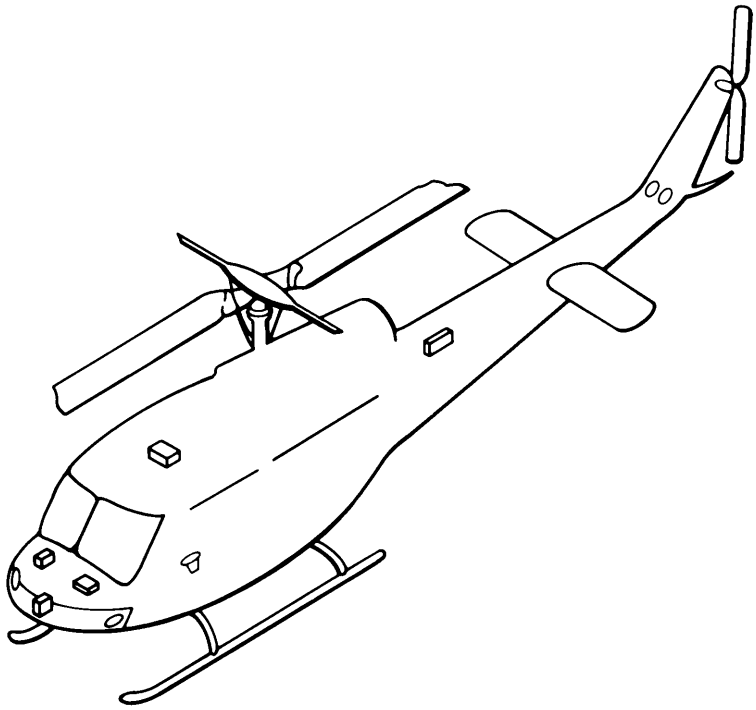
TM 11-5841-283-34-1
NAVAIR 16-30APR39-2

AVIATION INTERMEDIATE MAINTENANCE MANUAL



RADAR SIGNAL DETECTING SET AN/APR-39(V)1 (NSN 5841-01-023-7112)

HEADQUARTERS, DEPARTMENTS OF THE ARMY AND NAVY

31 AUGUST 1983

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1 DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL

2 IF POSSIBLE , TURN OFF THE ELECTRICAL POWER

3 IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL

4 END FOR HELP AS SOON AS POSSIBLE

5 AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

WARNING

High voltage is used in the operation of this equipment.

DON'T TAKE CHANCES!

Turn all equipment off before you do repair work inside it.

WARNING

Adequate ventilation should be provided while using trichlorotrifluoroethane. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products of decomposition are toxic and irritating. Since trichlorotrifluoroethane dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

TECHNICAL MANUAL
No. 11-5841-283-34-1
Technical Manual
NAVAIR 16-30APR39-2

DEPARTMENTS OF THE ARMY
AND THE NAVY
WASHINGTON, DC *31 August 1983*

Aviation Intermediate Maintenance Manual

RADAR SIGNAL DETECTING SET AN/APR-39(V)1 (NSN 5841-01-023-7112)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. For Navy, submit comments on OPNAV 4790/66 (Technical Publications Deficiency Report) to the Commander, Naval Air Technical Services Facility, ATTN: Code 41, 700 Robbins Avenue, Philadelphia, Pennsylvania 19111. In either case, a reply will be furnished to you.

*This manual together with TM 11-5841-283-34-2 supersedes TM 11-5841-283-34, 11 October 1977, including all changes.

HOW TO USE THIS MANUAL

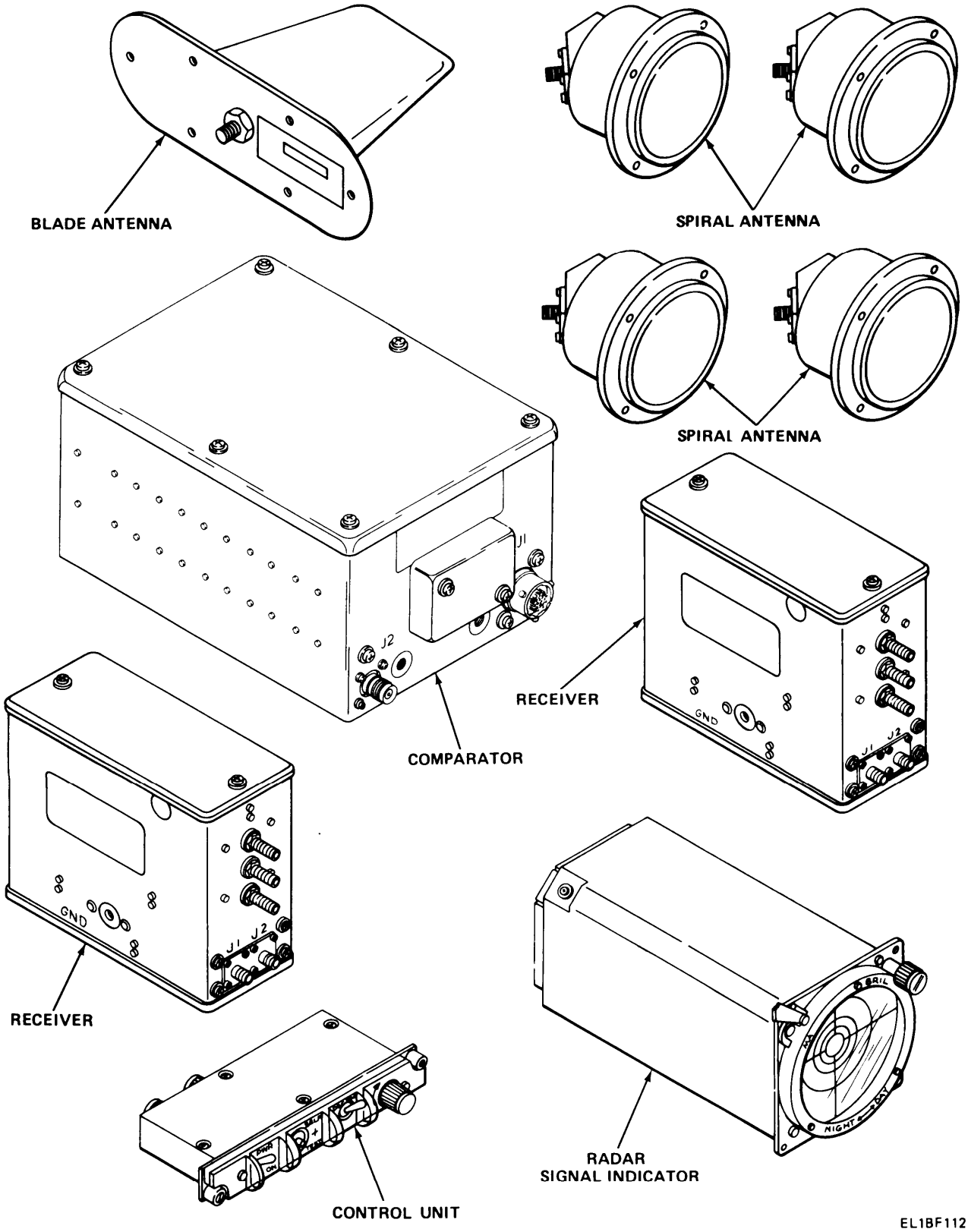
This manual is designed to help you maintain the radar signal detecting set. The front cover table of contents is provided for quick reference to important information. There is also an index located in the final pages for use in locating specific items of information.

Read all preliminary information found at the beginning of each task. It has important information and safety instructions you must follow before beginning the task. Warning pages are located in the front of this manual. You should learn the warnings before doing maintenance on the equipment.

Paragraphs in this manual are numbered by chapter and order of appearance within a chapter. A subject index appears at the beginning of each chapter listing sections that are included in that chapter. A more specific subject index is located at the beginning of each section to help you find the exact paragraph you're looking for.

This manual has a companion document with TM number TM 11-5841-283-34-2. The TM 11-5841 -283-34-2 consists of classified data on the radar signal detecting set. Refer to TM 11-5841 -283-34-2 when this manual tells you to.

RADAR SIGNAL DETECTING SET AN/APR-39(V)1



CHAPTER 1

INTRODUCTION

OVERVIEW

This chapter contains information about the theory of operation of the radar signal detecting set. It also covers equipment data that will be helpful in using and maintaining the radar signal detecting set.

Section I GENERAL INFORMATION

1-1. SCOPE.

Type of Manual: Aviation Intermediate Maintenance

Equipment Name and Model Number: Radar Signal Detecting Set AN/APR-39(V)1

Purpose of Equipment: To receive and display to an aircraft pilot or other observer, information about radar and tracking signals which may be a potential threat.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

REPORT OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System (TAMMS). Navy personnel will report maintenance performed utilizing the Maintenance Data Collection Subsystem (MDCS) IAW OPNAVINST 4790.2 Vol 3, and unsatisfactory material/conditions (UR submissions) lAW OPNAVINST 4790.2, Vol 2, chapter 17.

REPORT OF PACKAGING AND HANDLING DEFICIENCIES

Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.

DISCREPANCY IN SHIPMENT REPORT (DISREP)(SF361)

Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C/DLAR 4500.15.

1-3. DESTRUCTION OF ARMY ELECTRONICS MATERIEL.

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1-4. PREPARATION FOR STORAGE AND SHIPMENT.

For instructions covering preparation for storage and shipment, refer to TM 11-5841-283-12, chapter 4, section VI.

1-5. NOMENCLATURE CROSS-REFERENCE LIST.

This list contains common names used throughout this manual in place of official nomenclature.

Common Name	Official Name
control unit	Detecting Set Control C-9326/APR-39(V)
radar signal indicator	Radar Signal Indicator IP-1150/APR-39(V)
comparator	Comparator CM-440/APR-39(V)
receiver	Radar Receiver R-1838/APR-39(V)
right FWD antenna	Left Spiral Antenna AS-2892/APR-39(V)
right AFT antenna	Right Spiral Antenna AS-2891/APR-39(V)
left FWD antenna	Right Spiral Antenna AS-2891/APR-39(V)
left AFT antenna	Left Spiral Antenna AS-2892/APR-39(V)
blade antenna	Blade Antenna AS-2890/APR-39(V)

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your AN/APR-39(V)1 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. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. We'll send you a reply.

Navy personnel are encouraged to submit ElR's through their local Beneficial Suggestion Program.

1-7. CALIBRATION.

Calibration of comparator circuit cards 3A2 and 3A3 is required if indicated by troubleshooting. For calibration procedures, refer to TM 11-5841-283-34-2.

Section II EQUIPMENT DESCRIPTION AND DATA

1-8. EQUIPMENT DESCRIPTION AND DATA.

For unclassified equipment data refer to TM 11-5841-283-12. For classified data, refer to TM 11-5841-283-34-2.

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

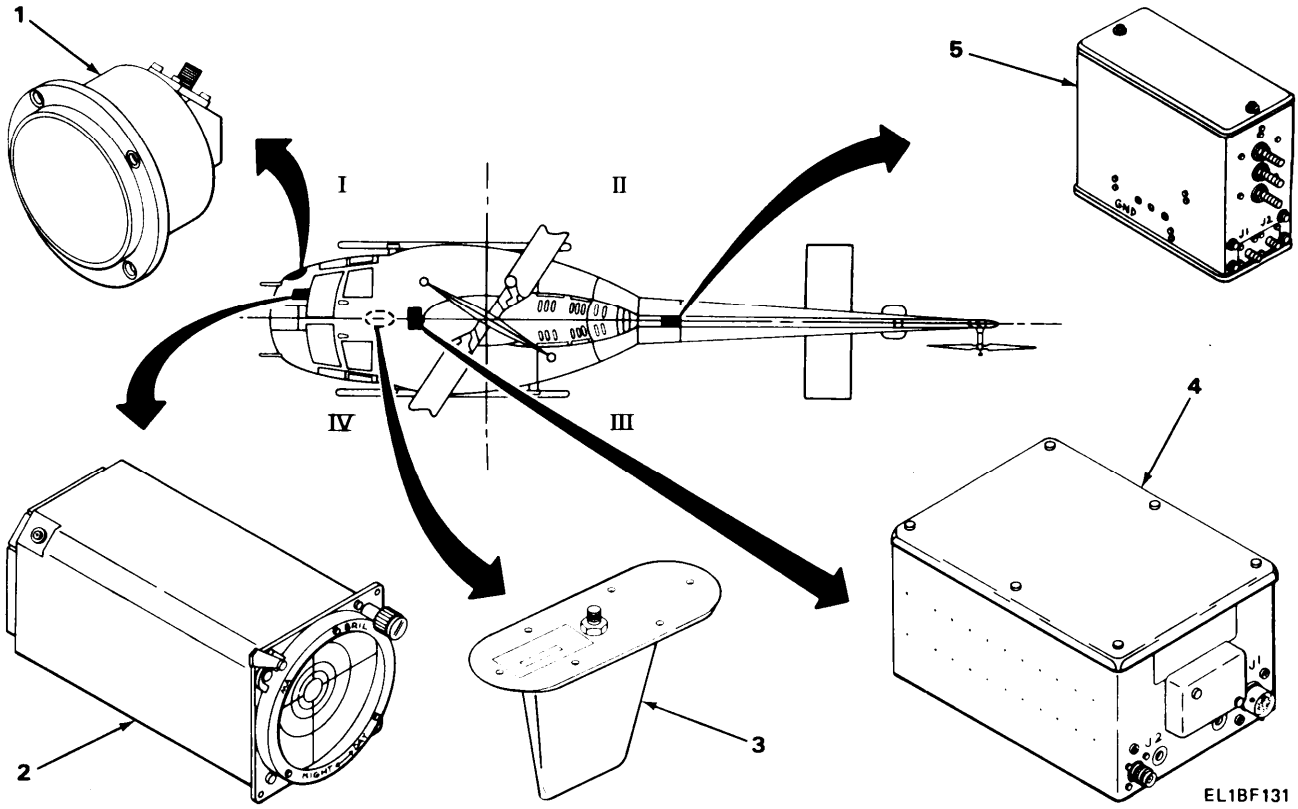
The Radar Signal Detecting Set, AN/APR-39(V)1, consists of ten individually packaged components:

Control unit
Radar signal indicator
Comparator
Two radar receivers
Four spiral antennas
Blade antenna

The radar signal detecting set provides the following capabilities and features:

Can be operated in all weather and climate conditions
Lightweight and compact
Can be installed in rotary wing or fixed wing aircraft
Responds to radars associated with hostile fire control systems
Generally excludes nonthreat radars in the discriminator-on mode
Accepts low band missile guidance radar signals
When a low band signal is time-coincident (correlated) with a tracking radar signal, the equipment identifies the combination as an activated SAM (surface to air missile) radar complex
Offers both visual and aural warning displays

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.



1 FORWARD RIGHT SPIRAL ANTENNA. Quadrant I; Unit 6. Mounted on outside airframe. Picks up high band signals and relays them to the forward radar receiver.

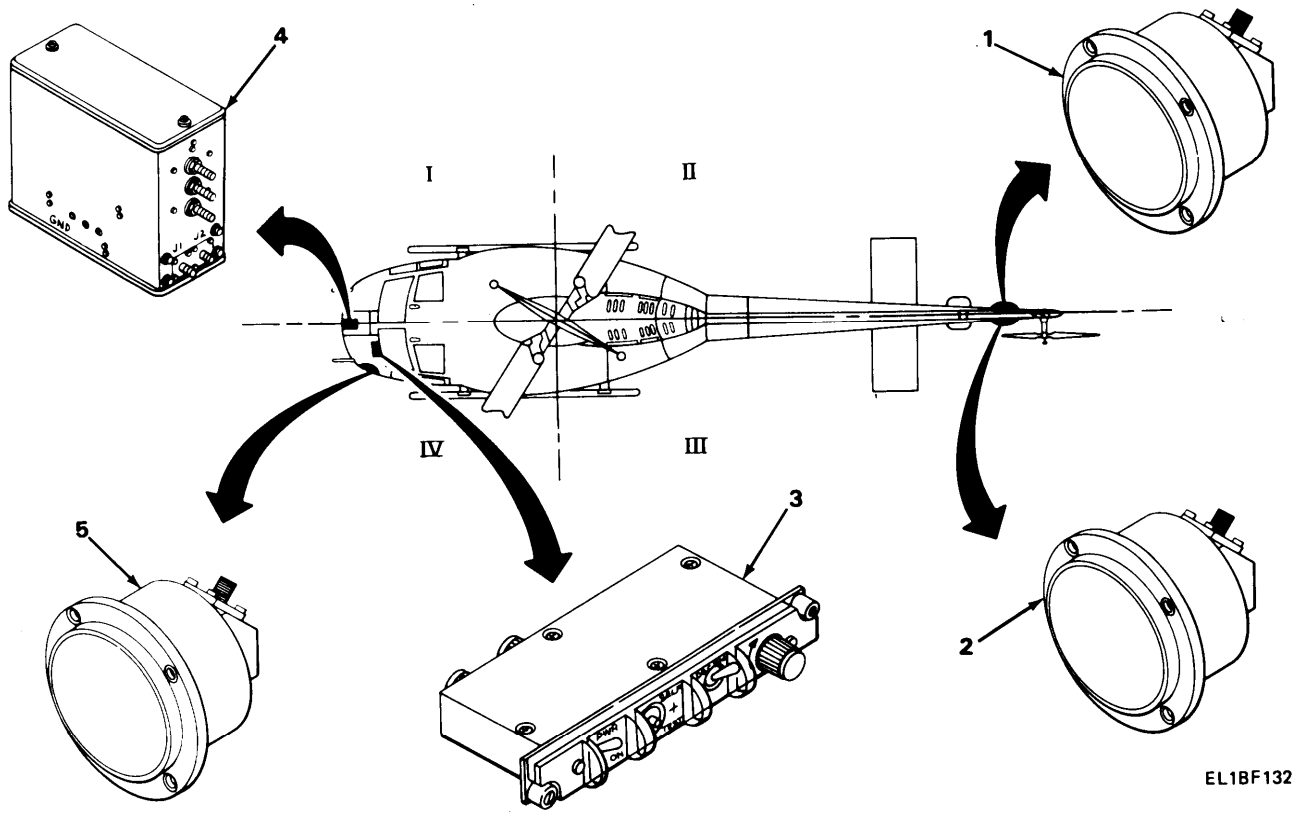
2 RADAR SIGNAL INDICATOR. Quadrant I; Unit 2. Mounted on instrument panel. Alerts the aircraft operator, or other observer, to the presence of a signal. Warning light, located on upper left corner of indicator, flashes when an activated SAM site is detected.

3 BLADE ANTENNA. Middle of Quadrant I and IV; Unit 10. Mounted on underside of aircraft. Picks up low band signals and relays them to the comparator.

4 COMPARATOR. Middle of Quadrant I and IV; Unit 3. Mounted on inside airframe. Electronically decides whether an incoming signal is a threat or a nonthreat.

5 AFT RADAR RECEIVER. Middle of Quadrant II and Ill; Unit 4. Mounted on inside airframe in tail boom. Filters, detects, and amplifies the signals received by the spiral antennas.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (CONT)



1 AFT RIGHT SPIRAL ANTENNA. Quadrant II; Unit 7. Mounted on outside airframe. Picks up high band signals and relays them to the aft radar receiver.

2 AFT LEFT SPIRAL ANTENNA. Quadrant Ill; Unit 8. Mounted on outside airframe. Picks up high band signals and relays them to the aft radar receiver.

3 CONTROL UNIT. Quadrant IV; Unit 1. Mounted on instrument panel. Contains switching functions for self-tests and select mode of operation. Turns radar set on and off, and regulates audio alarm level.

4 FORWARD RADAR RECEIVER. Middle of Quadrant I and IV; Unit 5. Mounted on inside airframe. Filters, detects, and amplifies the signals received by the spiral antennas.

5 FORWARD LEFT SPIRAL ANTENNA. Quadrant IV; Unit 9. Mounted on outside airframe. Picks up high band signals and relays them to the forward radar receiver.

CHAPTER 2

AVIATION INTERMEDIATE MAINTENANCE

Section I REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

2-1. COMMON TOOLS AND EQUIPMENT.

The common tools and equipment needed for troubleshooting and maintenance procedures at the AVUM level can be found in appendix B of TM 11-5841-283-12, AVUM Manual for Radar Signal Detecting Set AN/APR-39(V)1.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.

The special tools, TMDE, and support equipment needed for troubleshooting and maintenance procedures at the AVUM level are the card extractor, card extender, and test adapter.

Use of this equipment is shown in paragraphs 2-4, 2-5 and 2-6.

2-3. REPAIR PARTS.

The repair parts needed for maintenance procedures at the direct support level can be found in TM 11-5841-283-23P, Repair Parts and Special Tools List for Radar Signal Detecting Set AN/APR-39(V)1.

2-4. USE OF CARD EXTRACTOR.

Before using card extractor, the equipment cover must be removed. For removal of cover from comparator, see paragraph 2-45. For removal of cover from receiver, see paragraphs 2-53 and 2-54. Comparator and receiver circuit cards are removed in the same way. The following procedure shows the receiver.

This task covers:

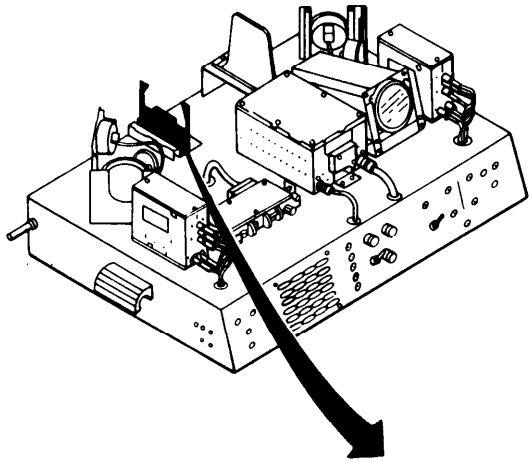
Removal of circuit card assembly

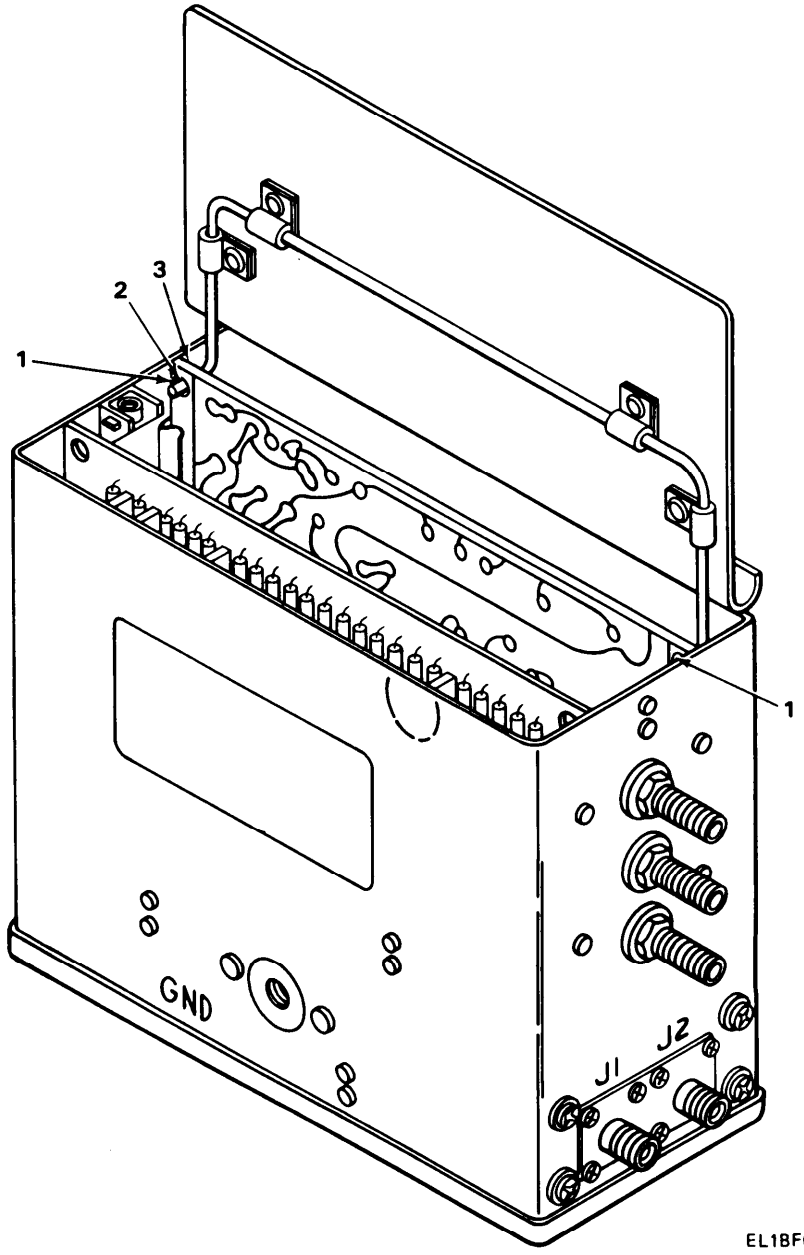
INITIAL SETUP

Tools	Equipment Condition
Card extractor	Power switch off.

LOCATION	ITEM	ACTION **REMARKS**
1. Circuit card assembly	Holes (1) and hooks (2)	Insert hooks into holes.
2. Receiver	Circuit card assembly (3)	Remove. **Rock the card extractor back carefully to extract the circuit card from the equipment case.**

2-4. USE OF CARD EXTRACTOR. (CONT)





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2-5. USE OF CARD EXTENDER.

The card extender is used for receiver and comparator cards. The following procedure shows the receiver.

This task covers:

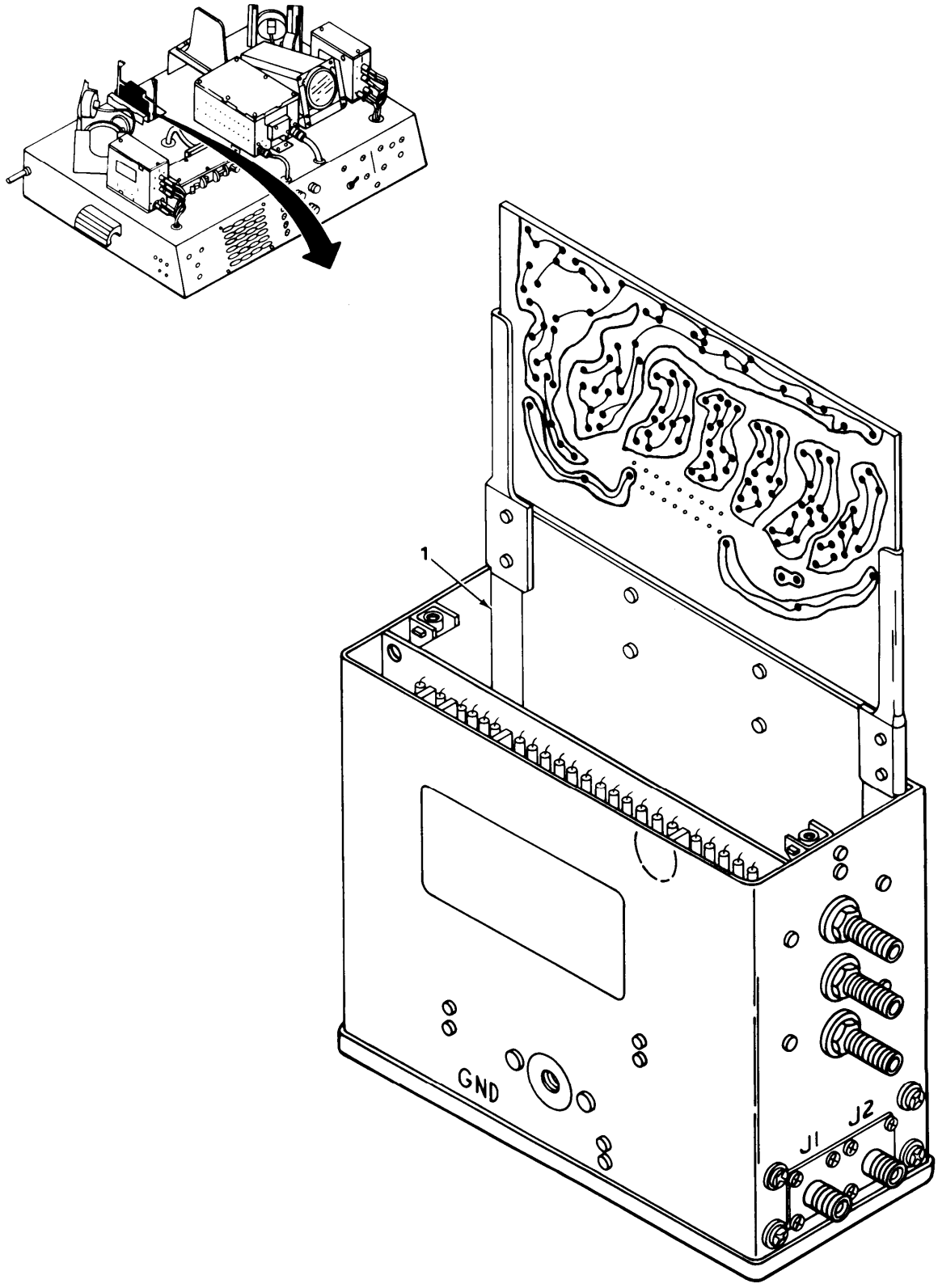
1. Installation of card extender
2. Removal of card extender

INITIAL SETUP

Tools	Equipment Condition
Card extender	Circuit card assembly, removed. See paragraph 2-4.

LOCATION	ITEM	ACTION	**REMARKS**
INSTALLATION OF CARD EXTENDER			
1. Circuit card assembly	Card extender (1)	Install.	**Match the card extender pins with the circuit card assembly pins.**
2. Connector board	Card extender (1)	Install.	**Match the circuit card connector board pins with the card extender pins.**
REMOVAL OF CARD EXTENDER			
1. Connector board	Card extender (1)	Remove.	
2. Circuit card assembly	Card extender (1)	Remove.	

2-5. USE OF CARD EXTENDER. (CONT)



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2-6. USE OF TEST ADAPTER.

For a complete description of controls and indicators of Radar Signal Test Adapter MX-9848/APR-39(V), see TM 11-6940-211-12.

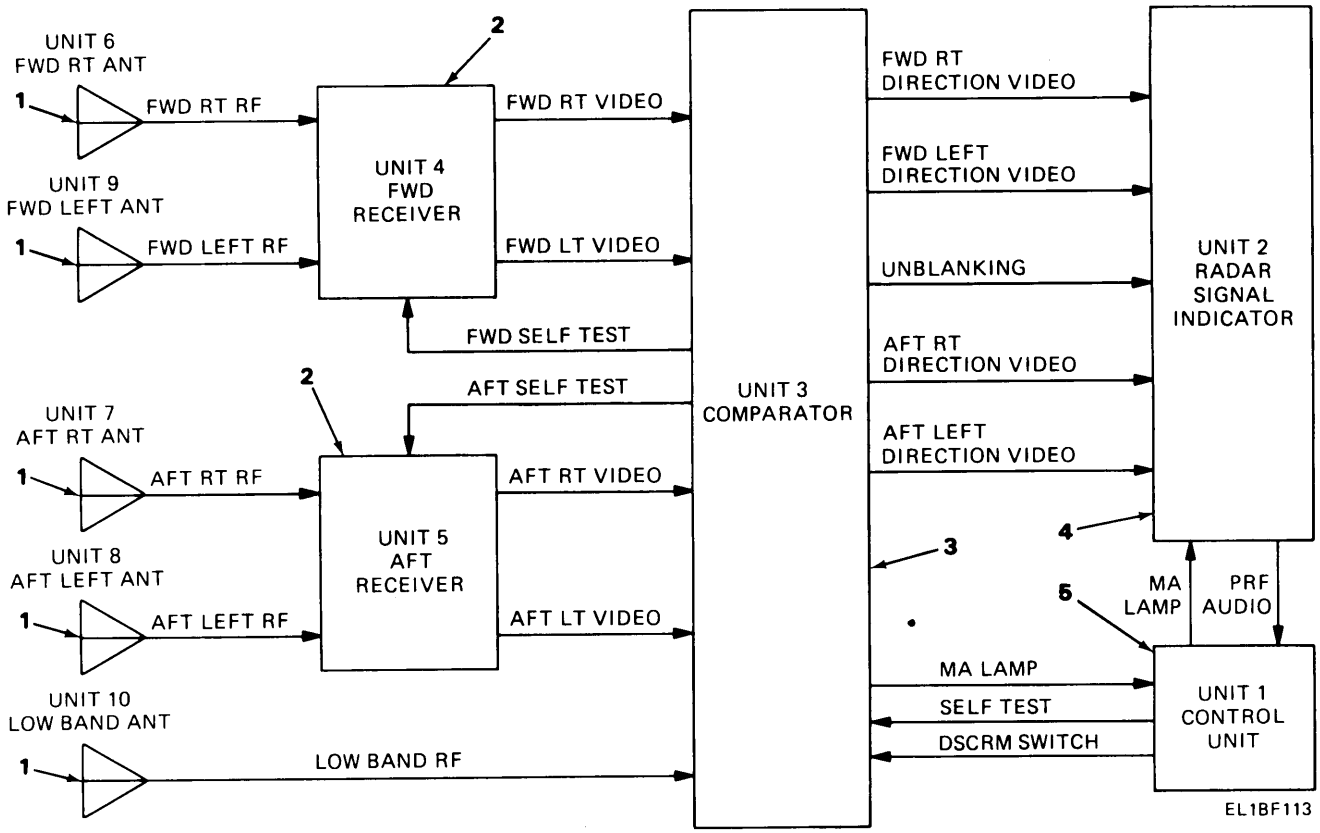
Section II SERVICE UPON RECEIPT

The service upon receipt procedures for the radar signal detecting set can be found in TM 11-5841-283-12, Radar Signal Detecting Set AN/APR-39(V)1.

