

Figure 6-2. Operator Assisted Self-Test (Sheet 27 of 29)

**TM 9-4931-381-14&P-1
OPERATOR ASSISTED SELF TEST PROCEDURE**

Table 6-4. OAST FAIL CODE INDEX (Continued)

Code Display	Corrective Action
0.1.0.4	Do procedures for fail code 0.1.0.2 and fail code 0.1.0.3.
0.3.0.1	Do procedure in figure 7-14.
0.3.0.2	Do procedure in figure 7-16.
0.3.0.3	Do procedure in figure 7-17.
0.3.0.4	Replace TRU-FCS simulator circuit card A 13. Refer to Remove and Install Circuit Card Assembly, Volume IV, para. 2-7.
0.4.0.1	Do procedure in figure 7-7.
0.4.0.2	Do procedure for fail code 0.4.0.1.
0.4.0.3	Do procedure in figure 7-8.
0.4.0.4	Do procedure for fail code 0.4.0.3.
0.4.0.5	Do procedures for fail code 0.4.0.1 and fail code 0.4.0.3.
0.4.0.6	Do procedure for fail code 0.4.0.5.
0.5.0.1	Do procedure in figure 7-9.
0.5.0.2	Do procedure for fail code 0.5.0.1.
0.5.0.3	Do procedure in figure 7-10.
0.500.4	Do procedure for fail code 0.5.0.3.
0.5.0.5	Do procedures for fail code 0.5.0.1 and fail code 0.5.0.3.
0.5.0.6	Do procedure for fail code 0.5.0.5.
0.7.0.1	Do procedure for fail code 0.3.0.4.
0.8.0.1	Do procedure in figure 7-11.
0.8.0.2	Do procedure in figure 7-12.

Figure 6-2. Operator Assisted Self-Test (Sheet 28 of 29)

Table 6-4. OAST FAIL CODE INDEX (Continued)

Code Display	Corrective Action
0.8.0.3	Do procedures for fail code 0.8.0.1 and fail code 0.8.0.2.
0.8.0.4	Do procedure in figure 7-13.
0.8.0.5	Do procedures for fail code 0.8.0.1 and fail code 0.8.0.4.
0.8.0.6	Do procedures for fail code 0.8.0.2. and fail code 0.8.0.4.
0.8.0.7	Do procedures for fail codes 0.8.0.1, 0.8.0.2, and 0.8.0.4.
0.8.0.8	Do procedure in figure 7-13.
0.8.0.9	Do procedures for fail code 0.8.0.1 and fail code 0.8.0.8.
0.8.0.10	Do procedures for fail code 0.8.0.2 and fail code 0.8.0.8.
0.8.0.11	Do procedures for fail codes 0.8.0.1, 0.8.0.2, and 0.8.0.8.
0.8.0.12	Do procedures for fail code 0.8.0.4 and fail code 0.8.0.8.
0.8.0.13	Do procedures for fail codes 0.8.0.1, 0.8.0.4, and 0.8.0.8.
0.8.0.14	Do procedures for fail codes 0.8.0.2, 0.8.0.4, and 0.8.0.8.
0.8.0.15	Do procedures for fail codes 0.8.0.1, 0.8.0.2, 0.8.0.4, and 0.8.0.8.

Figure 6-2. Operator Assisted Self-Test (Sheet 29 of 29)

CHAPTER 7
TROUBLESHOOTING PROCEDURES

This chapter includes detailed troubleshooting procedures (figures 7-1 through 7-33) which consist of illustrated flow-charts. They are used to help you trace problems in the test to the bad part that is causing the problem. The fail symptom titles are listed in the OAST fail code index (figure 6-2) together with the corresponding troubleshooting procedure located in this chapter. All the replaceable test set items that can be found by using a trouble shooting procedure are identified in the troubleshooting roadmap (chapter 3). Each troubleshooting procedure also refers to a maintenance procedure in volume IV that gives instructions on how to replace the bad part. Chapter 2 discusses in detail how troubleshooting is done. Chapter 5 is a detailed explanation of how to use the troubleshooting procedure. The fail codes referred to in the troubleshooting procedures are listed in the fail code indexes (figures 6-2, 7-14, 7-15, 7-16).

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

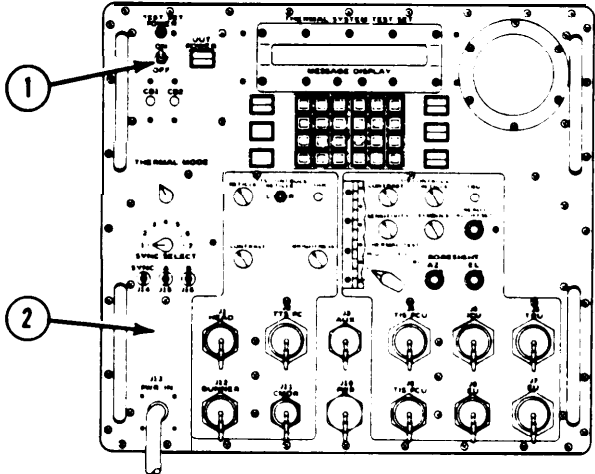
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

* 0.0.0.1
0.0.0.7
0.0.0.13

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

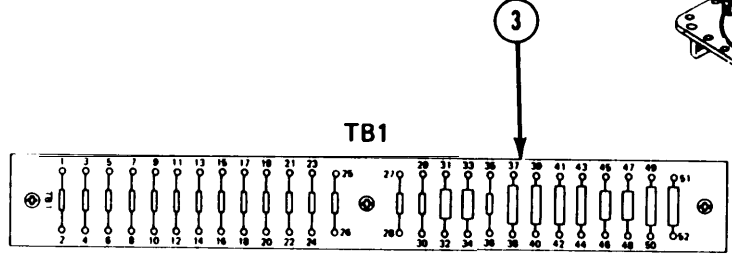
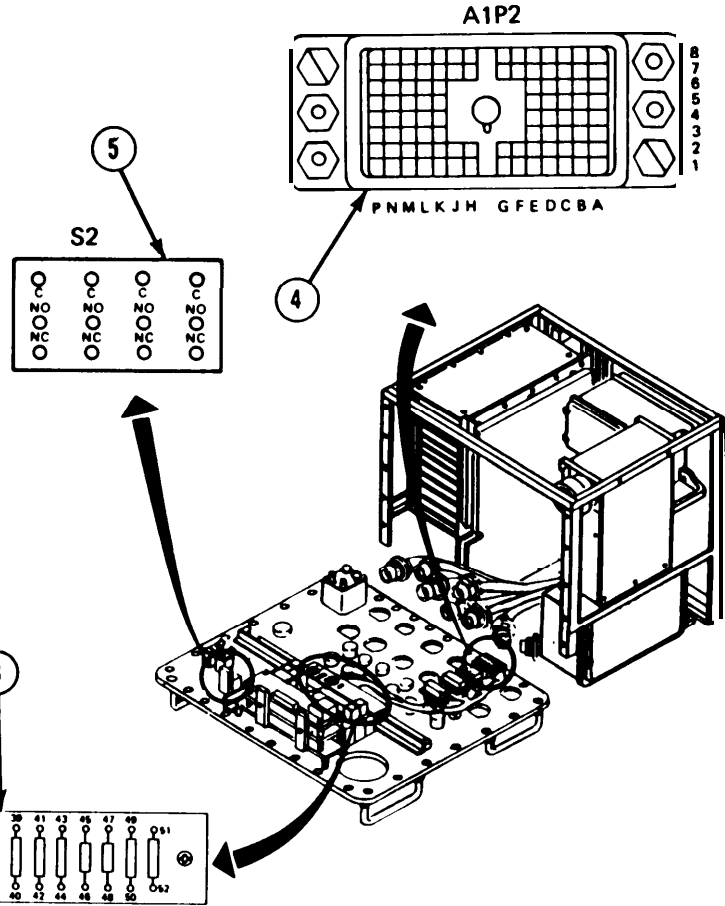
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
- Remove front panel assembly (2).
 - Refer to Remove Panel Assembly A 1, volume IV, para. 2-6.
- Set up multimeter to check continuity.



2 Using **multimeter**, check continuity between the following points:

FROM (+)	TO (-)
TB1(3)-1	S2(5)-A
-1	TB1-2
-1	TB1-35
-35	-36
-3	S2-C
-3	TB1-4
TB1-36	A1P2(4)-A5

Are all continuity checks OK?



ARR82-24111

Figure 7-1. (Sheet 1 of 3)

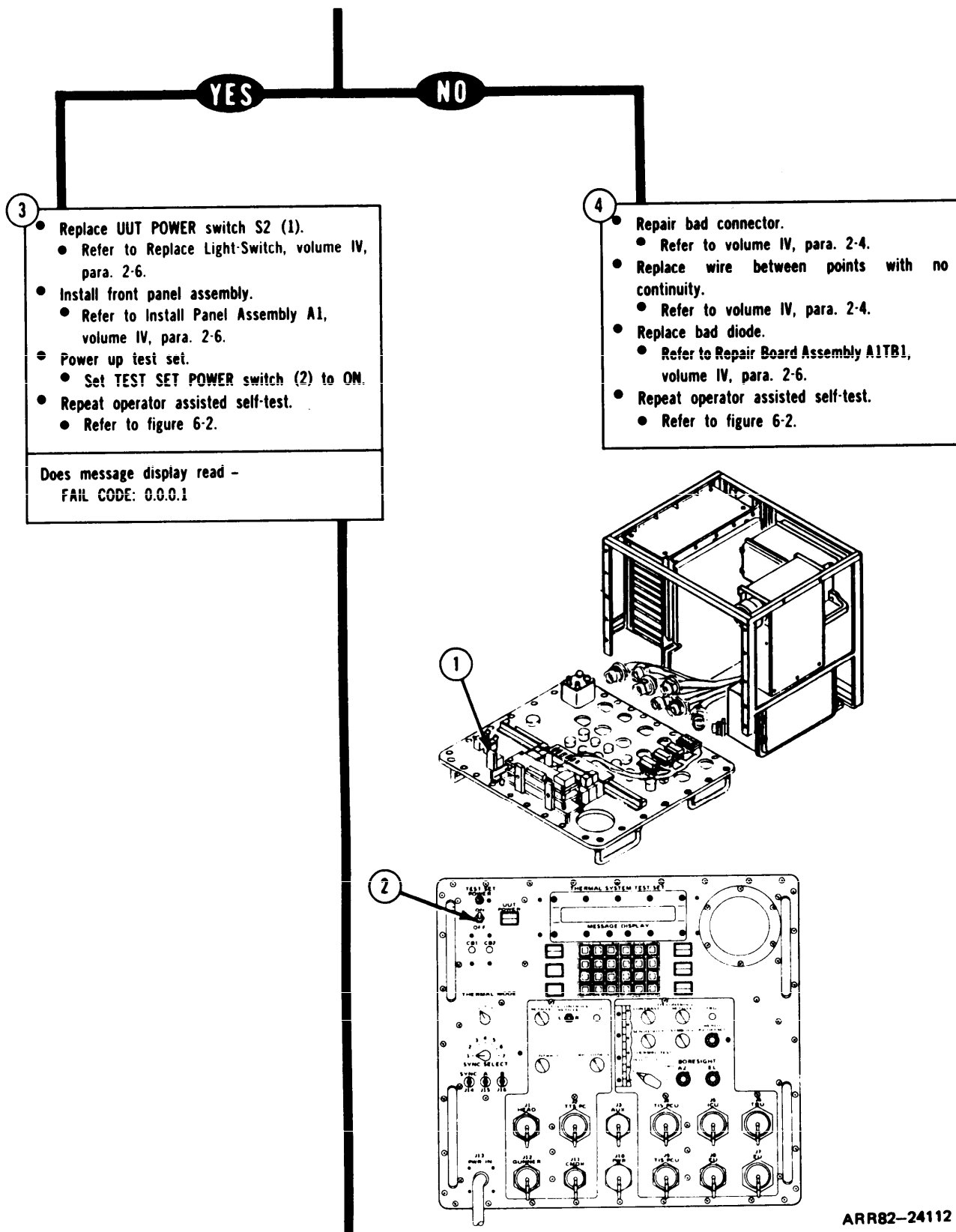
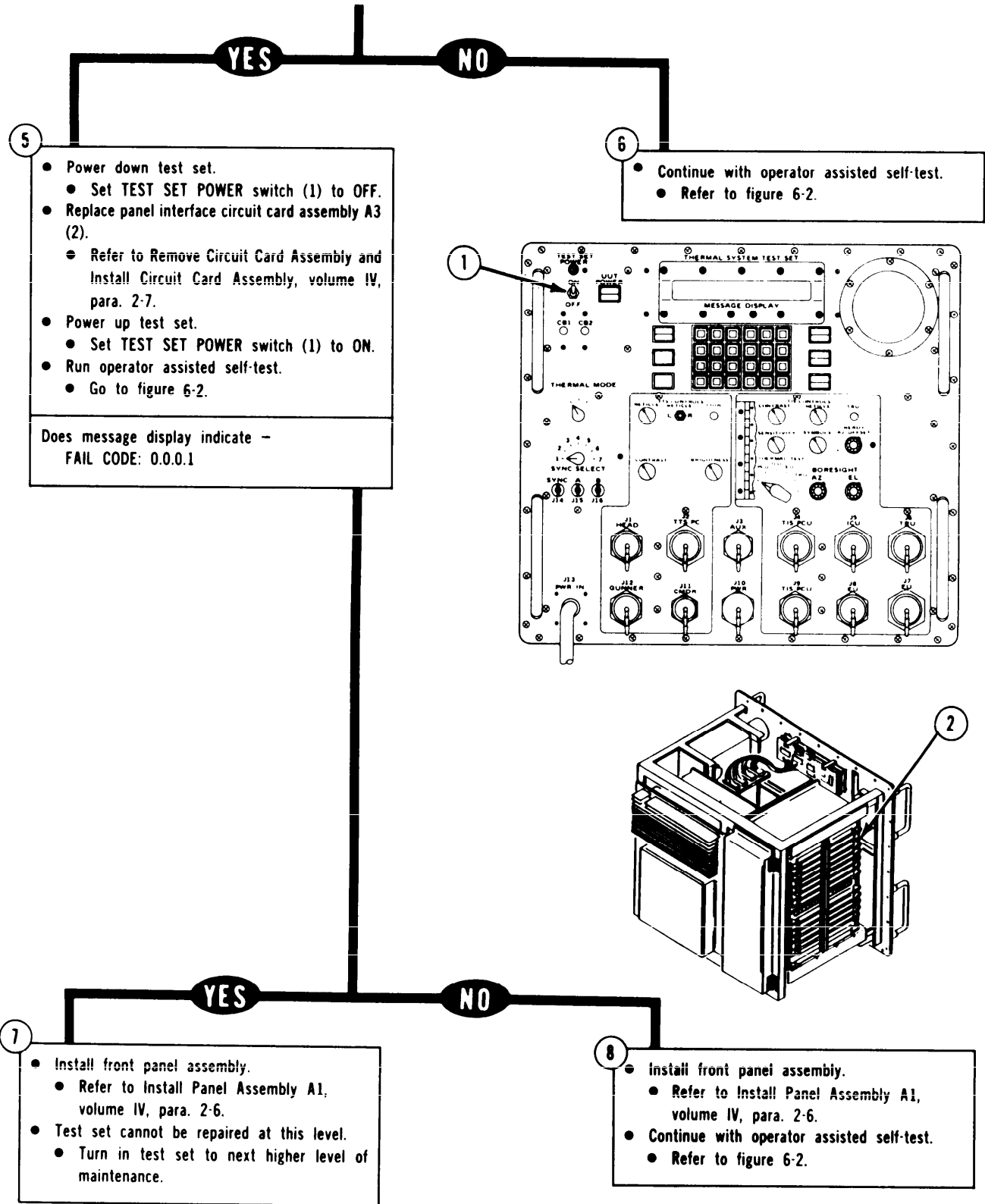


Figure 7-1. (Sheet 2 of 3)



ARR82-24113

Figure 7-1. (Sheet 3 of 3)

DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

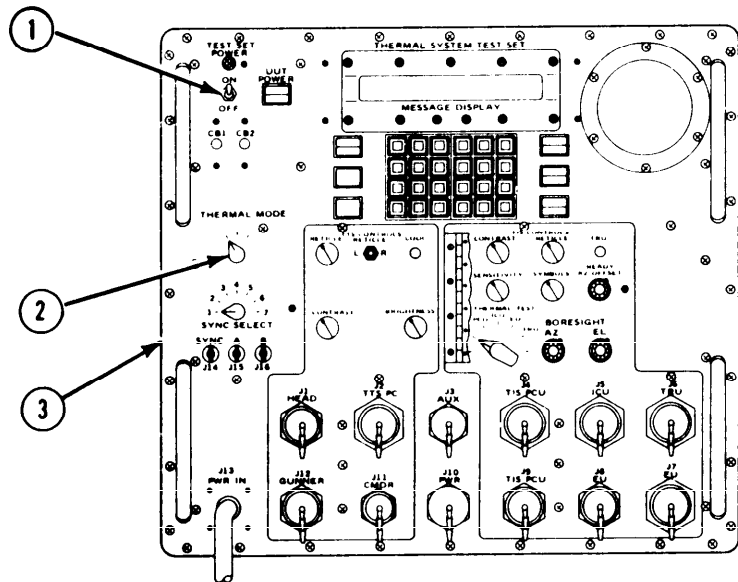
- * 0.0.0.2
- 0.0.0.8
- 0.0.0.14

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

i

- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to STBY.
- Remove front panel assembly (3).
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.
- Set up multimeter to check continuity.



ARR82-24114

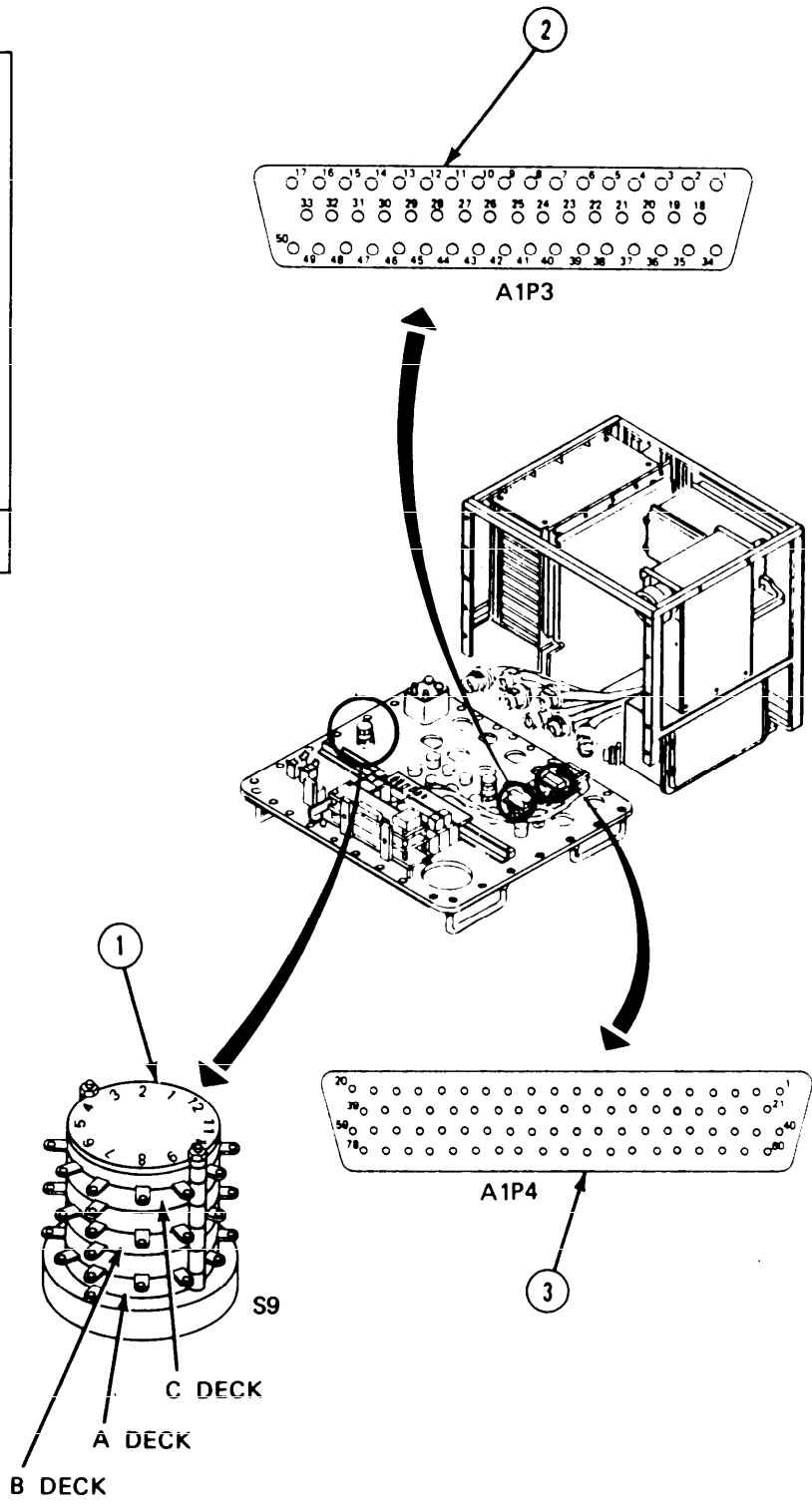
Figure 7-2. (Sheet 1 of 5)

2

- Using multimeter, check continuity between the following points:

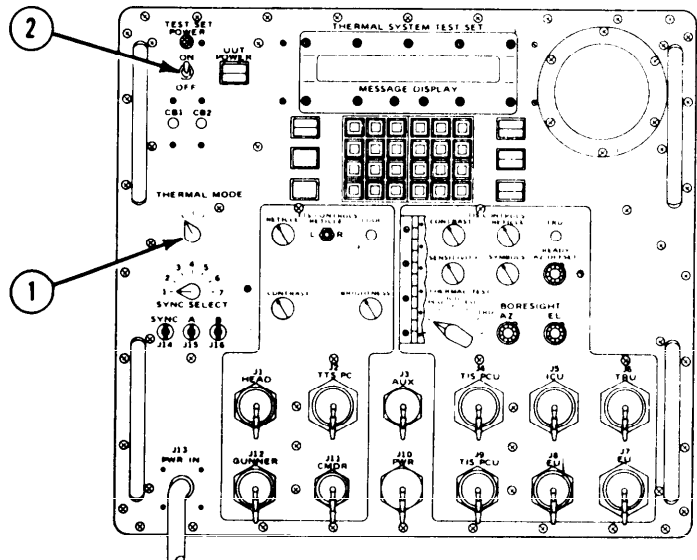
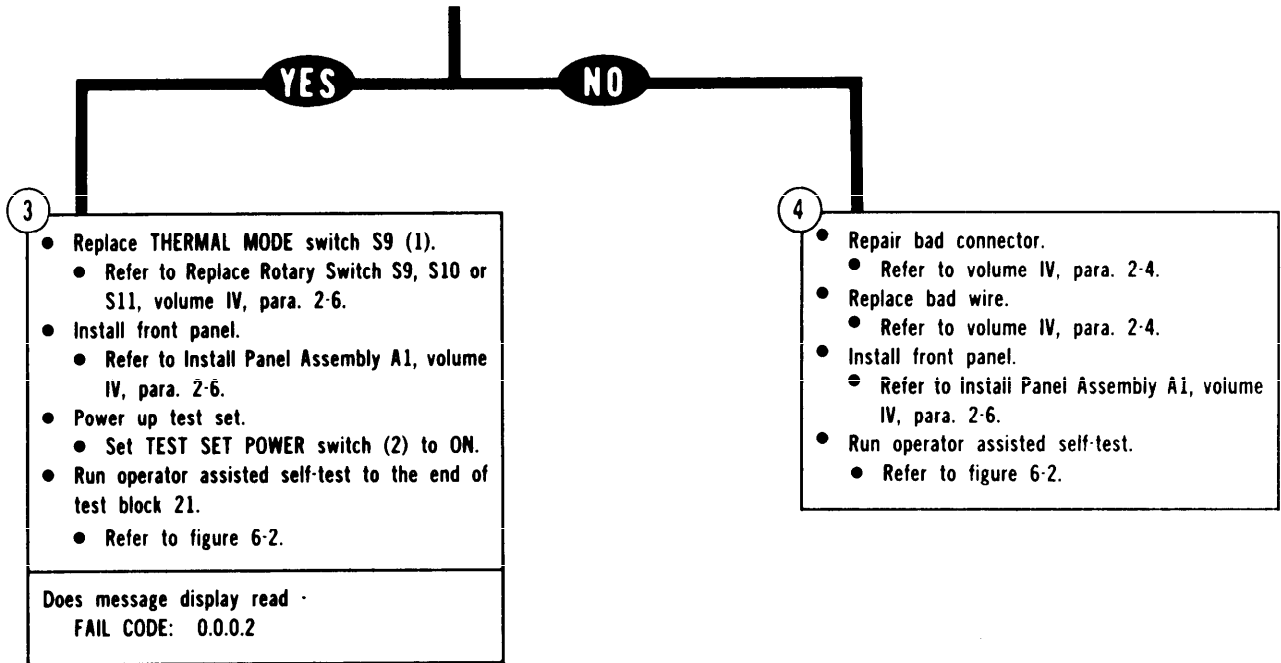
FROM	TO
THERMAL MODE SWITCH S9(1):	FRONT PANEL CONNECTORS:
AC1-1	A1P3(2)-38
AC2-2	A1P3-22
AC2-3	A1P3-21
BC2-3	A1P3-43
BC2-8	A1P3-42
BC2-9	A1P3-42
CC2-3	A1P4(3)-21
CC2-9	A1P4-22
CC2-2	A1P4-21

Are continuity checks OK?



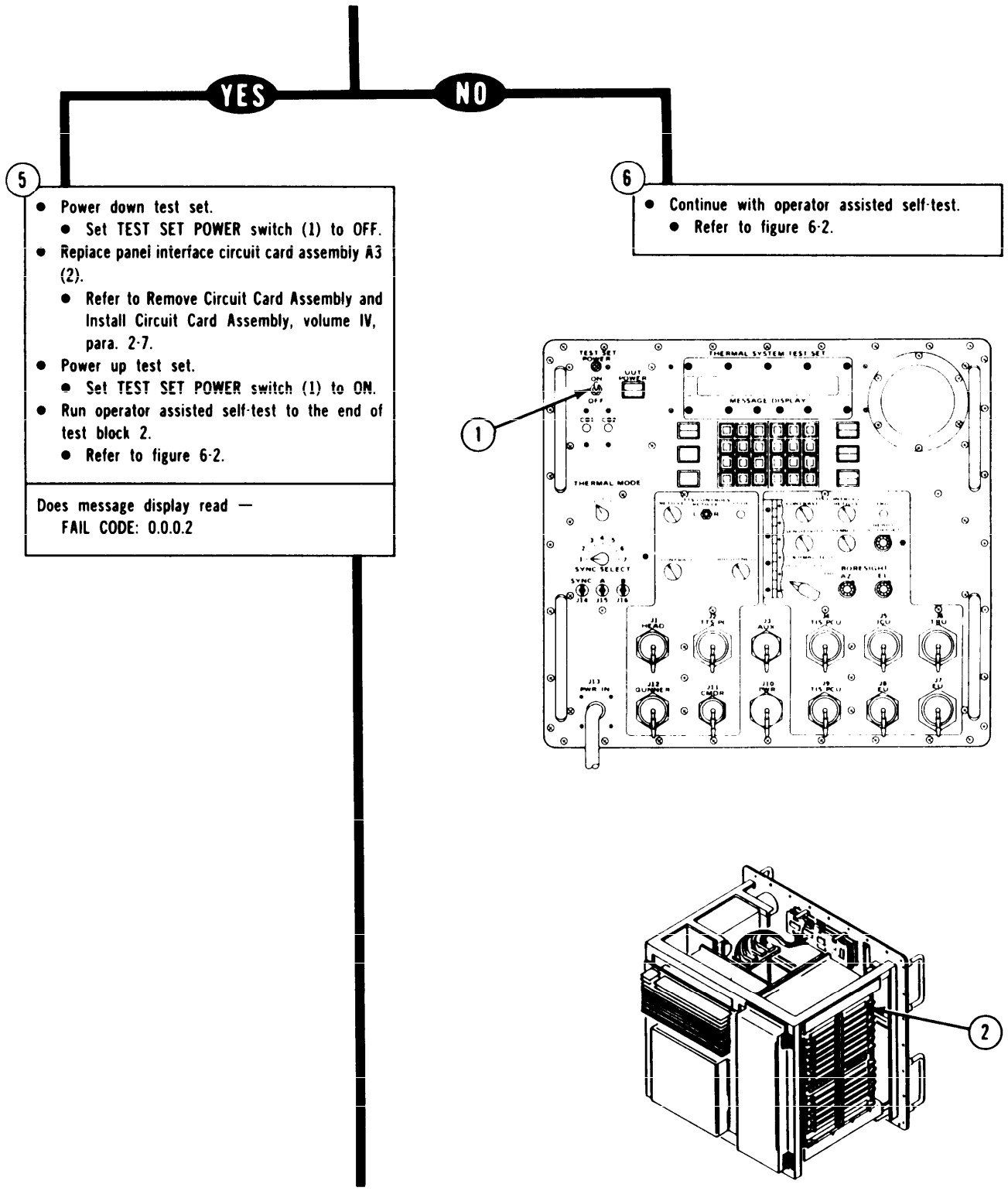
ARR82-24115

Figure 7-2. (Sheet 2 of 5)



ARR82-24116

Figure 7-2. (Sheet 3 of 5)



ARR82-24117

Figure 7-2. (Sheet 4 of 5)

TSTS TROUBLESHOOTING PROCEDURES

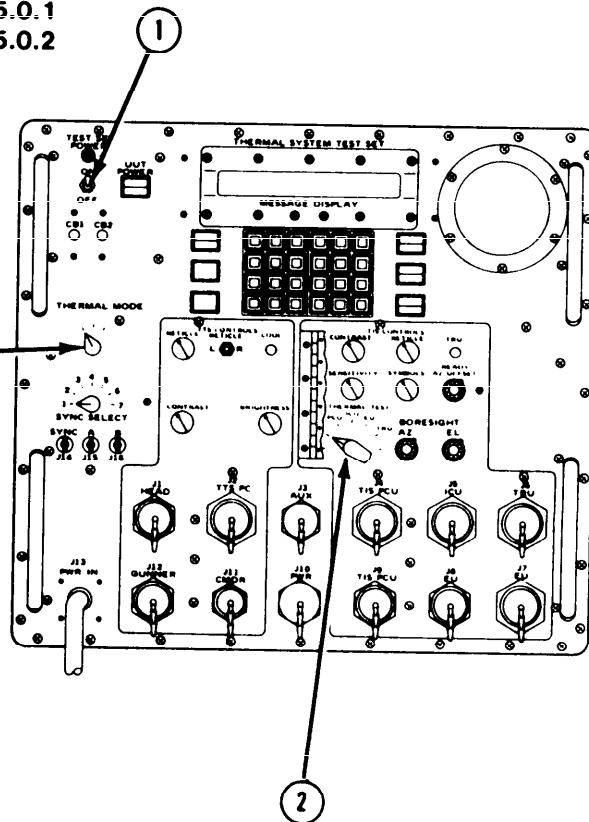
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

- * 0.0.0.3
- 0.0.0.9
- 0.0.0.15
- 4.15.0.1
- 4.15.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL TEST switch (2) to OFF.
 - Set THERMAL MODE switch (3) to STBY.
 - Remove front panel assembly.
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.
 - Set up multimeter to check continuity.



ARR82-24119

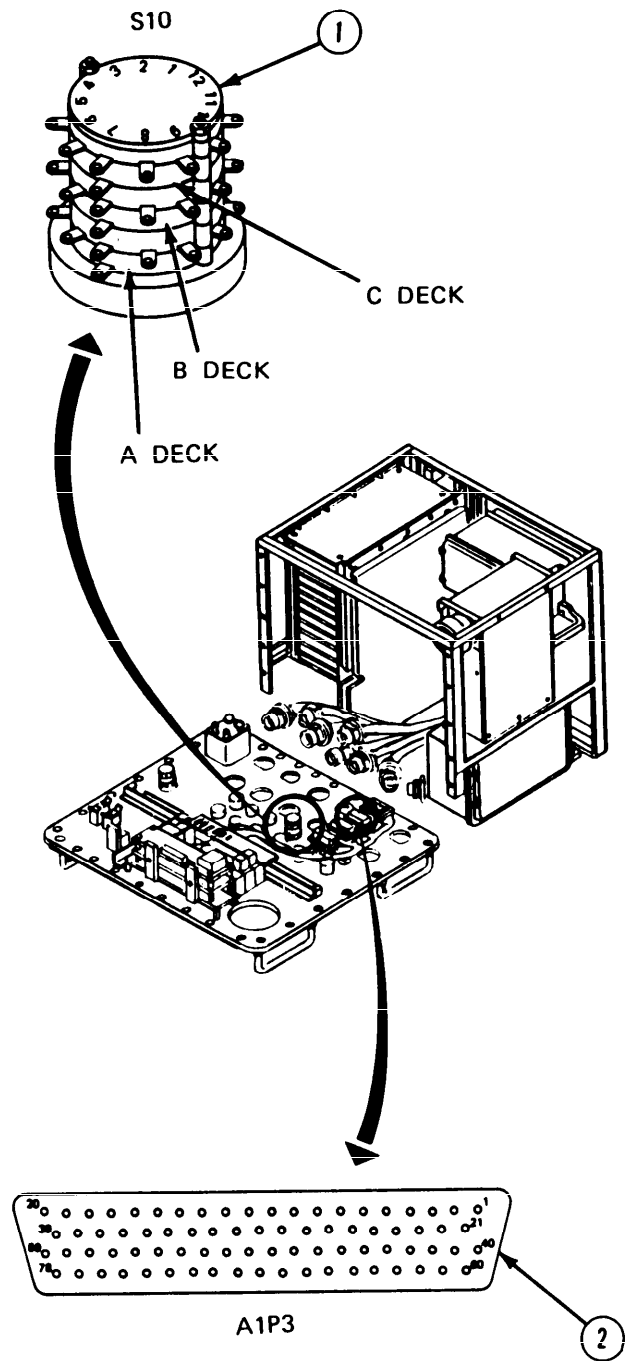
Figure 7-3. (Sheet 1 of 5)

2

- Using multimeter, check continuity between the following points:

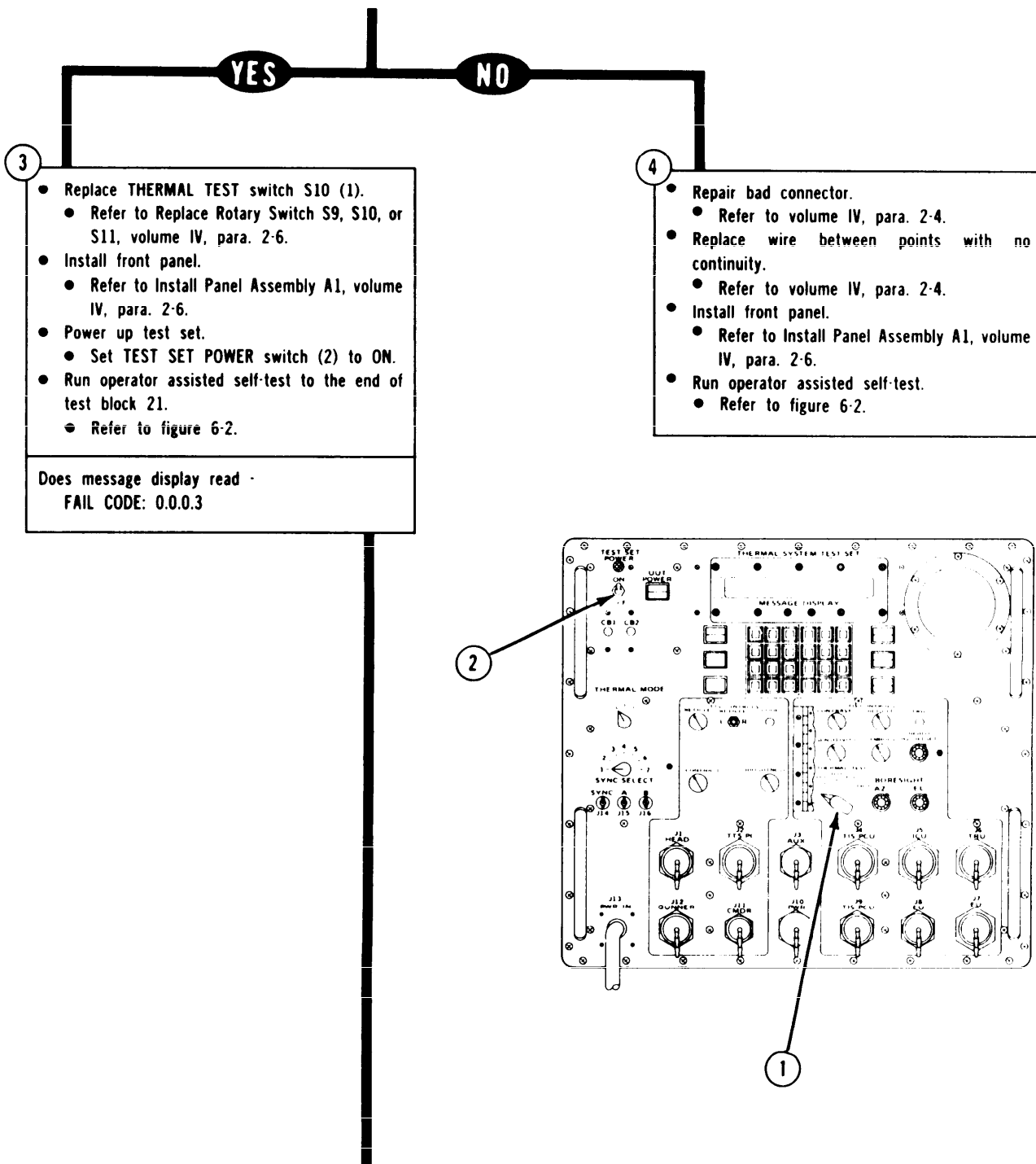
FROM	TO
THERMAL TEST SWITCH S10 (1):	FRONT PANEL CONNECTOR:
AC1-1	A1P3(2)-38
AC2-1	A1P3-23
AC2-2	A1P3-24
AC2-3	A1P3-25
AC2-4	A1P3-26
AC2-5	A1P3-27
AC2-9	A1P3-28
BC2-5	A1P3-29
BC2-10	A1P3-7
BC2-7	A1P3-10
Front Panel Connector: A1P3-38	A1P3-23

Are continuity checks OK?



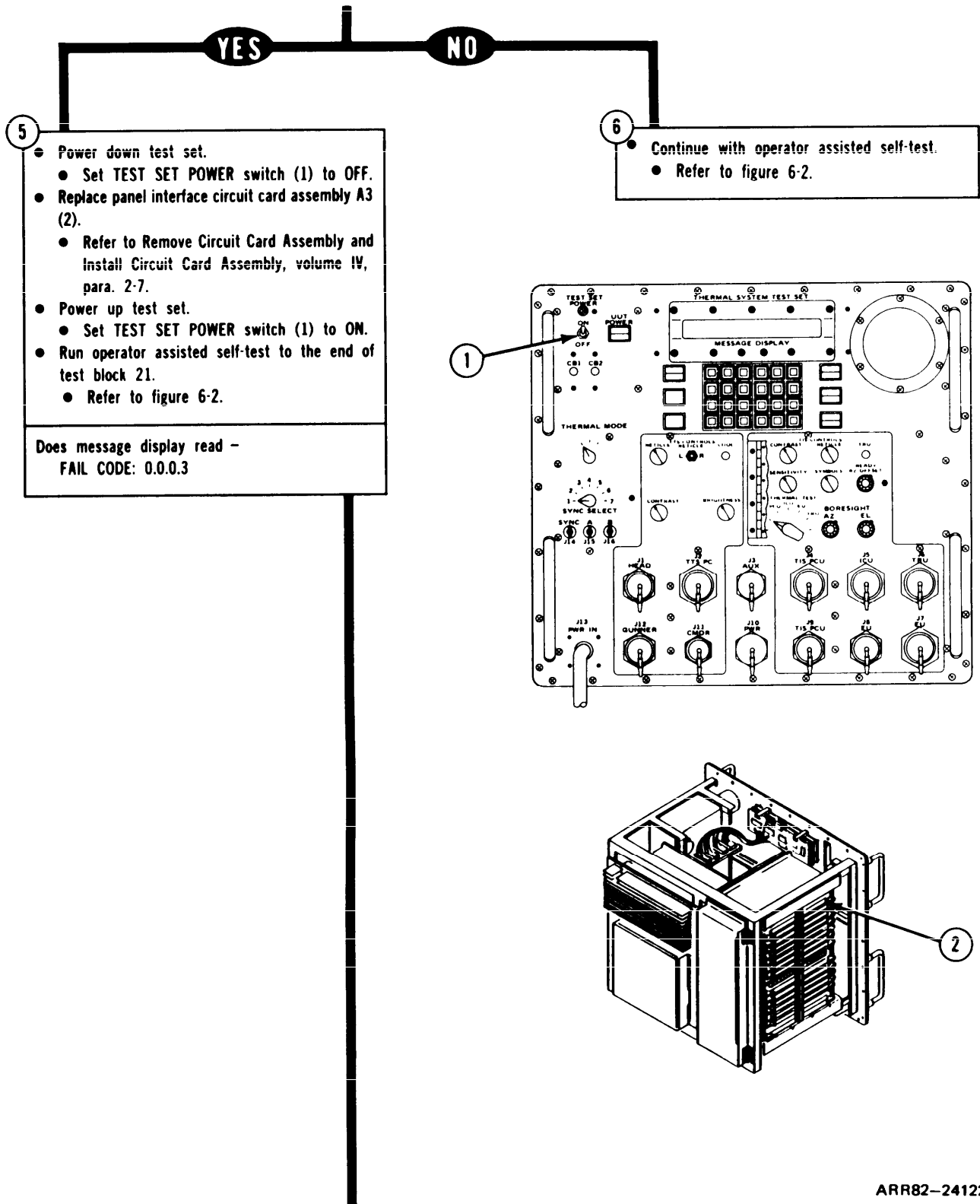
ARR82-24120

Figure 7-3. (Sheet 2 of 5)



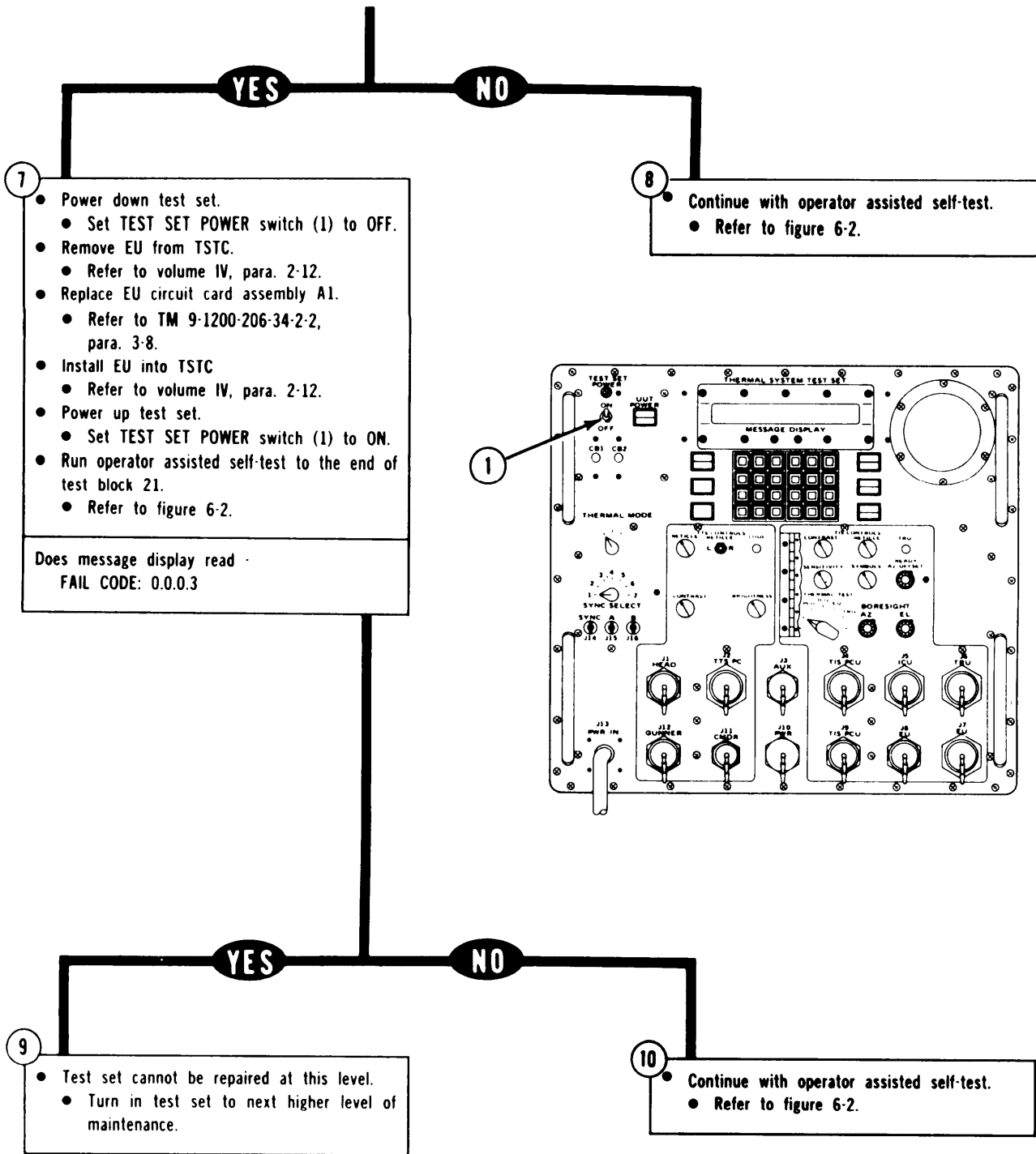
ARR82-24121

Figure 7-3. (Sheet 3 of 5)



ARR82-24122

Figure 7-3. (Sheet 4 of 5)



ARR82-24123

Figure 7-3. (Sheet 5 of 5)

DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

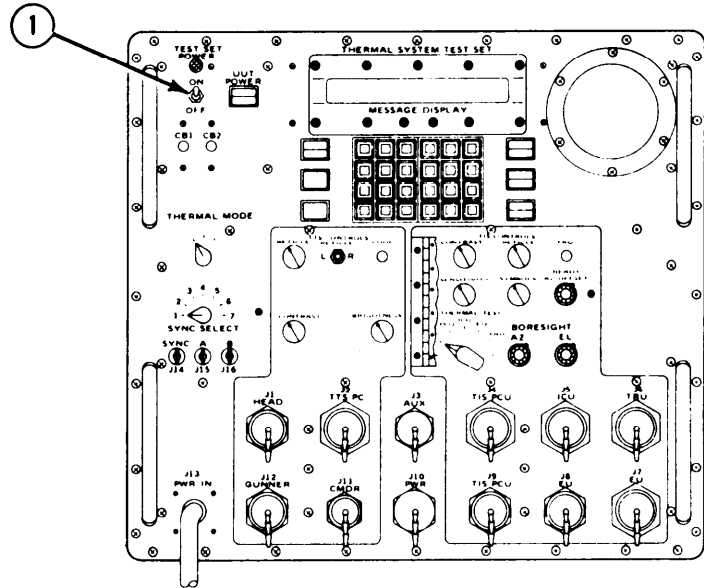
- * 0.0.0.4
- 0.0.0.10
- 0.0.0.16

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

1 Power down test set.

- Set TEST SET POWER switch (1) to OFF.
- Remove front panel assembly.
- Refer to Remove Panel Assembly A1, volume IV, para. 2-6.
- Set up multimeter to check continuity.



ARR82-24124

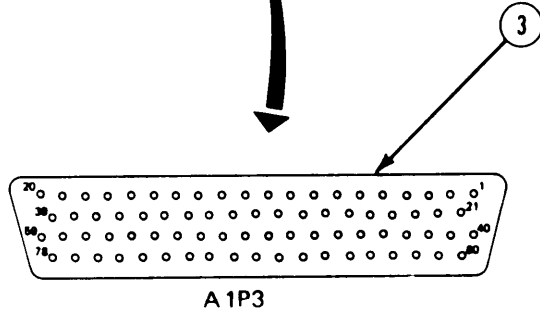
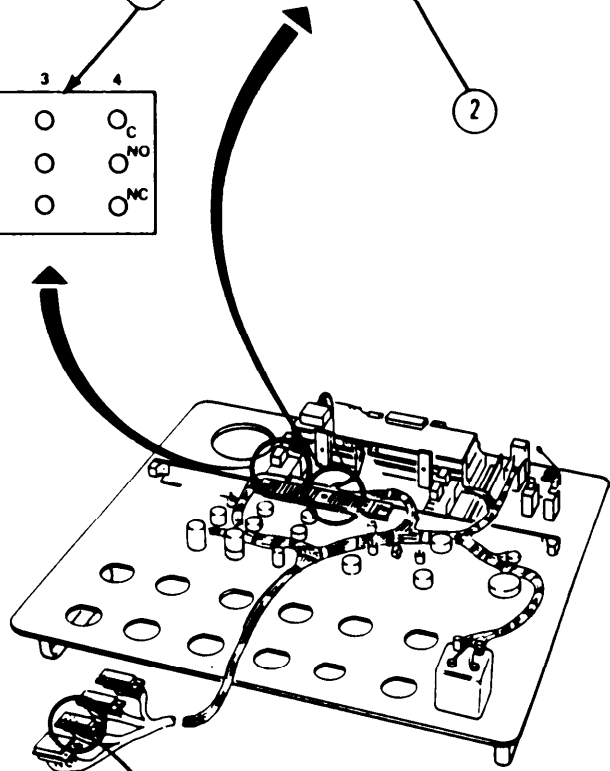
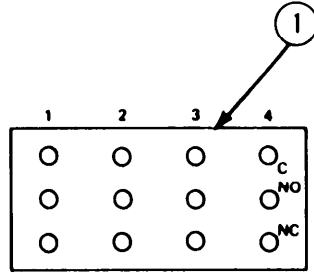
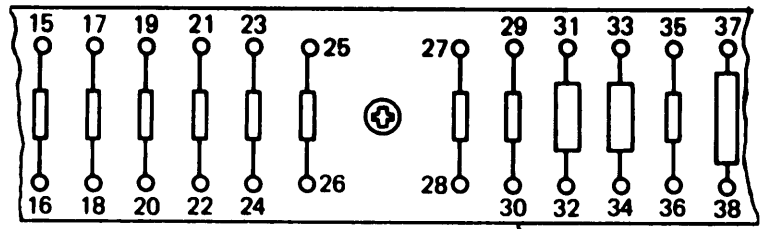
Figure 7-4. (Sheet 1 of 3)

2

- Using multimeter, check continuity between the following points:

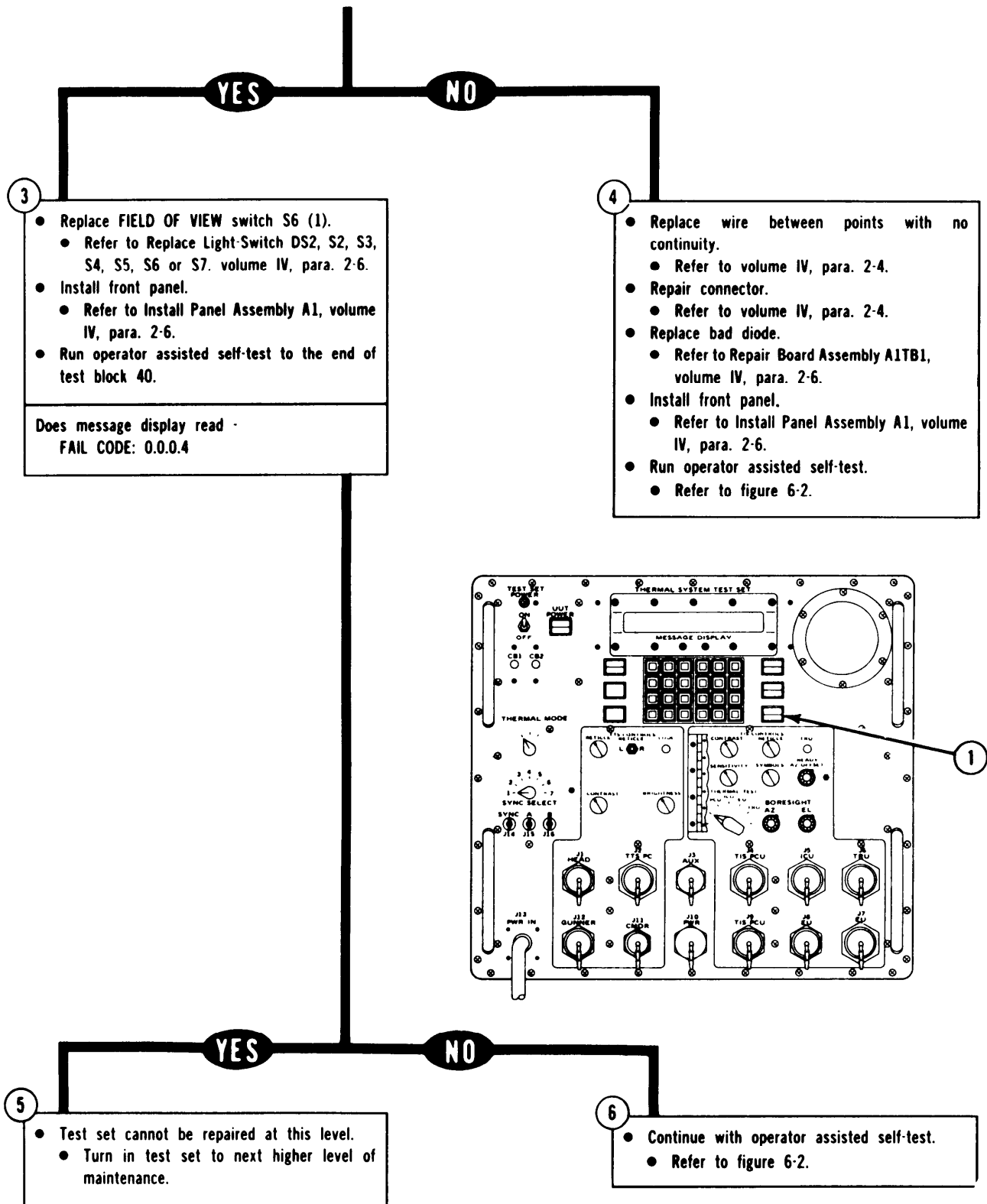
FROM	TO
FIELD OF VIEW	BOARD ASSEMBLY
SWITCH S6 (1):	TB1 (2):
4-NC	TB1-19
4-NO	TB1-17
2-C	A1P3(3)-37
2-NO	A1P3-36
BOARD ASSEMBLY	
TB1 (2): TB1-17	TB1-18
TB1-19	TB1-20

Are continuity checks OK?



ARR82-24125

Figure 7-4. (Sheet 2 of 3)



ARR82-24126

Figure 7-4. (Sheet 3 of 3)

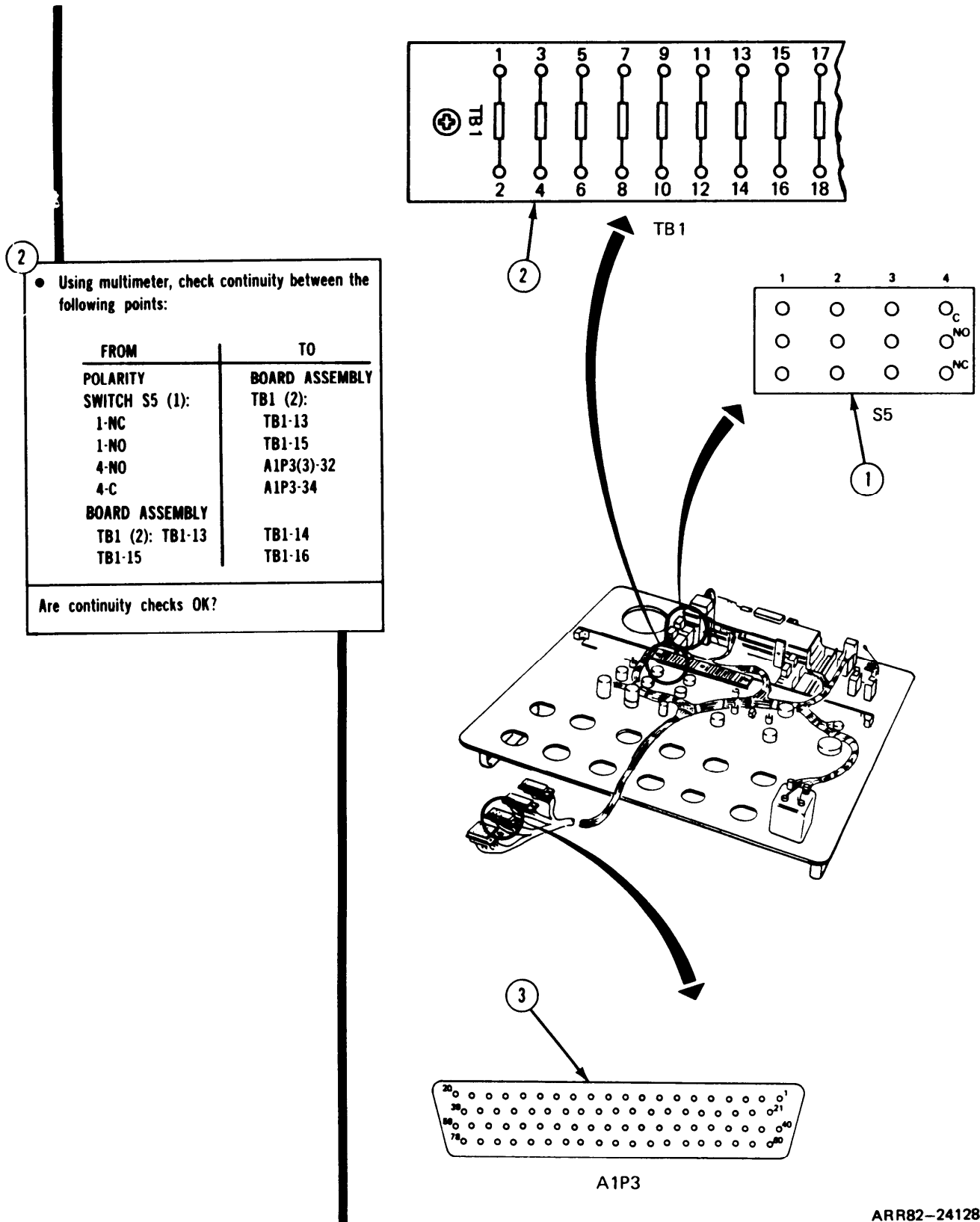


Figure 7-5. (Sheet 2 of 4)

ARR82-24128

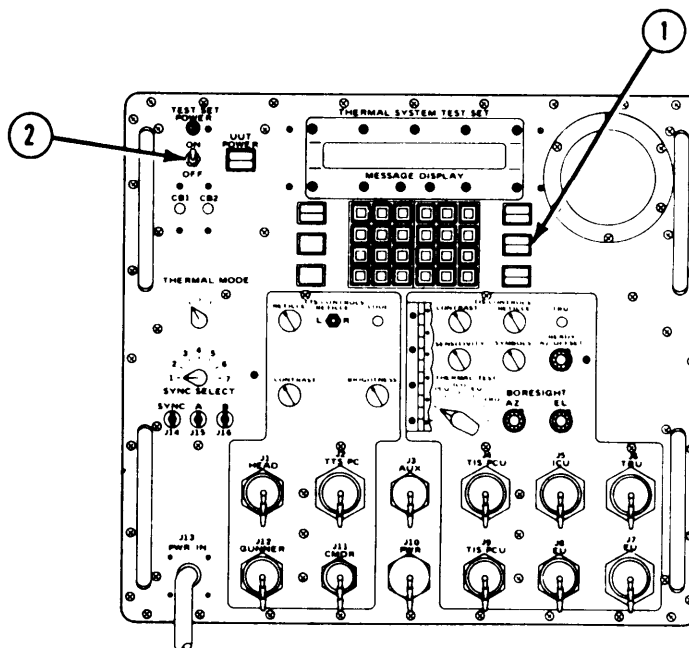
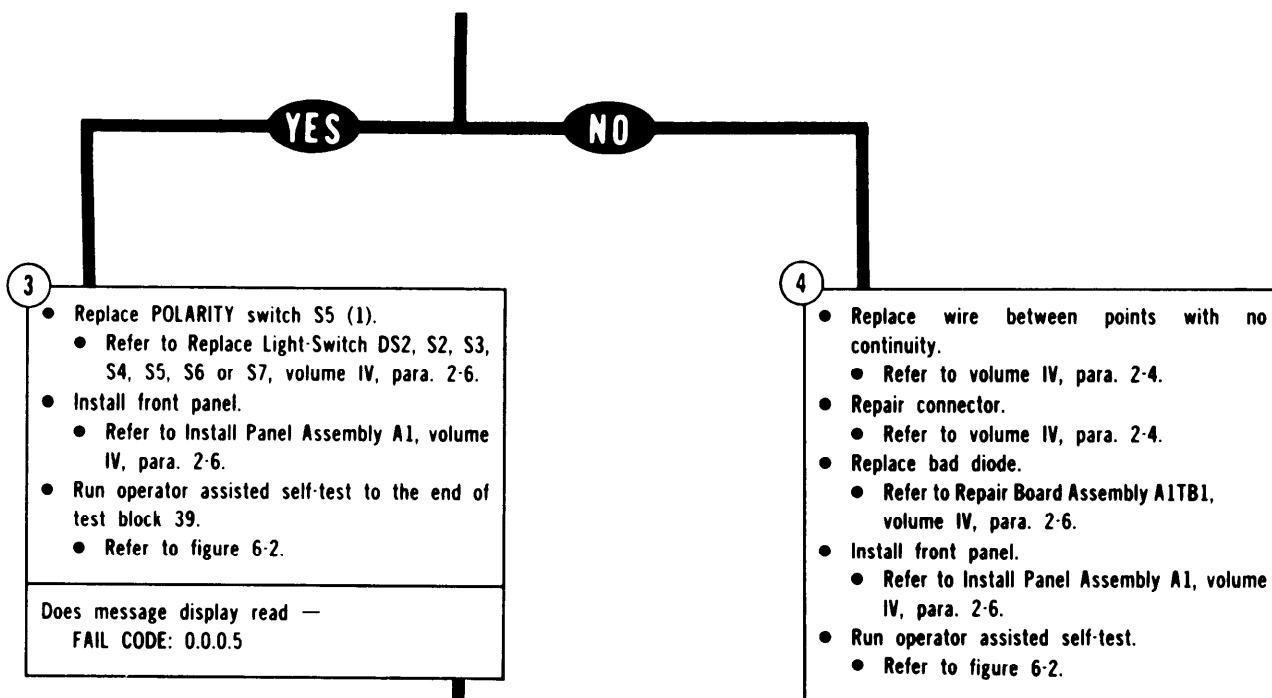
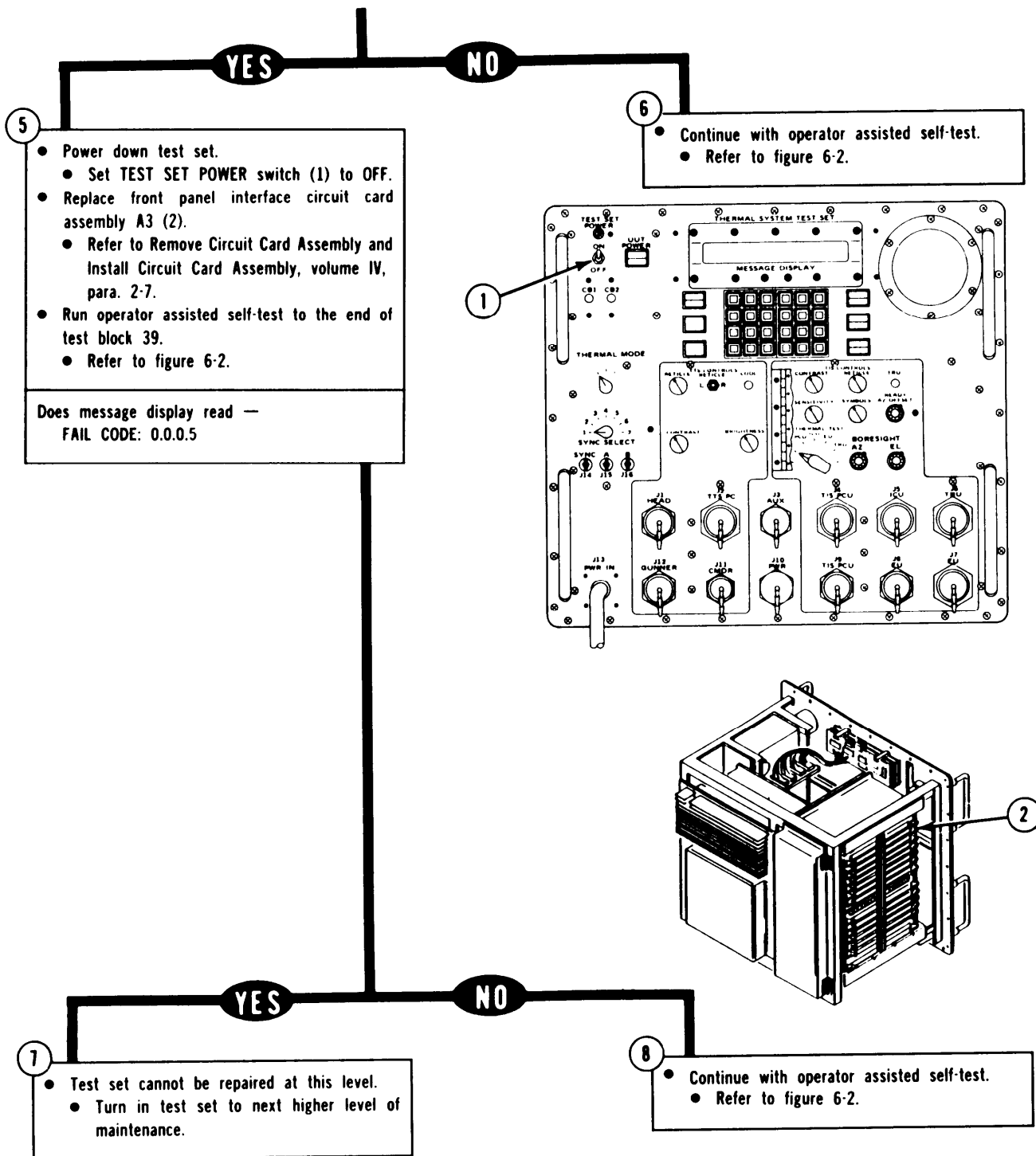


Figure 7-5. (Sheet 3 of 4)

ARR82-24129



ARR82-24130

Figure 7-5. (Sheet 4 of 4)

TSTS TROUBLESHOOTING PROCEDURES

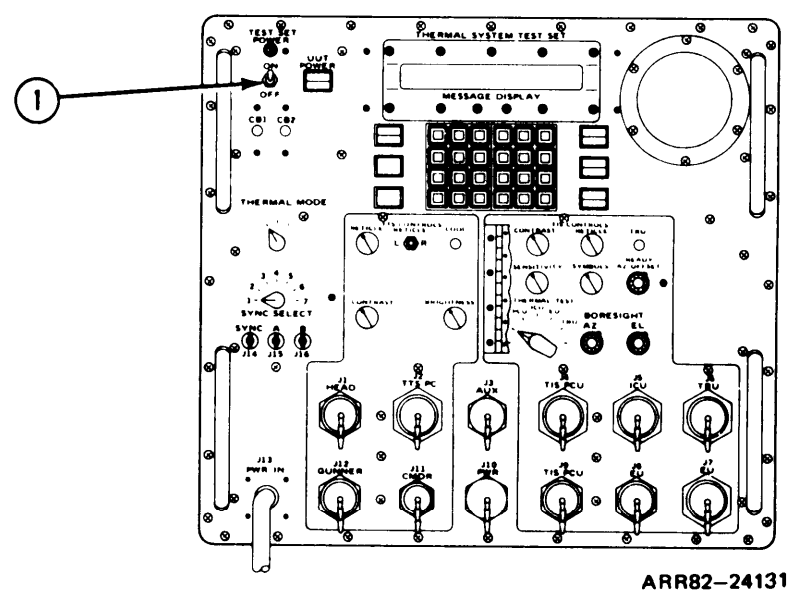
DISPLAY READS
FAIL CODE: 0.1.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

1

- Remove unit lamps.
 - Refer to Replace Light-Switch and Replace Lens, Lamp, or Housing, volume IV, para. 2-6.
- Set TEST SET POWER switch (1) to OFF.
- Set up multimeter to check continuity.



ARR82-24131

Figure 7-6. (Sheet 1 of 3)

- 2
- Remove front panel assembly (1).
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.
 - Check continuity at board assembly TB1 (2):
 - Using multimeter, check continuity between TB1 pins listed in Table 7-1 for lamps that were removed in block 1.
- Are all continuity checks OK?

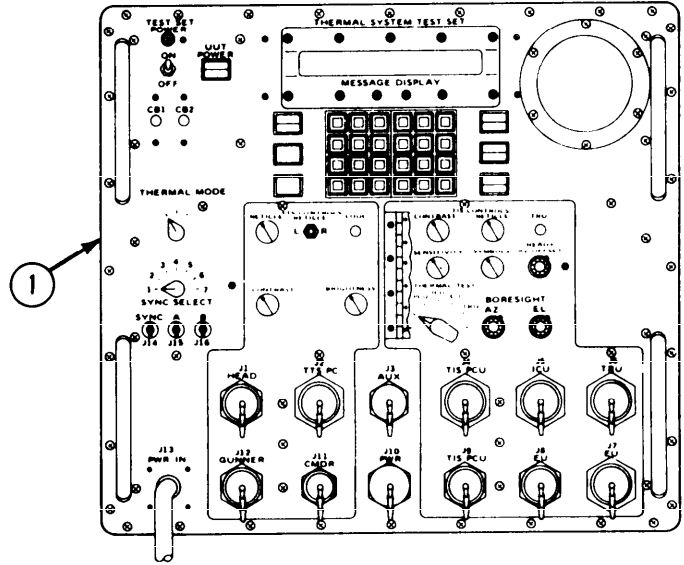


TABLE 7-1

LAMP	FROM TB1 PIN (VOLTAGE PROBE)	TO TB1 PIN (COMMON PROBE)
TRU READY	25	26
COOL	31	32
FAULT	21	22
LAMP TEST	23	24
WIDE	17	18
NARROW	19	20
WHITE	13	14
BLACK	15	16
PROC FAIL	9	10
PROC PWR FAIL	11	12
YES	5	6
NO	7	8
ON	1	2
OFF	3	4

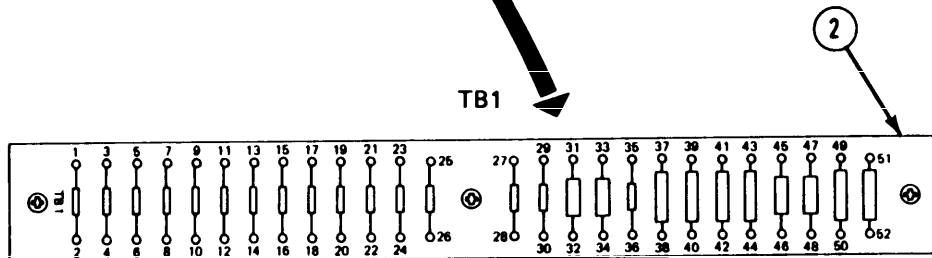
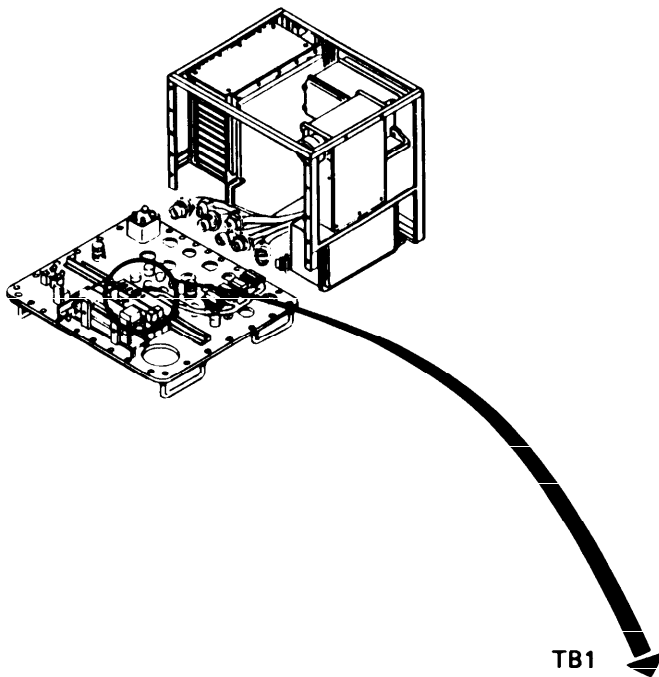
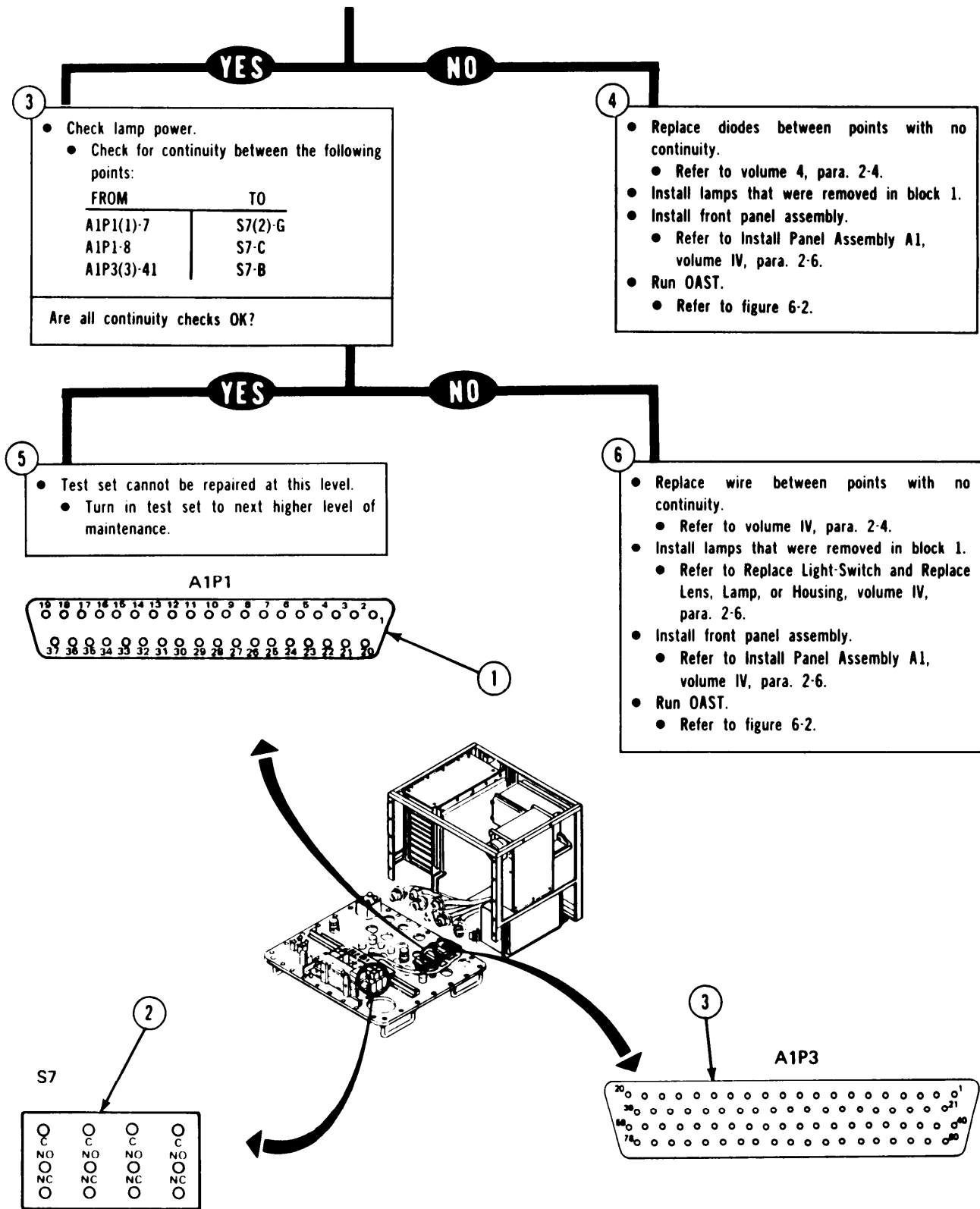


Figure 7-6. (Sheet 2 of 3)

ARR82-24132

TM 9-4931-381-14&F-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82-24133

Figure 7-6. (Sheet 3 of 3)

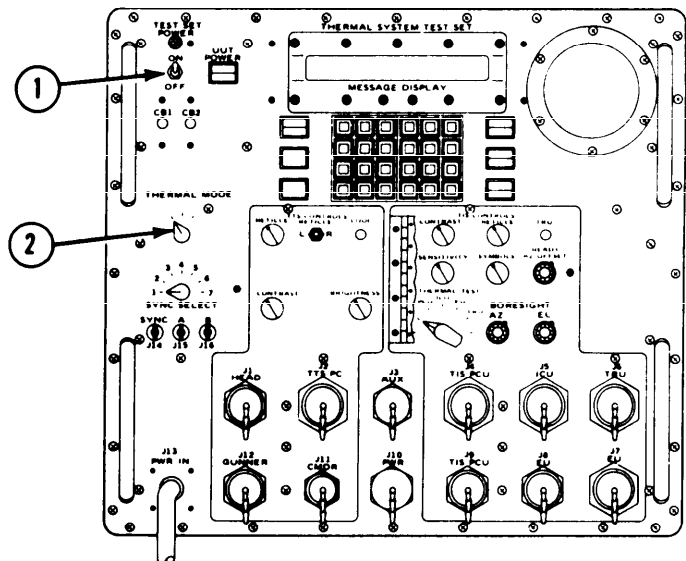
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

- * 0.4.0.1
- 0.4.0.2
- 0.4.0.5
- 0.4.0.6
- 4.5.0.1
- 4.5.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to OFF.
 - Remove front panel assembly.
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.