Section III PRINCIPLES OF OPERATION

Principles of operation of the radar signal detecting set are covered in this section by block diagram and logic diagram presentations.

2-7. BLOCK DIAGRAM DESCRIPTION.



1 ANTENNA. Signals received from the FWD RT, FWD LEFT, AFT RT and AFT LEFT antenna are sent to the FWD and AFT receivers. Signals received from the LOW BAND antenna are sent to the comparator.

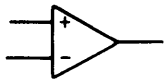
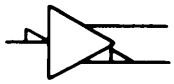
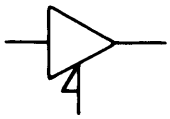
2 RECEIVERS. Signals received from the FWD RT, FWD LEFT, AFT RT, and AFT LEFT are filtered, detected, amplified and sent to the comparator.

3 COMPARATOR. Signals received from the receivers and LOW BAND antenna are sent to video processors in the comparator. Video processors delay sending the signals to the radar signal indicator until logic circuits determine which signals to send.

4 RADAR SIGNAL INDICATOR. Signals received from the comparator are shown on a CRT screen.

5 CONTROL UNIT. Selects logic circuits in the comparator to control the signals sent to the radar signal indicator. Operates a self-test circuit to check that the system operates properly.

2-8. LOGIC DIAGRAM DESCRIPTION.

SYMBOL	DEFINITION
	POLARITY INDICATOR. MAY BE USED AT THE INPUT OR OUTPUT OF ANY DEVICE. AT THE INPUT IT INDICATES THAT THE ACTIVATING SIGNAL IS LOW. AT THE OUTPUT IT INDICATES THAT AN ACTIVATED DEVICE OUTPUT IS LOW. ABSENCE OF THE SYMBOL MEANS INPUT OR OUTPUT IS HIGH.
	NON INVERTING AMPLIFIERS. ACTIVATING INPUT AND ACTIVATED OUTPUT ARE THE SAME STATE.
	INVERTING AMPLIFIERS (LOGIC INVERTERS), ACTIVATING INPUT AND ACTIVATED OUTPUT HAVE OPPOSITE STATES.
	DIFFERENTIAL AMPLIFIER. OUTPUT ASSUMES THE STATE OF THE INPUT WITH THE GREATEST AMPLITUDE PRESENT.
	PHASE SPLITTER. A LOW INPUT CAUSES BOTH HIGH AND LOW OUTPUTS.
	GATED AMPLIFIER. CANNOT BE ACTIVATED UNLESS GATE INPUT IS LOW.

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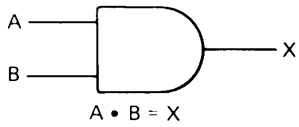
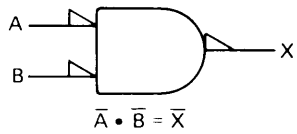
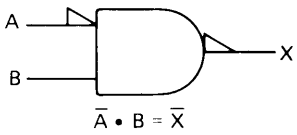
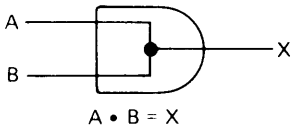
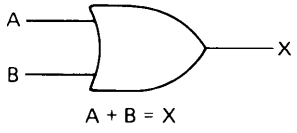
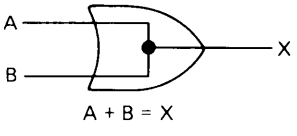
2-8. LOGIC DIAGRAM DESCRIPTION. (CONT)

SYMBOL	DEFINITION
 TRUTH TABLE A B X L L L H L L L H L H H H	AND GATES. ALL INPUTS MUST BE PRESENT SIMULTANEOUSLY IN THE INDICATED STATE TO ACTIVATE THE DEVICE TO OUTPUT THE INDICATED STATE. THE TRUTH TABLES SHOW THE OUTPUT STATE FOR ALL INPUT STATES.
 TRUTH TABLE A B X L L L H L H L H H H H H	
 TRUTH TABLE A B X L L H H L H L H L H H H	
 TRUTH TABLE A B X L L L H L L L H L H H H	WIRED (OR PHANTOM) AND GATE. NO SPECIFIC CIRCUIT ELEMENTS PROVIDE THE FUNCTION. OPERATING REQUIREMENTS ARE IDENTICAL TO OTHER AND GATES.
 TRUTH TABLE A B X L L L H L H L H H H H H	OR GATE. ANY INPUT IN THE INDICATED STATE ACTIVATES THE DEVICE TO CAUSE AN OUTPUT OF THE INDICATED STATE.
 TRUTH TABLE A B X L L L H L H L H H H H H	WIRED (OR PHANTOM) OR GATE. NO SPECIFIC CIRCUIT ELEMENTS PERFORM THE FUNCTION. OPERATING REQUIREMENTS ARE IDENTICAL TO OTHER OR GATES.
	GENERAL SYMBOL. DEVICE FUNCTION IDENTIFIED BY LEGEND WITHIN RECTANGLE (FLIP-FLOP, SINGLE SHOT, OSC, ETC.). A SCREWHEAD WITHIN THE SYMBOL INDICATES THAT THE FUNCTION IS ADJUSTABLE.

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Section IV TROUBLESHOOTING

OVERVIEW

This section gives instructions for troubleshooting of the following:

Control unit
Radar signal indicator
Comparator
Receiver

All voltage and resistance or continuity measurements are made using the multimeter.

Measure voltage at test point (TP) with ground lead of multimeter connected to chassis of unit under test.

Measure resistance or continuity with test adapter power off and connecting cables to unit disconnected.

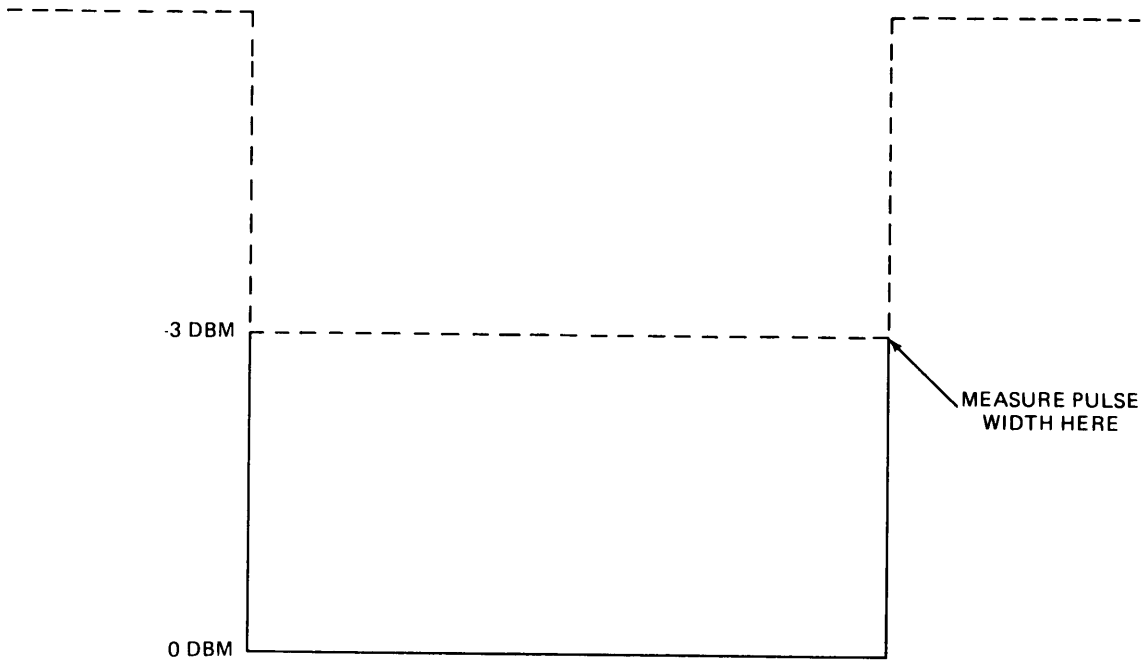
All waveform measurements are made using the oscilloscope.

Measure waveforms at test point (TP) with ground lead of oscilloscope connected to chassis of unit under test.

Pulse width measurements must be made at the half power point. To measure pulse width at half power:

Adjust input signal on oscilloscope to -3 dBm.
Adjust vertical control to set waveform peak on zero graticule.
Increase adjustment of input signal again to 0 dBm.
Measure pulse width at zero graticule.

OVERVIEW (CONT)



The test adapter is used to help troubleshoot a radar signal detecting set unit. See paragraph 2-9 for the setup of the test adapter before beginning any troubleshooting.

Troubleshooting procedures are written in flow chart form. The flow chart directs you through yes or no decisions so that you can find the problem. If the problem to be corrected requires a repair or a replacement, set test adapter power off and remove unit.

Repair and replacement procedures for parts or assemblies are in section Ill, Maintenance Procedures.

2-9. TEST ADAPTER SETUP.

The test adapter contains wire harnesses to connect any unit of radar signal detecting set to a complete radar signal detecting set system. The test adapter has test points (TP) on the front panel so that circuits in some units can be tested.

This task covers:

Test adapter setup

INITIAL SETUP

Equipment Condition	Test Equipment
Cover off unit tested. See section III index for removal of unit covers.	Test adapter See appendix B, TM 11-5841-283-12 for test equipment needed for troubleshooting.

LOCATION	ITEM	ACTION	REMARKS

CAUTION

Do not set test adapter power on when making or breaking unit connections.

NOTE

All test equipment should be turned on at least 30 minutes before use in troubleshooting so that test equipment will measure properly.

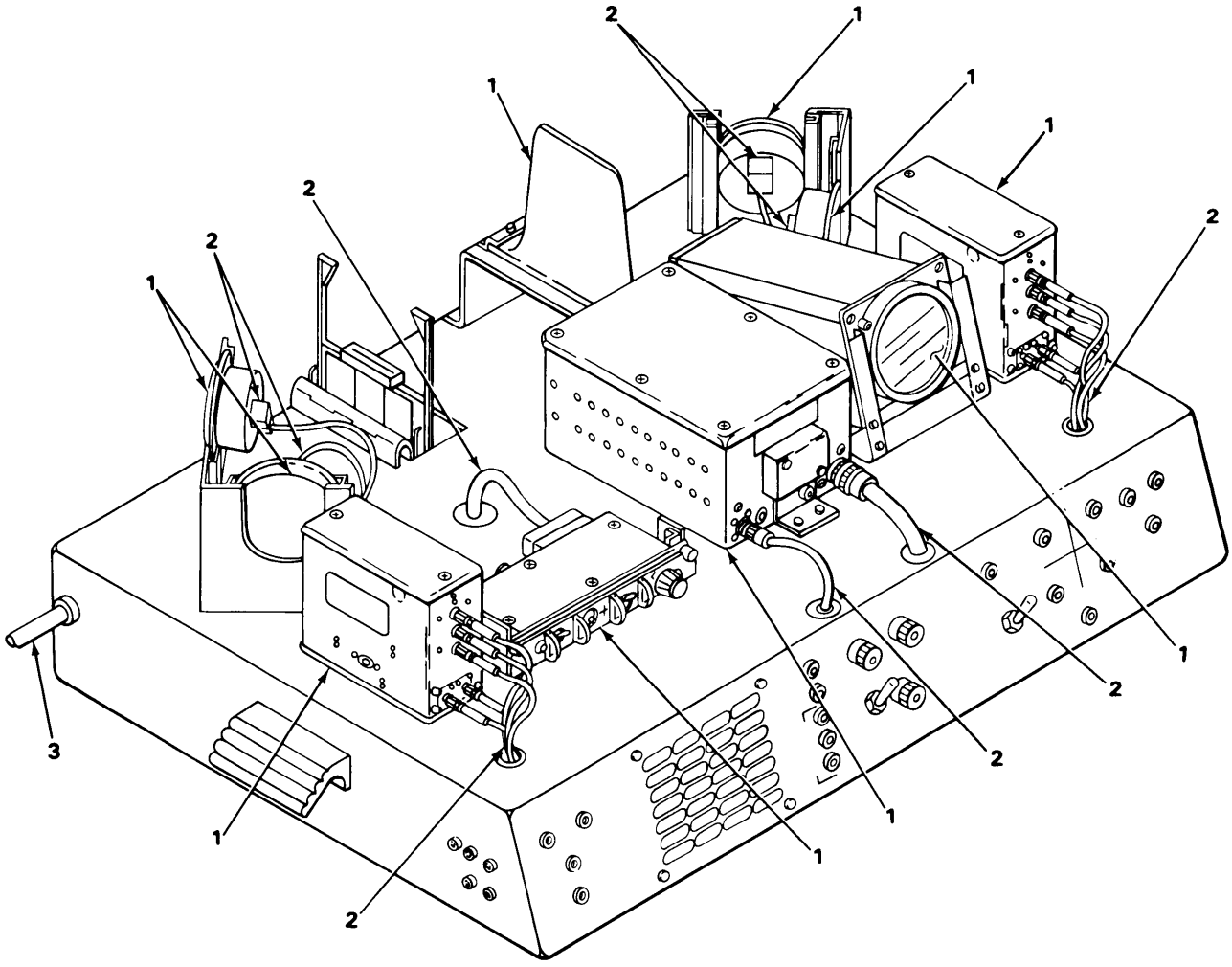
1. Test adapter	Units (1)	Install.	
2. Units	Cables (2)	Install.	**A plastic band near each wire harness connector shows where connection should be made.**

2-9. TEST ADAPTER SETUP. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
3. Test adapter	Power cord (3)	Connect to 115 vac, 50 to 60 Hz, single phase power.

NOTE

Test adapter is now setup for troubleshooting. See section index for beginning page of unit troubleshooting.



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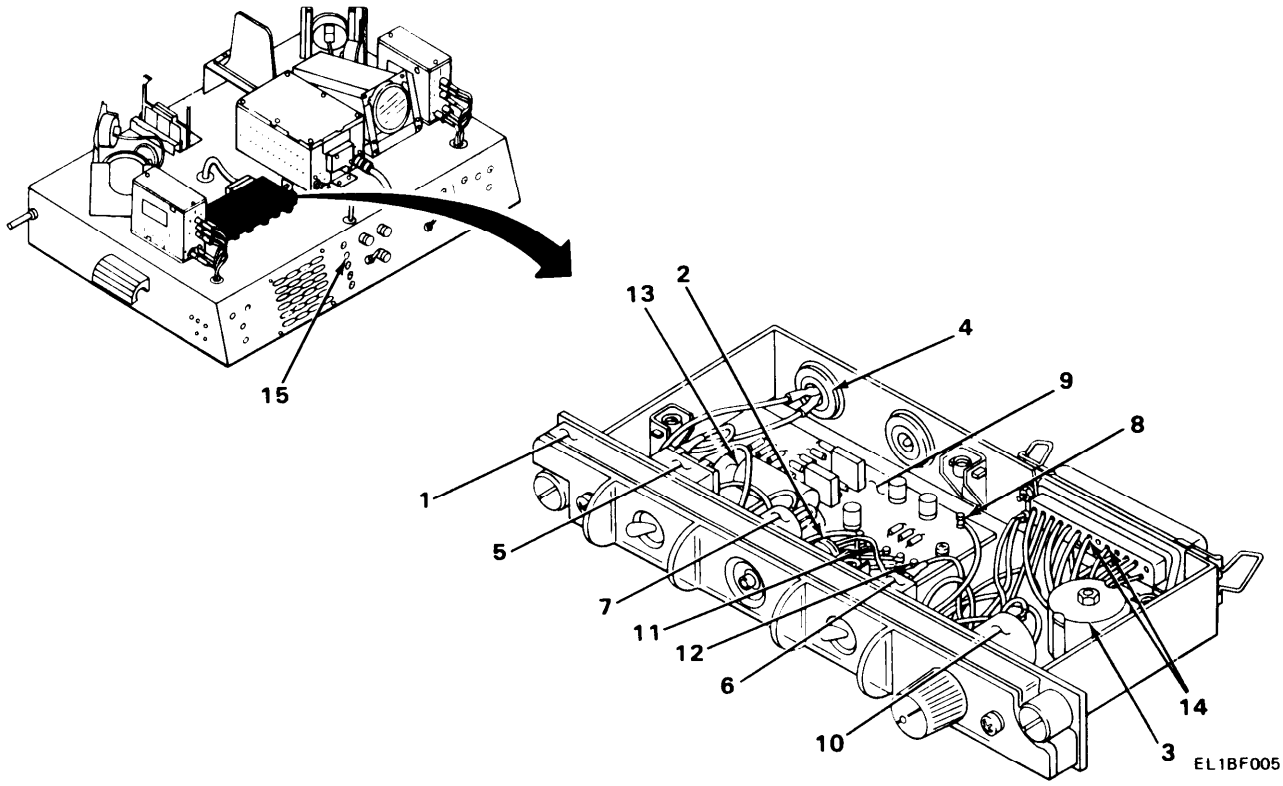
2-10. TROUBLESHOOTING OF CONTROL UNIT.



1 LIGHTING PANEL

2 LIGHTING PANEL JACK

3 CHOKE ASSEMBLY

4 FUSE

5 PWR ON-OFF SWITCH

6 DISCRM ON-OFF SWITCH

7 SELF TEST SWITCH

8 TONE GENERATOR TERMINAL E9

9 TONE GENERATOR

10 AUDIO; VARIABLE RESISTOR

11 TONE GENERATOR TERMINAL E5

12 TONE GENERATOR TERMINAL E8

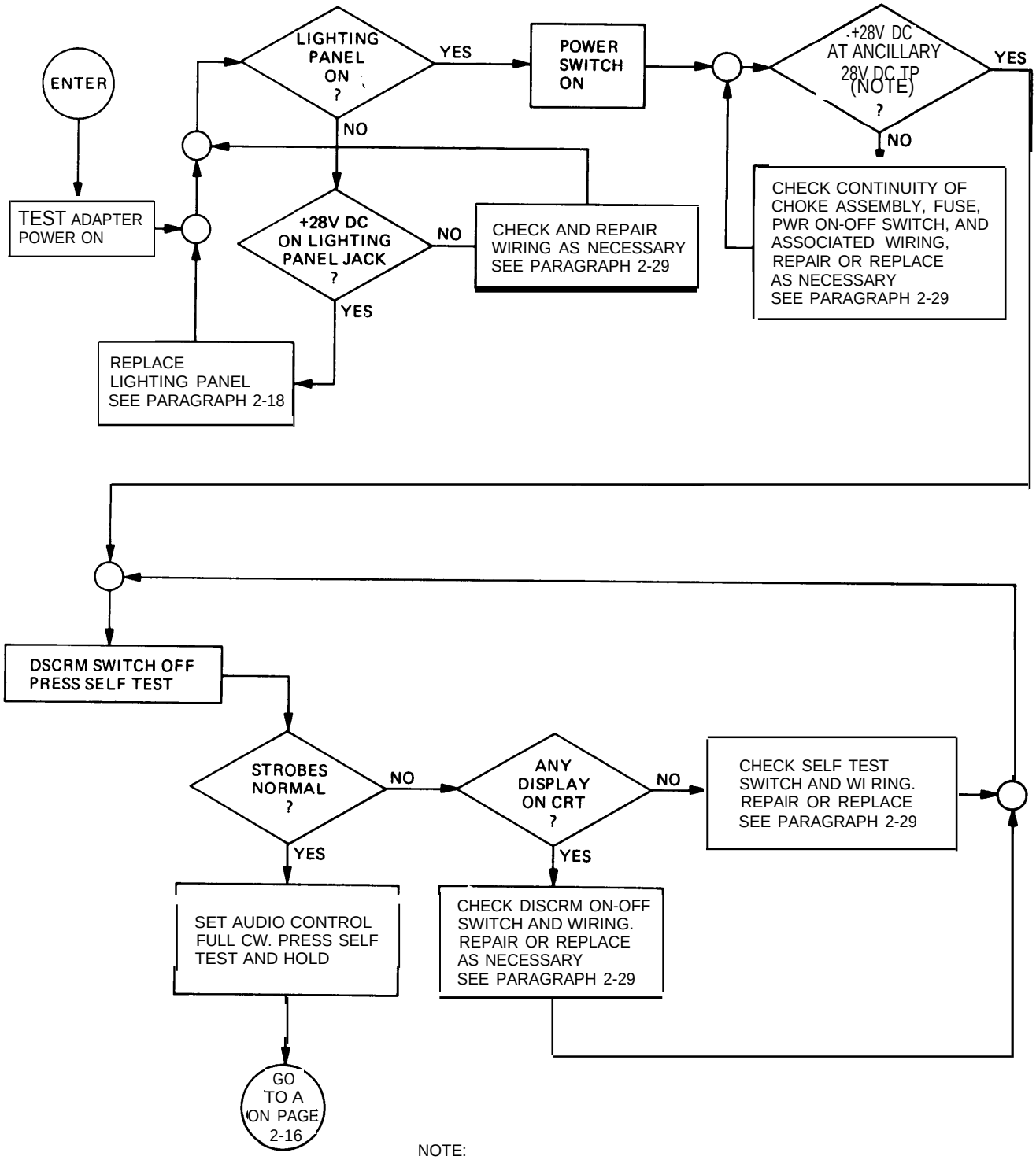
13 TONE GENERATOR TERMINAL E2

14 CONNECTOR PIN 5 AND CONNECTOR PIN 7

15 ANCILLARY MA LAMP

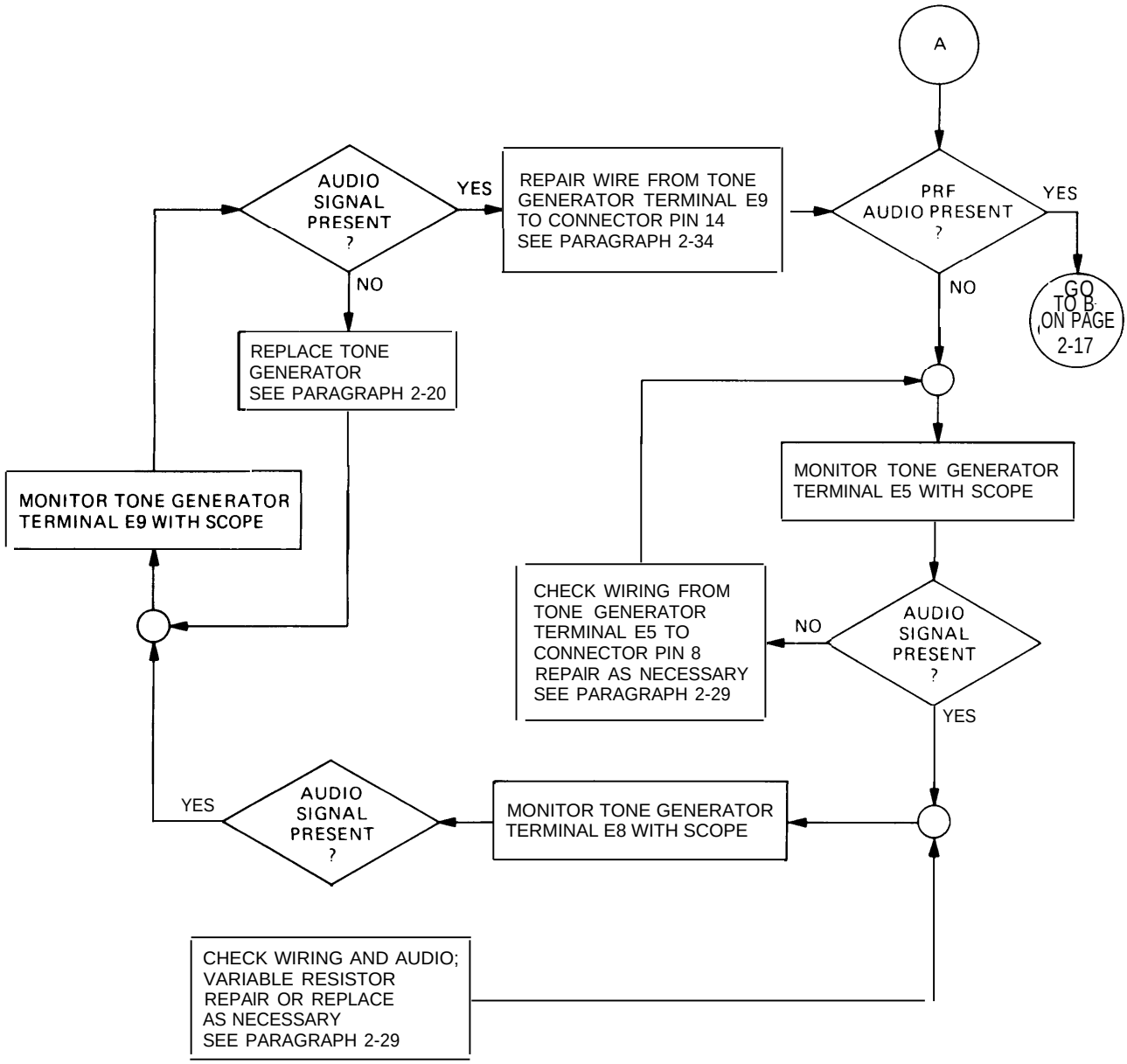
In this section, troubleshooting procedures are given in flow chart form. If at any point, repair or replacement of wiring or parts is needed, see section Ill for maintenance procedures.

2-10. TROUBLESHOOTING OF CONTROL UNIT. (CONT)



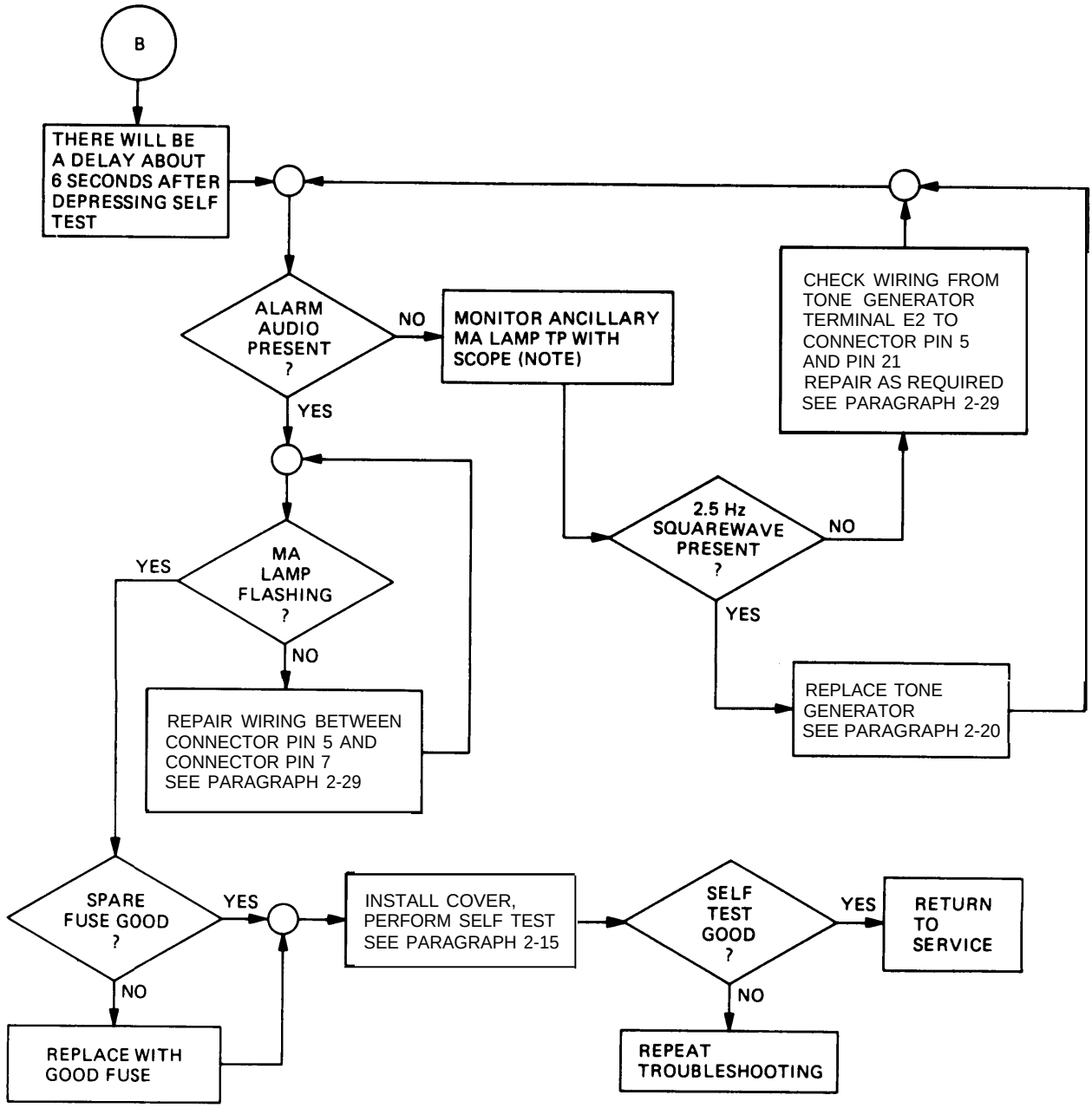
NOTE:
NAMED TEST POINTS ARE LOCATED ON TEST ADAPTER FRONT PANEL.

2-10. TROUBLESHOOTING OF CONTROL UNIT. (CONT)



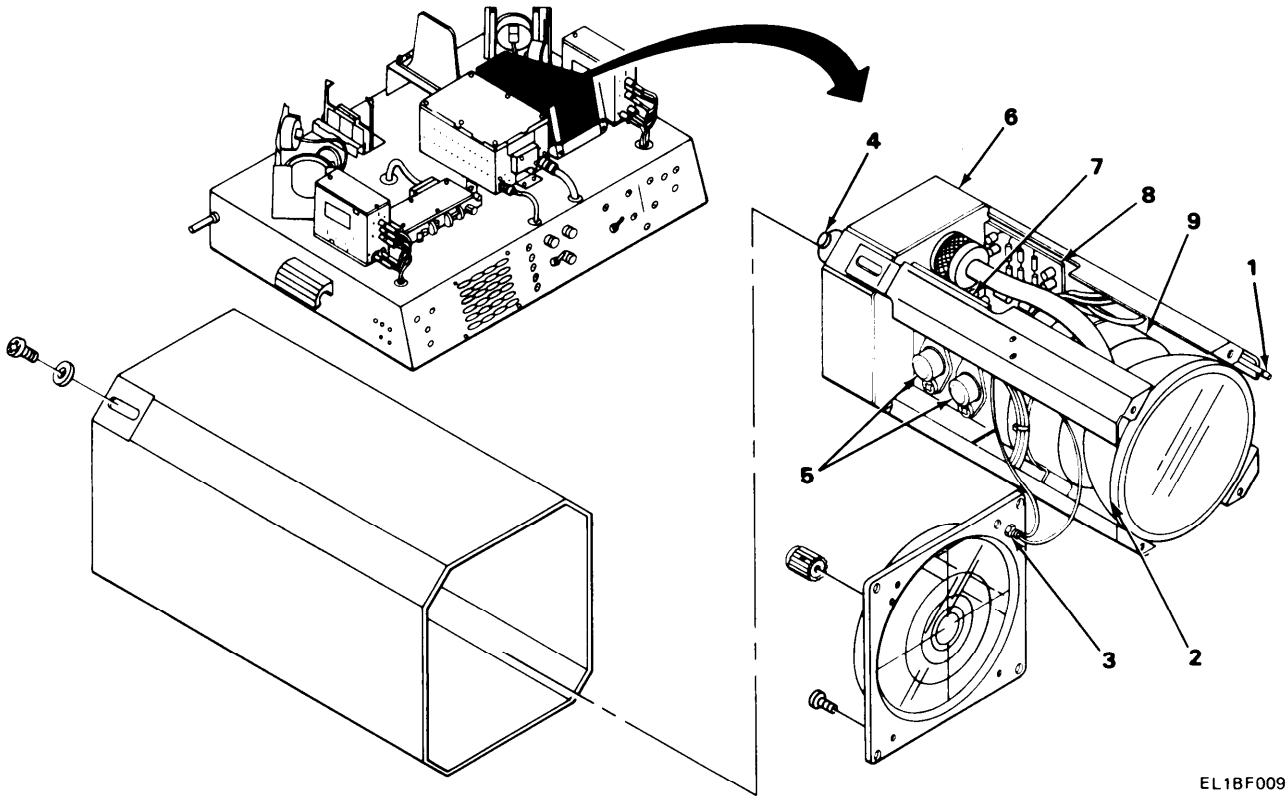
E L 1 B F007

2-10. TROUBLESHOOTING OF CONTROL UNIT. (CONT)



NOTE:
NAMED TEST POINTS ARE LOCATED ON TEST ADAPTER FRONT PANEL.

2-11. TROUBLESHOOTING OF RADAR SIGNAL INDICATOR.