ARR82-24134

Figure 7-7. (Sheet 1 of 3)

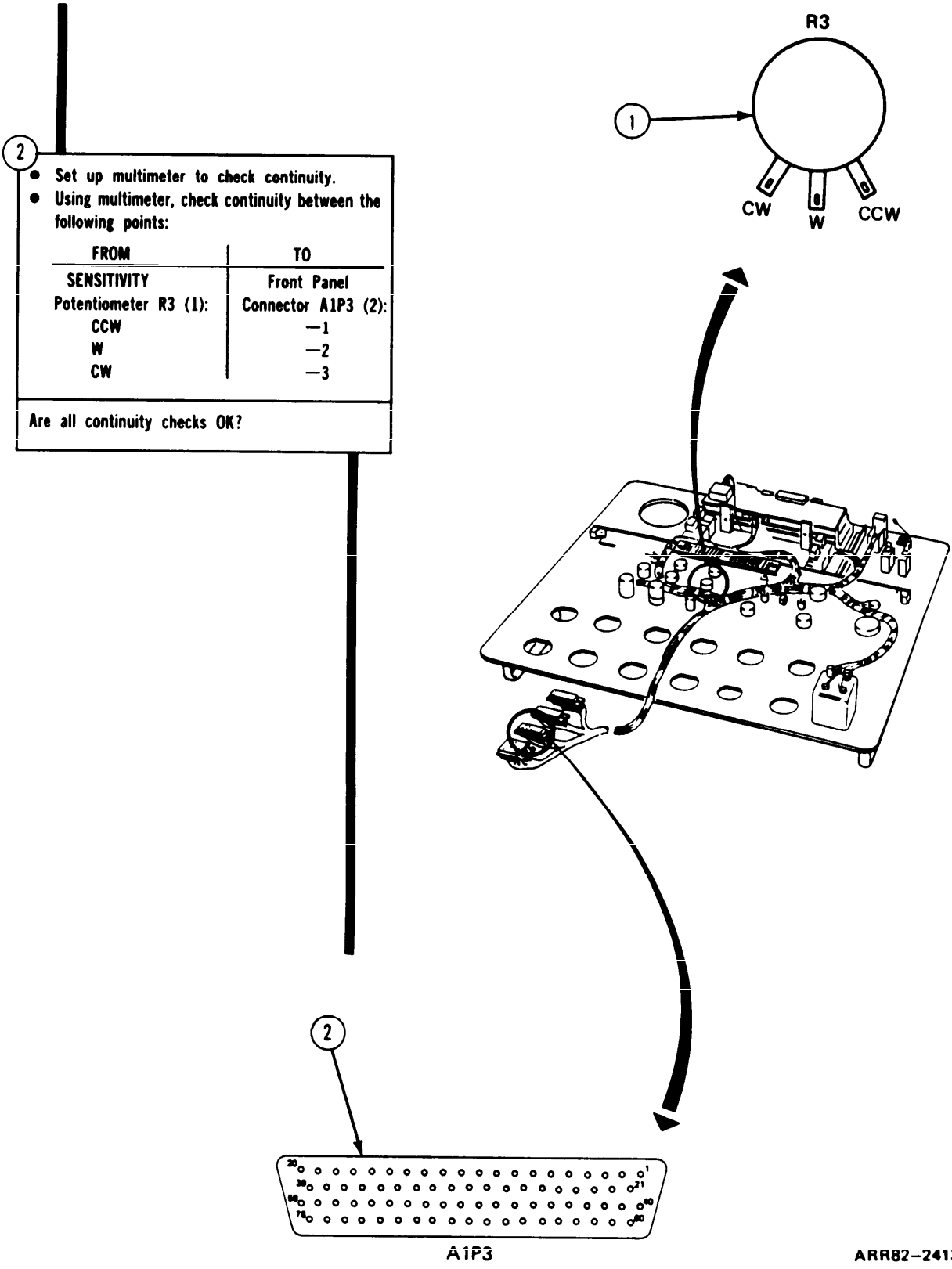
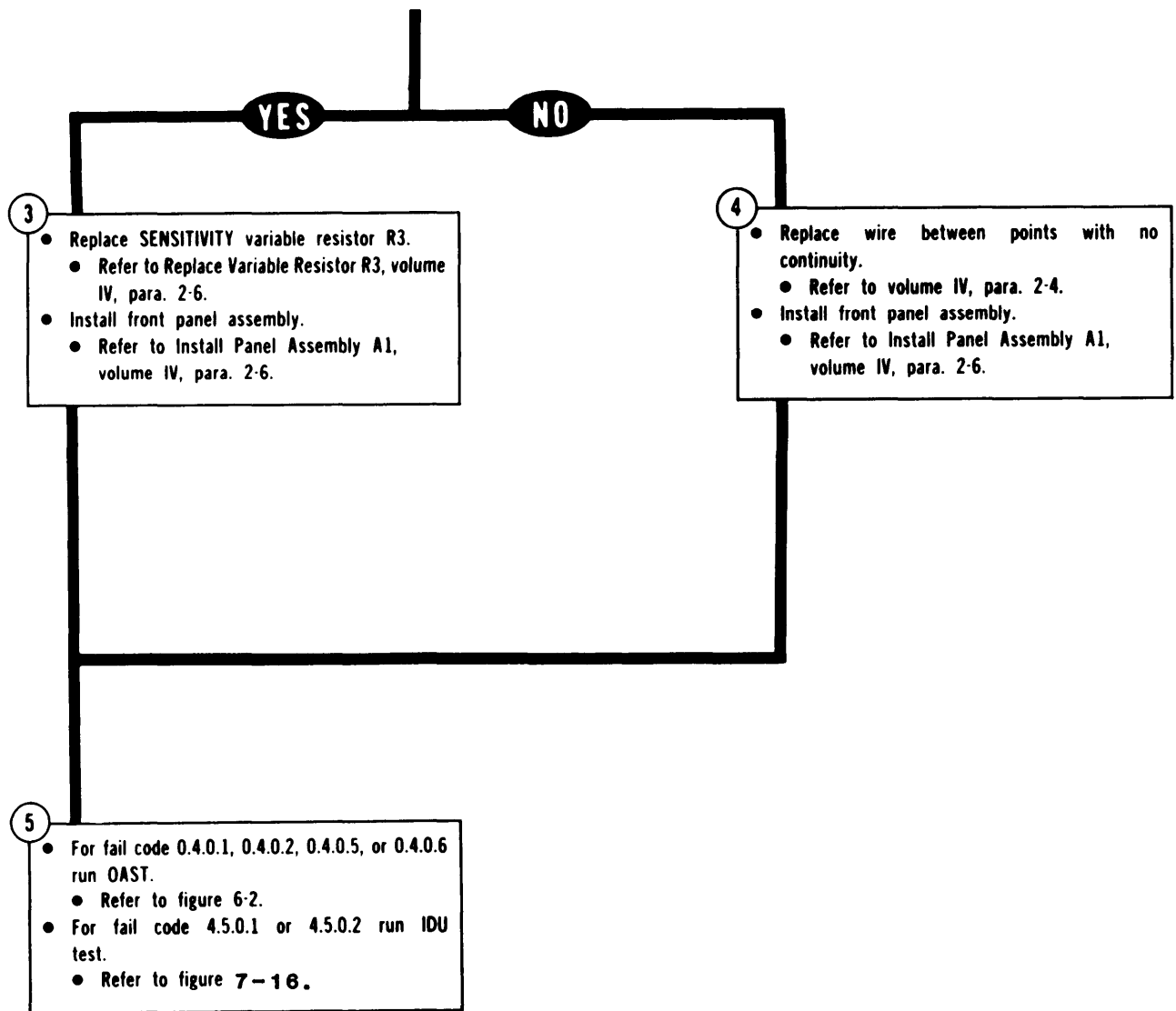


Figure 7-7. (Sheet 2 of 3)



ARR82-24136

Figure 7-7. (Sheet 3 of 3)

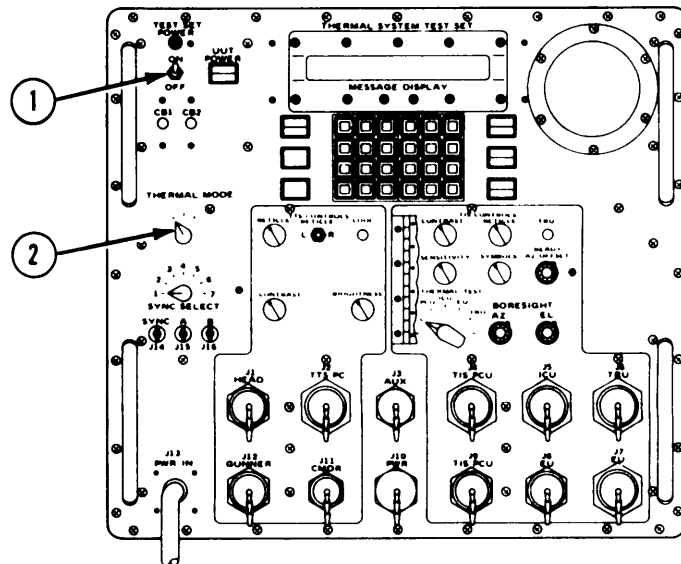
* 0.4.0.3
0.4.0.4
0.4.0.5
0.4.0.6

DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

Test Equipment/Special Tools:

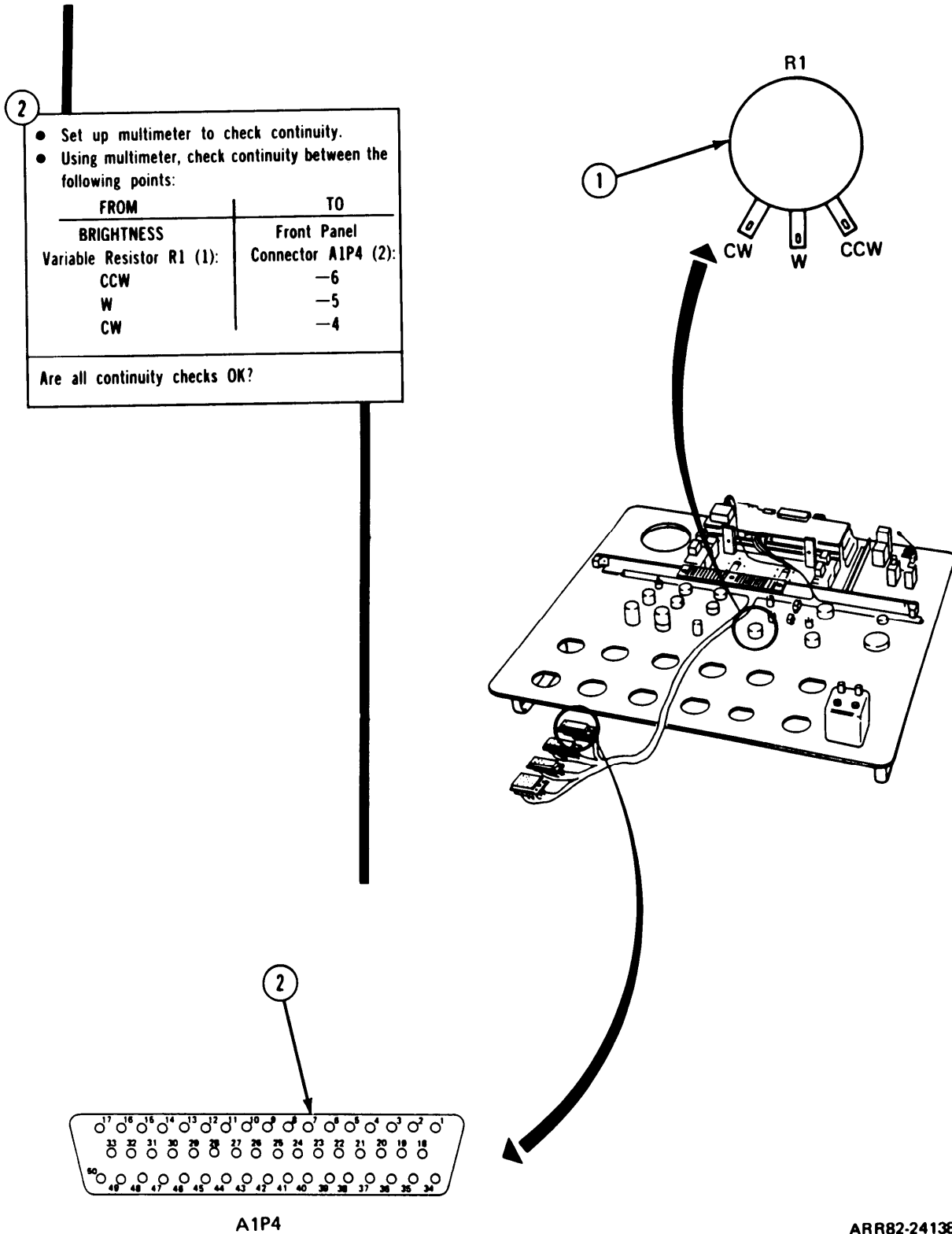
- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to OFF.
 - Remove front panel assembly.
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.



ARR82-24137

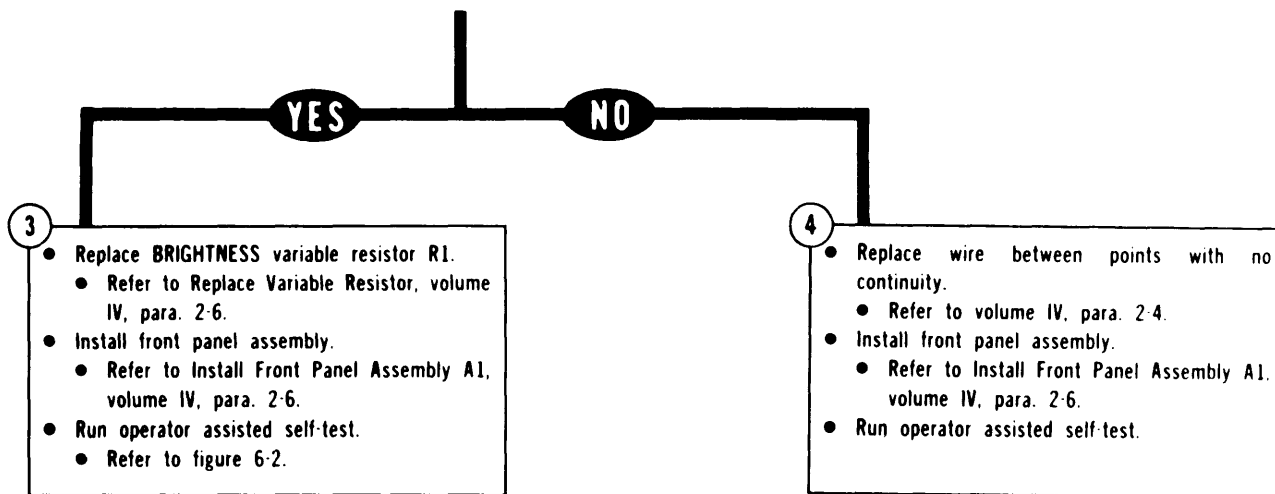
Figure 7-8. (Sheet 1 of 3)



ARR82-24138

Figure 7-8. (Sheet 2 of 3)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24139

Figure 7-8. (Sheet 3 of 3)

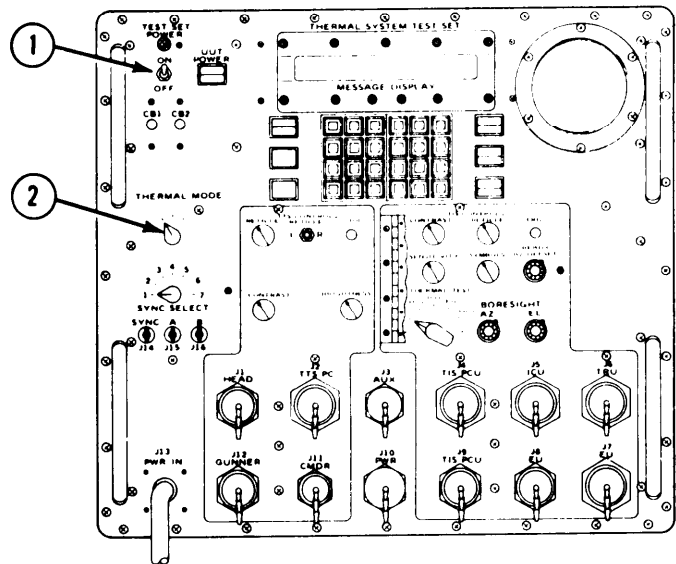
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

- * 0.5.0.1
- 0.5.0.2
- 0.5.0.5
- 0.5.0.6
- 4.6.0.1
- 4.6.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to OFF.
 - Remove front panel assembly.
 - Refer to Remove Front Panel Assembly A1, volume IV, para. 2-6.



ARR82-24140

Figure 7-9. (Sheet 1 of 3)

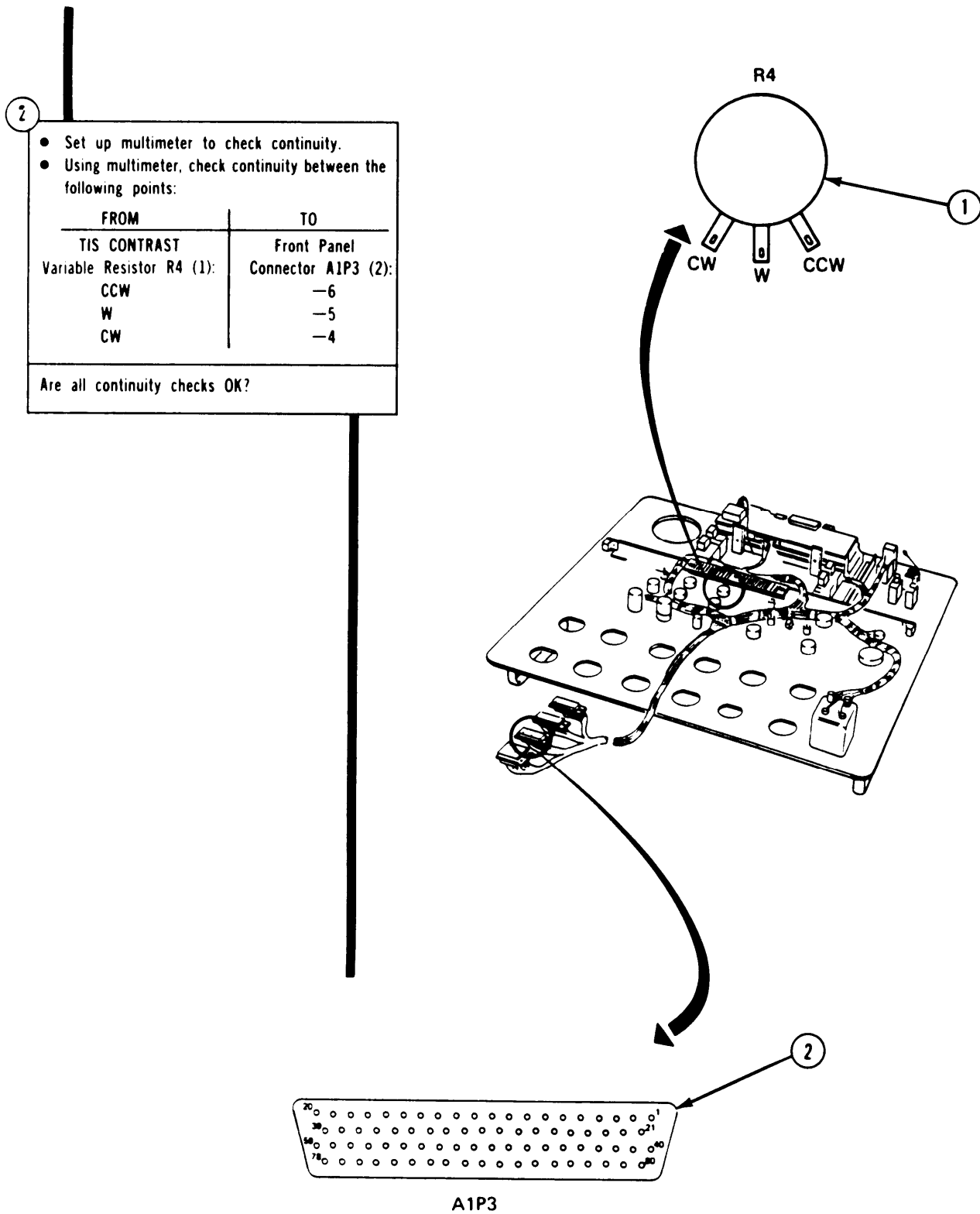
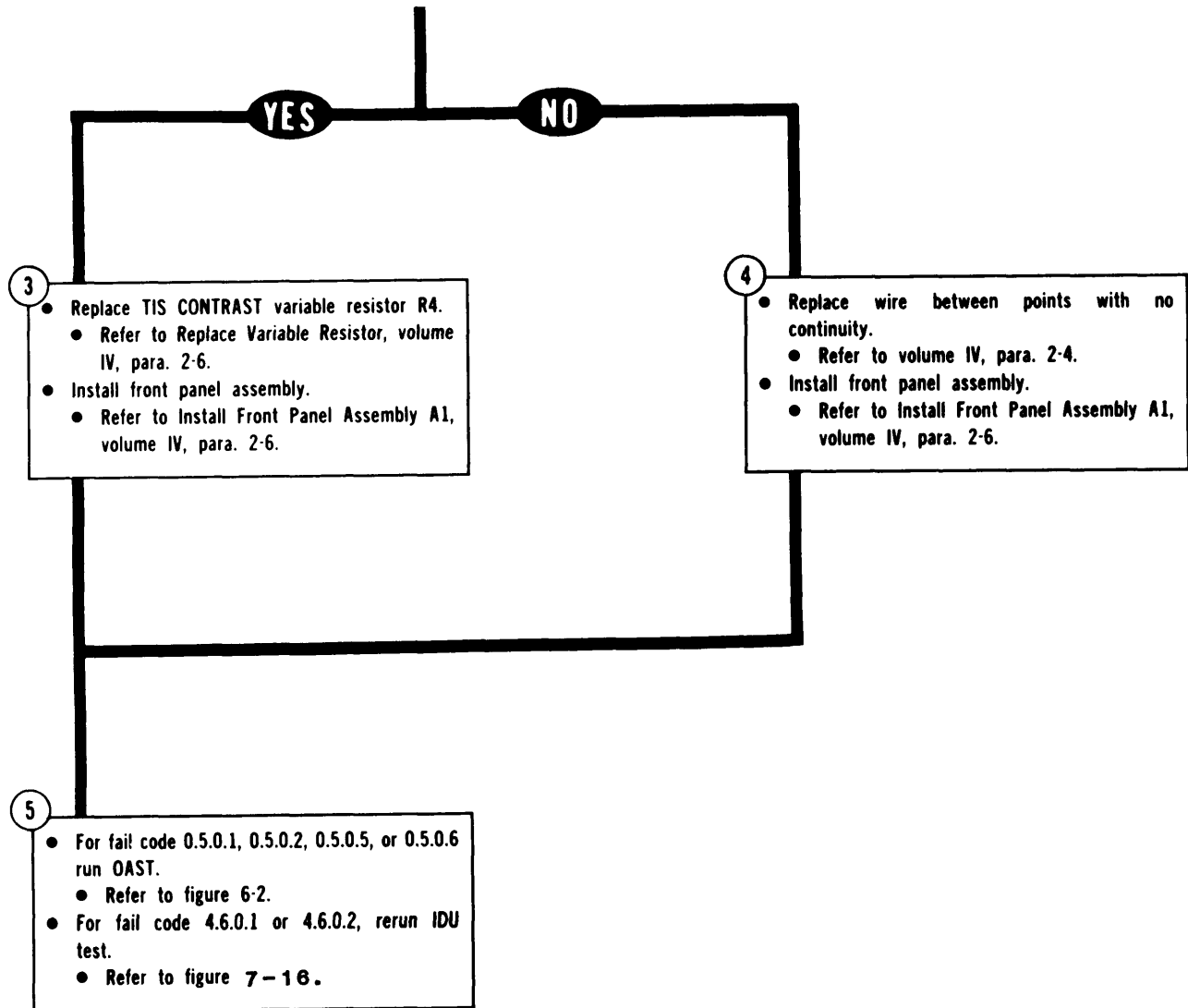


Figure 7-9. (Sheet 2 of 3)

ARR82-24141



ARR82-24142

Figure 7-9. (Sheet 3 of 3)

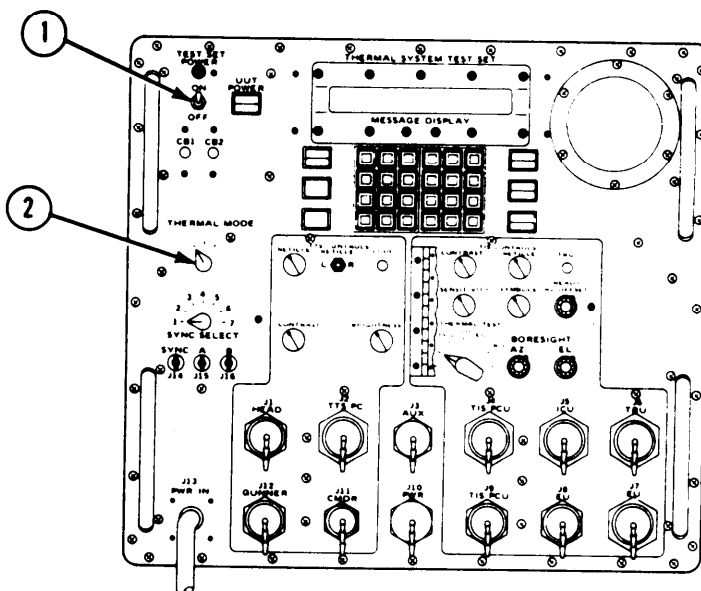
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

- * 0.5.0.3
- 0.5.0.4
- 0.5.0.5
- 0.5.0.6

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to OFF.
 - Remove front panel assembly.
 - Refer to Remove Front Panel Assembly A1, volume IV, para. 2-6.



ARR82-24143

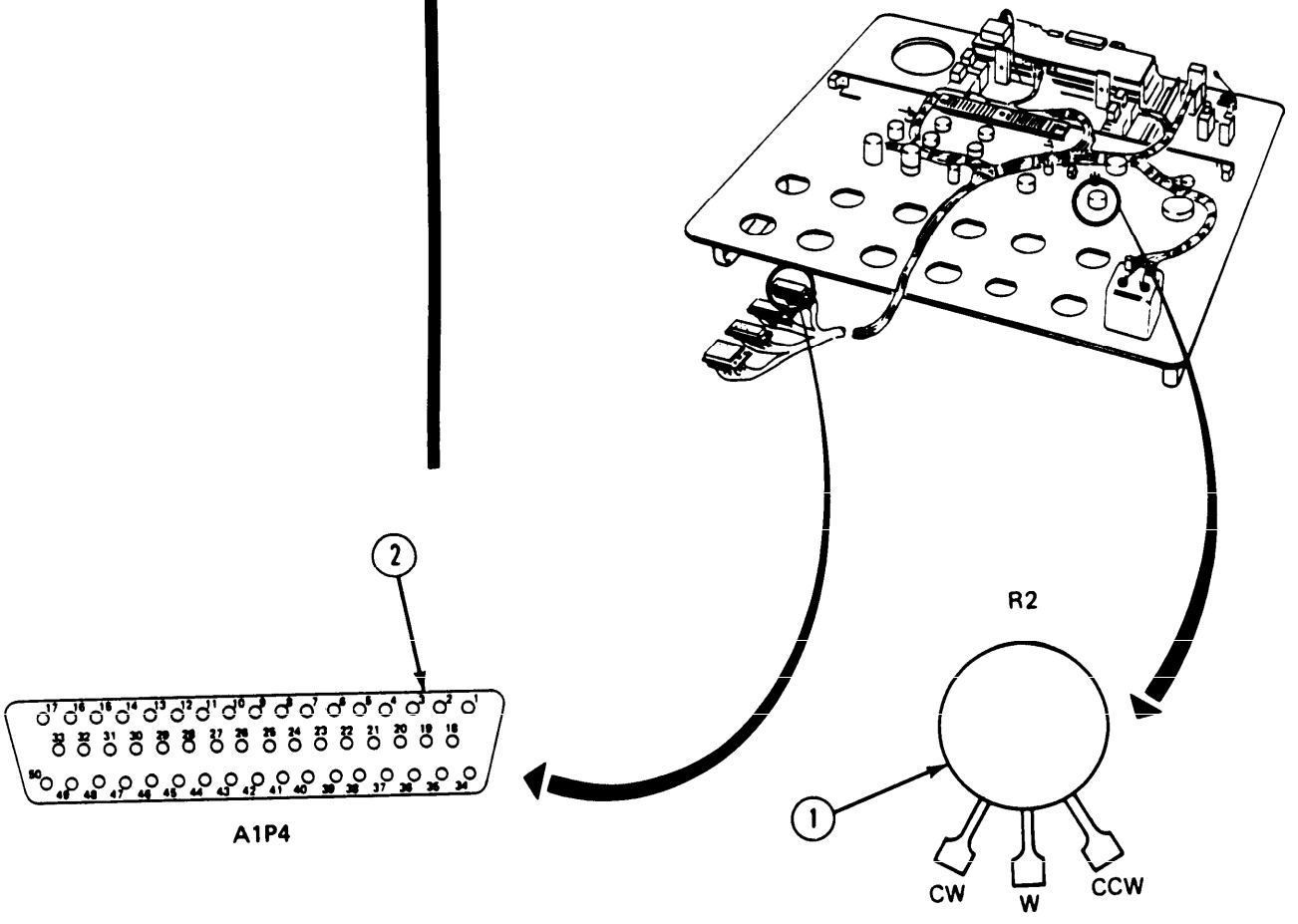
Figure 7-10. (Sheet 1 of 3)

2

- Set up multimeter to check continuity.
- Using multimeter, check continuity between the following points:

FROM	TO
TIS CONTRAST Variable Resistor R2 (1):	Front Panel Connector A1P4 (2):
CCW	-9
W	-8
CW	-7

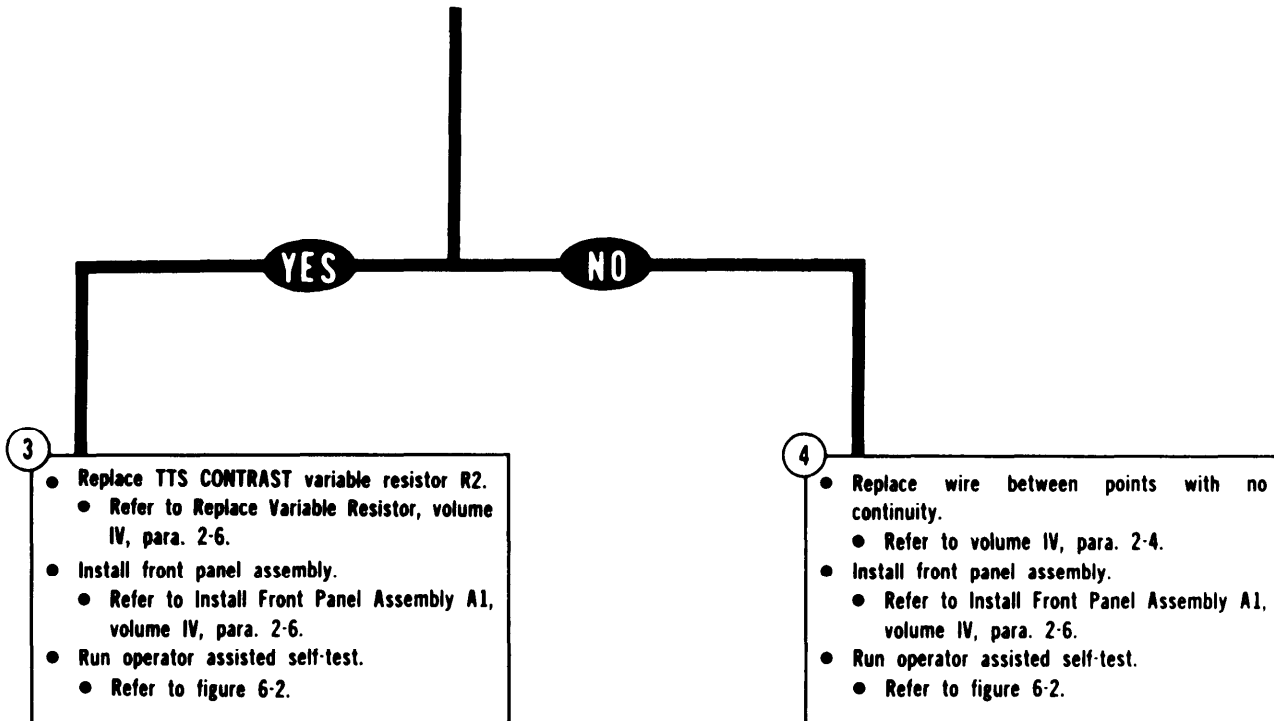
Are all continuity checks OK?



ARR82-24144

Figure 7-10. (Sheet 2 of 3)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24145

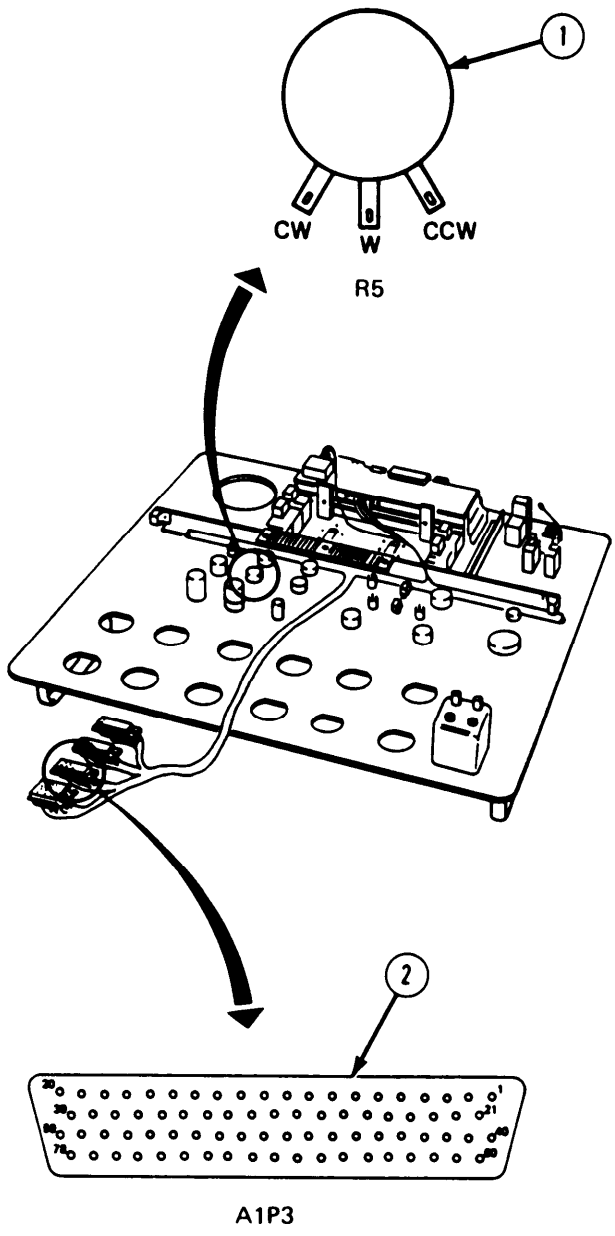
Figure 7-10. (Sheet 3 of 3)

2

- Set up multimeter to check continuity.
- Using multimeter, check continuity between the following points:

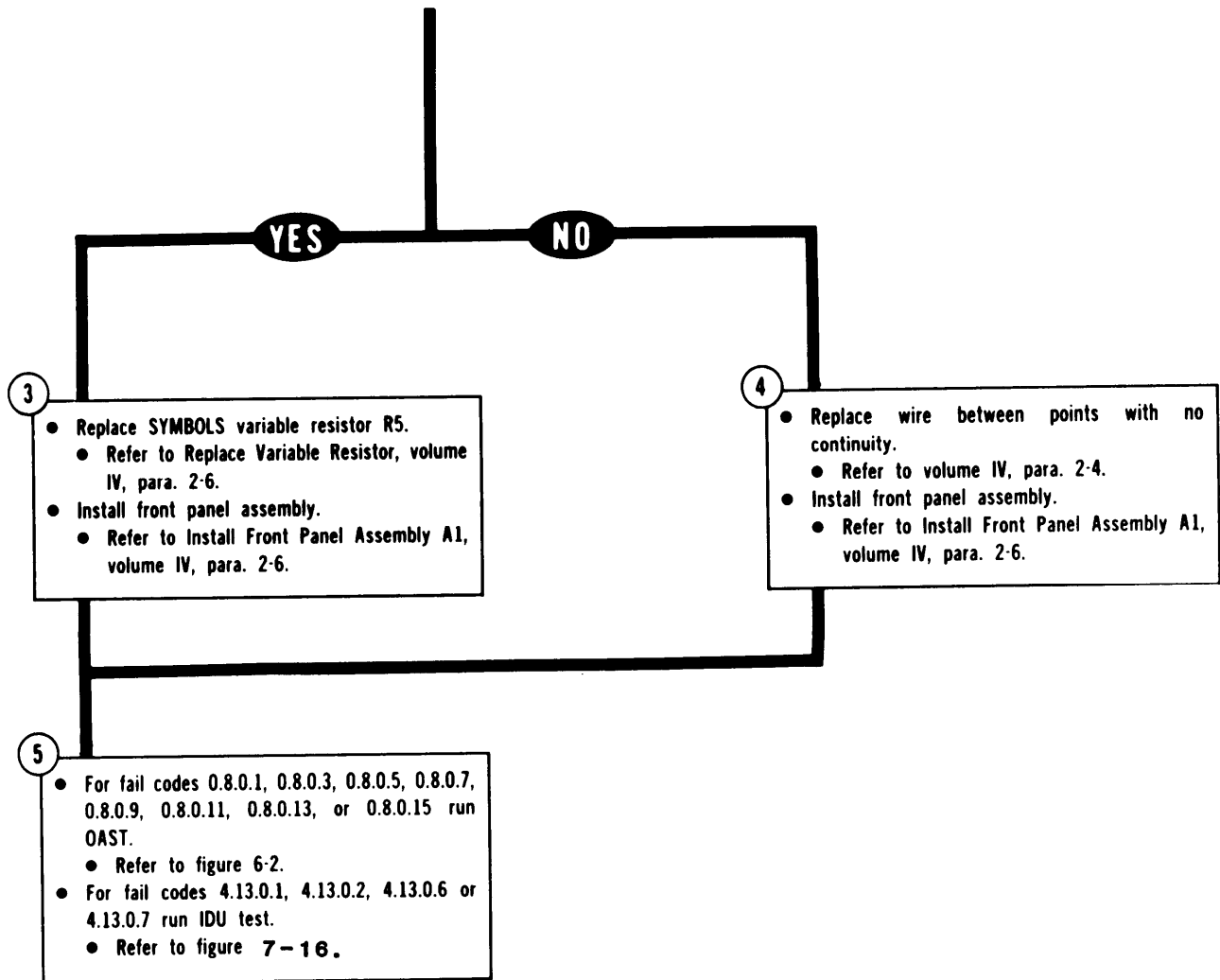
FROM	TO
SYMBOLS	Front Panel
Variable Resistor R5 (1):	Connector A1P3 (2):
-CCW	-9
-CW	-7
-W	-10

Are all continuity checks OK?



ARR82-24147

Figure 7-11. (Sheet 2 of 3)



ARR82-24148

Figure 7-11. (Sheet 3 of 3)

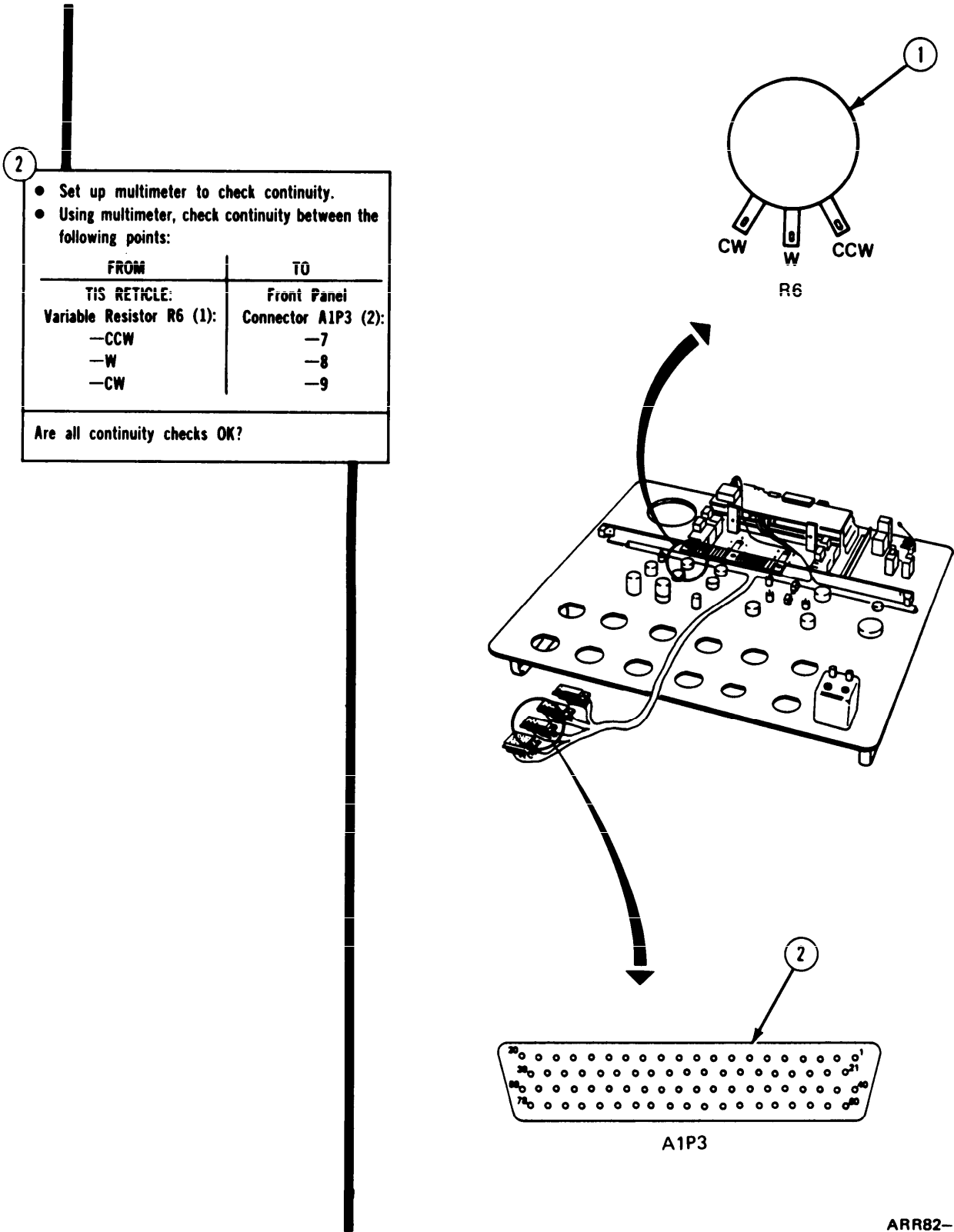
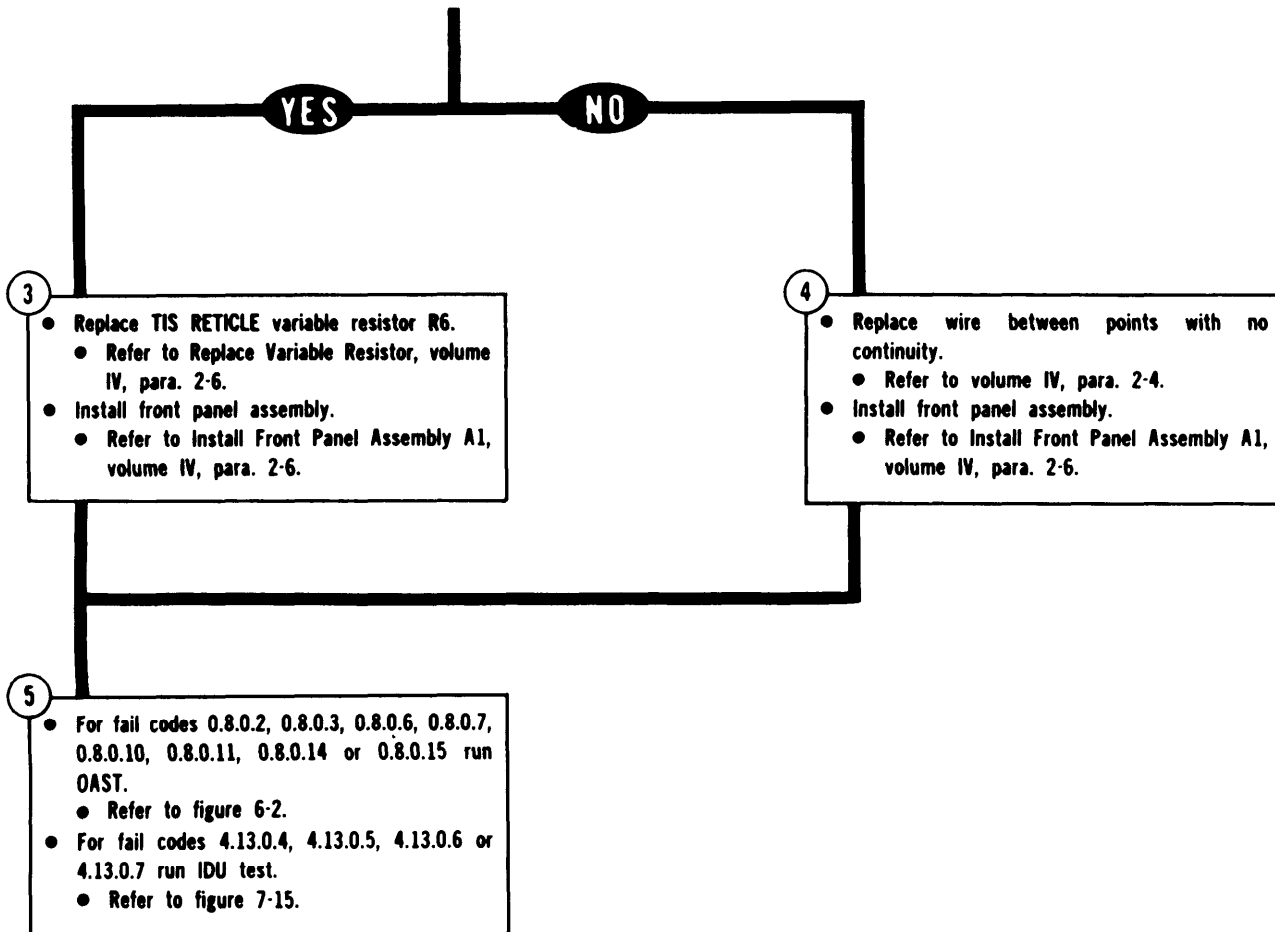


Figure 7-12. (Sheet 2 of 3)

ARR82-24150



ARR82-24151

Figure 7-12. (Sheet 3 of 3)

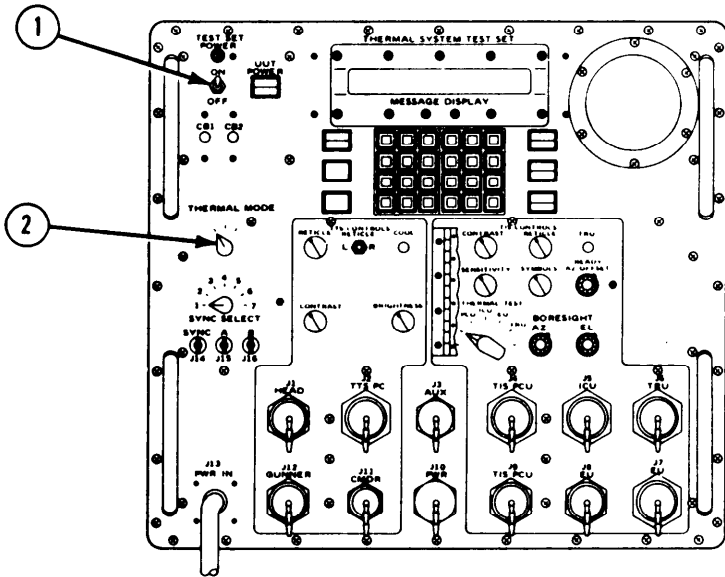
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

* 0.8.0.4	0.8.0.13
0.8.0.5	0.8.0.14
0.8.0.6	0.8.0.15
0.8.0.7	4.14.0.1
0.8.0.8	4.14.0.2
0.8.0.9	4.14.0.3
0.8.0.10	4.14.0.4
0.8.0.11	4.14.0.5
0.8.0.12	4.14.0.6

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to OFF.
 - Remove front panel assembly.
 - Refer to Remove Front Panel Assembly A1, volume IV, para. 2-6.



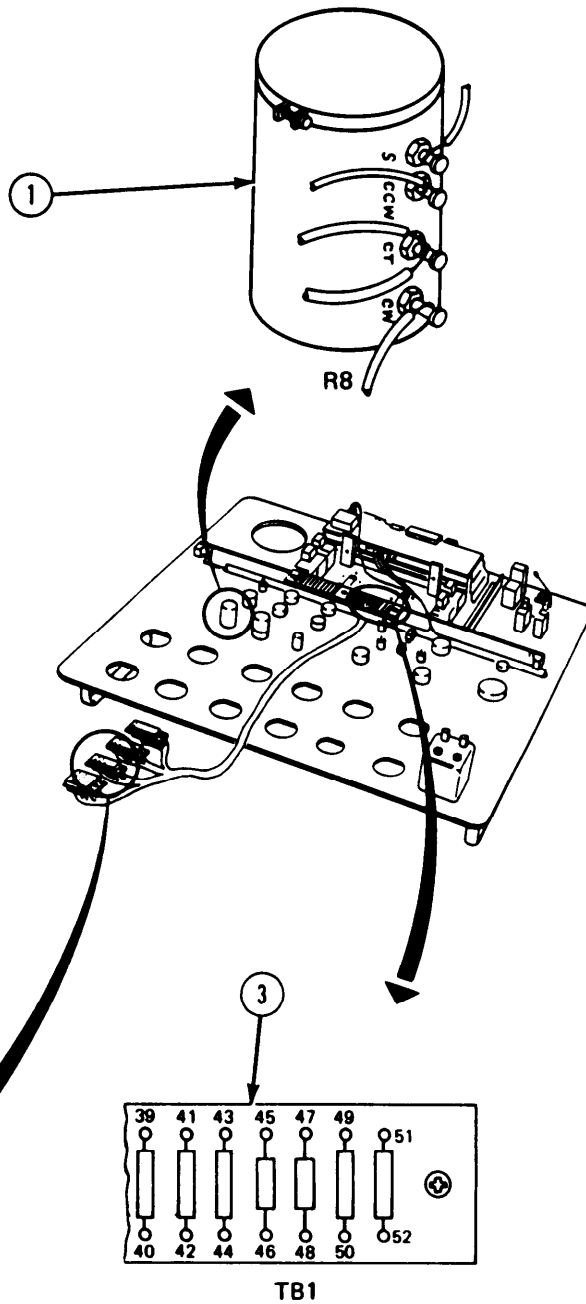
ARR82-24152

Figure 7-13. (Sheet 1 of 5)

- 2
- Set up multimeter to check continuity.
 - Using multimeter, check continuity between points listed in table 7-2.
- Are all continuity checks OK?

TABLE 7-2

FROM	TO
EL BORESIGHT Variable Resistor R8 (1):	Front Panel Connector A1P3 (2):
	-S -12
	-CT -15
	Board Assembly TB1 (3):
	-CCW -47
	-CW -46



ARR82-24153

Figure 7-13. (Sheet 2 of 5)

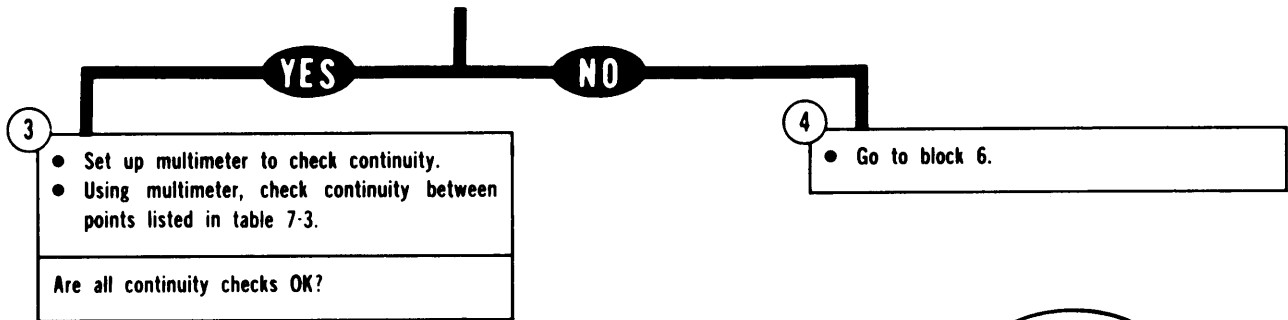


TABLE 7-3

FROM	TO
AZ BORESIGHT Variable Resistor R7 (1):	Front Panel Connector A1P3 (2):
	Board Assembly TB1 (3):
-S	-14
-CT	-15
-CCW	-32
-CW	-33

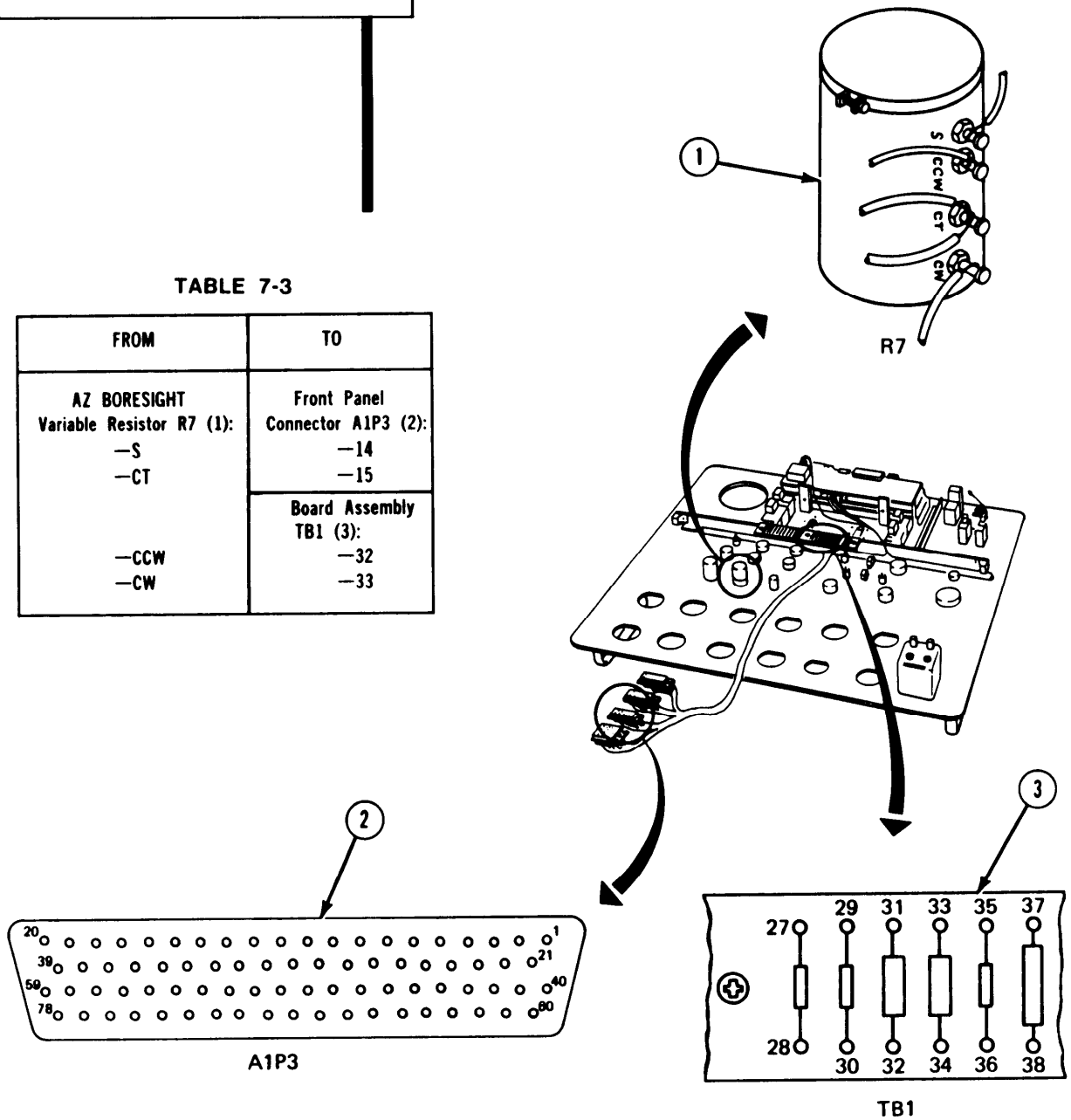
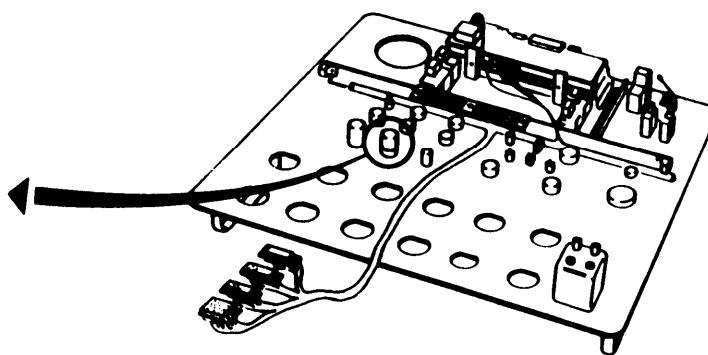
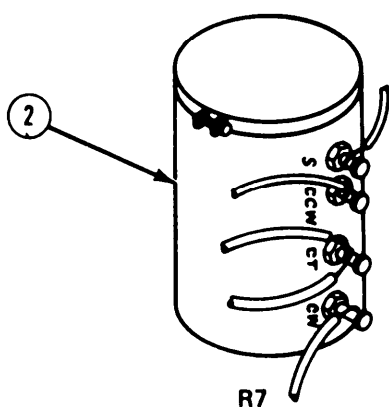
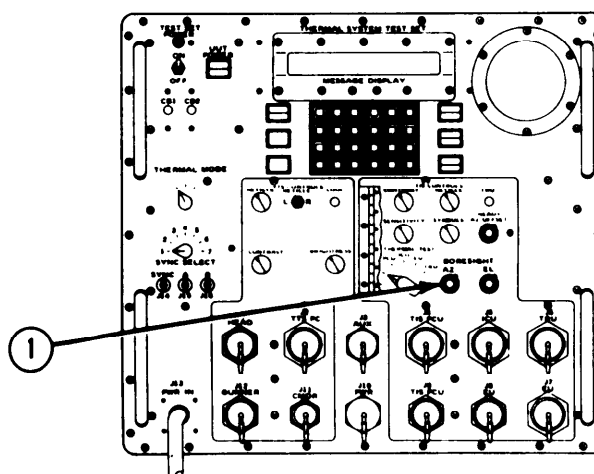
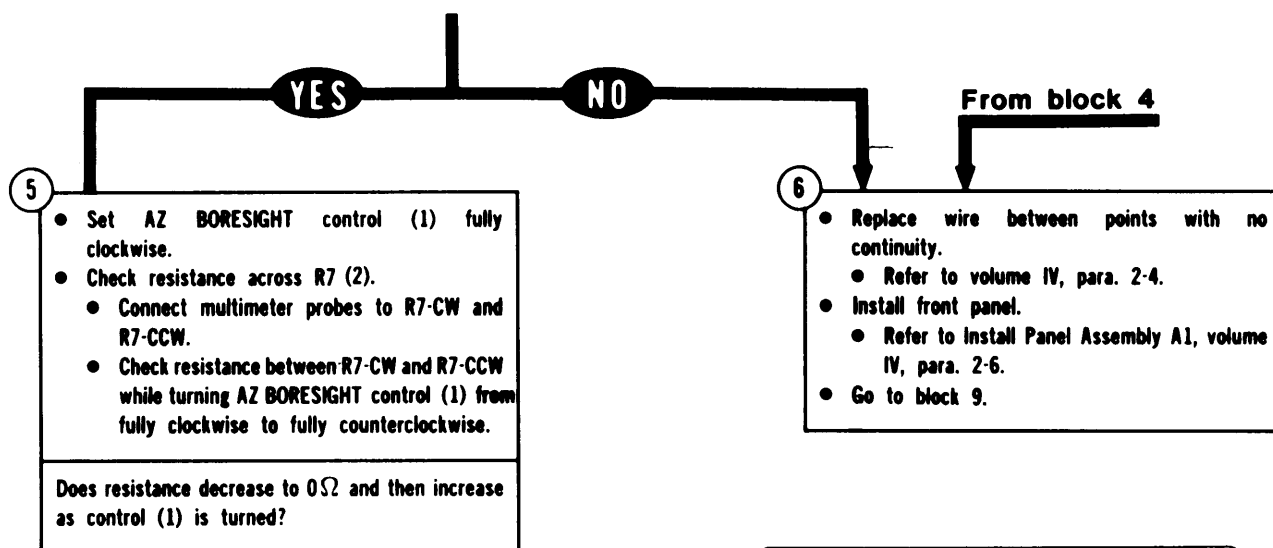


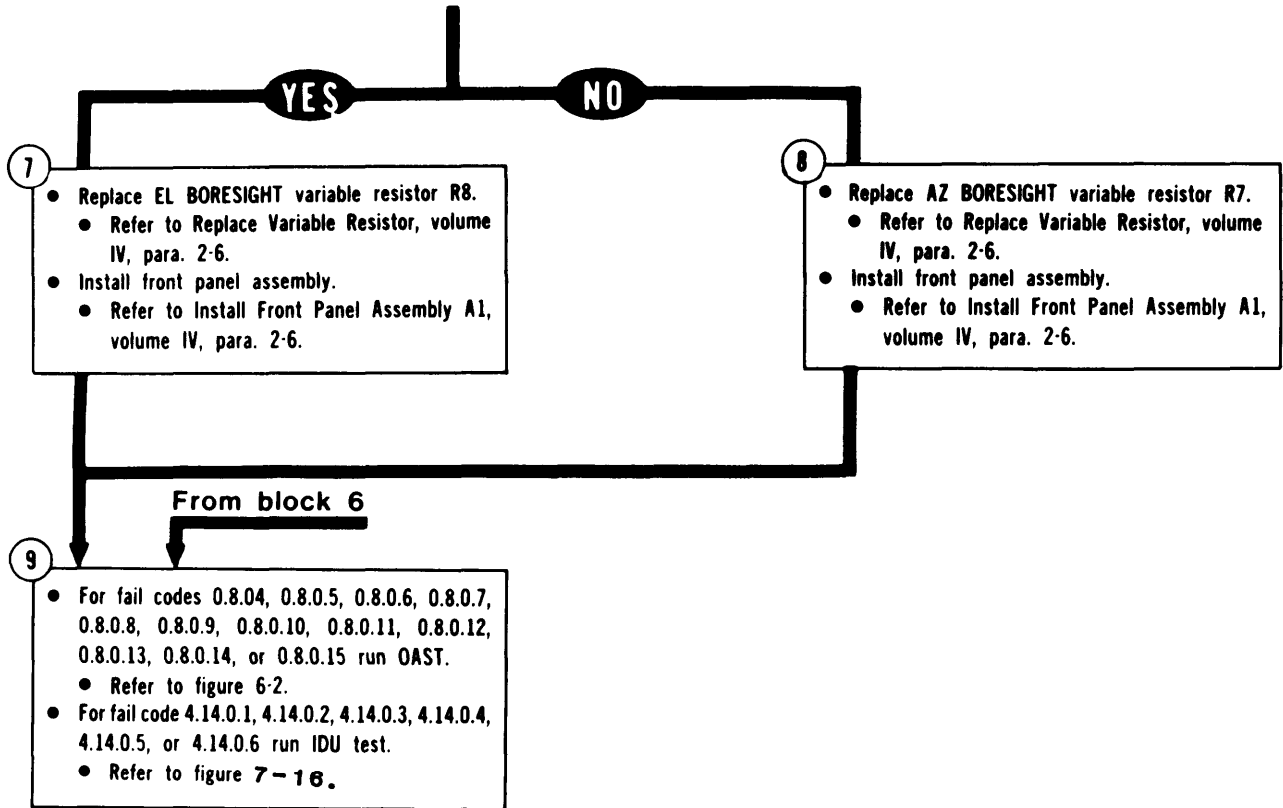
Figure 7-13. (Sheet 3 of 5)

ARR82-24154



ARR82-24155

Figure 7-13. (Sheet 4 of 5)



ARR82-24156

Figure 7-13. (Sheet 5 of 5)

DISPLAY INDICATES
FAIL CODE: 0.3.0.1

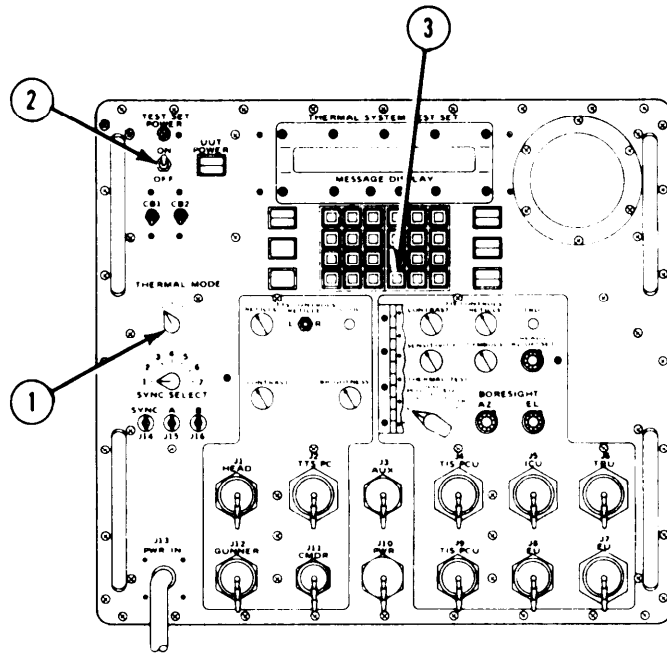
Test Equipment/Special Tools:
None

Equipment Condition:
• TSTS on clean work surface, power ON.

- 1
- Power down TSTS.
 - Set THERMAL MODE switch (1) to OFF.
 - Set TEST SET POWER switch (2) to OFF.
 - Remove TSTC for access.
 - Refer to volume IV, para. 2-5.
 - Remove power module for access.
 - Refer to volume IV, para. 2-9.

NOTE

- If same fail code appears during rerun of test, do not repeat the corrective action, instead press CON key (3) and continue.
- For PCU schematics refer to FO-9 and FO-10.



ARR82-24157

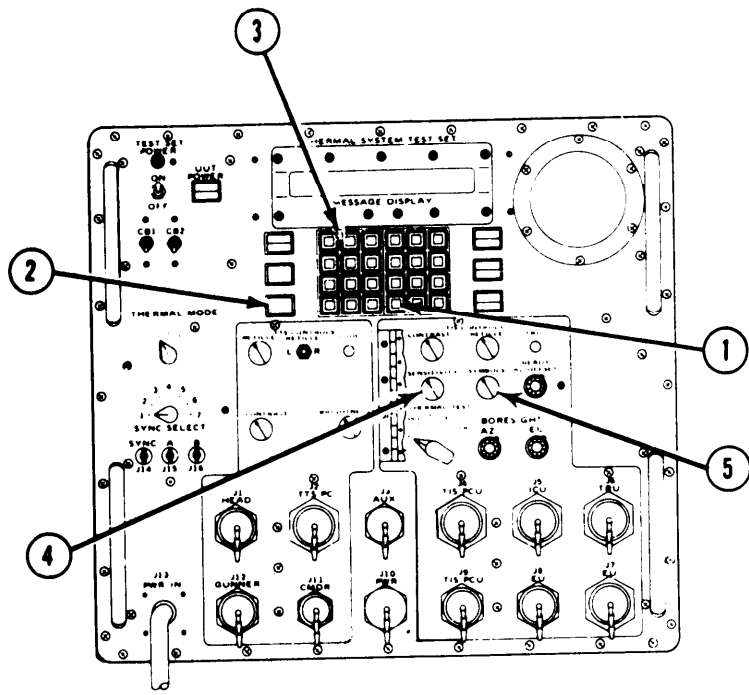
Figure 7-14. (Sheet 1 of 12)

NOTE

During testing, message display may read —
**REFER TO PROCEDURE # 0.0.0.4
SYSTEM POWER MALFUNCTION**
If this happens, press **CON** key (1). If message
display still refers to procedure, then refer to figure
7-14.1. If not, then continue troubleshooting where
you left off.

- 2
- Prepare test set for operation.
 - Refer to volume 1, para. 4-17.
 - Press **NO** key (2).

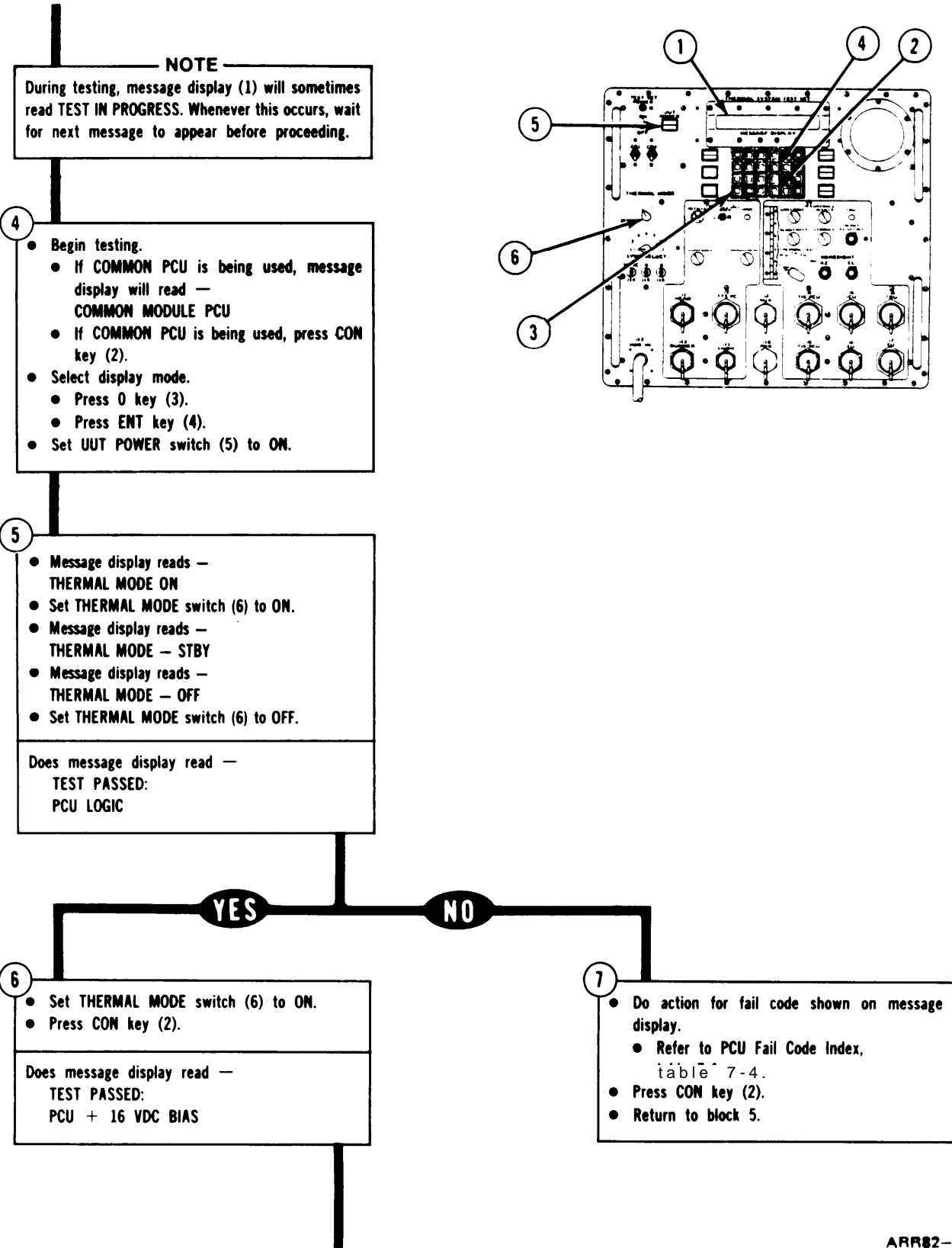
- 3
- Enter Unit Under Test (UUT) number.
 - Using keyboard (3) press the following keys:
 - Press 1 key.
 - Press +/- key.
 - Press ENT key.
 - Enter test instructions.
 - Press TST # key.
 - Press ENT key.
 - Message display reads —
SENSITIVITY and SYMBOLS — FULL CCW
 - Set **SENSITIVITY** knob (4) and **SYMBOLS** knob (5) fully counterclockwise.
 - Press **CON** key (1).