1 BRIL CONTROL

2 CRT

3 MA LAMP

4 CONNECTOR

5 DRIVER TRANSISTOR

6 POWER SUPPLY

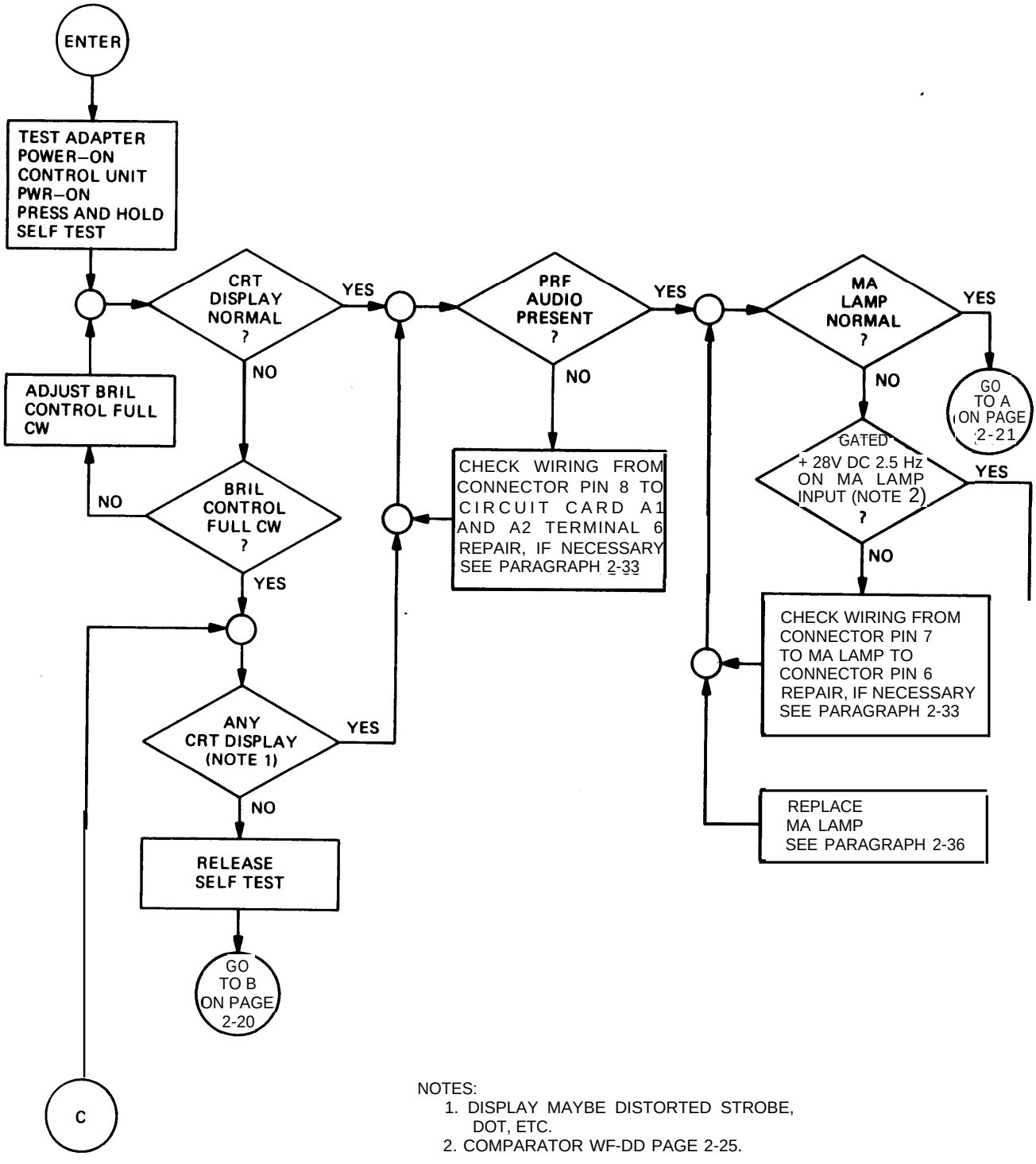
7 CIRCUIT CARD A1

8 CIRCUIT CARD A2

9 YOKE

In this section, troubleshooting procedures are given in flow chart form. If at any point, repair or replacement of wiring or parts is needed, see section III for maintenance procedures.

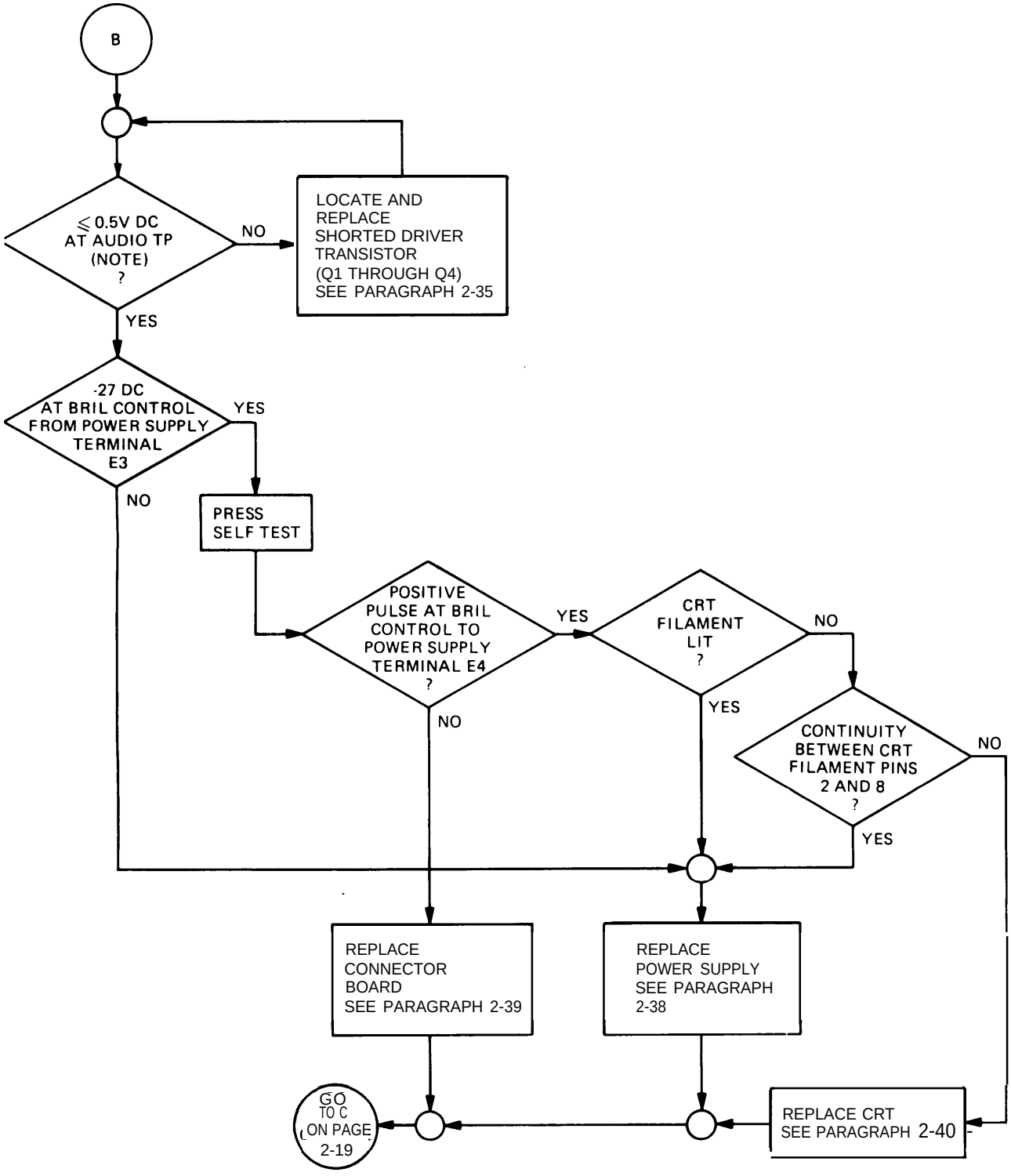
2-11. TROUBLESHOOTING OF RADAR SIGNAL INDICATOR. (CONT)



NOTES:
1. DISPLAY MAYBE DISTORTED STROBE, DOT, ETC.
2. COMPARATOR WF-DD PAGE 2-25.

EL1BF010

2-11. TROUBLESHOOTING OF RADAR SIGNAL INDICATOR. (CONT)

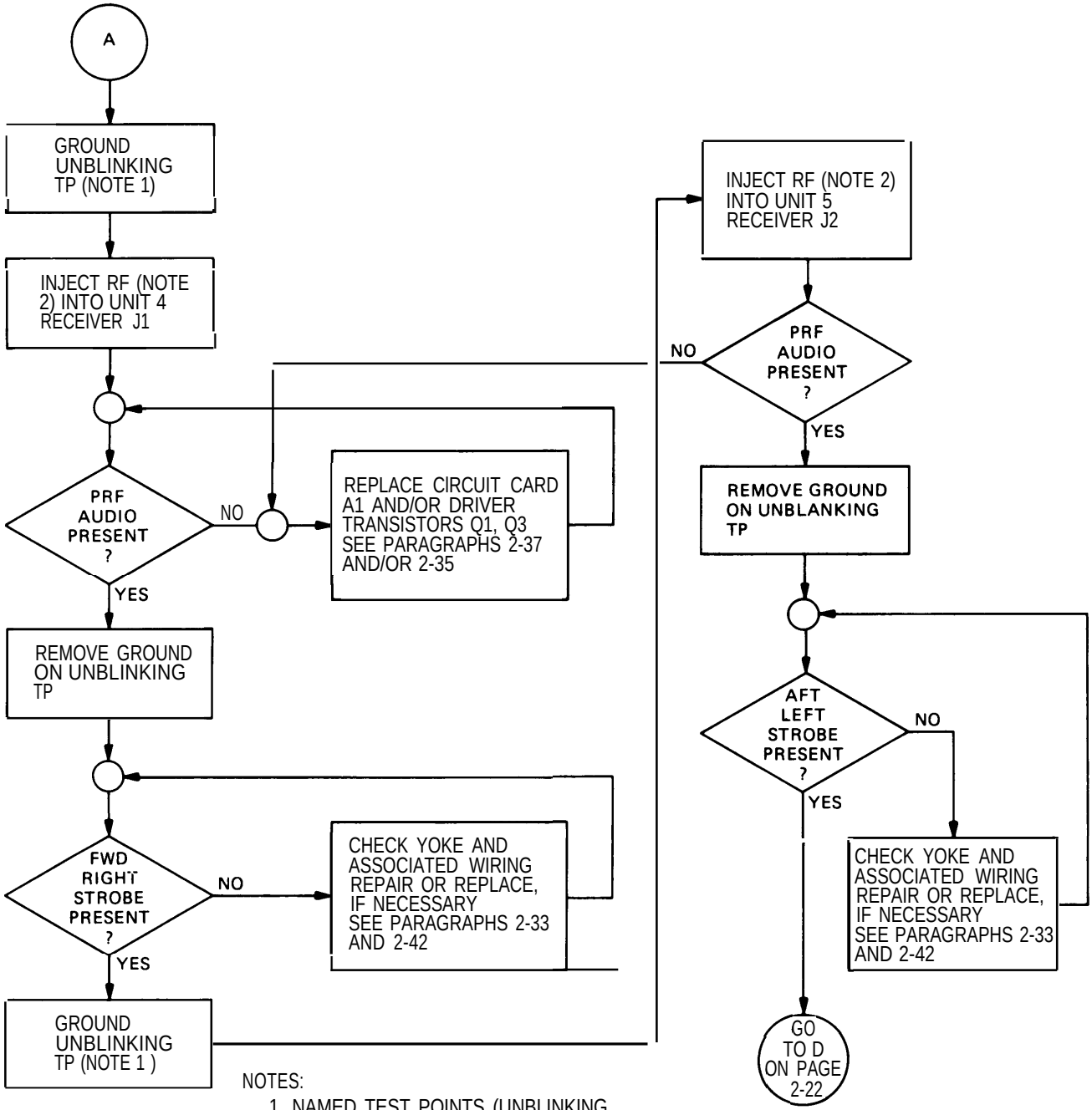


NOTE:

NAMED TEST POINTS (UNBLINKING, AUDIO) ARE LOCATED ON TEST ADAPTER.

EL1BF011

2-11. TROUBLESHOOTING OF RADAR SIGNAL INDICATOR. (CONT)

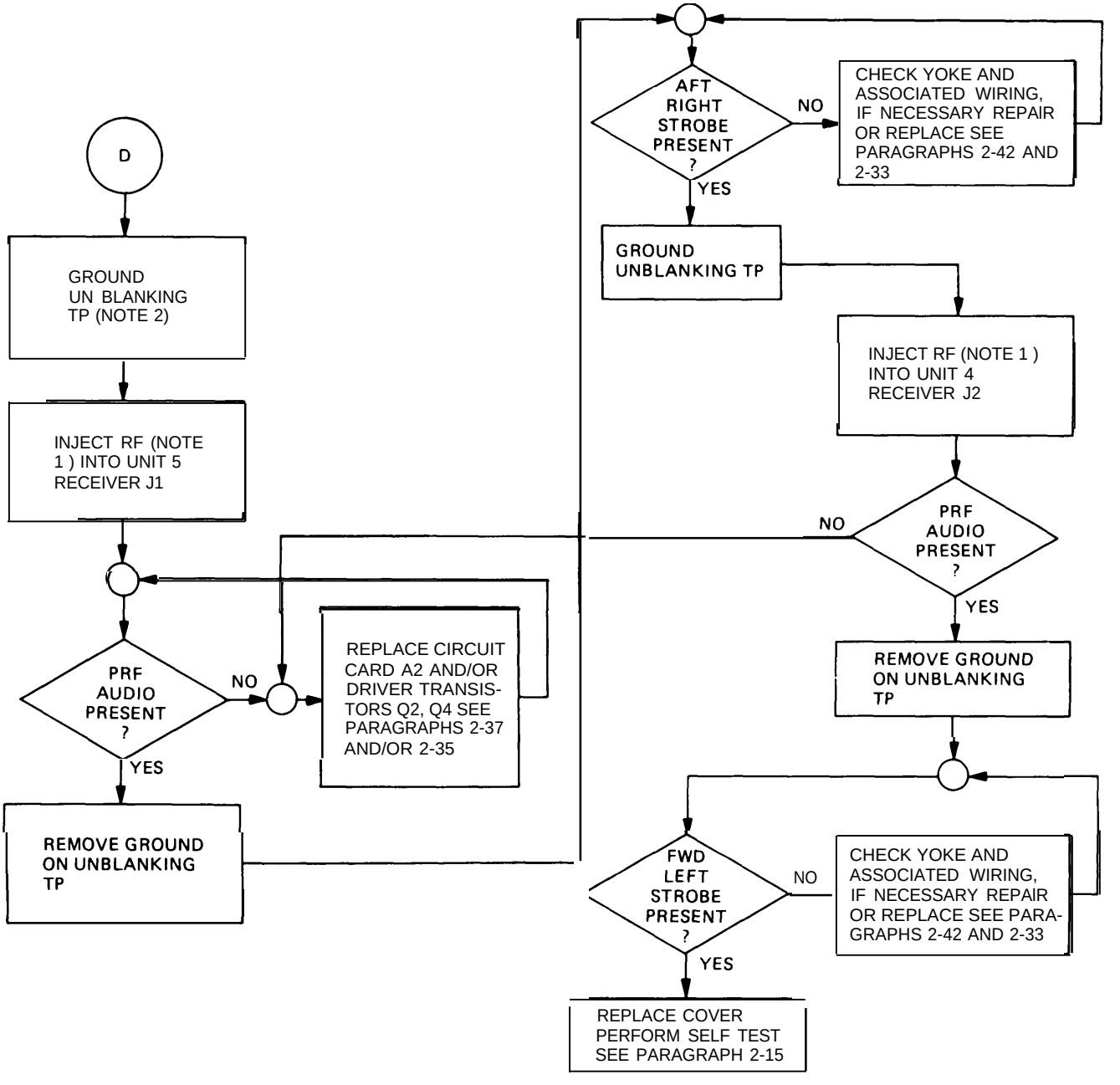


NOTES:

1. NAMED TEST POINTS (UNBLINKING, AUDIO) ARE LOCATED ON TEST ADAPTER.
2. TO INJECT RF:
   A. CONNECT EQUIPMENT
   B. ADJUST SIGNAL GENERATOR:
      FREQUENCY – ANY WITHIN RECEIVER BAND LIMITS
      PRT – APPROX 1 MILLISECOND
      PW – APPROX 2 MICROSECONDS
      POWER – -10 DBM AT RECEIVER INPUT
   C. SET DSCRM SWITCH OFF.
   D. CONNECT SIGNAL GENERATOR OUTPUT TO SPECIFIED RECEIVER INPUT.

EL1BF012

2-11. TROUBLESHOOTING OF RADAR SIGNAL INDICATOR. (CONT)

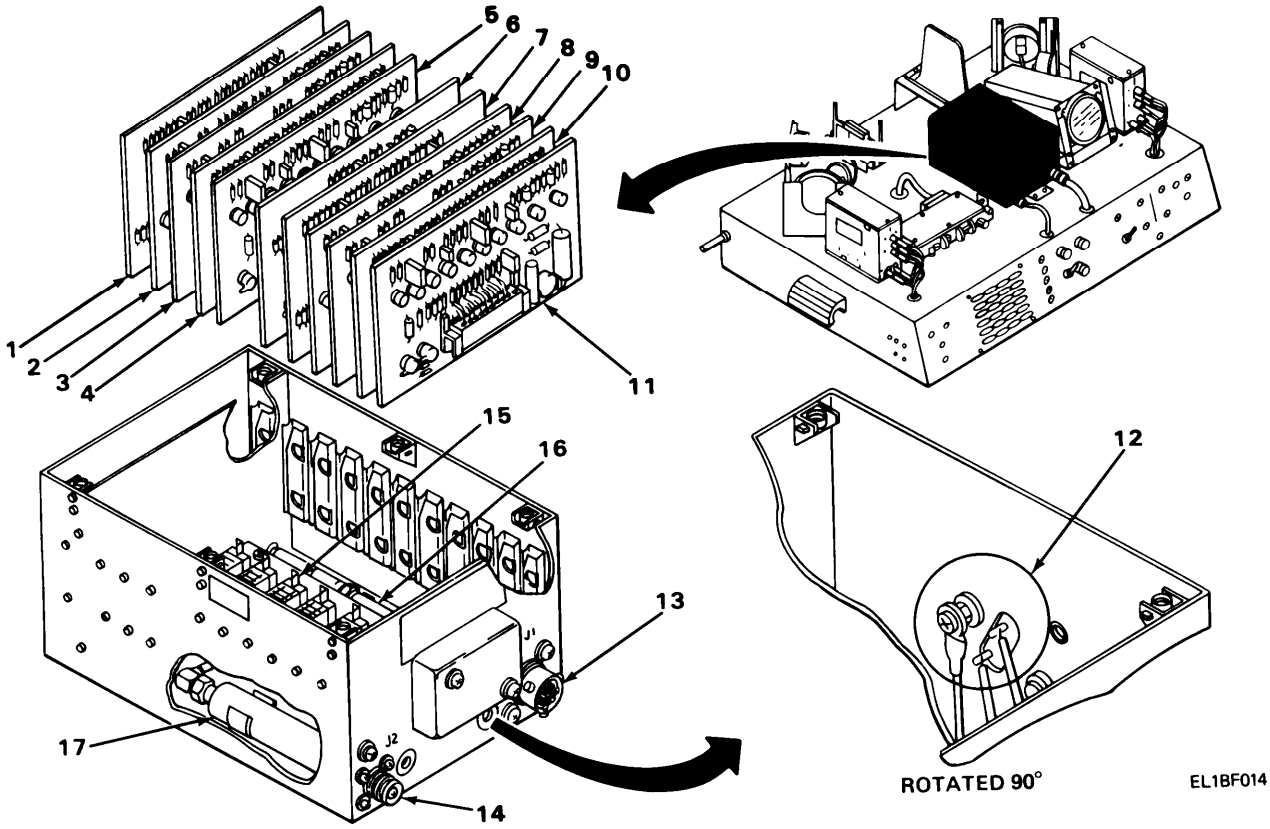


NOTES:

1. TO INJECT RF:
   - A. CONNECT EQUIPMENT
   - B. ADJUST SIGNAL GENERATOR:
     - FREQUENCY – ANY WITHIN RECEIVER BAND LIMITS
     - PRT – APPROX 1 MILLISECOND
     - PW – APPROX 2 MICROSECONDS
     - POWER – -10 DBM AT RECEIVER INPUT
   - C. SET DSCRM SWITCH OFF
   - D. CONNECT SIGNAL GENERATOR OUTPUT TO SPECIFIED RECEIVER INPUT
2. UNBLINKING TEST POINT IS LOCATED ON TEST ADAPTER.

EL1BF013

2-12. TROUBLESHOOTING OF COMPARATOR.



1 CIRCUIT CARD A1

2 CIRCUIT CARD A2

3 CIRCUIT CARD A3

4 CIRCUIT CARD A4

5 CIRCUIT CARD A5

6 CIRCUIT CARD A6

7 CIRCUIT CARD A7

8 CIRCUIT CARD A8

9 CIRCUIT CARD A9

10 CIRCUIT CARD A10

11 CIRCUIT CARD A11

12 TRANSISTOR

13 CONNECTOR J1

14 CONNECTOR J2

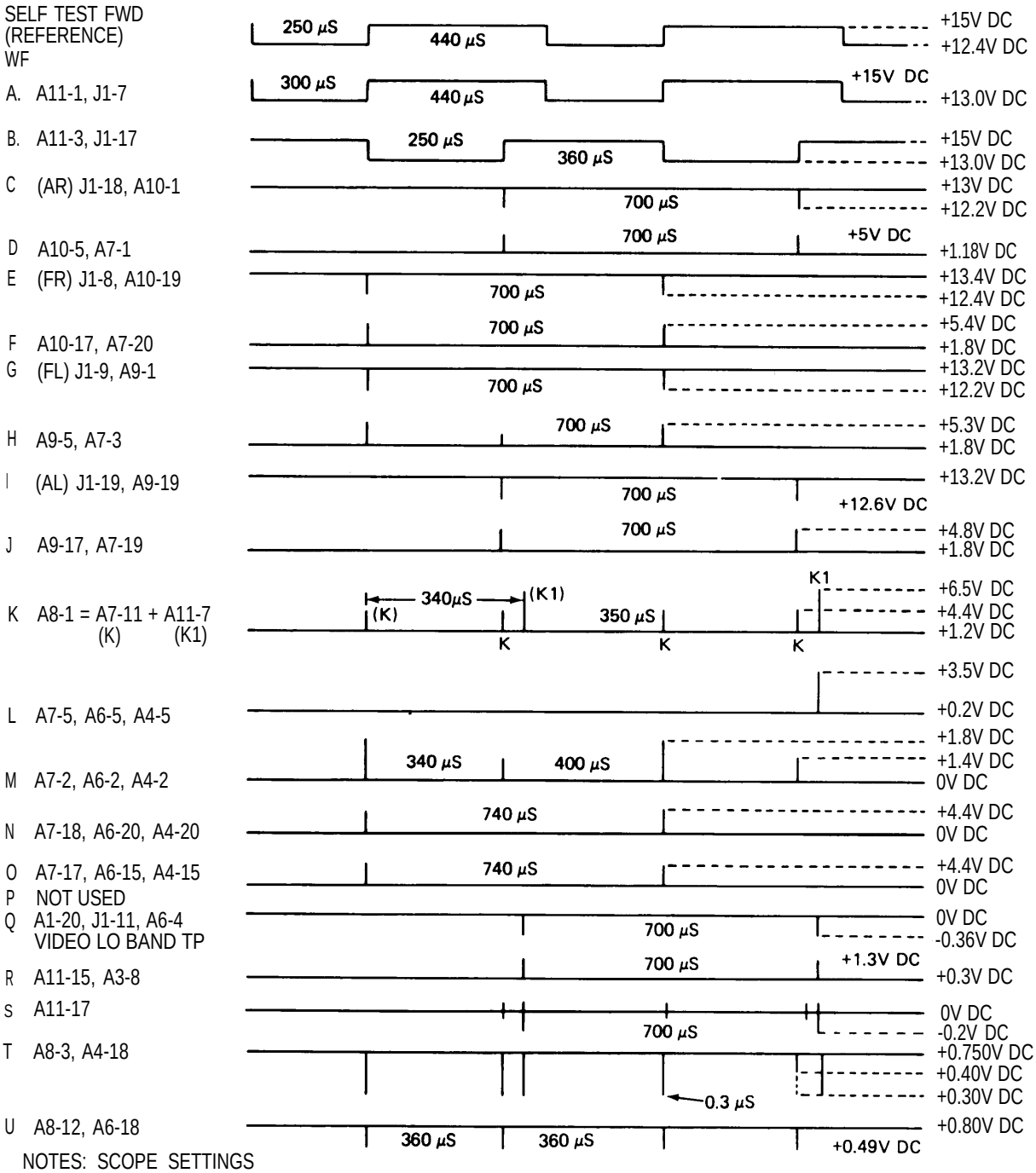
15 CONNECTOR BOARD

16 DETECTOR

17 FILTER

In this section, troubleshooting procedures are given in flow chart form. If at any point, repair or replacement of wiring or parts is needed, see section Ill for maintenance procedures. Comparator waveforms are given on pages 2-24 and 2-25 of this manual.

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

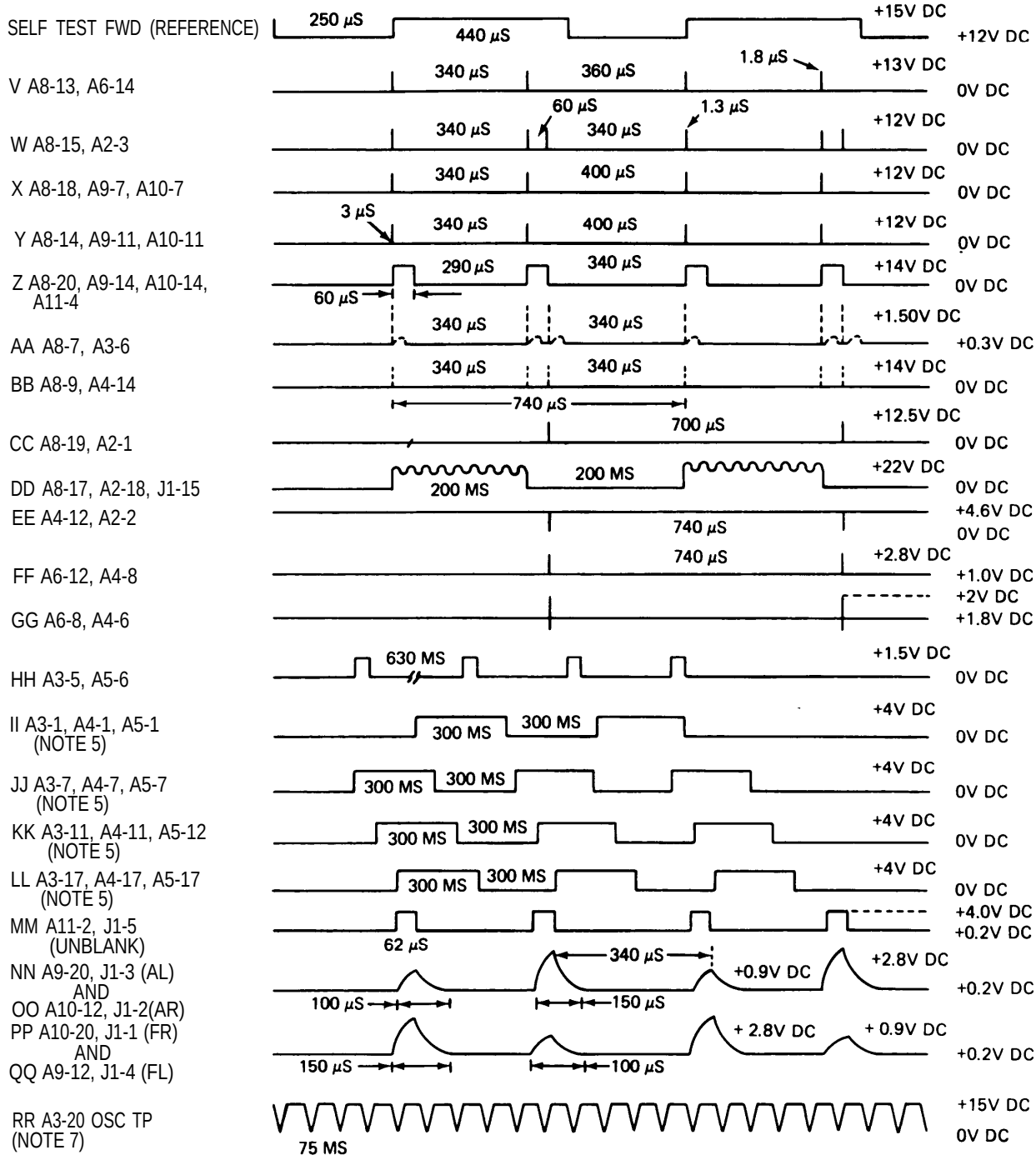


NOTES: SCOPE SETTINGS

1. SYNC-EXT NEG, CONNECT TO FWD RCVR VIDEO SELF TEST TP.
2. CH 1 INPUT TO FWD RCVR VIDEO SELF TEST TP.
   a. VERT 1.0 V/DIV
   b. MAGNIFIER - XI
3. TIME BASE ≈100 µS/DIV
4. CH 2 INPUT TO WAVEFORM AS DETERMINED IN FLOW DIAGRAM OF UNIT UNDER TEST.
5. WAVEFORMS II THROUGH LL ARE TIMING GENERATOR OUTPUTS. NOT REFERENCED TO SELF TEST FWD.
6. REFERENCE DESIGNATIONS ARE ABBREVIATED; PREFIX WITH 3.
7. ALL WAVE FORMS MAY VARY SLIGHTLY DUE TO COMPONENT TOLERANCES.

EL1BF015

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

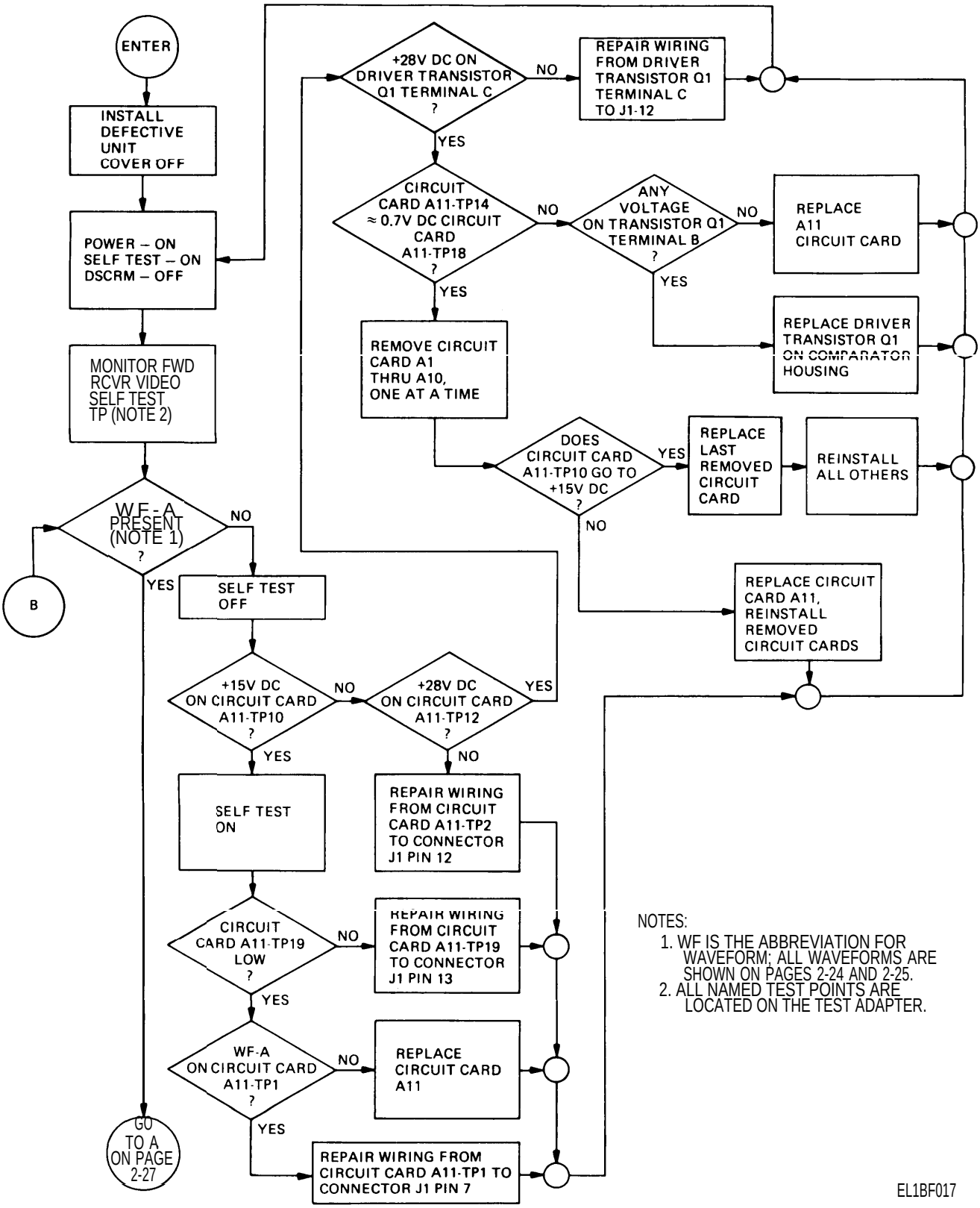


NOTES: SCOPE SETTINGS

1. SYNC-EXT NEG, CONNECT TO FWD RCVR VIDEO SELF TEST TP.
2. CH 1 INPUT TO FWD RCVR VIDEO SELF TEST TP.
3. TIME BASE ≈ 100 µS/DIV
4. CH 2 INPUT TO WAVEFORM AS DETERMINED IN FLOW DIAGRAM OF UNIT UNDER TEST.
5. WAVEFORMS II THROUGH LL ARE TIMING GENERATOR OUTPUTS, NOT REFERENCED TO SELF TEST FWD. SHOWN WITH SELF TEST RELEASED.
6. REFERENCE DESIGNATIONS ARE ABBREVIATED; PREFIX WITH 3.
7. NOT REFERENCED TO SELF TEST. SELF TEST SWITCH RELEASED.

EL1BF016

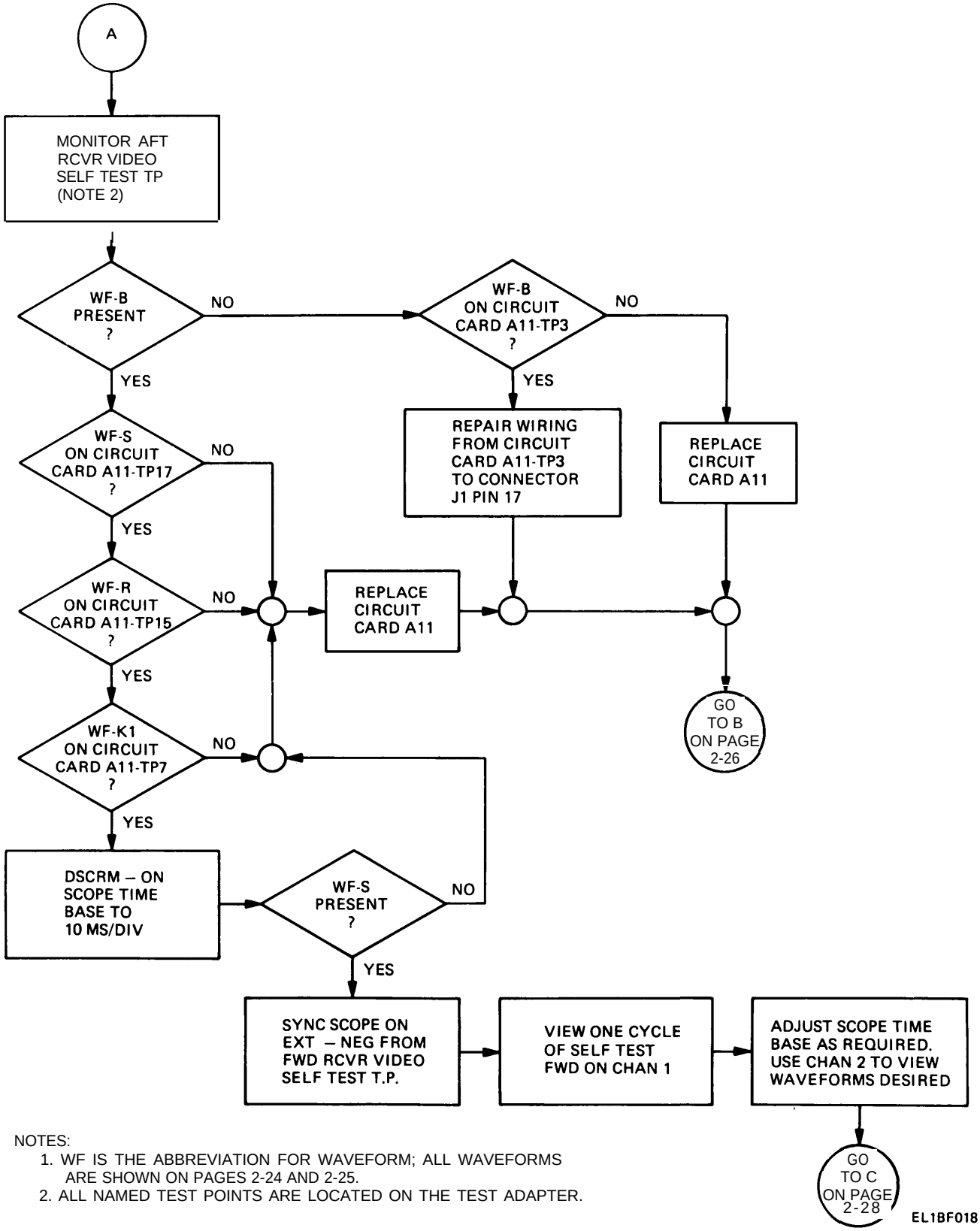
2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



NOTES:
1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

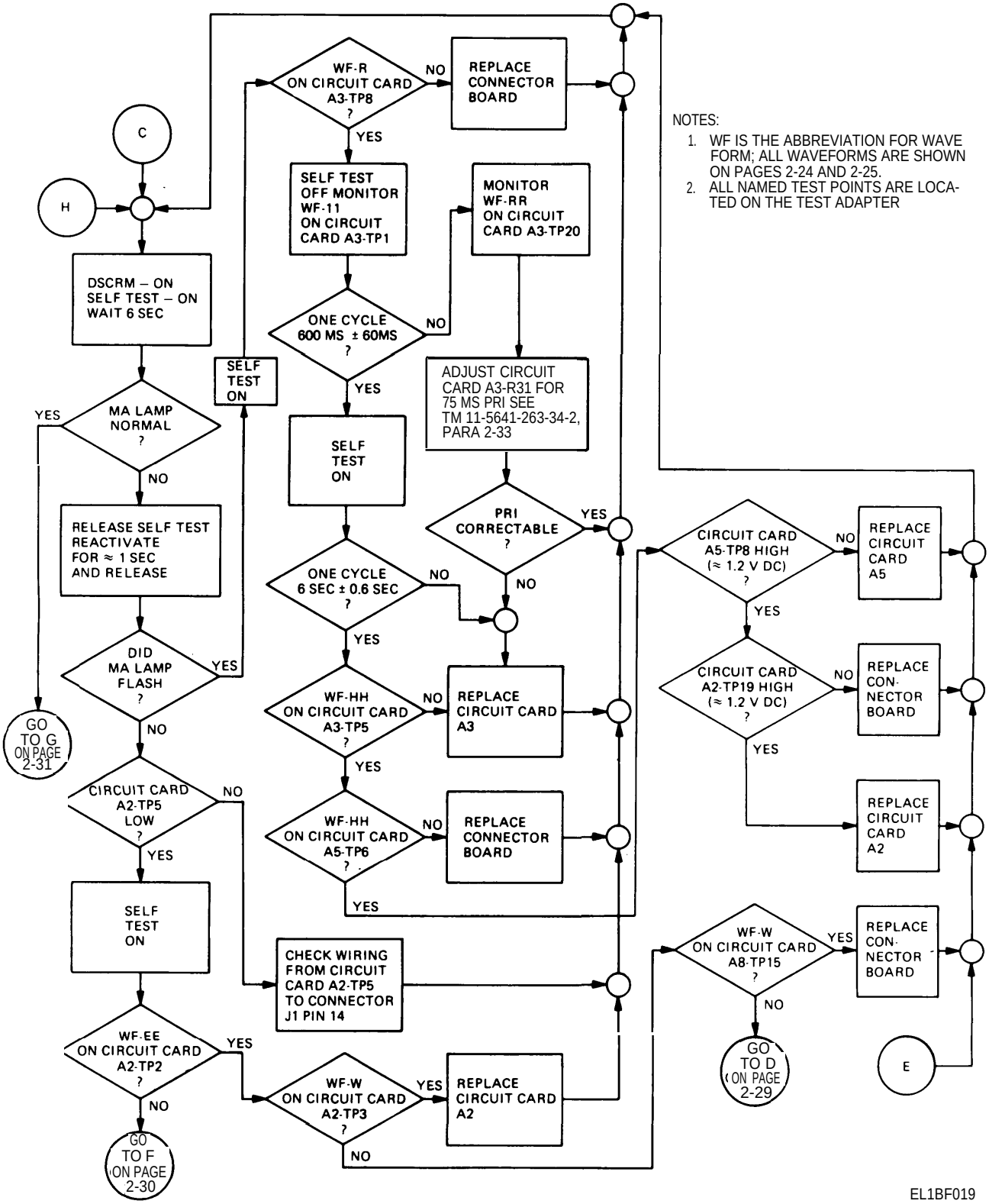
EL1BF017

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



NOTES:
1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

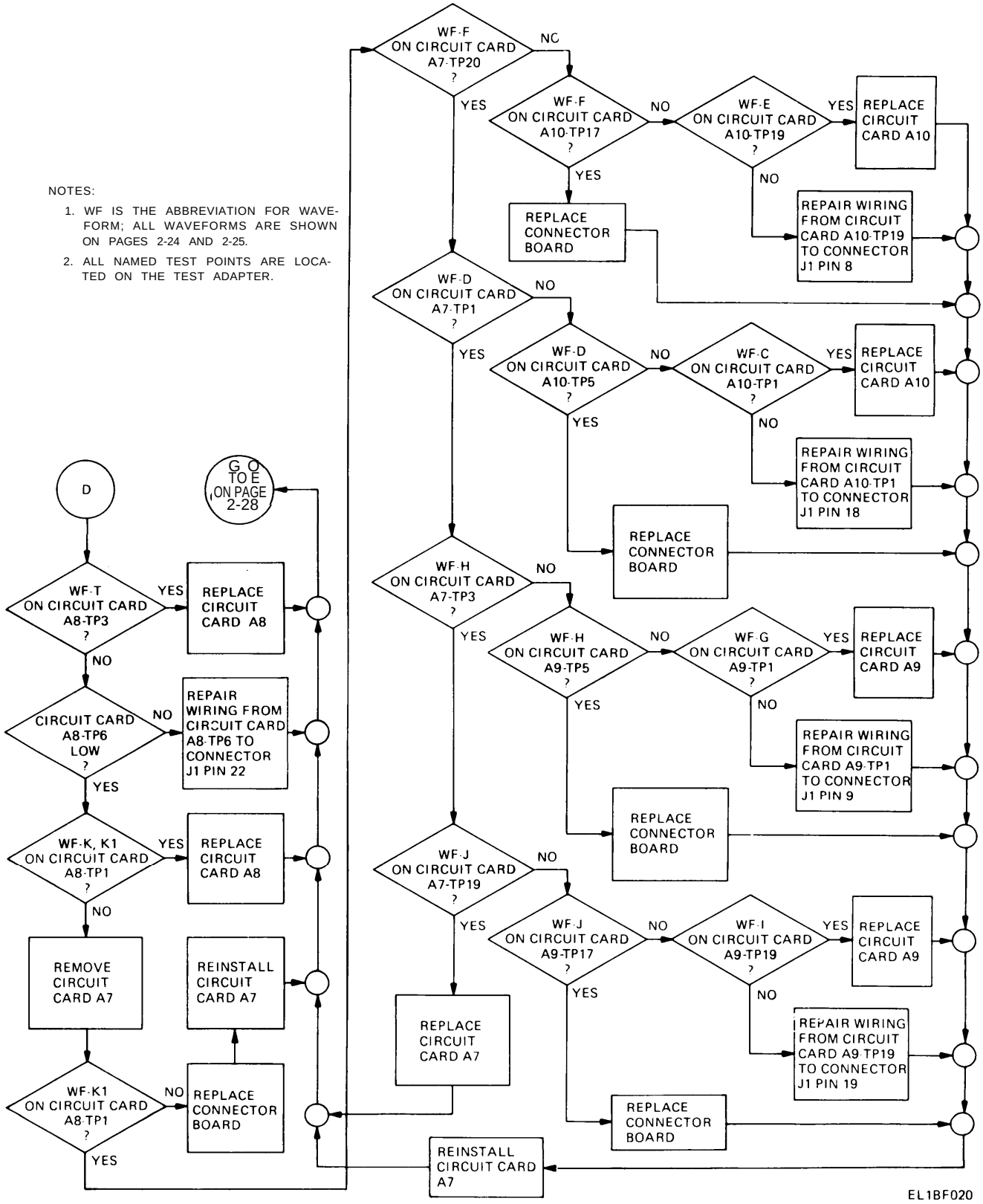
2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



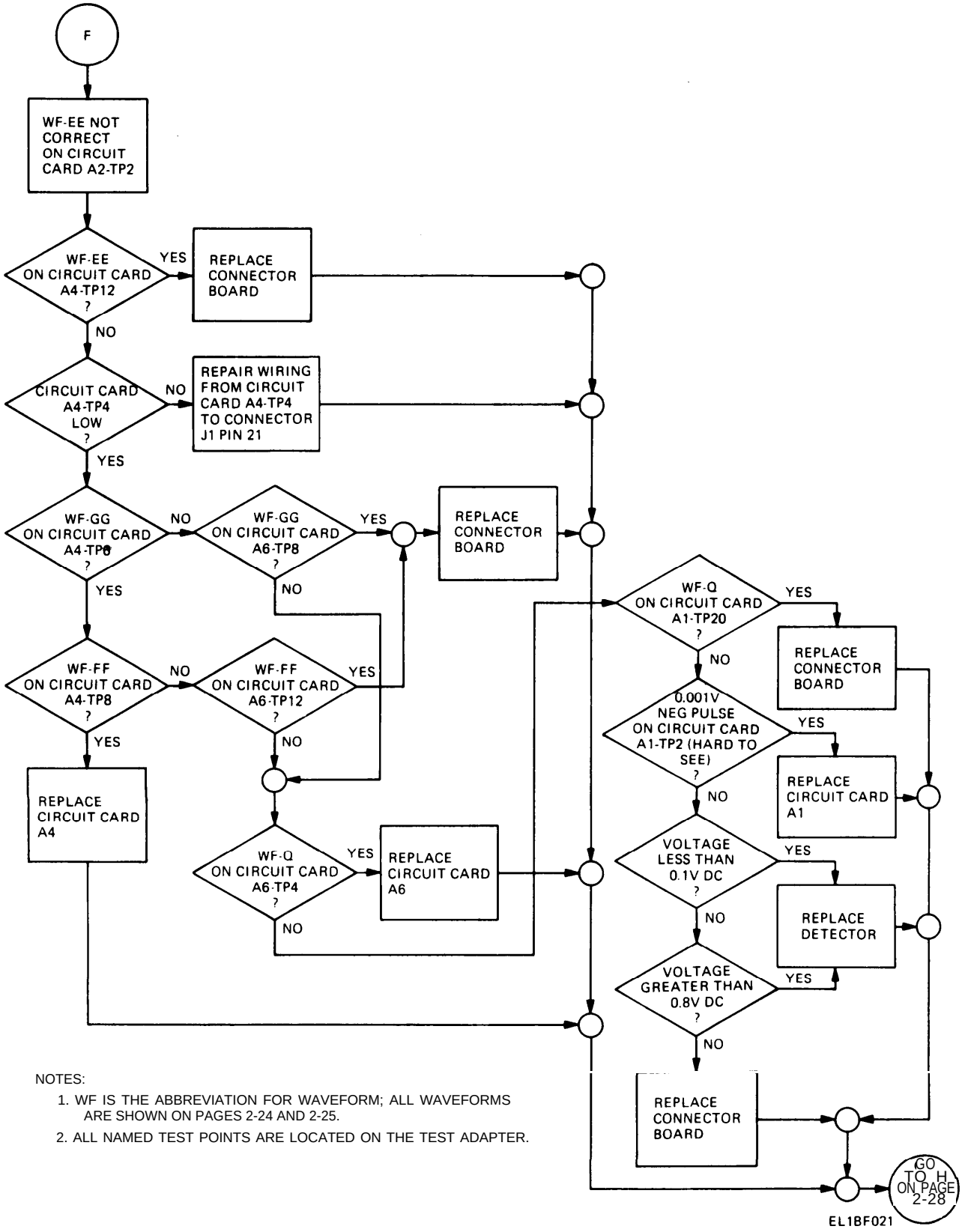
2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.



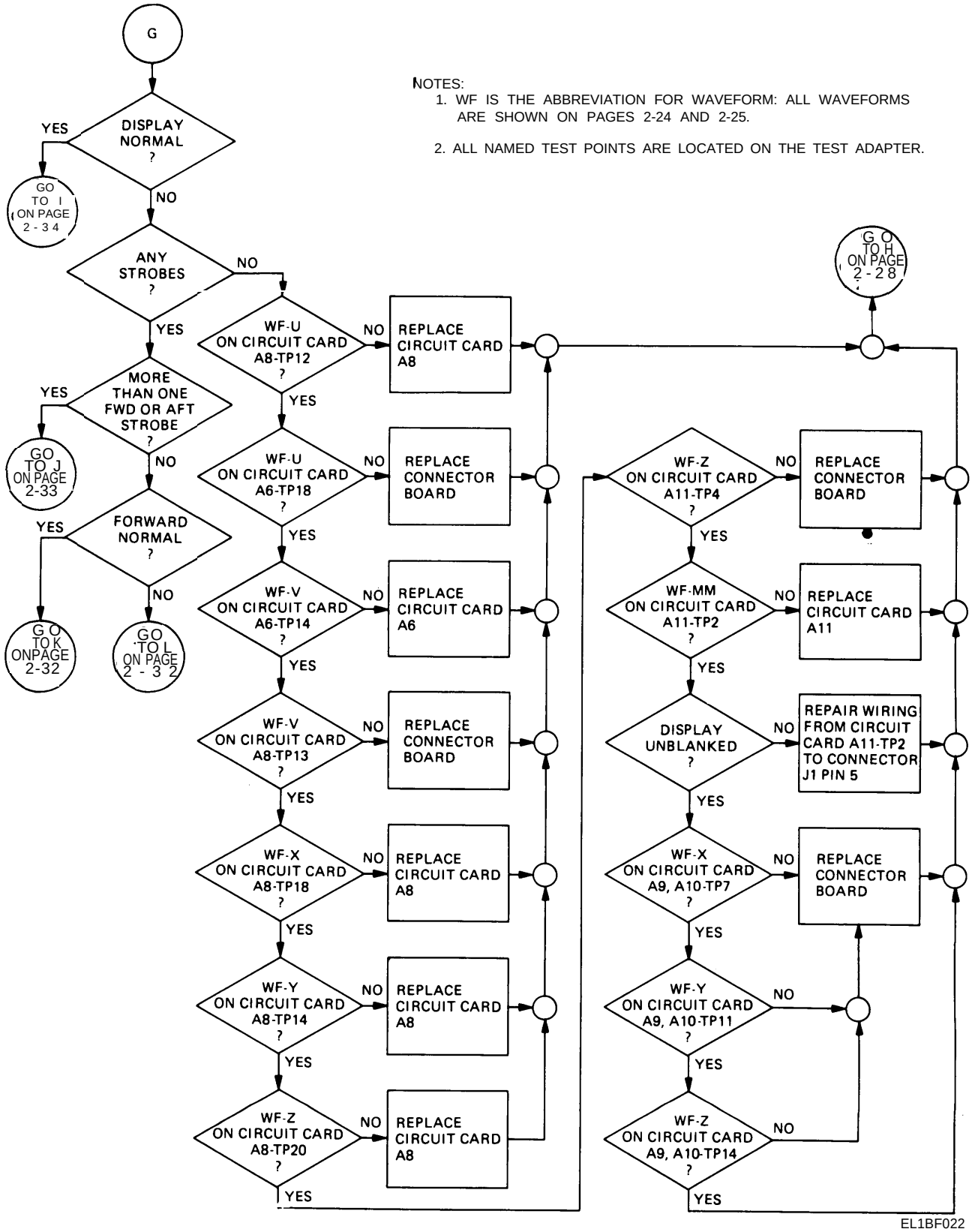
2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

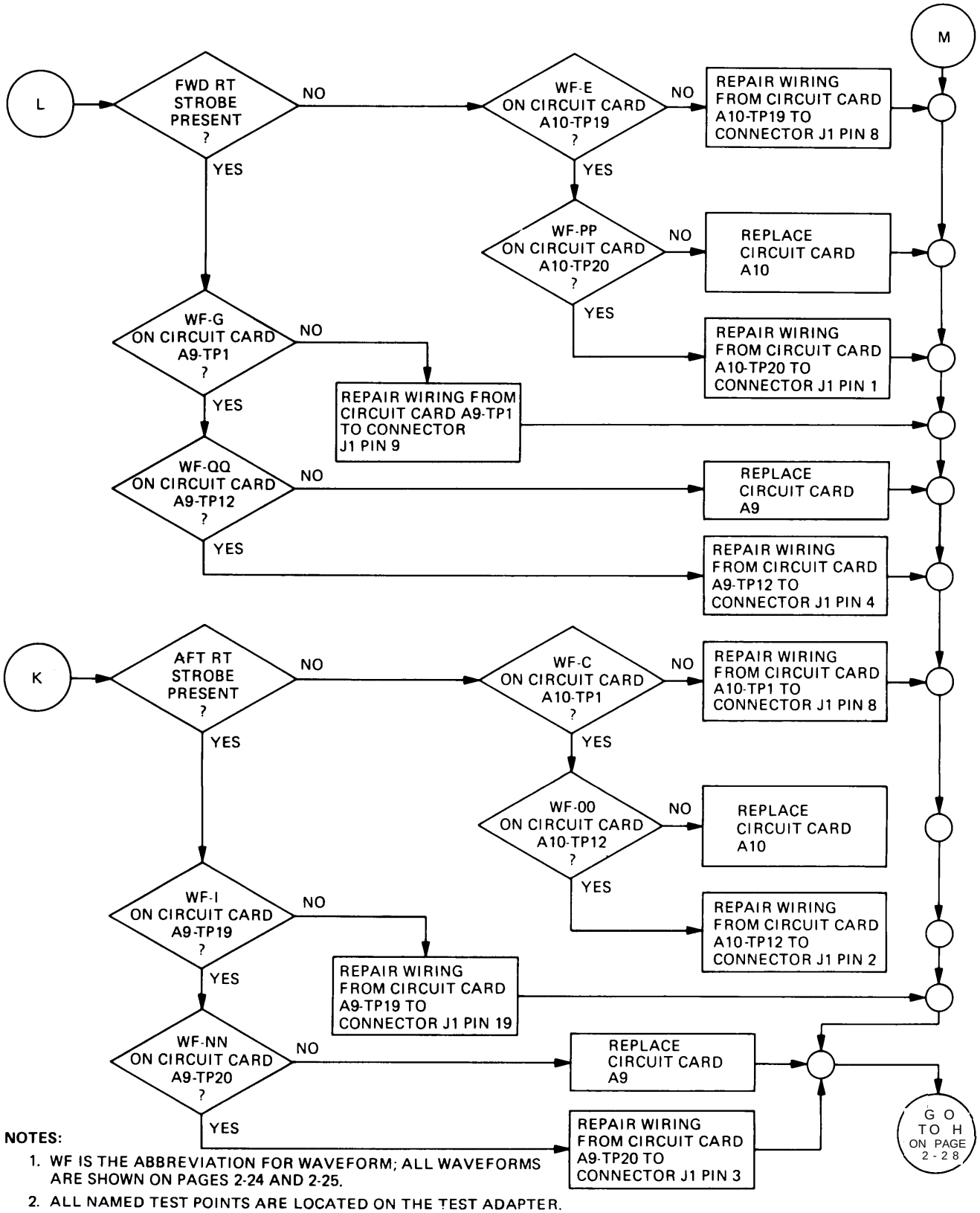


NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM: ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

EL1BF022

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



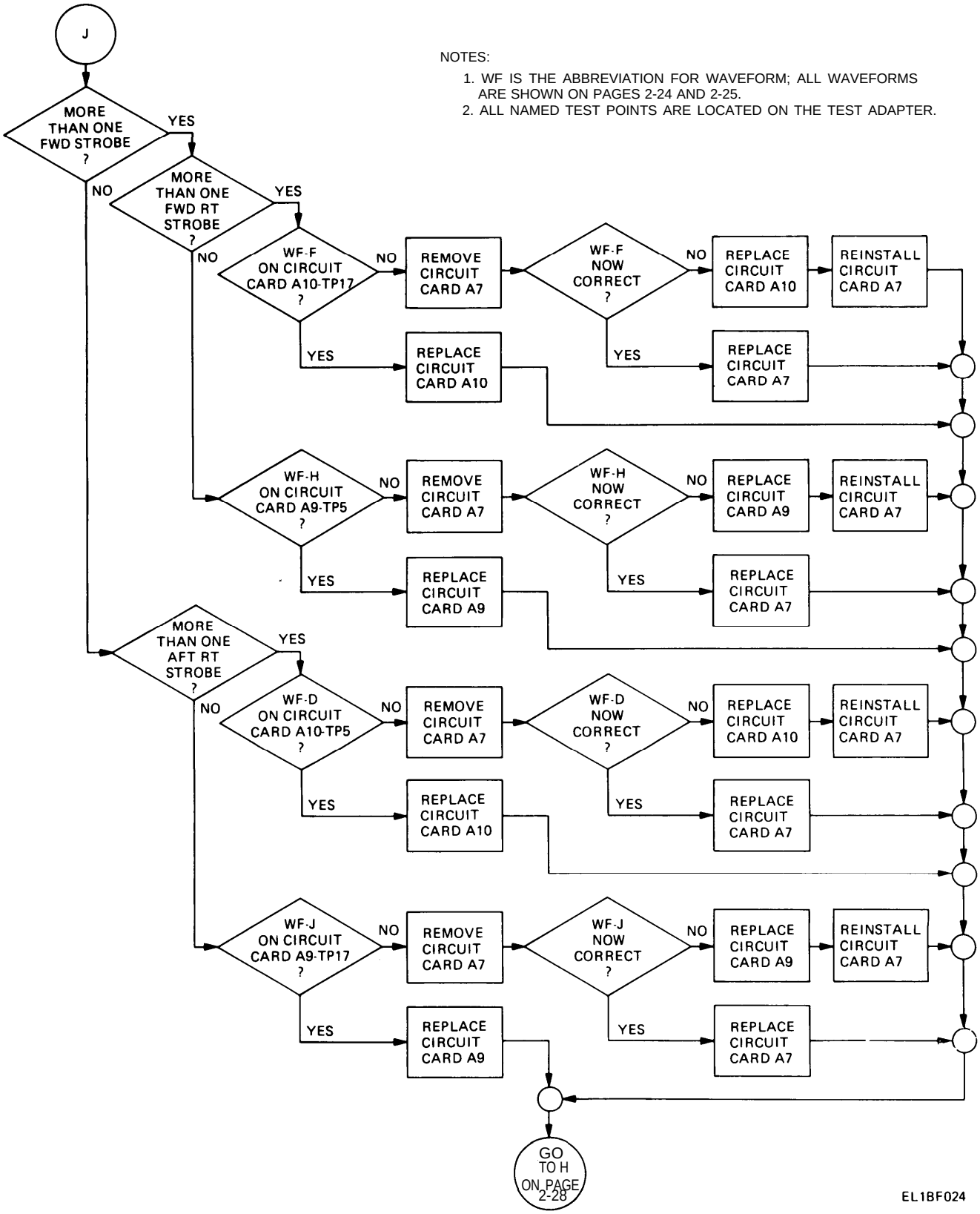
NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

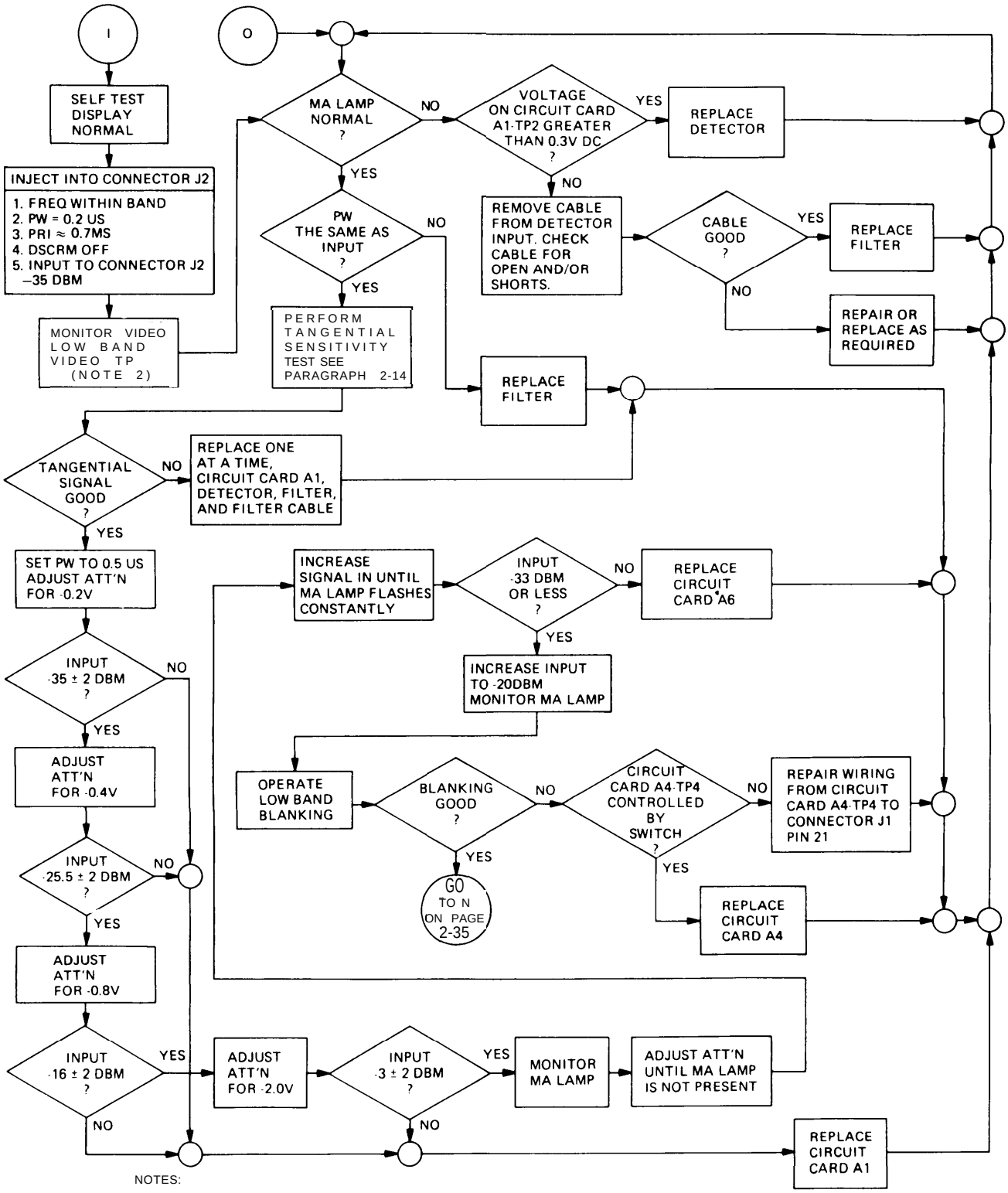
2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.