ARR82-24158

Figure 7-14. (Sheet 2 of 11)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24159

Figure 7-14. (Sheet 3 of 12)

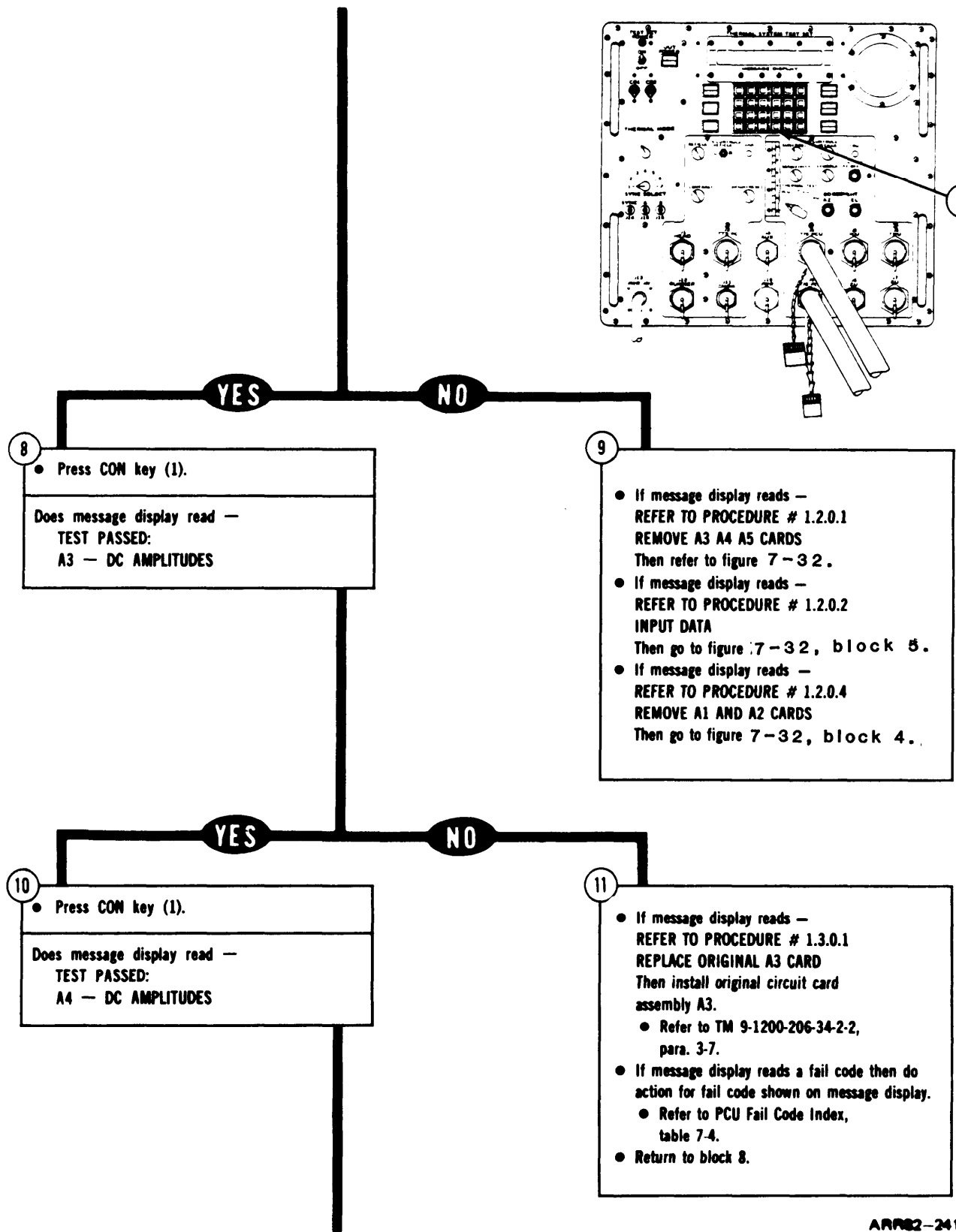
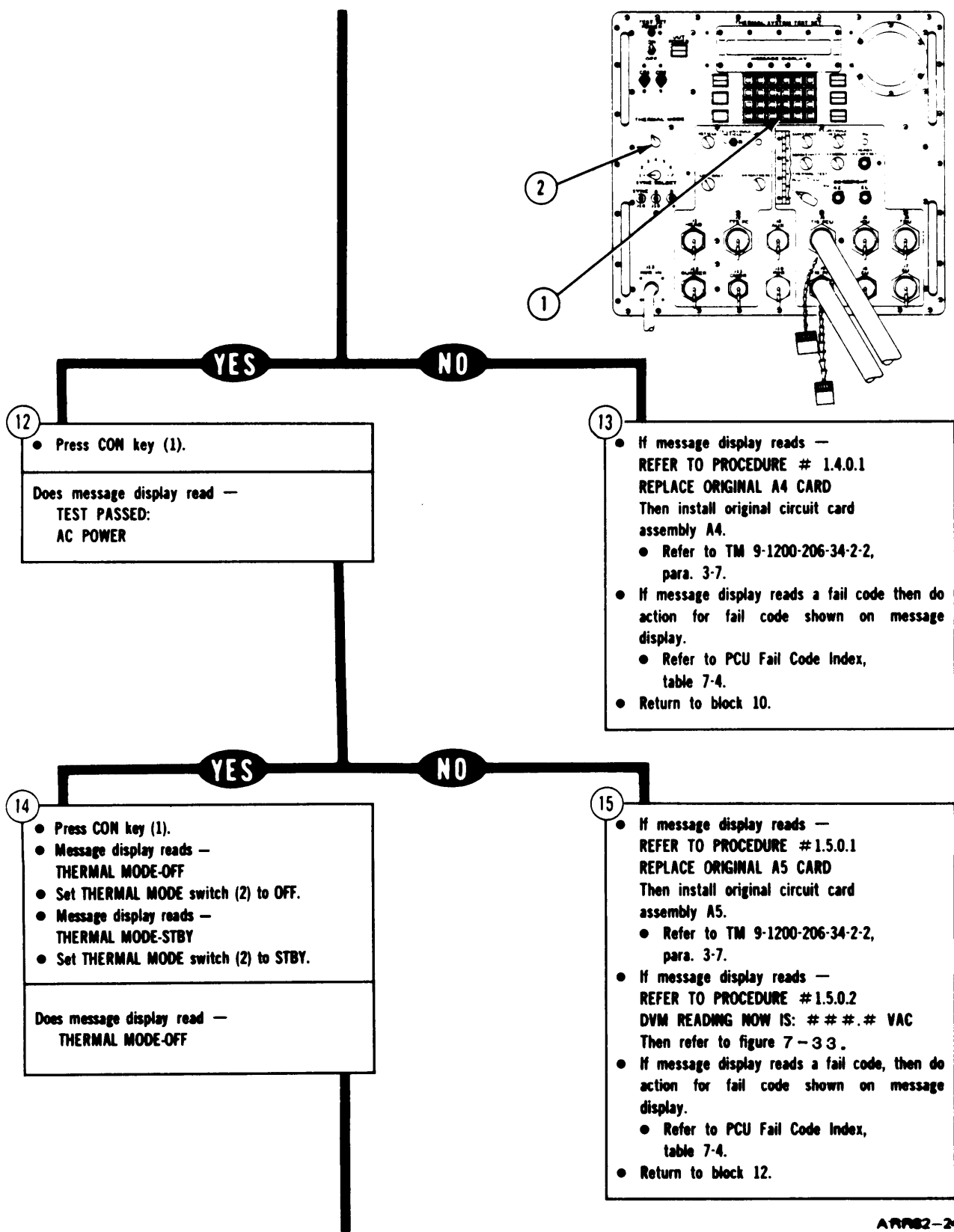


Figure 7-14. (Sheet 4 of 12)

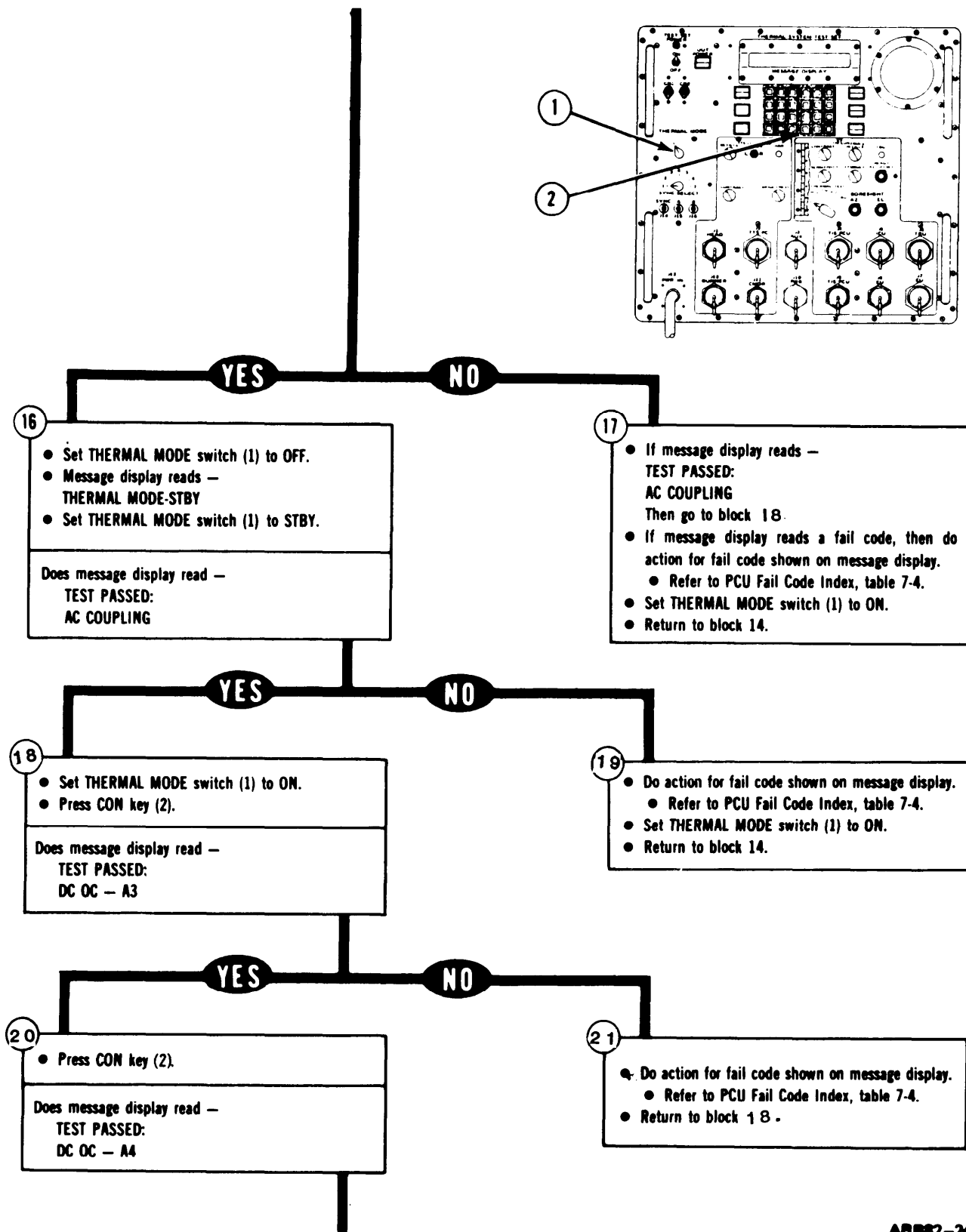
ARR82-24150

TSTS TROUBLESHOOTING PROCEDURES



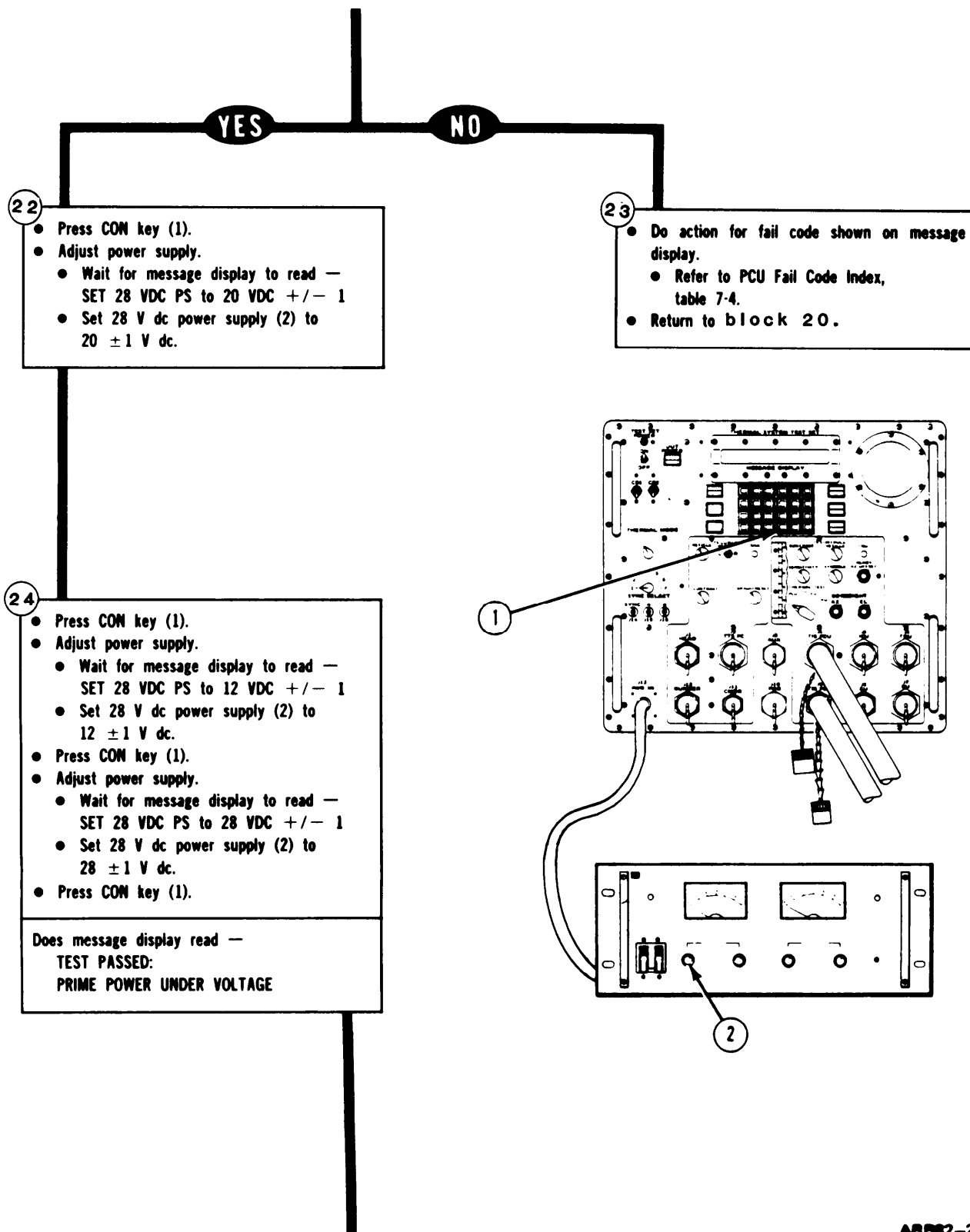
ARRB2-24100

Figure 7-14. (Sheet 5 of 12)



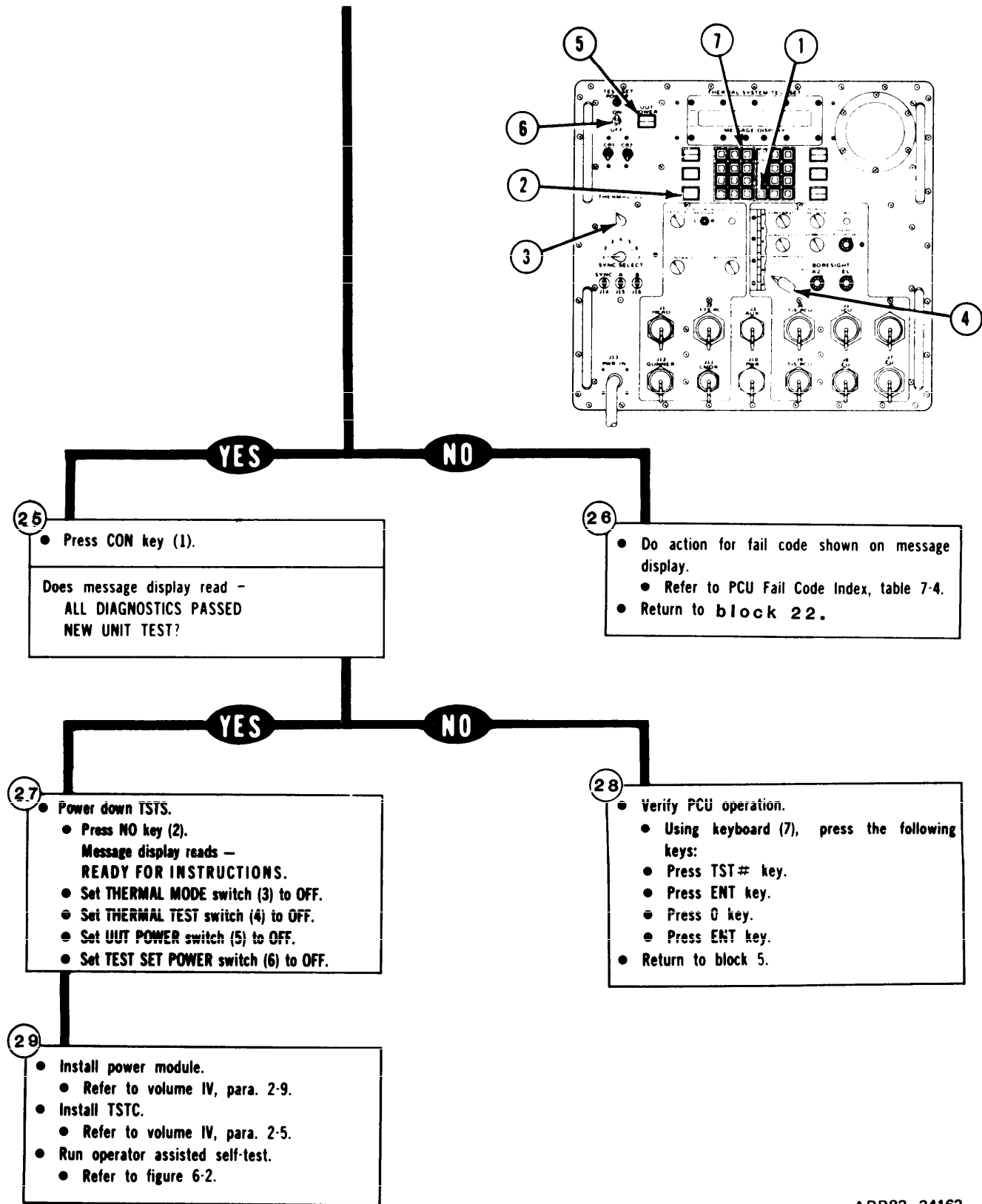
ARR82-24163

Figure 7-14. (Sheet 6 of 12)



ARR2-24161

Figure 7-14. (Sheet 7 of 12)



ARR82-24162

Figure 7-14. (Sheet 8 of 12)

TABLE 7-4. PCU FAIL CODE INDEX

CODE DISPLAY	CORRECTIVE ACTION
UNRESOLV- ABLE FAULT	PCU cannot be repaired at DS/GS level. Turn in PCU to depot.
1.1.0.1	Replace filter assembly A6; refer to Remove and Install Filter Assembly A6, TM 9-1200-206-34-2-2, para. 3-7.
1.1.0.2	Replace electronic component; refer to Remove and Install Electronic Component, TM 9-1200-206-34-2-2, para. 3-7.
1.1.0.3	Refer to procedure in figure 7-34.
1.1.0.4	Replace alternating current generator A5; refer to Remove and Install Alternating Current Generator A5, TM 9-1200-206-34-2-2, para. 3-7.
1.2.0.1	Do procedure in figure 7-32.
1.2.0.2	Do procedure for fail code 1.1.0.1. If A1 and A2 cards are removed then replace original A1 and A2 cards; refer to Remove and Install Switching Regulator A1 and Remove and Install Converter Assembly A2, TM 9-1200-206-34-2-2, para. 3-7.
1.2.0.3	Replace switching regulator A1; refer to Remove and Install Switching Regulator A1, TM 9-1200-206-34-2-2, para. 3-7. If A2 card is removed then replace original A2 card; refer to Remove and Install Converter Assembly A2, TM 9-1200-206-34-2-2, para. 3-7.
1.2.0.4	Do procedure for fail code 1.1.0.2. Replace original A1 and A2 cards; refer to Remove and Install Switching Regulator A1 and Remove and Install Converter Assembly A2, TM 9-1200-206-34-2-2, para. 3-7.

Figure 7-14. (Sheet 9 of 12)

TABLE 7-4. PCU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
1.2.0.5	Replace converter assembly A2; refer to Remove and Install Converter Assembly A2, TM 9-1200-206-34-2-2, para. 3-7. If A1 card is removed then replace original A1 card; refer to Remove and Install Switching Regulator A1, TM 9-1200-206-34-2-2, para. 3-7.
1.2.1.2	Do procedure for fail code 1.2.0.3.
1.2.1.3	Do procedure for fail code 1.2.0.5.
1.2.1.4	Do procedure for fail code 1.1.0.2.
1.3.0.1	Do procedure for fail code 1.1.0.1.
1.3.0.2	Do procedure for fail code 1.1.0.2.
1.3.0.3	Replace linear regulator assembly A3; refer to Remove and Install Linear Regulator Assembly A3, TM 9-1200-206-34-2-2, para. 3-7.
1.3.0.4	Do procedure for fail code 1.2.0.5.
1.4.0.1	Do procedure for fail code 1.1.0.1.
1.4.0.2	Do procedure for fail code 1.1.0.2.
1.4.0.3	Replace linear converter assembly A4; refer to Remove and Install Linear Converter Assembly A4, TM 9-1200-206-34-2-2, para. 3-7.

Figure 7-14. (Sheet 10 of 12)

TABLE 7-4. PCU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
1.4.0.4	Do procedure for fail code 1.2.0.5.
1.5.0.0	PCU cannot be repaired at DS/GS level. Turn in PCU to depot.
1.5.0.1	Do procedure for fail code 1.1.0.1.
1.5.0.2	Do procedure for fail code 1.1.0.2.
1.5.0.3	Do procedure for fail code 1.1.0.4.
1.5.0.4	Do procedure for fail code 1.2.0.5.
1.6.0.0	PCU cannot be repaired at DS/GS level. Turn in PCU to depot.
1.6.0.1	Do procedure for fail code 1.1.0.1.
1.6.0.2	Do procedure for fail code 1.1.0.4.
1.7.0.0	PCU cannot be repaired at DS/GS level. Turn in PCU to depot.
1.7.0.1	Do procedure for fail code 1.1.0.1.
1.7.0.2	Do procedure for fail code 1.1.0.2.
1.7.0.3	Do procedure for fail code 1.3.0.3.
1.7.0.4	Do procedure for fail code 1.2.0.3.
1.8.0.0	PCU cannot be repaired at DS/GS level. Turn in PCU to depot.

Figure 7-14. (Sheet 11 of 12)

TSTS TROUBLESHOOTING PROCEDURES

TABLE 7-4. PCU FAIL CODE INDEX (Continued)

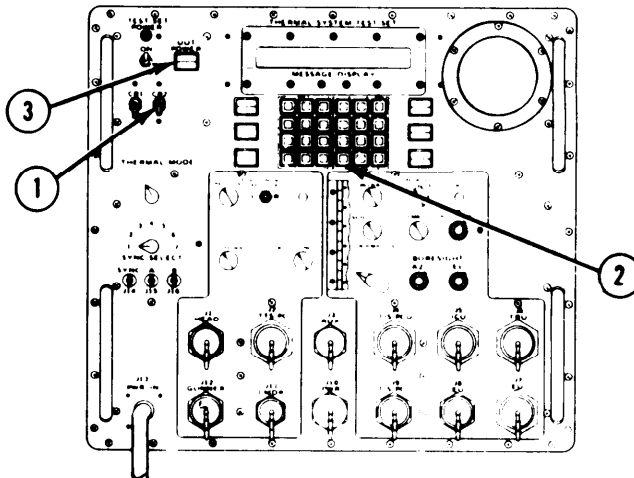
CODE DISPLAY	CORRECTIVE ACTION
1.8.0.1	Do procedure for fail code 1.1.0.1.
1.8.0.2	Do procedure for fail code 1.1.0.2.
1.8.0.3	Do procedure for fail code 1.4.0.3.
1.9.0.1	Do procedure for fail code 1.2.0.3.
1.9.0.2	Do procedure for fail code 1.1.0.1.

Figure 7-14. (Sheet 12 of 12)

TSTS TROUBLESHOOTING PROCEDURES

**DISPLAY READS —
REFER TO PROCEDURE #0.0.0.4
SYSTEM POWER MALFUNCTION**

NOTE
During this procedure, disregard fail codes shown on message display.



1
● Look at CB2 (1).
Is CB2 (1) in down position?

NO **YES**

NOTE
When pressing COM key (2) in block 2, observe UUT POWER switch (3) to see if it toggles.

3
● Go to block 6.

2
● Press COM key (2), slowly, three times.
Did UUT POWER switch (3) toggle?

YES **NO**

4
● Replace A6 card.
● Refer to TM 9-1200-206-34-2-2, para. 3-7.
● Continue troubleshooting.
● Go to block 2 8, figure 7-14.

5
● PCU cannot be repaired at DS/GS level.
● Turn in PCU to depot.

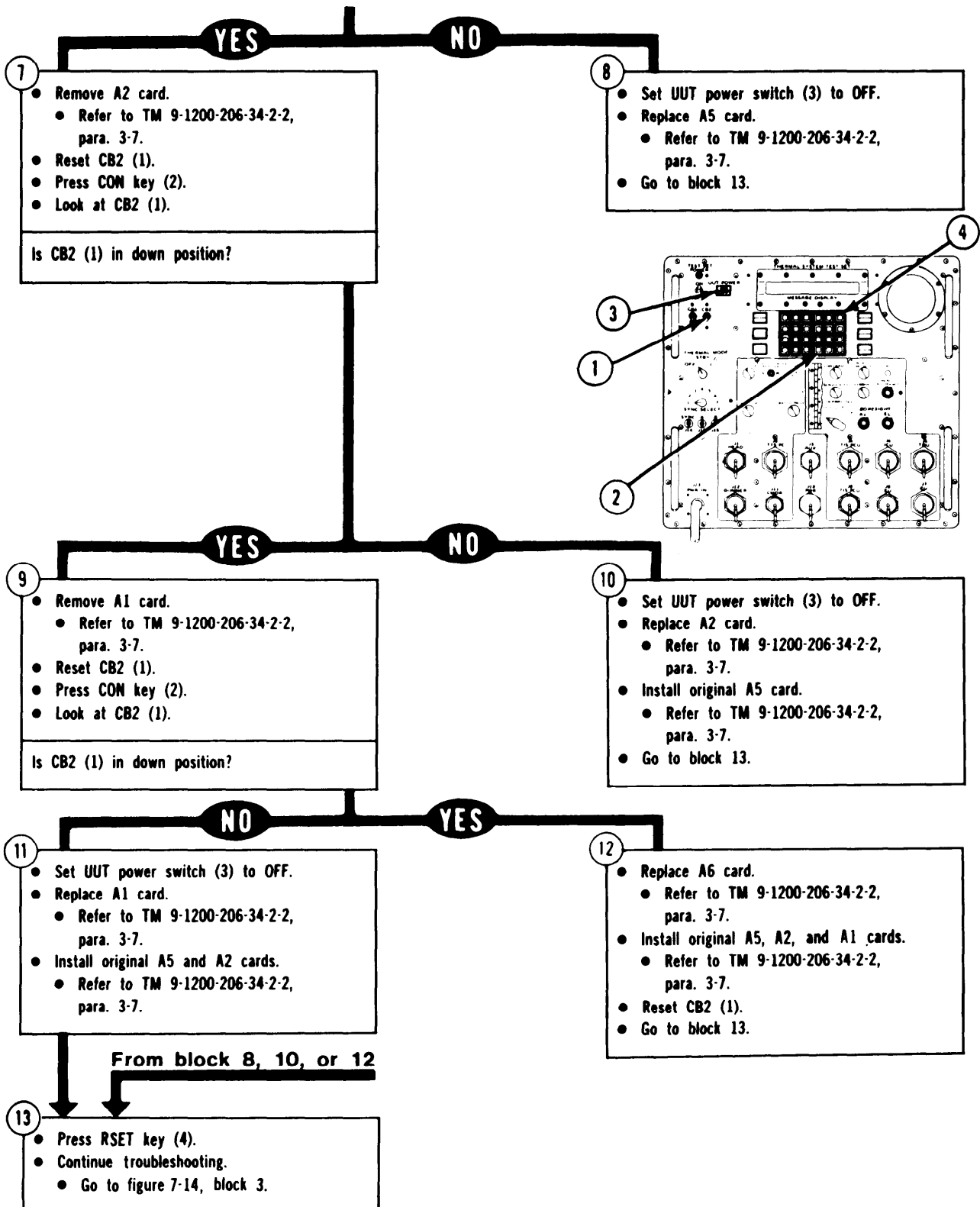
From block 3

6
● Remove, but do not turn in circuit card assembly A5.
● Refer to TM 9-1200-206-34-2-2, para. 3-7.
● Reset CB2 (1).
● Press COM key (2).
● Look at CB2 (1).
Is CB2 (1) in down position?

ARR82-24162.1

Figure 7-15 (Sheet 1 of 2)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24162.2

Figure 7-15 (Sheet 2 of 2)

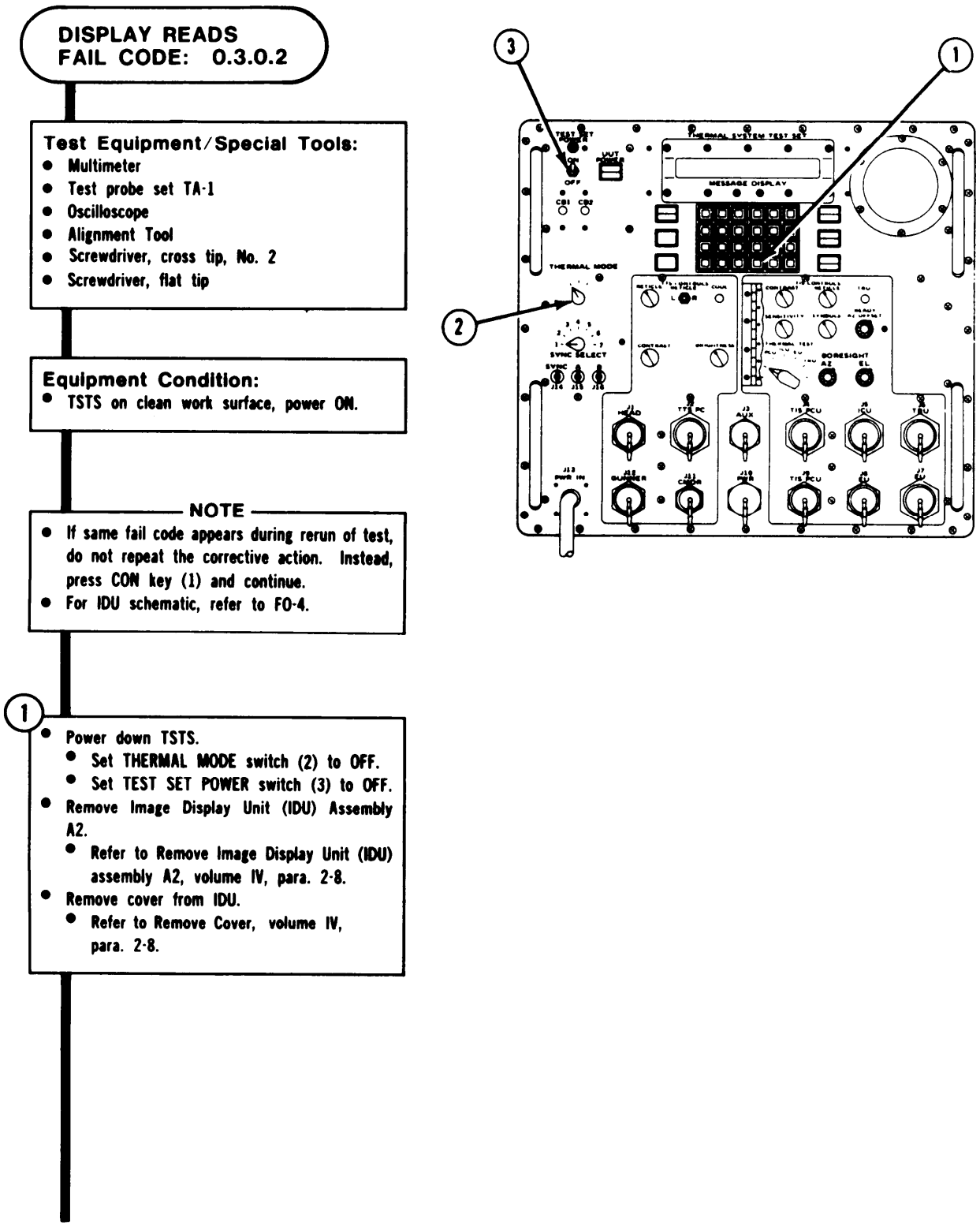


Figure 7-16 (Sheet 1 of 34)

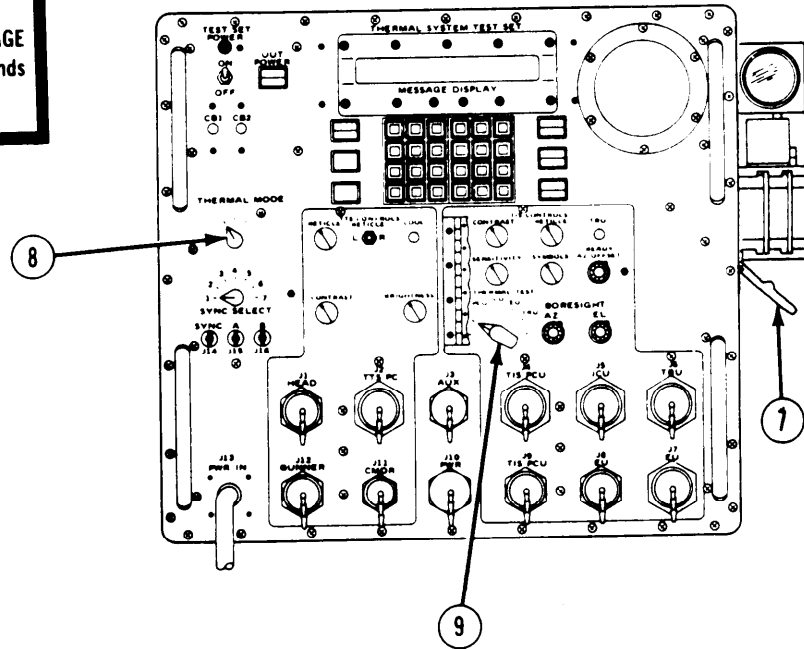
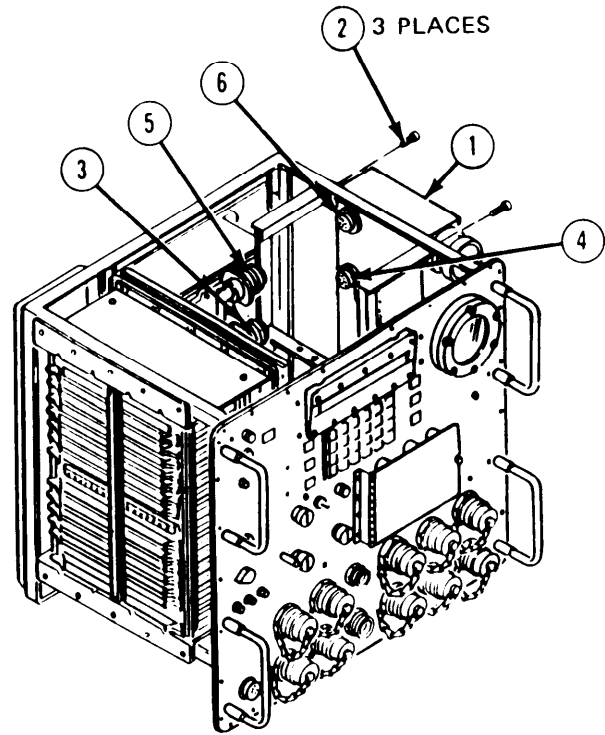
TSTS TROUBLESHOOTING PROCEDURES

- 2
- Connect IDU to TSTS.
 - Position IDU (1) in TSTS so front of IDU is accessible at side of TSTS and rear of IDU can be connected to W14 harness.
 - Connect cable connector W14P4 (3) to receptacle J2 (4).
 - Connect cable connector W14P3 (5) to receptacle J1 (6).
 - Screw in and tighten 3 screws (2) using cross tip screwdriver.

- 3
- Ground IDU.
 - Connect one end of clip lead (7) to IDU chassis.
 - Connect other end of clip lead (7) to bench ground.
 - Set THERMAL MODE switch (8) to OFF.
 - Set THERMAL TEST switch (9) to OFF.

WARNING

The top half of the IDU contains HIGH VOLTAGE that can cause serious injury or death. Keep hands and tools away from this area.

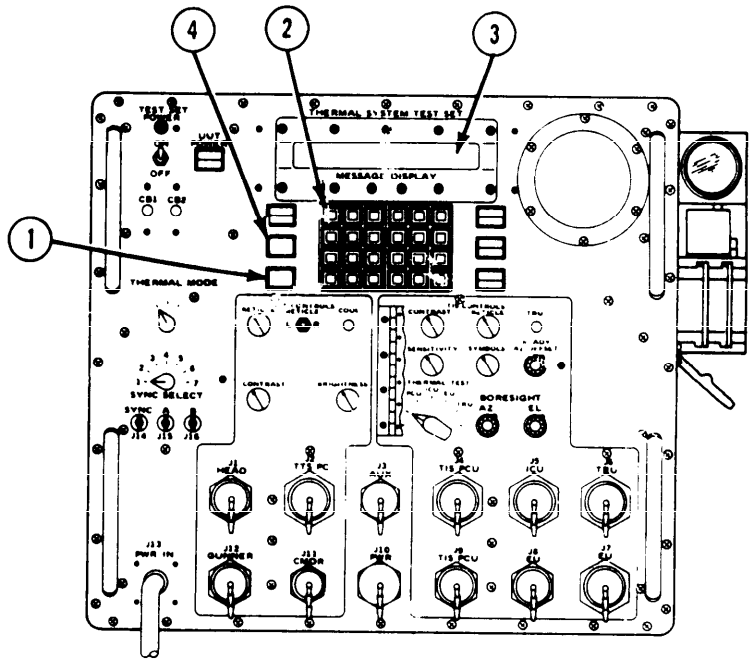


ARR82-24165

Figure 7-16. (Sheet 2 of 34)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

- 4
- Prepare test set for operation.
 - Refer to volume I, para. 4-17.
 - Press NO key (1).
 - Enter Unit Under Test (UUT) number.
 - Using keyboard (2) press the following keys:
 - Press 4 key.
 - Press +/- key.
 - Press ENT key.
 - Enter test instructions.
 - Press TST ≠ key.
 - Press ENT key.
 - Select display mode.
 - Press 0 key.
 - Press ENT key.

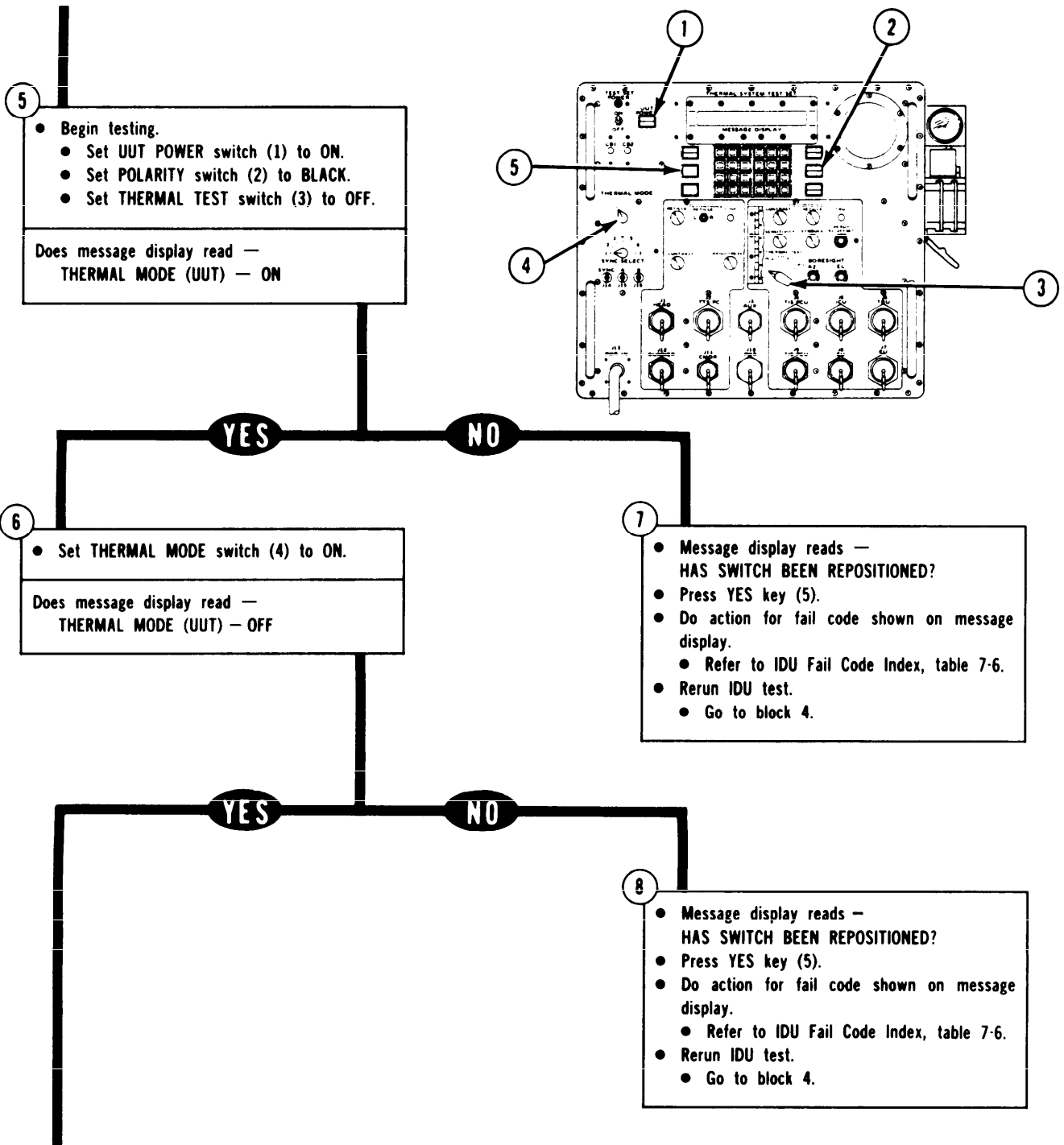


NOTE

- During testing, message display (3) will sometimes read TEST IN PROGRESS. Whenever this occurs, wait for next message to appear before proceeding.
- During testing, message display (3) will sometimes read —
HAS SWITCH BEEN REPOSITIONED?
If this happens, set switch to indicated position and press YES key (4).

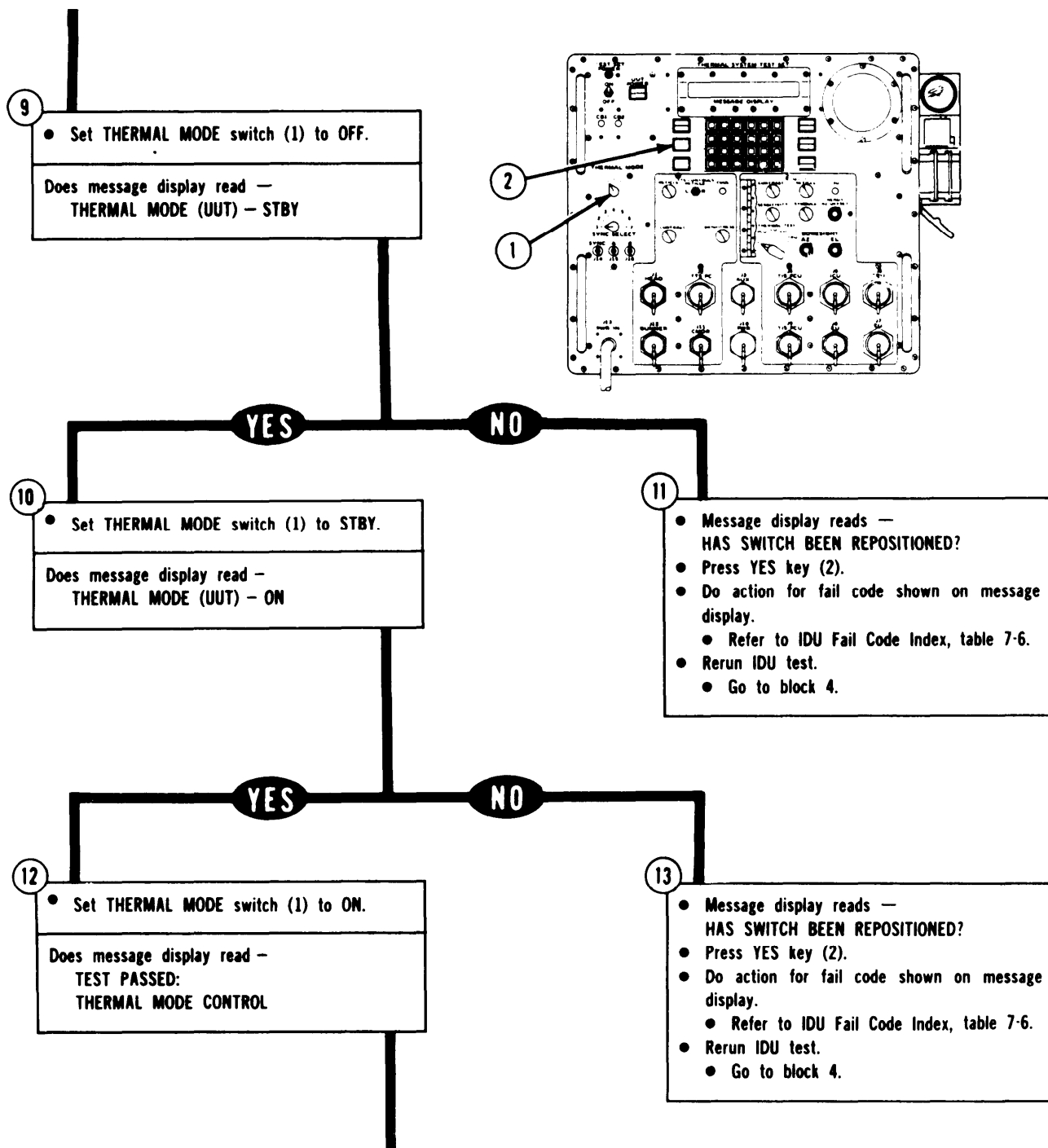
ARR82-24166

Figure 7-15. (Sheet 3 of 34)



ARR82-24167

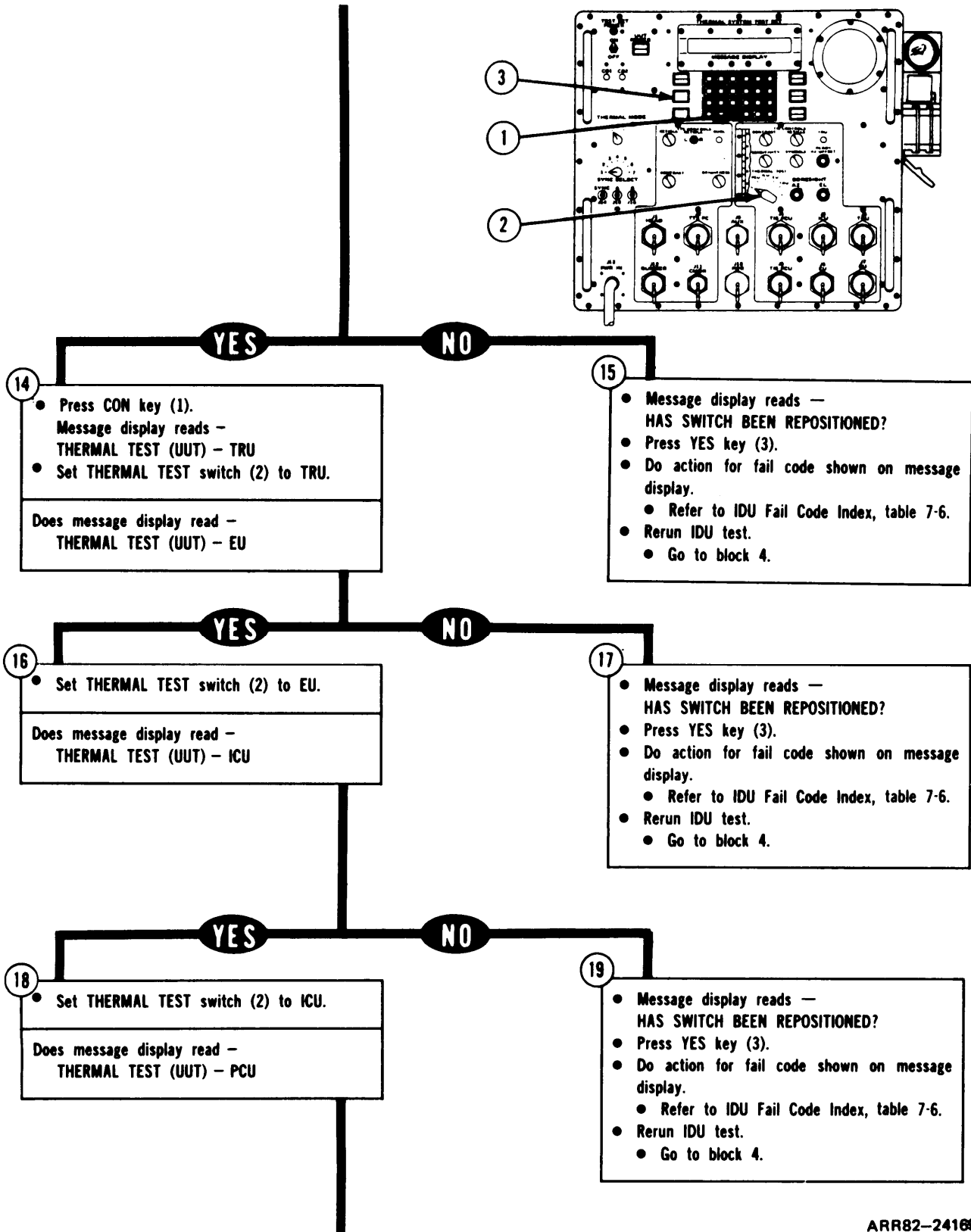
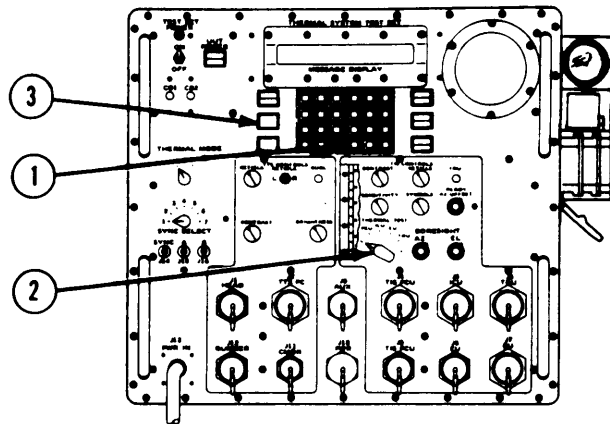
Figure 7-16. (Sheet 4 of 34)



ARR82-24168

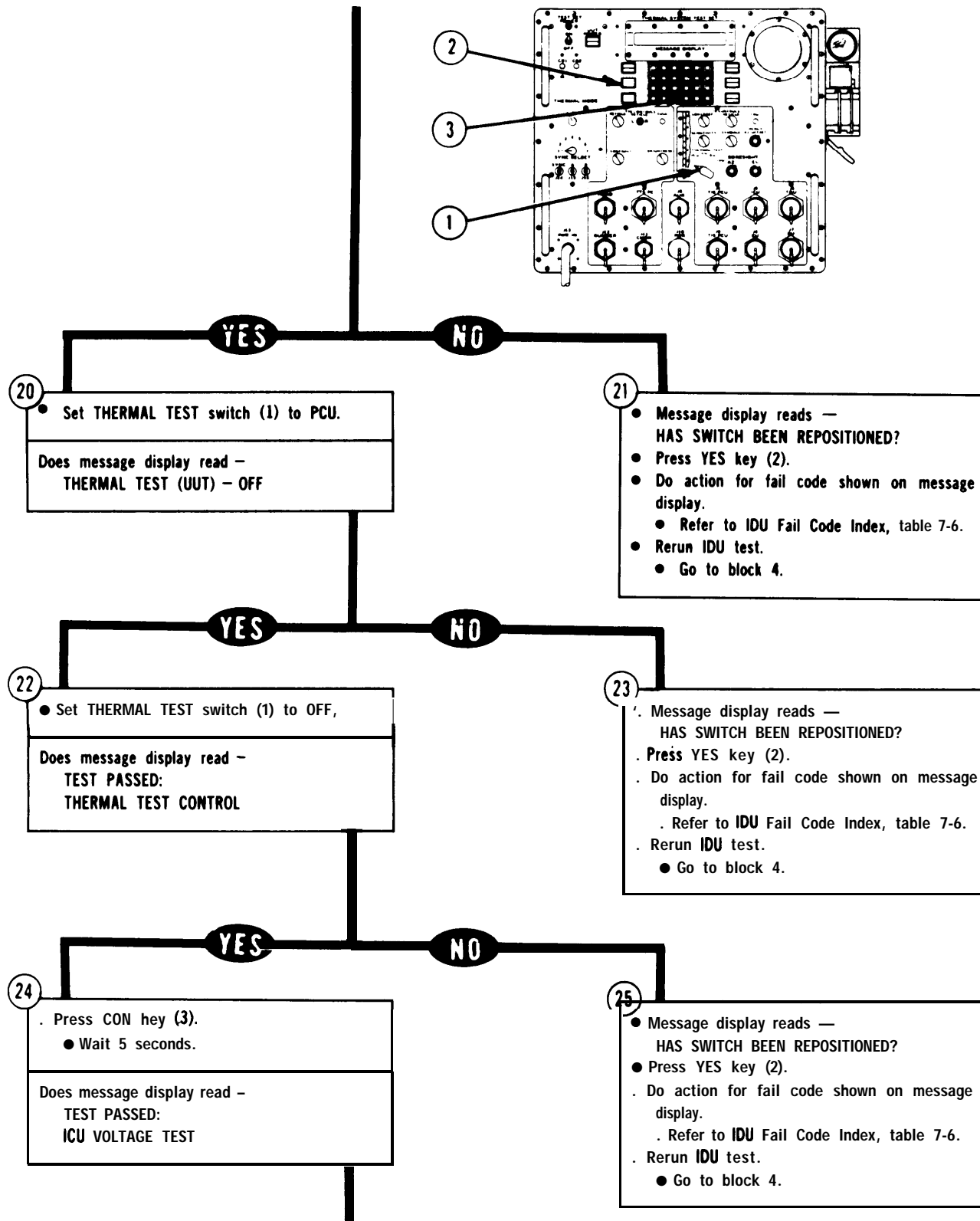
Figure 7-16. (Sheet 5 of 34)

TSTS TROUBLESHOOTING PROCEDURES

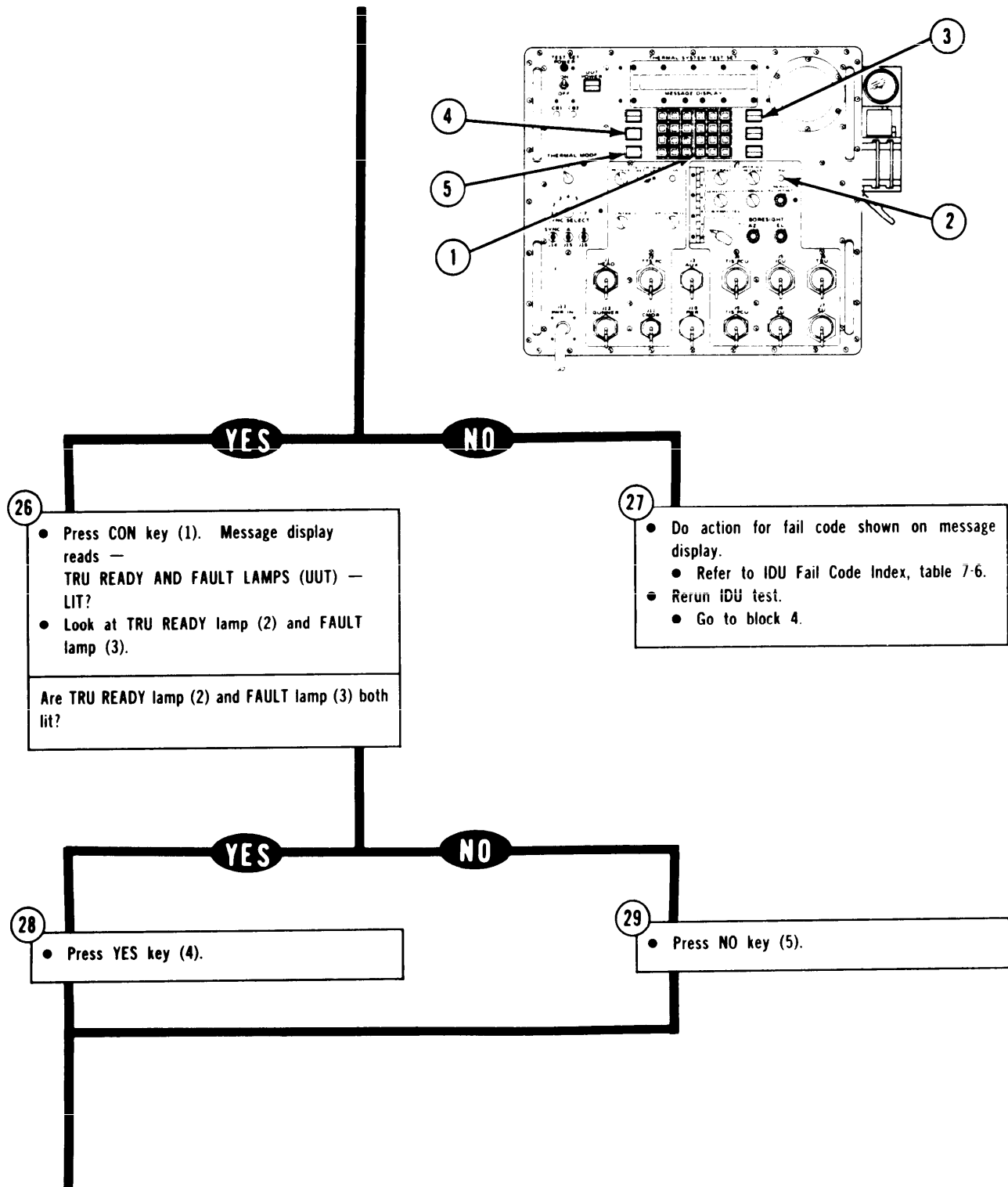


ARR82-24169

Figure 7-16. (Sheet 6 of 34)



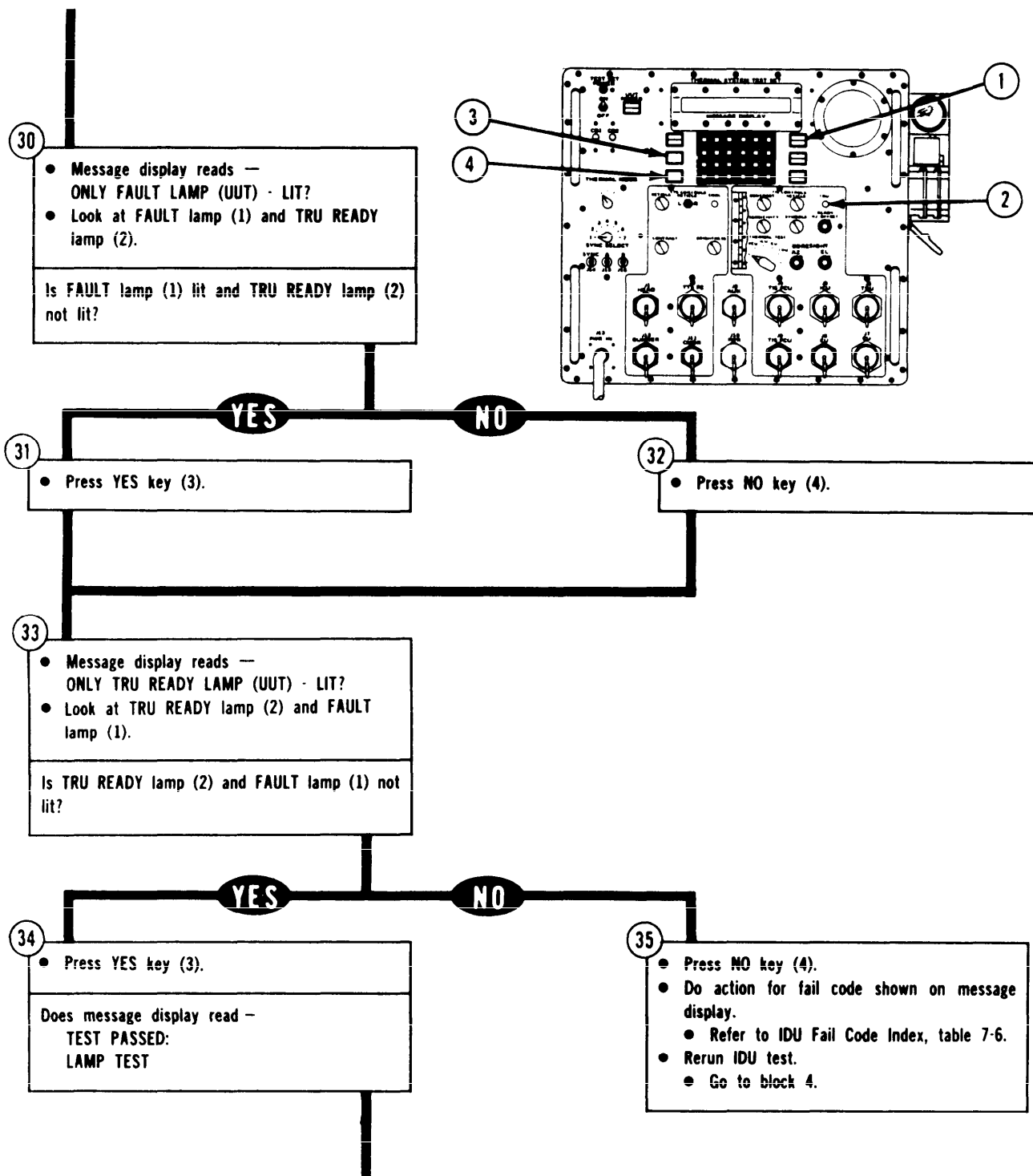
ARR82-24170



ARR82-24171

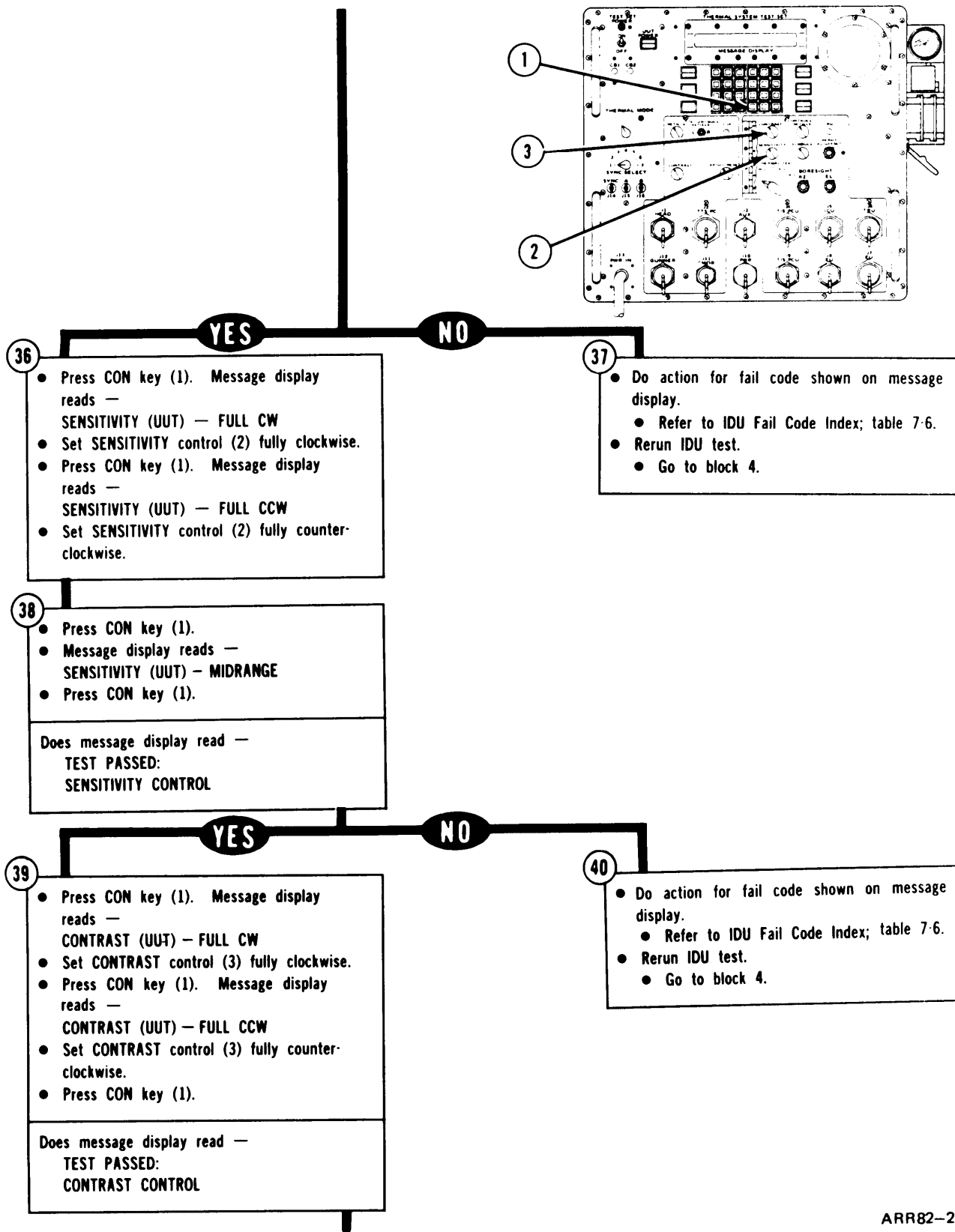
Figure 7-16. (Sheet 8 of 34)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24172

Figure 7-16. (Sheet 9 of 34)



ARR82-24173

Figure 7-16 (Sheet 10 of 34)
Volume III

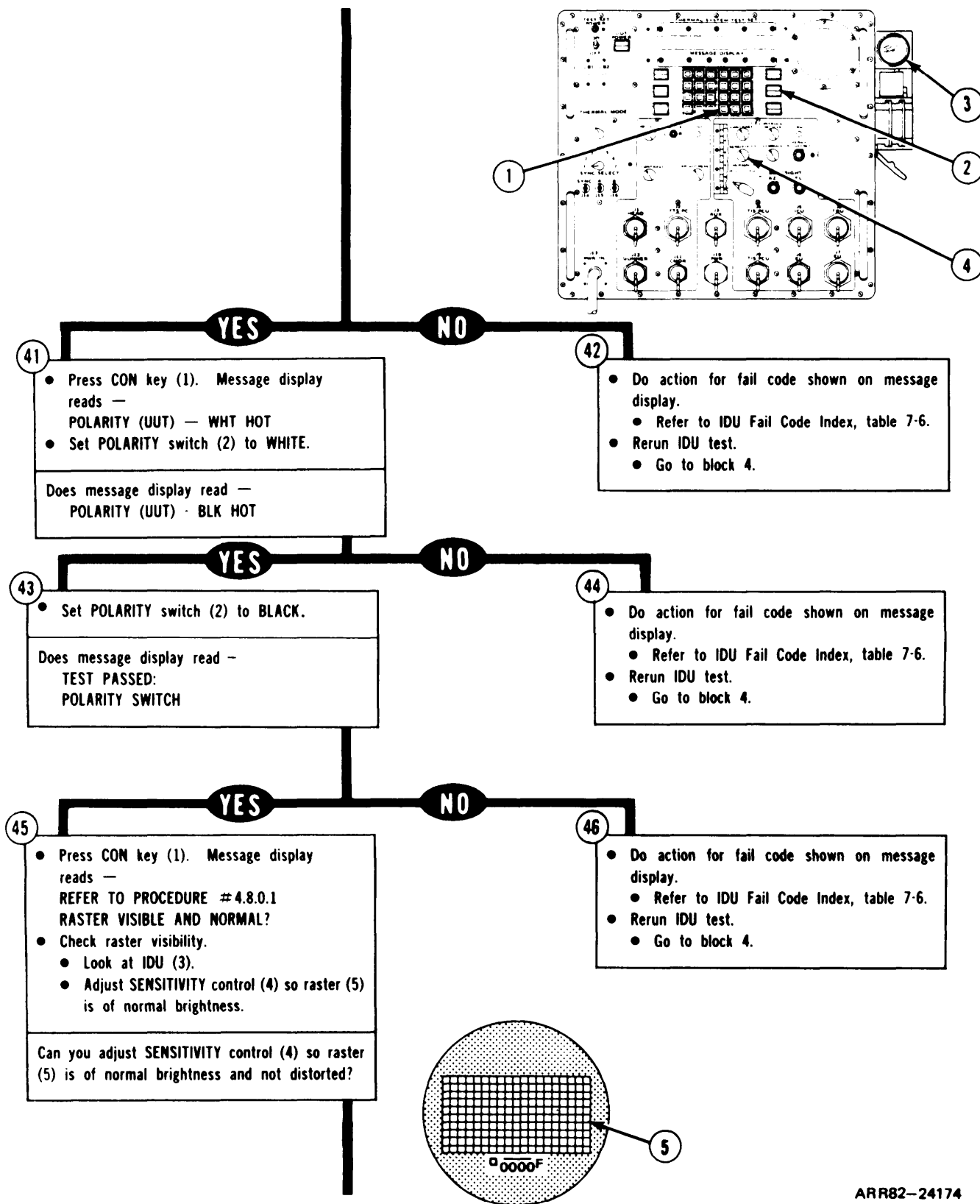
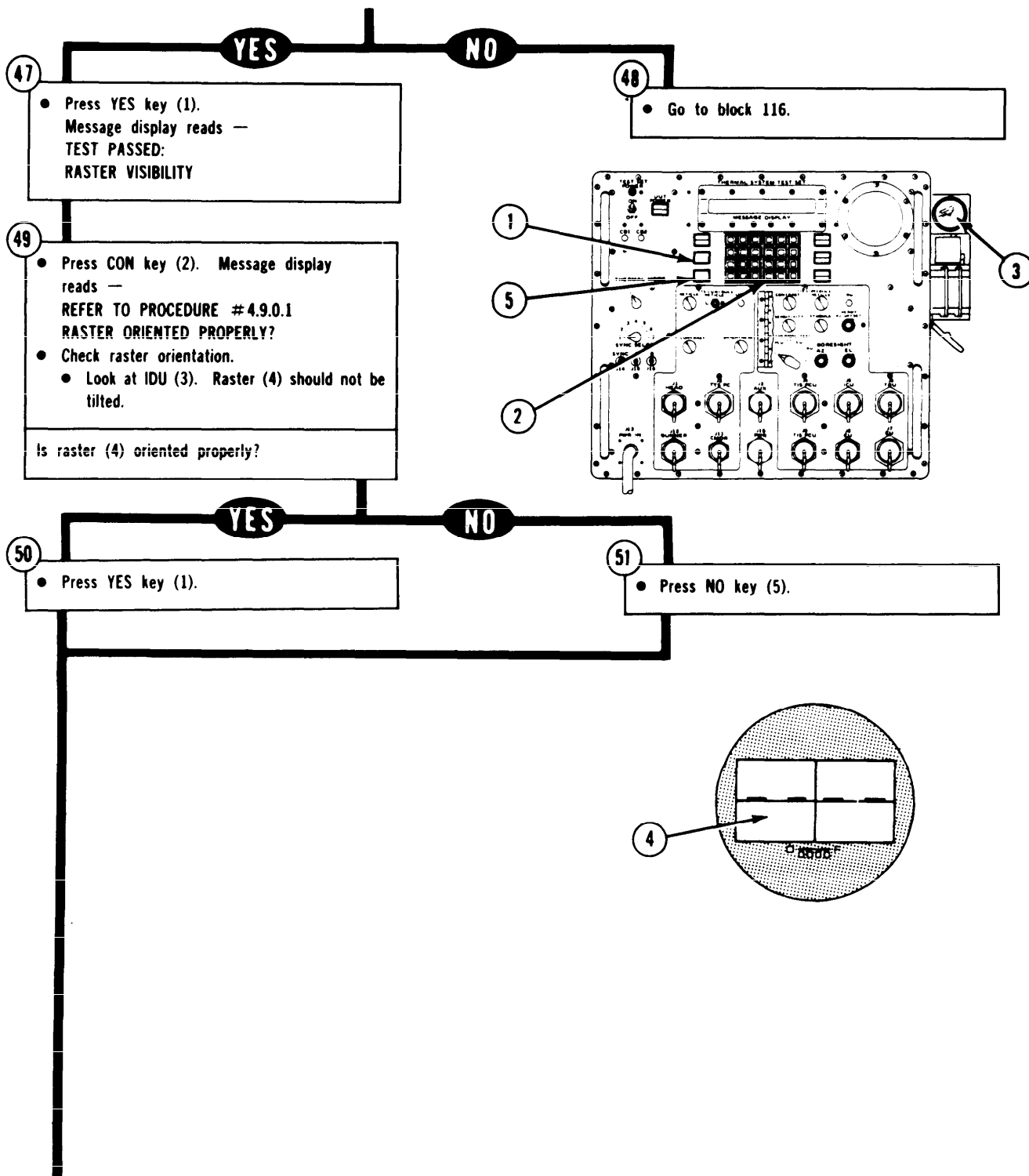


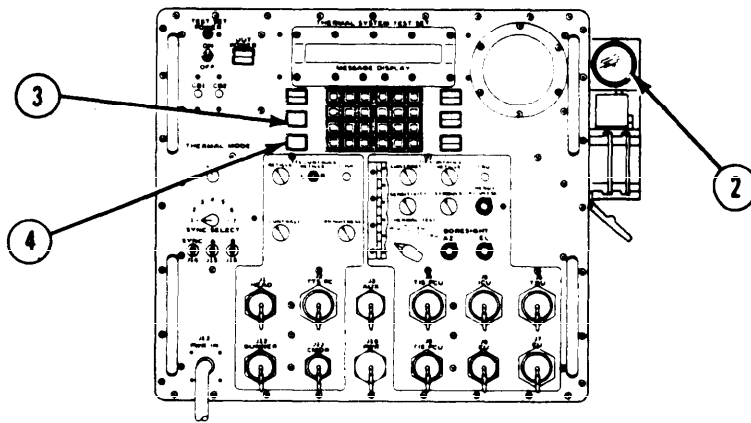
Figure 7-16. (Sheet 11 of 34)

ARR82-24174



ARR82-24175

Figure 7-16. (Sheet 12 of 34)



52

- Message display reads —
**REFER TO PROCEDURE #4.9.0.2
RASTER SHAPE CORRECT?**
- Check shape of raster (1).
- Look at IDU (2).