2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

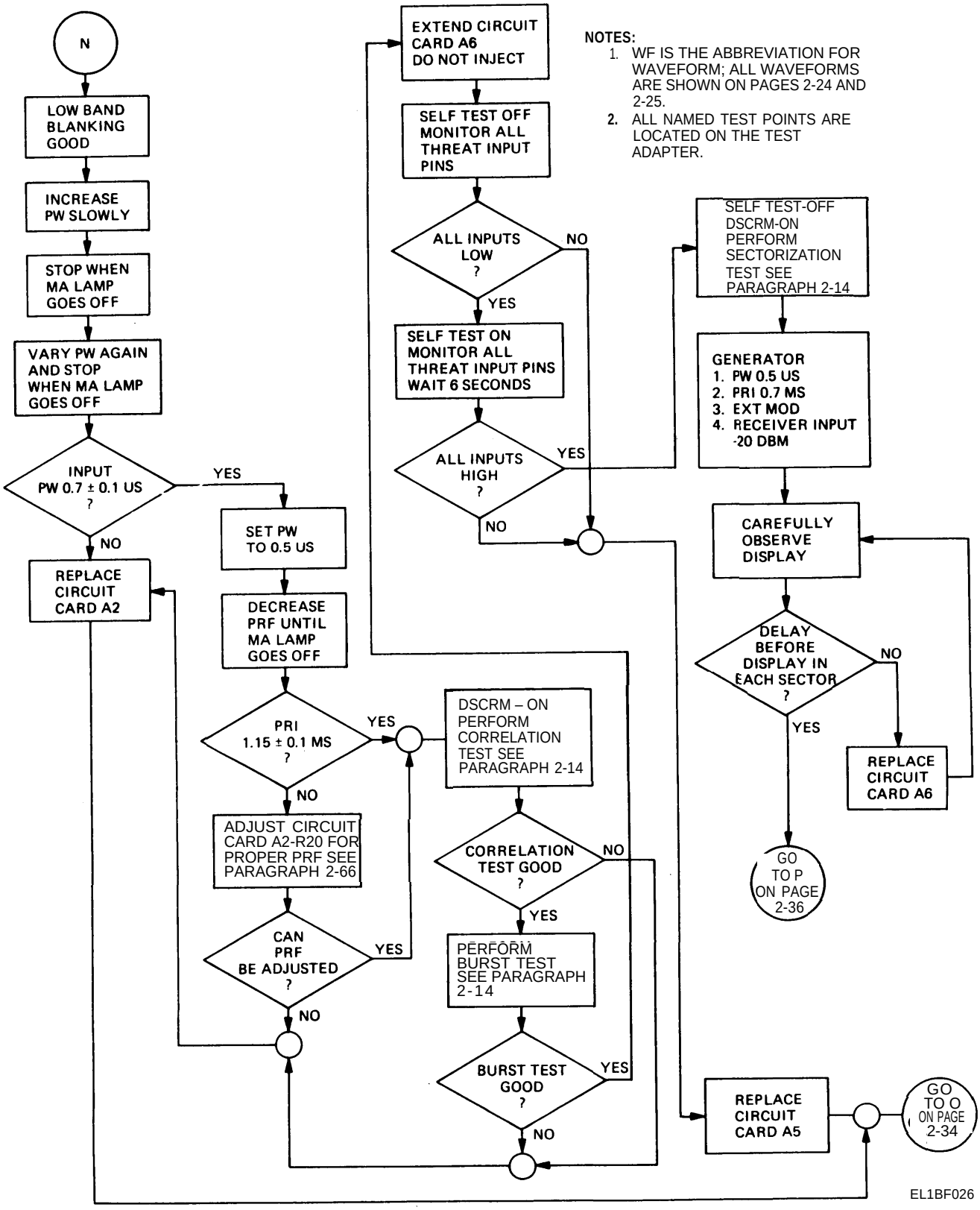


NOTES:

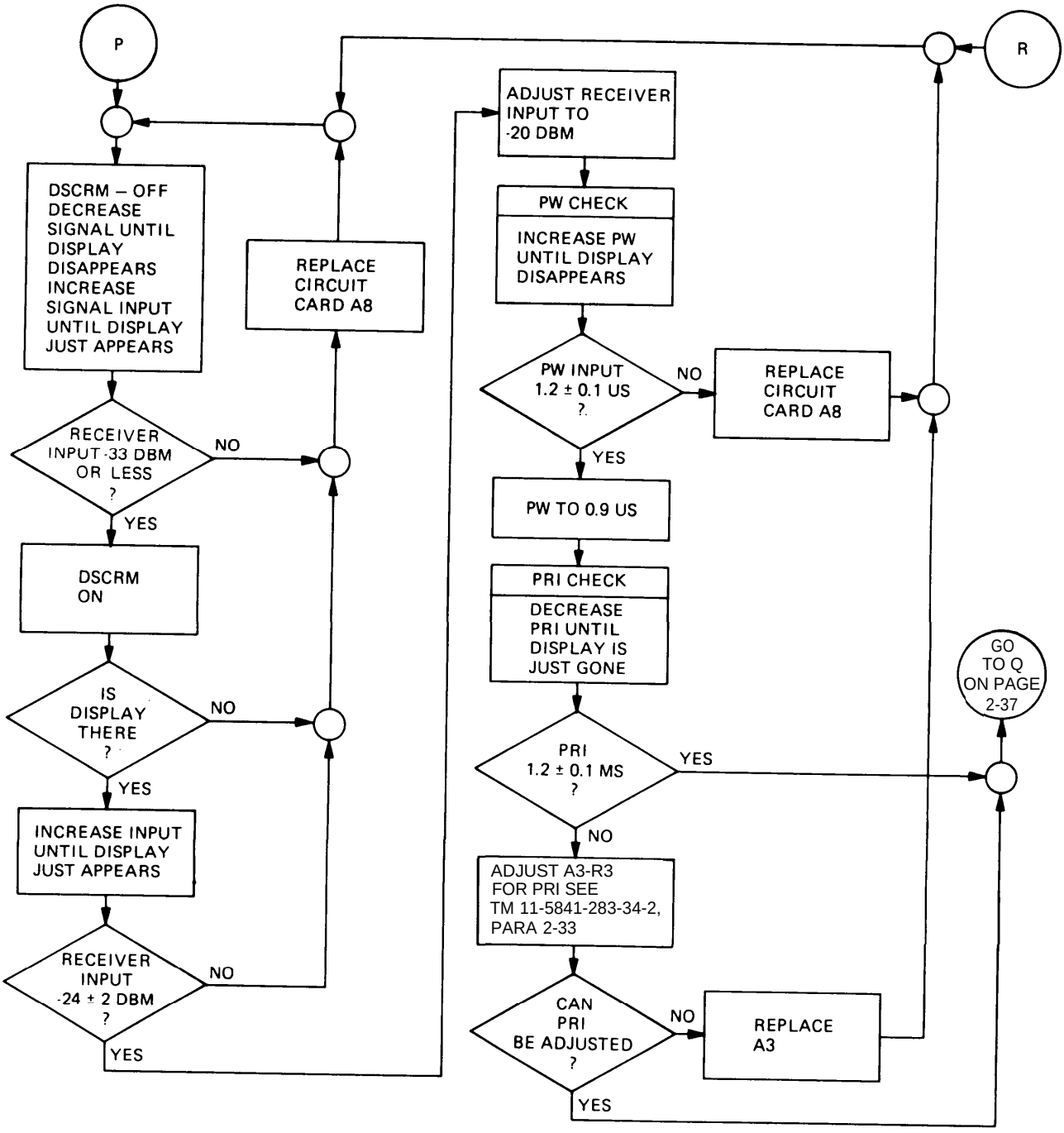
1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.
3. ATTENUATE VIDEO OUTPUT.

EL1BF025

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)

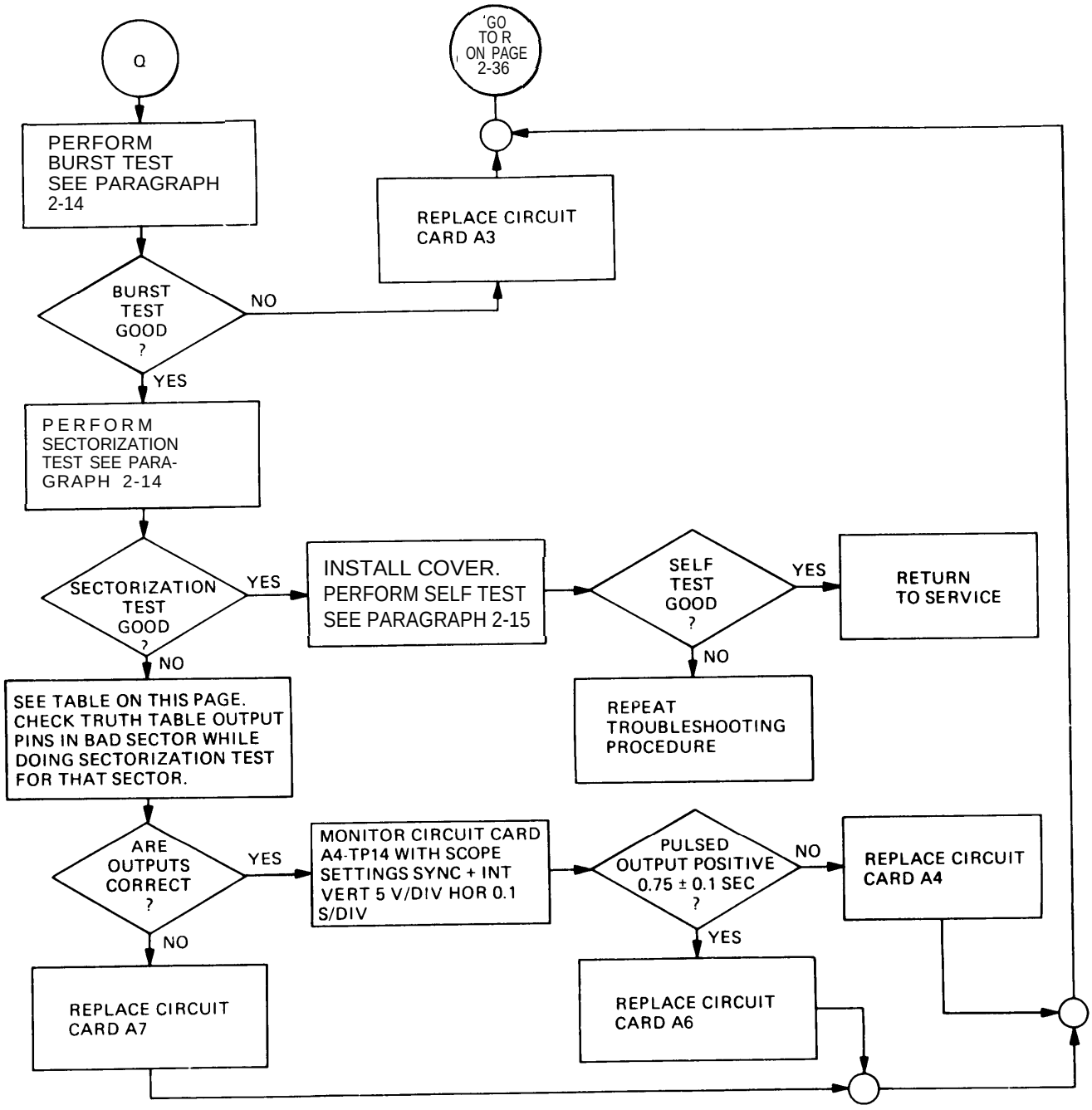


NOTES:

1. WF IS THE ABBREVIATION FOR WAVEFORM; ALL WAVEFORMS ARE SHOWN ON PAGES 2-24 AND 2-25.
2. ALL NAMED TEST POINTS ARE LOCATED ON THE TEST ADAPTER.

EL1BF027

2-12. TROUBLESHOOTING OF COMPARATOR. (CONT)



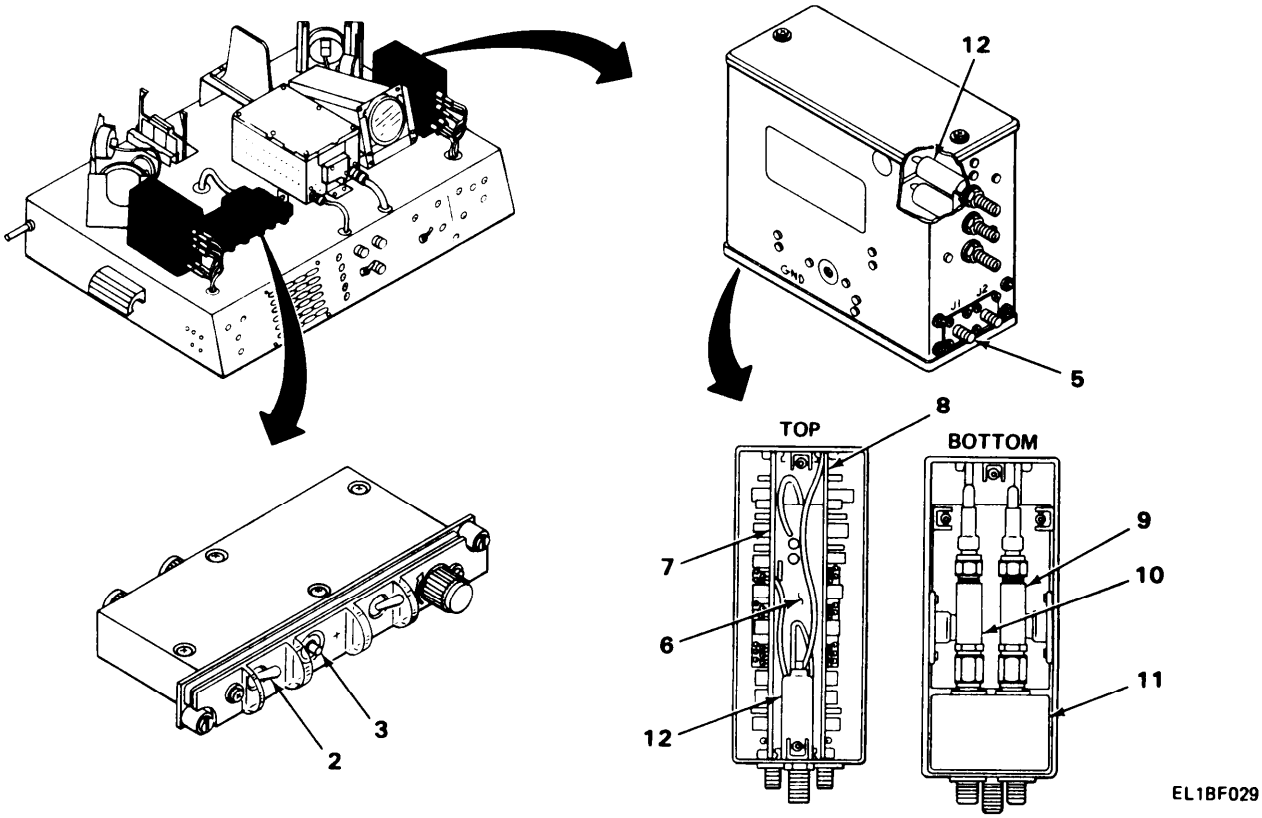
DIRECTION COMPARATOR TRUTH TABLE

SECTORS								CIRCUIT CARD A7 PIN NO.
A	B	C	D	E	F	G	H	
0	1	1	1	1	0	0	0	5
1	1	1	1	0	0	0	0	2
1	1	1	0	0	0	0	1	18
1	1	0	0	0	0	1	1	17

"1" STATE INDICATES VOLTAGE $\geq$ 1.2V
"0" STATE INDICATES VOLTAGE $<$ 1.2V

EL1BF028

2-13. TROUBLESHOOTING OF RECEIVER.



1 TEST ADAPTER POWER ON-OFF

2 CONTROL UNIT POWER ON-OFF

3 SELF TEST SWITCH

4 CRT DISPLAY

5 CONNECTOR J1

6 CONNECTOR BOARD

7 CIRCUIT CARD Al

8 CIRCUIT CARD A2

9 DETECTOR CR1

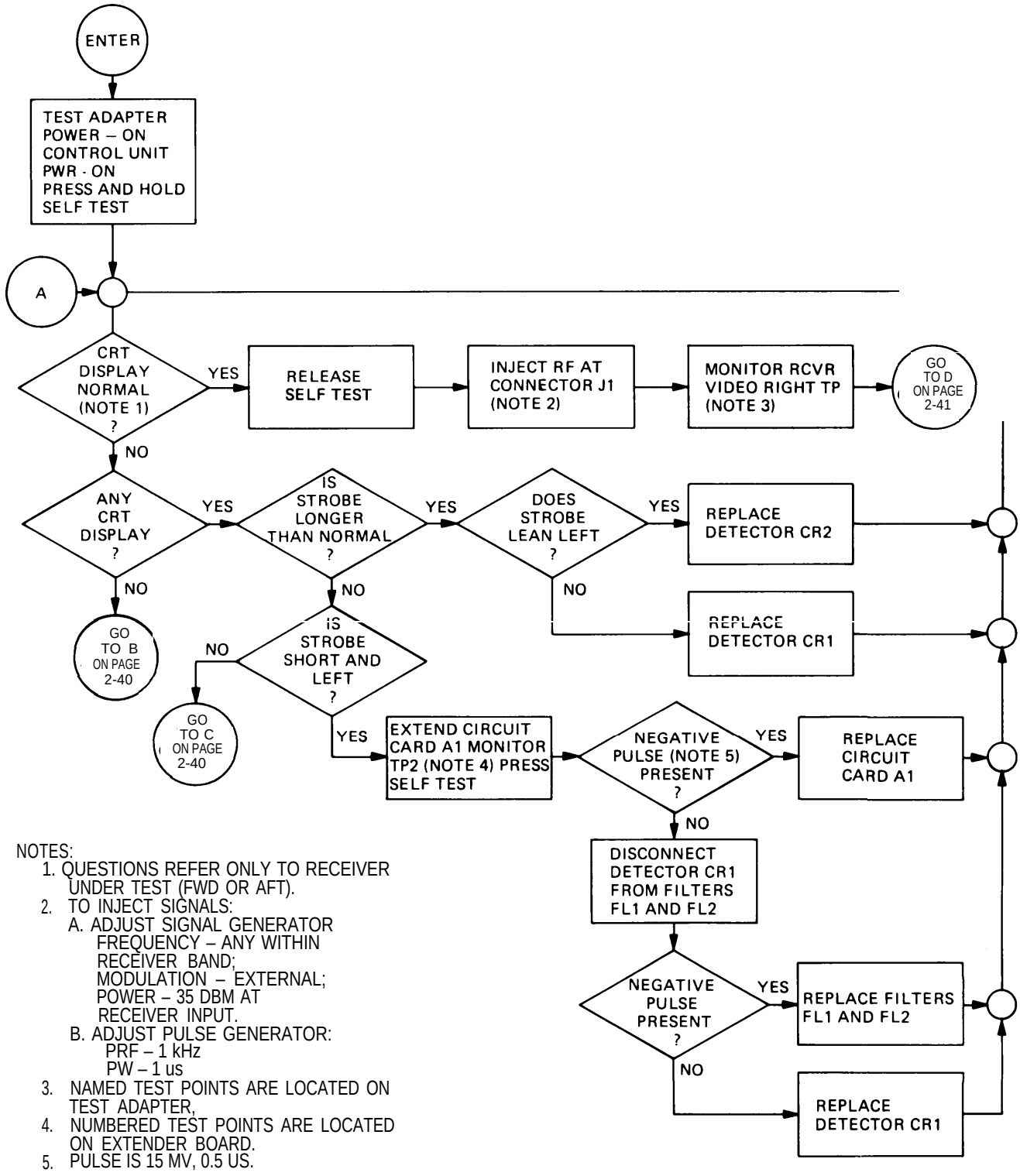
10 DETECTOR CR2

11 FILTERS FL1 AND FL2

12 FILTER FL5

In this section, troubleshooting procedures are given in flowchart form. If at any point, repair or replacement of wiring or parts is needed, see section V for maintenance procedures.

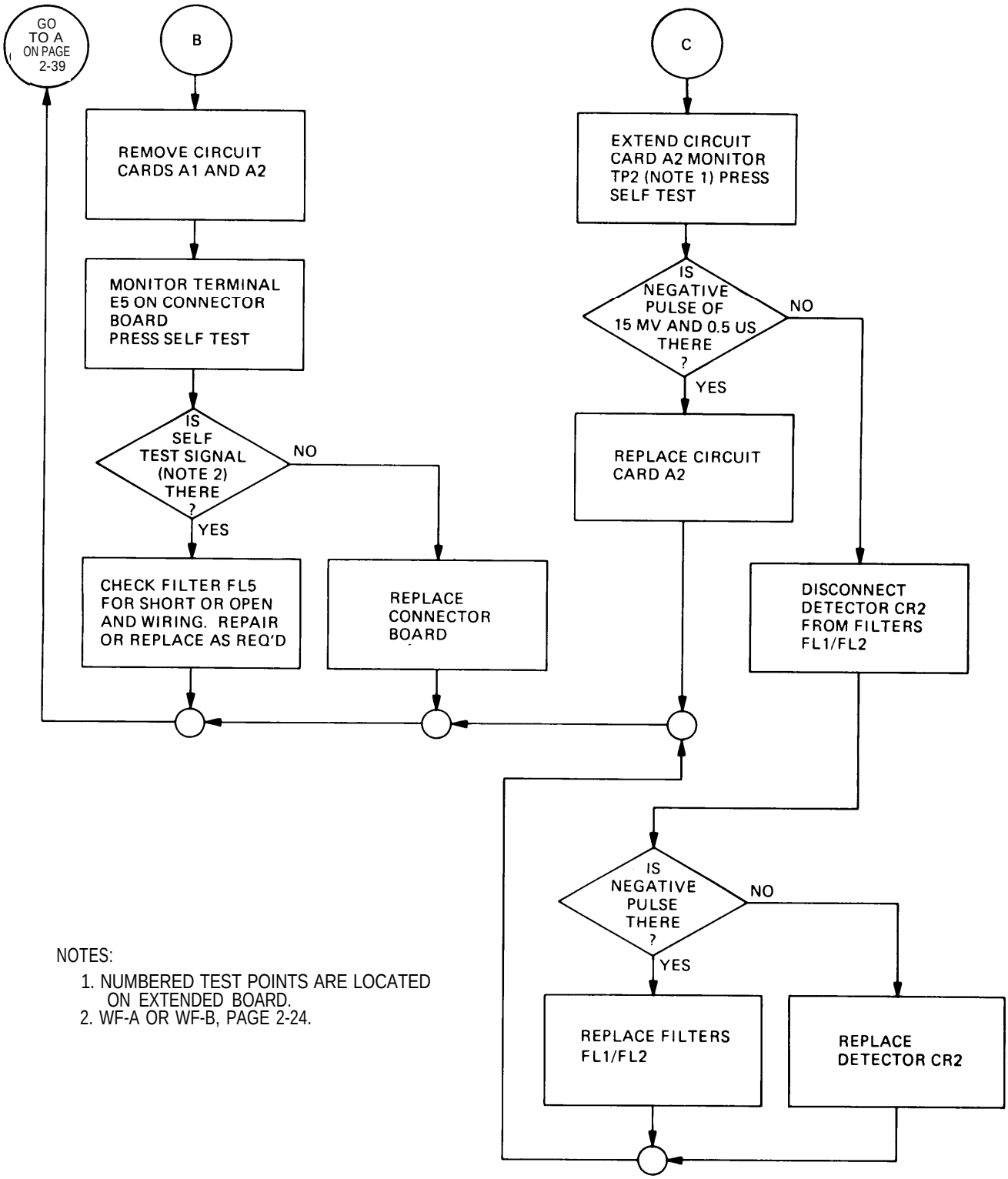
2-13. TROUBLESHOOTING OF RECEIVER. (CONT)



NOTES:
1. QUESTIONS REFER ONLY TO RECEIVER UNDER TEST (FWD OR AFT).
2. TO INJECT SIGNALS:
   A. ADJUST SIGNAL GENERATOR FREQUENCY – ANY WITHIN RECEIVER BAND; MODULATION – EXTERNAL; POWER – 35 DBM AT RECEIVER INPUT.
   B. ADJUST PULSE GENERATOR: PRF – 1 kHz PW – 1 us
3. NAMED TEST POINTS ARE LOCATED ON TEST ADAPTER,
4. NUMBERED TEST POINTS ARE LOCATED ON EXTENDER BOARD.
5. PULSE IS 15 MV, 0.5 US.

EL1BF030

2-13. TROUBLESHOOTING OF RECEIVER. (CONT)

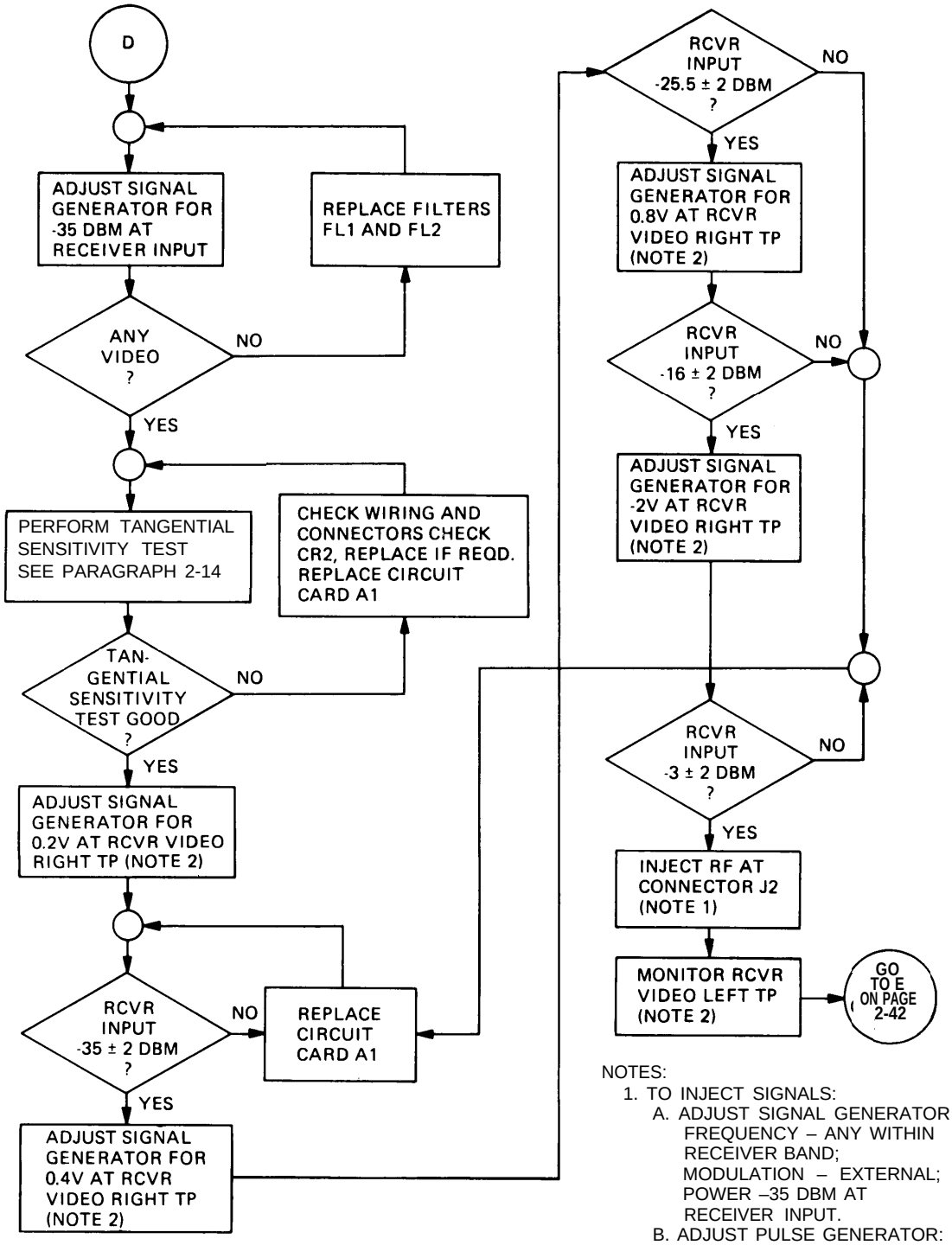


NOTES:

1. NUMBERED TEST POINTS ARE LOCATED ON EXTENDED BOARD.
2. WF-A OR WF-B, PAGE 2-24.

EL1BF031

2-13. TROUBLESHOOTING OF RECEIVER. (CONT)

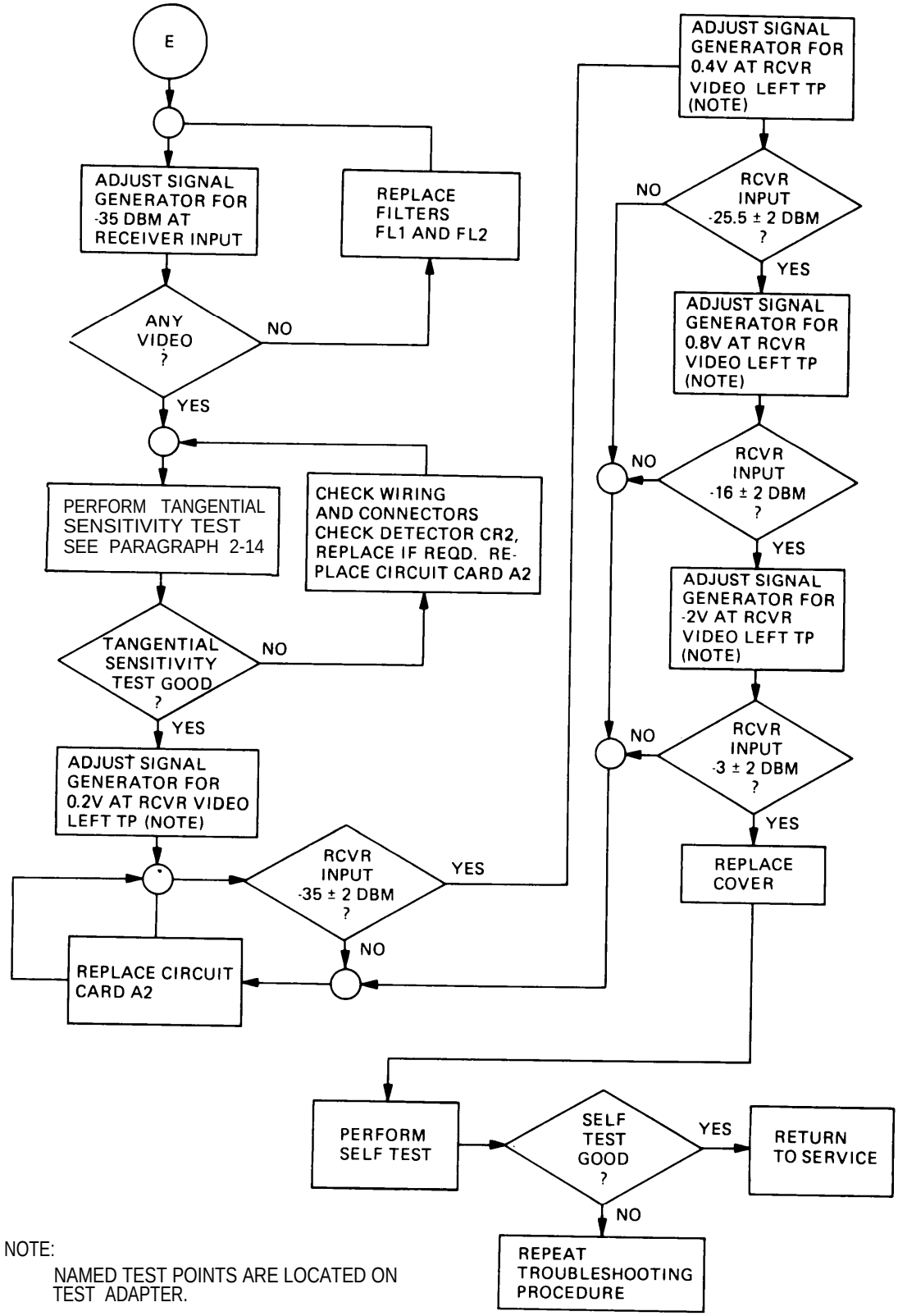


NOTES:

1. TO INJECT SIGNALS:
   A. ADJUST SIGNAL GENERATOR FREQUENCY – ANY WITHIN RECEIVER BAND; MODULATION – EXTERNAL; POWER –35 DBM AT RECEIVER INPUT.
   B. ADJUST PULSE GENERATOR: PRF – 1kHz PW – 1 US
2. NAMED TEST POINTS ARE LOCATED ON TEST ADAPTER.

EL1BF032

2-13. TROUBLESHOOTING OF RECEIVER. (CONT)



NOTE:

NAMED TEST POINTS ARE LOCATED ON TEST ADAPTER.

EL1BF033

2-14. TESTS.

For tests applicable to the radar signal detecting set, see classified manual TM 11-5841-283-34-2.

2-15. SELF-TEST.

Self-test procedures for the radar signal detecting set are given in TM 11-5841-283-12.

Section V MAINTENANCE PROCEDURES

2-16. GENERAL.

This section provides instructions for replacement of parts and assemblies for the following:

Control unit
Radar signal indicator
Comparator
Receiver

Reference to this section is made when the testing and troubleshooting procedures of section II show that a part or assembly is bad.

Typical procedures for the repair of the wire harness are given for the following:

Control unit
Radar signal indicator
Comparator

If the CRT or yoke of the radar signal indicator is replaced, be sure to see paragraph 2-44 for the alinement of the strobe.

Resources required are not listed unless they apply to the procedure.

Personnel are listed only if the task requires more than one. If personnel required is not listed, one person can do the task.