Is raster (1) about twice as wide as it is high?

YES

NO

53

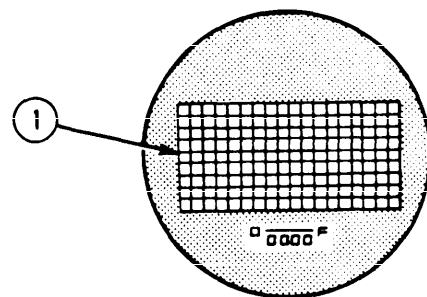
- Press YES key (3).

54

- Press NO key (4).

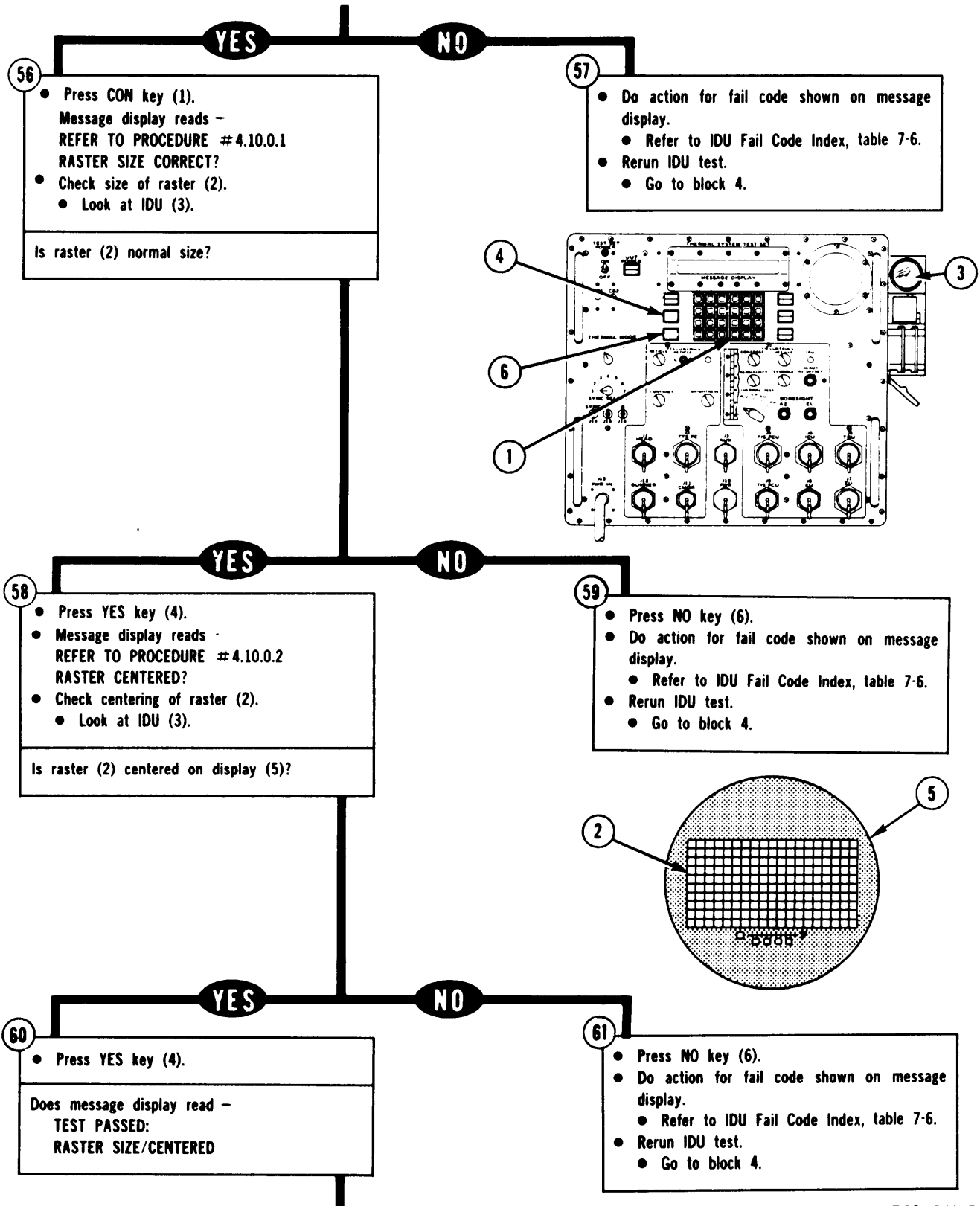
55

- Does message display read —
**TEST PASSED:
RASTER ORIENTATION/SHAPE**



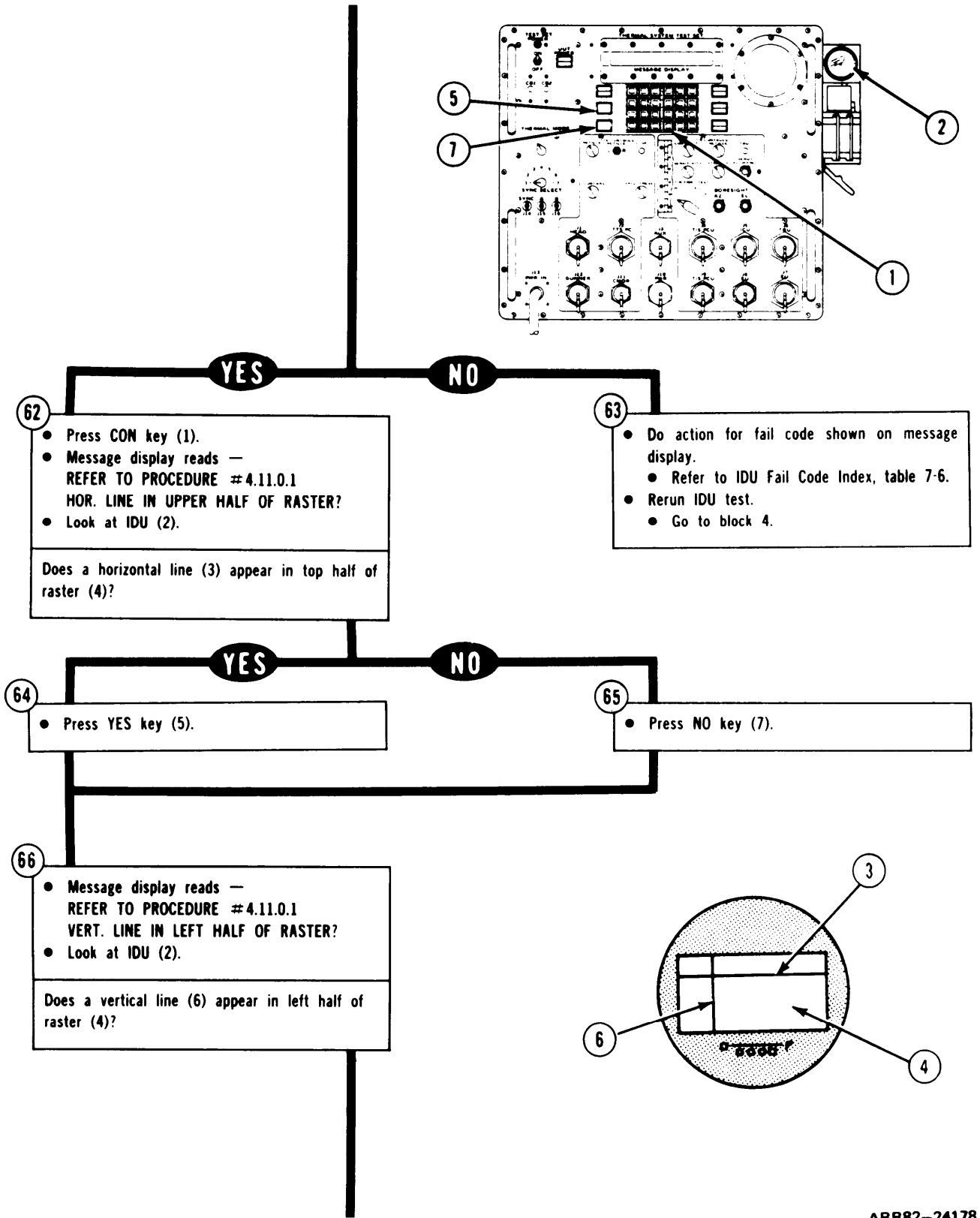
ARR82-24176

Figure 7-16. (Sheet 13 of 34)

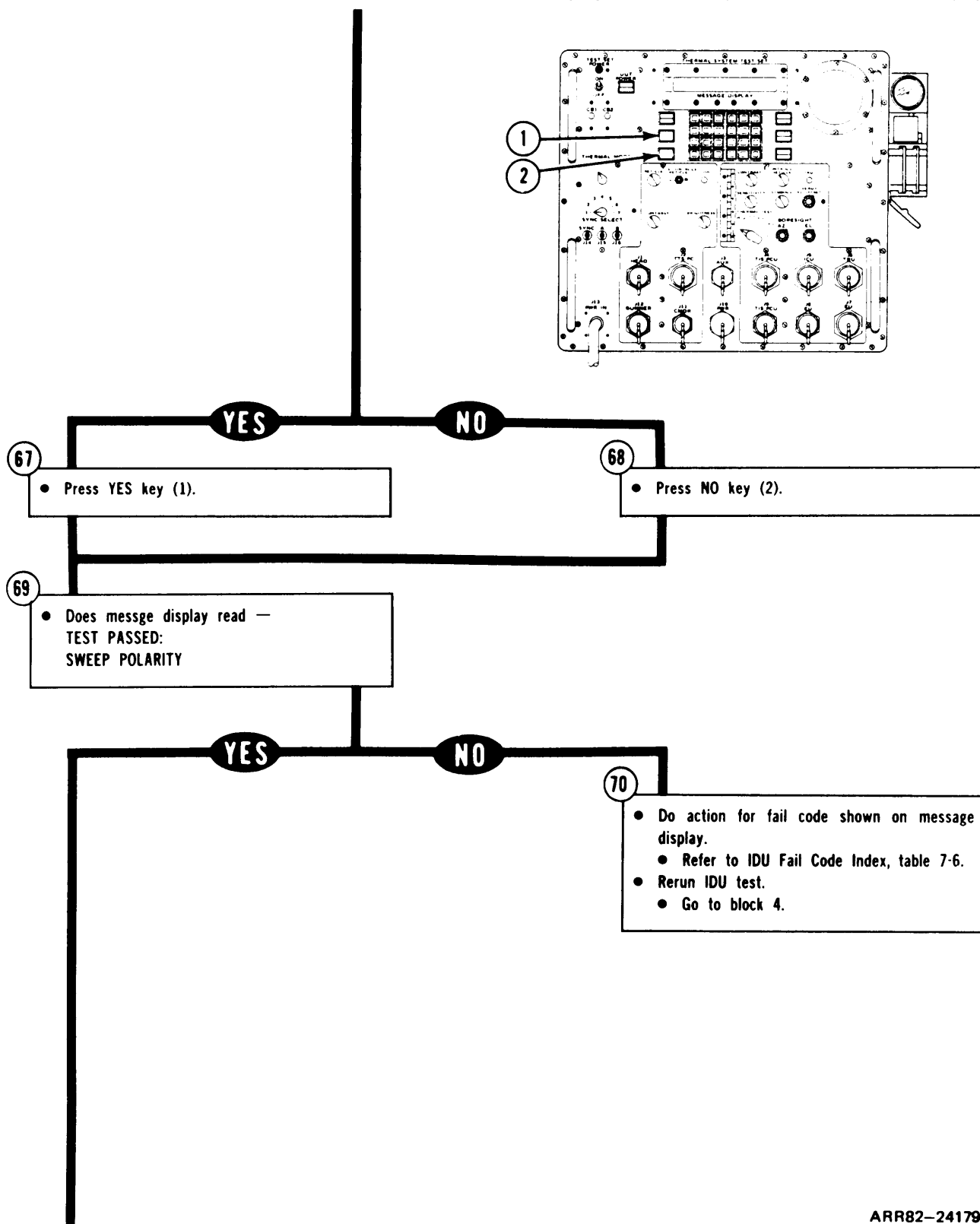


ARR82-24177

Figure 7-16. (Sheet 14 of 34)



ARR82-24178



ARR82-24179

Figure 7-16. (Sheet 16 of 34)

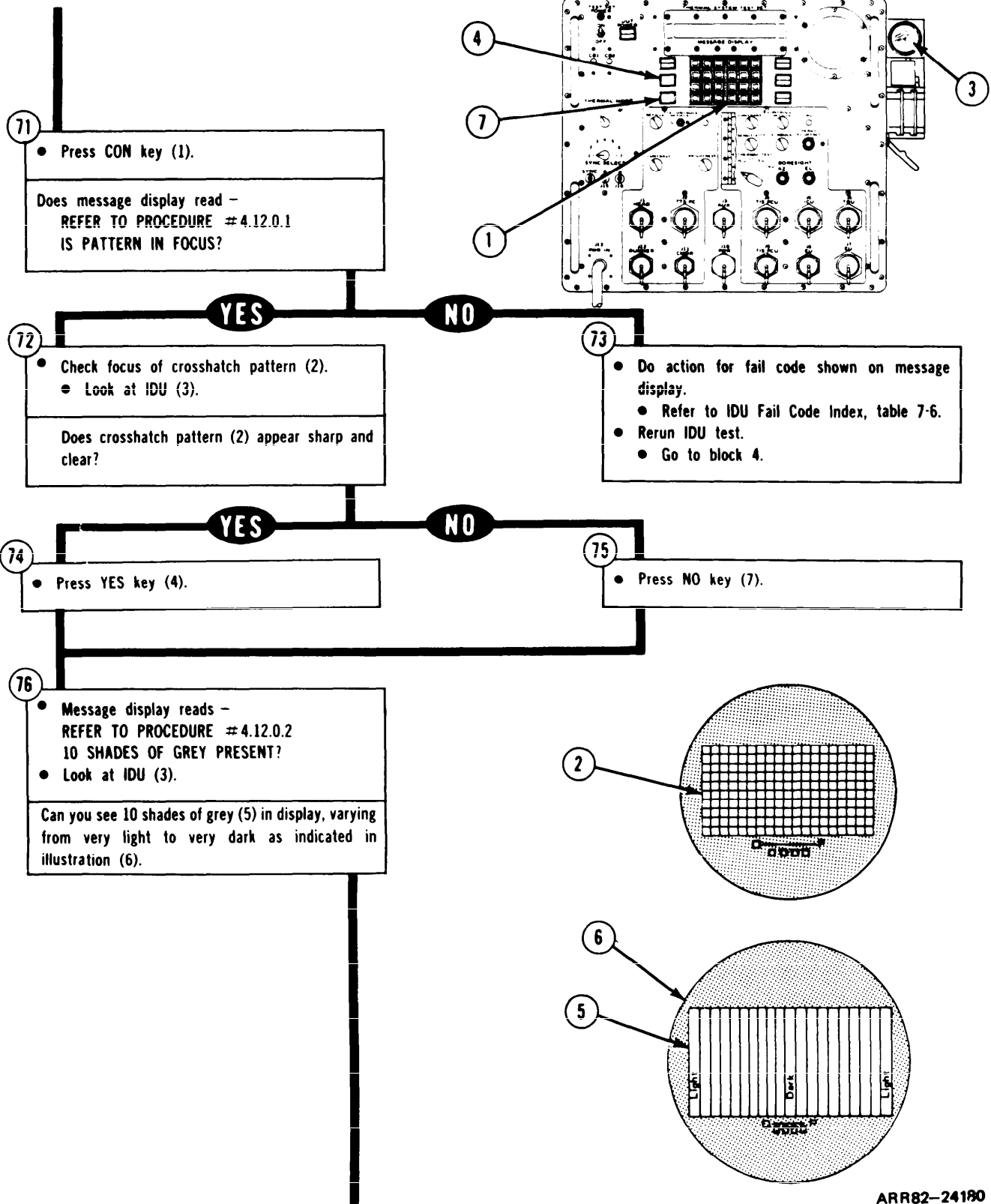
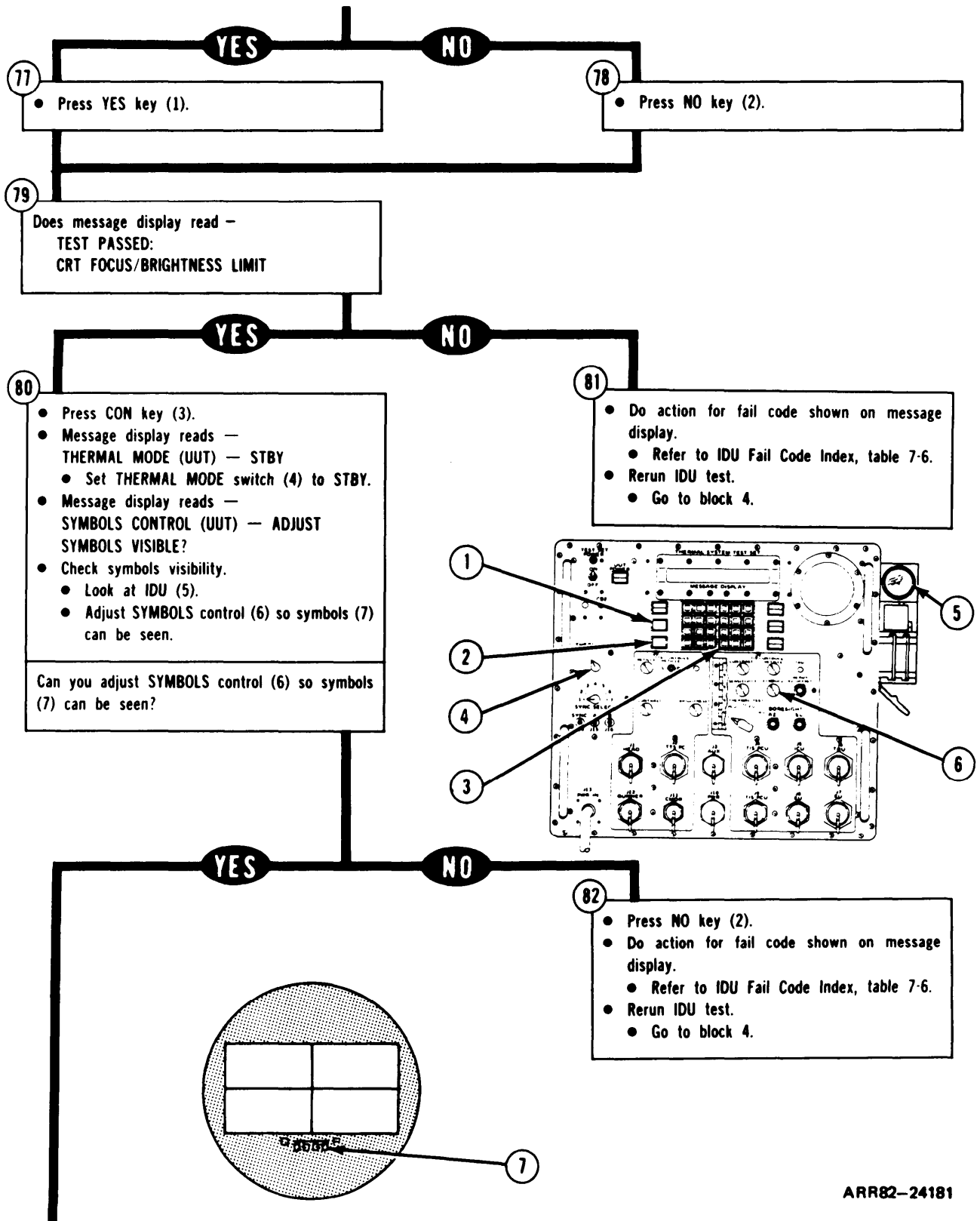
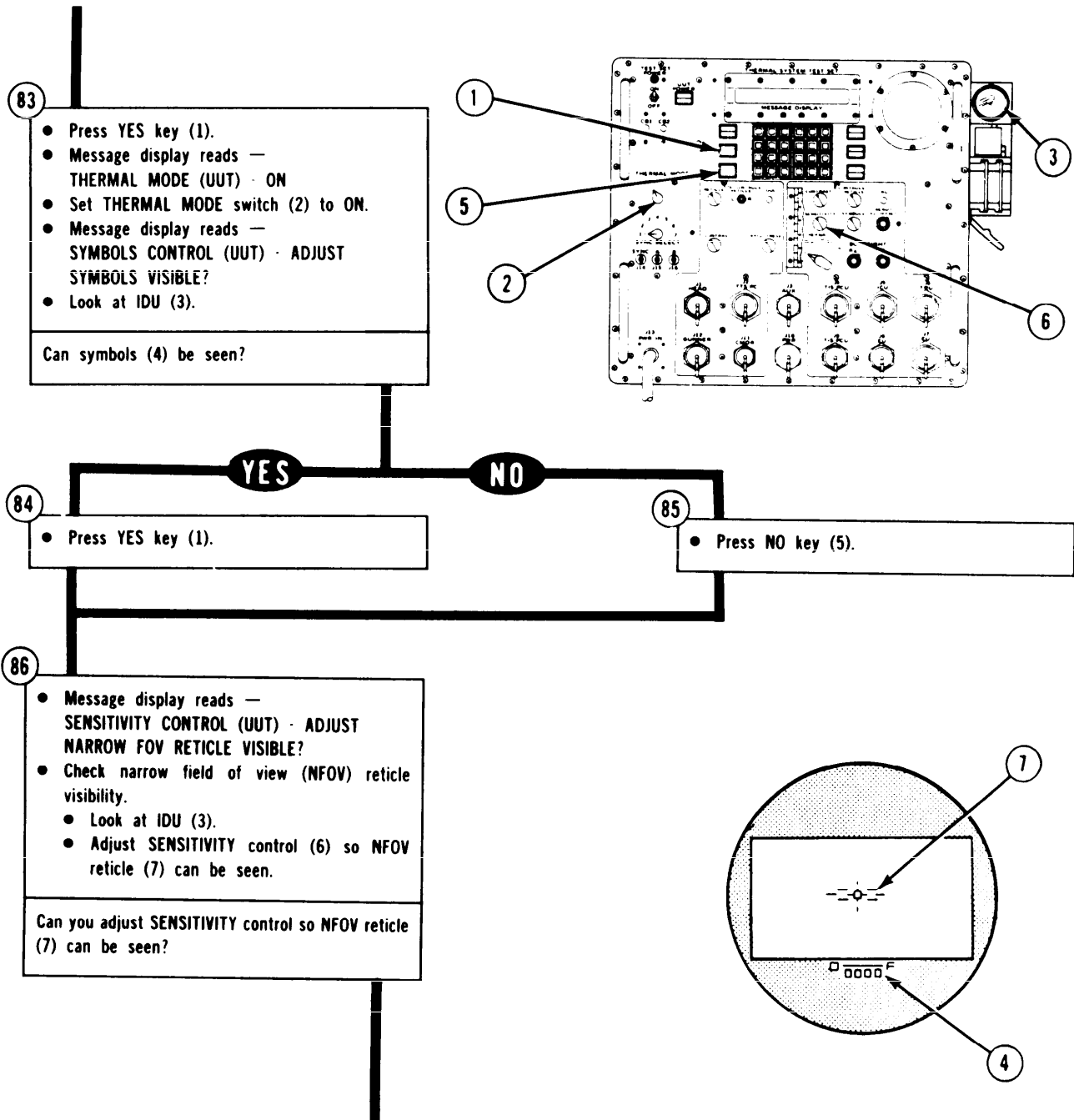


Figure 7-16. (Sheet 17 of 34)



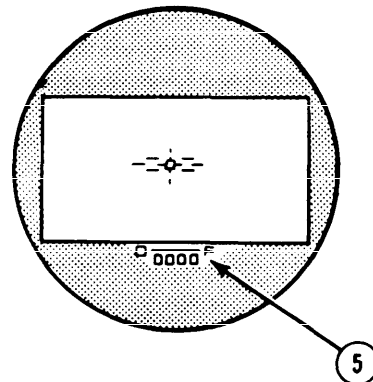
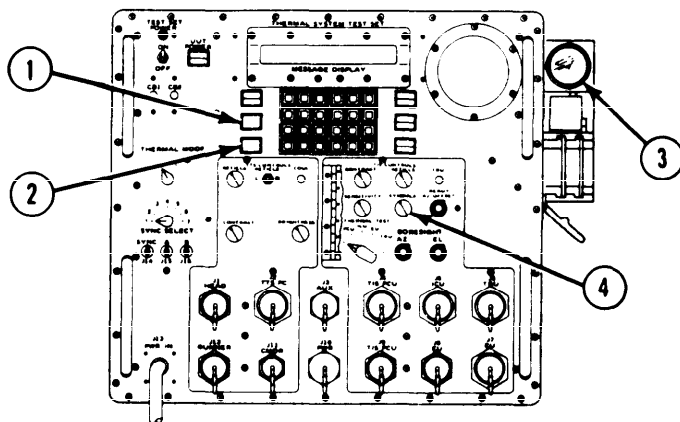
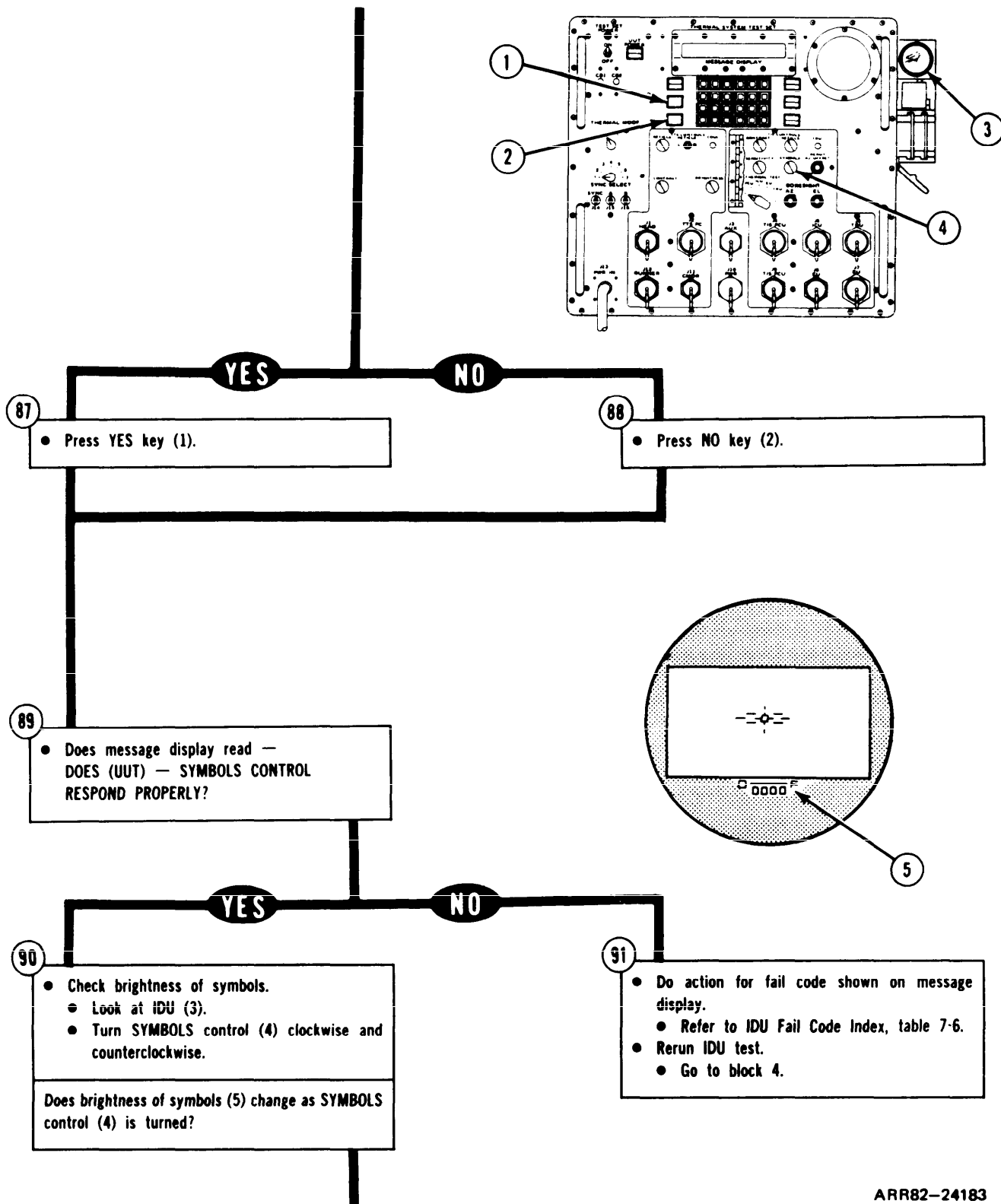
ARR82-24181

Figure 7-16. (Sheet 18 of 34)



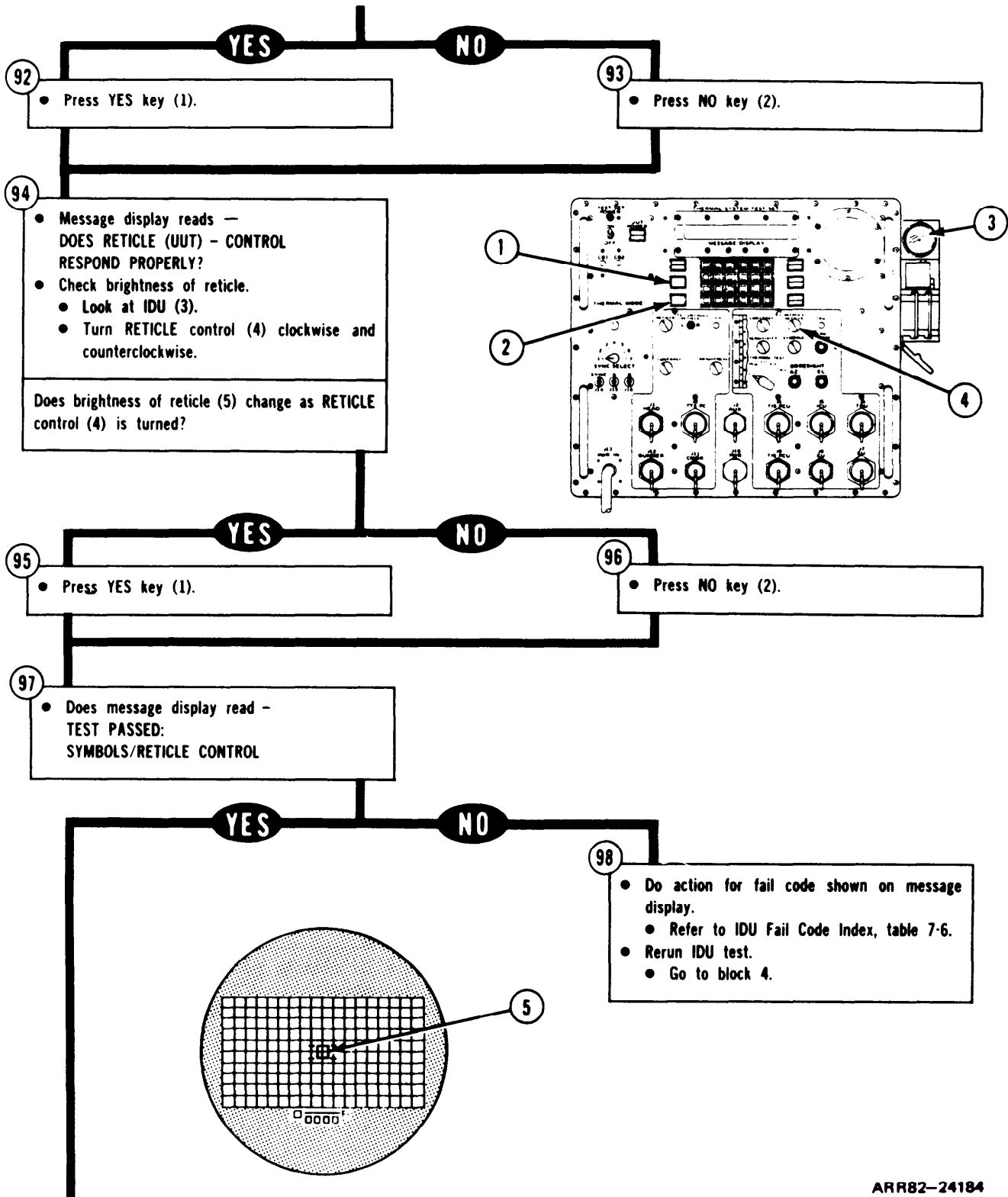
ARR82-24182

Figure 7-16. (Sheet 19 of 34)



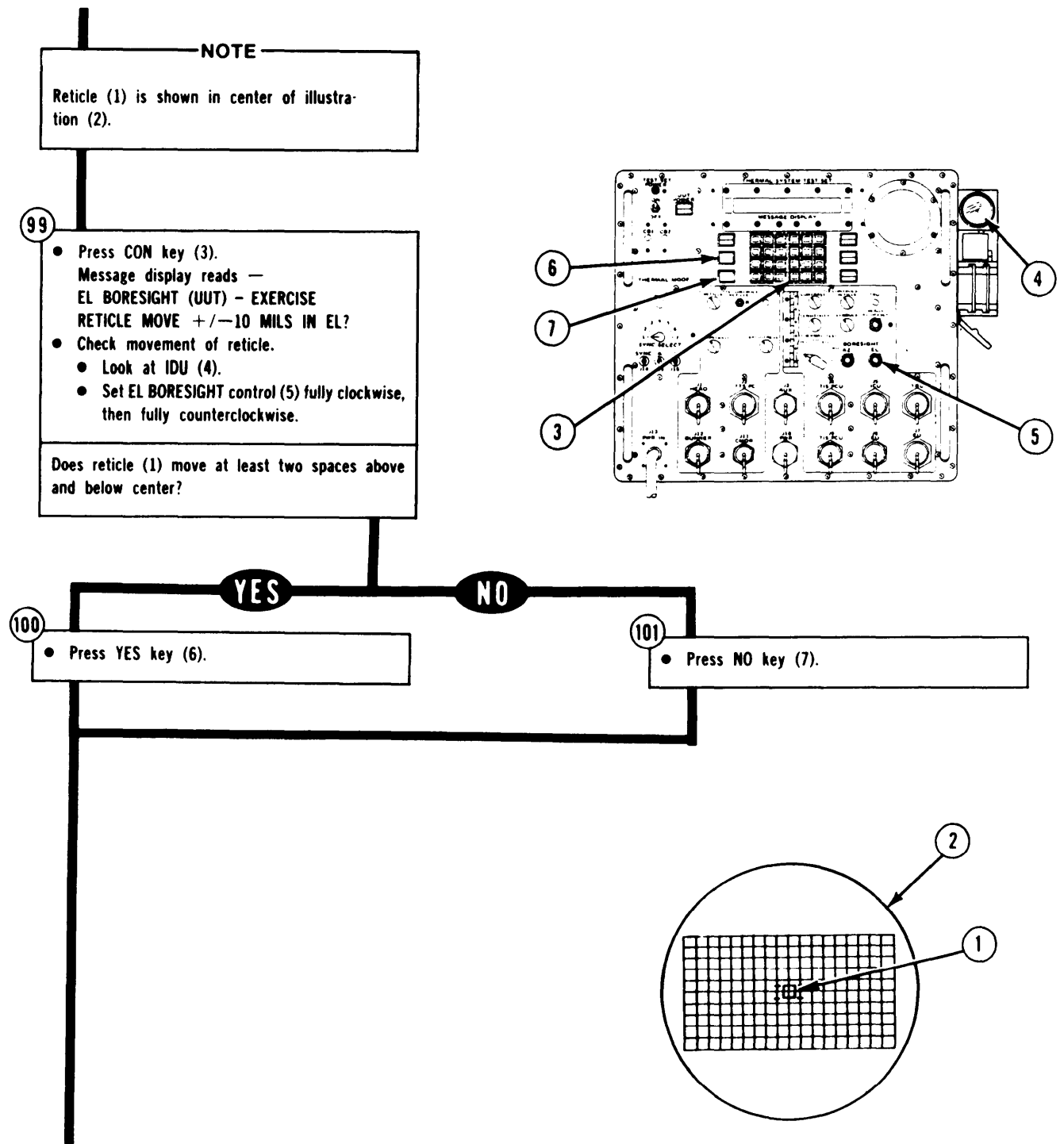
ARR82-24183

Figure 7-16. (Sheet 20 of 34)



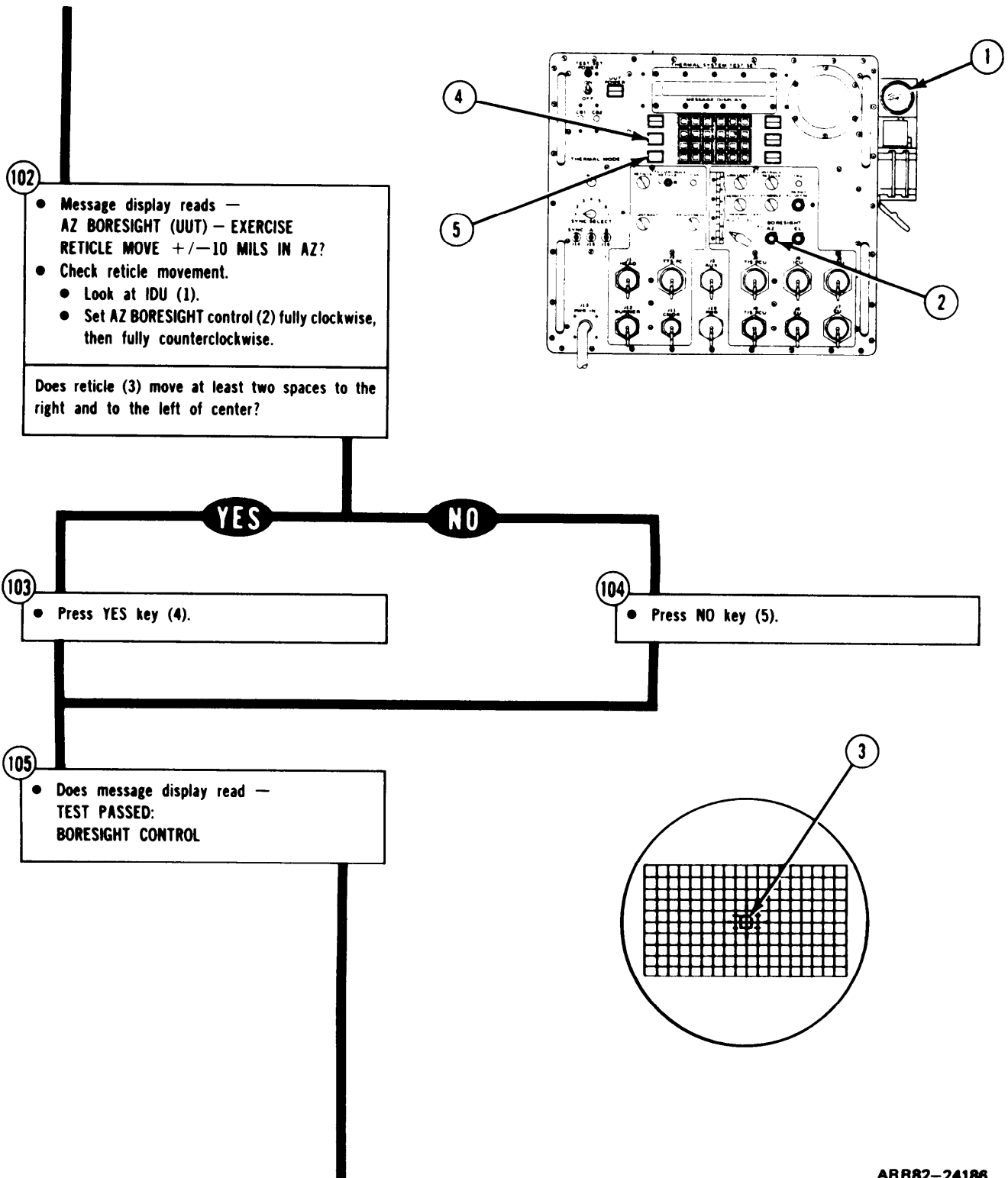
ARR82-24184

Figure 7-16. (Sheet 21 of 34)



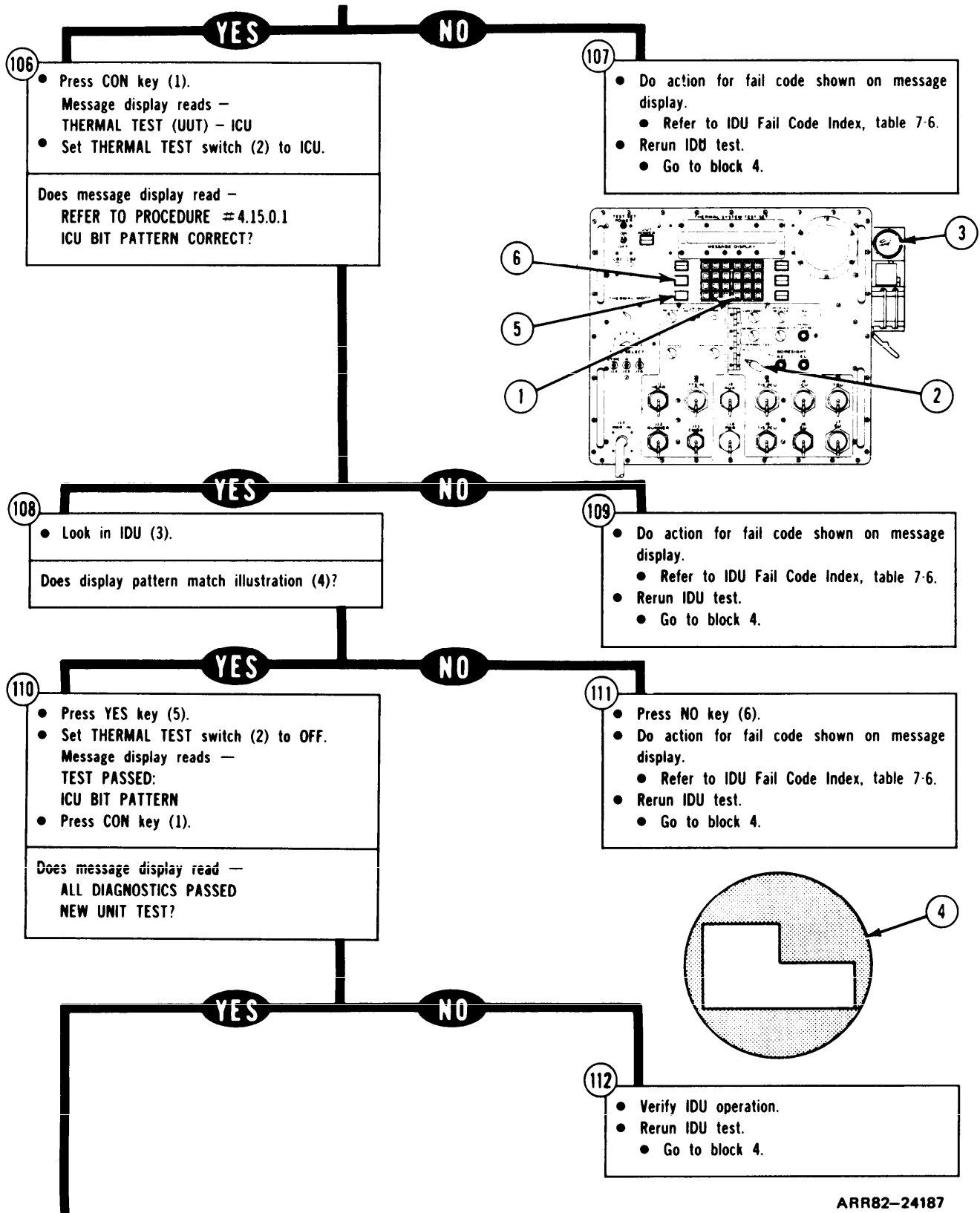
ARR82-24185

Figure 7-16. (Sheet 22 of 34)



ARR82-24186

Figure 7-16. (Sheet 23 of 34)



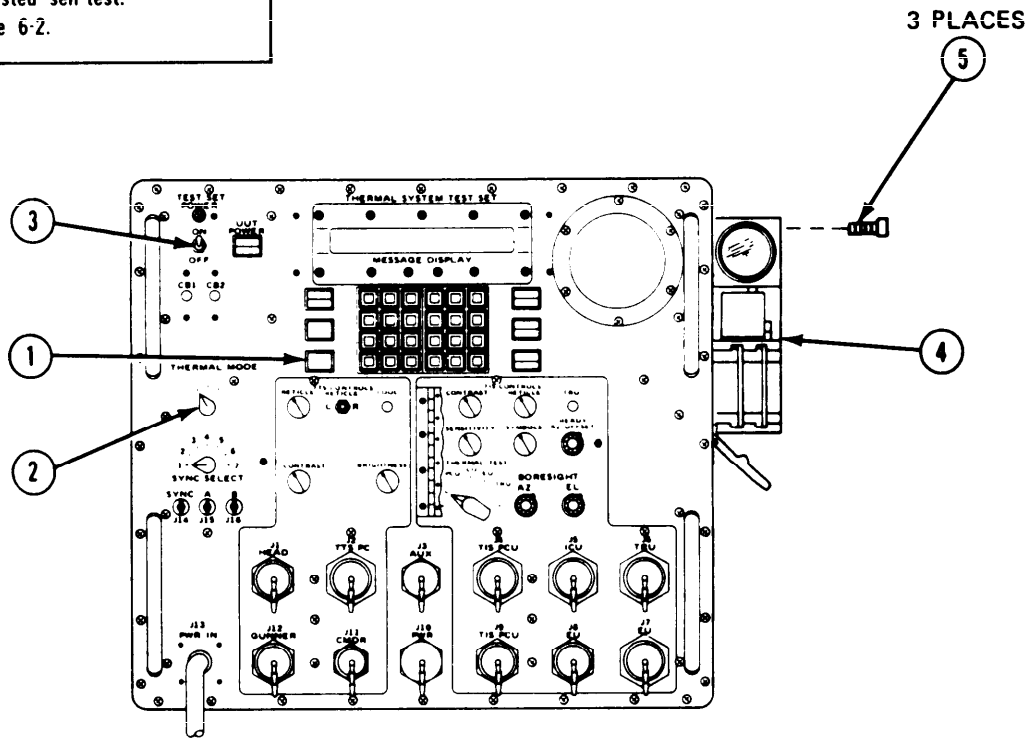
ARR82-24187

Figure 7-16. (Sheet 24 of 34)

- 113
- Power down TSTS.
 - Press and release NO key (1). Message display reads -
READY FOR INSTRUCTIONS
 - Set THERMAL MODE switch (2) to OFF.
 - Set TEST SET POWER switch (3) to OFF.

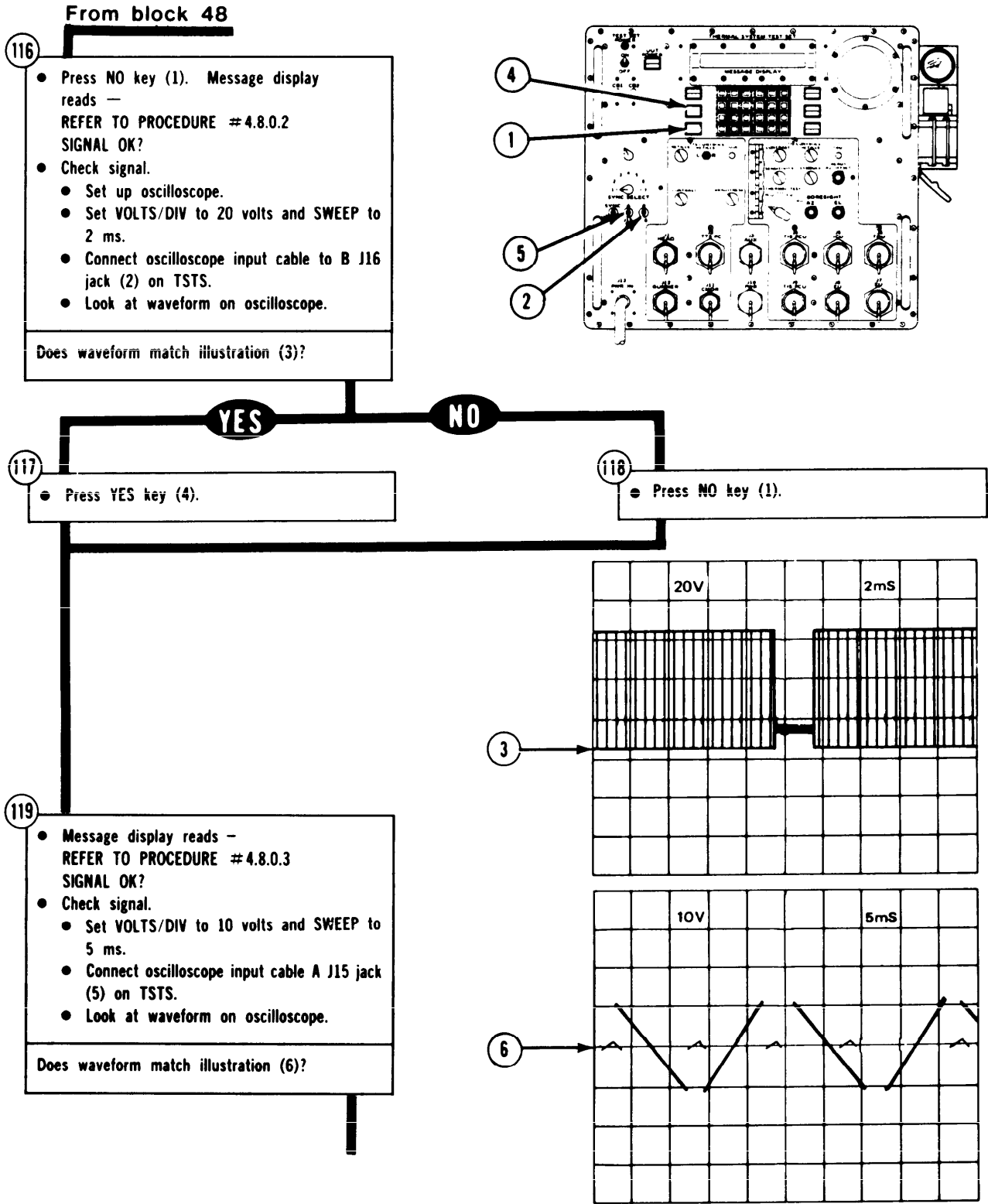
- 114
- Remove IDU (4) from TSTS by removing 3 screws (5) using cross tip screwdriver.
 - Install IDU assembly cover.
 - Refer to Install Cover, volume IV, para. 2-8.
 - Install IDU assembly A2.
 - Refer to Install IDU Assembly A2, volume IV, para. 2-8.

- 115
- Run operator assisted self-test.
 - Refer to figure 6-2.



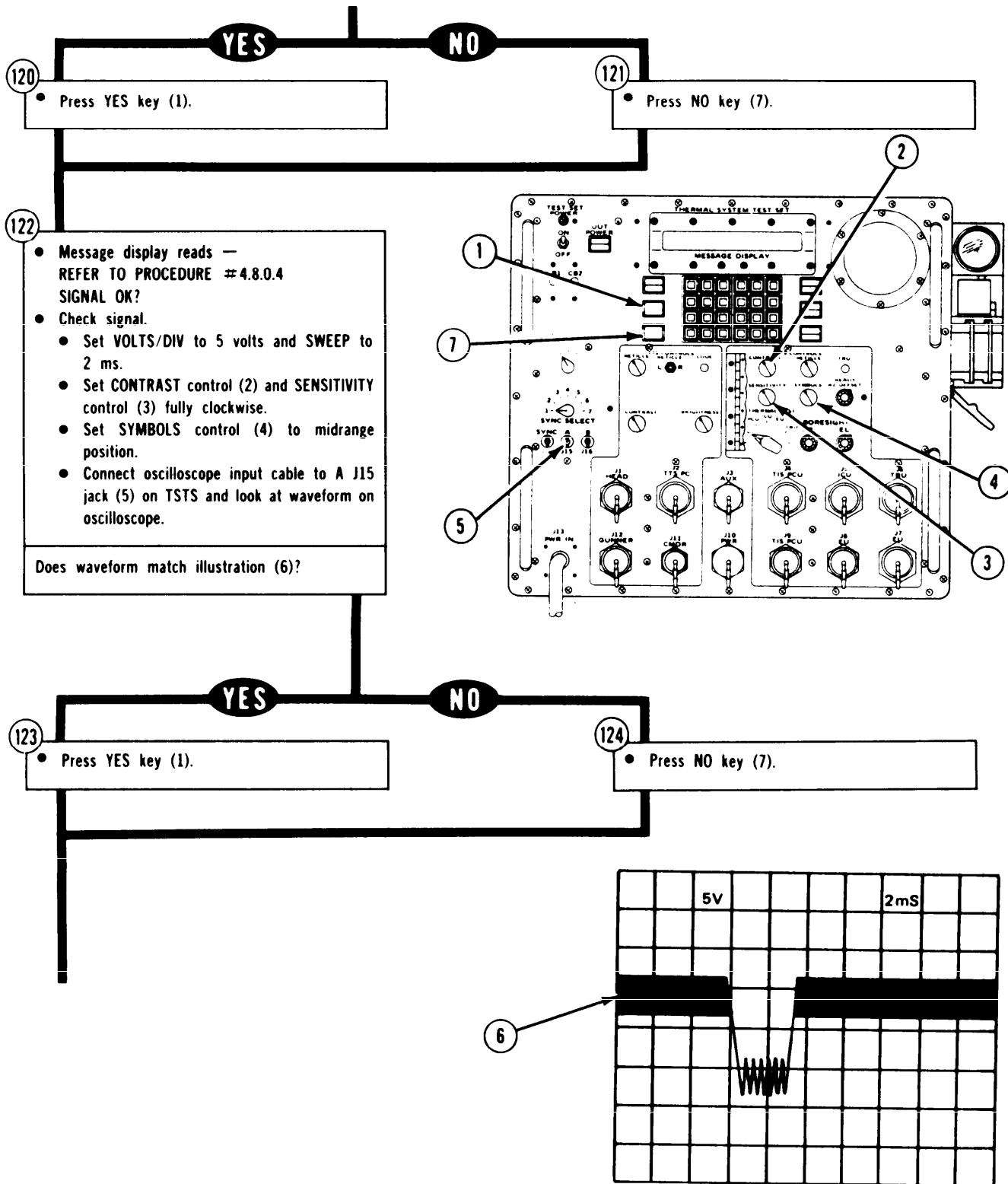
ARR82-24188

Figure 7-16. (Sheet 25 of 34)



ARR82-24189

Figure 7-16. (Sheet 26 of 34)



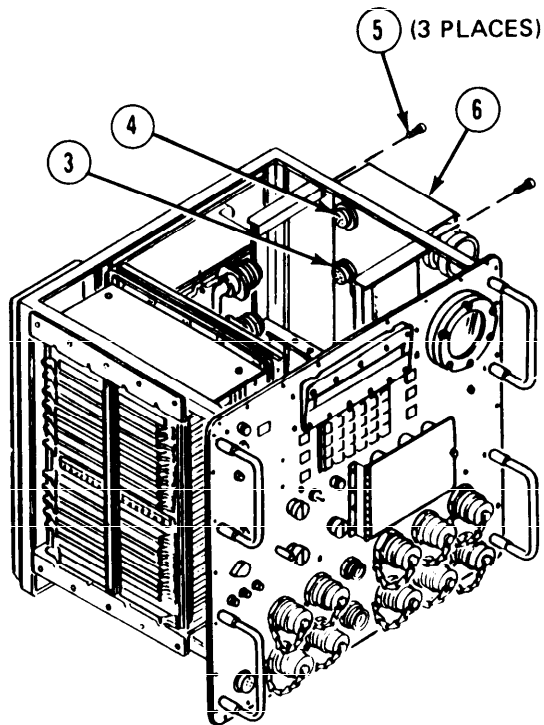
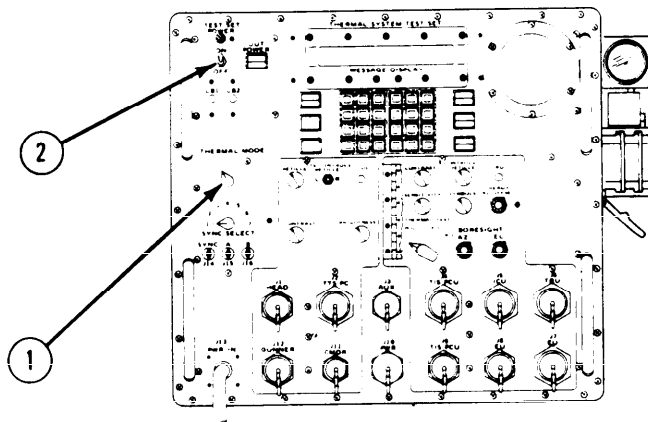
ARR82-24190

Figure 7-16. (Sheet 27 of 34)

- 125
- Write down fail code.
 - Power down TSTS.
 - Set THERMAL MODE switch (1) to OFF.
 - Set TEST SET POWER switch (2) to OFF.

- 126
- Remove circuit card assemblies A1 and A2.
 - Refer to Remove Circuit Card Assembly A1 or A2, volume iv, para. 2-8.

- 127
- Remove IDU from TSTS.
 - Remove W14P4 from receptacle J2 (3).
 - Remove W14P3 from J1 (4).
 - Remove 3 screws (5) and remove IDU (6) from TSTC using cross tip screwdriver.
 - Place IDU on clean work surface.



ARR82-24191

Figure 7-16. (Sheet 28 of 34)

CAUTION

Jack screws (1) will tighten or loosen only one side of connector A3P3 at a time. To avoid cracking A3P3 (2) turn jack screws (1) alternately.

128

- Alternately loosen two jack screws (1) with flat tip screwdriver.
- Remove connector P3 (2) from connector J3 (3).

129

- Set up multimeter to check continuity.
- Using multimeter, check continuity between points listed in table 7-5.

Are all continuity checks OK?

TABLE 7-5

FROM	TO
Connector J1 (4) J1-BB J1-p J1-q J1-t	XA1(7)-63 XA2(7)-6 XA2-4 XA2-13
Connector J2 (5) J2-A J2-B J2-D J2-E J2-S J2-T	XA1-9 XA1-10 XA1-2 XA1-36 XA2-59 XA2-58
Connector J3 (3) J3-C J3-D J3-F J3-A J3-C J3-Y J3-c	XA1-66 XA1-64 XA1-62 XA2-3 XA2-12 XA2-8 XA2-15
Connector XA1 (6) XA1-3 XA1-4	XA2-18 XA2-11

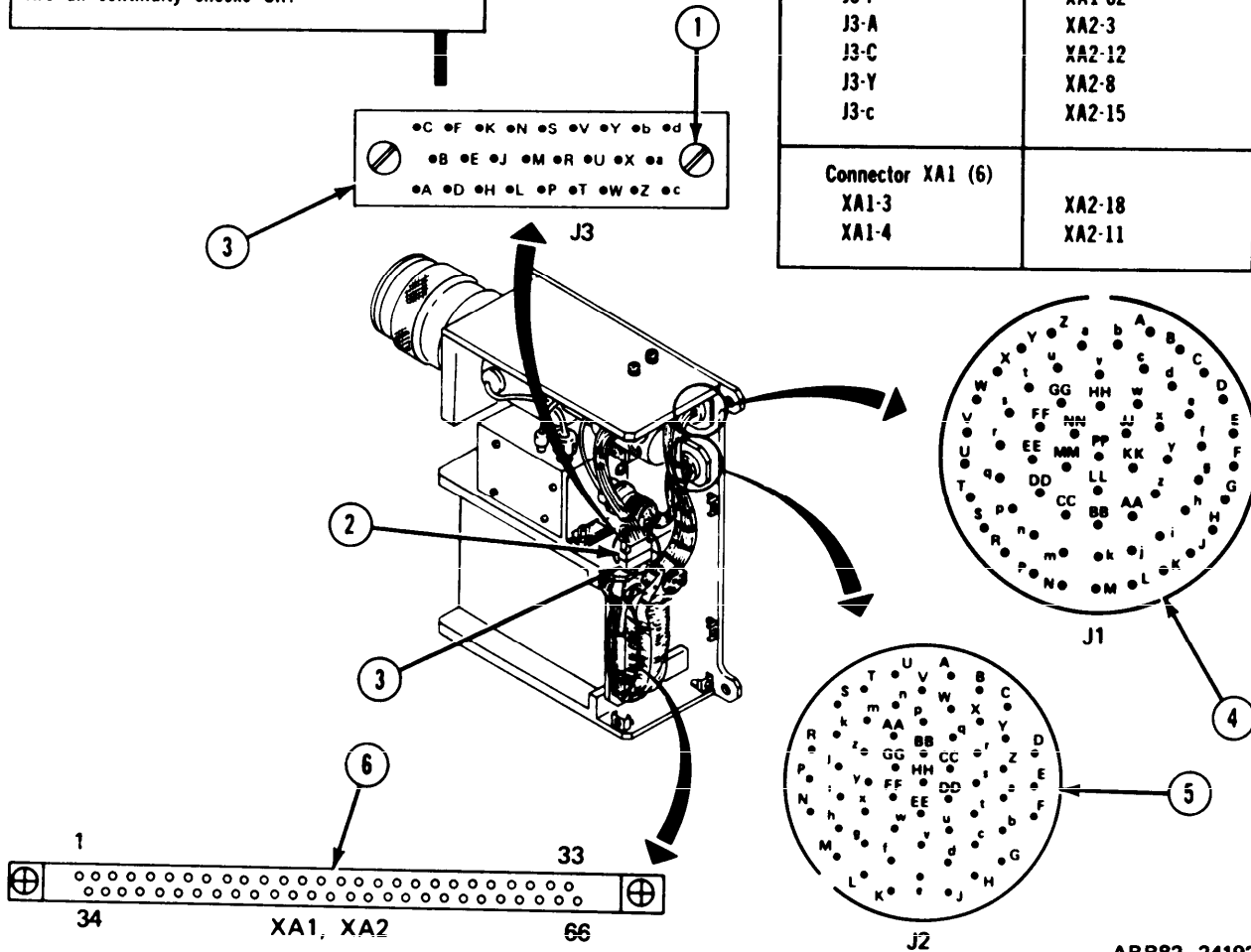
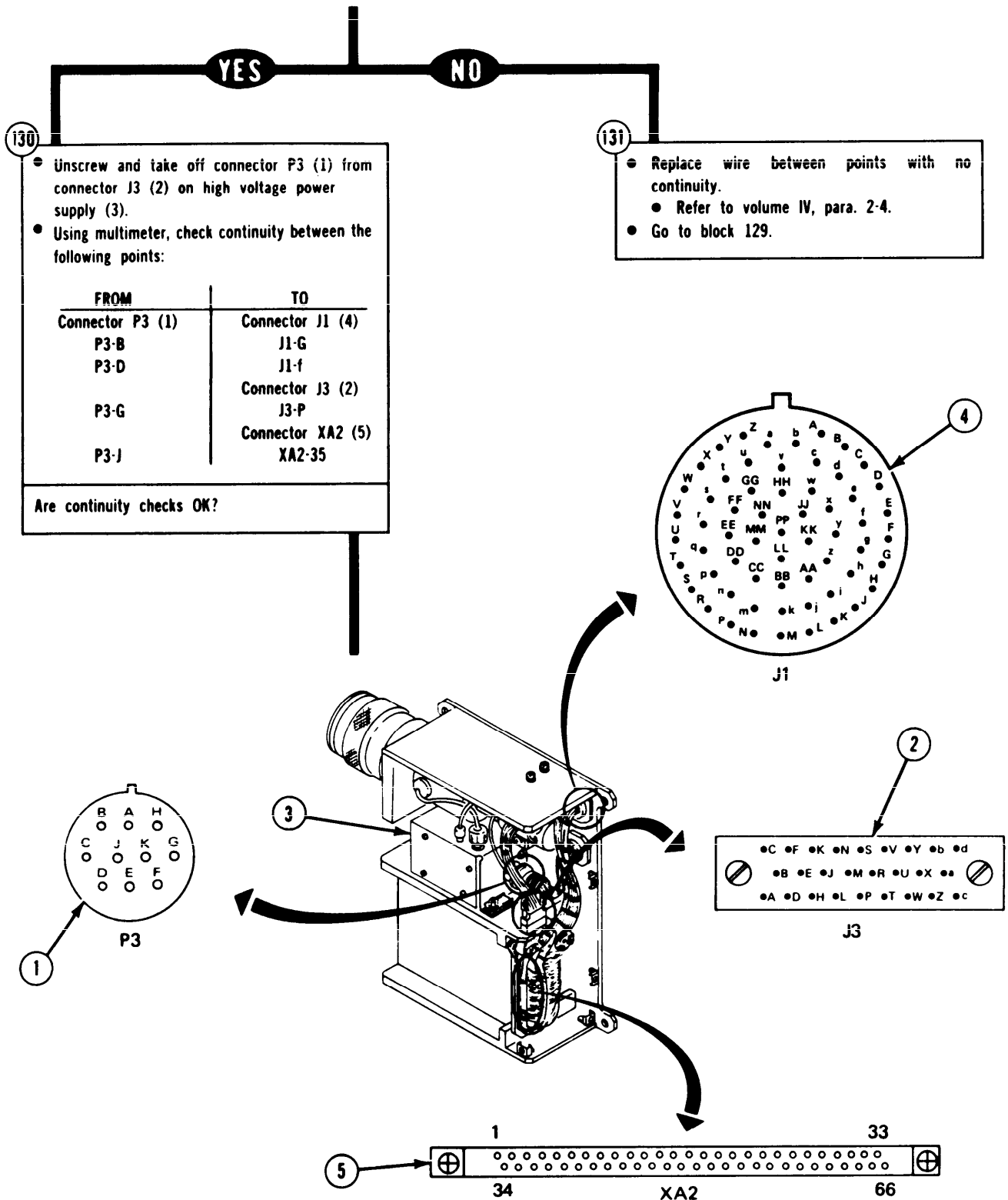


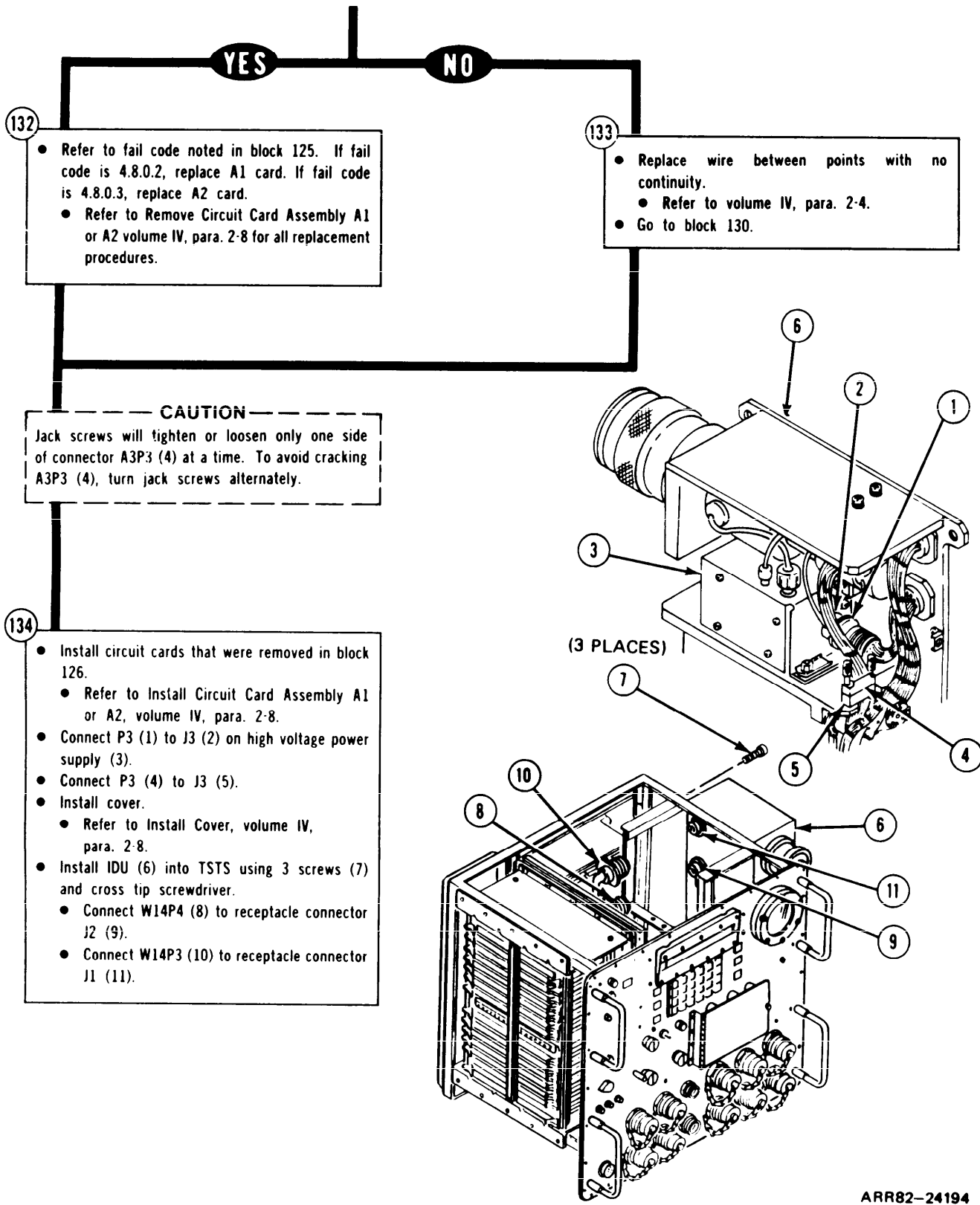
Figure 7-16. (Sheet 29 of 34)

ARR82-24192



ARR82-24193

Figure 7-16. (Sheet 30 of 34)



ARR82-24194

Figure 7-16. (Sheet 31 of 34)

TABLE 7-6. IDU FAIL CODE INDEX

CODE DISPLAY	CORRECTIVE ACTION
UNRESOLV- ABLE FAULT	Do procedure in figure 7-21.
4.0.0.2	Do procedure in figure 7-22.
4.0.0.3	Do procedure in figure 7-23.
4.0.0.8	Replace THERMAL MODE switch; refer to Replace Rotary Switch S9, S10, or S11; volume IV, para. 2-6.
4.0.0.9	Replace THERMAL TEST switch; refer to Replace Rotary Switch S9, S10, or S11; volume IV, para. 2-6.
4.0.0.14	Replace panel interface circuit card assembly A3; refer to Remove and Install Circuit Card Assembly; volume IV, para. 2-7.
4.0.0.15	Do procedure for fail code 4.0.0.14.
4.3.0.0	Do procedure in figure 7-21.
4.3.0.1	Replace video circuit card assembly A1; refer to Remove Circuit Card Assembly A1 or A2 volume IV, para. 2-8.
4.3.0.2	Replace circuit card assembly A2; refer to Replace Circuit Card Assembly A1 or A2 volume IV, para. 2-8.
4.3.0.3	Do procedure in figure 7-24.
4.3.0.4	Replace power supply; refer to volume IV, para. 2-8.
4.4.0.0	Do procedure in figure 7-25.
4.4.0.1	Do procedure for fail code 4.3.0.1.
4.4.0.2	Replace FAULT lamp bulb; refer to Replace Light-Switch; volume IV, para. 2-6.
4.4.0.3	Replace TRU READY lamp bulb; refer to Replace Lens, Lamp, or Housing; volume IV, para. 2-6.
4.4.0.4	Do procedure in figure 7-25.
4.5.0.1	Do procedure in figure 7-7.

Figure 7-16. (Sheet 32 of 34)

TSTS TROUBLESHOOTING PROCEDURES

TABLE 7-6. IDU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
4.5.0.2	Do procedure in figure 7-7.
4.6.0.1	Do procedure in figure 7-9.
4.6.0.2	Do procedure in figure 7-9.
4.7.0.1	Do procedure in figure 7-26.
4.7.0.2	Do procedure in figure 7-26.
4.8.0.0	Do procedure in figure 7-21.
4.8.0.1	Do procedure in figure 7-27.
4.8.0.2	Do procedure for fail code 4.3.0.1.
4.8.0.3	Do procedure for fail code 4.3.0.2.
4.9.0.1	Align electron tube assembly. Refer to Remove and Install Electron Tube Assembly, Clamp, and CRT Support; volume IV, para. 2-8.
4.9.0.2	Do procedure for fail code 4.3.0.1.
4.9.0.3	Do procedures for fail code 4.9.0.1 and fail code 4.3.0.1.
4.10.0.1	Do procedure in figure 7-20.
4.10.0.2	Do procedure for fail code 4.3.0.1.
4.10.0.3	Do procedure in figure 7-20.
4.10.0.4	If raster is not centered vertically, replace circuit card assembly A1. If raster is not centered horizontally, replace circuit card assembly A2. Refer to Remove Circuit Card Assembly A1 or A2; volume IV, para. 2-8.
4.11.0.1	Do procedure for fail code 4.3.0.1.
4.11 .0.2	Do procedure for fail code 4.3.0.2.
4.11.0.3	Do procedures for fail code 4.3.0.1 and fail code 4.3.0.2.
4.12.0.1	Do procedure for fail code 4.3.0.4.

Figure 7-16. (Sheet 33 of 34)

TABLE 7-6. IDU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
4.12.0.2	Replace electron tube assembly; refer to Remove Electron Tube Assembly, Clamp, and CRT Support and Install Electron Tube Assembly, Clamp, and CRT Support; volume IV, para. 2-8.
4.12.0.3	Do procedure in figure 7-18.
4.12.0.4	Do procedure for fail code 4.3.0.2.
4.12.0.5	Do procedure in figure 7-28.
4.13.0.1	Do procedure in figure 7-11.
4.13.0.2	Do procedure in figure 7-11.
4.13.0.3	Do procedure for fail code 4.3.0.2.
4.13.0.4	Do procedure in figure 7-12.
4.13.0.5	Do procedure in figure 7-12.
4.13.0.6	Do procedure in figure 7-11 and figure 7-12.
4.13.0.7	Do procedure in figure 7-11 and figure 7-12.
4.14.0.1	Do procedure in figure 7-13.
4.14.0.2	Do procedure in figure 7-13.
4.14.0.3	Do procedure in figure 7-13.
4.14.0.4	Do procedure in figure 7-13.
4.14.0.5	Do procedure in figure 7-13.
4.14.0.6	Do procedure in figure 7-13.
4.15.0.1	Do procedure in figure 7-3.
4.15.0.2	Do procedure in figure 7-3.
4.15.0.3	Do procedure in figure 7-11.
4.15.0.4	Do procedure in figure 7-11.

Figure 7-16. (Sheet 34 of 34)

**DISPLAY READS -
FAIL CODE: 0.3.0.3**

Test Equipment/Special Tools:

- Multimeter, digital
- Oscilloscope.

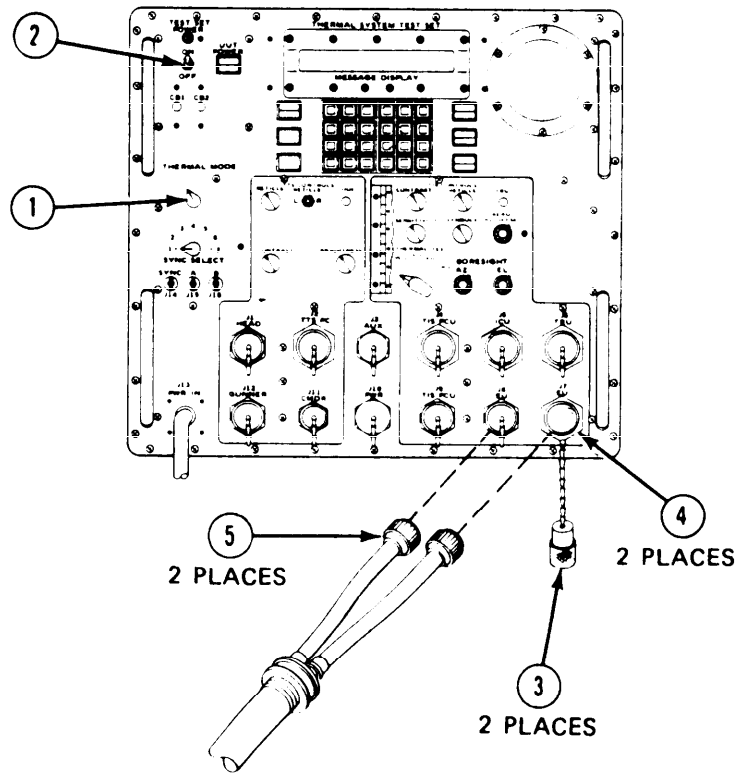
Equipment Condition:

- TSTS on clean work surface, power on.

NOTE

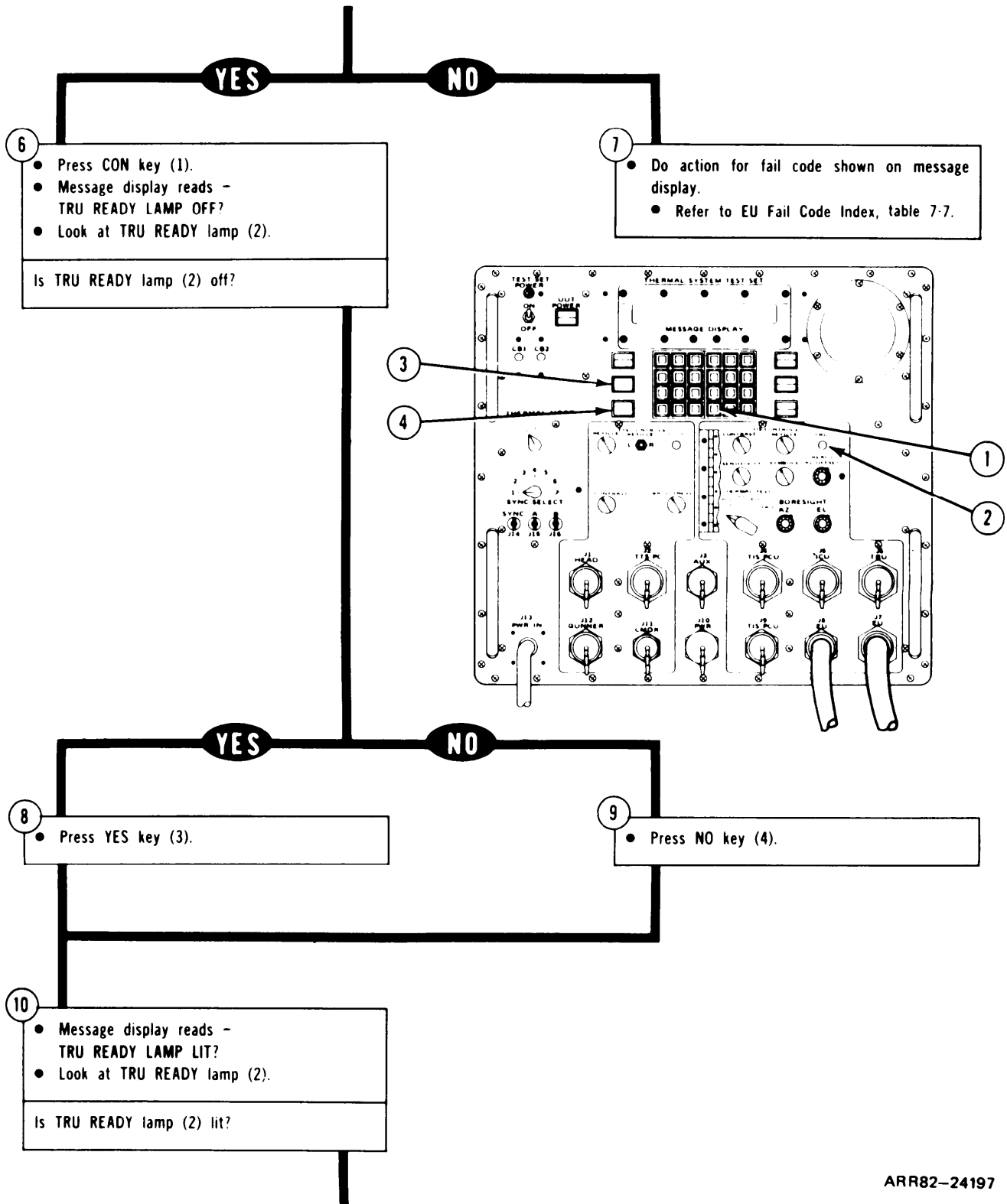
- For EU schematic, refer to FO-6.

- 1
- Power down TSTS.
 - Set THERMAL MODE switch (1) to OFF.
 - Set TEST SET POWER switch (2) to OFF.
 - Remove TSTC for access only.
 - Refer to volume IV, para. 2-5.
 - Remove Electronics Unit (EU) Assembly A4.
 - Refer to volume IV, para. 2-12.
 - Place EU on clean work surface.
 - Set up TSTS.
 - Disconnect the following dummy connector plugs (3) from receptacle connectors (4) on TSTS.
- | DUMMY CONNECTOR PLUGS | RECEPTACLE CONNECTORS |
|-----------------------|-----------------------|
| P7A | J7 |
| P8A | J8 |
- Connect the following cable connectors (5) to receptacle connectors (4) on TSTS.
- | CABLE CONNECTORS | RECEPTACLE CONNECTORS |
|------------------|-----------------------|
| W4P4 | J7 |
| W4P3 | J8 |



ARR82-24195

Figure 7-17. (Sheet 1 of 29)



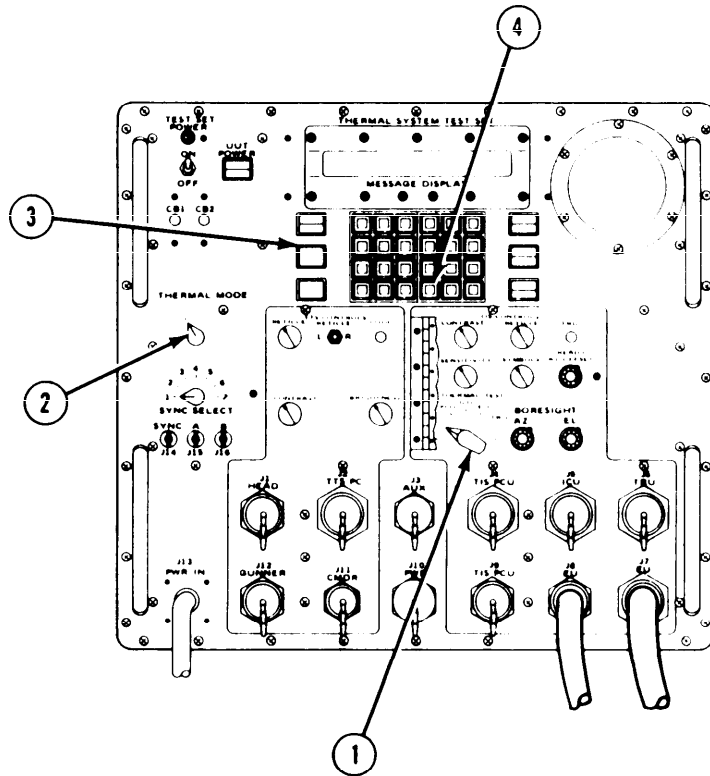
ARR82-24197

Figure 7-17. (Sheet 3 of 29)

TSTS TROUBLESHOOTING PROCEDURES

NOTE

- In the following steps, THERMAL TEST switch (1) and THERMAL MODE switch (2) must be set to new positions as indicated by message display.
- During testing, message display may read - HAS SWITCH BEEN REPOSITIONED? If this happens, set switch to indicated position and press YES key (3).



15

- Press CON key (4).
- The following message should appear in order on the message display. After each appears, set THERMAL TEST switch (1) and THERMAL MODE switch (2) to position indicated:
 - THERMAL MODE - OFF
 - THERMAL TEST - PCU
 - THERMAL TEST - TRU
 - THERMAL TEST - OFF
 - THERMAL MODE - STBY
 - THERMAL MODE - ON
 - THERMAL TEST - PCU
 - THERMAL TEST - ICU
 - THERMAL TEST - EU
 - THERMAL TEST - TRU
 - THERMAL TEST - EU
 - THERMAL TEST - ICU
 - THERMAL TEST - PCU
 - THERMAL TEST - OFF

Does message display read -
TEST PASSED:
BITE/RCVR ON CMD/INV ON CMD

YES

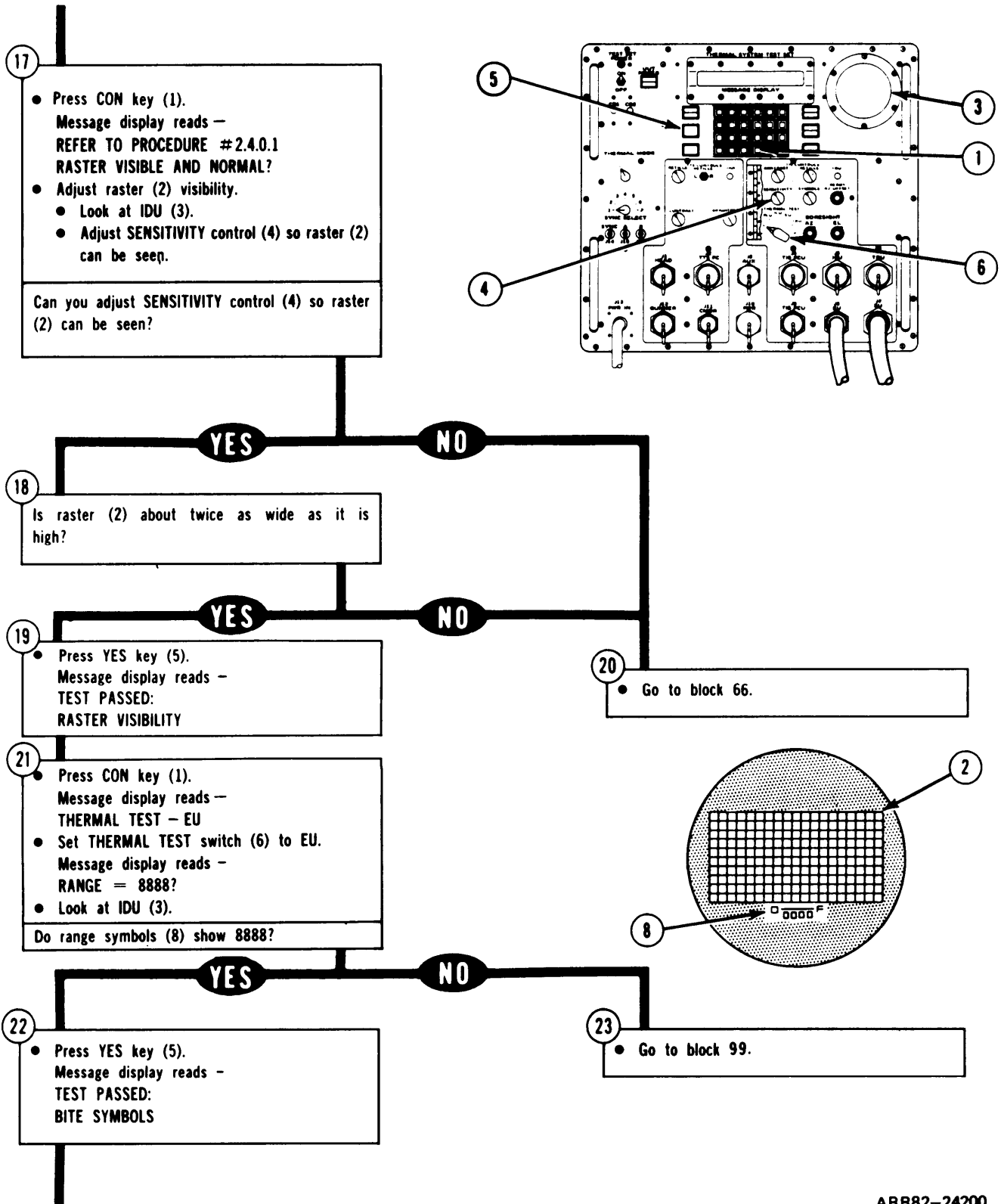
NO

16

- Do action for fail code shown on message display.
- Refer to EU Fail Code Index, table 7-7.
- Return to block 15.

ARR82-24199

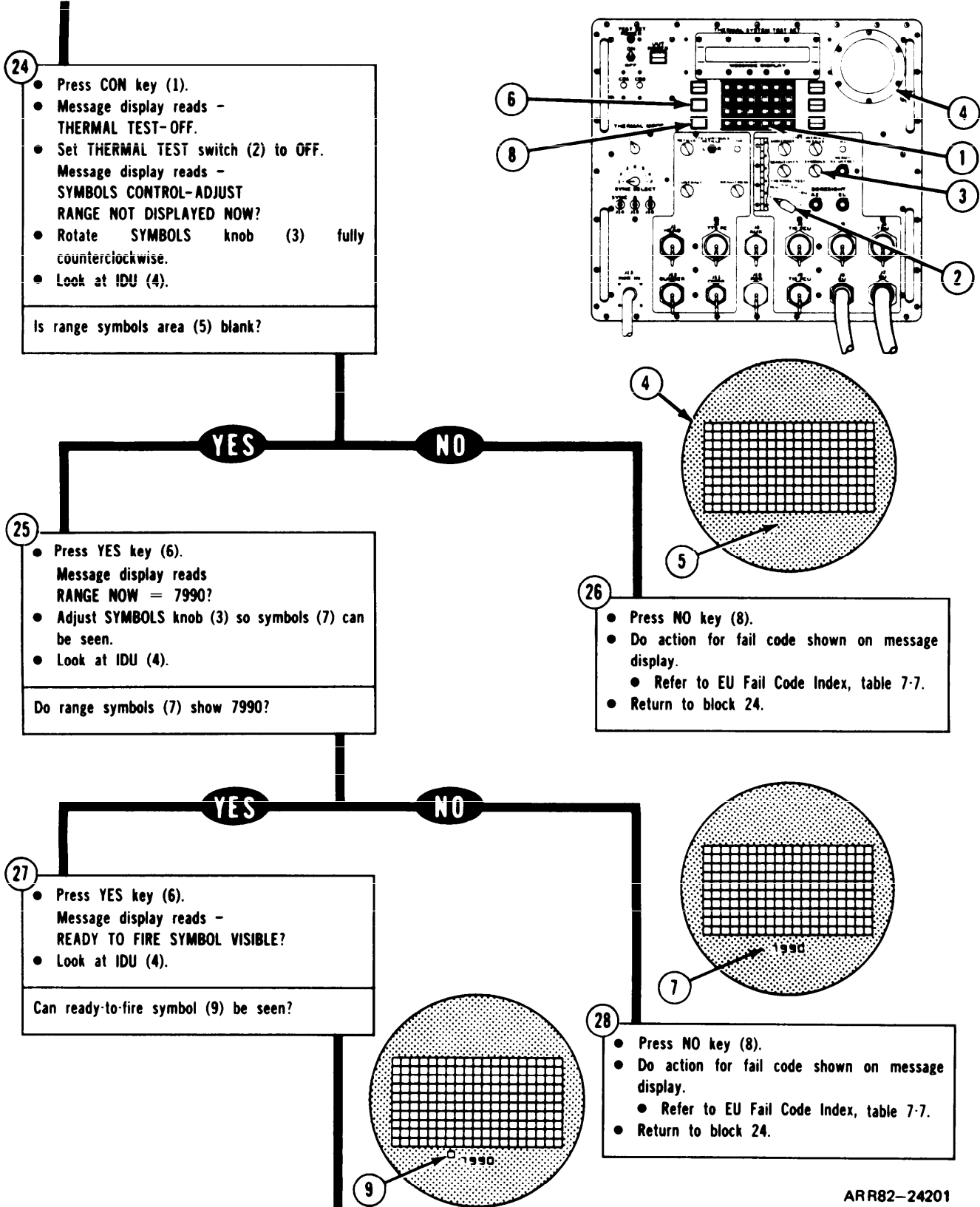
Figure 7-17. (Sheet 5 of 29)



ARR82-24200

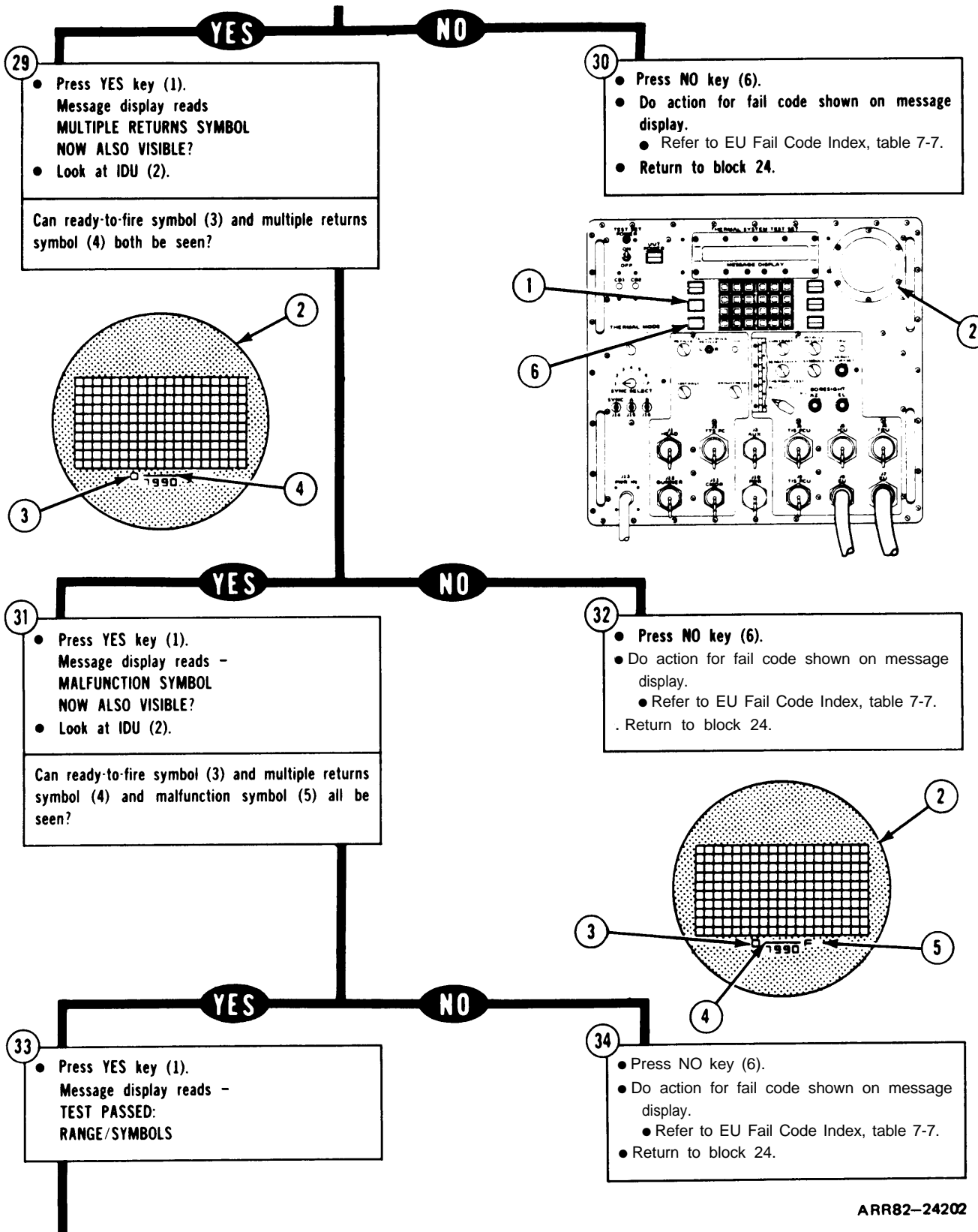
Figure 7-17. (Sheet 6 of 29)

TSTS TROUBLESHOOTING PROCEDURES



ARR82-24201

Figure 7-17. (Sheet 7 of 29)



ARR82-24202

Figure 7-17. (Sheet 8 of 29)

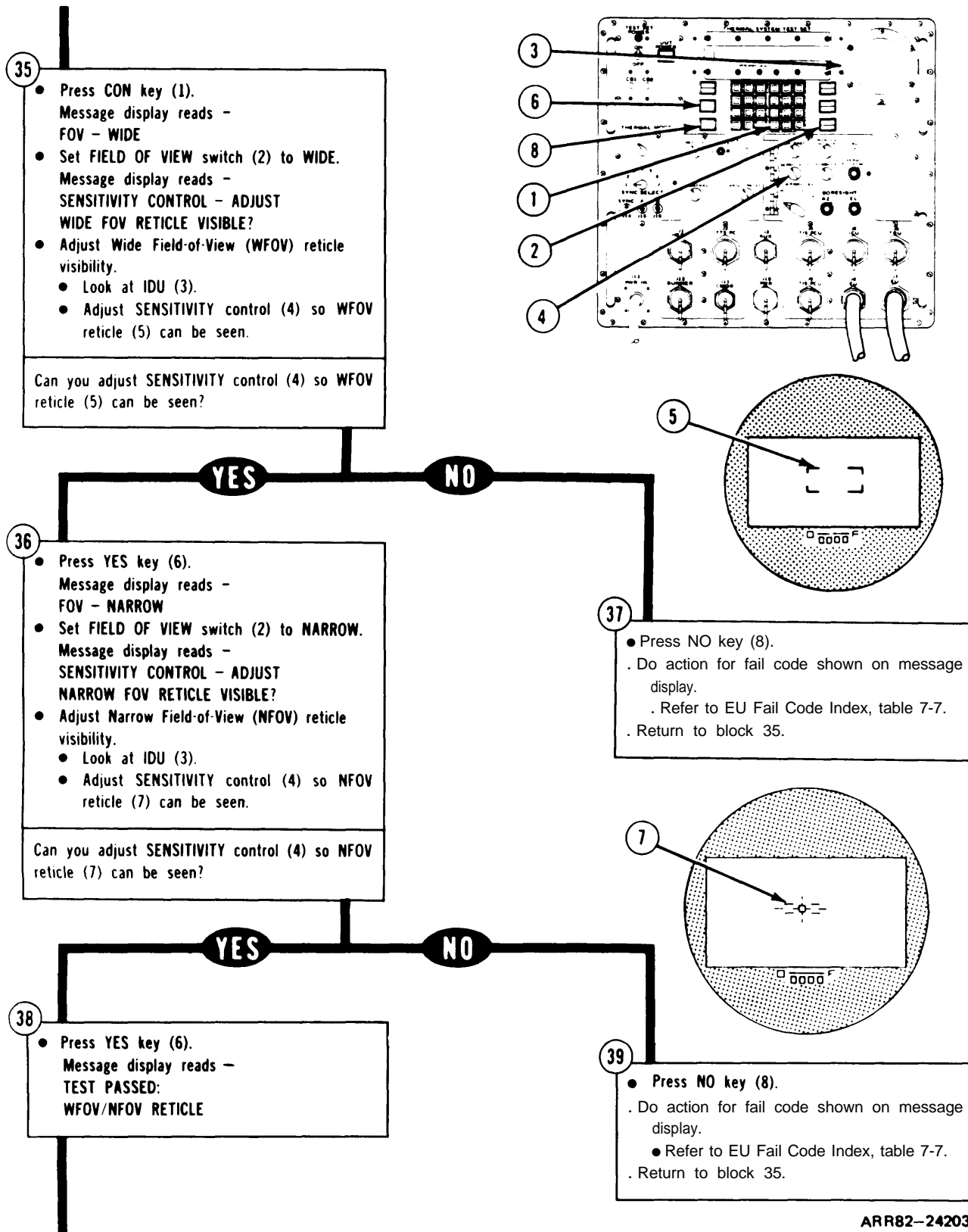
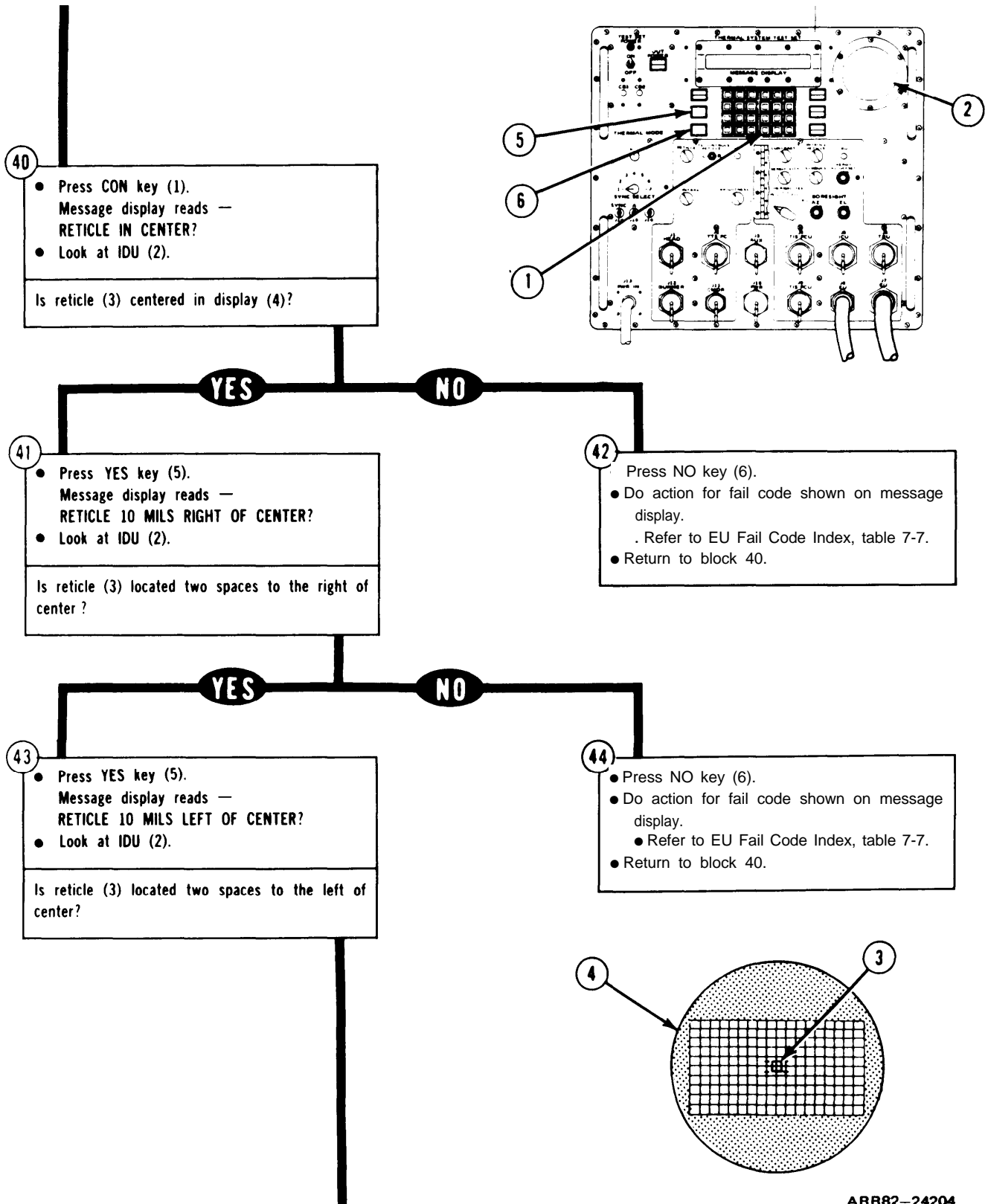
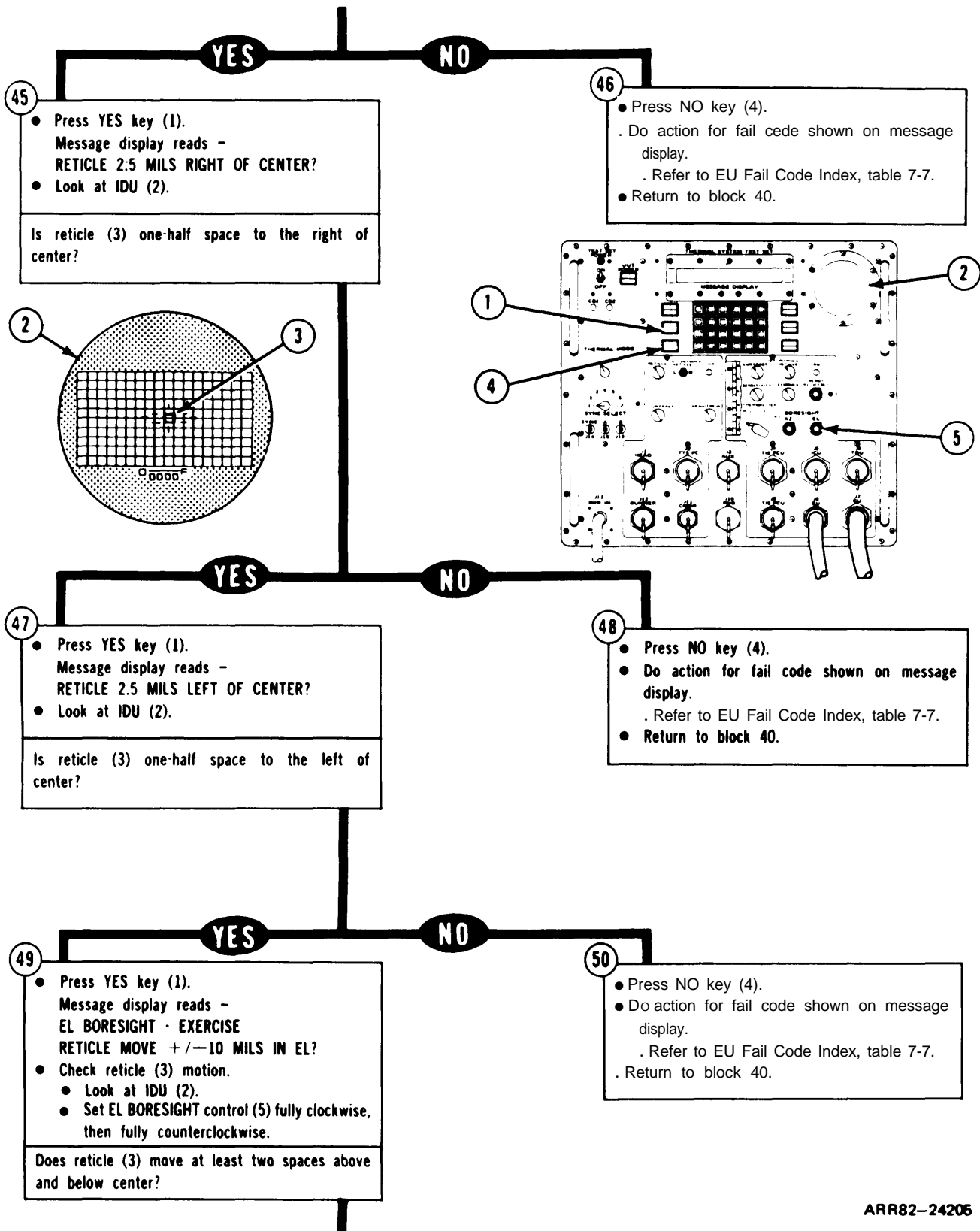


Figure 7-17. (Sheet 9 of 29)



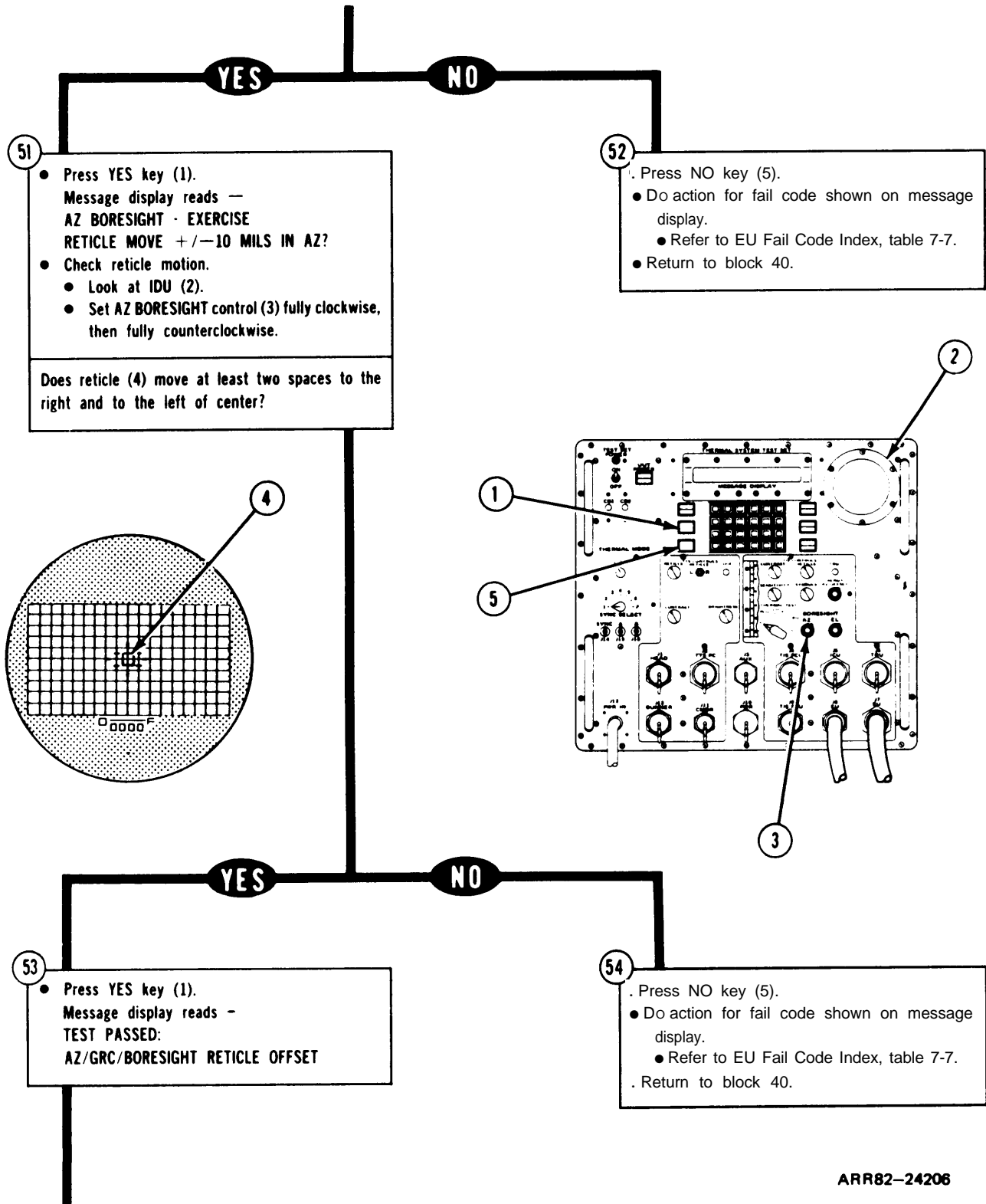
ARR82-24204

Figure 7-17. (Sheet 10 of 29)



ARR82-24205

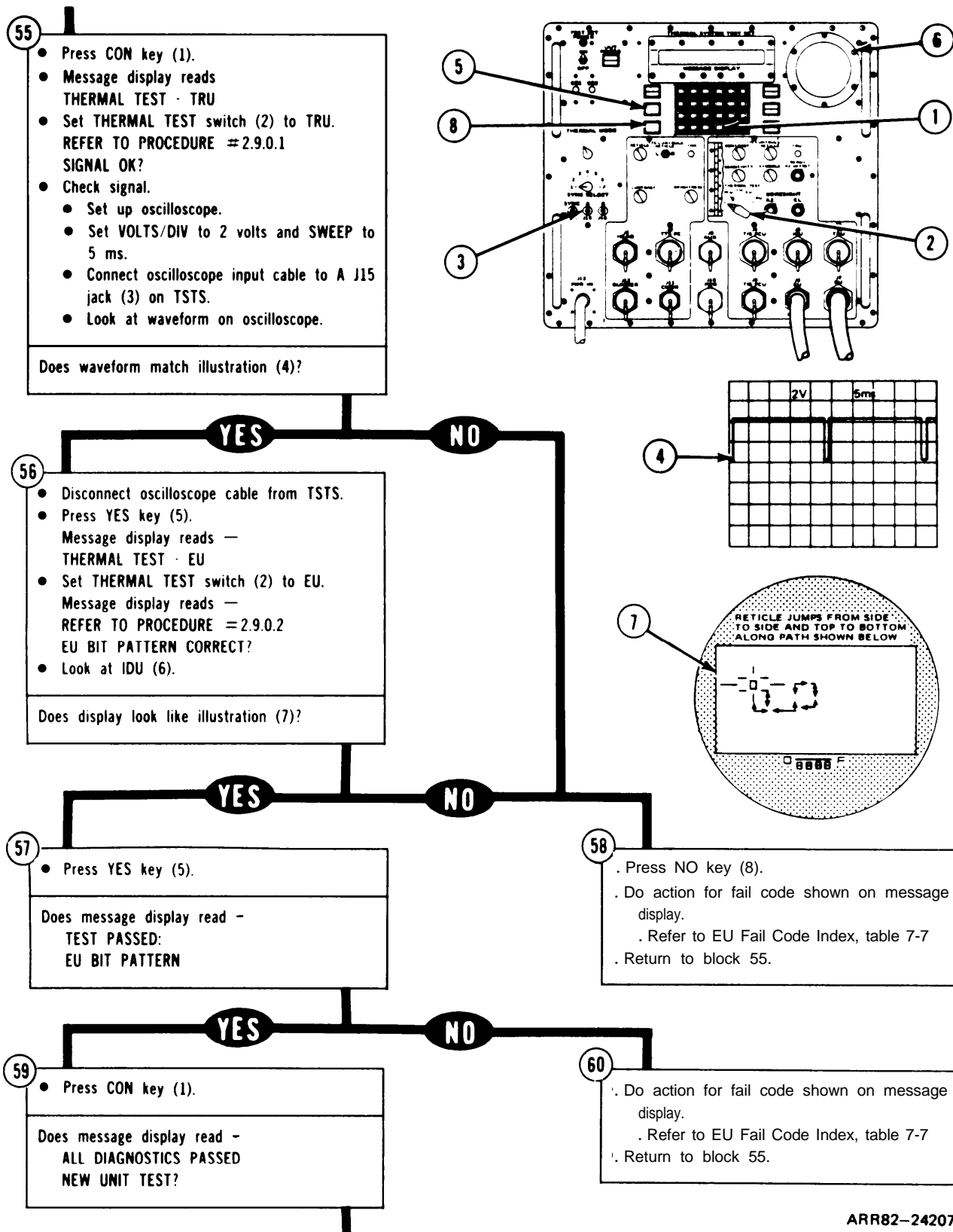
Figure 7-17. (Sheet 11 of 29)



ARR82-24206

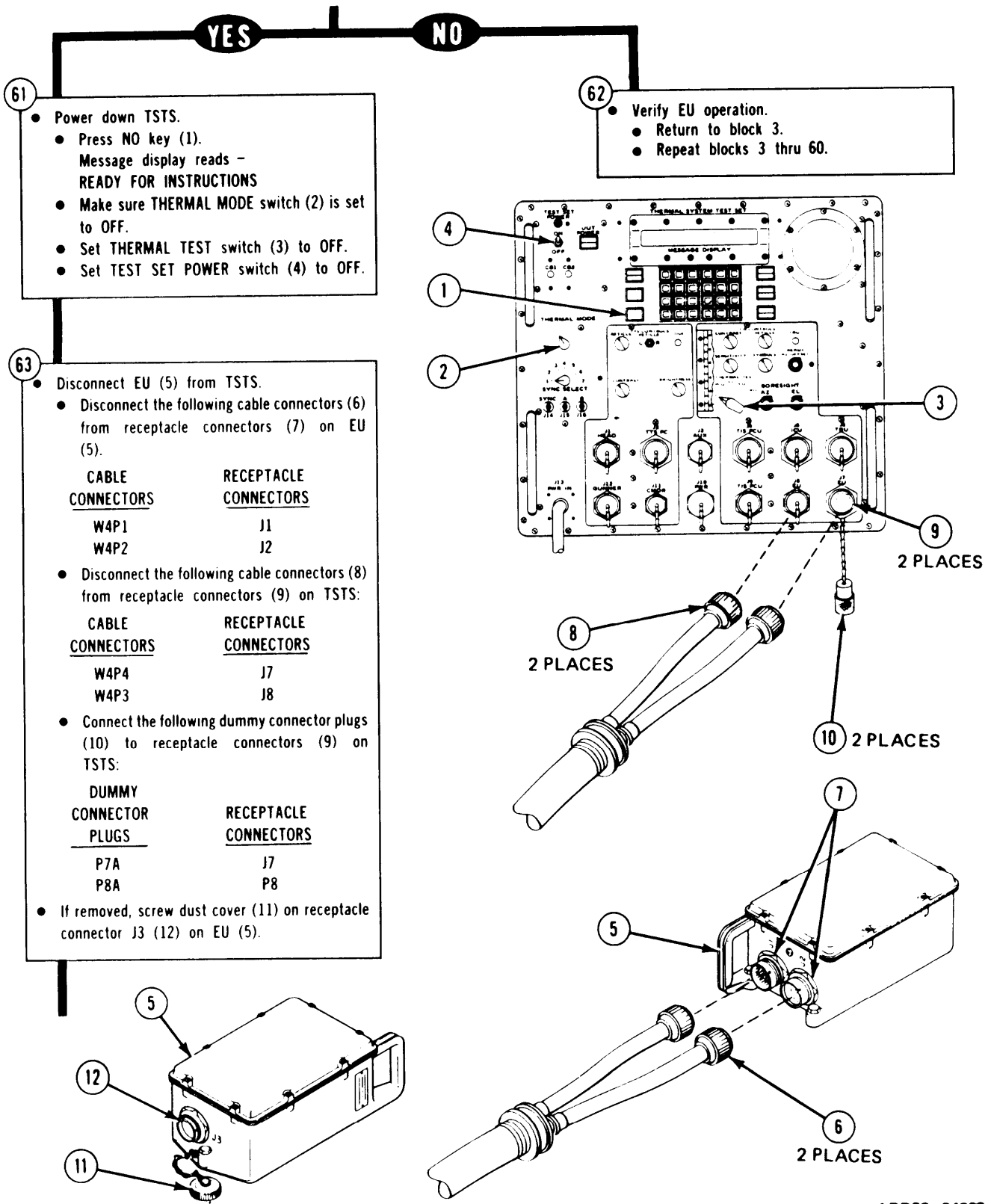
Figure 7-17. (Sheet 12 of 29)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82-24207

Figure 7-17. (Sheet 13 of 29)



ARR82-24208

Figure 7-17. (Sheet 14 of 29)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

64

- Install Electronics Unit (EU) A4.
- Refer to volume IV, para. 2-12.

65

- . Run operator assisted self-test.
- . Refer to figure 6-2.

ARR82-24209

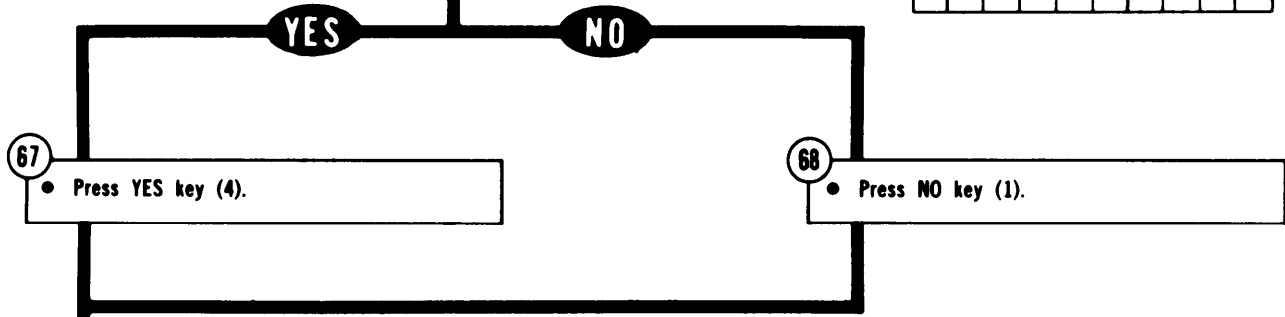
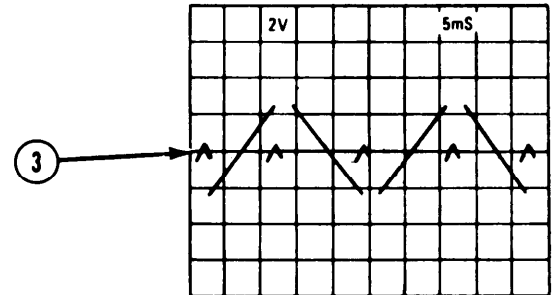
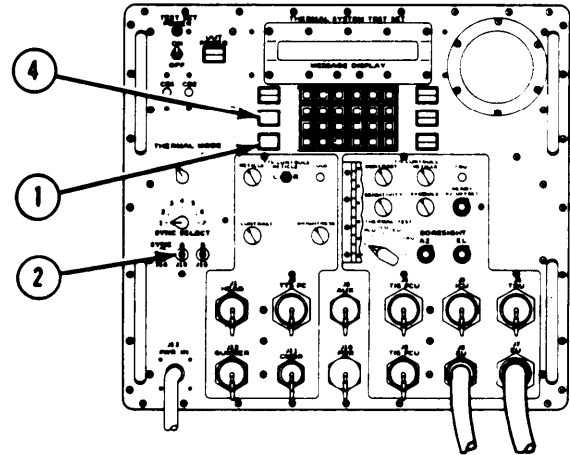
Figure 7-17. (Sheet 15 of 29)

From block 20

66

- Press NO key (1).
- Message display reads - REFER TO PROCEDURE #2.4.0.2 SIGNAL OK?
- Check signal.
 - Set up oscilloscope.
 - Set VOLTS/DIV to 2 volts and SWEEP to 5 ms.
 - Connect oscilloscope input cable to A J15 jack (2) on TSTS.
 - Look at waveform on oscilloscope.

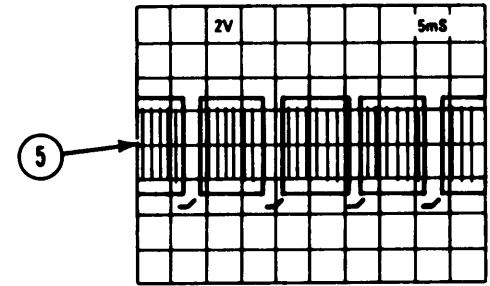
Does waveform match illustration (3)?



69

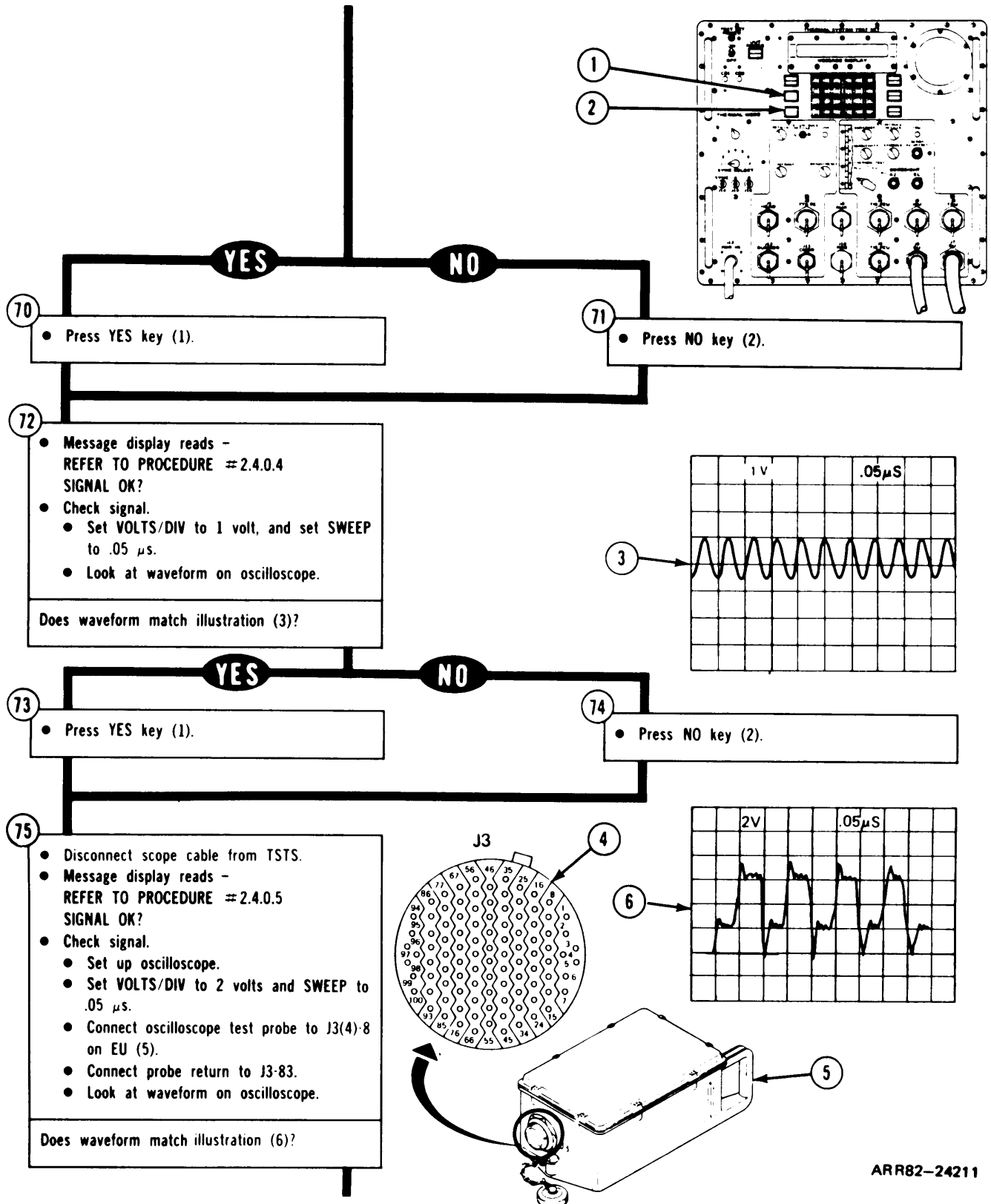
- Message display reads - REFER TO PROCEDURE #2.4.0.3 SIGNAL OK?
- Check signal.
 - Look at waveform on oscilloscope.

Does waveform match illustration (5)?



ARR82-24210

Figure 7-17. (Sheet 16 of 29)



ARR82-24211

Figure 7-17. (Sheet 17 of 29)

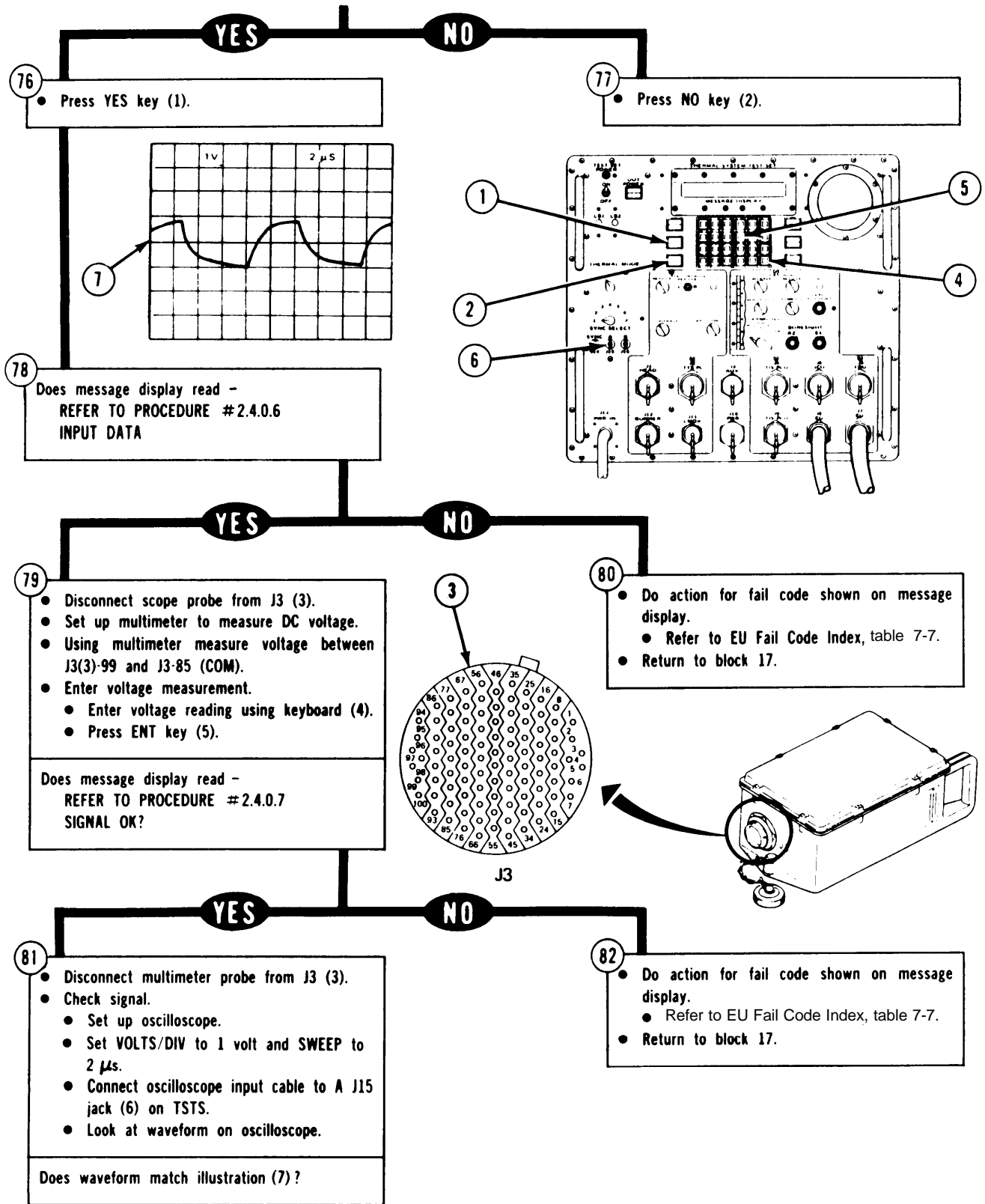


Figure 7-17. (Sheet 18 of 29)

ARR82-24212

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

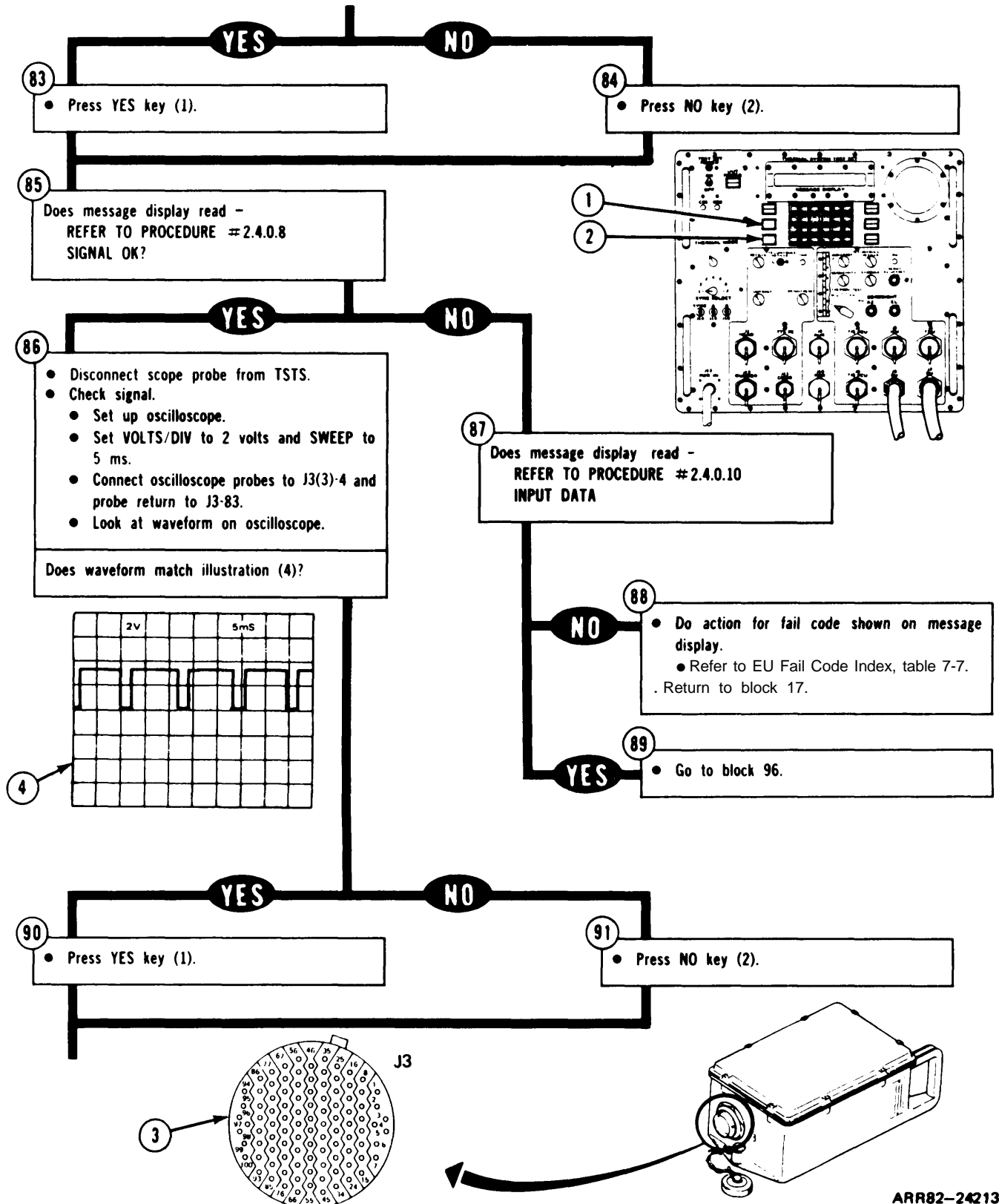


Figure 7-17. (Sheet 19 of 29)

ARR82-24213

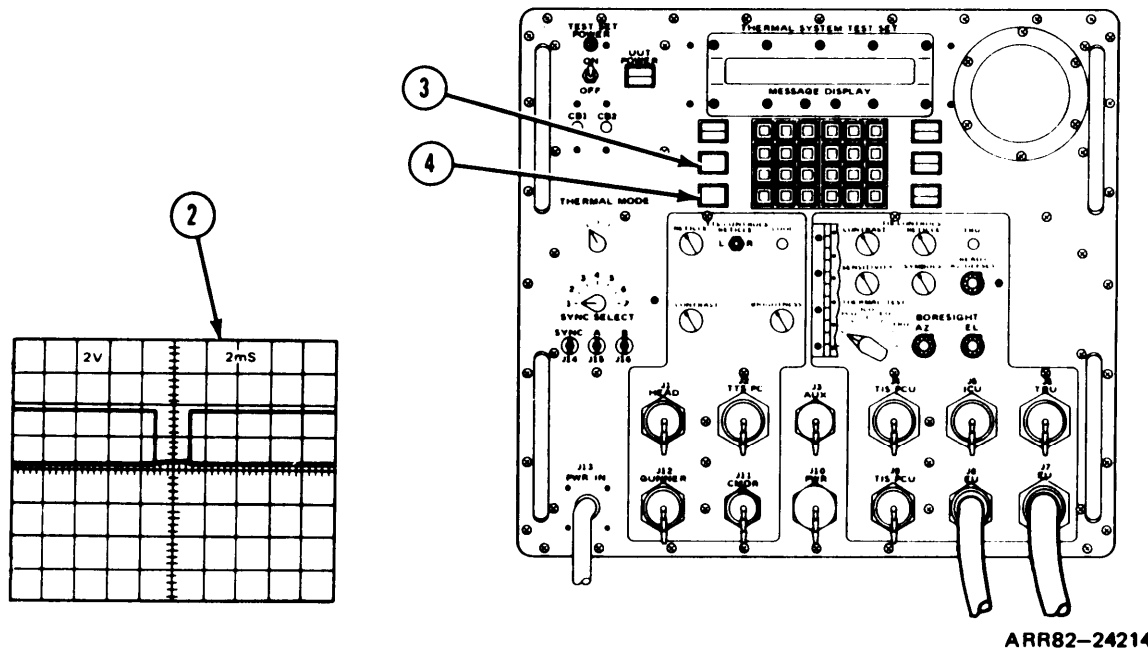
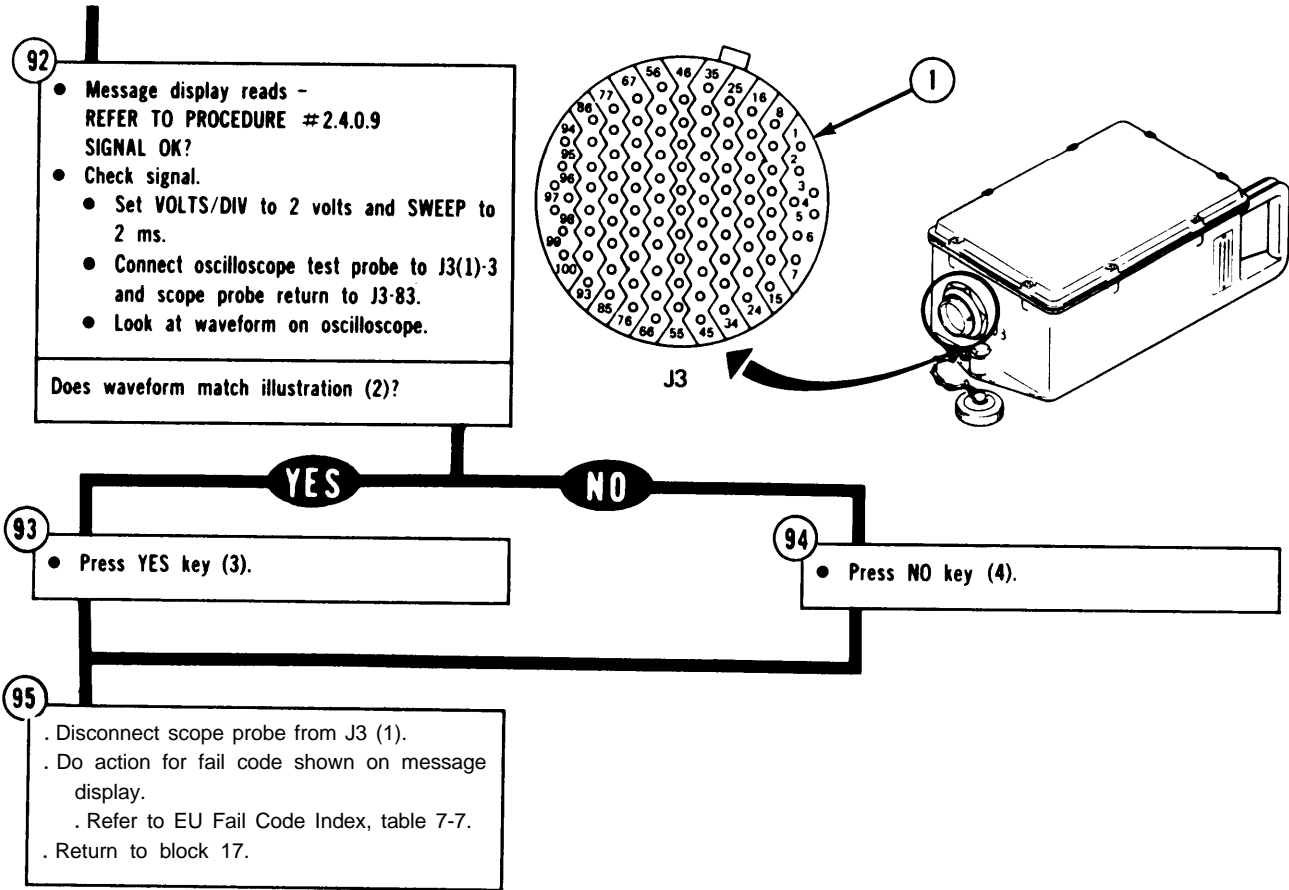


Figure 7-17. (Sheet 20 of 29)

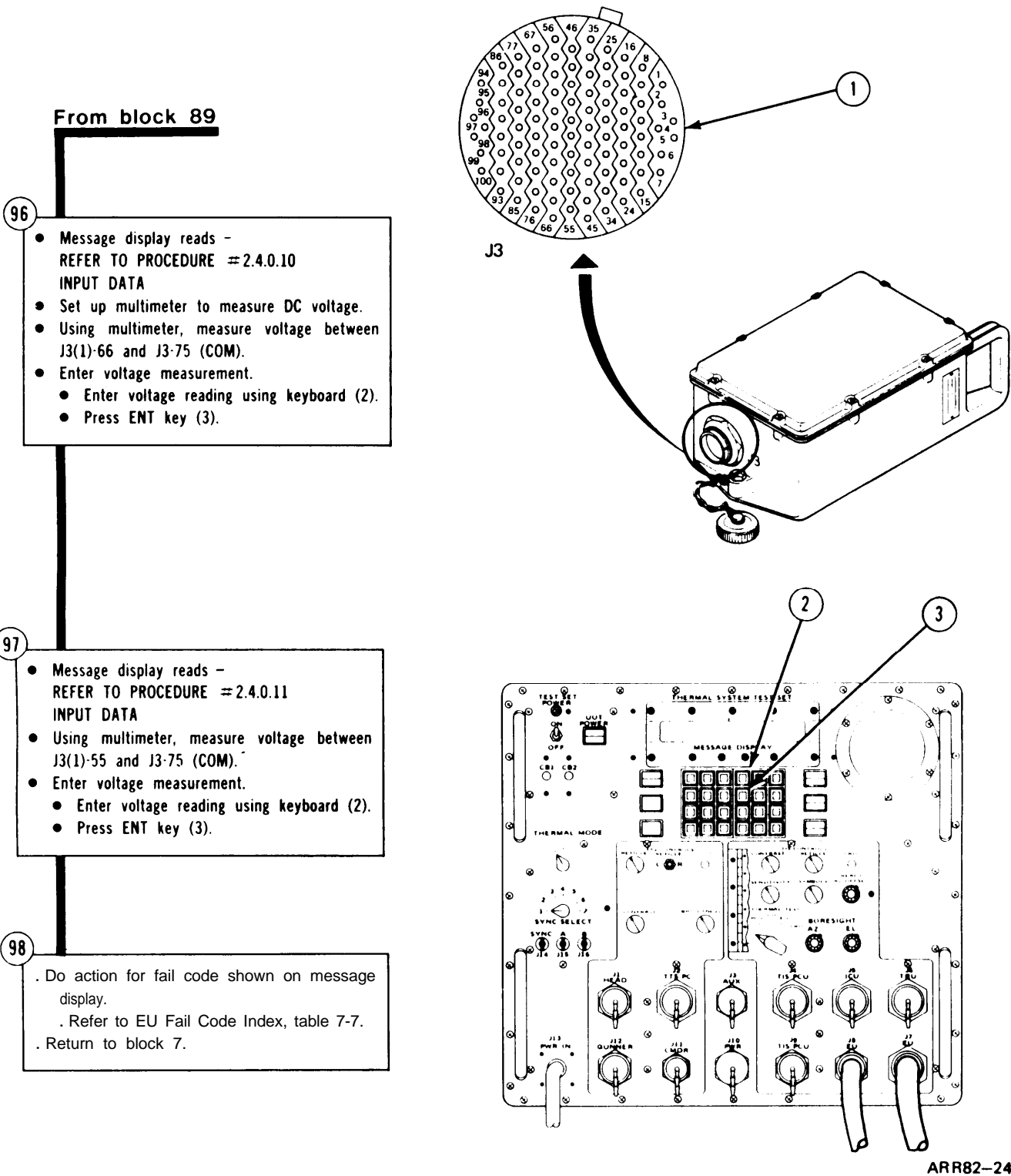
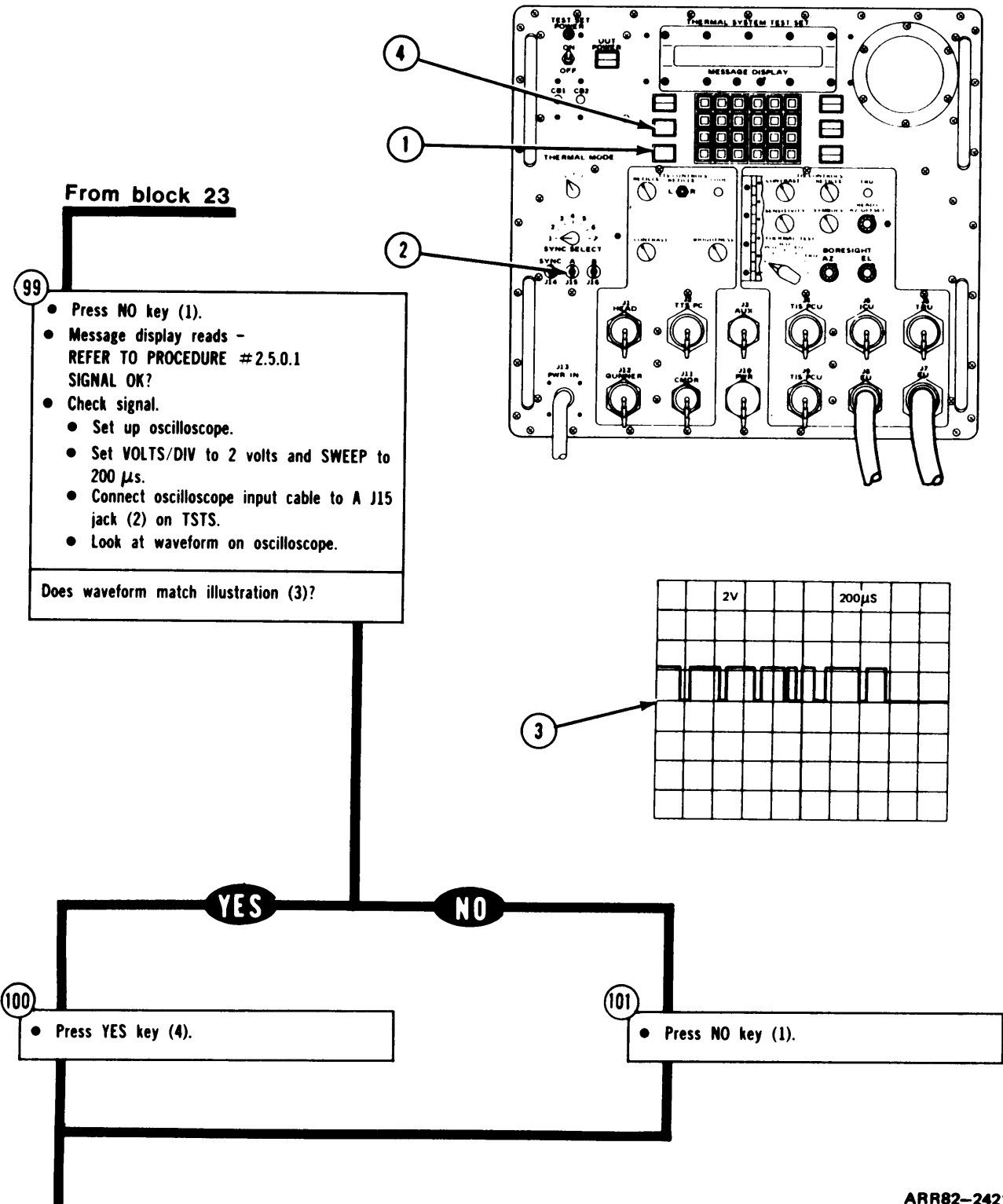
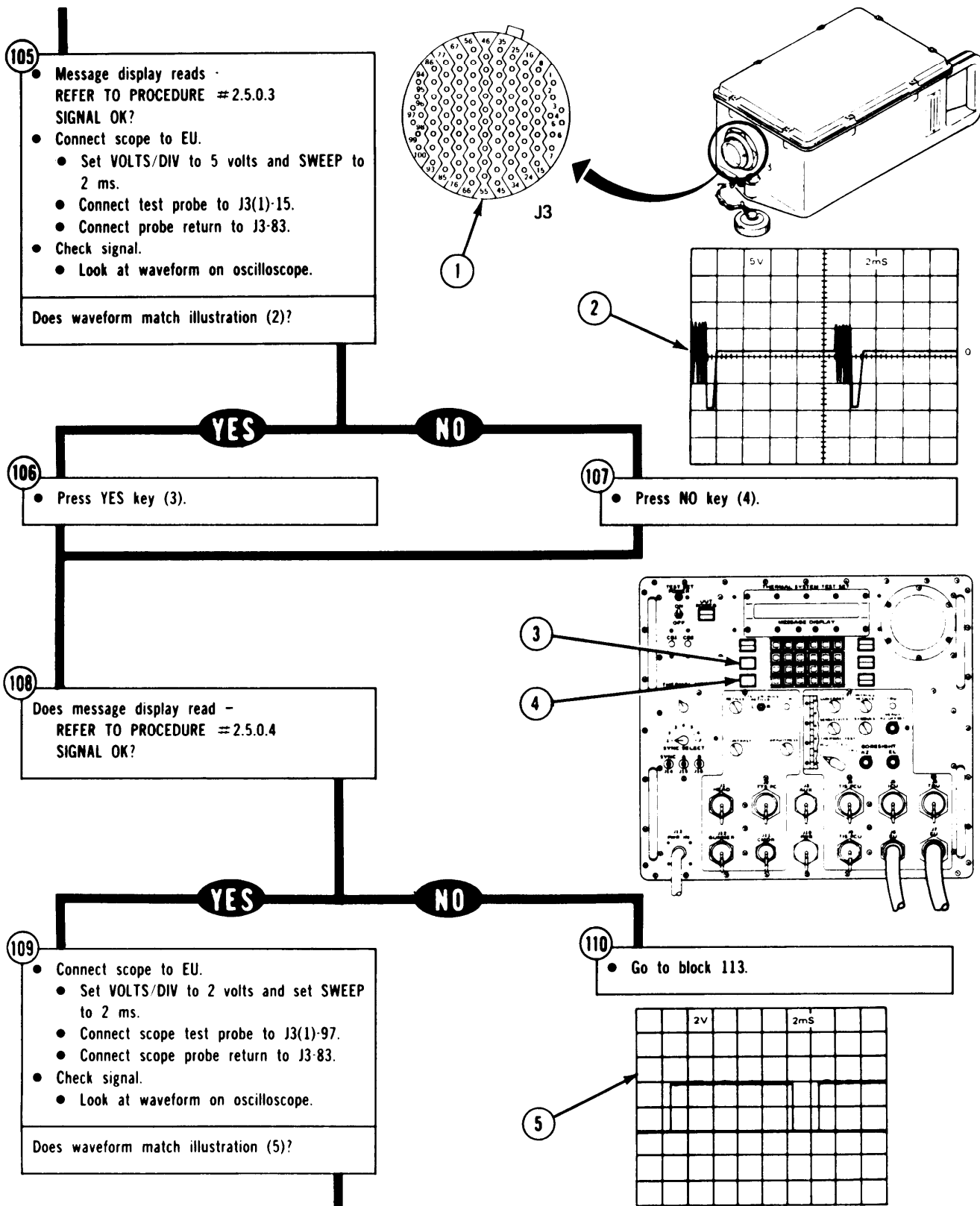


Figure 7-17. (Sheet 21 of 29)





ARR82-24218

Figure 7-17. (Sheet 24 of 29)

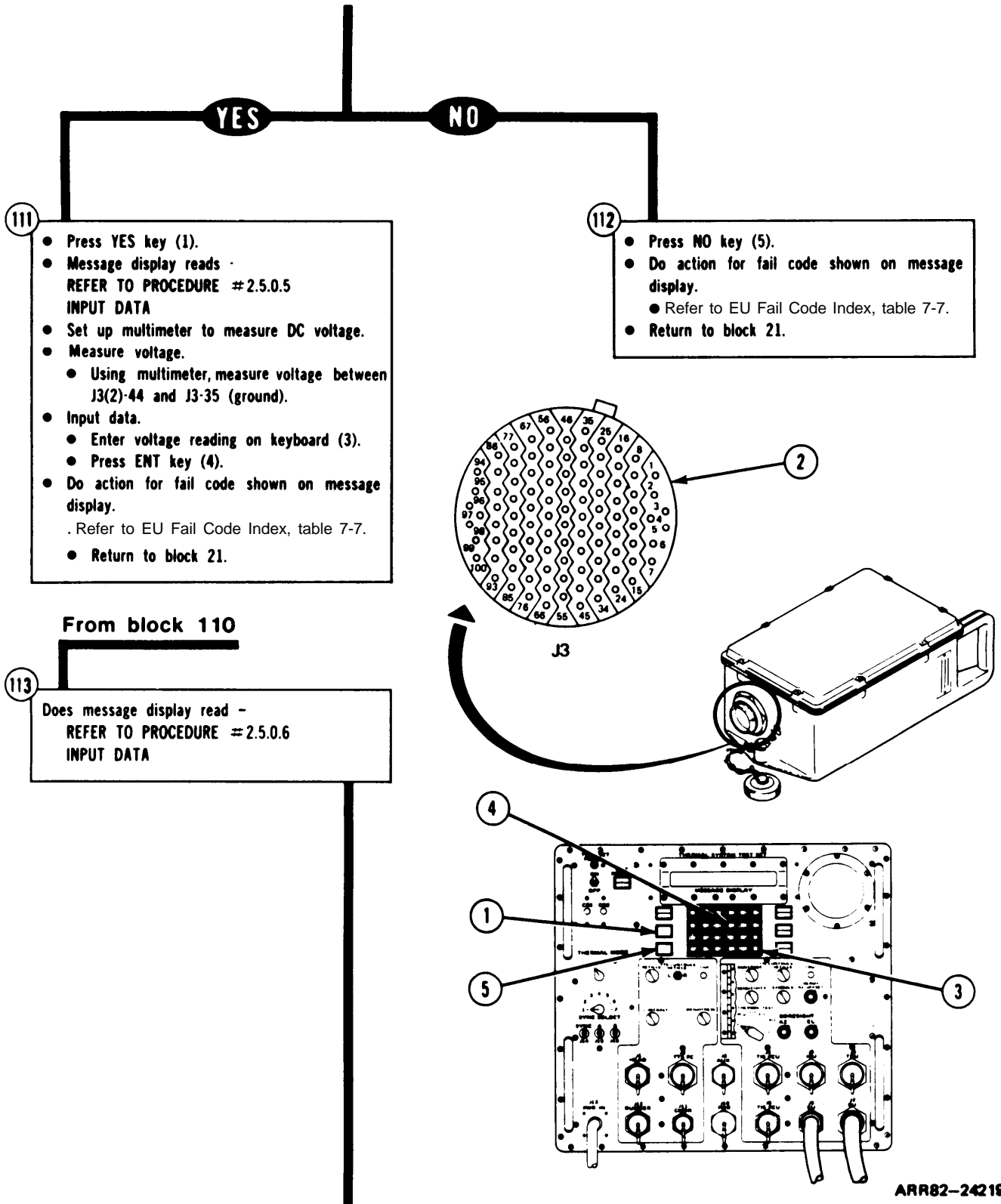


Figure 7-17. (Sheet 25 of 29)

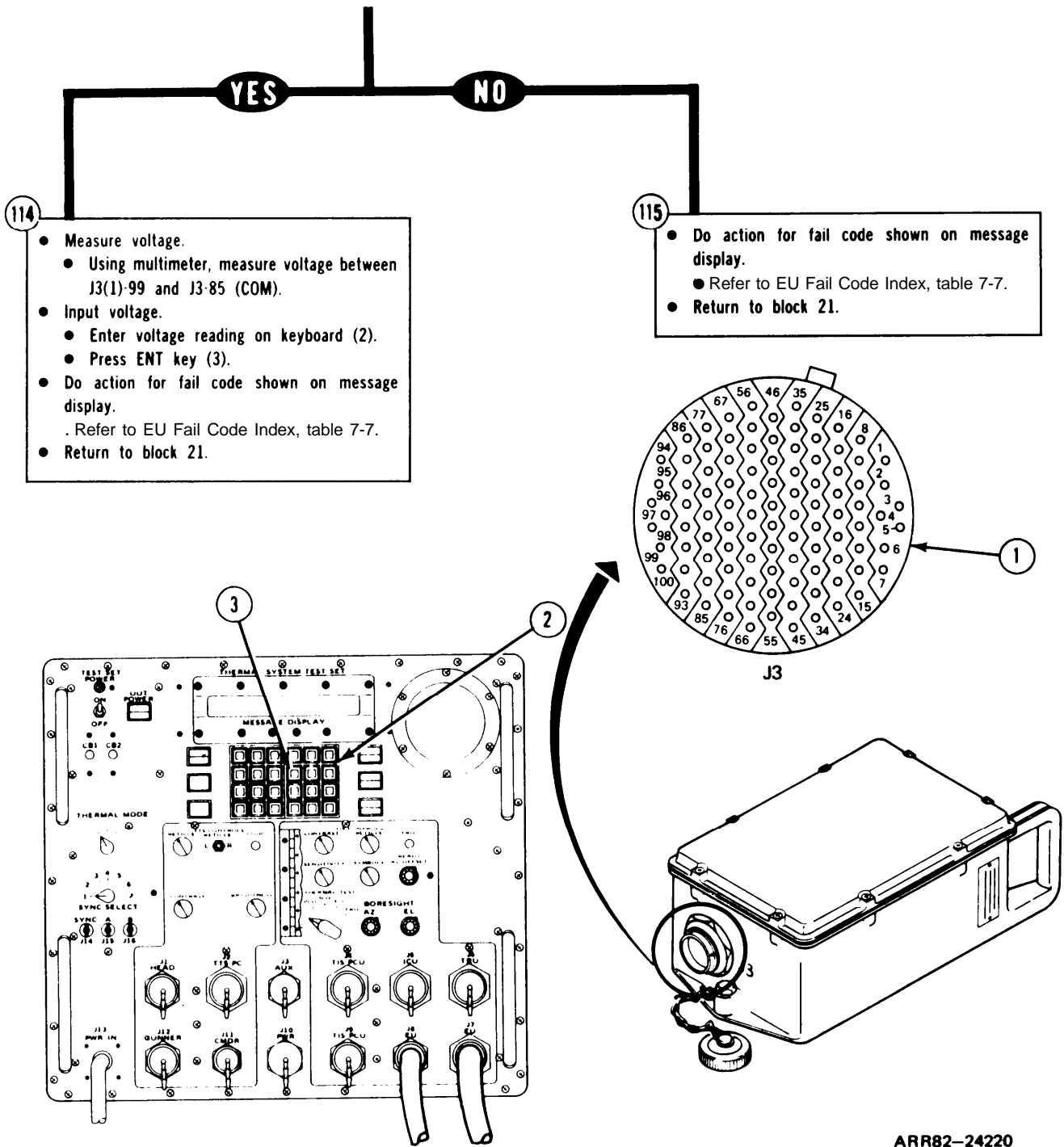


Figure 7-17. (Sheet 26 of 29)

TABLE 7-7. EU FAIL CODE INDEX

CODE DISPLAY	CORRECTIVE ACTION
UNRESOLV- ABLE FAULT	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.1.0.1	Do procedure in figure 7-19.
2.1.0.2	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.1.0.3	Do procedure in figure 7-19.
2.1.0.4	Do procedure in figure 7-19.
2.1.0.5	Do procedure in figure 7-19.
2.1.0.6	Do procedure in figure 7-19.
2.2.0.0	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.2.0.1	Replace BITE circuit card assembly A1; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.2.0.2	Replace reticle data processor circuit card assembly A2; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.2.0.3	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.2.0.4	Replace relay K2; refer to Remove and Install Relay K1, K2, K3, or K4; TM 9-1200-206-34-2-2, para. 3-8.
2.2.0.5	Replace relay K4; refer to Remove and Install Relay K1, K2, K3, or K4; TM 9-1200-206-34-2-2, para. 3-8.
2.2.0.6	Do procedure for fail code 2.2.0.4 and fail code 2.2.0.5.
2.3.0.1	Do procedure for fail code 2.2.0.1.
2.3.0.2	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.4.0.0	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.