2-17. REPLACEMENT OF CONTROL UNIT SWITCH GUARD PLATE.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

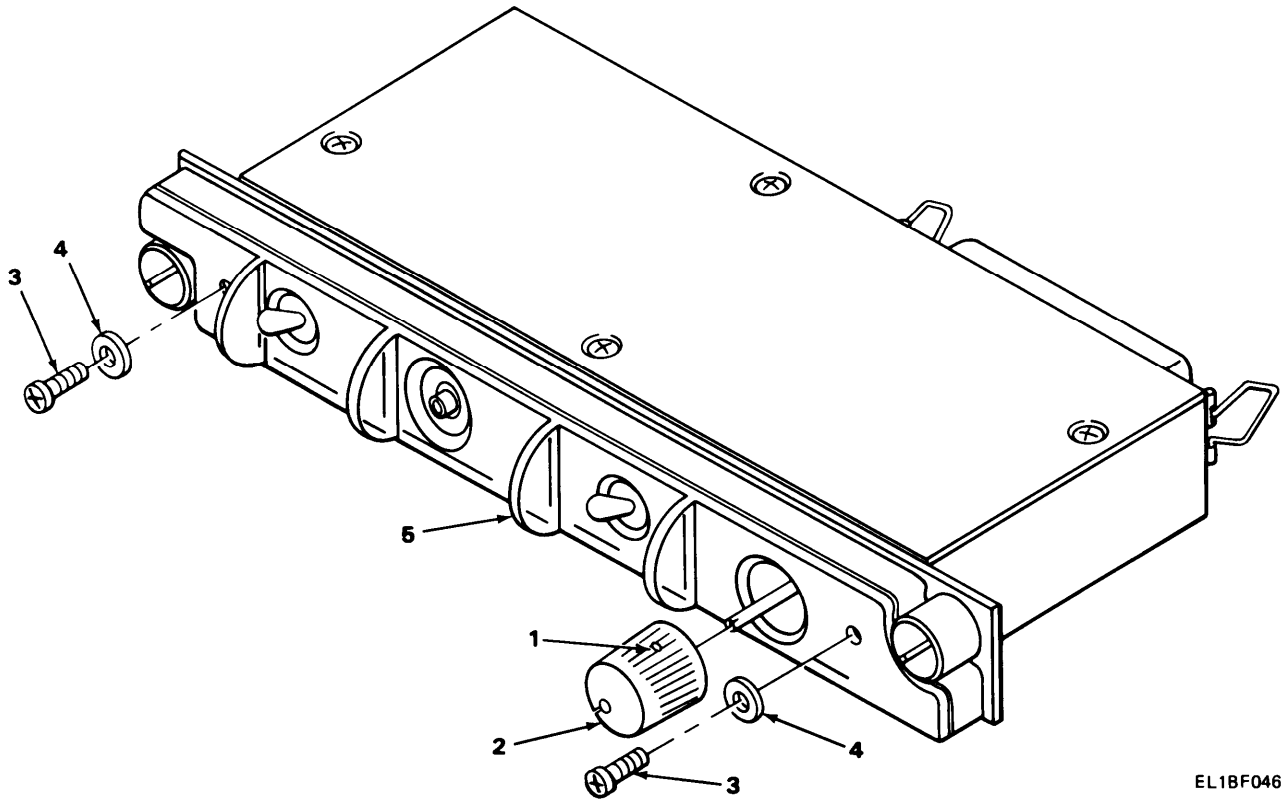
Switch guard plate
NSN

Equipment Condition

Control unit on workbench.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit front panel	Hex screw (1) and knob (2)	Using Allen wrench, loosen hex screw. Remove knob.
2.	Screws (3) flat washers (4) and switch guard plate (5)	Using cross-tip screwdriver, remove. **Throw away plate.**
INSTALLATION		
1. Control unit front panel	Switch guard plate (5), flat washers (4) and screws (3)	Using cross-tip screwdriver, install.
2.	Knob (2) and hex screw (1)	Install knob. Using Allen wrench, tighten hex screw.

2-17. REPLACEMENT OF CONTROL UNIT SWITCH GUARD PLATE. (CONT)



2-18. REPLACEMENT OF CONTROL UNIT LIGHT PANEL.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Equipment Condition

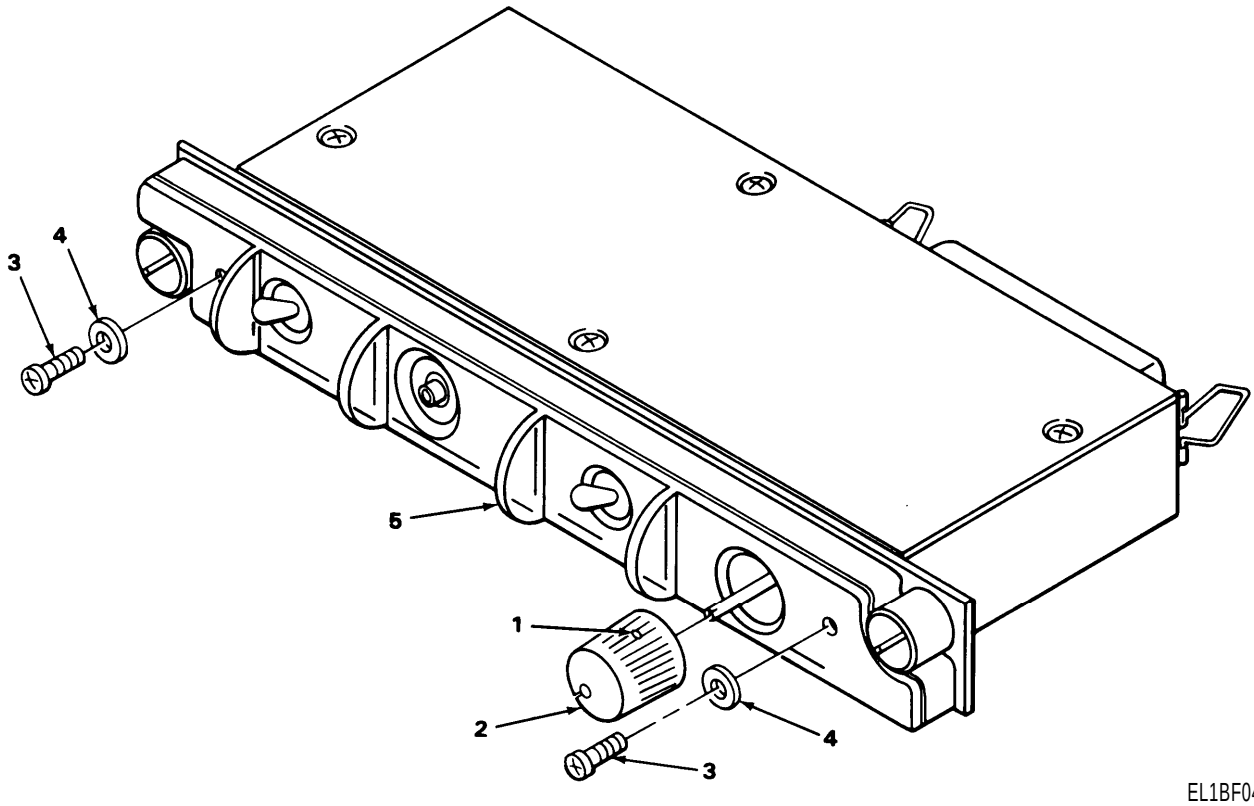
Control unit on workbench.

Materials/Parts

Panel, integrally illuminated
NSN 5841 -01-088 -2694

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit front panel	Hex screw (1) and knob (2)	Using Allen wrench, loosen hex screw. Remove knob.
2.	Screws (3), flat washers (4) and switch guard plate (5)	Using cross-tip screwdriver, remove.
3.	Light panel (6)	Remove.
INSTALLATION		
1. Control unit front panel	Light panel (6)	Install.
2.	Switch guard plate (5), flat washers (4) and screws (3)	Using cross-tip screwdriver, install.
3.	Knob (2) and hex screw (1)	Install knob. Using Allen wrench, tighten hex screw.

2-18. REPLACEMENT OF CONTROL UNIT LIGHT PANEL. (CONT)



EL1BF047

2-19. REPLACEMENT OF CONTROL UNIT COVER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Equipment Condition

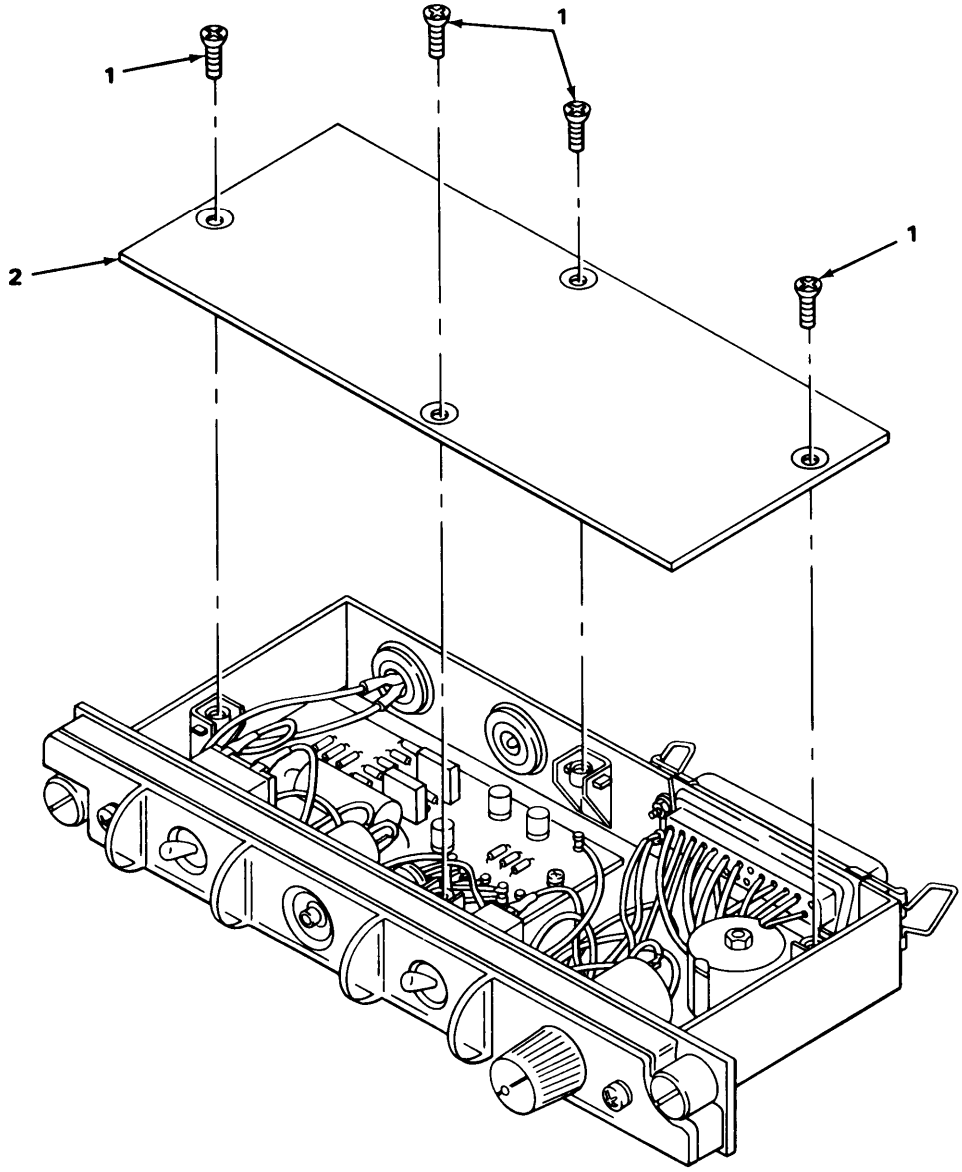
Control unit on workbench.

Materials/Parts

Cover, NSN

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit top	Screws (1)	Using cross-tip screwdriver, remove.
2.	Cover (2)	Remove.
INSTALLATION		
1. Control unit top	Cover (2)	Install.
2.	Screws (1)	Using cross-tip screwdriver, install.

2-19. REPLACEMENT OF CONTROL UNIT COVER. (CONT)



EL1BF048

2-20. REPLACEMENT OF CONTROL UNIT TONE GENERATOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Circuit card assembly, tone generator
NSN 5841-01-040-3968

Equipment Condition

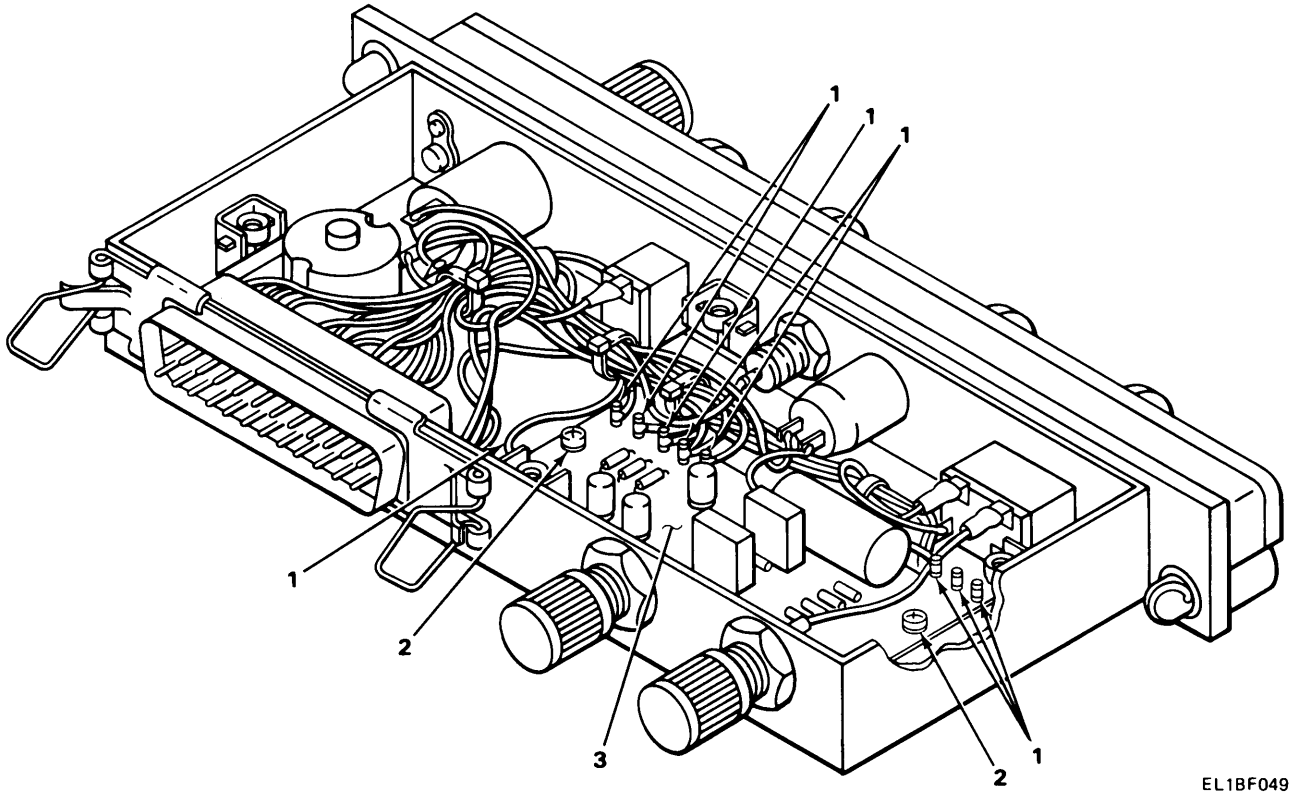
Control unit cover off. See paragraph 2-19.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Tone generator	Leads (1)	Tag. Using soldering iron and aid, unsolder.
2.	Screws (2)	Using cross-tip screwdriver, remove.
3. Control unit chassis	Tone generator (3)	Remove.
INSTALLATION		
1. Control unit chassis	Tone generator (3)	Install.
2. Tone generator	Screws (2)	Using cross-tip screwdriver, install.
3.	Leads (1)	Using soldering iron and aid, solder. Remove tags.

NOTE

See paragraph 2-19 for installation of cover onto case.

2-20. REPLACEMENT OF CONTROL UNIT TONE GENERATOR. (CONT)



2-21. REPLACEMENT OF CONTROL UNIT FUSE HOLDER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Equipment Condition

Control unit cover off. See paragraph 2-19.

Materials/Parts

Fuse holder
NSN 5920-00-902-8827
Tubing, heat shrinkable, .38 LG, RT 850-1-8

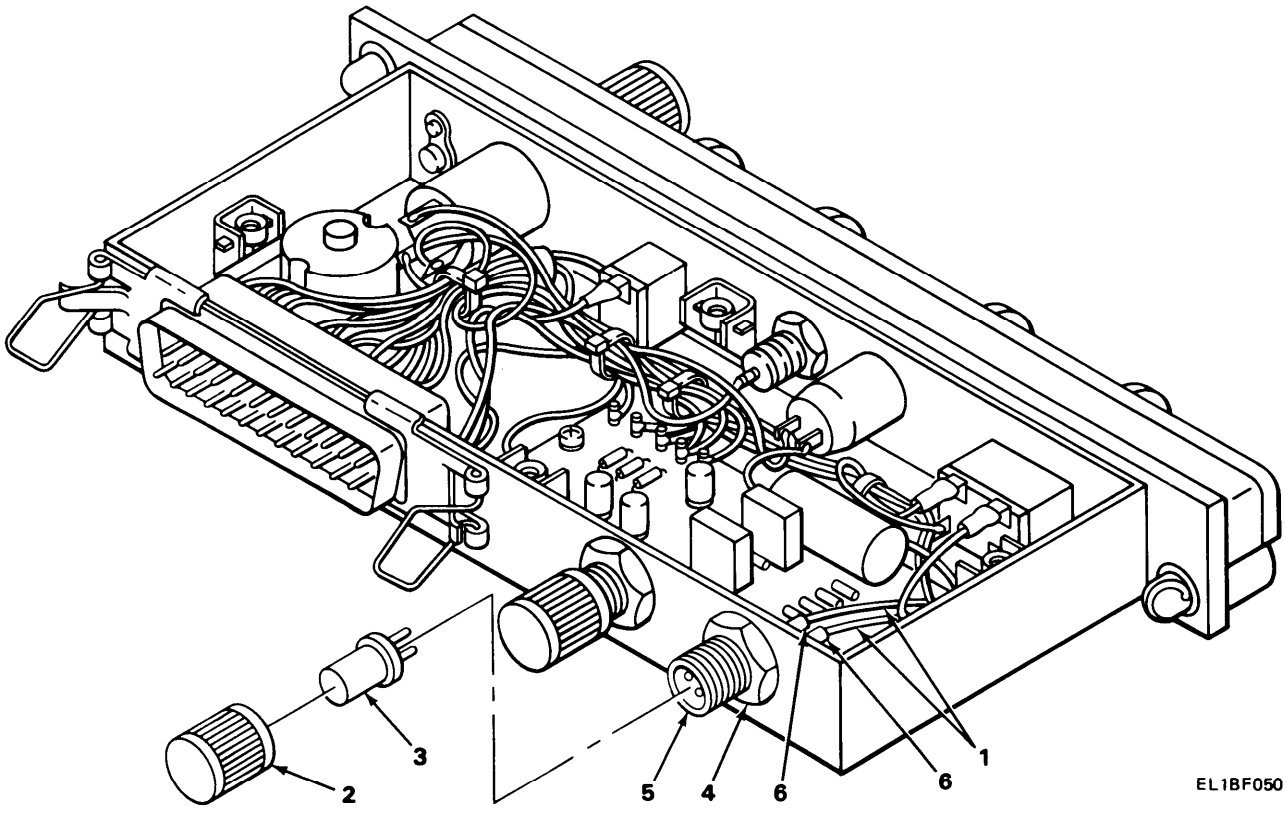
LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Fuse holder	Leads (1)	a. Using knife, remove tubing. b. Using soldering iron and aid, unsolder leads.
2.	Fuse cap (2) and fuse (3)	Remove.
3.	Hex nut (4)	Using 1/2-inch wrench, remove.
4. Control unit chassis	Fuse holder (5)	Remove.
INSTALLATION		
	NOTE Remove fuse cap on new fuse holder before installation.	
1. Control unit chassis	Fuse holder (5)	Install.
2. Fuse holder	Hex nut (4)	Using 1/2-inch wrench, install.

2-21. REPLACEMENT OF CONTROL UNIT FUSE HOLDER. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
3.	Shrinkable tubing (6) and leads (1)	Slide shrinkable tubing onto leads. Using soldering iron and aid, solder.
4.	Fuse cap (2) and fuse (3)	Install.

NOTE

See paragraph 2-19 for installation of cover onto case.



2-22. REPLACEMENT OF CONTROL UNIT AUDIO CONTROL.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Equipment Condition

Control unit cover off. See paragraph 2-19.

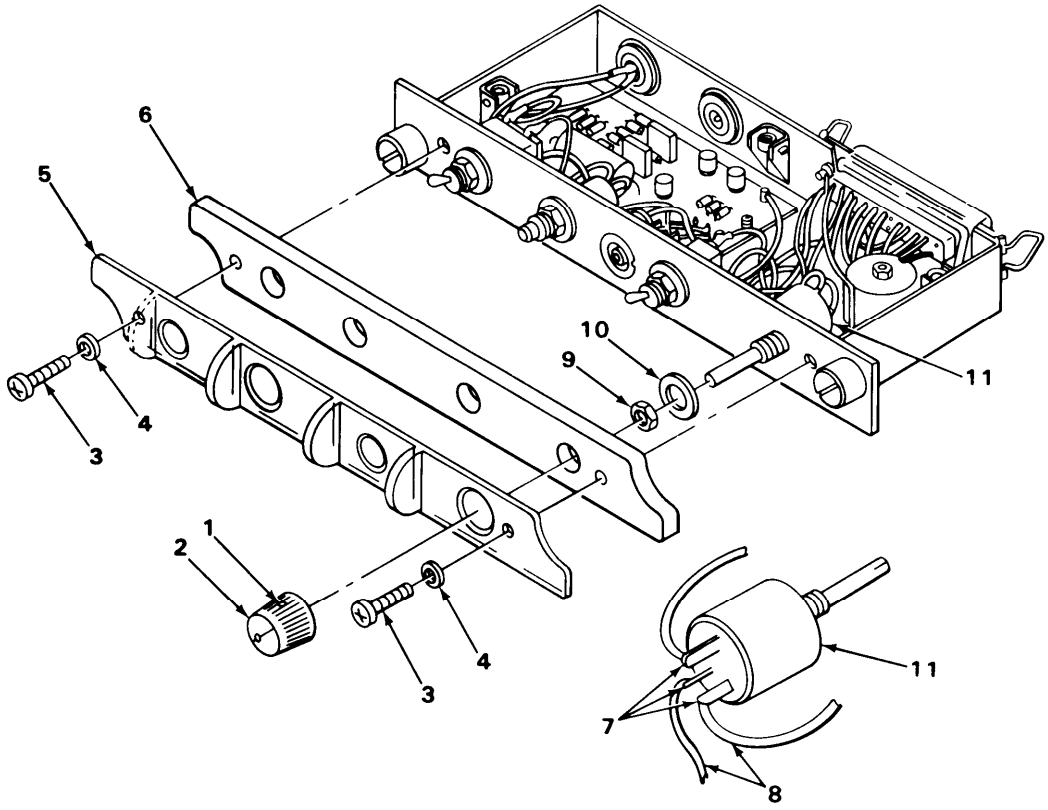
Materials/Parts

Resistor, variable
NSN 5905-00-577-1759

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit	Hex screw (1) and knob (2)	Using Allen wrench, loosen hex screw. Remove knob.
2.	Screws (3) and flat washers (4)	Using cross-tip screwdriver, remove.
3.	Switch guard plate (5) and light panel (6)	Remove.
4.	Terminal lugs (7) and leads (8)	Tag leads. Using soldering iron and aid, unsolder.
5.	Hex nut (9) and Iockwasher (10)	Using 3/8-inch wrench, remove.
6.	Audio control (11)	Remove.
INSTALLATION		
1. Control unit front panel	Audio control (11)	Install.
2.	Lockwasher (10) and hex nut (9)	Using 3/8-inch wrench, install.

2-22. REPLACEMENT OF CONTROL UNIT AUDIO CONTROL. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
3.	Leads (8) and terminal lugs (7)	Using soldering iron and aid, solder. Remove tags.
4.	Light panel (6) and switch guard plate (5)	Install.
5.	Flat washers (4) and screws (3)	Using cross-tip screwdriver, install.
6.	Knob (2) and hex screw (1)	Install knob. Using Allen wrench, tighten hex screw.



EL1BF051

2-23. REPLACEMENT OF CONTROL UNIT CHOKE ASSEMBLY.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Choke assembly
NSN 5950-01-088-2736
Tie-down straps, item 7, appendix B

Equipment Condition

Control unit cover off. See paragraph 2-19.

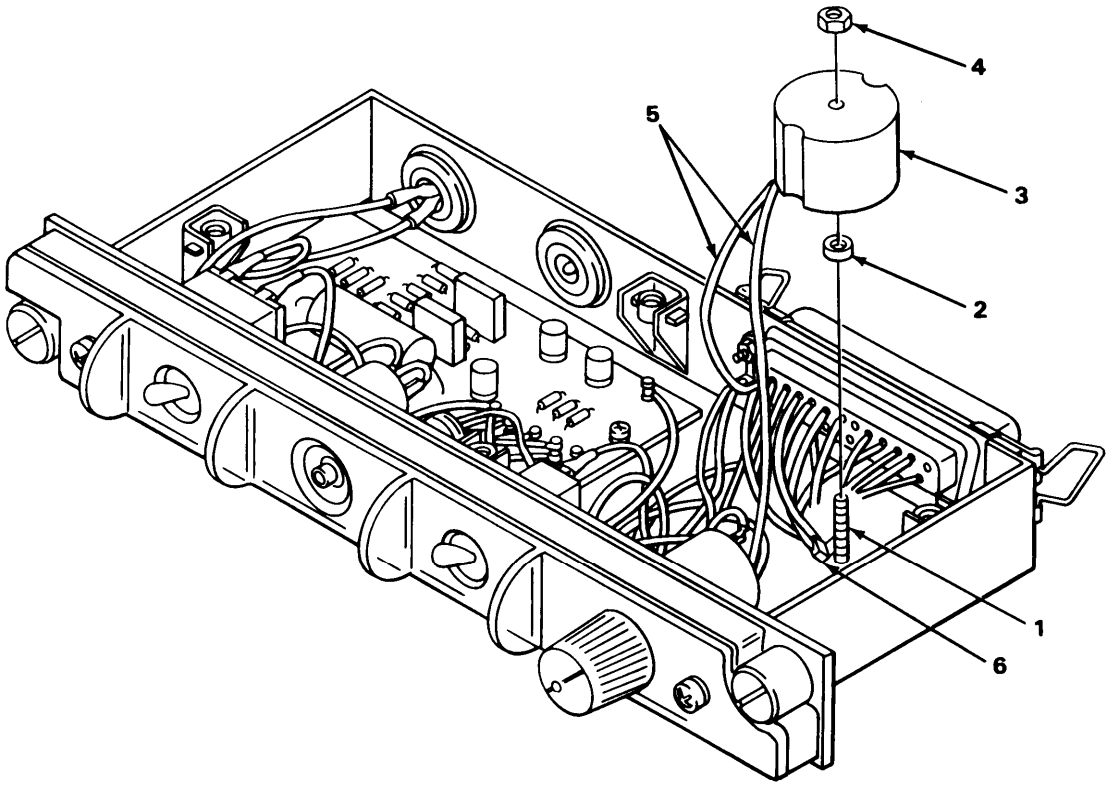
LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit chassis	Screw (1), flat washer (2), choke assembly (3) and hex nut (4)	Using cross-tip screwdriver and 1/4-inch wrench, remove.
2.	Leads (5)	a. Using soldering iron and aid, unsolder. b. Pull from wire harness to remove.
INSTALLATION		
1. Control unit chassis	Leads (5)	Using soldering iron and aid, solder.
2.	Tie-down strap (6)	Using diagonal cutters, cut tie-down strap. Insert choke assembly leads. Attach new tie-down strap. **Repeat this step along wire harness until choke assembly leads are inserted.**

2-23. REPLACEMENT OF CONTROL UNIT CHOKE ASSEMBLY. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
3. Control unit chassis	Hex nut (4), choke assembly (3), flat washer (2) and screw (1)	Using cross-tip screwdriver and 1/4-inch wrench, install.

NOTE

See paragraph 2-19 for installation of cover onto case.



EL1BF052

2-24. REPLACEMENT OF CONTROL UNIT TOGGLE SWITCH.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

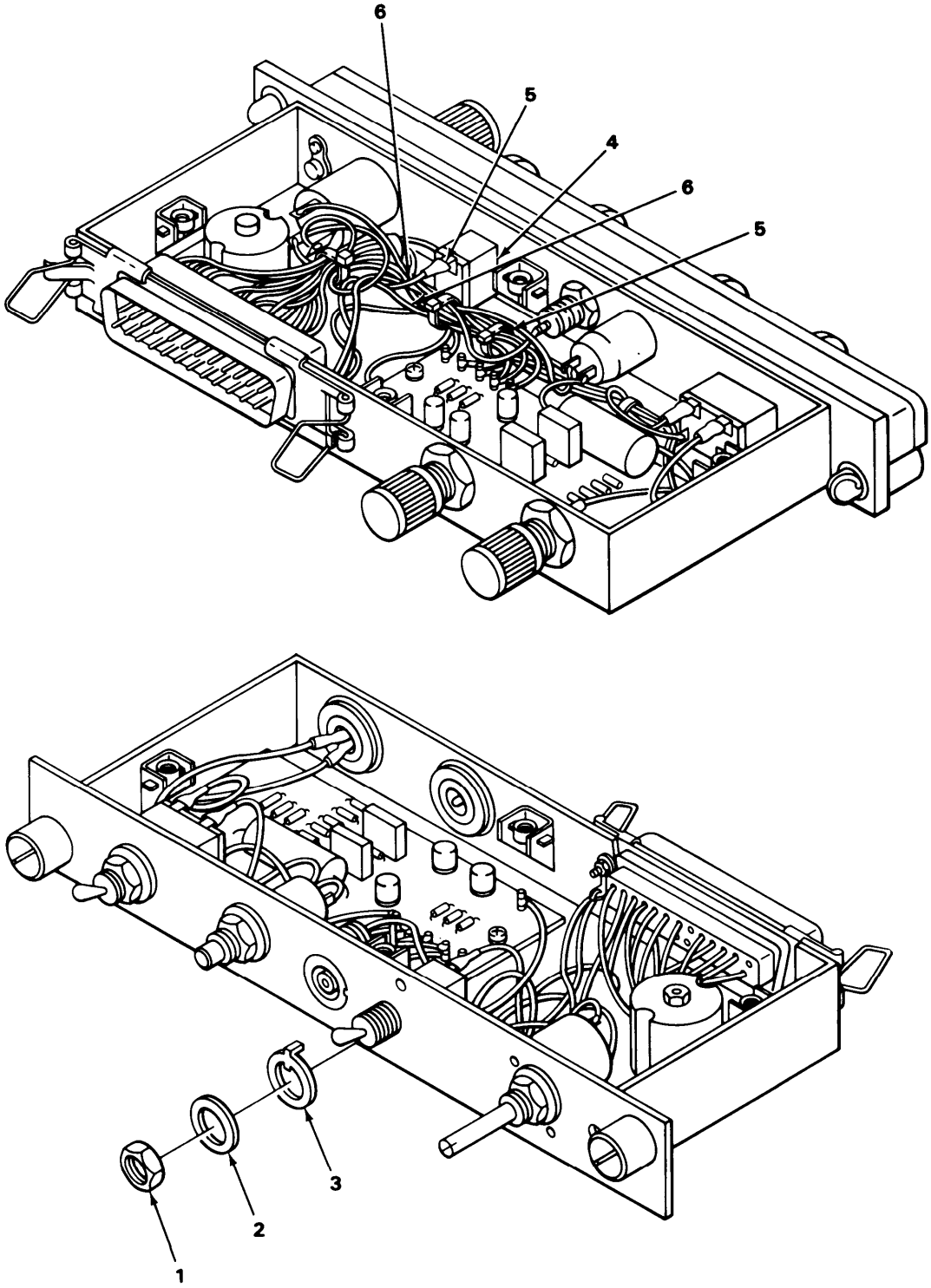
Tools	Equipment Condition
Tool Kit, Electronic Equipment TK-105/G	Control unit cover and light panel off. See paragraphs 2-17 and 2-19.
References	
TM 11-5814-283-24P	

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit front panel	Hex nut (1), lock-washer (2) and flat washer (3)	Using 3/8-inch wrench, remove.
2.	Toggle switch (4)	Remove.
3. Toggle switch	Terminal lugs (5) and leads (6)	Tag leads. Using soldering iron and aid, unsolder.
INSTALLATION		
1. Toggle switch	Leads (6) and terminal lugs (5)	Using soldering iron and aid, solder. Remove tags.
2. Control unit front panel	Toggle switch (4)	Put in panel.
3.	Flat washer (3), Iockwasher (2) and hex nut (1)	Using 3/8-inch wrench, install.

NOTE

See paragraph 2-19 for installation of cover onto case.