Figure 7-17. (Sheet 27 of 29)

TABLE 7-7. EU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
2.4.0.1	Do procedure in figure 7-29.
2.4.0.2	Replace symbol decoder circuit card assembly A7; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.4.0.3	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.4.0.4	Do procedure for fail code 2.4.0.2; then do troubleshooting in figure 7-32.
2.4.0.5	Replace reticle generator circuit card assembly A3; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.4.0.6	Replace azimuth timing generator circuit card assembly A4; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.4.0.7	Replace sweep generator circuit card assembly AS; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.4.0.8	Do procedure for fail code 2.2.0.1.
2.4.0.9	Replace relay K3; refer to Remove and Install Relay K1, K2, K3, or K4; TM 9-1200-206-34-2-2, para. 3-8.
2.4.0.10	Do procedures for fail code 2.4.0.2 and fail code 2.4.0.5.
2.4.0.11	Do procedures for fail code 2.4.0.5 and fail code 2.4.0.6.
2.4.0.12	Do procedures for fail code 2.2.0.1 and fail code 2.4.0.5.
2.4.1.1	Do procedure for fail code 2.4.0.7.
2.4.1.2	Replace relay K1; refer to Remove and Install Relay K1, K2, K3, or K4; TM 9-1200-206-34-2-2, para. 3-8.
2.4.1.3	Replace symbol generator circuit card assembly A6; refer to TM 9-1200-206-34-2-2, para. 3-8.
2.4.1.4	Do procedure for fail code 2.4.0.6.
2.5.0.1	Do procedure for fail code 2.4.0.2.

Figure 7-17. (Sheet 28 of 29)

TSTS TROUBLESHOOTING PROCEDURES

TABLE 7-7. EU FAIL CODE INDEX (Continued)

CODE DISPLAY	CORRECTIVE ACTION
2.5.0.2	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.5.0.3	Do procedure for fail code 2.4.1.3.
2.5.0.4	Do procedure for fail code 2.2.0.1.
2.5.0.5	Do procedure for fail code 2.4.1.2.
2.6.0.1	Do procedure for fail code 2.4.0.2.
2.6.0.2	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.7.0.1	Do procedure for fail code 2.4.0.5.
2.7.0.2	Do procedure for fail code 2.2.0.2.
2.7.0.3	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.8.0.1	Do procedure for fail code 2.2.0.2.
2.8.0.2	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.
2.9.0.1	Do procedure for fail code 2.4.0.5.
2.9.0.2	Do procedure for fail code 2.2.0.1.
2.9.0.3	EU cannot be repaired at this level. Turn in EU to next higher level of maintenance.

Figure 7-17. (Sheet 29 of 29)

**DISPLAY READS
FAIL CODE: 4.12.0.3**

Test Equipment/Special Tools:
• Alignment tool

WARNING
HIGH VOLTAGE

- Do not reach into IDU (1) with alignment tool any farther than necessary to make adjustments.
- Make sure alignment tool does not touch anything in IDU (1) except points specified.
- Use only one hand when reaching into IDU (1).

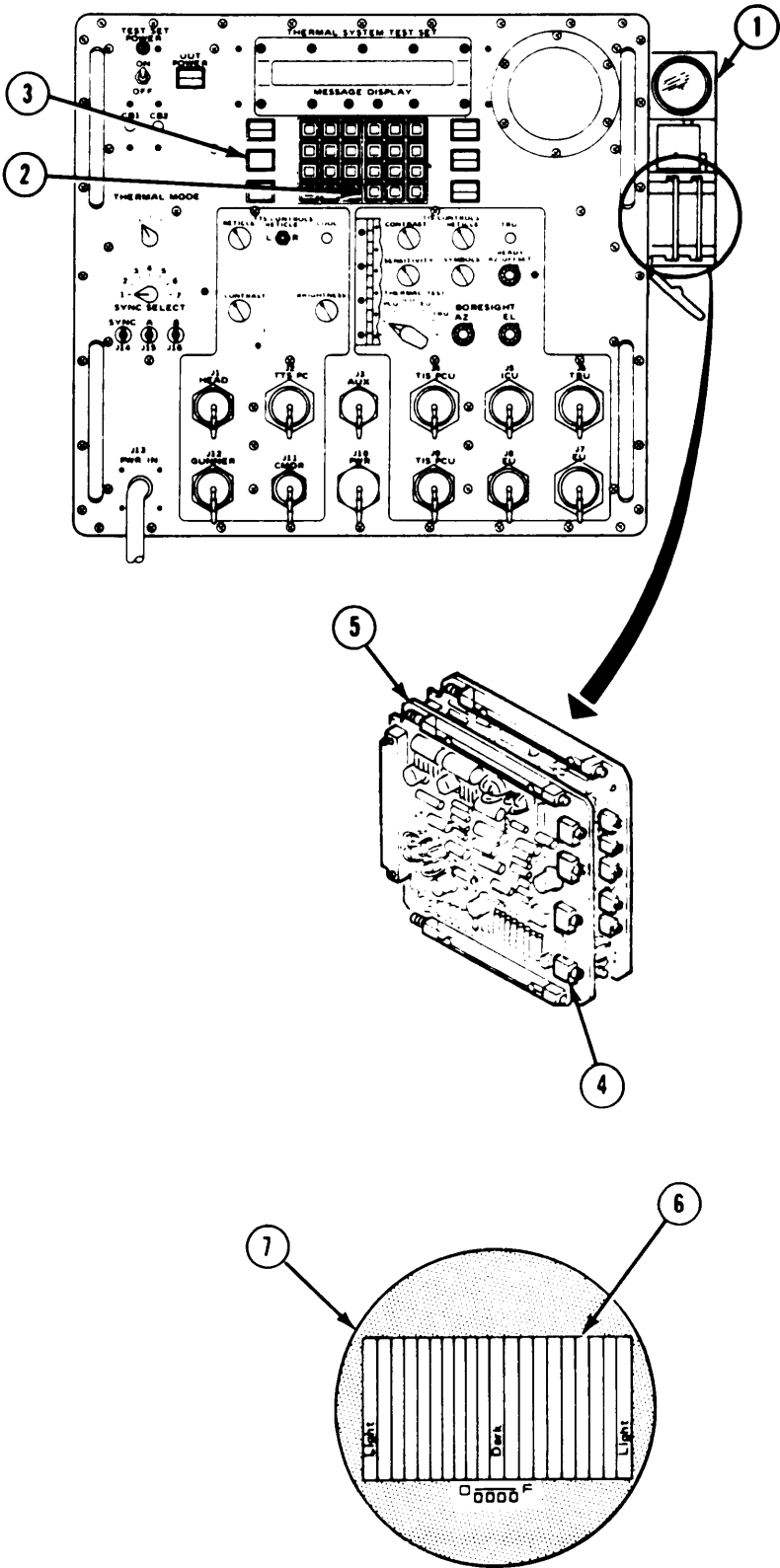
NOTE
If you cannot make the following adjustment, go on to the next block.

1

- Press CON key (2).
- Press YES key (3).
- Look at IDU (1).
- Using tool, try to adjust R75 (4) on circuit card assembly A2 (5) so you can see 10 shades of grey (6). Shades should range from very light to very dark, as in illustration (7).

2

- Continue IDU troubleshooting.
. Refer to figure 7-16, block 71.



ARR82-24221

Figure 7-18

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

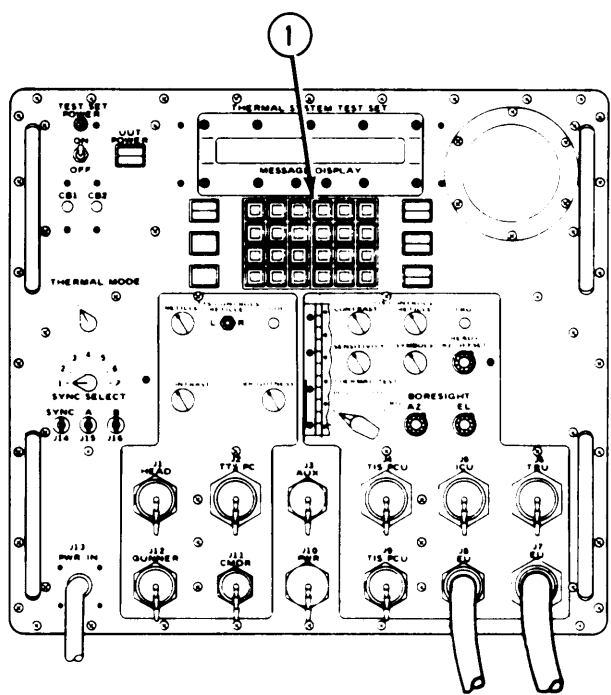
DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

- * 2.1.0.1
- 2.1.0.3
- 2.1.0.4
- 2.1.0.5
- 2.1.0.6

WARNING
Be sure UUT POWER switch is OFF before removing or installing circuit cards in this procedure.

1

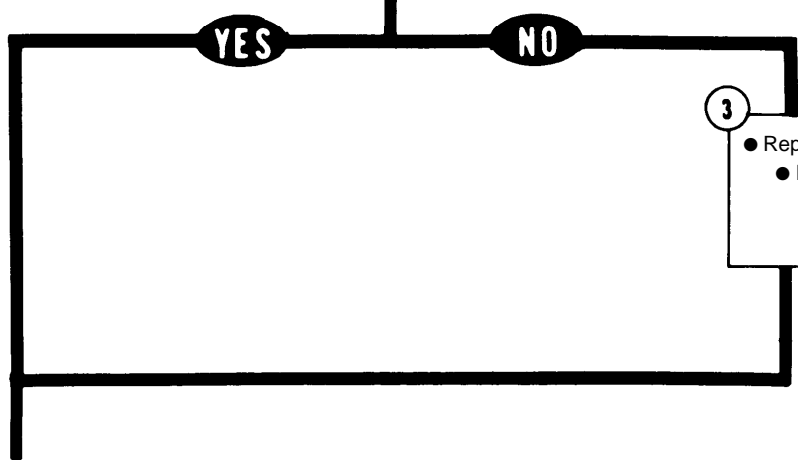
- Remove, but do not turn in circuit card assemblies A2, A3, A4, A5, A6, A7.
- Refer to TM 9-1200-206-34-2-2, para. 3-8.



2

- Run EU test block #1.
 - Using keyboard (1), press the following keys:
 - Press TST#, 1, and ENT keys.
 - Press 0 and ENT keys.

Does message display read —
TEST PASSED:
EU VOLTAGE TEST

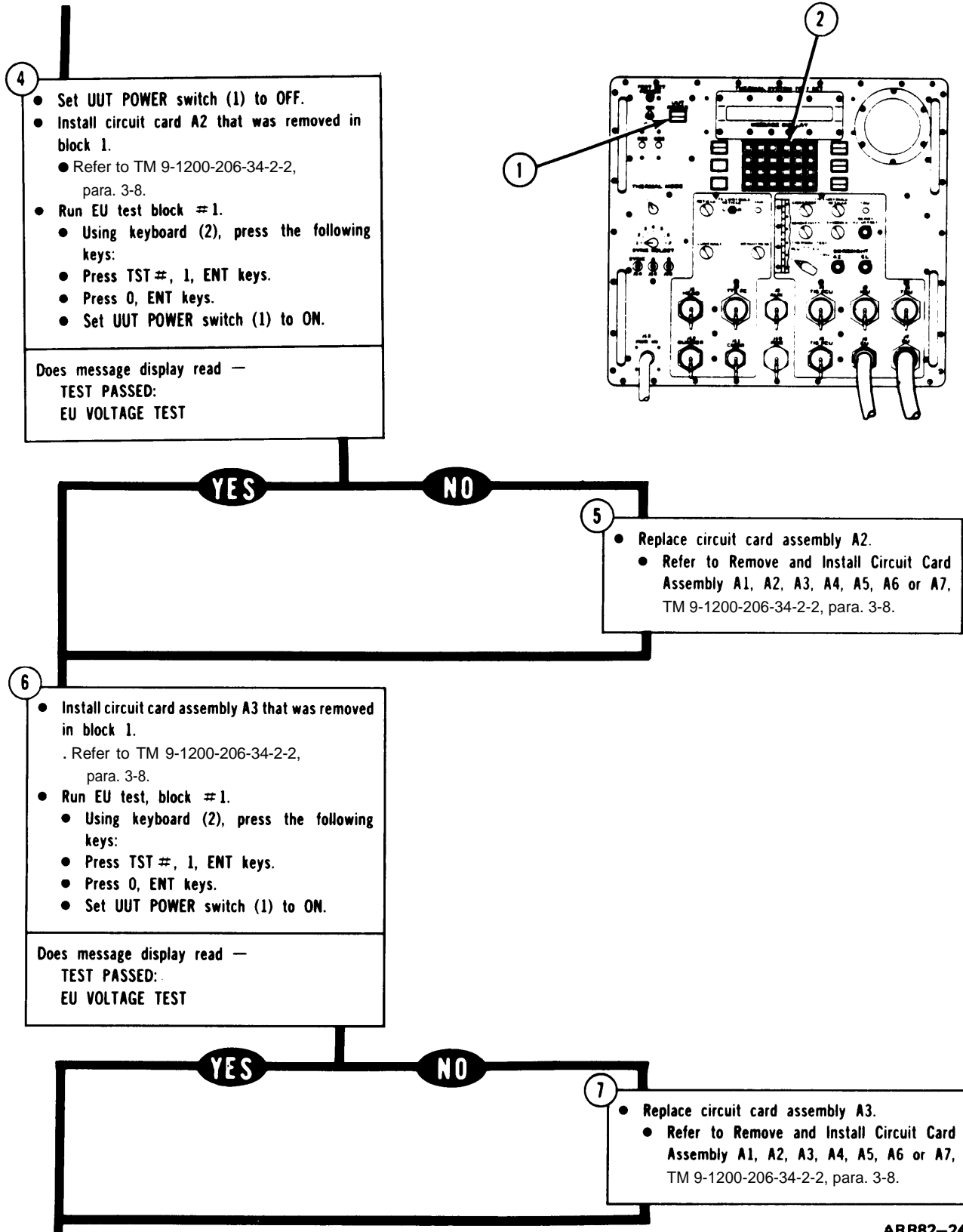


3

- Replace circuit card assembly A1.
 - Refer to Remove and Install Circuit Card Assembly A1, A2, A3, A4, A5, A6 or A7, TM 9-1200-206-342-2, para. 3-8.

ARR82-24222

Figure 7-19. (Sheet 1 of 4)



ARRR2-24223

Figure 7-19. (Sheet 2 of 4)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

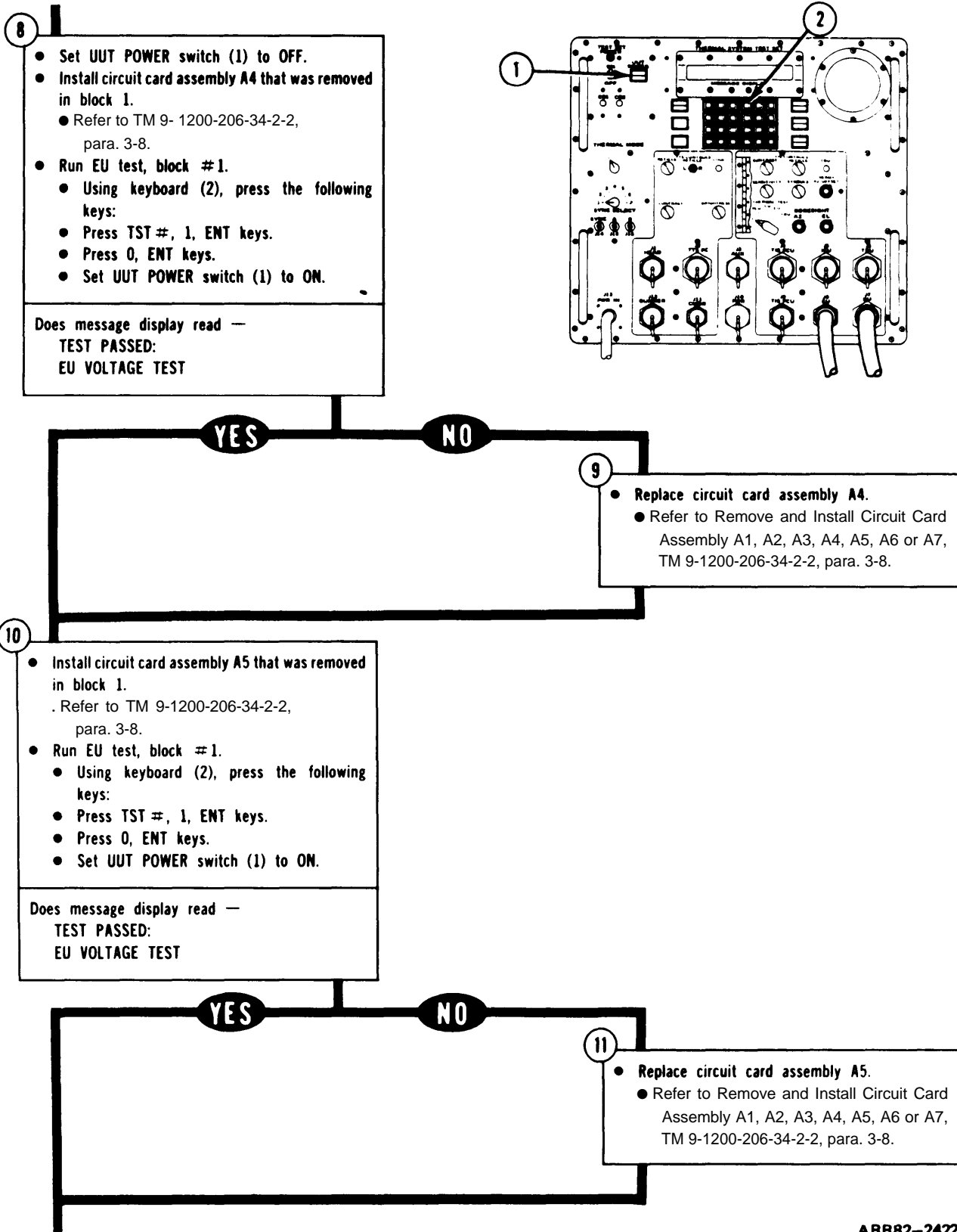
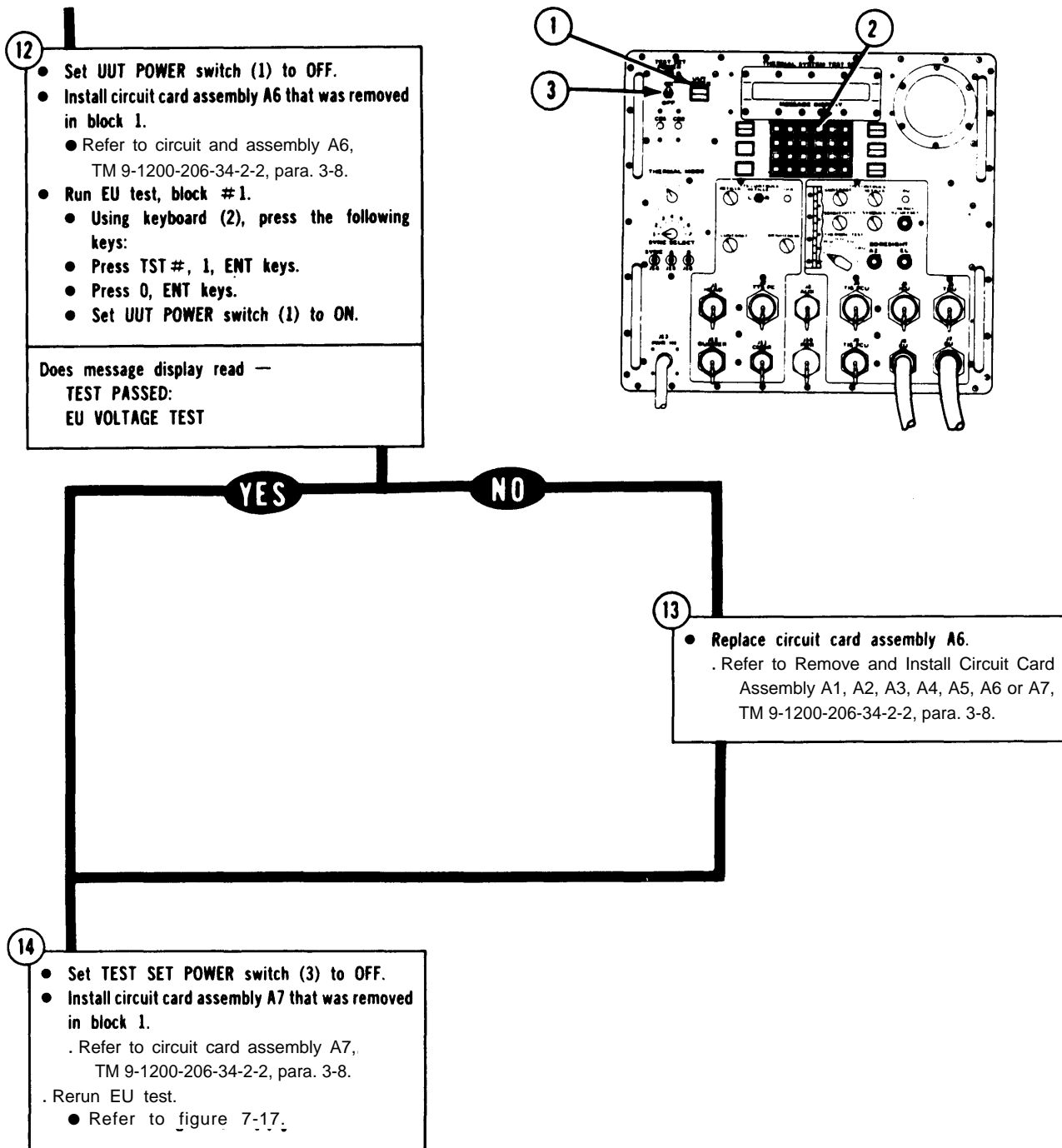


Figure 7-19. (Sheet 3 of 4)

ARR82-24224



ARR82-24225

Figure 7-19. (Sheet 4 of 4)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

DISPLAY INDICATES ONE OF THE FOLLOWING FAIL CODES: *

*4.10.0.1
4.10.0.3

Test Equipment/Special Tools:
• Alignment tool

WARNING

HIGH VOLTAGE

- Do not reach into IDU (1) with alignment tool any farther than necessary to make adjustments.
- Make sure tool does not touch anything in IDU (1) except the variable resistors (2,3,4,5) on A1 and A2 cards.
- Use only one hand when reaching into IDU (1).

NOTE

You may not be able to make all of the following adjustments. If one of them cannot be made, go on to the next one.

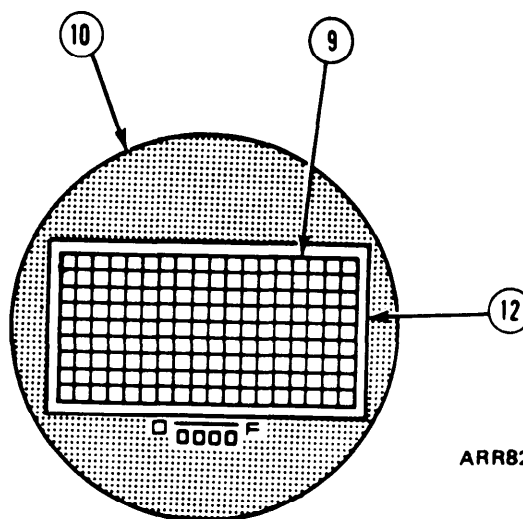
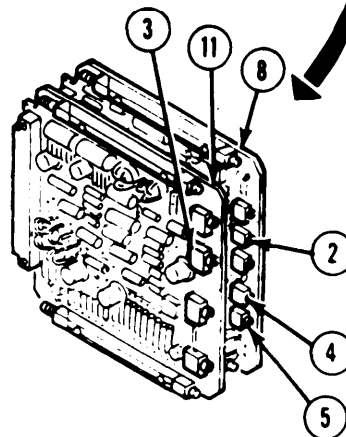
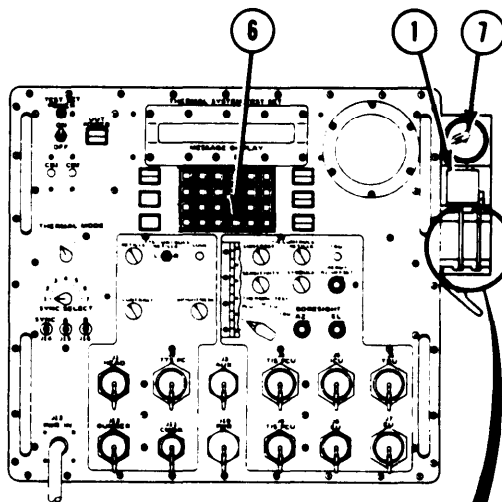
- 1
- Press CON key (6).
 - Look at IDU (7).
 - Using tool, adjust R19 (2) on video amplifier A1 (8) so raster (9) is centered vertically in display area (10).
 - Using tool, adjust R66 (3) on circuit card assembly A2 (11) so raster (9) is centered horizontally in display area (10).

NOTE

Normal raster size —
1. Twice as long in length as in height.
2. Fills IDU block pattern (12).

- 2
- Using tool, try to adjust R9 (4) on video amplifier A1 (8) so raster (9) is of normal height.
 - Using tool, adjust R55 (5) on video amplifier A1 (8) so raster (9) is of normal width.

- 3
- Continue IDU troubleshooting.
. Refer to figure 7-16, block 56.



ARR82-24226

Figure 7-20.

DISPLAY READS
UNRESOLVABLE FAULT OR *

*4.3.0.0
4.8.0.0

Test Equipment/Special Tools:

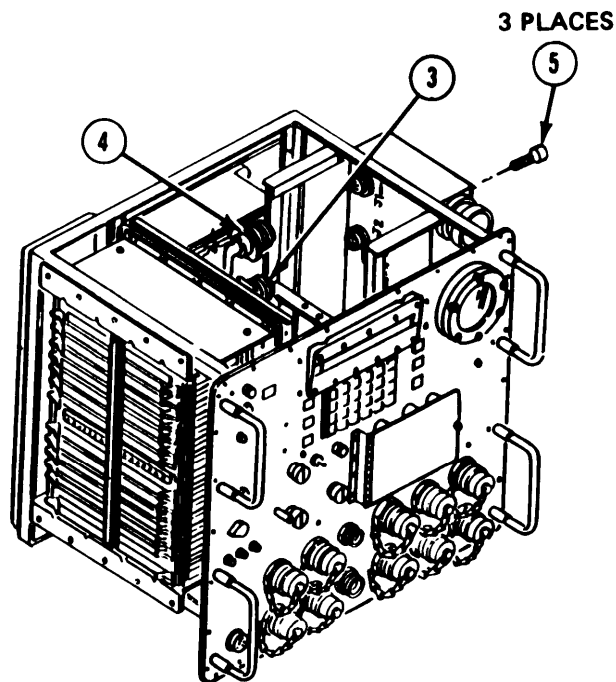
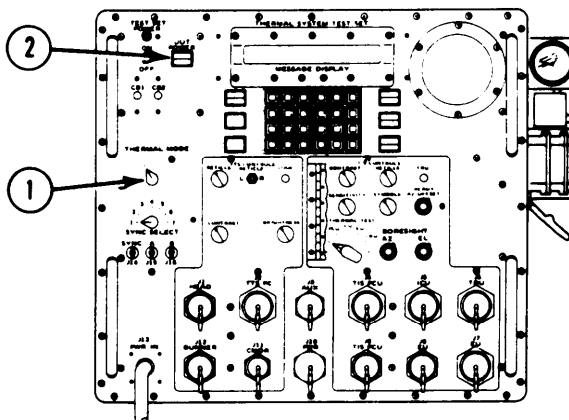
- Multimeter, digital
- Test probe set TA-1
- Screwdriver, cross tip #2.

1

- Power down TSTS.
 - Set THERMAL MODE switch (1) to OFF.
 - Set UUT POWER switch (2) to OFF.
- Remove IDU from TSTS.
 - Disconnect IDU cable connectors W14P4 (3) and W14P3 (4).
 - Unscrew and take out 3 screws (5).
- Remove circuit card assemblies A1 and A2.
 - Refer to volume IV, para. 2-8.

2

- Disconnect W1P3 from high voltage power supply.
 - Refer to Remove Power Supply, volume IV, para. 2-8.
 - Disconnect A3P3 connector.
 - Refer to Remove Electron Tube Assembly, Clamp, and CRT Support, volume IV, para. 2-8.



ARR82-24227

Figure 21. (Sheet 1 of 4)

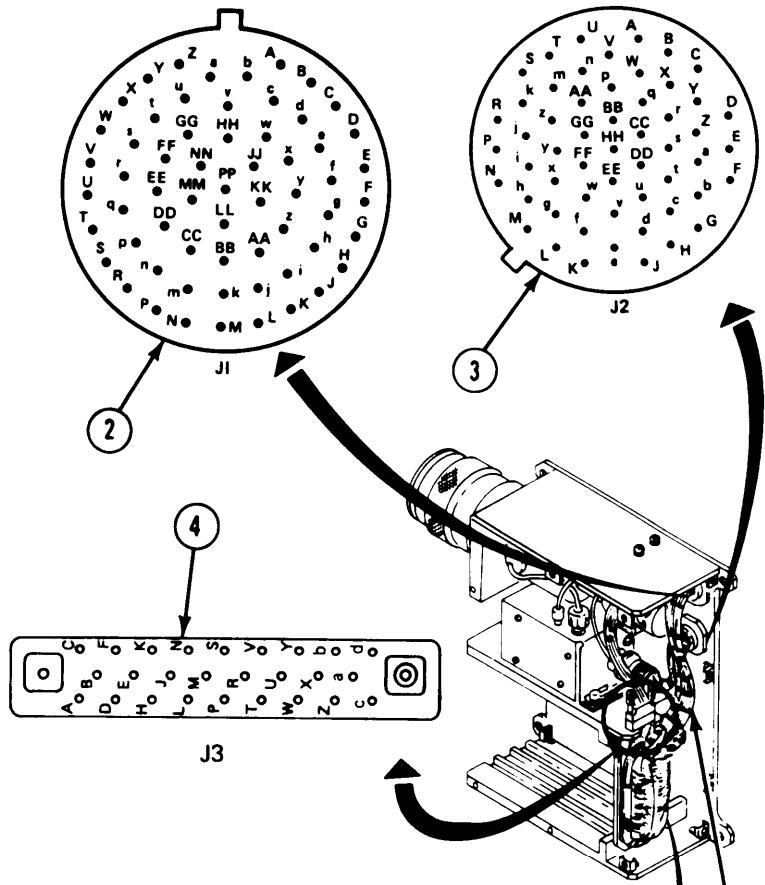
TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

3

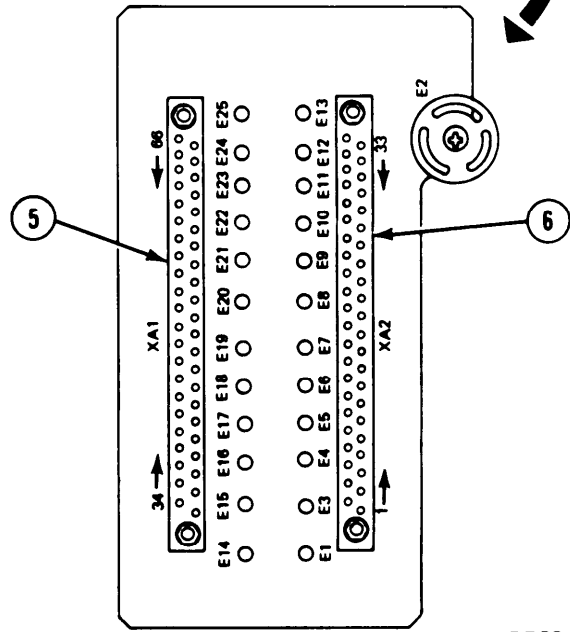
- Set up multimeter to check continuity.
- Using multimeter, perform the following continuity checks on IDU cable (1):

FROM	TO	FROM	TO
J1(2)-CC	XA1(5)-42	XA2(6)-25	XA1-14
J1-EE	XA1-43	XA2-18	XA1-3
J1-BB	XA1-63	XA2-11	XA1-4
J1-FF	XA1-31	XA1(5)-24	E9
J1-M	XA1-13	XA1-44	E10
J1-N	XA1-38	XA1-57	E9
J1-P	XA1-12	XA1-55	E20
J1-y	XA1-17	XA1-23	E20
J2-(3)-A	XA1-9	XA1-16	E18
J2-B	XA1-10	XA1-49	E18
J2-D	XA1-2	XA1-20	E19
J2-E	XA1-36	XA1-52	E19
J2-Y	XA1-15	XA1-1	E14
J2-Z	XA1-21	XA1-41	E3
J3(4)-F	XA1-64	XA1-7	E16
J3-D	XA1-62	XA1-65	E25
J3-C	XA2(6)-3	XA1-33	E25
		XA1-27	E22

Are continuity checks OK?



WIRES REMOVED FOR CLARITY



ARR82-24228

Figure 7-21. (Sheet 2 of 4)

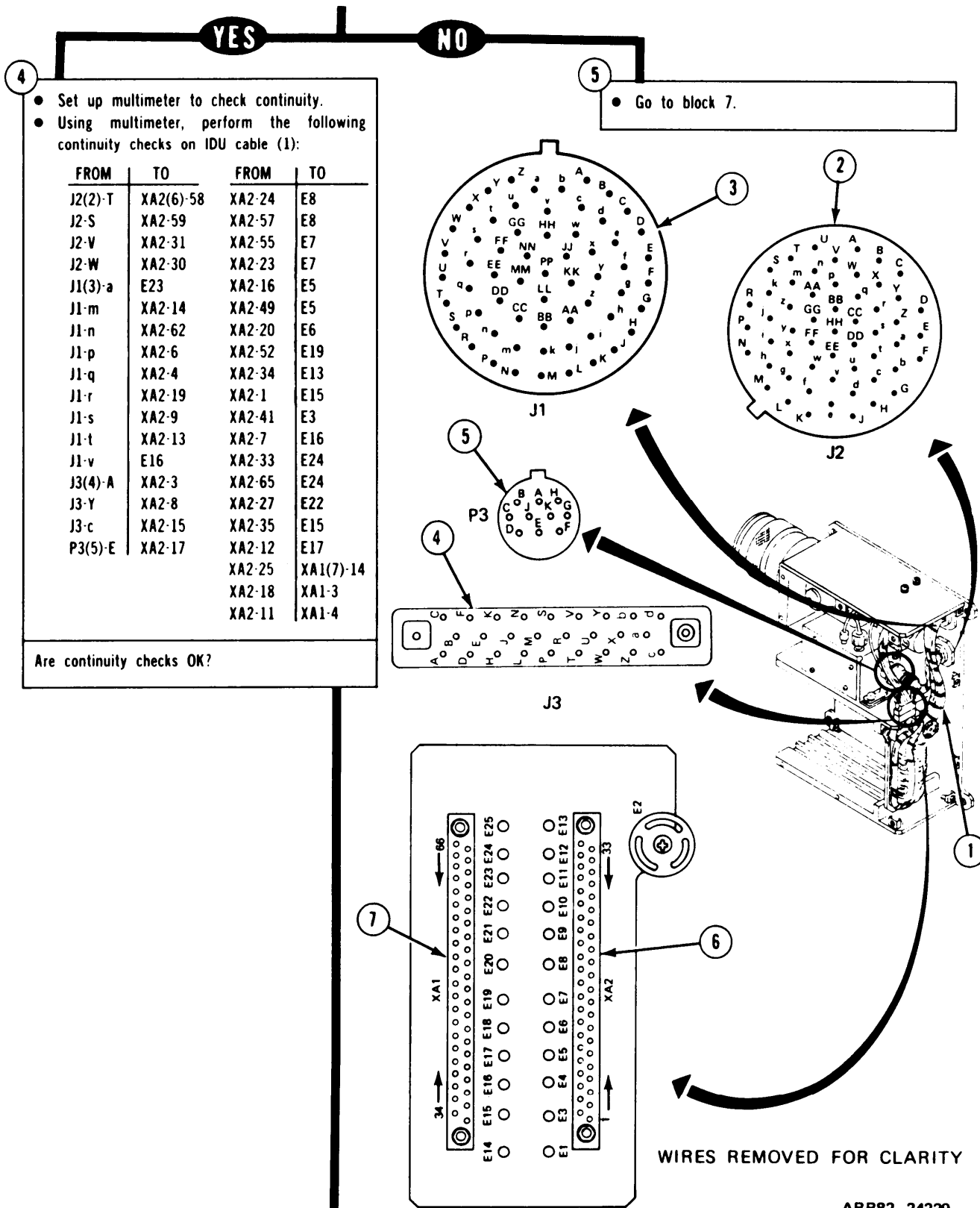


Figure 7-21. (Sheet 3 of 4)

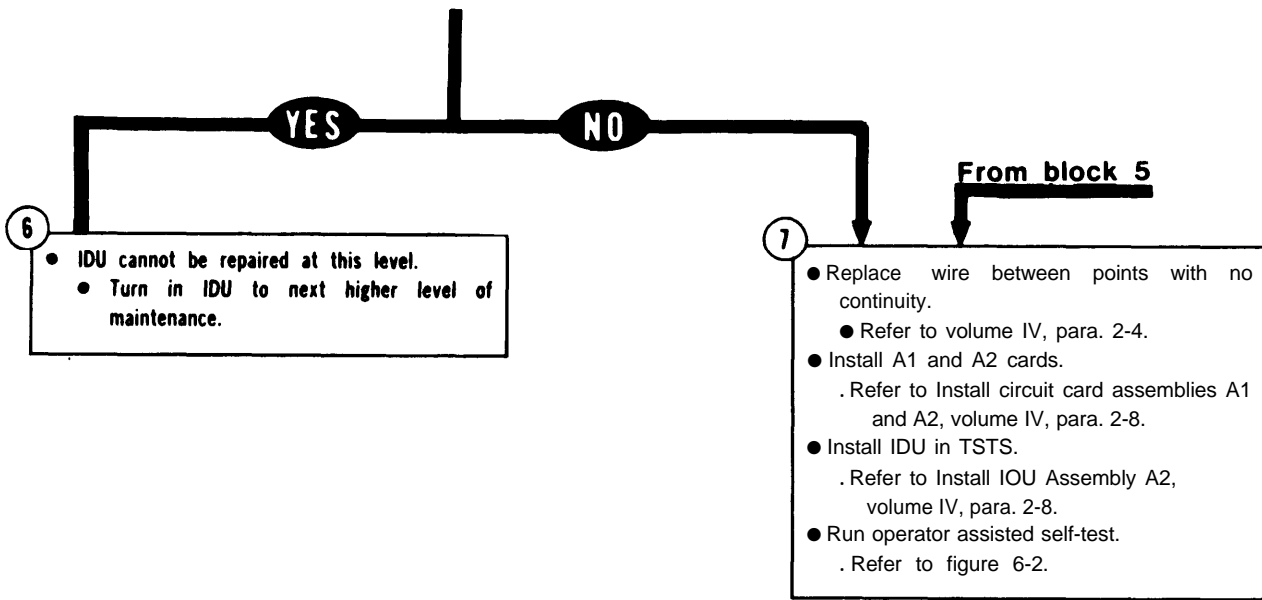


Figure 7-21. (Sheet 4 of 4)

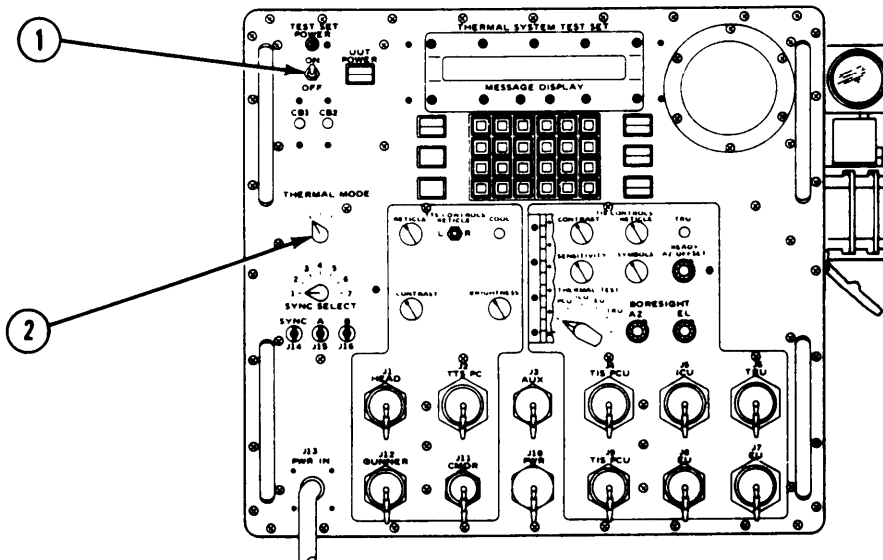
DISPLAY READS
FAIL CODE: 4.0.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

1

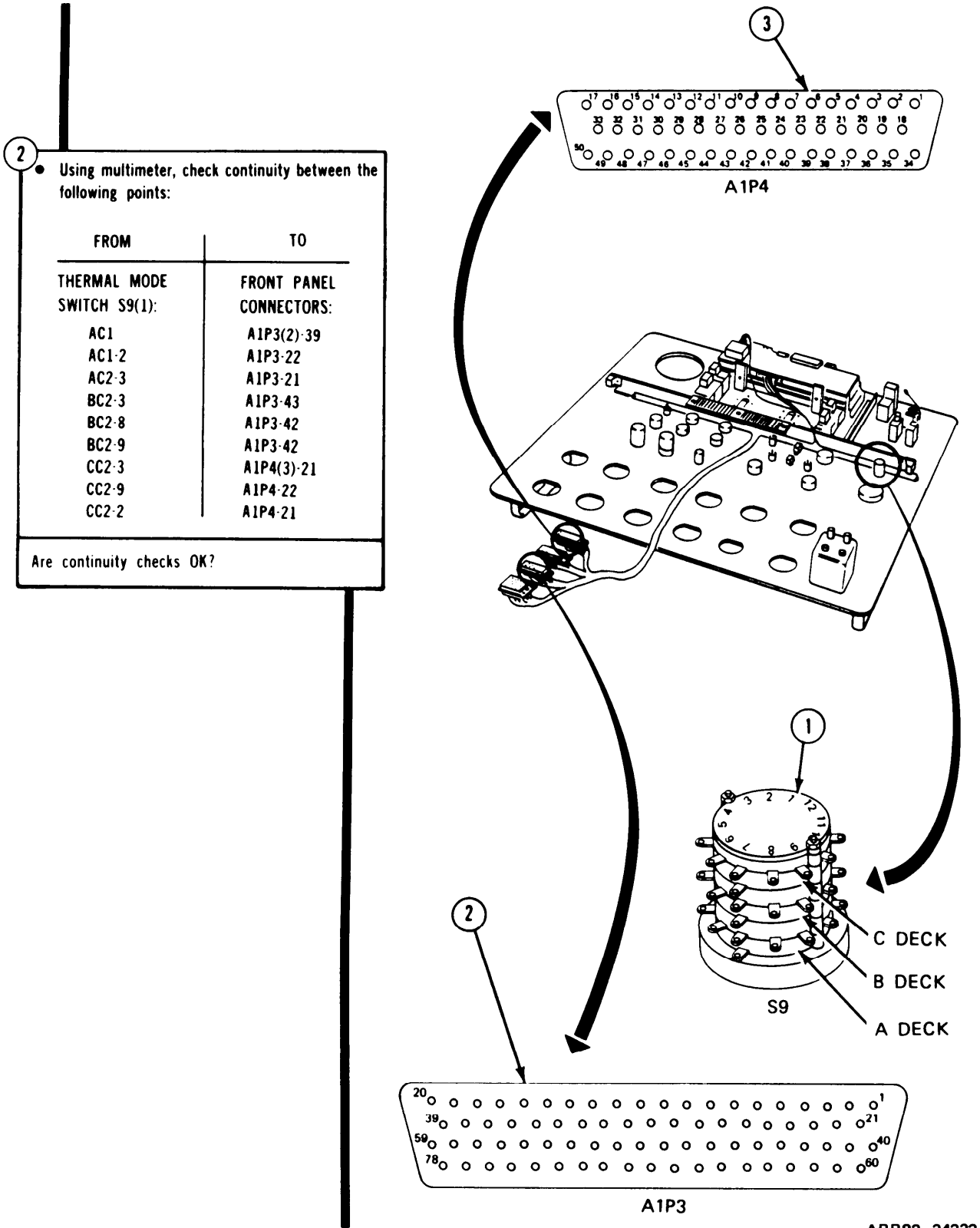
- Power down test set.
 - Set TEST SET POWER switch (1) to OFF.
 - Set THERMAL MODE switch (2) to STBY.
- Remove front panel assembly.
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.
- Set up multimeter to check continuity.



ARR82-24231

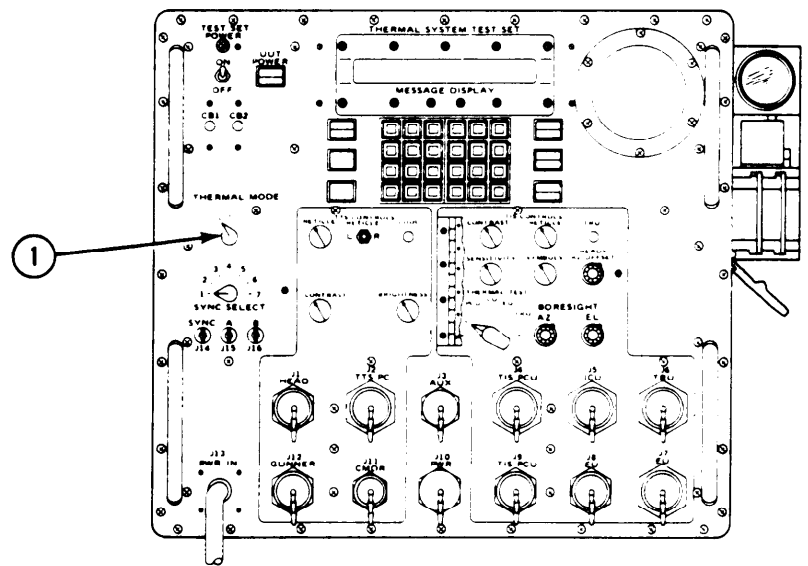
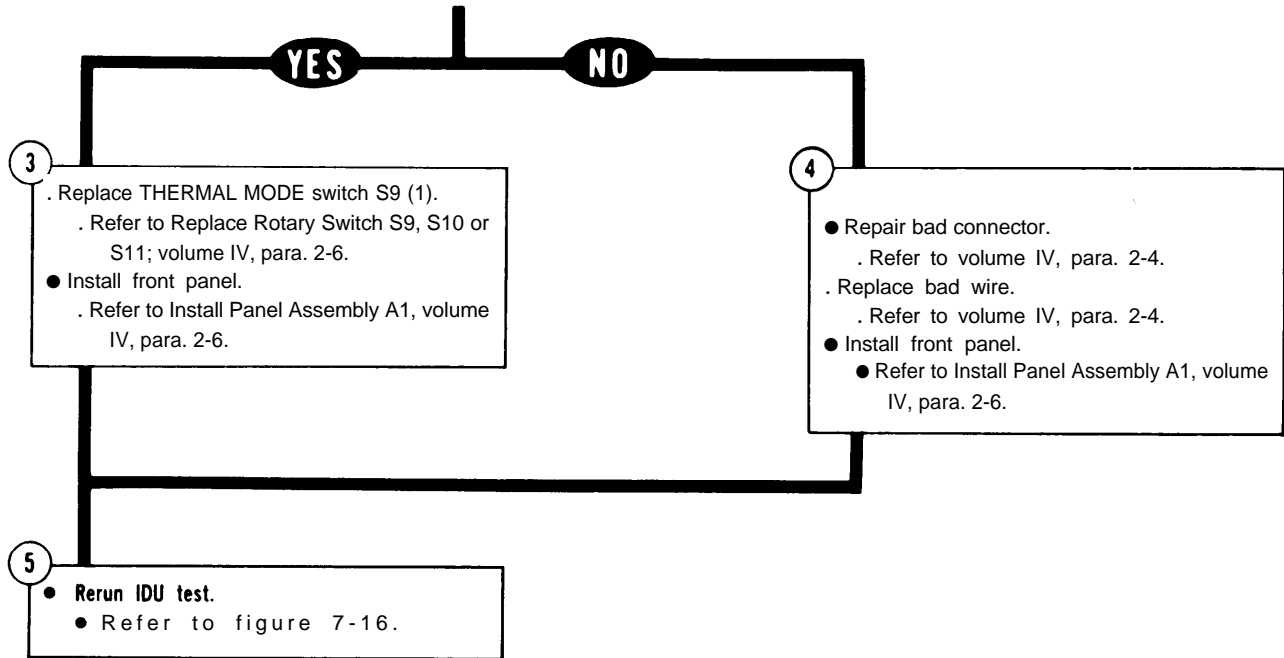
Figure 7-22. (Sheet 1 of 3)

TM 9-4931-381-14&P
TTS TROUBLESHOOTING PROCEDURES



ARR82-24232

Figure 7-22. (Sheet 2 of 3)



ARR82-24233

Figure 7-22 (Sheet 3 of 3)

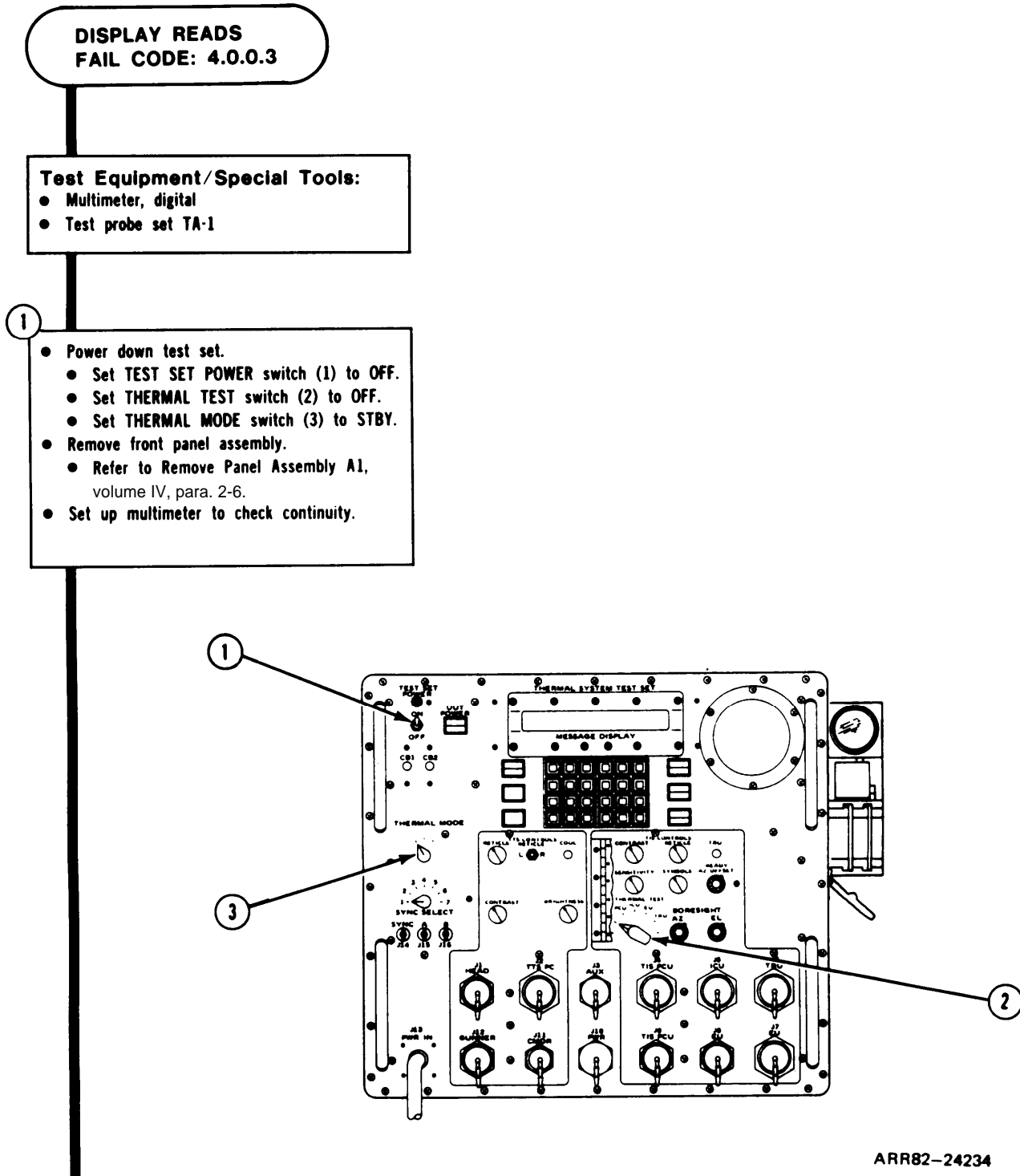


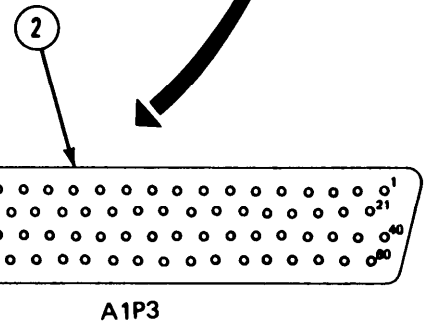
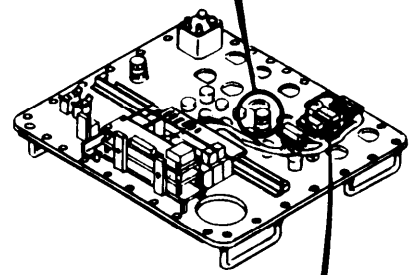
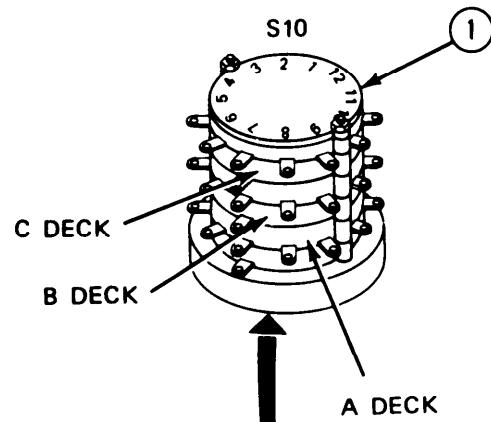
Figure 7-23. (Sheet 1 of 3)

2

- Using multimeter, check continuity between the following points:

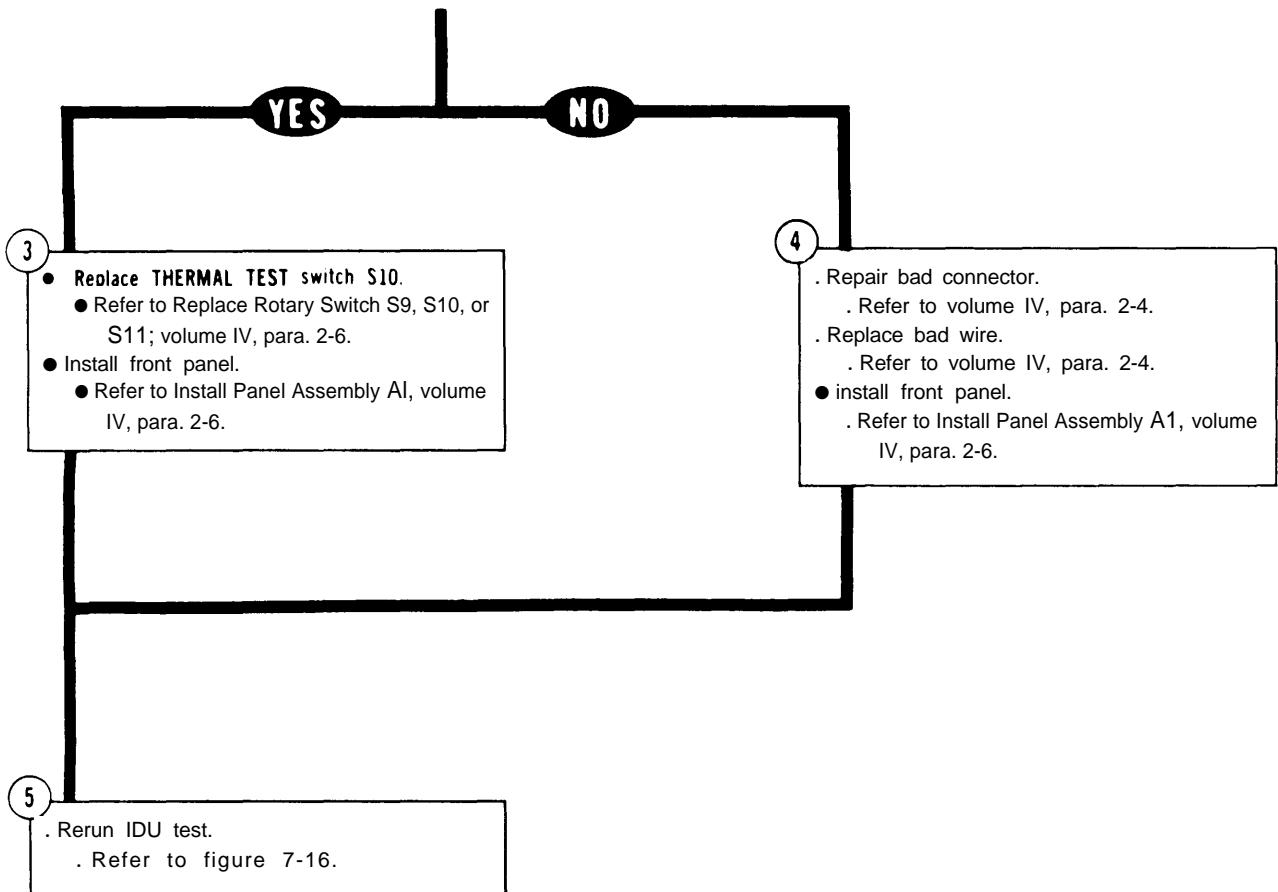
FROM	TO
THERMAL TEST SWITCH S10(1):	FRONT PANEL CONNECTORS:
AC1-1	A1P3(2)-38
AC2-2	A1P3-23
AC2-2	A1P3-24
AC2-3	A1P3-25
AC2-4	A1P3-26
AC2-4	A1P3-27
AC2-9	A1P3-28
BC2-5	A1P3-29
BC2-10	A1P3-7
BC2-7	A1P3-10
Front Panel Connector:	
A1P3-38	A1P3-23

Are continuity checks OK?



ARR82-24236

Figure 7-23 (Sheet 2 of 3)



ARR82-24236

Figure 7-23. (Sheet 3 of 3)

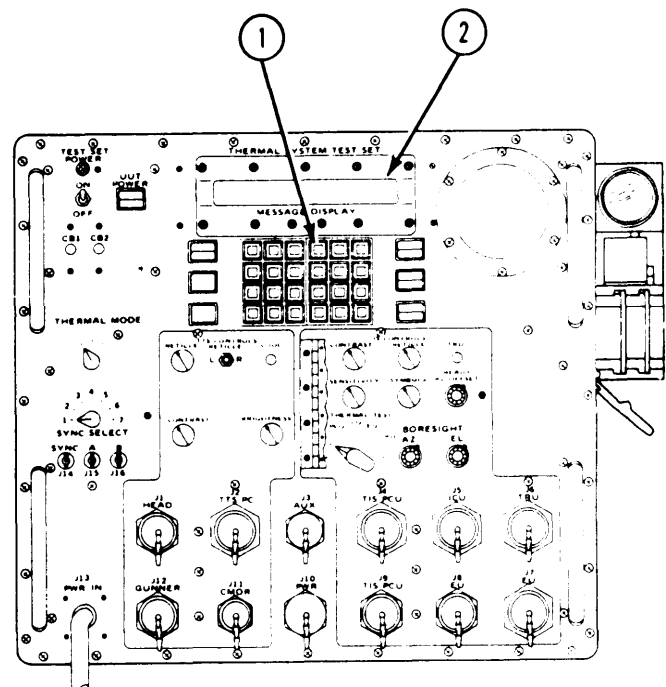
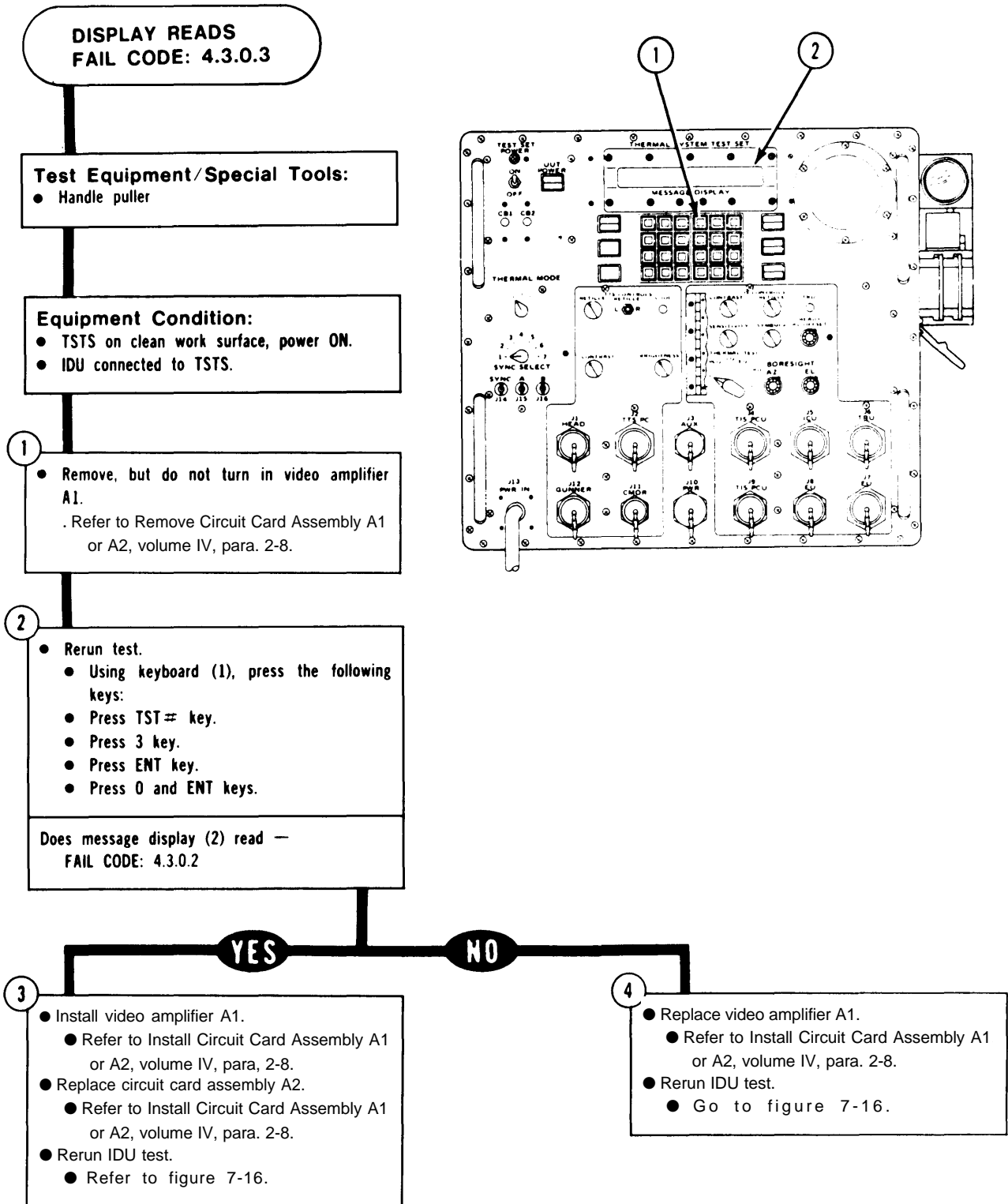
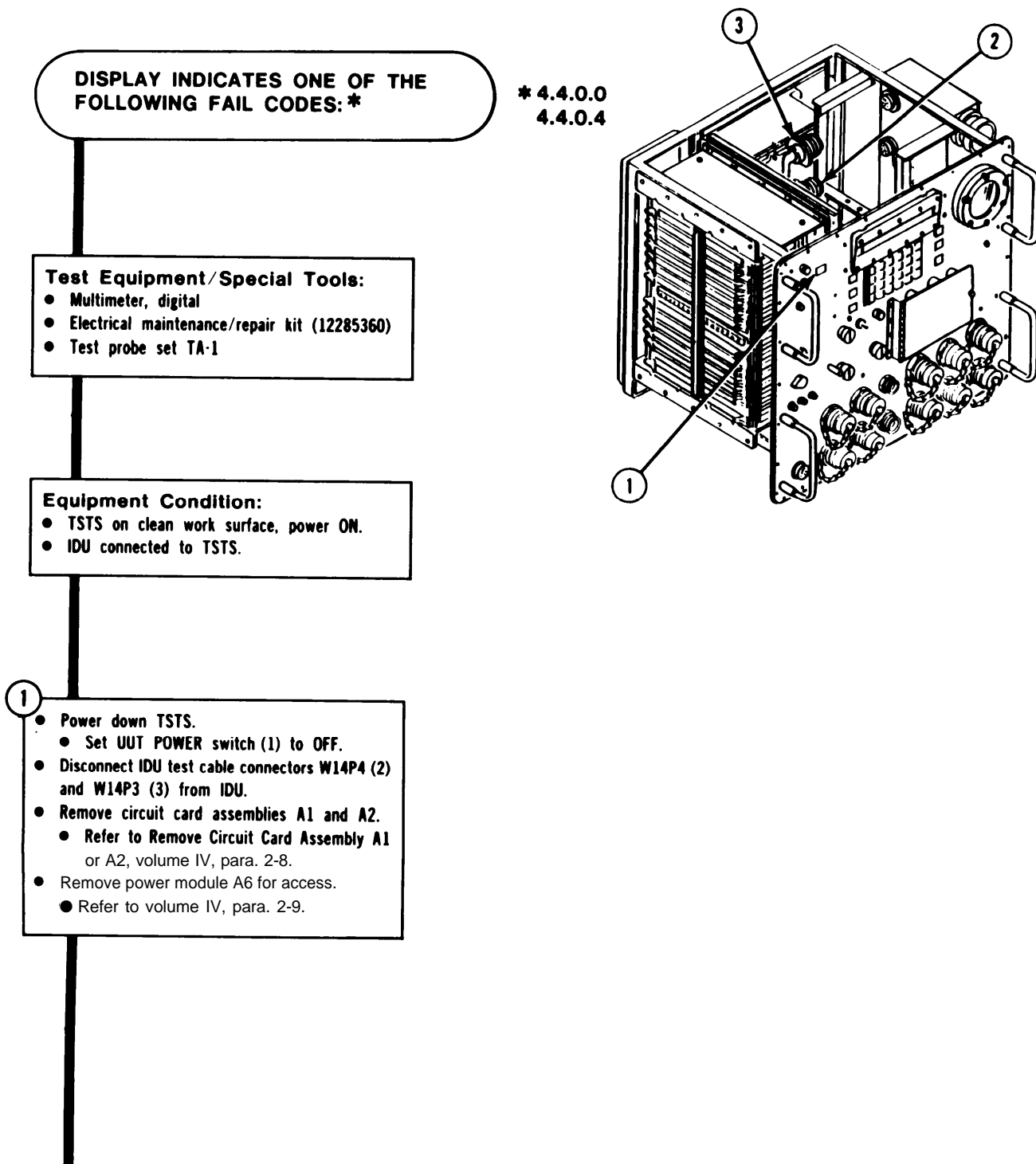


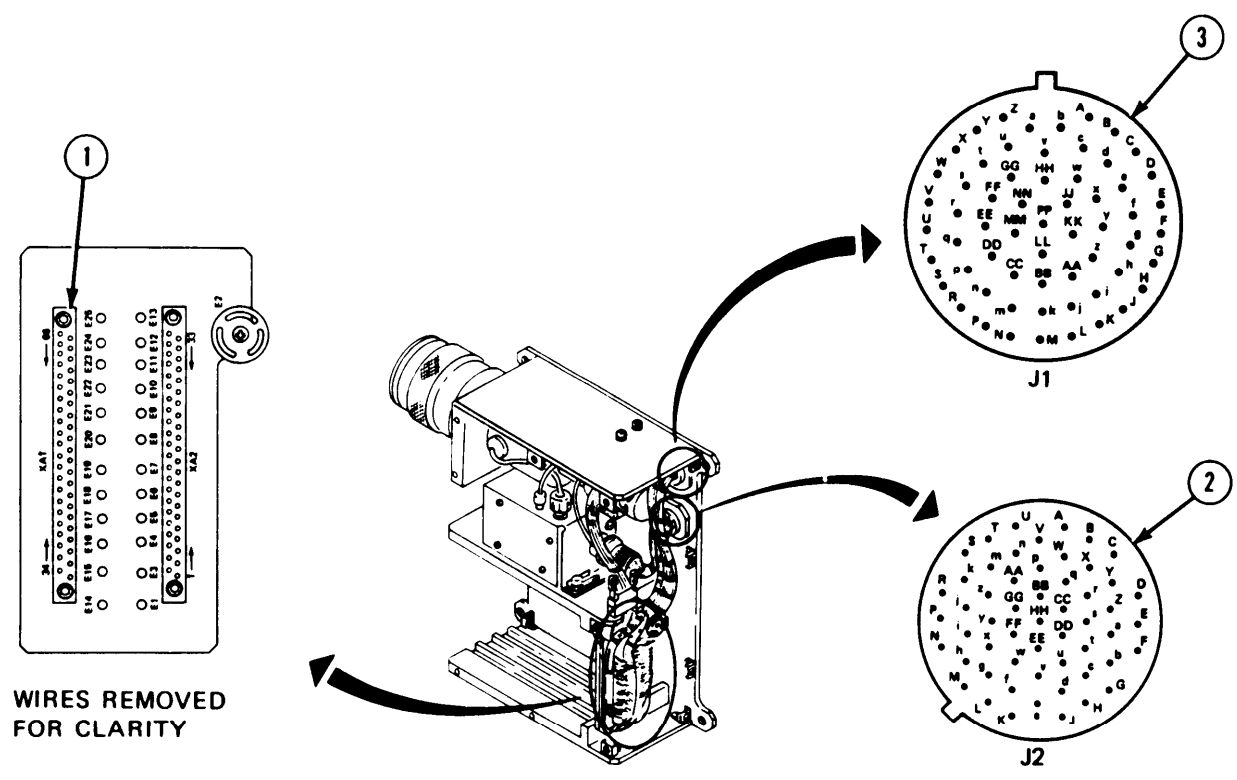
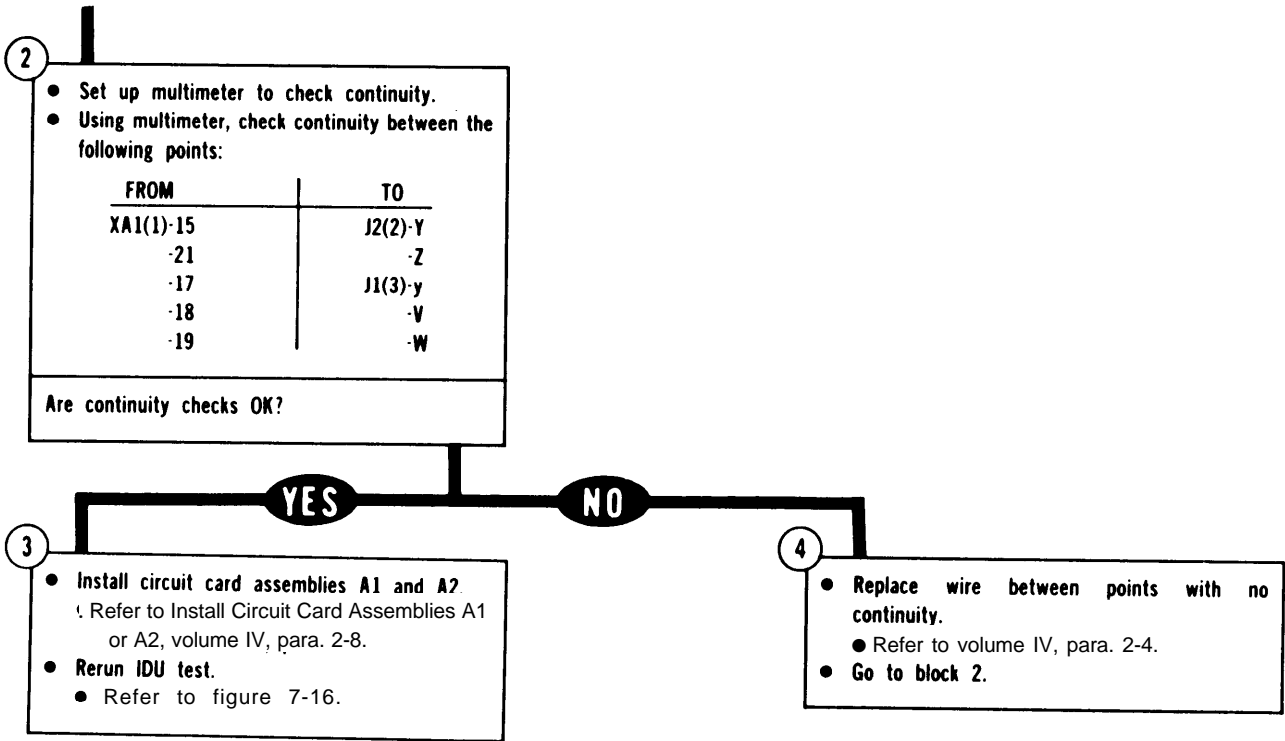
Figure 7-24.

ARR82-24237



ARR82-24238

Figure 7-25. (Sheet 1 of 2)



ARR82-24239

Figure 7-25. (Sheet 2 of 2)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

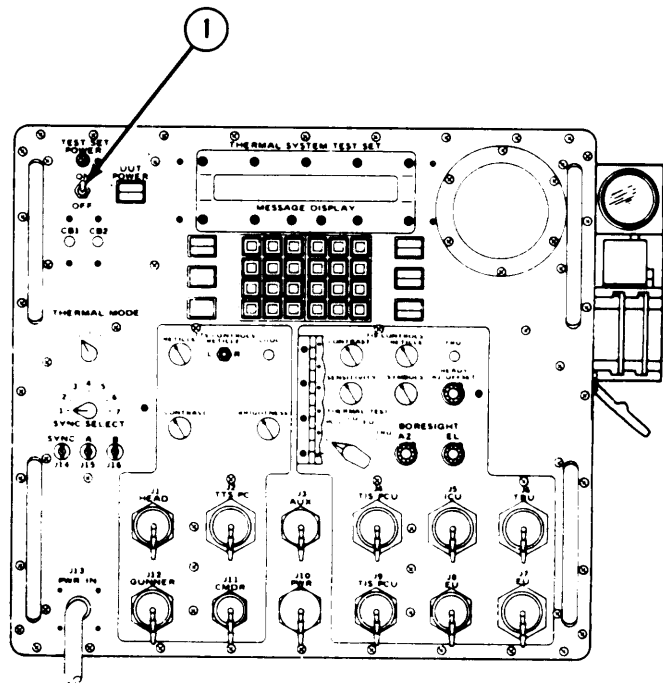
DISPLAY READS
FAIL CODE*

* 4.7.0.1
4.7.0.2

Test Equipment/Special Tools:

- Multimeter
- Test probe set TA-1

- 1
- Power down TSTS.
 - Set TEST SET POWER switch (1) to OFF.
 - Remove front panel.
 - Refer to Remove Panel Assembly A1, volume IV, para. 2-6.



ARR82-24240

Figure 7-26. (Sheet 1 of 3)

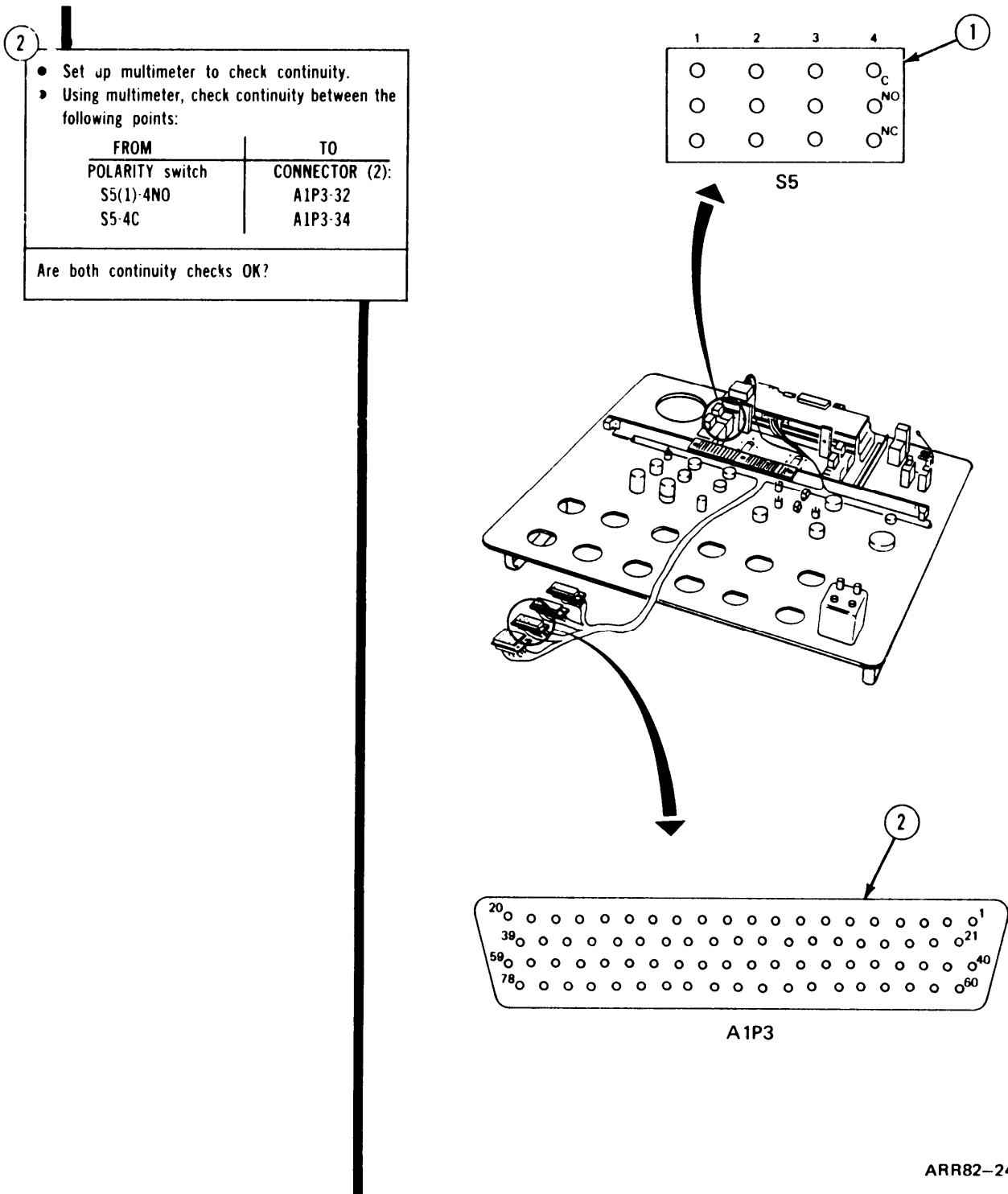
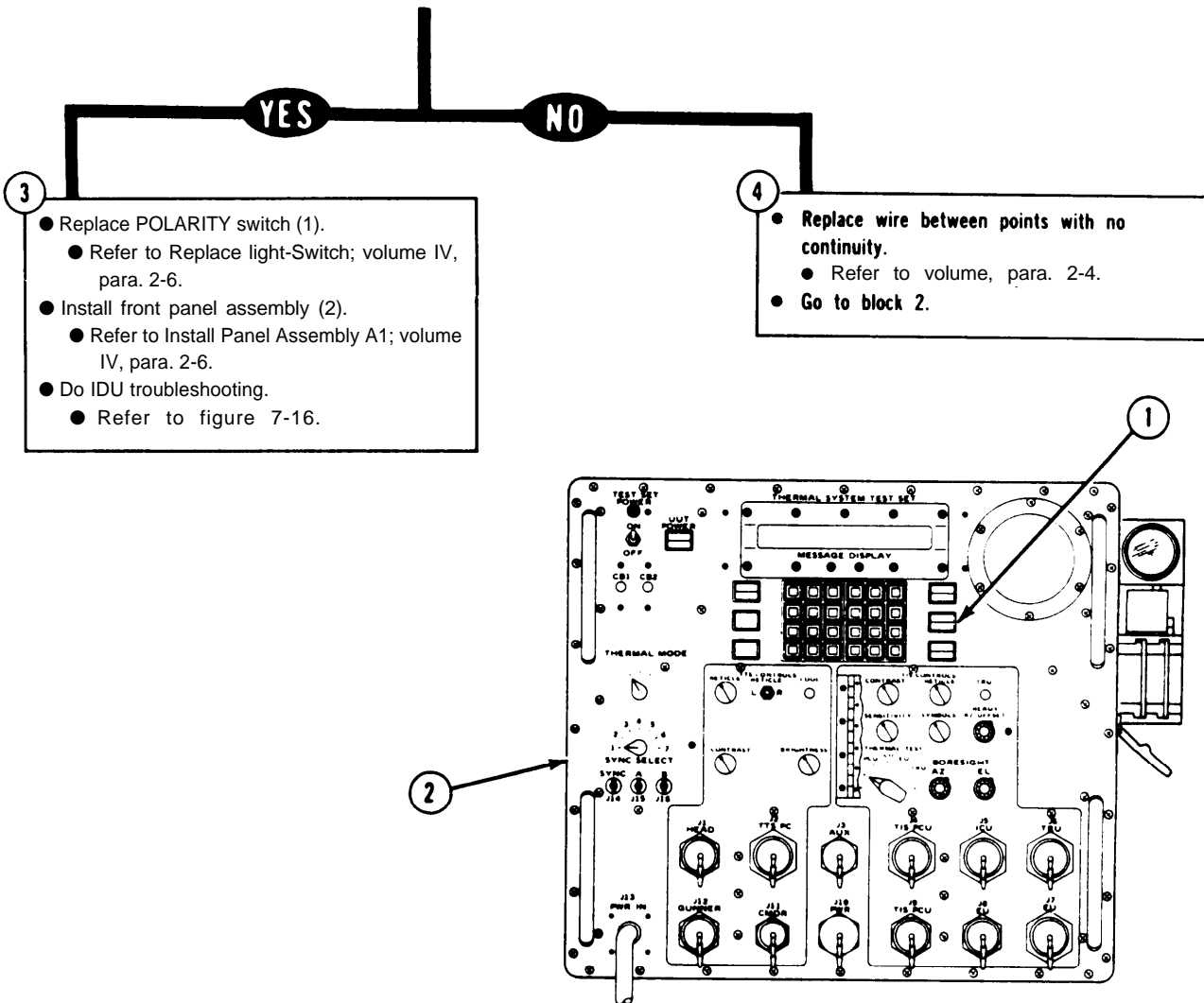


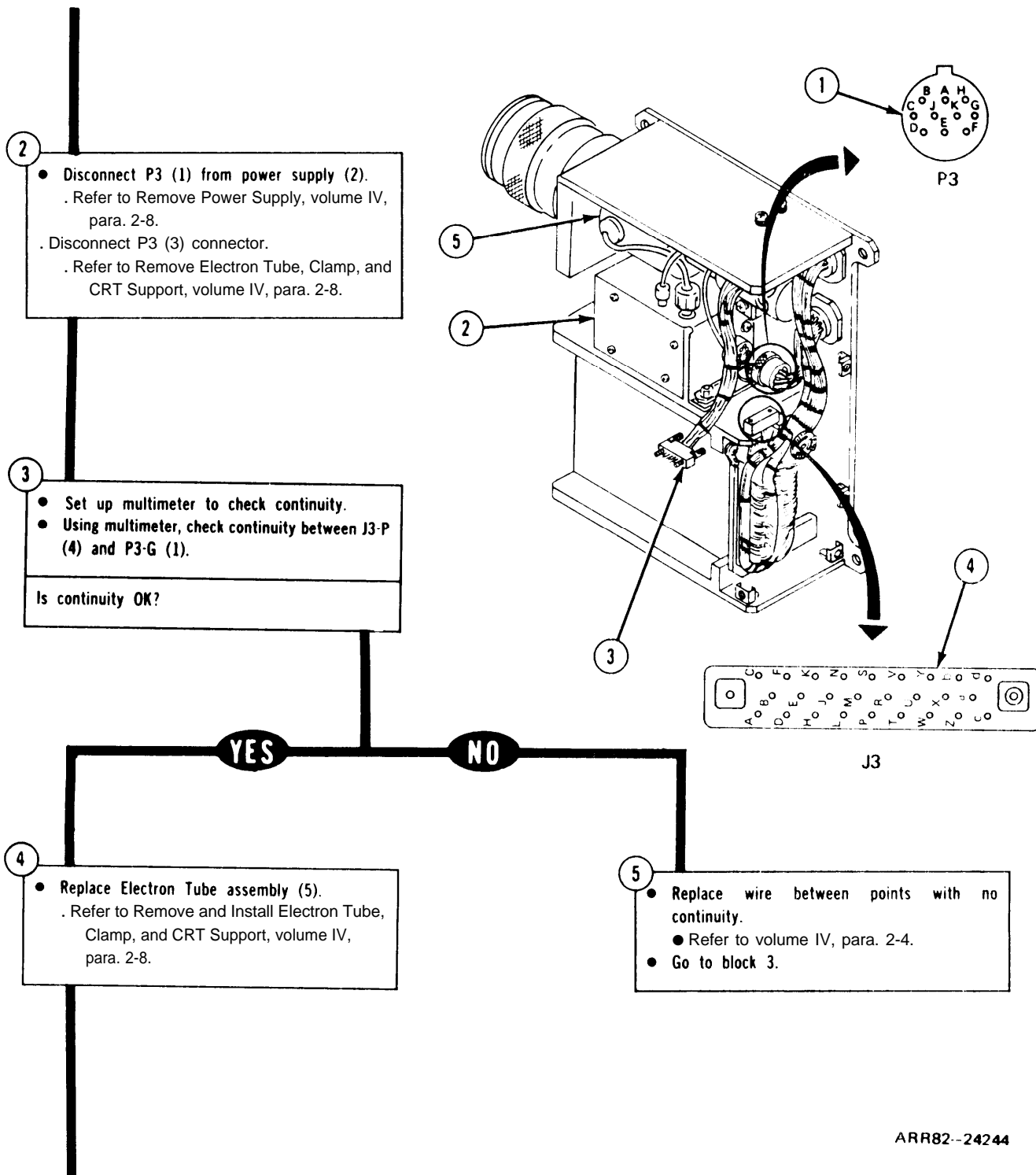
Figure 7-26. (Sheet 2 of 3)



ARR82-24242

Figure 7-26. (Sheet 3 of 3)

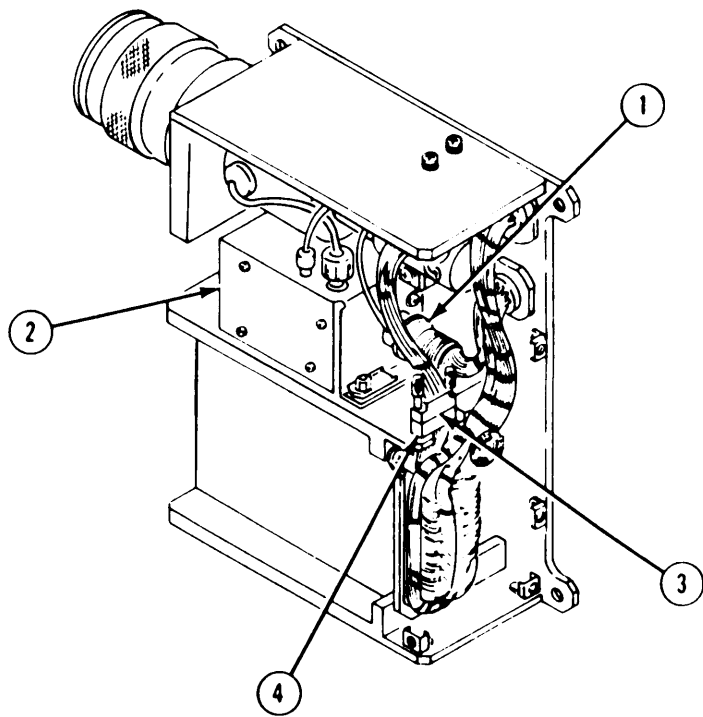
TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82--24244

Figure 7-27. (Sheet 2 of 3)

- 6
- Connect P3 (1) to power supply (2).
 - Connect P3 (3) to J3 (4).
 - Refer to Install Electron Tube, Clamp, and
● CRT Support, volume IV, para. 2-8:
- . Rerun IDU test.
. Refer to figure 7-16.



ARR82-24245

Figure 7-27. (Sheet 3 of 3)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

DISPLAY READS
FAIL CODE: 4.12.0.5

Test Equipment/Special Tools:
• Alignment tool

WARNING
HIGH VOLTAGE

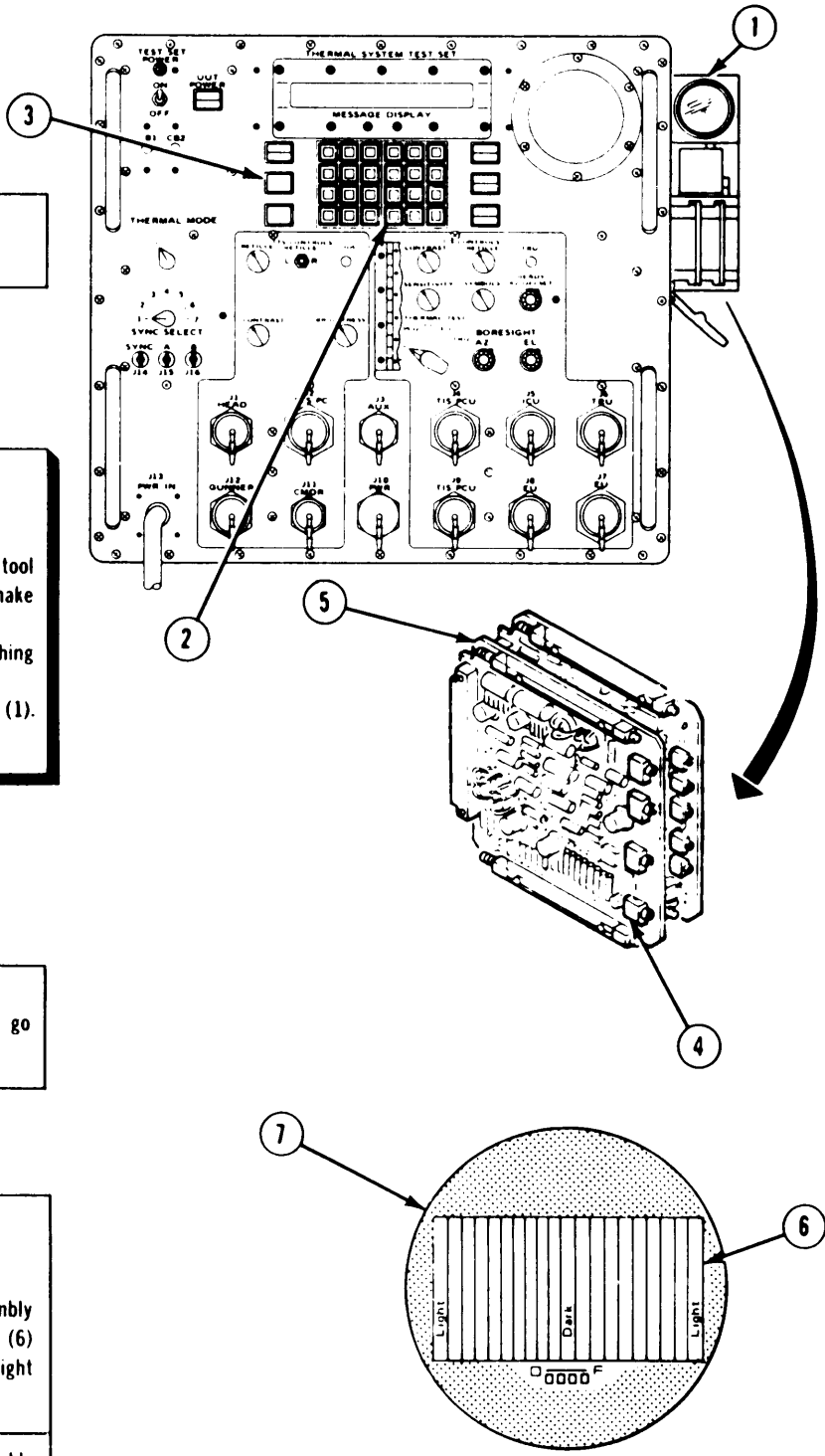
- Do not reach into IDU (1) with alignment tool any farther than necessary to make adjustments.
- Make sure alignment tool does not touch anything in IDU (1) except points specified.
- Use only one hand when reaching into IDU (1).

NOTE
If you cannot make the following adjustment, go on to the next block.

1

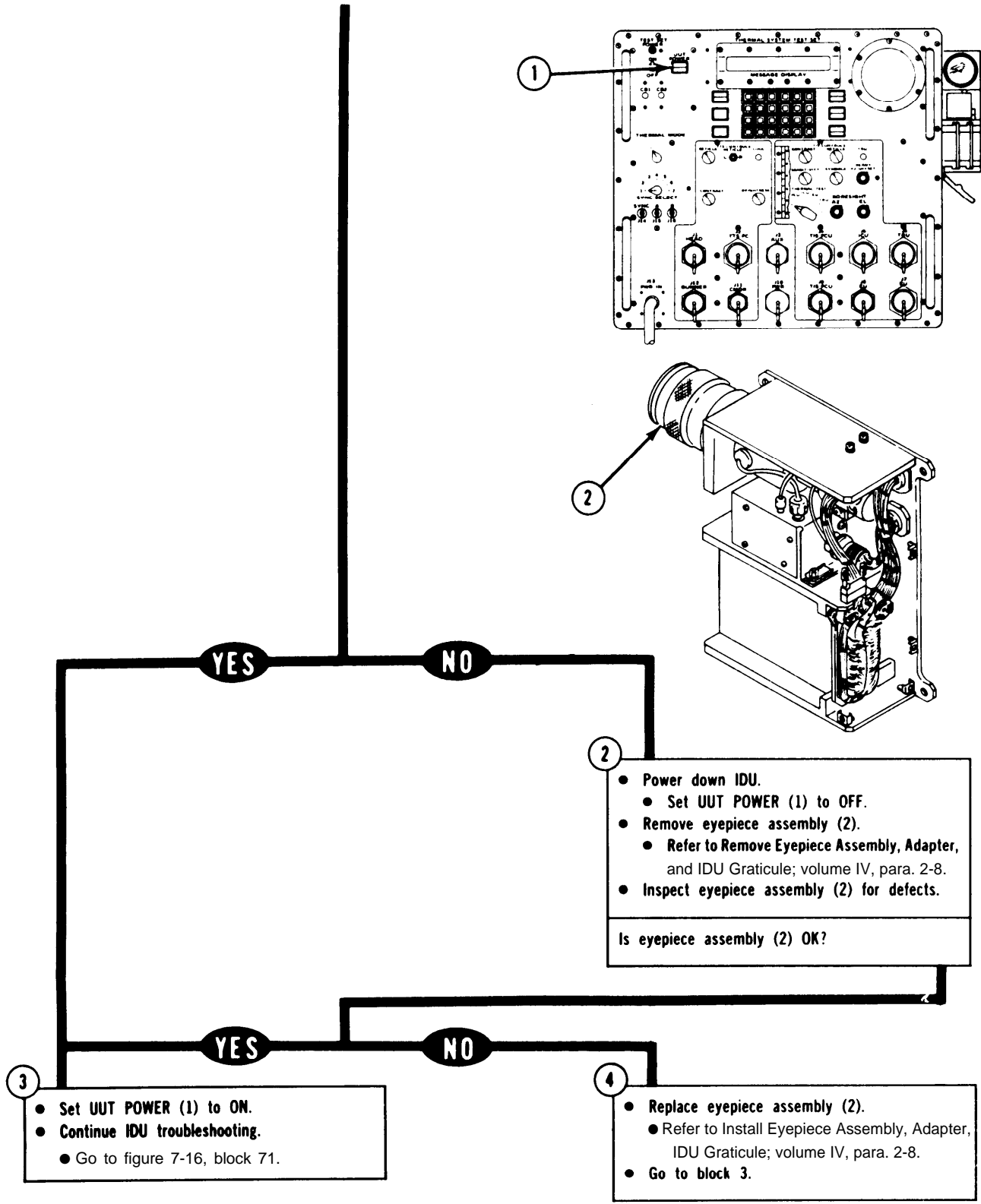
- Press CON key (2).
- Press YES key (3).
- Look at IDU (1).
- Using tool, adjust R75 (4) on circuit card assembly A2 (5) so you can see 10 shades of grey (6) on display. Shades should range from very light to very dark, as in illustration (7).

Can you adjust R75 (4) on circuit card assembly A2 (5) so you can see 10 shades of grey (6)?



ARR82-24246

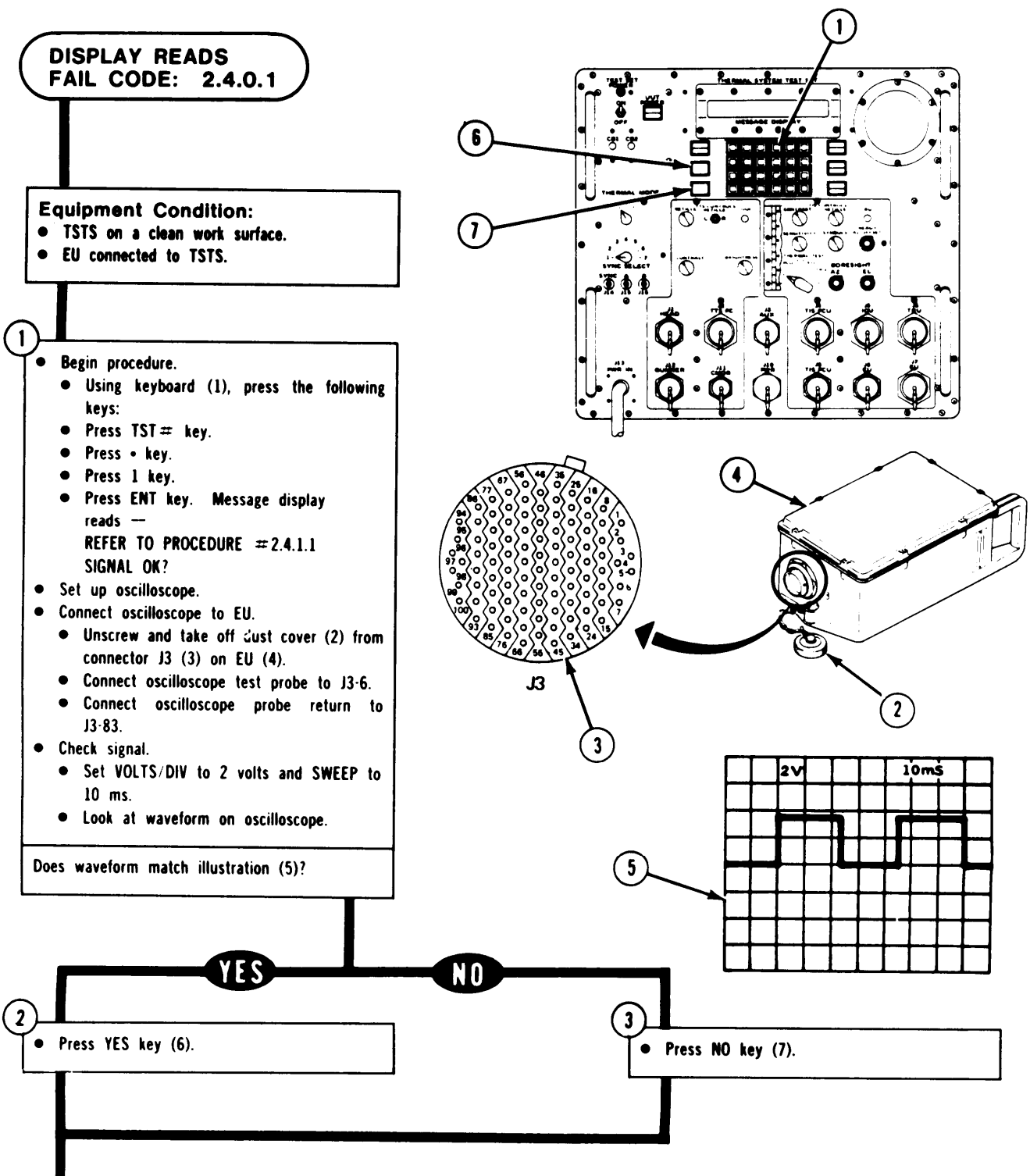
Figure 7-28. (Sheet 1 of 2)



ARR82-24247

Figure 7-28. (Sheet 2 of 2)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82-24248

Figure 7-29. (Sheet 1 of 4)

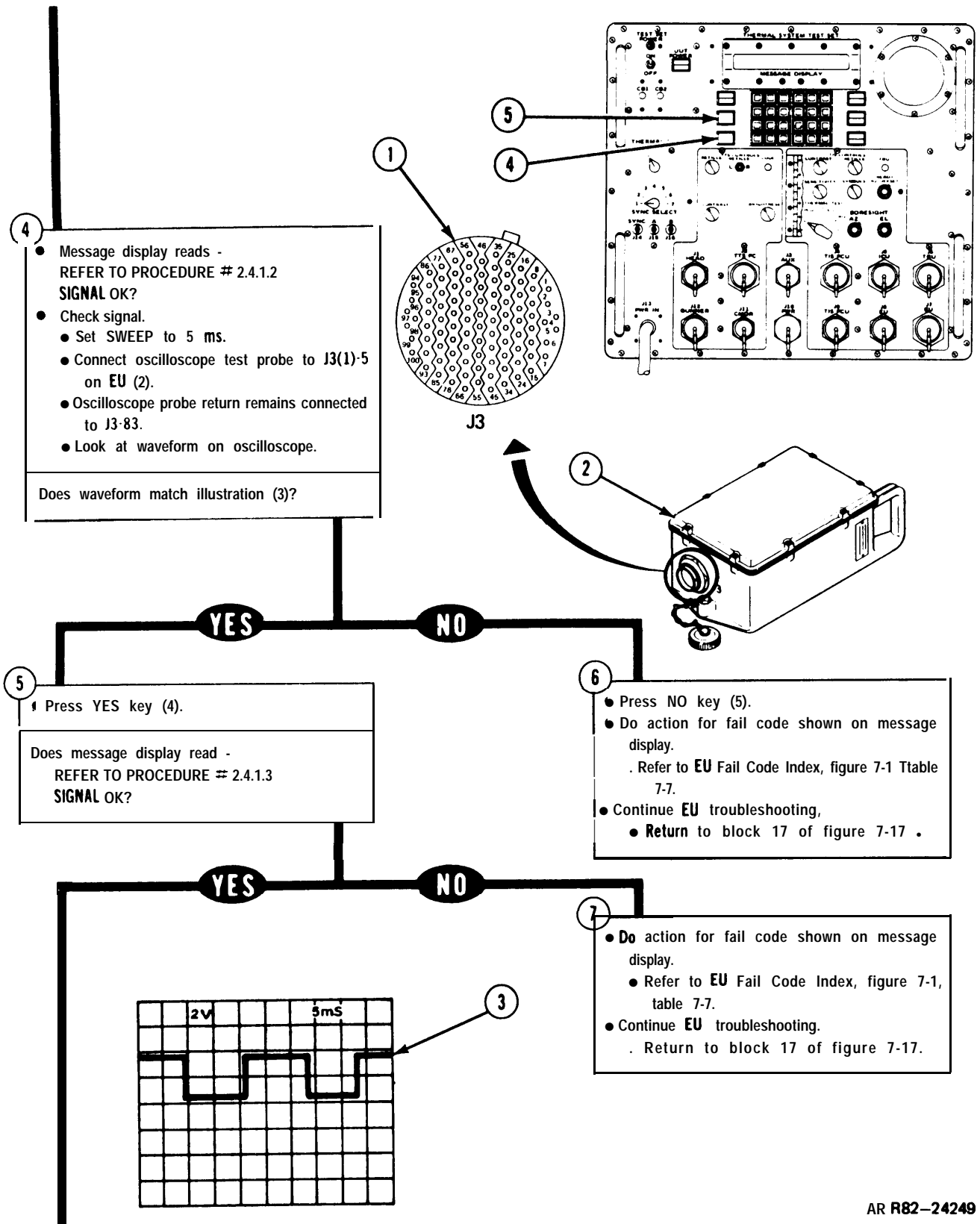
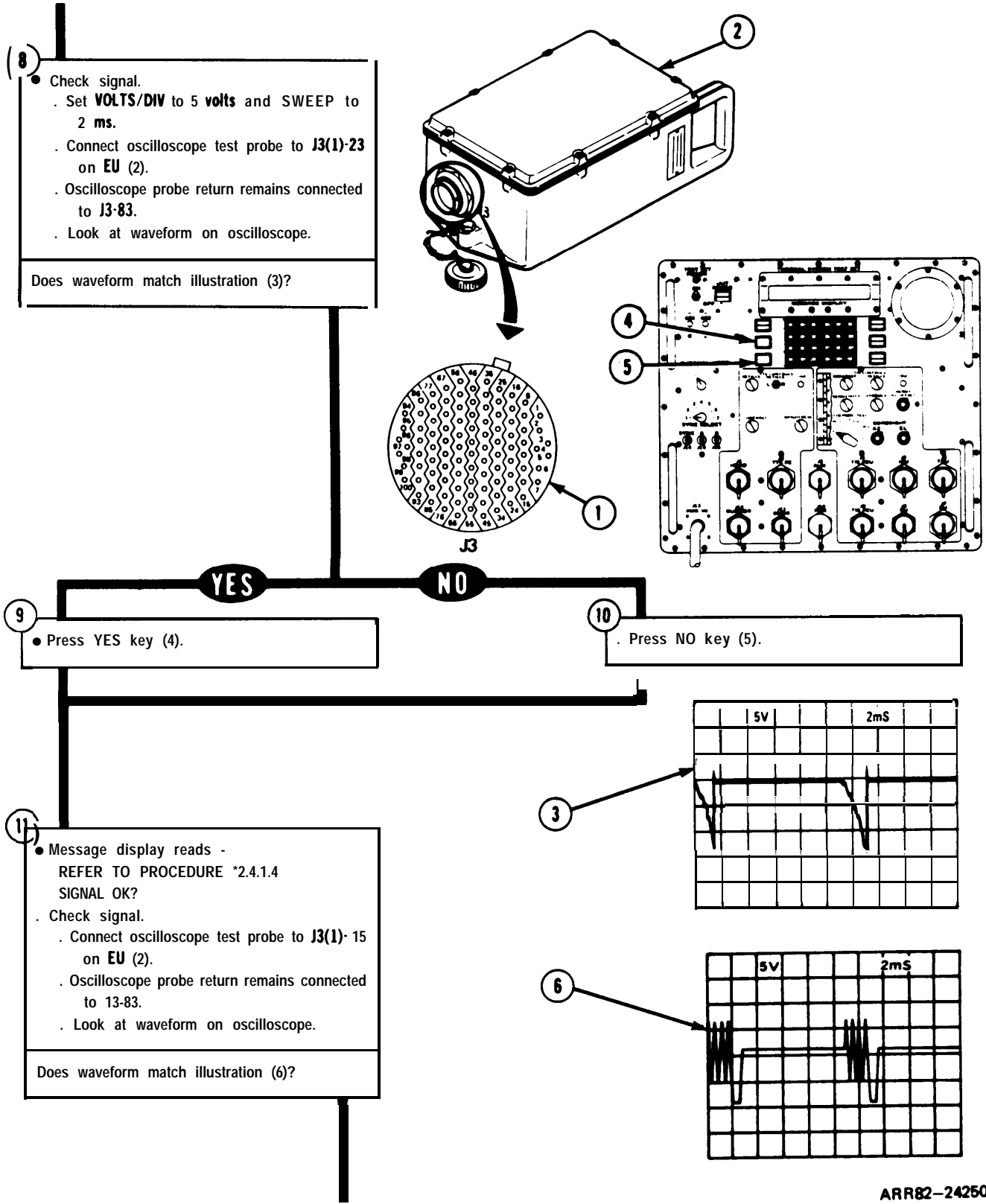


Figure 7-29. (Sheet 2 of 4)

AR R82-24249

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82-24250

Figure 7-20Q (Sheet 3 of 4)

DISPLAY READS -
REFER TO PROCEDURE #2.2.0.1
INPUT DATA

Equipment Condition:
• Test set resting on clean work bench.
• EU connected to TSTS.
• UUT POWER - ON

1 • Set up multimeter to measure DC voltage.
. Measure voltage.
. Unscrew and take off dust cover (1) from connector J3 (2) on EU (3).
• Using multimeter, measure voltage between J3-96 and J3-35 (COM).
. Input data,
. Enter voltage reading on keyboard (4).
. Press ENT key (5).

Does message display read -
REFER TO PROCEDURE #2.2.0.2
INPUT DATA

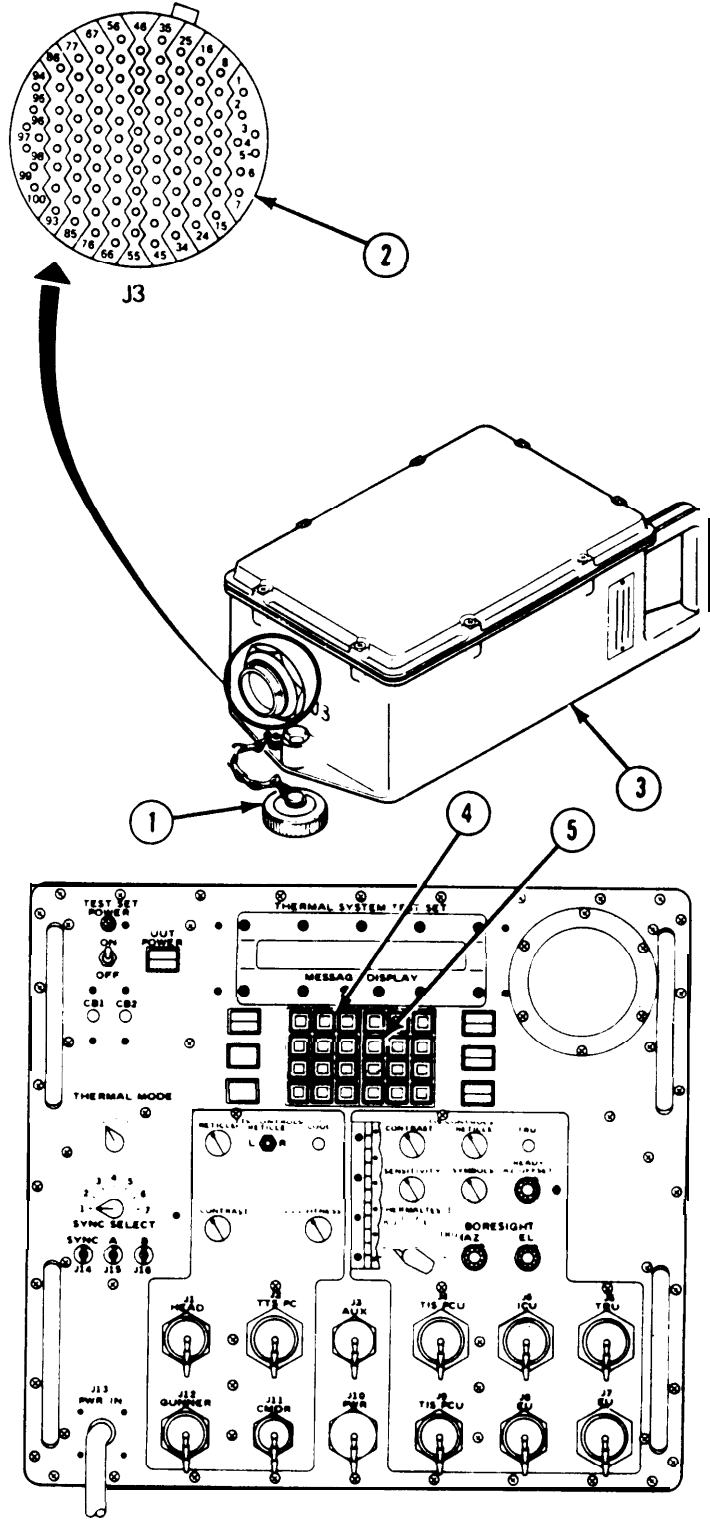
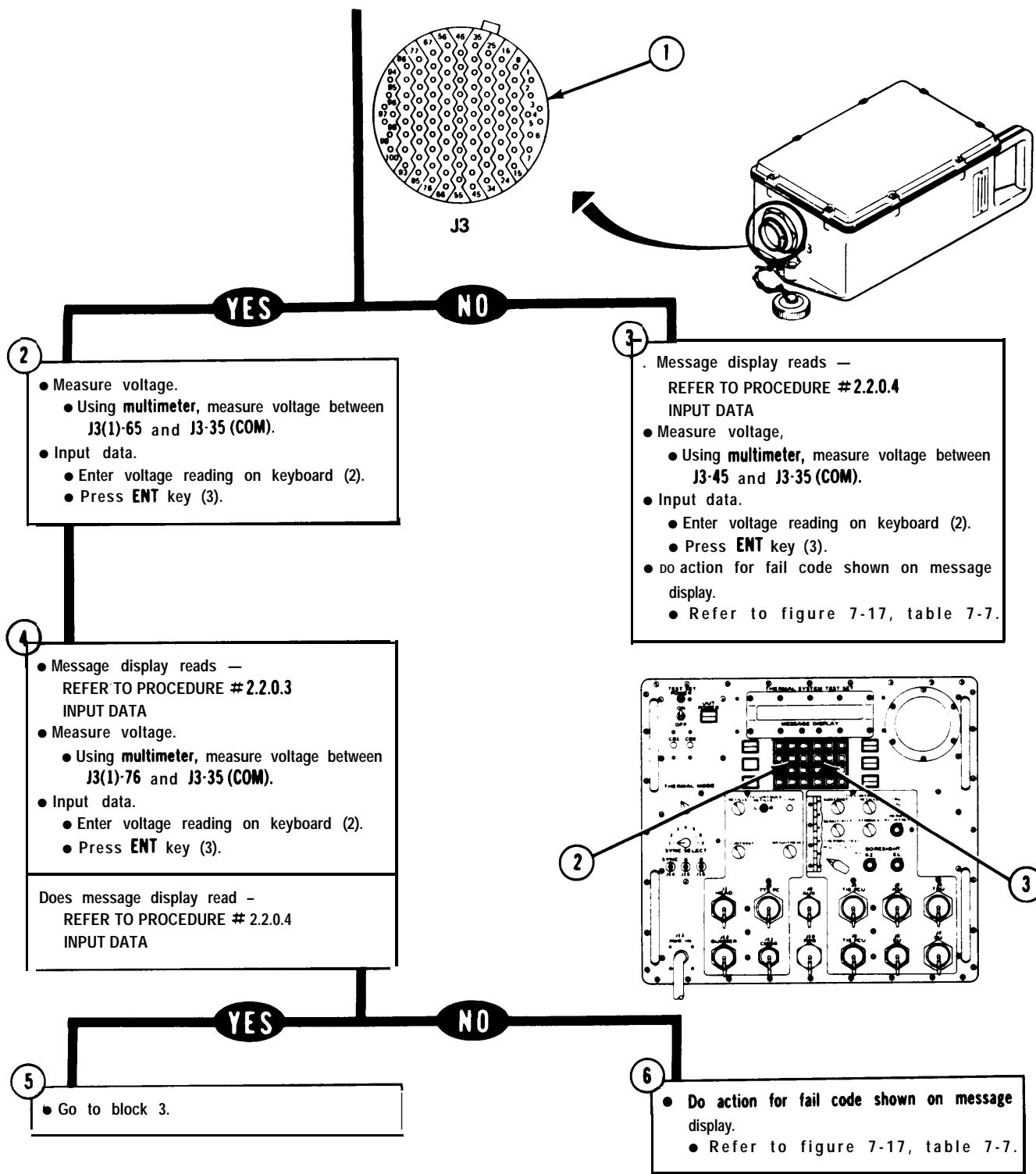


Figure 7-30. (Sheet 1 of 2)

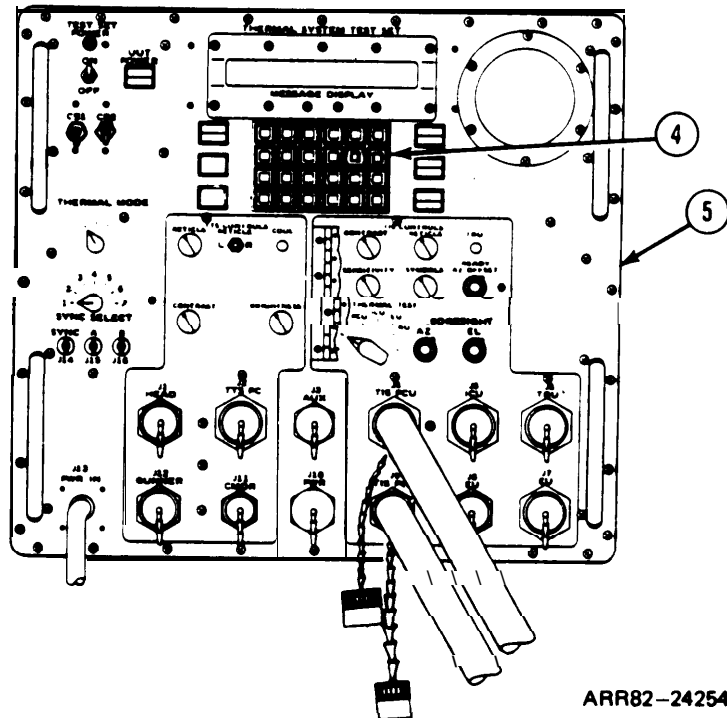
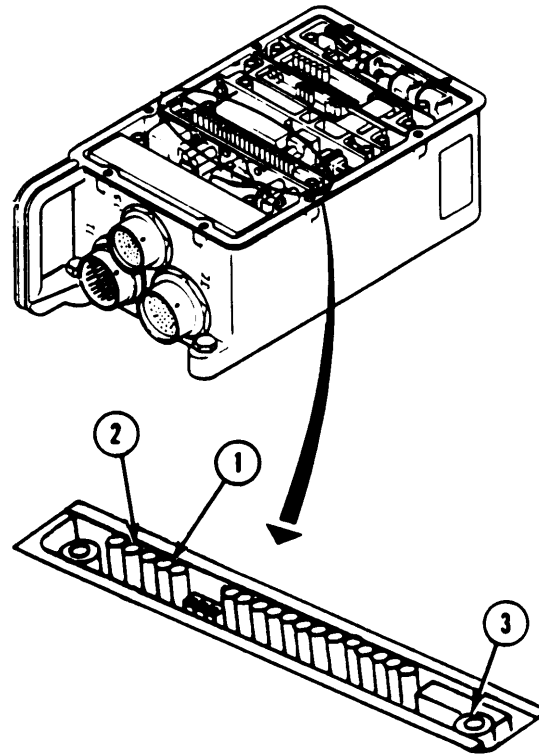
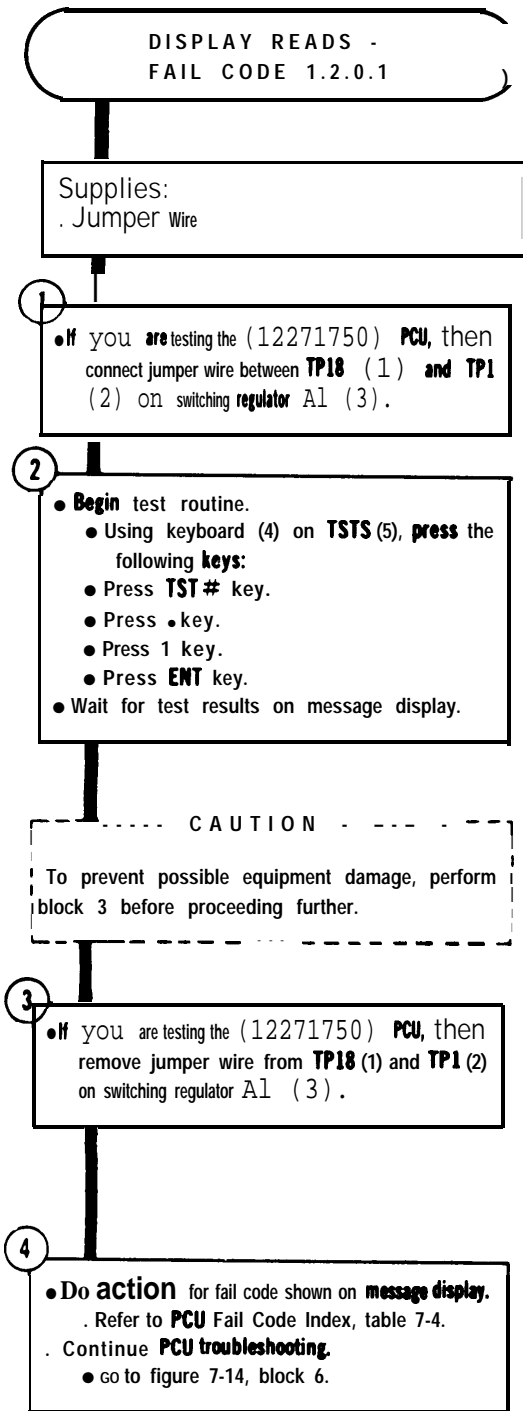
ARR82-24252



ARR82-24263

Figure 7-30 (Sheet 2 of 2)

TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES



ARR82-24254

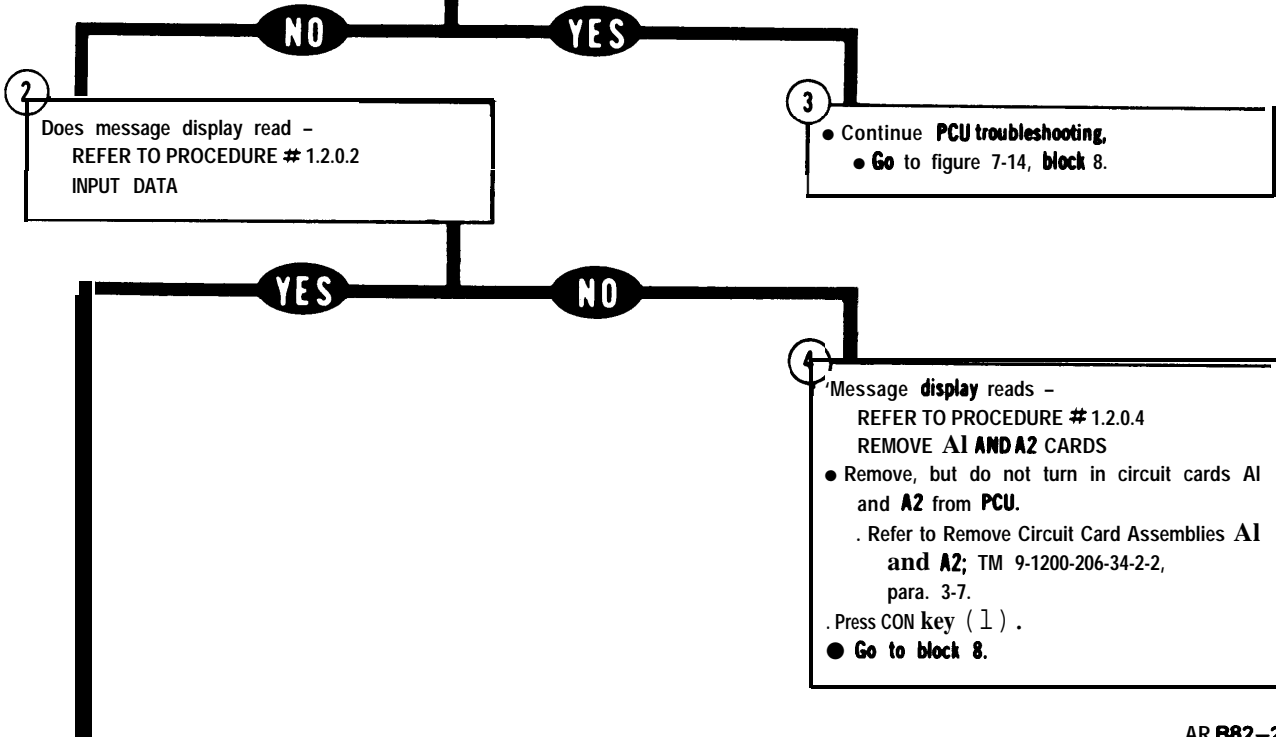
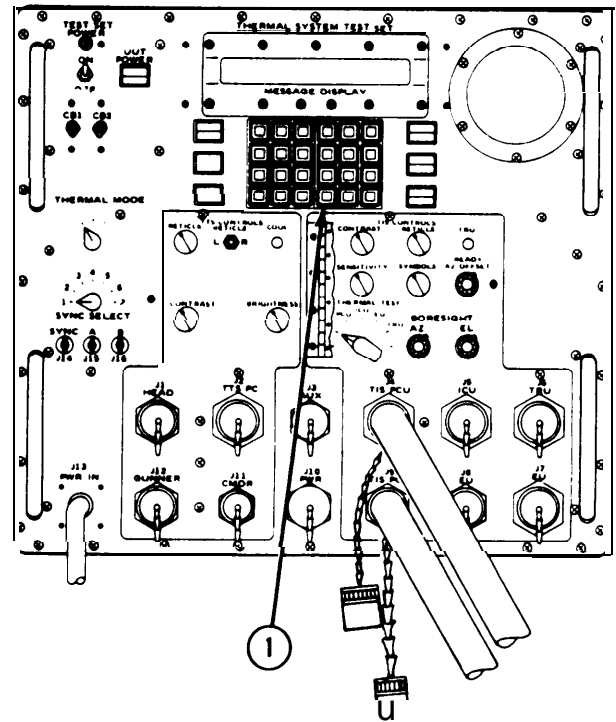
Figure 7-31

DISPLAY READS —
REFER TO PROCEDURE # 1.2.0.1
REMOVE A3 A4 A5 CARDS

Test Equipment/Special Tools:
● Multimeter, digital

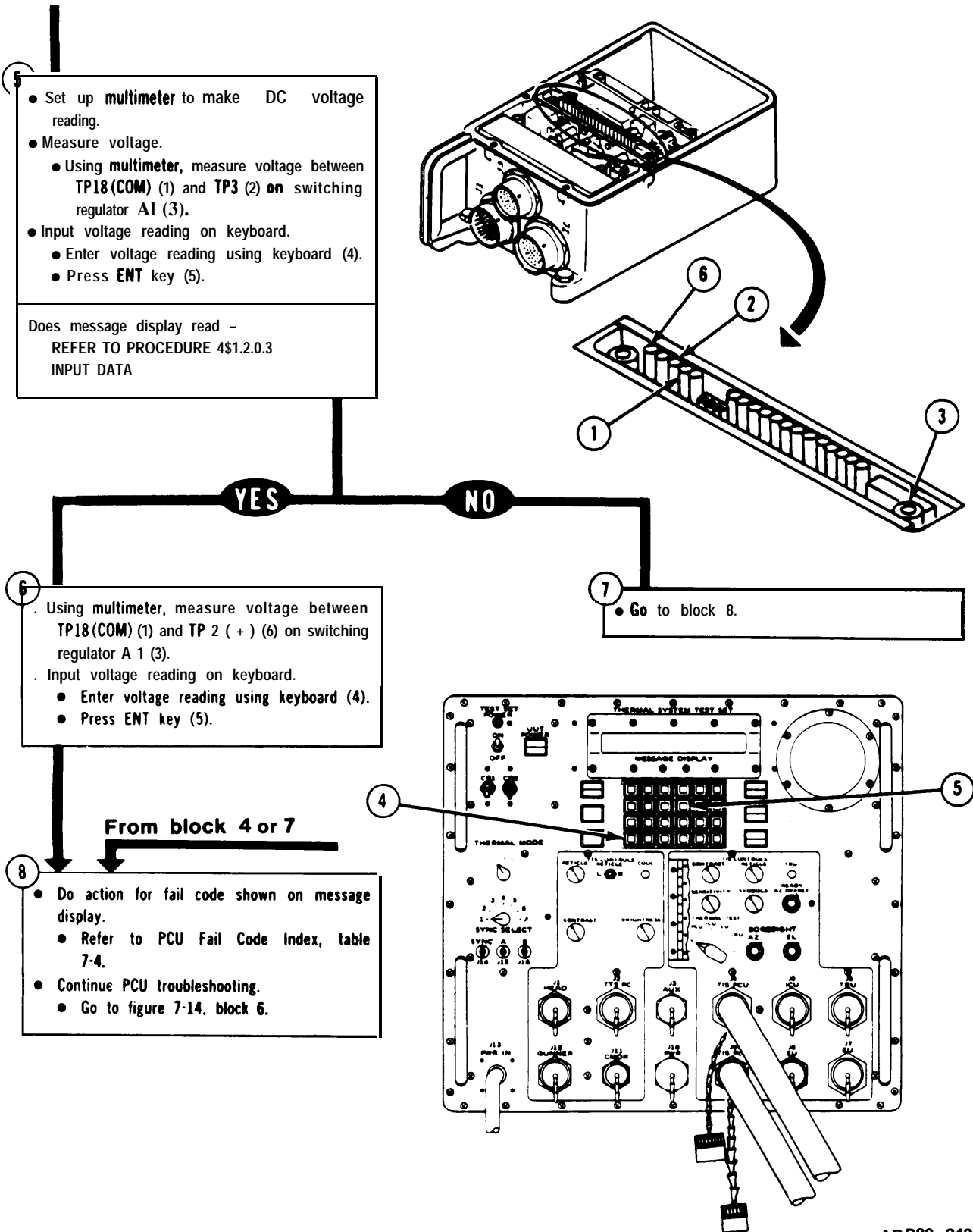
- Remove access cover from PCU.
 - . Refer to Remove Access Cover, TM 9-1200-206-34-2-2, para. 3-7.
 - . Remove, but do not turn in circuit cards A3, A4 and A5 from PCU.
 - . Refer to Remove Circuit Card Assemblies A3, A4 and A5; TM 9-1200-206-34-2-2, para. 3-7.
- Press CON key (I).

Does message display read -
TEST PASSED:
PCU + 16 VDC BIAS



AR R82-24255

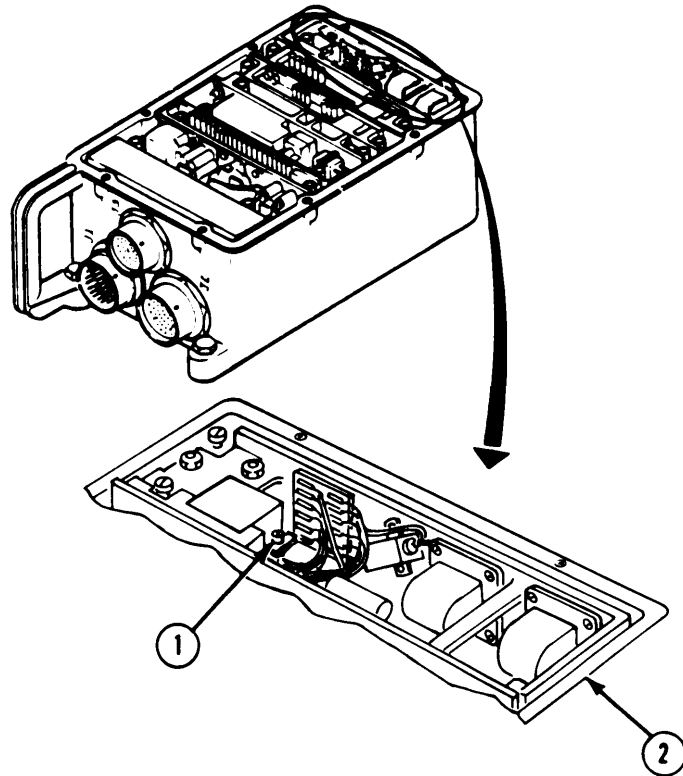
Figure 7-32 (Sheet 1 of 2)



ARR82-24256

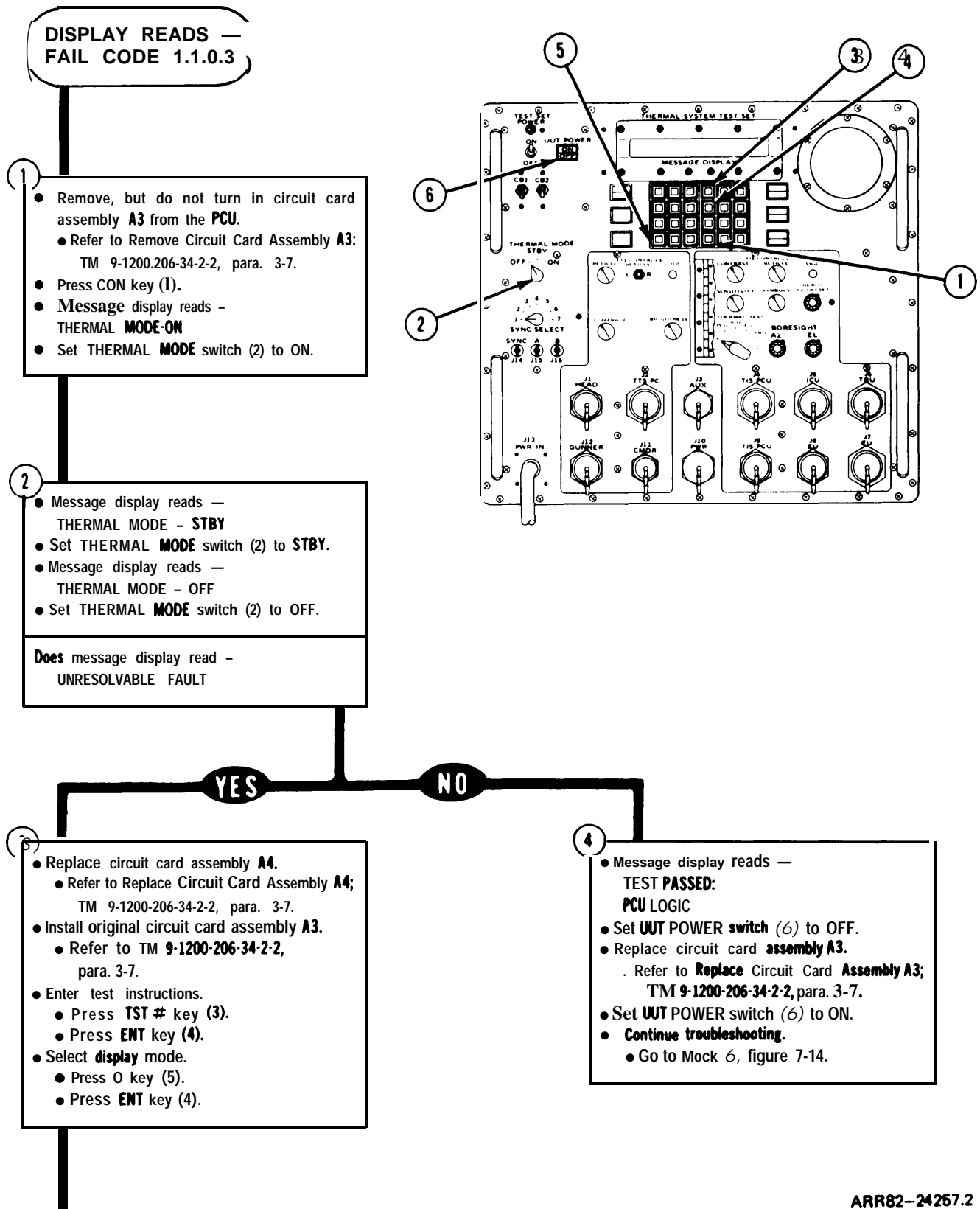
Figure 7-32 (Sheet 2 of 2)

- 2
- Locate variable resistor R9 (1) on alternating current generator A5 (2).
 - Using alignment tool, adjust R9 (1) until message display reads 118 V ac.
- 3
- If message display reads a fail code then do action for fail code shown on message display.
 - Refer to PCU Fail Code Index, table 7-4.
 - 60 to figure 7-14, block 12.