2-24. REPLACEMENT OF CONTROL UNIT TOGGLE SWITCH. (CONT)



EL1BF053

2-25. REPLACEMENT OF CONTROL UNIT Pushbutton SWITCH.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Switch, pushbutton
NSN 5930-00-345-6860

Equipment Condition

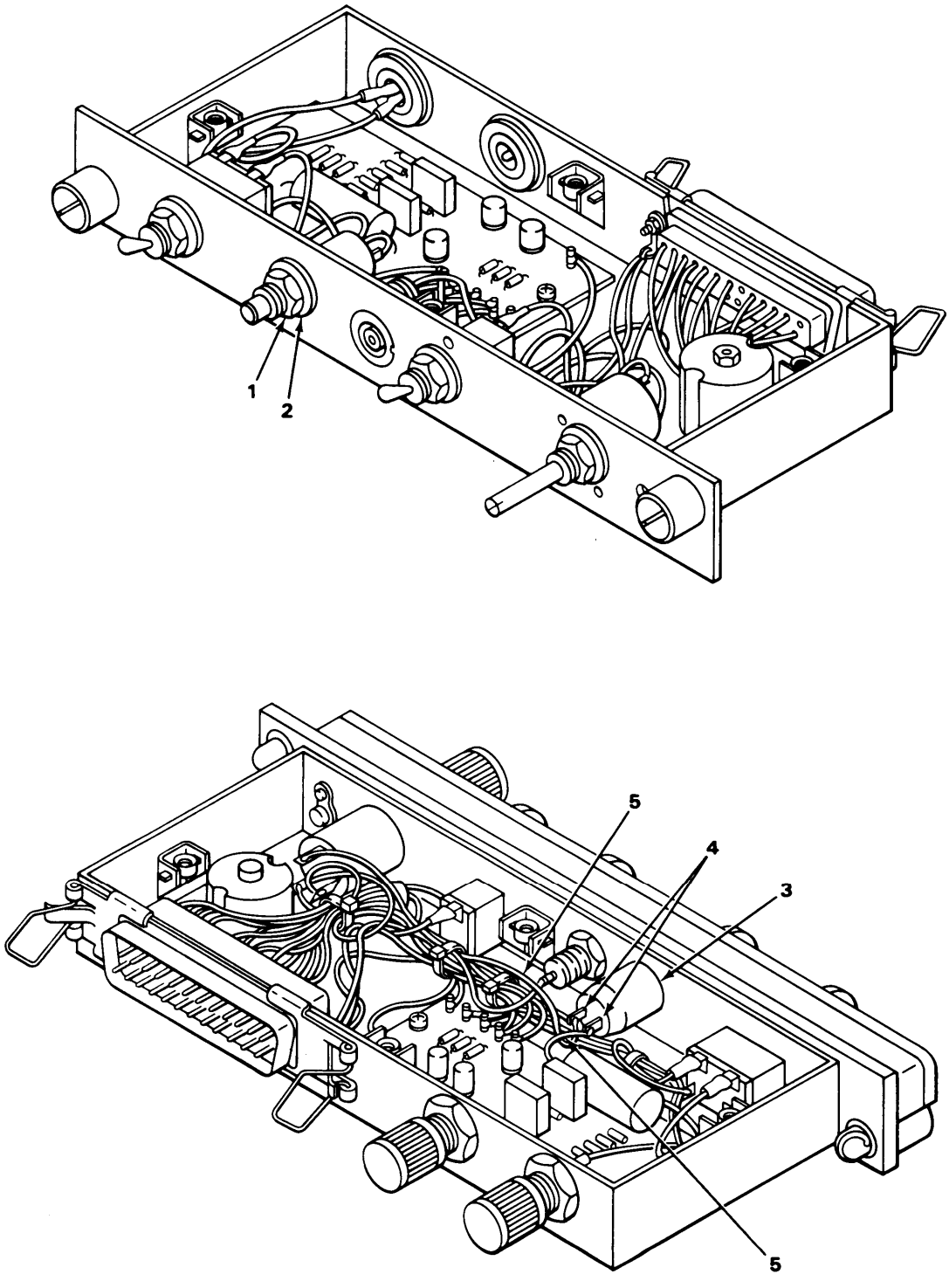
Control unit cover and light panel off. See paragraphs 2-18 and 2-19.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Control unit front panel	Hex nut (1) and lockwasher (2)	Using 3/8-inch wrench, remove.
2.	Pushbutton switch (3)	Remove.
3. Pushbutton switch	Terminal lugs (4) and leads (5)	Tag leads. Using soldering iron and aid, unsolder.
INSTALLATION		
1. Pushbutton switch	Leads (5) and terminal lugs (4)	Using soldering iron and aid, solder. Remove tags.
2. Control unit front panel	Pushbutton switch (3)	Put in panel.
3.	Lockwasher (2) and hex nut (1)	Using 3/8-inch wrench, install.

NOTE

See paragraph 2-19 for installation of cover onto case.

2-25. REPLACEMENT OF CONTROL UNIT Pushbutton SWITCH. (CONT)



EL1BF054

2-26. REPLACEMENT OF CONTROL UNIT LIGHT PANEL CONNECTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

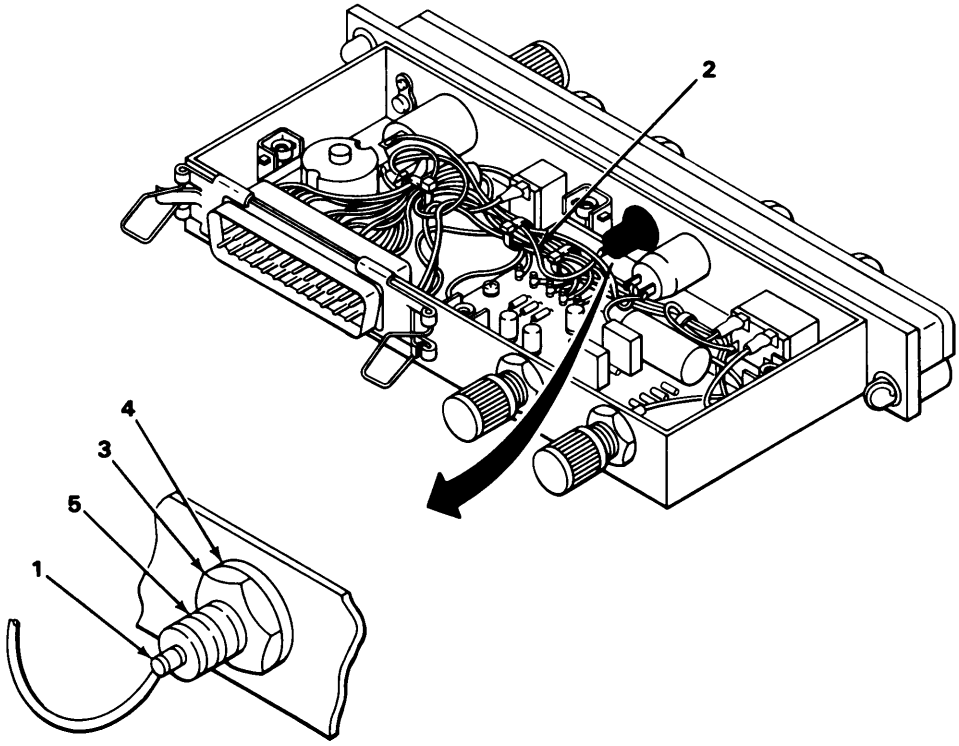
Connector, receptacle, electrical
NSN 5935-00-917-0336

Equipment Condition

Control unit cover and light panel off. See paragraphs 2-18 and 2-19. Pushbutton switch removed. See paragraph 2-25.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Light panel connector	Terminal (1) and lead (2)	Using soldering iron and aid, unsolder.
2. Control unit front panel	Hex nut (3) and flat washer (4)	Using 1/2-inch wrench, remove.
3.	Light panel connector (5)	Remove.
INSTALLATION		
1. Control unit front panel	Light panel connector (5)	Put in place.
2.	Flat washer (4) and hex nut (3)	Using 1/2-inch wrench, install.
3. Light panel connector	Lead (2) and terminal (1)	Using soldering iron and aid, solder.

2-26. REPLACEMENT OF CONTROL UNIT LIGHT PANEL CONNECTOR. (CONT)



EL1BF055

2-27. REPLACEMENT OF CONTROL UNIT LATCH SPRING.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Latch, spring
NSN 5340-00-232-9083

Equipment Condition

Control unit cover off. See paragraph 2-19.

LOCATION	ITEM	ACTION **REMARKS**

REMOVAL

NOTE

In the following procedure, the latch spring may or may not have a lead lug. Replacement is done in the same way for both.

Control unit rear panel	Screw (1), latch spring (2), lead lug (3), flat washer (4), lock-washer (5) and hex nut (6)	Using flat-tip screwdriver, remove.

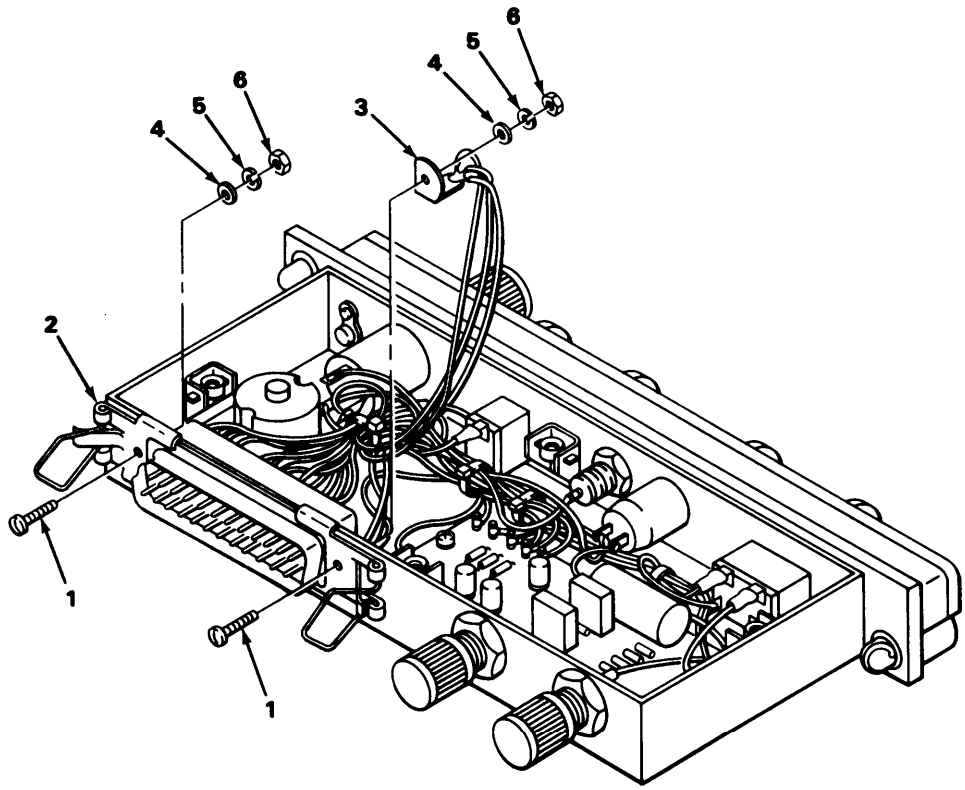
INSTALLATION

Control unit rear panel	Screw (1), latch spring (2), lead lug (3), flat washer (4), lock-washer (5) and hex nut (6)	Using flat-tip screwdriver, install.

NOTE

See paragraph 2-19 for installation of cover onto case.

2-27. REPLACEMENT OF CONTROL UNIT LATCH SPRING. (CONT)



EL1BF056

2-28. REPLACEMENT OF CONTROL UNIT ELECTRICAL CONNECTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Connector, electric, rectangular
NSN 5935-00-439-3748

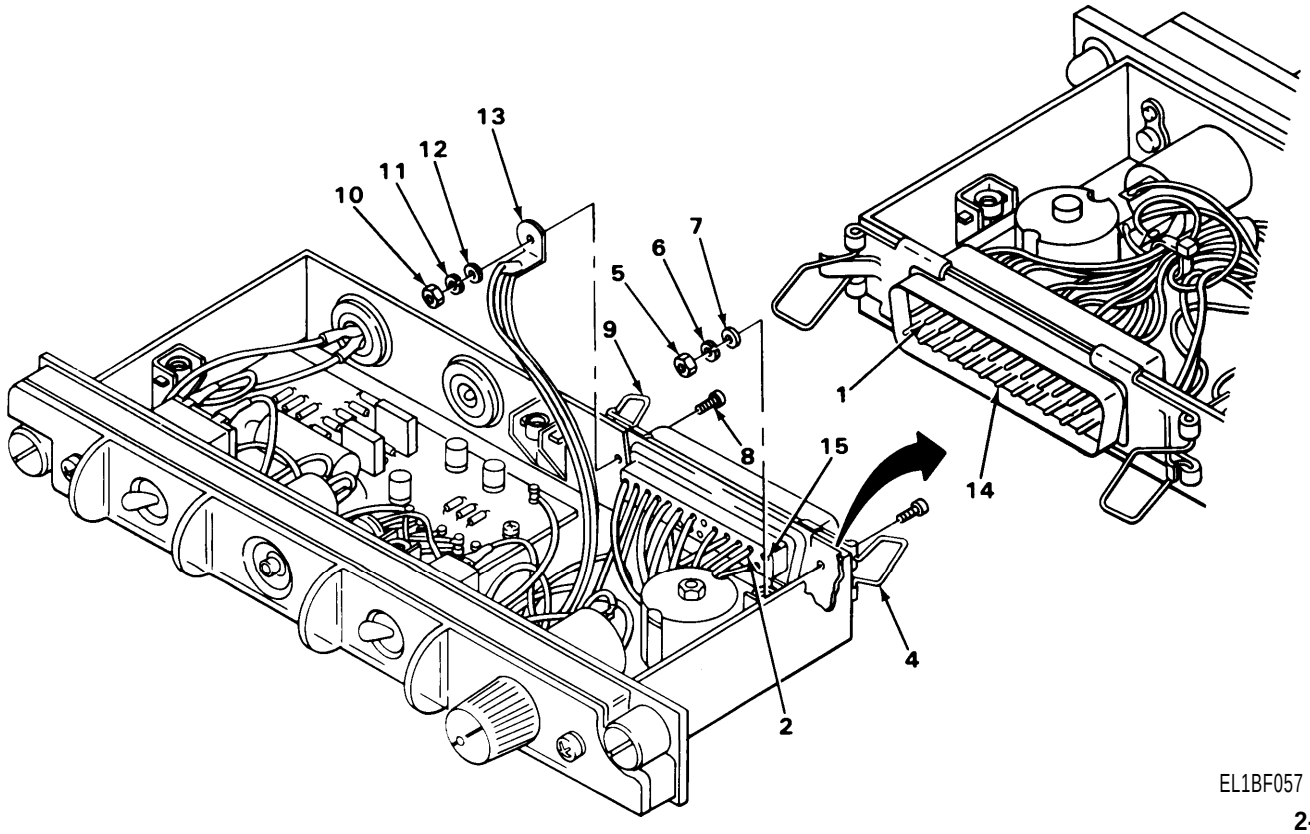
Equipment Condition

Control unit cover off. See paragraph 2-19.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Electrical connector	Connector pin (1) and lead (2)	Using flat-tip soldering iron, heat pin and remove lead. Tag lead. There are 15 leads. Repeat step 1 for each lead.
2. Control unit rear panel	Screw (3), latch spring (4), hex nut (5), lock-washer (6) and flat washer (7)	Using flat-tip screwdriver, remove.
3.	Screw (8), latch spring (9), hex nut (10), lock-washer (11), flat washer (12) and terminal lug (13)	Using flat-tip screwdriver, remove.
4.	Connector (14)	Remove.

2-28. REPLACEMENT OF CONTROL UNIT ELECTRICAL CONNECTOR. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION		
1. Electrical connector	Connector pin wells (15)	Using flat-tip soldering iron, heat pin and melt solder into wells.
2. Control unit rear panel	Connector (14)	Put in place.
3.	Latch spring (9), screw (8), terminal lug (13), flat washer (12), lockwasher (11) and hex nut (10)	Using flat-tip screwdriver and needle nose pliers, install.
4.	Latch spring (4), screw (3), flat washer (7), lockwasher (6) and hex nut (5)	Using flat-tip screwdriver and needle nose pliers, install.
5.	Lead (2) and connector pin (1)	Using flat-tip soldering iron, heat pin and insert lead. Remove tag. **Do this step for each pin and lead.**



EL1BF057

2-29. REPAIR OF CONTROL UNIT WIRE HARNESS.

This task covers:

Repair

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

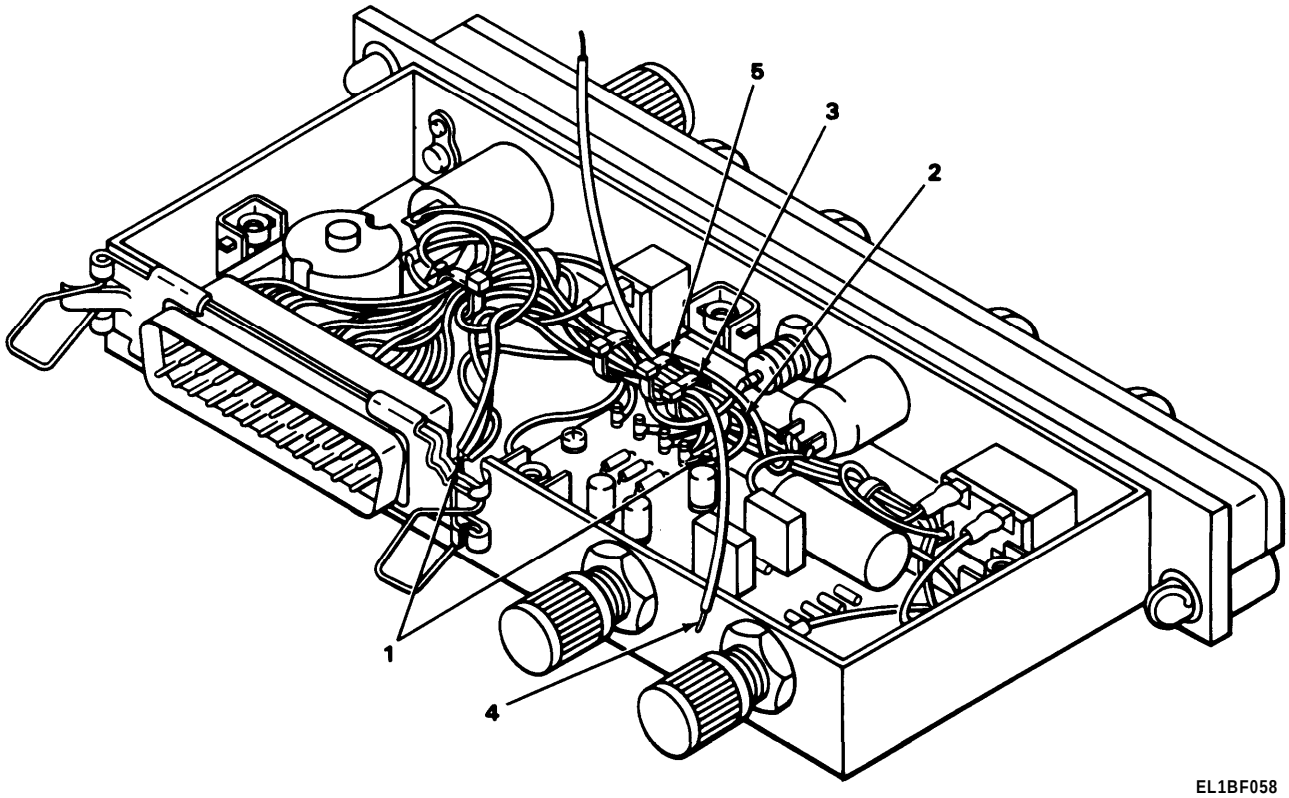
Wire, type E-22, Rem 6, appendix B
Tie-down straps, item 7, appendix B

Equipment Condition

Control unit cover off. See paragraph 2-19.

LOCATION	ITEM	ACTION **REMARKS**
		NOTE The following procedure shows typical repair. All wires are repaired in the same way.
1. Control unit	Terminal lugs (1) and lead (2)	Using soldering iron and aid, unsolder.
2. Wire harness	Tie-down strap (3) and lead (2)	Using diagonal cutters, cut tie-down strap and remove lead.
3.	New lead (4) and new tie-down strap (5)	Install, **Repeat steps 2 and 3 along wire harness until old lead is removed and new lead is installed.**
4.	New lead (4) and terminal lugs (1)	Using soldering iron and aid, solder.
		NOTE See paragraph 2-19 for installation of cover onto case.

2-29. REPAIR OF CONTROL UNIT WIRE HARNESS. (CONT)



EL1BF058

2-30. REPLACEMENT OF RADAR SIGNAL INDICATOR RED POLARIZER LENS.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

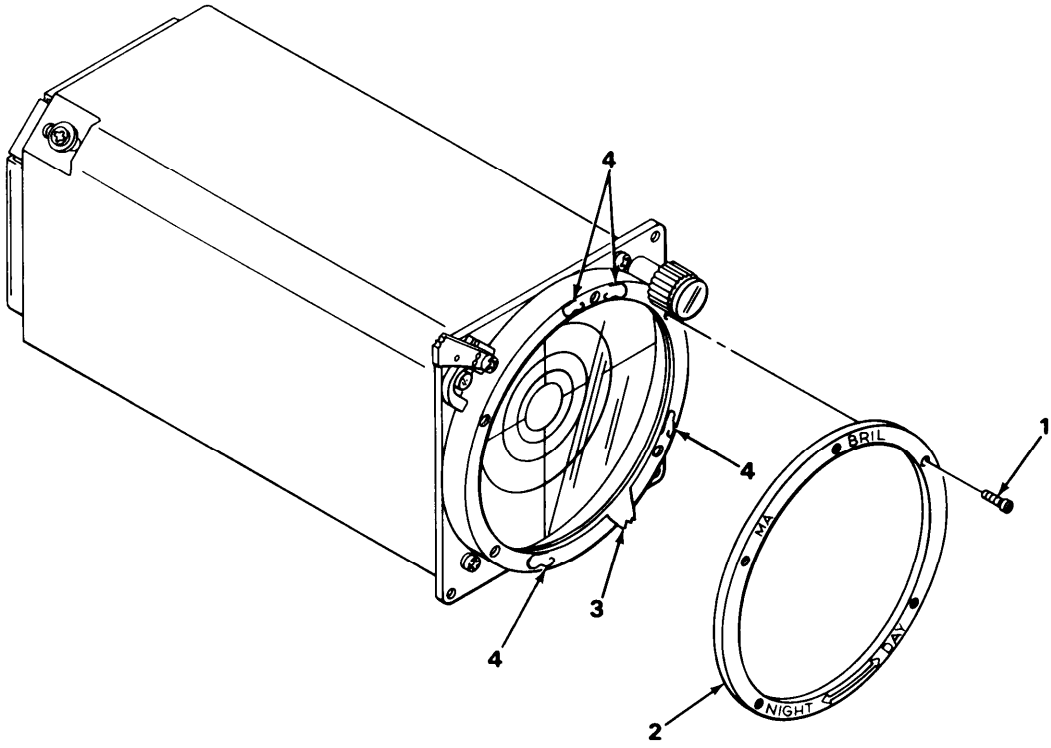
Polarizer, variable, red, sector scope, SMC876935

Equipment Condition

Radar signal indicator on workbench.

LOCATION	ITEM	ACTION / REMARKS
REMOVAL		
1. Radar signal indicator front panel	Screws (1) and retainer ring (2)	Using cross-tip screwdriver, remove.
2.	Red polarizer lens (3)	Remove.
3.	Retainer lens springs (4)	Remove. **Keep retainer lens springs.**
INSTALLATION		
1. Radar signal indicator front panel	Red polarizer lens (3)	Install. **Install lens where maximum red occurs in NIGHT position.**
2.	Retainer lens springs (4)	Install.
3.	Retainer ring (2) and screws (1)	Using cross-tip screwdriver, install.

2-30. REPLACEMENT OF RADAR SIGNAL INDICATOR RED POLARIZER LENS. (CONT)



EL1BF059

2-31. REPLACEMENT OF RADAR SIGNAL INDICATOR COVER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

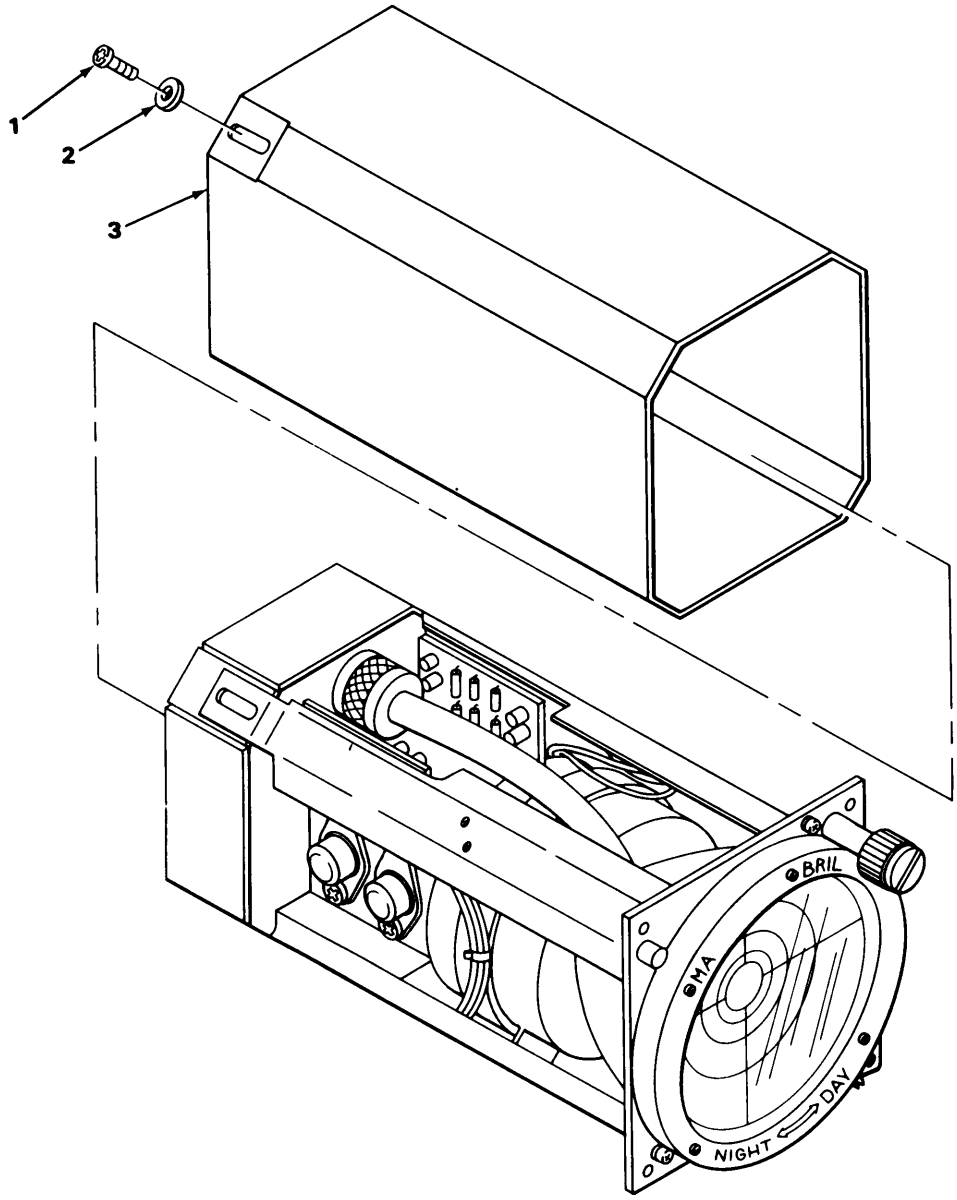
Cover, indicator, SMD876940

Equipment Condition

Radar signal indicator on workbench.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Radar signal indicator	Screws (1) and flat washers (2)	Using cross-tip screwdriver, remove.
2.	Cover (3)	Remove.
INSTALLATION		
1. Radar signal indicator	Cover (3)	Install.
2.	Flat washers (2) and screws (1)	Using cross-tip screwdriver, install.

2-31. REPLACEMENT OF RADAR SIGNAL INDICATOR COVER. (CONT)



EL1BF060

2-32. REPLACEMENT OF RADAR SIGNAL INDICATOR FRONT PANEL.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/parts

Panel, front
NSN

Equipment Condition

Radar signal indicator cover and red polarizer lens removed. See paragraphs 2-30 and 2-31.

LOCATION	ITEM	ACTION / REMARKS
REMOVAL		
1. Front panel	Screw (1) and BRIL control knob (2)	Using Allen wrench, loosen screw and remove knob.
2.	Mounting screw (3) and flat washer (4)	Using cross-tip screwdriver, remove. **There are four mounting screws. Each screw must be removed to remove front panel.**
3. Chassis assembly	Front panel (5)	Remove.

NOTE

See paragraph 2-36 for removal of MA lamp.

INSTALLATION

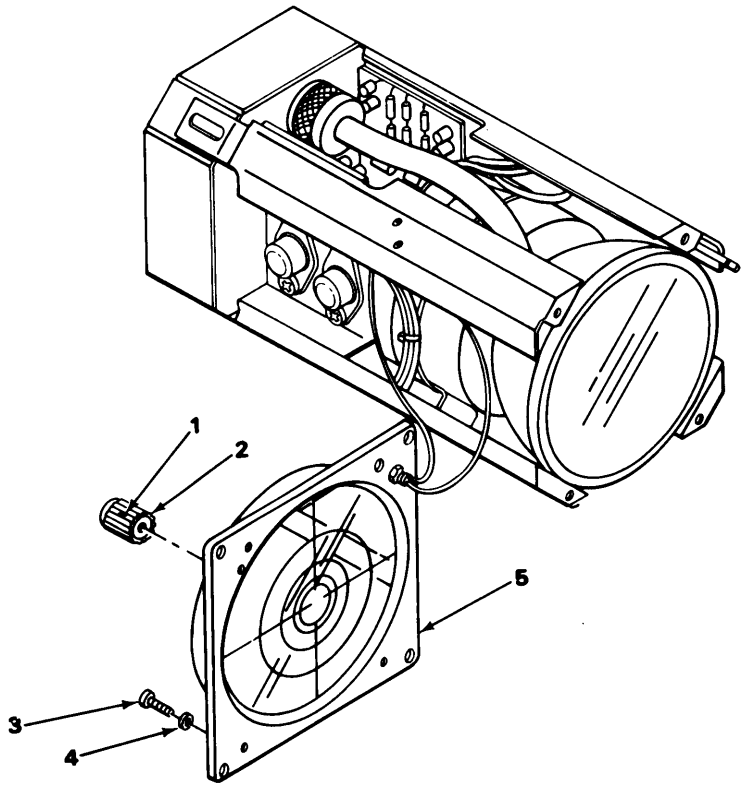
NOTE

See paragraph 2-36 for installation of MA lamp.

1. Chassis assembly	Front panel (5)	Install.

2-32. REPLACEMENT OF RADAR SIGNAL INDICATOR FRONT PANEL. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
2. Front panel	Flat washer (4) and mounting screw (3)	Using cross-tip screwdriver, install. **There are four mounting screws. Each screw must be installed to install front panel.**
3.	BRIL control knob (2) and screw (1)	Install knob. Using Allen wrench, tighten screw.



EL1BF061

2-33. REPAIR OF RADAR SIGNAL INDICATOR WIRE HARNESS.

This task covers:

Repair

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

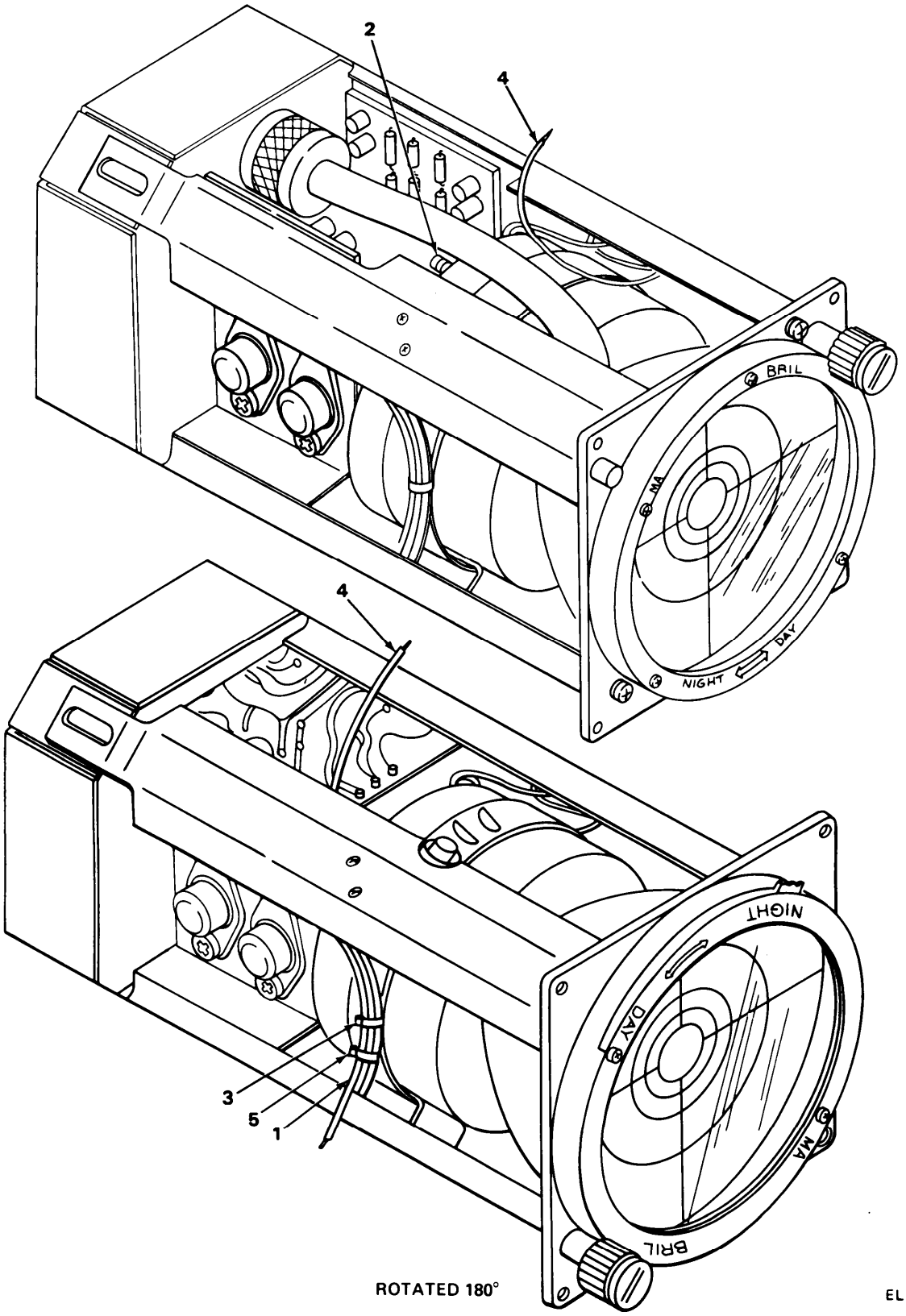
Wire, type E-22, item 6, appendix B
Tie-down strap, item 7, appendix B

Equipment Condition

Radar signal indicator cover off. See paragraph 2-31.