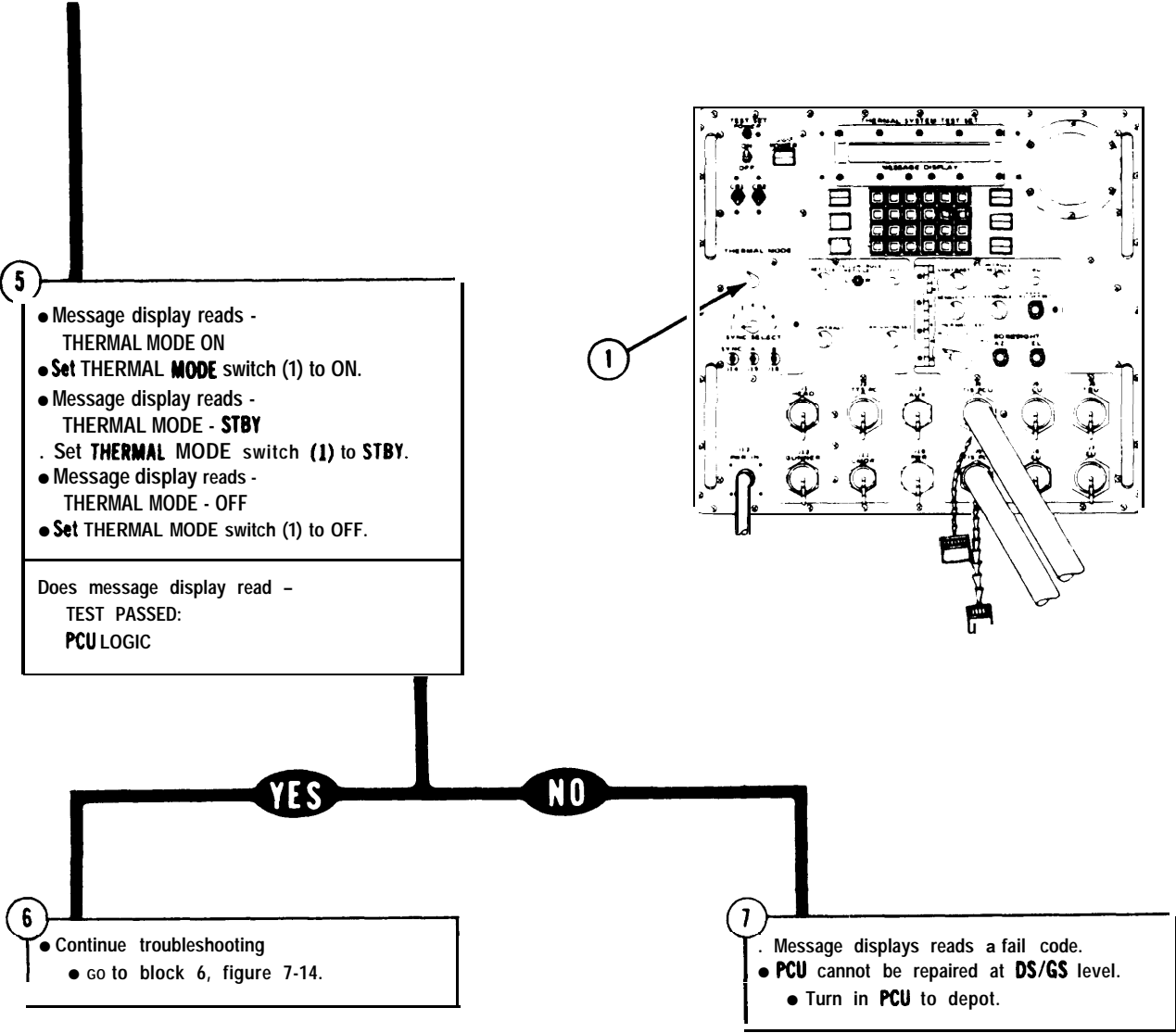
ARR82-24257.1

Figure 7-33 (Sheet 2 of 2)



ARR82-24257.2

Figure 7-34 (Sheet 1 of 2)



AR R82-24257.3

Figure 7-34 (Sheet 2 of 2)

INSTALL AND ALIGN GRATICULE

Test Equipment/Special Tools:
 . Screwdriver, cross tip, No. 2

Supplies:
 NOTE: Expendable supplies are defined in volume 1, appendix C.
 . Bonding (Item 7)

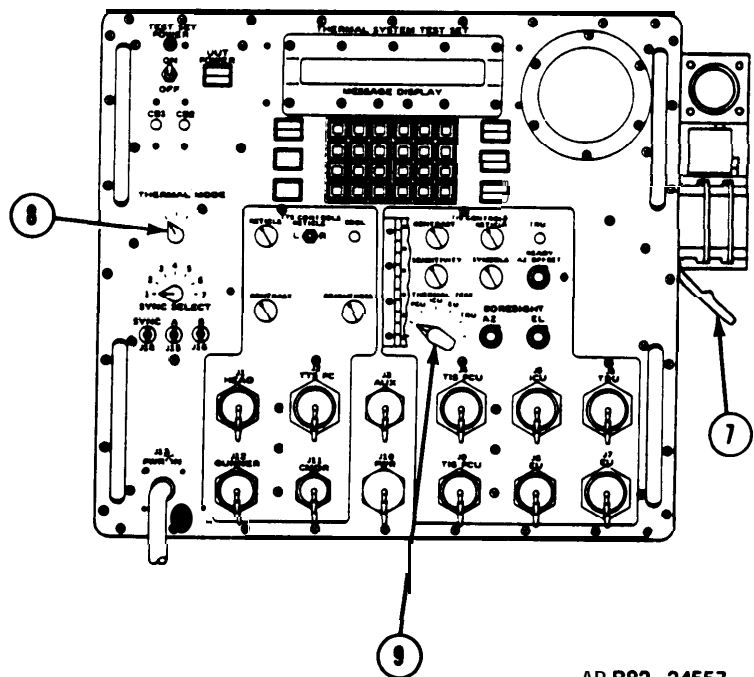
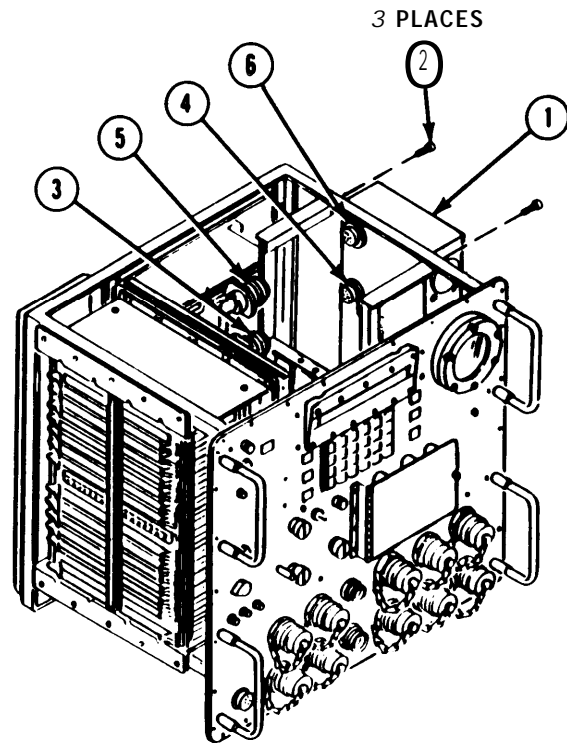
Equipment Conditions:
 ● TSTS on clean work surface.
 . IDU on clean work surface.

- 1
- . Connect IDU to TSTS.
 - Position IDU (1) in TSTS so front of IDU is accessible at side of TSTS and rear of IDU can be connected to W14 harness.
 - Connect cable connector W14P4 (3) to receptacle J2 (4).
 - Connect cable connector W 14P3 (5) to receptacle J1 (6).
 - Screw in and tighten 3 screws (2) using cross tip screwdriver.

- 2
- . Ground IDU.
 - . Connect one end of clip lead (7) to IDU chassis.
 - . Connect other end of clip lead (7) to bench ground.
 - . Set THERMAL MODE switch (8) to OFF.
 - . Set THERMAL TEST switch (9) to OFF.

WARNING

The top half of the IDU contains HIGH VOLTAGE that can cause serious injury or death. Keep hands and tools away from this area.



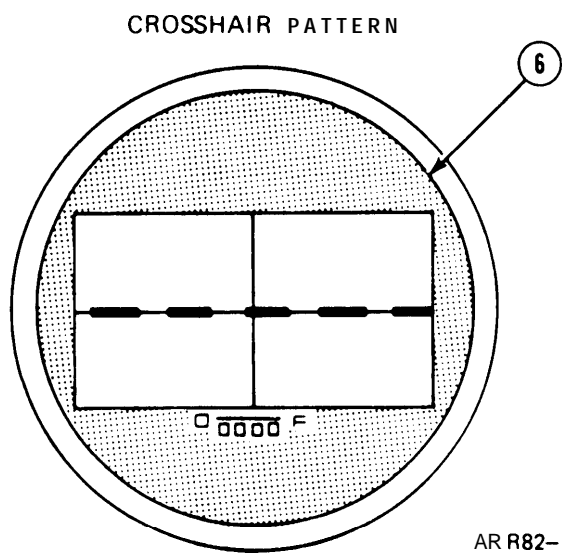
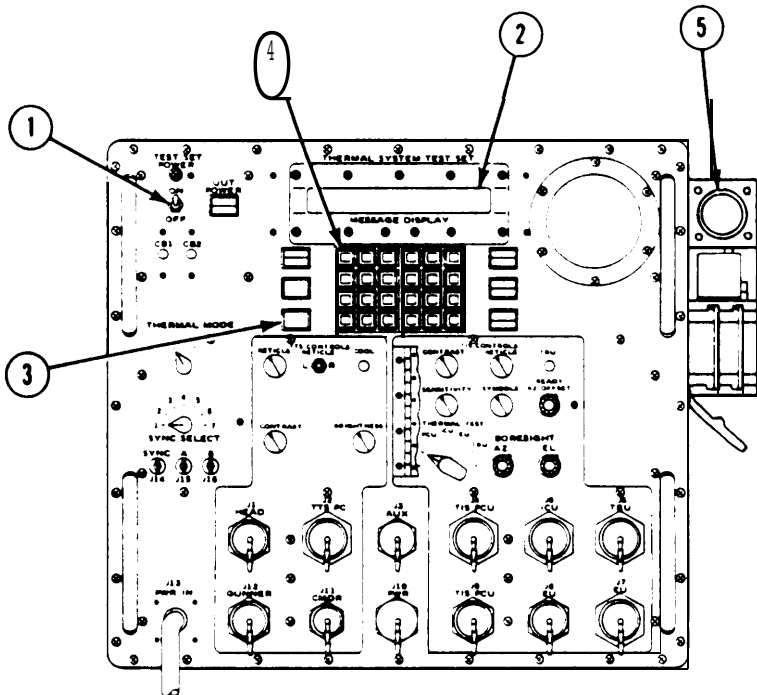
AR R82-24557

Figure 7-35 (Sheet 1 of 4)

TSTS TROUBLESHOOTING PROCEDURES

- 3
- Power up TSTS.
 - . Set TEST SET POWER switch (1) to ON.
 - . Wait for message display (2) to read —
AUTOMATIC SELF TEST COMPLETED
RUN OAST?
 - . Press NO key (3).

- 4
- . Put crosshair pattern on IDU.
 - . Using keyboard (4) press the following keys:
 - . 0 key
 - . ENT key
 - TST = key
 - . 7 key
 - . ENT key
 - . 0 key
 - . ENT key
 - . IDU display (5) shows crosshair pattern (6).



AR R82-24558

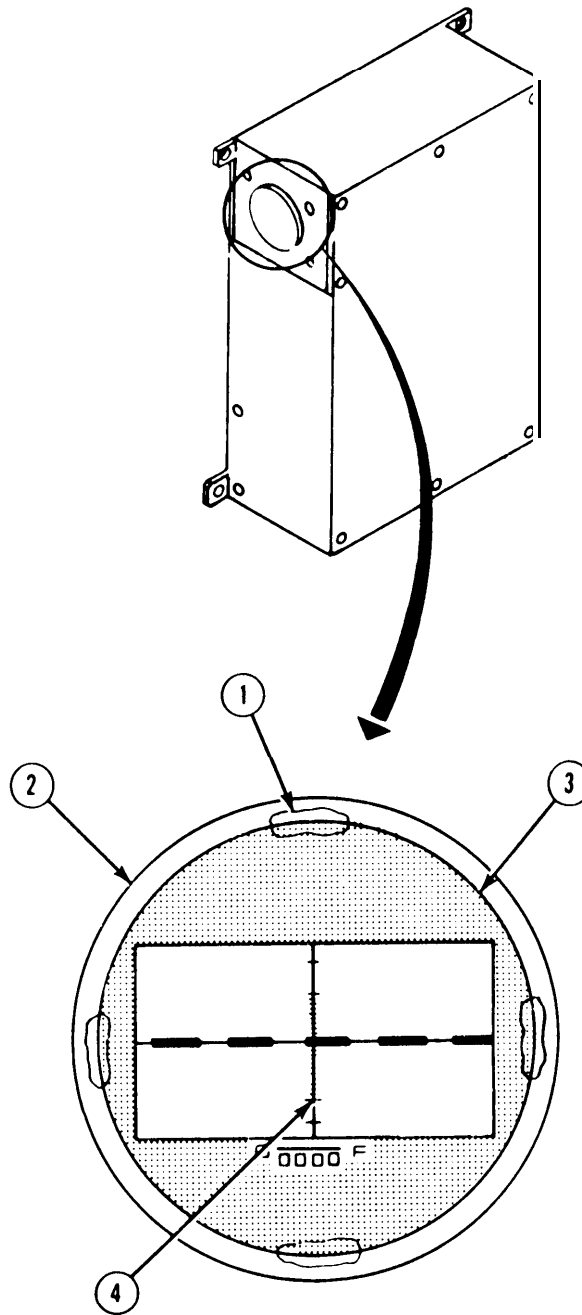
Figure 7-35. (Sheet 2 of 4)

WARNING

- Bonding material is toxic.
Use only in well ventilated area.
Do not prepare bonding material on any surface that is above room temperature.

5

- Align and install graticule.
 - Put bonding material (1) in four places in 1/4 inch applicators on electron tube assembly face (2).
 - Put graticule (3) on electron tube assembly face (2) and align graticule (3) horizontally and vertically with crosshair pattern (4).

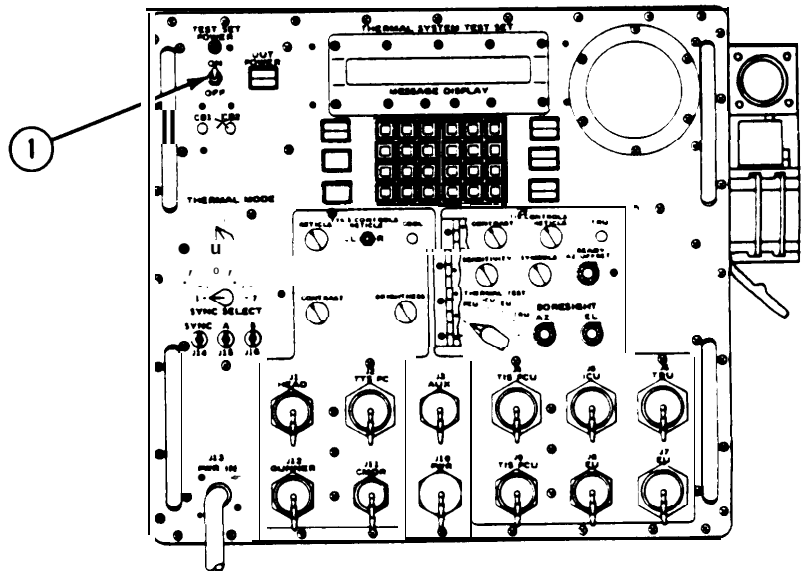


AR R82-24559

Figure 7-35. (Sheet 3 of 4)

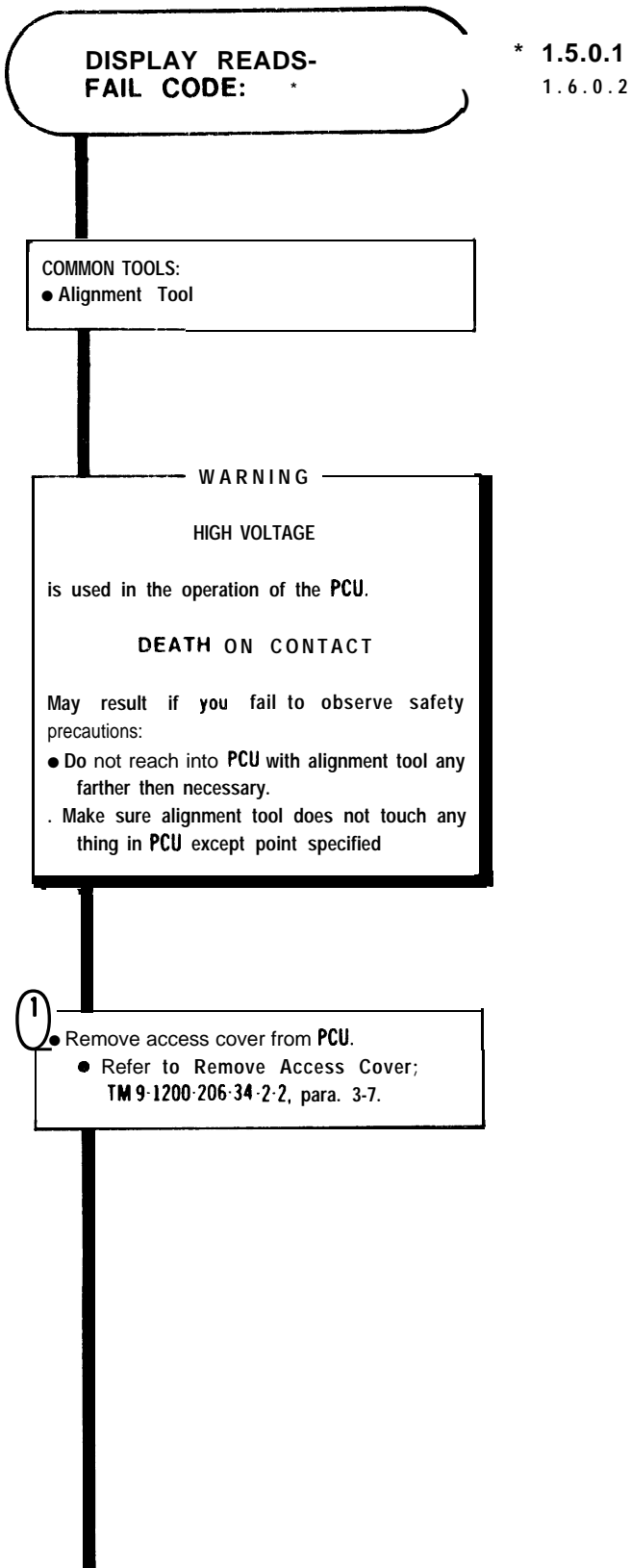
TM 9-4931-381-14&P-1
TSTS TROUBLESHOOTING PROCEDURES

- 6
- Power down TSTS.
 - Set TEST SET POWER switch (1) to OFF.
 - Wait for bonding material to dry.
 - Go to Install Eyepiece Assembly, Adapter, and IOU Graticule; refer to volume IV, para. 2-8.



AR R82-24560

Figure 7-35. (Sheet 4 of 4)



ARR82-24257.4

Figure 7-36. (Sheet 1 of 2)

TSTS TROUBLESHOOTING PROCEDURES

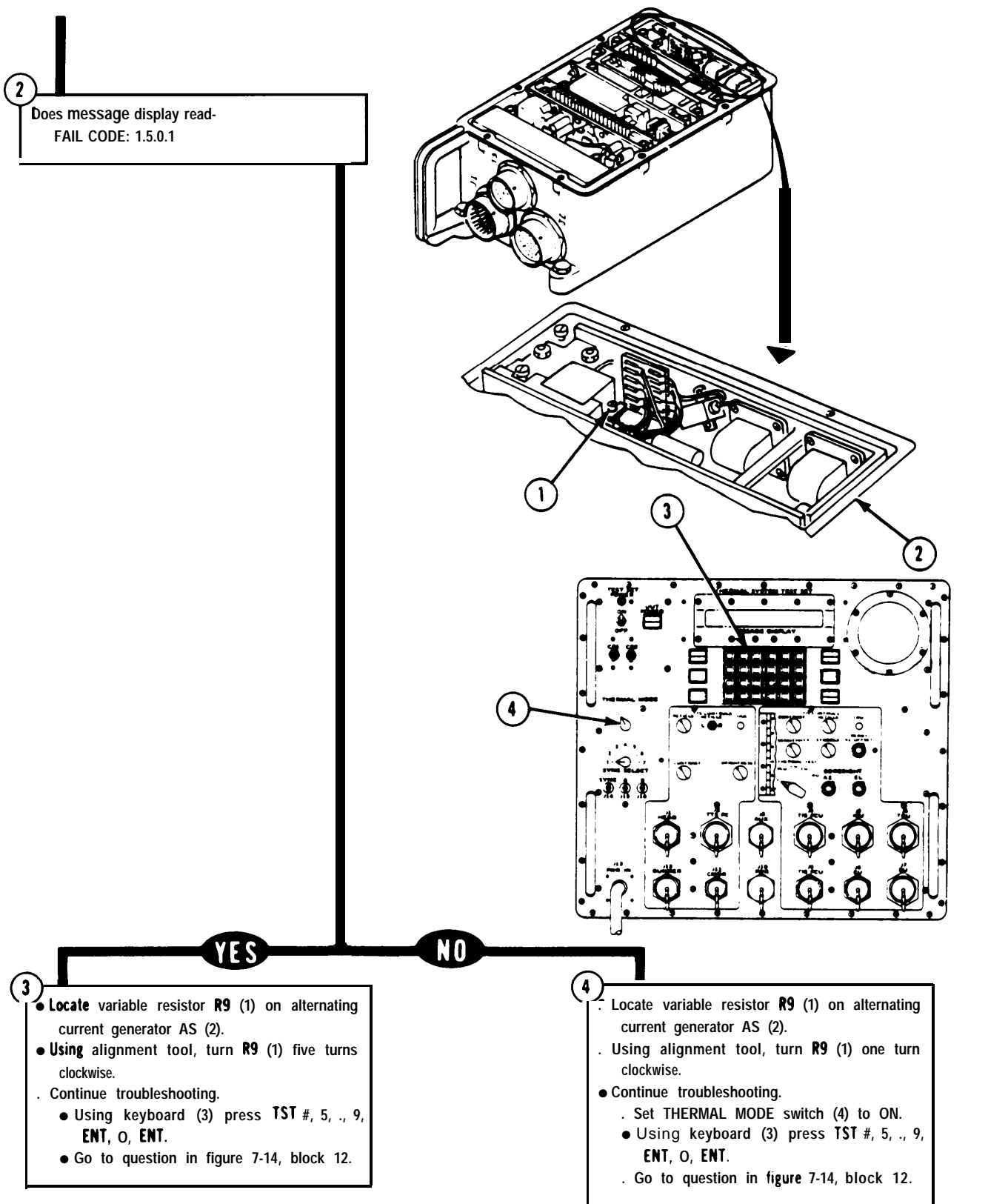
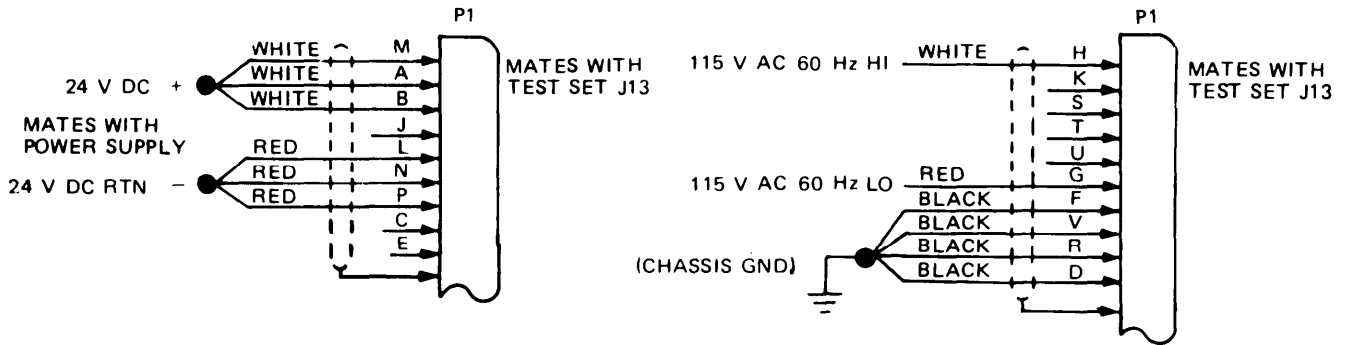


Figure 7-36. (Sheet 2 of 2)

CHAPTER 8
TEST SET DIAGRAMS

This chapter contains electrical diagrams, illustrations and wiring lists that support the detailed procedures in chapter 4. Figure 8-1 shows cable assembly W10. Figure 8-2 is the wiring diagram for power input. Figure 8-3 shows test set test connector assembly pin locations. Figure FO-1, located in the third binding of this manual, is the test set functional block diagram. Tables 8-1 through 8-11 are the wiring lists for the test set cable assemblies W1 through W10.



ARR82-24258

Figure 8-1. Power Cable W10

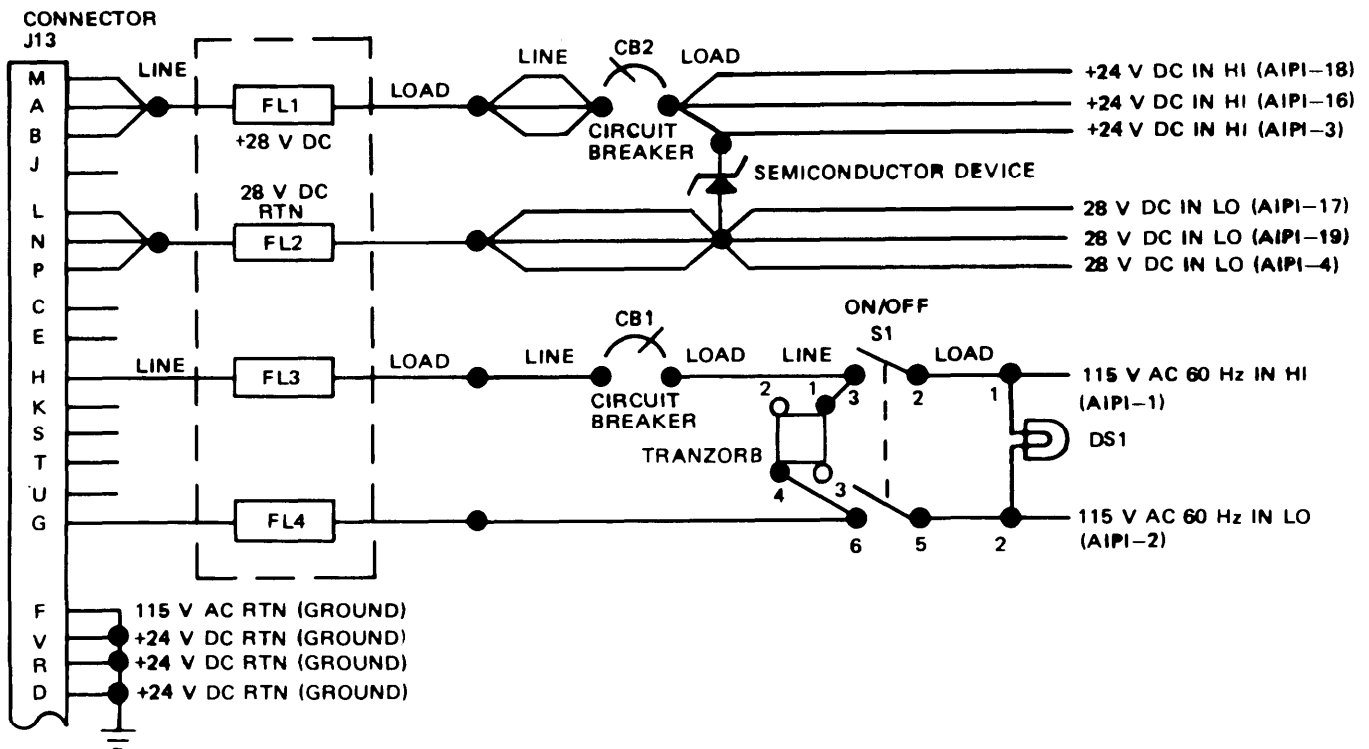


Figure 8-2. Power Input Wiring Diagram

TM 9-4931-381-14&P-1
 TEST SET DIAGRAMS

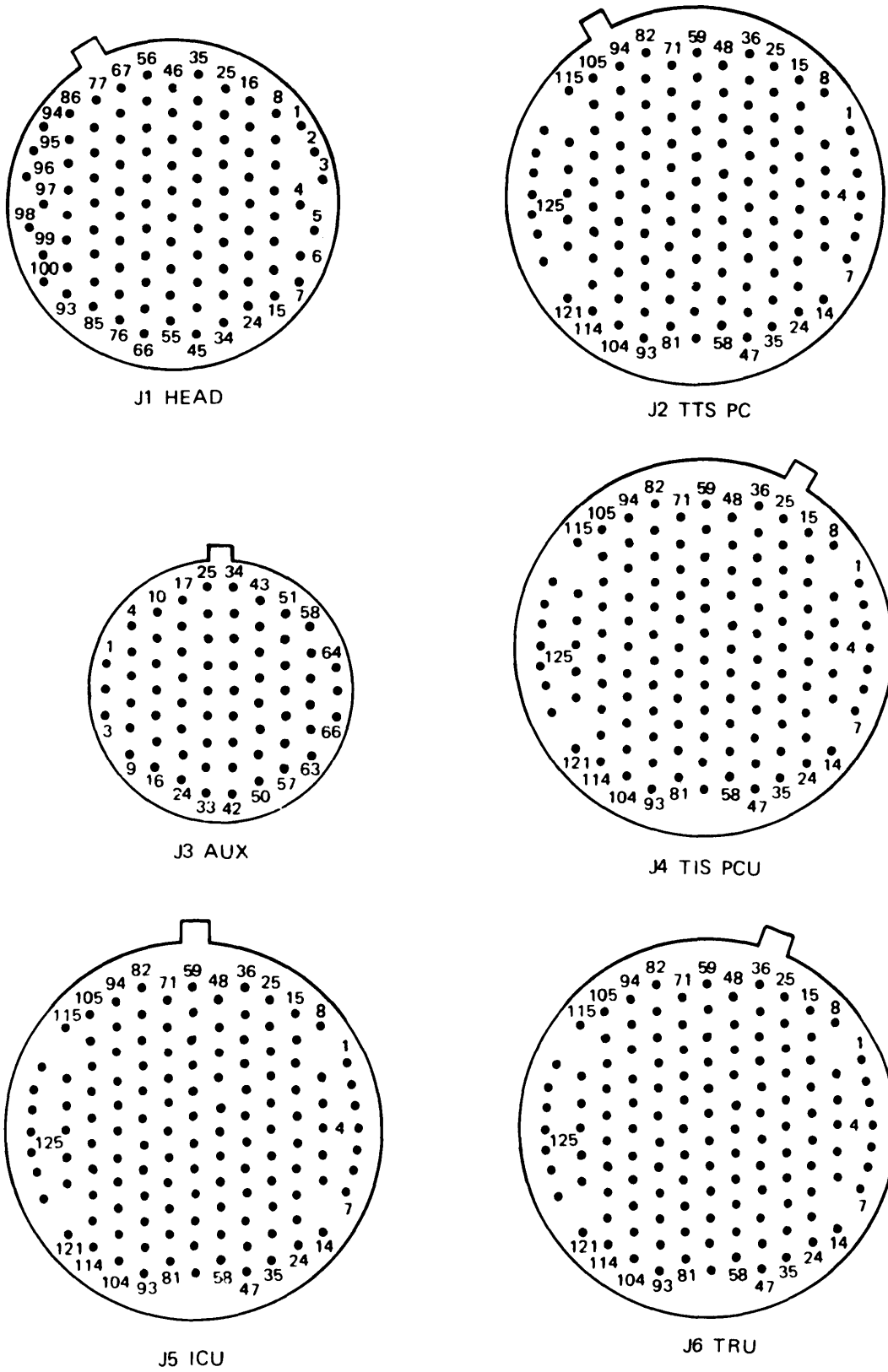
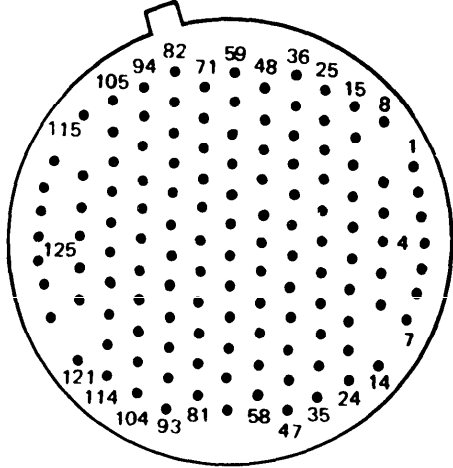
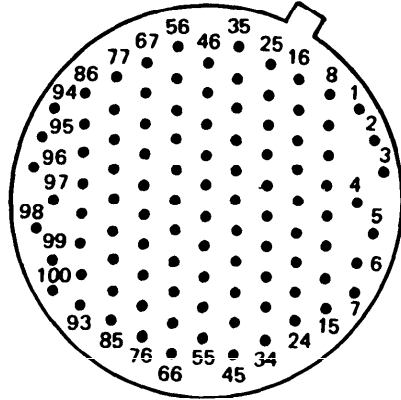


Figure 8-3. (Sheet 1 of 2)

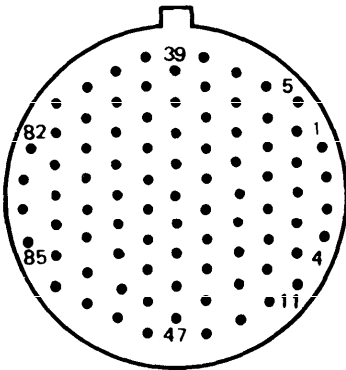
ARR82-24260



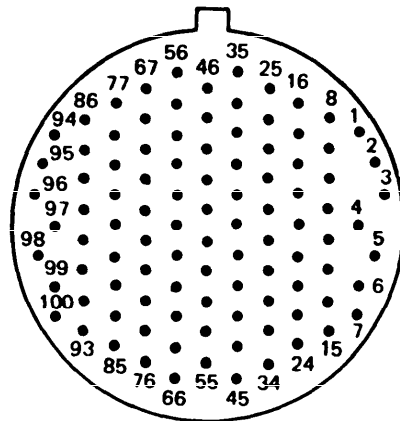
J7 EU



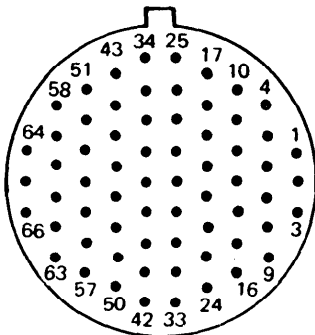
J8 EU



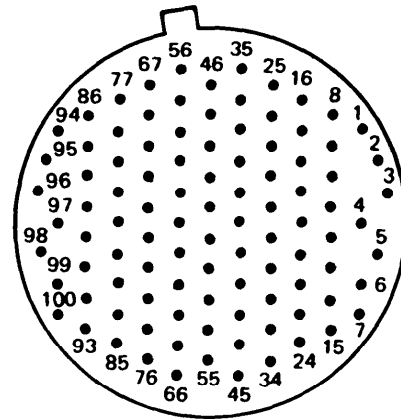
J9 TIS PCU



J10 PWR



J11 CMDR



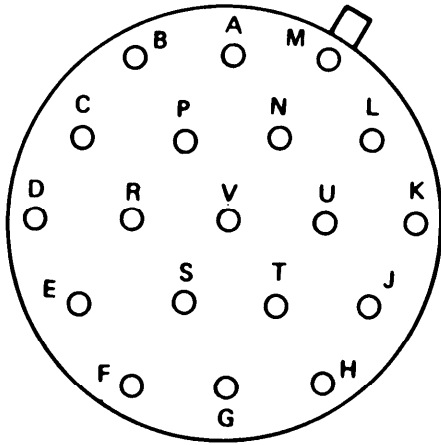
J12 GUNNER

ARR82-24261

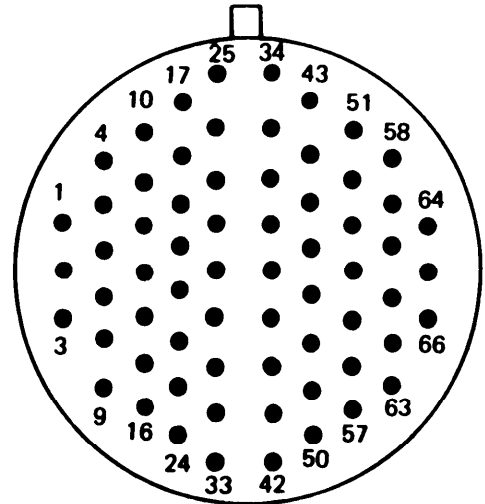
Figure 8-3. (Sheet 2 of 2)

Table 8-1. UUT Cable Wiring List Index

UUT Cable Identification	Wiring List Table Number	UUT Cable Identification	Wiring List Table Number
W1	Table 8-2	W7	Table 8-8
W2	Table 8-3	W8	Table 8-9
W3	Table 8-4	W9	Table 8-10
W4	Table 8-5	W10	Table 8-11
W5	Table 8-6		
W6	Table 8-7		



W1P1



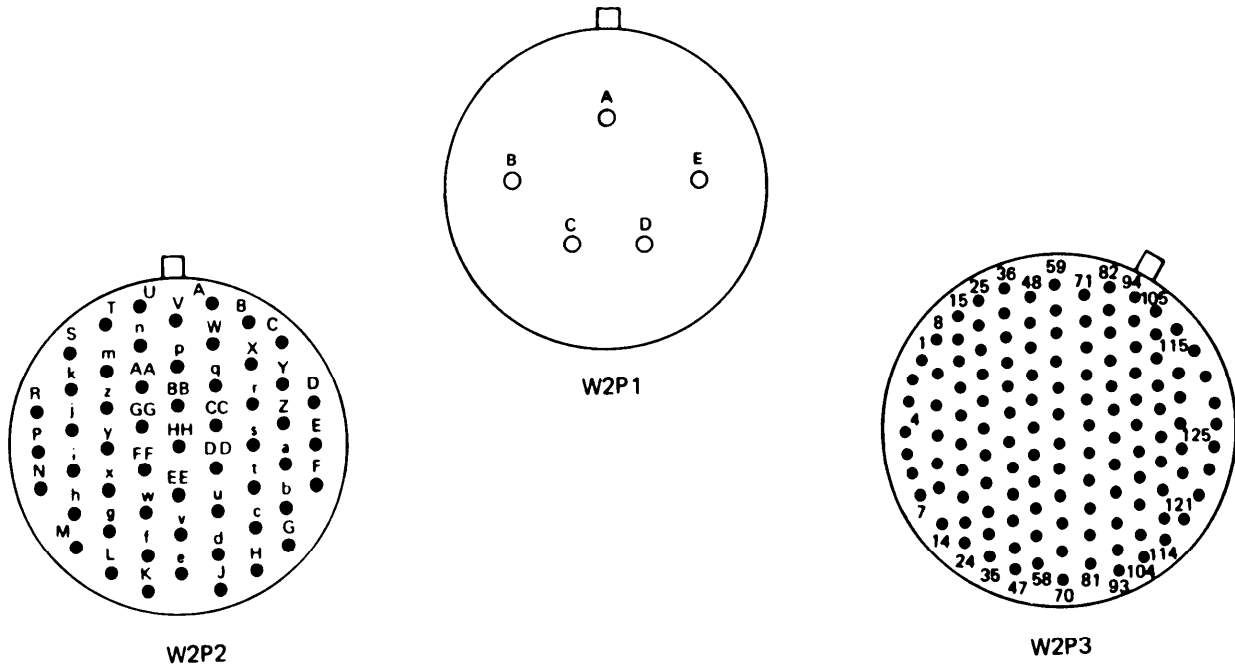
W1P2

ARR82-24262

Table 8-2. Commander's Control Cable W1 Wiring List

From		To	
Connector	Pin	Connector	Pin
P2	1	P1	R
P2	2	P1	S
P2	3	P1	A
P2	4	P1	E
P2	5	P1	F
P2	6	P1	N
P2	7	P1	B
P2	8	P1	G
P2	10	P1	L
P2	12	P1	K
P2	14	P1	H

From		To	
Connector	Pin	Connector	Pin
P2	16	P1	J
P2	18	P1	M
P2	20	P1	NC
P2	22	P1	P
P2	24	P1	T
P2	26	P1	U
P2	28	P1	V
P2	30	P1	D
P2	32	P1	C
P2	64	P1	NC
P2	65	P2	66



ARR82-24263

Table 8-3. TTS PCU Cable W2 Wiring List

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P2	<u>R</u>		NC	P3	28	P2	W
P2	<u>V</u>		NC	P3	30	P2	X
P3	2	P2	<u>N</u>	P3	32	P2	Y
P3	4	P2	<u>P</u>	P3	34	P2	I
P3	6	P2	Q	P3	36	P2	A
P3	8	P2	G	P3	38	P2	K
P3	10	P2	<u>U</u>	P3	40	P2	J
P3	12	P2	<u>T</u>	P3	42	P2	F
P3	14	P2	S	P3	44	P2	E
P3	16	P2	H	P3	46	P2	<u>J</u>
P3	18	P2	L	P3	47		NC
P3	20	P2	M	P3	48	P2	B
P3	22	P2	T	P3	50	P2	NC
P3	24	P2	U	P3	52	P3	54
P3	26	P2	V	P3	53		NC

Table 8-3. TTS PCU Cable W2 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	57	P1	A	P3	92	P2	FF
P3	60	P2	Z	P3	95	P2	DD
P3	63	P1	D	P3	96	P2	AA
P3	65	P1	C	P3	98	P2	BB
P3	69	P1	B	P3	100	P2	C
P3	72	P2	<u>A</u>	P3	102	P2	D
P3	74	P2	<u>B</u>	P3	105	P2	<u>K</u>
P3	76	P2	<u>E</u>	P3	106	P2	<u>M</u>
P3	78	P2	<u>F</u>	P3	107	P2	N
P3	80	P2	EE	P3	108	P2	P
P3	83	P2	CC	P3	109	P2	R
P3	85	P2	<u>Y</u>	P3	110	P2	S
P3	87	P2	<u>Z</u>	P3	111	P2	<u>X</u>
P3	88	P2	HH	P3	113	P2	<u>W</u>
P3	90	P2	GG				

TEST SET DIAGRAMS

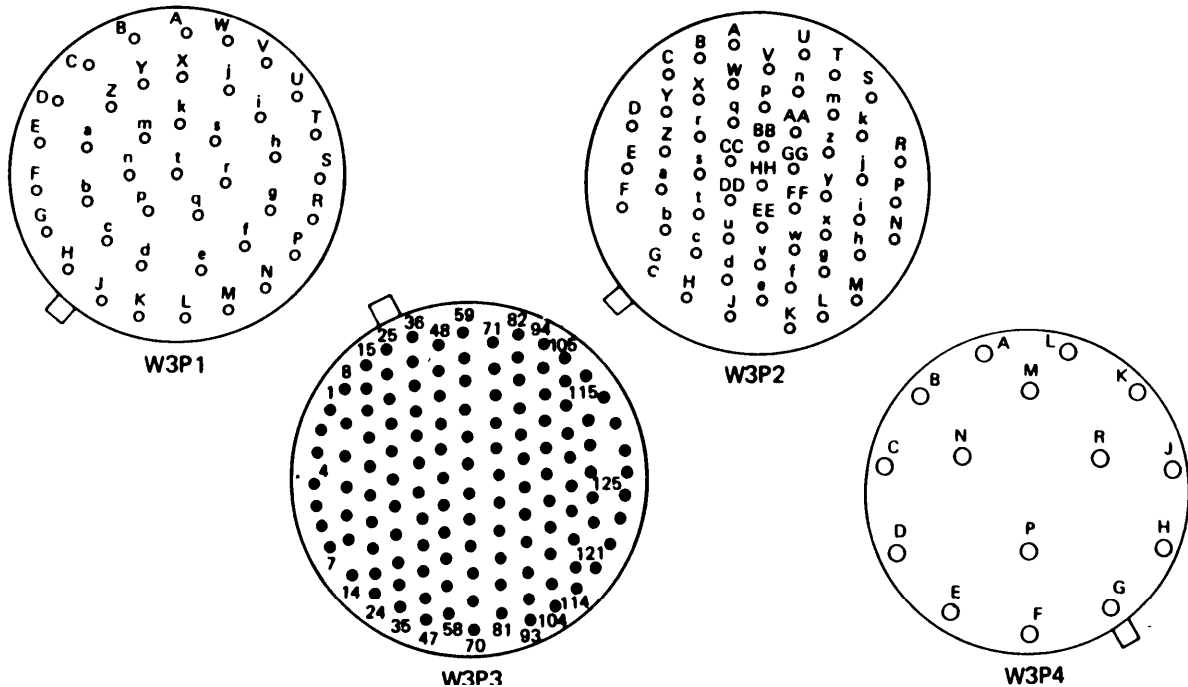


Table 8-4. TRU Cable W3 Wiring List

ARR82-24264

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	NC	P4	E	P3	12	P2	C
P3	NC	P2	<u>E</u>	P3	14	P2	NC
P3	NC	P2	F	P3	16	P2	D
P3	NC	P2	G	P3	18	P2	E
P3	NC	P2	<u>H</u>	P3	20	P2	H
P3	NC	P2	L	P3	22	P2	R
P3	NC	P2	<u>M</u>	P3	24	P2	<u>C</u>
P3	NC	P4	N	P3	25	P2	NC
P3	NC	P2	V	P3	27	P2	E
P3	NC	P2	<u>W</u>		28	P2	K
P3	NC	P2	<u>X</u>	P3	30	P2	T
P4	R	P1	W	P3	32	P2	NC
P3	2	P2	<u>K</u>	P3	34	P2	Y
P3	4	P2	S	P3	38	P2	NC
P3	6	P2	NC	P3	40	P2	<u>G</u>
P3	8	P2	B	P3	42	P2	<u>U</u>
P3	10	P2	X	P3	44	P2	<u>B</u>

TEST SET DIAGRAMS

Table 8-4. TRU Cable W3 Wiring List (Continued)

From		To		From		To	
connector	Pin	connector	Pin	connector	Pin	connector	Pin
P3	46	P2	NC	P3	95	PI	X
P3	48	P2	J	P3	96	PI	I
P3	50	P2	<u>D</u>	P3	97	PI	J
P3	52	P2	NC	P3	98	P2	M
P3	54	P2	R	P3	99	PI	<u>A</u>
P3	56	P2	<u>J</u>	P3	101	PI	K
P3	58	P2	NC	P3	102	PI	P
P3	60	P2	u	P3	103	PI	R
P3	62	P2	<u>P</u>	P3	104	PI	G
P3	64	P2	<u>N</u>	P3	105	PI	<u>B</u>
P3	66	P2	<u>I</u>	P3	106	PI	E
P3	68	P2	N	P3	107	PI	N
P3	70	P2	DD	P3	108	PI	<u>Q</u>
P3	71	PI	T	P3	109	PI	<u>H</u>
P3	73	P2	NC	P3	110	PI	<u>T</u>
P3	75	P2	<u>Q</u>	P3	112	PI	<u>P</u>
P3	77	P2	A	P3	113	PI	<u>N</u>
P3	79	P2	w	P3	114	PI	M
P3	82	PI	s	P3	115	P4	A
P3	83	PI	D	P3	116	P4	B
P3	84	PI	B	P3	117	P4	C
P3	85	PI	c	P3	118	P4	D
P3	86	PI	H	P3	119		NC
P3	87	PI	L	P3	120	P4	K
P3	88	P4	J	P3	121	P4	L
P3	90	PI	A	P3	122	P4	M
P3	91	PI	<u>K</u>	P3	123	P4	NC
P3	92	PI	v	P3	124		NC
P3	93	PI	<u>J</u>	P3	126		NC
P3	94	PI	U	P3	127	P3	128

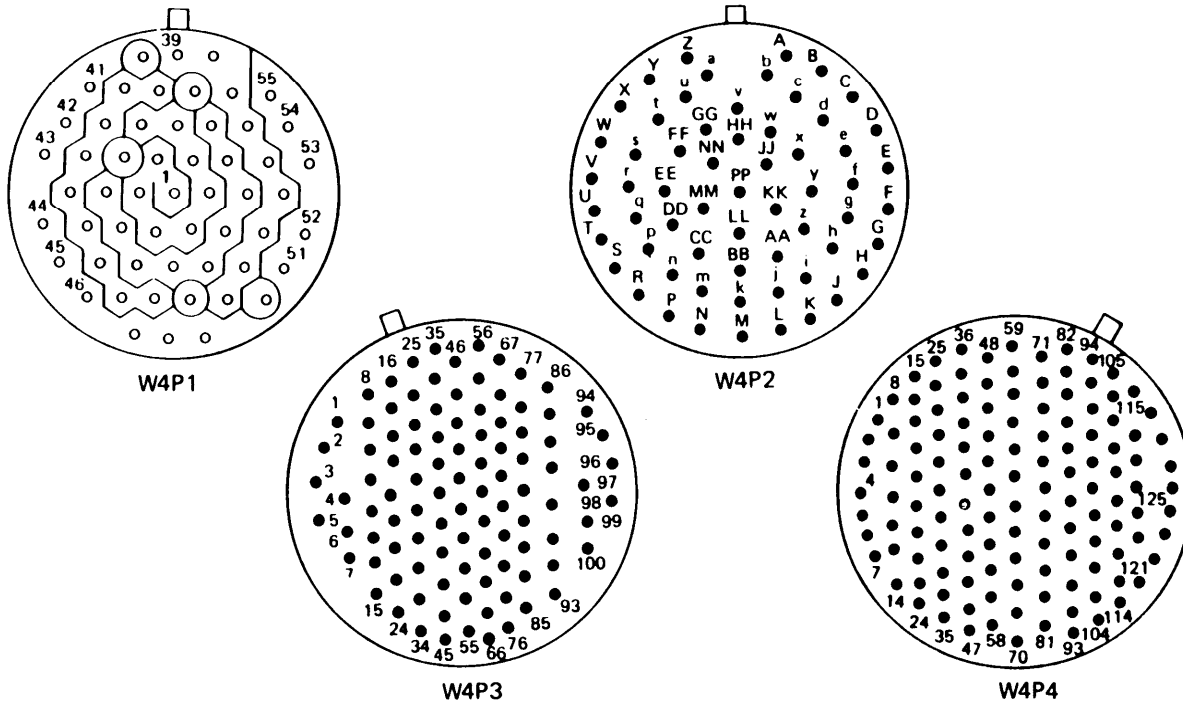


Table 8-5. EU Cable W4 Wiring List

ARR82-24265

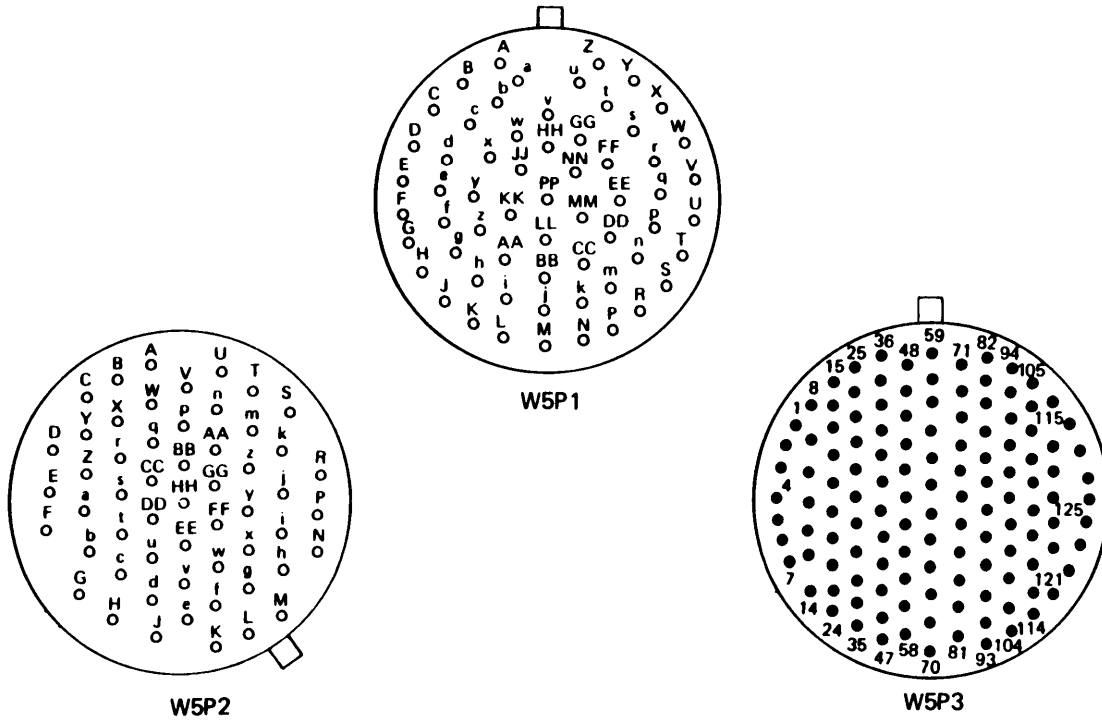
From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	NC	P1	25	P3	32	P1	49
P3	2	P1	22	P3	24	P1	41
P3	4	P1	29	P3	34	P1	54
P3	6	P1	48	P3	36	P1	53
P3	8	P1	23	P3	38	P1	52
P3	12	P1	31	P3	40	P1	51
P3	14	P1	32	P3	42	P1	50
P3	16	P1	30	P3	44	P1	39
P3	18	P1	33	P3	46	P1	10
P3	20	P1	34	P3	48	P1	20
P3	22	P1	35	P3	50	P1	11
P3	26	P1	42	P3	52	P1	36
P3	28	P1	43	P3	54	P1	38
P3	30	P1	NC	P3	56	P1	55
				P3	58	P1	40
				P3	60	P1	37

Table 8-5. EU Cable W4 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	62	P1	8	P4	26	P2	<u>F</u>
P3	68	P1	45	P4	28	P2	<u>Z</u>
P3	70	P1	47	P4	30	P2	<u>H</u>
P3	72	P1	44	P4	32	P2	KK
P3	74	P1	46	P4	34	P2	F
P3	76	P1	26	P4	36	P2	K
P3	78	P1	28	P4	38	P2	<u>I</u>
P3	80	P1	12	P4	40	P2	J
P3	82	P1	27	P4	42	P2	NC
P3	84	P1	21	P4	44	P2	G
P3	86	P1	9	P4	46	P2	<u>G</u>
P4	NC	P2	AA	P4	48	P2	<u>J</u>
P4	NC	P2	<u>B</u>	P4	50	P2	L
P4	NC	P2	<u>M</u>	P4	52	P2	NC
P4	NC	P2	P	P4	54	P2	<u>K</u>
P4	NC	P2	U	P4	56	P2	BB
P4	NC	P2	<u>U</u>	P4	58	P2	N
P4	NC	P2	X	P4	60	P2	R
P4	2	P2	A	P4	62	P2	<u>N</u>
P4	4	P2	NN	P4	64	P2	NC
P4	6	P2	HH	P4	66	P2	NC
P4	8	P2	<u>D</u>	P4	68	P2	<u>M</u>
P4	10	P2	B	P4	72	P2	S
P4	12	P2	<u>W</u>	P4	74	P2	<u>P</u>
P4	14	P2	<u>C</u>	P4	76	P2	T
P4	16	P2	C	P4	78	P2	<u>Q</u>
P4	18	P2	<u>E</u>	P4	80	P2	<u>R</u>
P4	20	P2	D	P4	82	P2	Y
P4	22	P2	<u>X</u>	P4	84	P2	<u>S</u>
P4	24	P2	E	P4	86	P2	W

Table 8-5. EU Cabe W4 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P4	88	P2	NC	P4	116	P4	114
P4	90	P2	NC	P4	118		NC
P4	92	P2	V	P4	119		NC
P4	94	P2	Z	P4	120		NC
P4	96	P2	NC	P4	121		NC
P4	98	P2	NC	P4	122		NC
P4	100	P2	<u>A</u>	P4	123		NC
P4	102	P2	<u>V</u>	P4	124		NC
P4	104	P2	<u>I</u>	P4	125		NC
P4	106	P2	GG	P4	126		NC
P4	108	P2	FF	P4	127		NC
P4	110	P2	MM	P4	128		NC
P4	112	P2	NC				



ARR82-24266

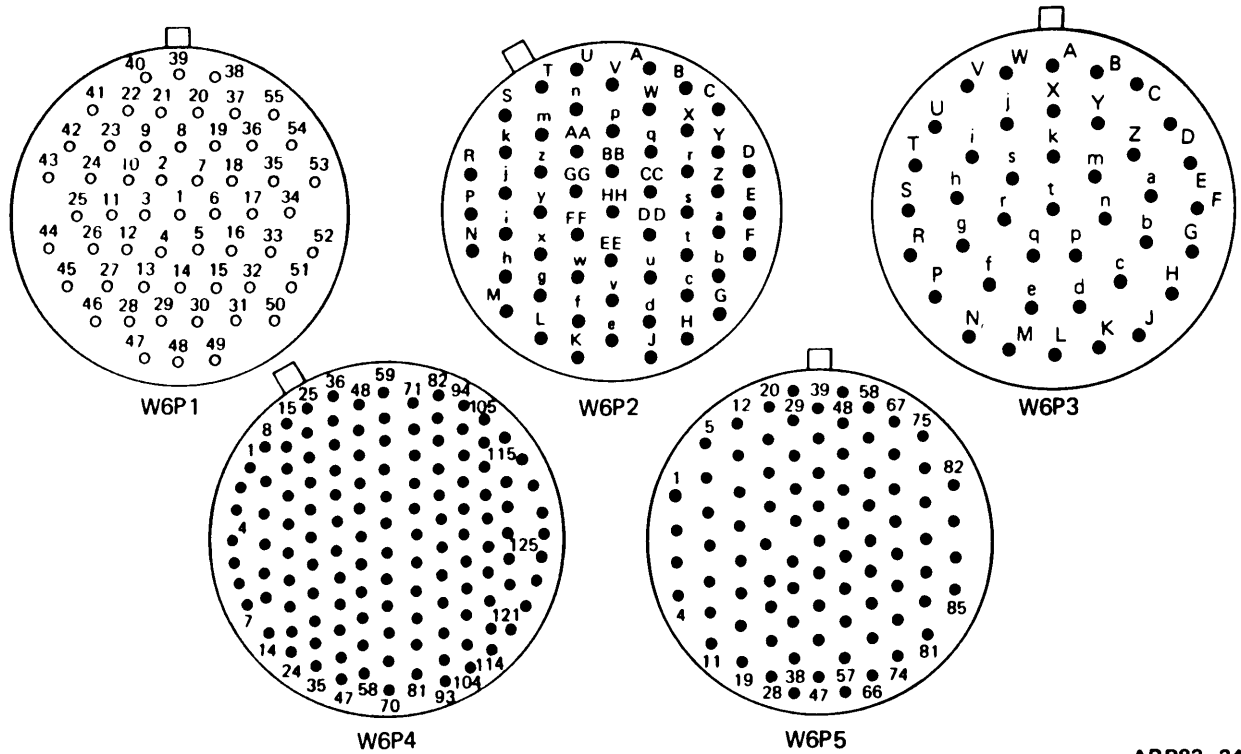
Table 8-6. ICU Code W5 Wiring List

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	NC	P2	C	P3	20	P2	V
P3	NC	P2	F	P3	22	P2	W
P3	NC	P2	FF	P3	24	P2	NC
P3	NC	P2	U	P3	26	P2	<u>A</u>
P3	NC	P2	X	P3	28	P2	<u>Y</u>
P3	2	P2	A	P3	30	P2	<u>Z</u>
P3	4	P2	B	P3	32	P2	<u>I</u>
P3	6	P2	NC	P1	34	P2	<u>J</u>
P3	8	P2	T	P3	36	P2	GG
P3	10	P2	NC	P3	38	P2	<u>H</u>
P3	12	P2	E	P3	40	P2	<u>Z</u>
P3	14	P2	D	P3	42	P2	<u>Y</u>
P3	16	P2	S	P3	44	P2	<u>X</u>
P3	18	P2	NC	P3	46	P2	<u>K</u>

TEST SET DIAGRAMS

Table 8-6. ICU Code W5 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	47	P1	KK	P3	84	P1	G
P3	48	P2	CC	P3	86	P1	A
P3	50	P2	DD	P3	88	P1	<u>H</u>
P3	52	P2	EE	P3	90	P1	JJ
P3	54	P2	NC	P3	92	P1	<u>Z</u>
P3	56	P2	HH	P3	94	P1	<u>F</u>
P3	58	P2	<u>N</u>	P3	96	P1	<u>V</u>
P3	60	P2	<u>U</u>	P3	98	P1	AA
P3	62	P2	<u>P</u>	P3	100	P1	HH
P3	64	P2	AA	P3	102	P1	<u>I</u>
P3	66	P2	BB	P3	104	P1	B
P3	68	P2	<u>M</u>	P3	106	P1	H
P3	70	P1	GG	P3	108	P1	<u>C</u>
P3	72	P2	<u>T</u>	P3	110	P2	<u>G</u>
P3	74	P2	<u>S</u>	P3	112	P1	<u>W</u>
P3	76	P2	<u>R</u>	P3	115	P3	116
P3	78	P2	<u>Q</u>	P3	117		NC
P3	80	P1	PP	P3	120	P1	<u>X</u>
P3	82	P1	<u>B</u>	P3	122	P1	<u>Y</u>



ARR82-24267

Table 8-7. PCU Cable W6 Wiring List

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P4	NC	P2	D	P4	26	P1	NC
P4	NC	P2	U	P4	28	P1	NC
P4	1	P1	51	P4	30	P1	NC
P4	3	P1	53	P4	32	P1	4
P4	5	P1	55	P4	34	P1	9
P4	7	P1	52	P4	36	P1	3
P4	8	P1	16	P4	38	P1	NC
P4	11	P1	38	P4	40	P1	NC
P4	13	P1	54	P4	42	P1	26
P4	16	P1	28	P4	44	P1	24
P4	18	P1	10	P4	46	P1	11
P4	20	P1	12	P4	48	P1	5
P4	22	P1	25	P4	50	P1	6
P4	24	P1	27	P4	52	P1	7

Table 8-7. PCU Code W6 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P4	54	P1	I	P4	108	P2	T
P4	56	P1	31	P4	110	P2	<u>E</u>
P4	58	P1	30	P4	112	P2	<u>F</u>
P4	60	P2	AA	P4	114	P2	H
P4	62	P2	R	P4	116	P2	J
P4	64	P2	N	P4	118	P2	K
P4	66	P1	36	P4	120	P2	W
P4	68	P1	14	P4	122	P2	<u>I</u>
P4	70		NC	P4	124	P2	<u>X</u>
P4	72	P2	GG	P4	126	P2	CC
P4	74	P2	Z	P5	2	P3	V
P4	76	P2	<u>H</u>	P5	4	P3	A
P4	78	P2	<u>E</u>	P5	6	P3	<u>D</u>
P4	80	P2	<u>Y</u>	P5	8	P3	<u>F</u>
P4	82	P2	BB	P5	10	P3	S
P4	84	P2	<u>B</u>	P5	12	P3	<u>H</u>
P4	86	P2	<u>K</u>	P5	14	P3	<u>K</u>
P4	88	P2	P	P5	16	P3	<u>B</u>
P4	90	P2	FF	P5	18	P3	X
P4	92	P2	<u>M</u>	P5	20	P3	<u>E</u>
P4	93	P4	128	P5	22	P3	<u>G</u>
P4	94	P2	Y	P5	24	P3	<u>M</u>
P4	96	P2	F	P5	26	P3	B
P4	98	P2	A	P5	28	P3	H
P4	100	P2	B	P5	30	P3	Y
P4	102	P2	C	P5	32	P3	<u>C</u>
P4	104	P2	S	P5	34	P3	W
P4	106	P2	V	P5	36	P3	<u>Q</u>

Table 8-7. PCU Code W6 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P5	38	P3	I	P5	64	P1	45
P5	40	P3	N	P5	66	P1	13
P5	42	P3	M	P5	68	P2	<u>G</u>
P5	44	P3	R	P5	70	P3	P
P5	46	P1	2	P5	72	P1	43
P5	48	P1	8	P5	74	P1	44
P5	52		NC	P5	76	P1	39
P5	54	P5	50	P5	78	P1	40
P5	56	P1	35	P5	80	P1	22
P5	58	P1	42	P5	82	P1	23
P5	60	P1	41	P5	84	P3	<u>P</u>
P5	62	P3	<u>J</u>				

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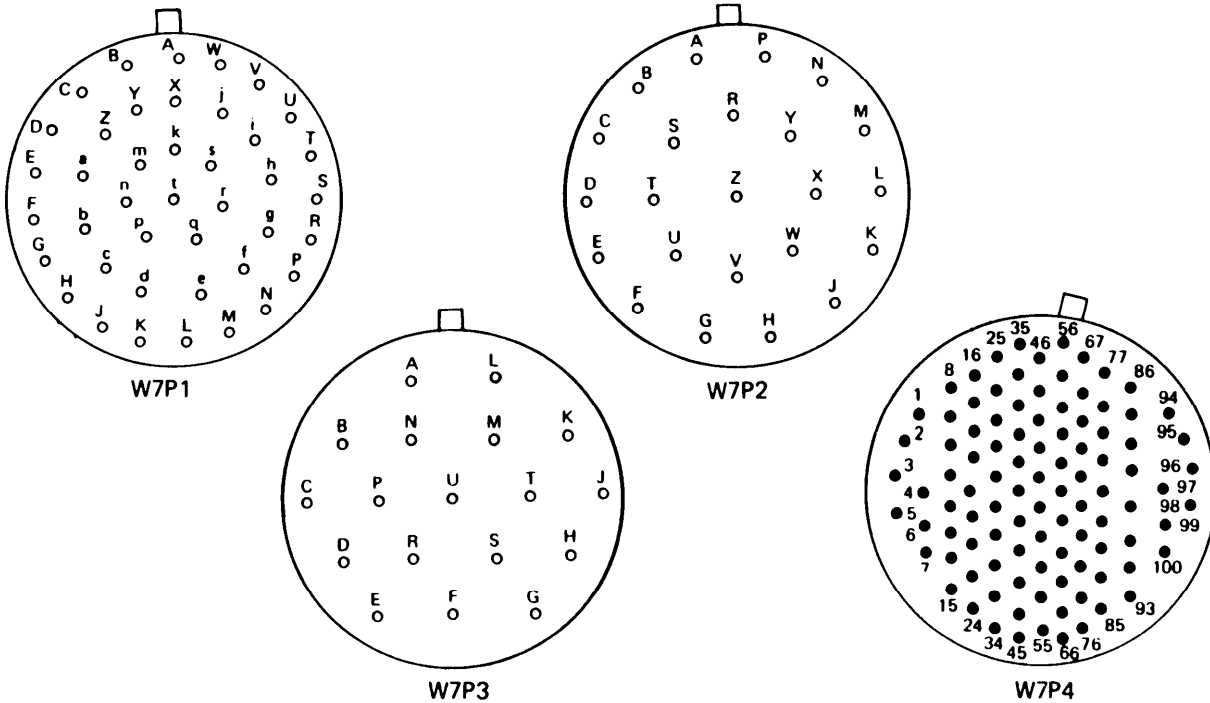


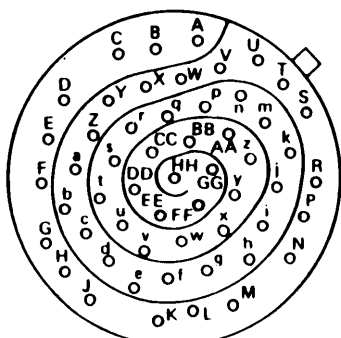
Table 8-8. Gunner's Code W7 Wiring List

From		TO		From		TO	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P2	J	P3	J	P4	21		NC
P2	K	P3	K	P4	22	P1	N
P4	2	P1	<u>Q</u>	P4	24	P1	M
P4	4	P1	<u>F</u>	P4	26	P1	H
P4	6	P1	<u>V</u>	P4	28	P1	<u>B</u>
P4	7	P1	<u>M</u>	P4	30	P2	D
P4	8	P1	<u>S</u>	P4	31	P2	F
P4	10	P1	L	P4	32	P2	L
P4	12	P1	K	P4	33	P2	C
P4	13		NC	P4	34	P2	B
P4	14	P1	<u>E</u>	P4	35	P2	M
P4	16	P1	<u>R</u>	P4	36	P3	A
P4	18	P1	<u>D</u>	P4	37	P3	B
P4	19		NC	P4	38	P2	A
P4	20	P1	<u>C</u>	P4	39	P2	H

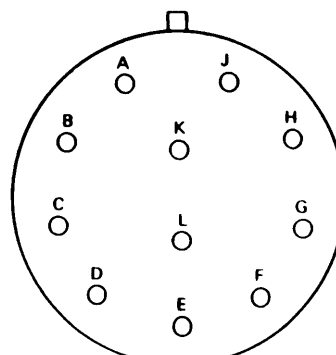
Table 8-8. Gunner's Code W7 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P4	40	P2	W	P4	66	P1	A
P4	41	P2	X	P4	68	P1	G
P4	42	P2	G	P4	69	P1	R
P4	43	P2	E	P4	71	P1	S
P4	44	P1	C	P4	74	P1	F
P4	46	P1	J	P4	75	P1	Y
P4	48	P1	T	P4	76	P1	X
P4	49		NC	P4	77	P1	A
P4	50	P1	U	P4	78	P1	H
P4	52	P1	E	P4	79	P1	K
P4	54	P1	B	P4	80	P1	I
P4	56	P1	N	P4	88	P4	87
P4	58	P1	P	P4	89	P4	92
P4	60	P1	Z	P4	98		NC
P4	62	P1	G	P4	99	P4	100
P4	64	P1	D				

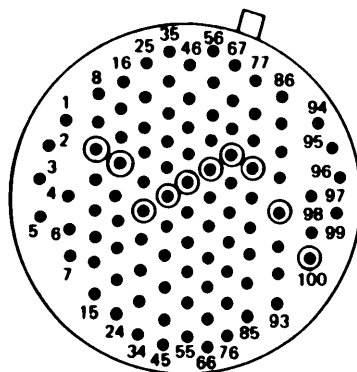
TEST SET DIAGRAMS



W8P1



W8P2



W8P3

ARR82-24269

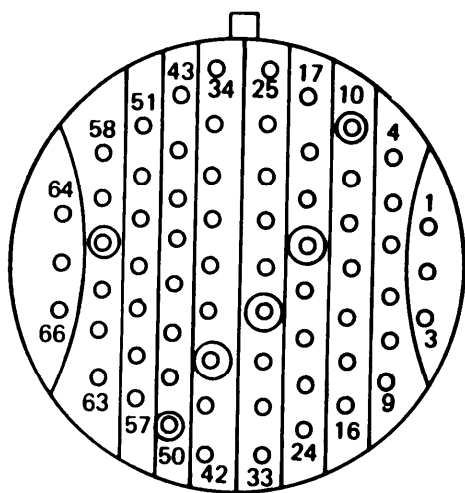
Table 8-9. Heed Cable W8 Wiring List

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	2	P1	GG	P3	26	P1	<u>E</u>
P3	4	P1	FF	P3	28	P1	<u>S</u>
P3	6	P1	D	P3	30	P1	DD
P3	8	P1	C	P3	32	P1	<u>I</u>
P3	10	P1	HH	P3	34	P1	<u>V</u>
P3	12	P1	<u>Q</u>	P3	36	P1	J
P3	14	P1	Y	P3	38	P1	K
P3	16	P1	AA	P3	40	P1	<u>B</u>
P3	17	P1	NC	P3	42	P1	<u>G</u>
P3	18	P3	19	P3	44	P1	H
P3	20	P1	Z	P3	48	P1	<u>C</u>
P3	22	P1	<u>A</u>	P3	49	P2	D
P3	24	P1	<u>U</u>	P3	50	P1	<u>D</u>
P3	25	P1	BB	P9	51	P2	G

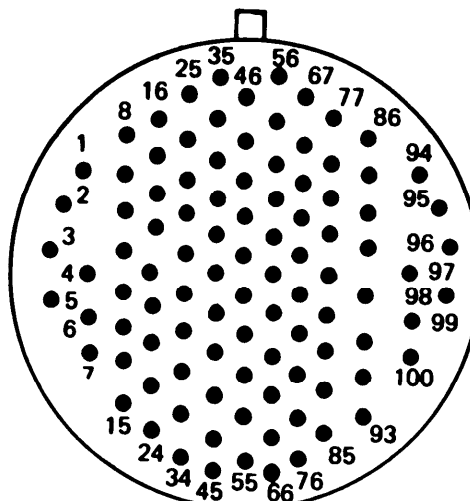
Table 8-9. Head Cable W8 Wiring List (Continued)

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P3	53		NC	P3	76	P1	P
P3	55	P2	E	P3	77	P1	<u>Y</u>
P3	56	P1	A	P3	78	P1	<u>Z</u>
P3	57	P2	F	P3	79	P1	<u>G</u>
P3	58	P1	<u>F</u>	P3	80	P1	X
P3	59	P1	<u>H</u>	P3	81	P1	U
P3	60	P1	<u>I</u>	P3	82	P1	<u>J</u>
P3	61	P1	<u>X</u>	P3	83	P2	A
P3	62	P1	L	P3	84	P2	B
P3	63	P1	M	P3	85	P2	C
P3	64	P1	N	P3	86	P2	H
P3	65	P2	L	P3	87	P2	J
P3	67	P1	B	P3	88	P2	K
P3	60	P1	T	P3	90	P1	EE
P3	69	P1	S	P3	92	P1	<u>W</u>
P3	70	P1	<u>M</u>	P3	94	P1	W
P3	71	P1	<u>K</u>	P3	95		NC
P3	72	P1	<u>P</u>	P3	96	P1	R
P3	73	P1	<u>N</u>	P3	97		NC
P3	74	P1	CC	P3	98	P1	F
P3	75	P1	<u>R</u>	P3	100	P1	E

TEST SET DIAGRAMS



W9P1

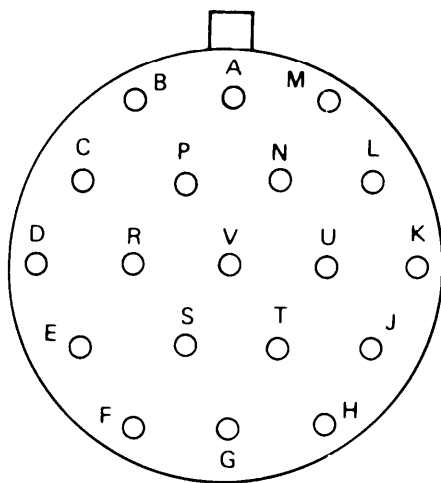


W9P2

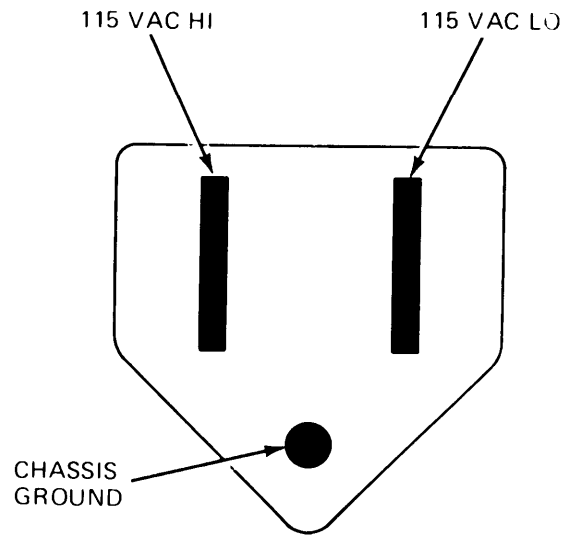
ARR82-24270

Table 8-10. TRU Cable W9 Wiring List

From		To		From		To	
Connector	Pin	Connector	Pin	Connector	Pin	Connector	Pin
P1	NC	P2	11	P1	12	P2	12
P1	NC	P2	13	P1	13	P2	NC
P1	NC	P2	31	P1	23	P2	23
P1	1	P2	1	P1	24	P2	24
P1	2	P2	2	P1	25	P2	25
P1	3	P2	3	P1	26	P2	26
P1	4	P2	4	P1	27	P2	27
P1	5	P2	5	P1	28	P2	28
P1	6	P2	6	P1	29	P2	29
P1	7	P2	7	P1	30	P2	30
P1	8	P2	8	P1	31	P2	NC
P1	9	P2	9	P1	34	P1	33
P1	10	P2	10	P1	36	P1	35
P1	11	P2	NC	P1	37 to 66	P2	31 to 100 NC



W10P1



W10 AC CONNECTOR

ARR82-24271.1

Table 8-11. PWR Cable W 10 Wiring List

From	To	From	To
Connector Pin	Connector Pin	Connector Pin	Connector Pin
Power Supply:		Power Supply:	
+24 VDC	P1 M	+24 VDC RTN	P1 P
+24 VDC RTN	P1 L	Chassis Gnd	P1 D
Chassis Gnd	P1 V	AC Connector:	
+24 VDC	P1 A	115 VAC HI	P1 H
+24 VDC RTN	P1 N	115 VAC L0	P1 G
Chassis Ghd	P1 R	Chassis Gnd	P1 F
+24 VDC	P1 B		

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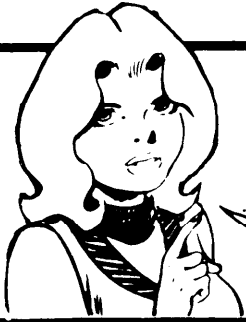
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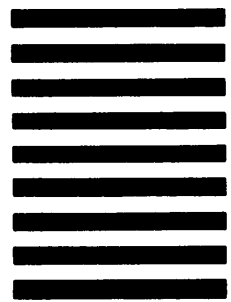
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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
 1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
 1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 Lb
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 $212^{\circ}\text{ Fahrenheit is equivalent to } 100^{\circ}\text{ Celsius}$
 $90^{\circ}\text{ Fahrenheit is equivalent to } 32.2^{\circ}\text{ Celsius}$
 $32^{\circ}\text{ Fahrenheit is equivalent to } 0^{\circ}\text{ Celsius}$
 $9/5 C^{\circ} + 32 = F^{\circ}$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