LOCATION	ITEM	ACTION **REMARKS**
		NOTE The following procedure shows typical repair. All wires are repaired in the same way.
1. Radar signal indicator	Lead (1) and terminal lug (2)	Using soldering iron and aid, unsolder.
2. Wire harness	Tie-down strap (3) and lead (1)	Using diagonal cutters, cut tie-down strap and remove lead.
3. Radar signal indicator	New lead (4) and terminal lug (2)	Using soldering iron and aid, solder.
4. Wire harness	New lead (4) and new tie-down strap (5)	Install. **Repeat steps 2 and 4 along wire harness until old lead is removed and new lead is installed.**
5. Radar signal indicator	Lead (1) and terminal lug (2)	Using soldering iron and aid, solder.
6.	New lead (4) and terminal lug (2)	Using soldering iron and aid, solder.

2-33. REPAIR OF RADAR SIGNAL INDICATOR WIRE HARNESS. (CONT)



2-34. REPLACEMENT OF RADAR SIGNAL INDICATOR ELECTRICAL CONNECTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

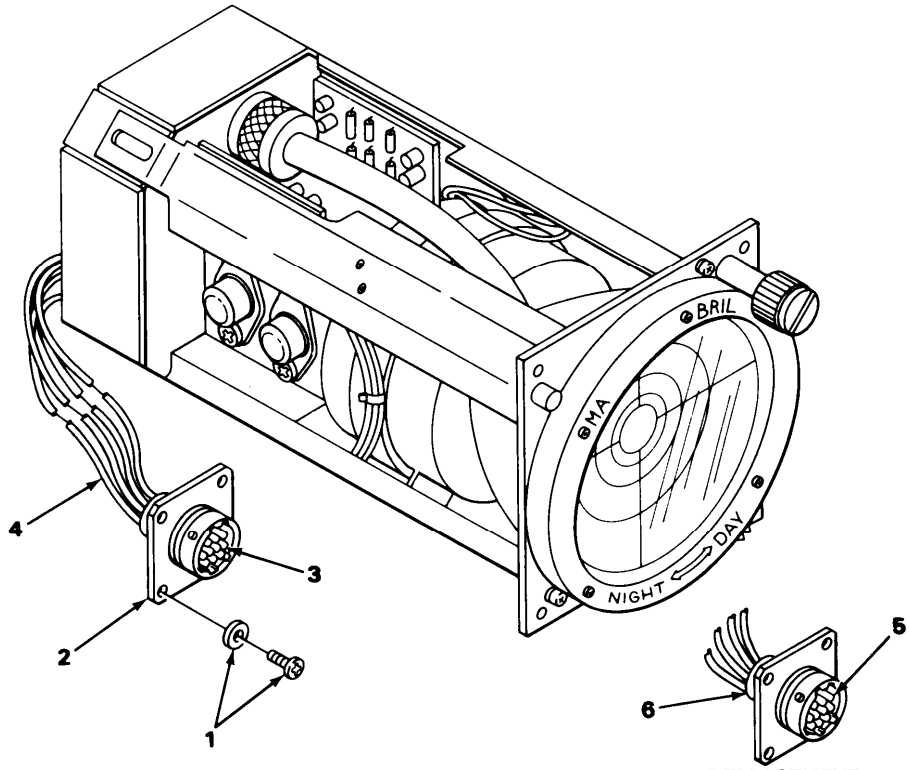
Connector, receptacle, electrical
NSN 5935-00-917-0336

Equipment Condition

Radar signal indicator cover off.
See paragraph 2-31.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Radar signal indicator	Screws (1)	Using cross-tip screwdriver, remove.
2.	Electrical connector (2)	Lift out.
3.	Pins (3) and leads (4)	Tag leads. Using soldering iron and aid, heat pins and remove leads.
INSTALLATION		
1. Radar signal indicator	Pins (5) and pin wells (6)	Using soldering iron and aid, heat pins and insert solder into pin wells.
2.	Pins (3) and leads (4)	Using soldering iron and aid, heat pins and insert leads. Remove tags.
3.	Electrical connector (2)	Install.
4.	Screws (1)	Using cross-tip screwdriver, install.

2-34. REPLACEMENT OF RADAR SIGNAL INDICATOR ELECTRICAL CONNECTOR. (CONT)



REPLACEMENT EL1BF063

2-35. REPLACEMENT OF RADAR SIGNAL INDICATOR DRIVER TRANSISTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

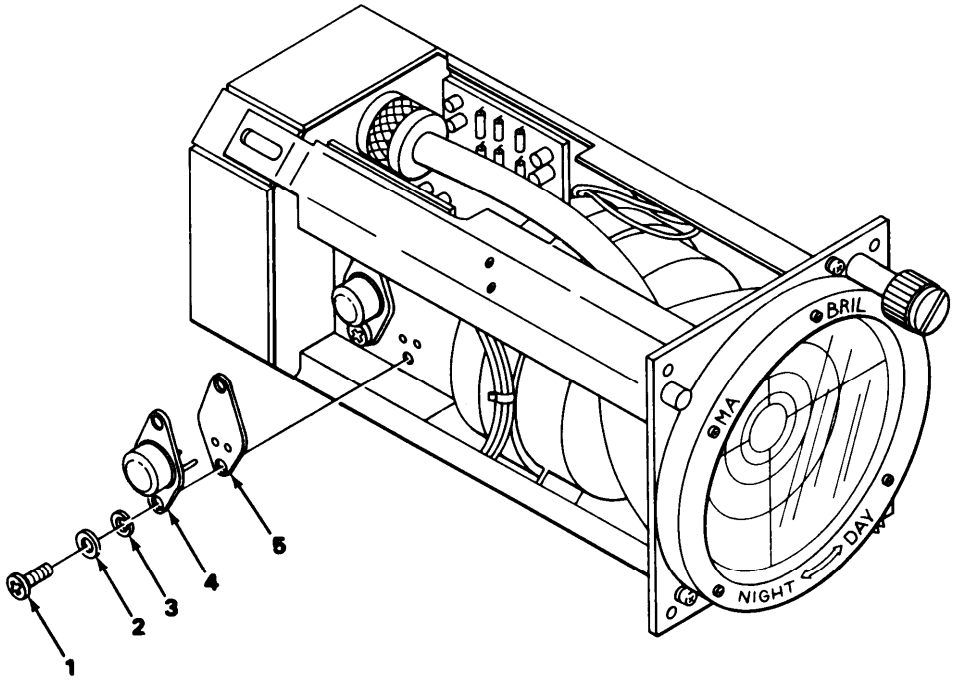
Transistor
NSN
Insulator plate, item 11, appendix B

Equipment Condition

Radar signal indicator cover off. See paragraph 2-31.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Transistor	Screws (1), lockwashers (2) and flat washers (3)	Using cross-tip screwdriver, remove.
2. Chassis assembly	Transistor (4) and insulator plate (5)	Remove.
INSTALLATION		
1. Chassis assembly	Insulator plate (5) and transistor (4)	Install.
2. Transistor	Flat washers (3), lockwashers (2) and screws (1)	Using cross-tip screwdriver, install.

2-35. REPLACEMENT OF RADAR SIGNAL INDICATOR DRIVER TRANSISTOR. (CONT)



EL1BF064

2-36. REPLACEMENT OF RADAR SIGNAL INDICATOR MA LAMP.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

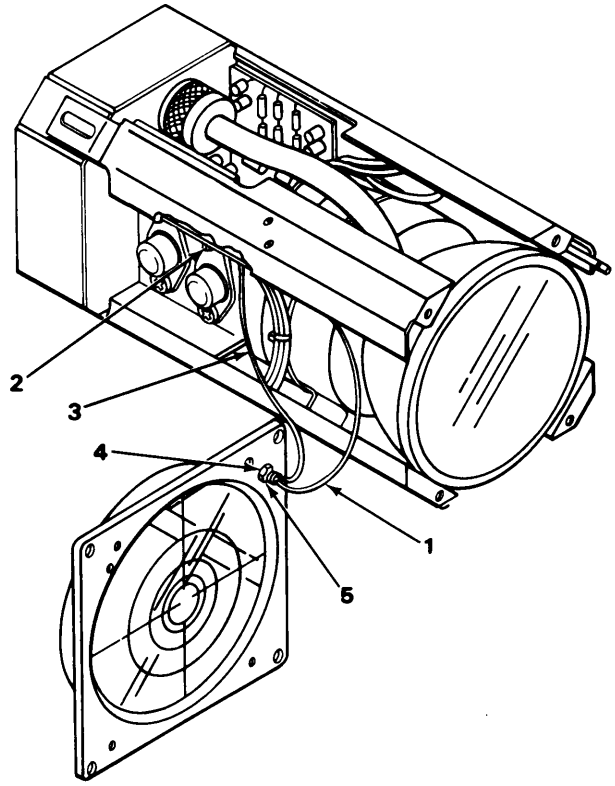
Light, indicator
NSN
Tubing, heat shrinkable,
item 8, appendix B

Equipment Condition

Radar signal indicator front panel removed. See paragraph 2-32.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Radar signal indicator	Lead (1)	Using soldering iron and aid, unsolder. Tag terminal.
2.	Allen screw (2) and lead (3)	Using Allen wrench, remove.
3.	Hex nut (4) and MA lamp (5)	Using 3/8-inch wrench, remove.
INSTALLATION		
1. Radar signal indicator	MA lamp (5) and hex nut (4)	Using 3/8-inch wrench, install.
2.	Lead (3) and Allen screw (2)	Using Allen wrench, install.
3.	Lead (1) and shrinkable tubing (6)	Install.
4.	Lead (1)	Using soldering iron and aid, solder. Remove tag.

2-36. REPLACEMENT OF RADAR SIGNAL INDICATOR MA LAMP. (CONT)



EL1BF065

2-37. REPLACEMENT OF RADAR SIGNAL INDICATOR DEFLECTION AMPLIFIER CIRCUIT CARDS Al AND A2.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Circuit card assembly, deflection, SMC877004

Insulator plate, item 11, appendix B

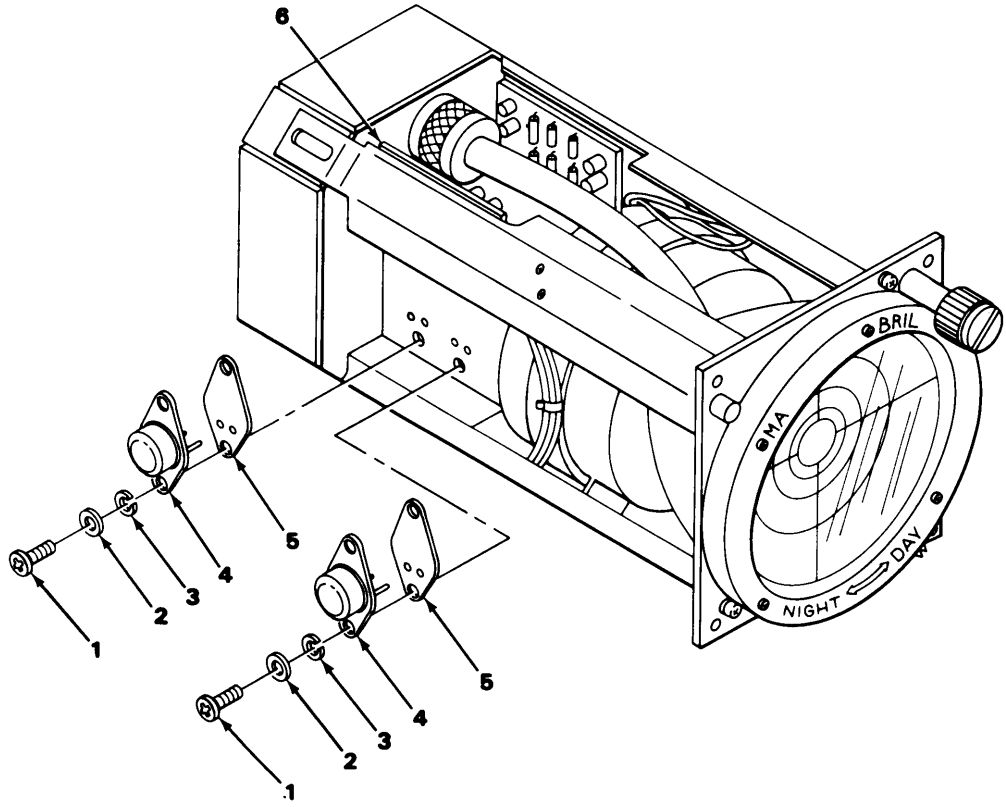
Equipment Condition

Radar signal indicator cover off. See paragraph 2-31.

LOCATION	ITEM	ACTION / REMARKS
REMOVAL		
1. Chassis assembly	Screws (1), lockwashers (2) and flat washers (3)	Using cross-tip screwdriver, remove.
2.	Transistor (4) and insulator plate (5)	Remove. **There are two transistors. Both must be removed to remove circuit card. Repeat steps 1 and 2.**
3. Circuit and connector board	Deflection amplifier circuit card (6)	Using needle nose pliers, remove.
INSTALLATION		
1. Circuit card connector board	Deflection amplifier circuit card (6)	Install.

2-37. REPLACEMENT OF RADAR SIGNAL INDICATOR DEFLECTION AMPLIFIER CIRCUIT CARDS A1 AND A2. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
2. Chassis assembly	Insulator plate (5) and transistor (4)	Install.
3.	Flat washers (3), lockwashers (2) and screws (1)	Using cross-tip screwdriver, install. **There are two transistors. Repeat steps 2 and 3.**



EL1BF066

2-38. REPLACEMENT OF RADAR SIGNAL INDICATOR POWER SUPPLY.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Power supply assembly, SMD877090

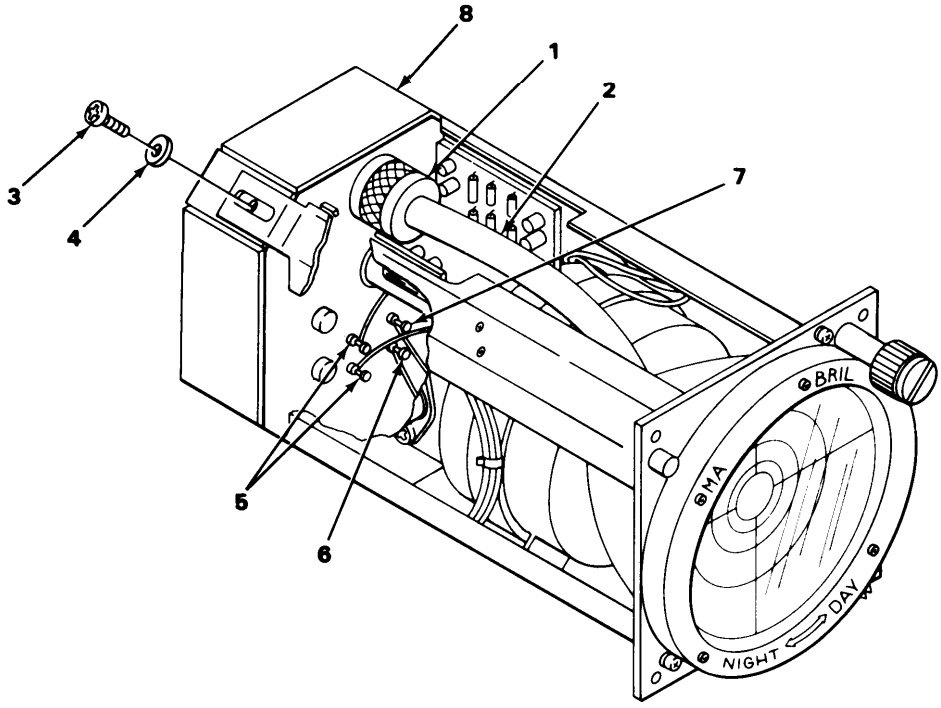
Equipment Condition

Radar signal indicator cover off and electrical connector removed. See paragraphs 2-31 and 2-34.

LOCATION	ITEM	ACTION	**REMARKS**
REMOVAL			
1. Power supply	Cap (1) and, high voltage cable (2)	Unscrew cap and remove cable.	
2.	Screws (3) and flat washers (4)	Using cross-tip screwdriver, remove.	
3.	Leads (5), (6) and (7)	Tag, unsolder.	
A. Chassis assembly	Power supply (8)	Remove.	**Pull straight back to remove the power supply from the CRT pins.**
INSTALLATION			
1. Chassis assembly	Power supply (8)	Install.	
2.	Leads (7), (6) and (5)	Solder. Remove tags.	
3. Power supply	Flat washers (4) and screws (3)	Using cross-tip screwdriver, install.	

2-38. REPLACEMENT OF RADAR SIGNAL INDICATOR POWER SUPPLY. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
4.	High voltage cable (2) and cap (1)	Install cable and screw on cap.



EL1BF067

2-39. REPLACEMENT OF RADAR SIGNAL INDICATOR CIRCUIT CARD CONNECTOR BOARD.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Circuit card assembly, connector board, SMC877001

Equipment Condition

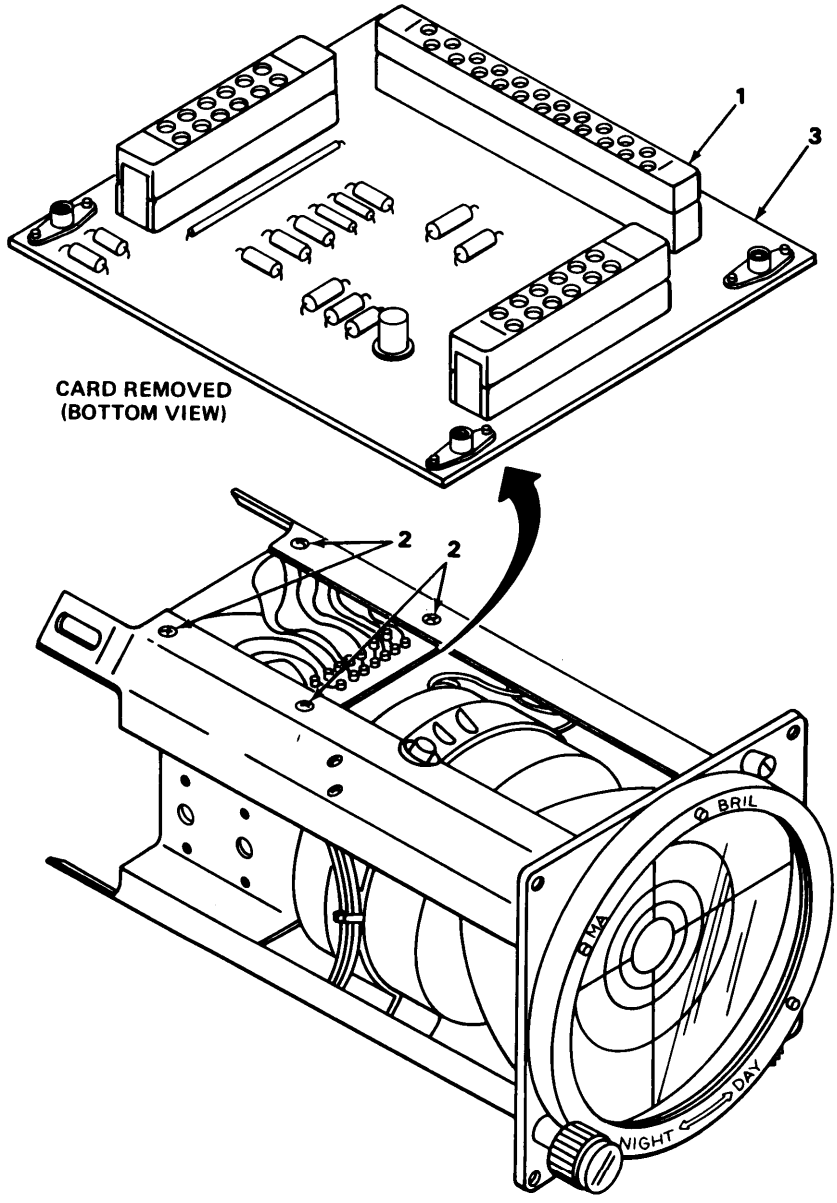
Radar signal indicator power supply and deflection amplifier circuit cards A1 and A2 removed. See paragraphs 2-37 and 2-38.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Circuit card connector board	Connector plug (1)	Remove.
2. Chassis assembly	Screws (2)	Using cross-tip screwdriver, remove.
3.	Circuit card connector board (3)	Remove.
INSTALLATION		
1. Chassis assembly	Circuit card connector board (3)	Install.
2.	Screws (2)	Using cross-tip screwdriver, remove.
3.	Connector plug (1)	Install.

NOTE

See paragraphs 2-37 and 2-38 for installation of power supply and deflection amplifier circuit cards A1 and A2.

2-39. REPLACEMENT OF RADAR SIGNAL INDICATOR CIRCUIT CARD CONNECTOR BOARD. (CONT)



EL1BF068

2-40. REPLACEMENT OF RADAR SIGNAL INDICATOR CRT.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Tube, electron, KC3055P28

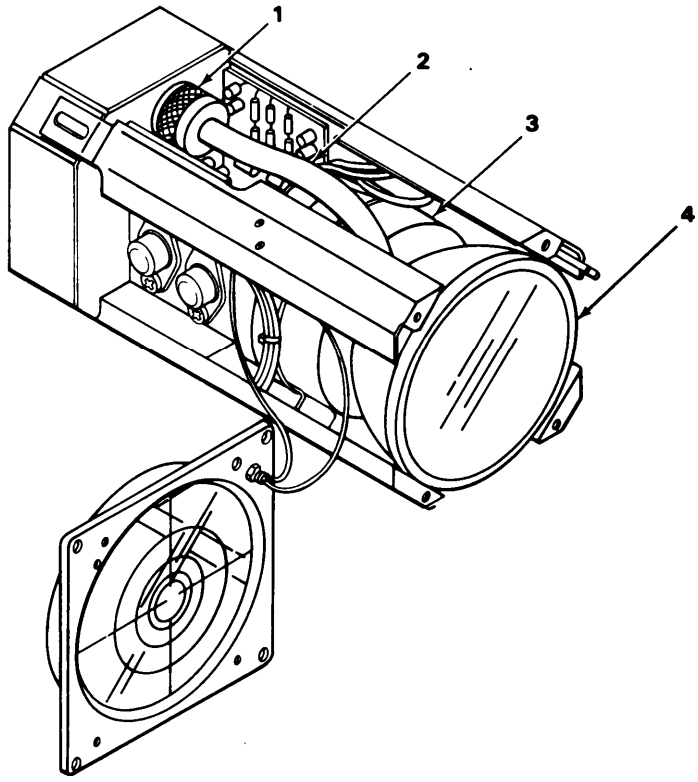
Equipment Condition

Radar signal indicator cover and front panel removed. See paragraphs 2-31 and 2-32.

LOCATION	ITEM	ACTION / **REMARKS**
REMOVAL		
1. Power supply	Cap (1) and high voltage cable (2)	Unscrew cap and remove cable.
2. Yoke	Yoke clamp (3)	Using flat-tip screwdriver, loosen.
		CAUTION Extreme care must be taken when removing the CRT. CRT will break if not handled properly.
3. Chassis assembly	CRT (4)	Pull to remove. **Carefully pull CRT pins out of socket. When pins are out of socket, rotate CRT clockwise so that the high voltage cable will clear the chassis assembly.**
INSTALLATION		
1. Chassis assembly	CRT (4)	Install. **Carefully insert CRT. When CRT reaches socket, rotate CRT counterclockwise so that the high voltage cable fits into chassis assembly and CRT pins aline with socket.**

2-40. REPLACEMENT OF RADAR SIGNAL INDICATOR CRT. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
2. Yoke	Yoke clamp (3)	Using flat-tip screwdriver, tighten.
3. Power supply	High voltage cable (2) and cap (1)	Install cable and screw on cap.



EL1BF069

2-41. REPLACEMENT OF RADAR SIGNAL INDICATOR BRIL CONTROL.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

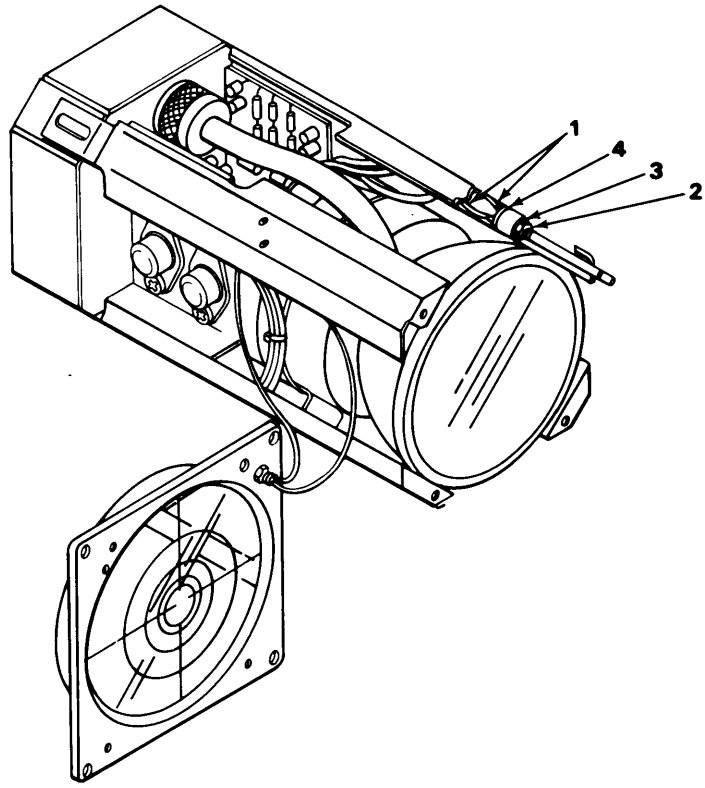
Resistor, variable, GA2G140F252UA

Equipment Condition

Radar signal indicator front panel removed. See paragraph 2-32.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. BRIL control	Leads (1)	Tag leads. Using soldering iron and aid, unsolder.
2.	Hex nut (2) and Lockwasher (3)	Using 3/8-inch wrench, install.
3. Chassis assembly	BRIL control (4)	Remove.
INSTALLATION		
1. Chassis assembly	BRiL control (4)	Install.
2. BRIL control	Lockwasher (3) and hex nut (2)	Using 3/8-inch wrench, install.
3.	Leads (1)	Using soldering iron and aid, solder. **Remove** tags.

2-41. REPLACEMENT OF RADAR SIGNAL INDICATOR BRIL CONTROL. CONT



EL1BF070

2-42. REPLACEMENT OF RADAR SIGNAL INDICATOR YOKE.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

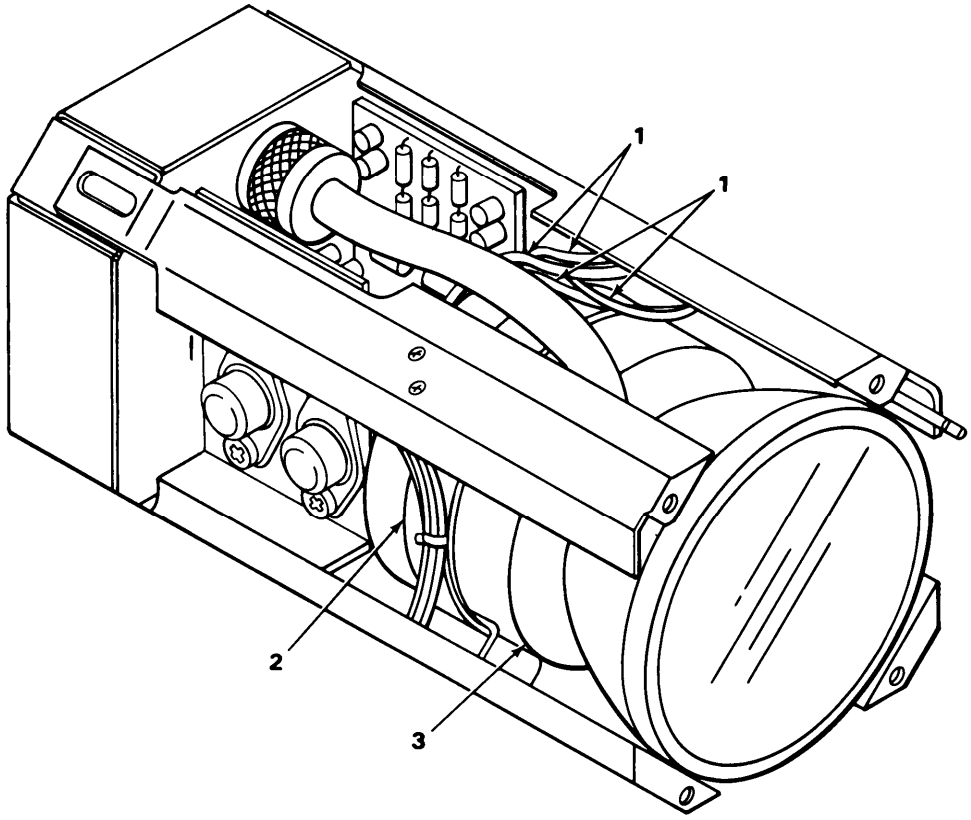
Yoke, C9740-1

Equipment Condition

Radar signal indicator CRT removed. See paragraph 2-40.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Yoke	Leads (1)	Tag leads. Using soldering iron and aid, unsolder.
2. Yoke clamp	Screw (2)	Using flat-tip screwdriver, loosen. **Loosen screw in clamp so that yoke can be removed.**
3.	Yoke (3)	Remove. **Carefully push out of clamp to front of indicator.**
INSTALLATION		
1. Yoke clamp	Yoke (3)	Install. **Carefully push into clamp from front of indicator.**
2.	Screw (2)	Using flat-tip screwdriver, tighten.
3. Yoke	Leads (1)	Using soldering iron and aid, solder. Remove tags.

2-42. REPLACEMENT OF RADAR SIGNAL INDICATOR YOKE. (CONT)



EL1BF071

2-43. REPLACEMENT OF RADAR SIGNAL INDICATOR WIREWOUND RESISTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

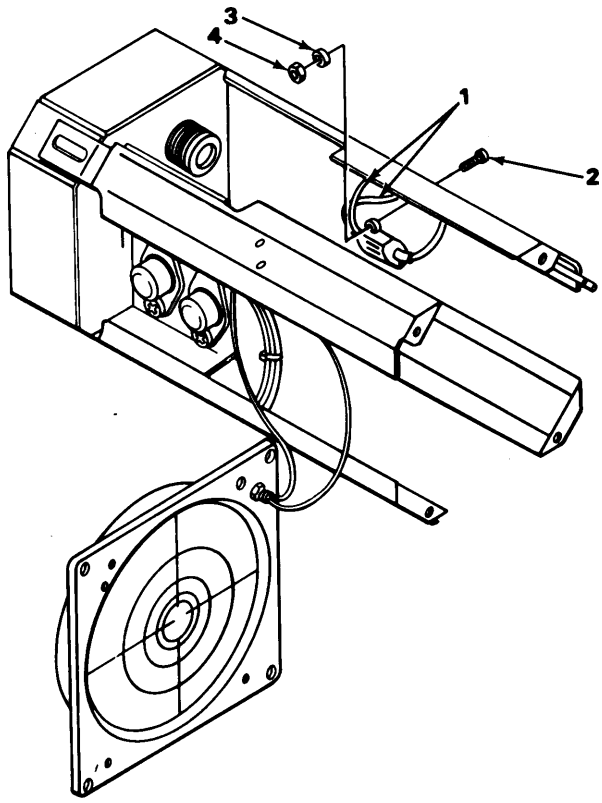
Resistor, fixed, wirewound, RER60F11R5R

Equipment Condition

CRT and radar signal indicator yoke removed. See paragraphs 2-40 and 2-42.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
		NOTE
		There are four resistors. All are removed in same way.
1. Chassis assembly	Leads (1)	Tag leads. Using soldering iron and aid, unsolder.
2.	Screws (2), lock-washers (3) and hex nuts (4)	Using cross-tip screwdriver, remove.
INSTALLATION		
1. Chassis assembly	Hex nuts (4), lockwashers (3) and screws (2)	Using cross-tip screwdriver, install.
2.	Leads (1)	Using soldering iron and aid, solder. Remove tags.

2-43. REPLACEMENT OF RADAR SIGNAL INDICATOR WIREWOUND RESISTOR. (CONT)



EL1BF072

2-44. ALINEMENT OF RADAR SIGNAL INDICATOR STROBE.

This task covers:

Alinement

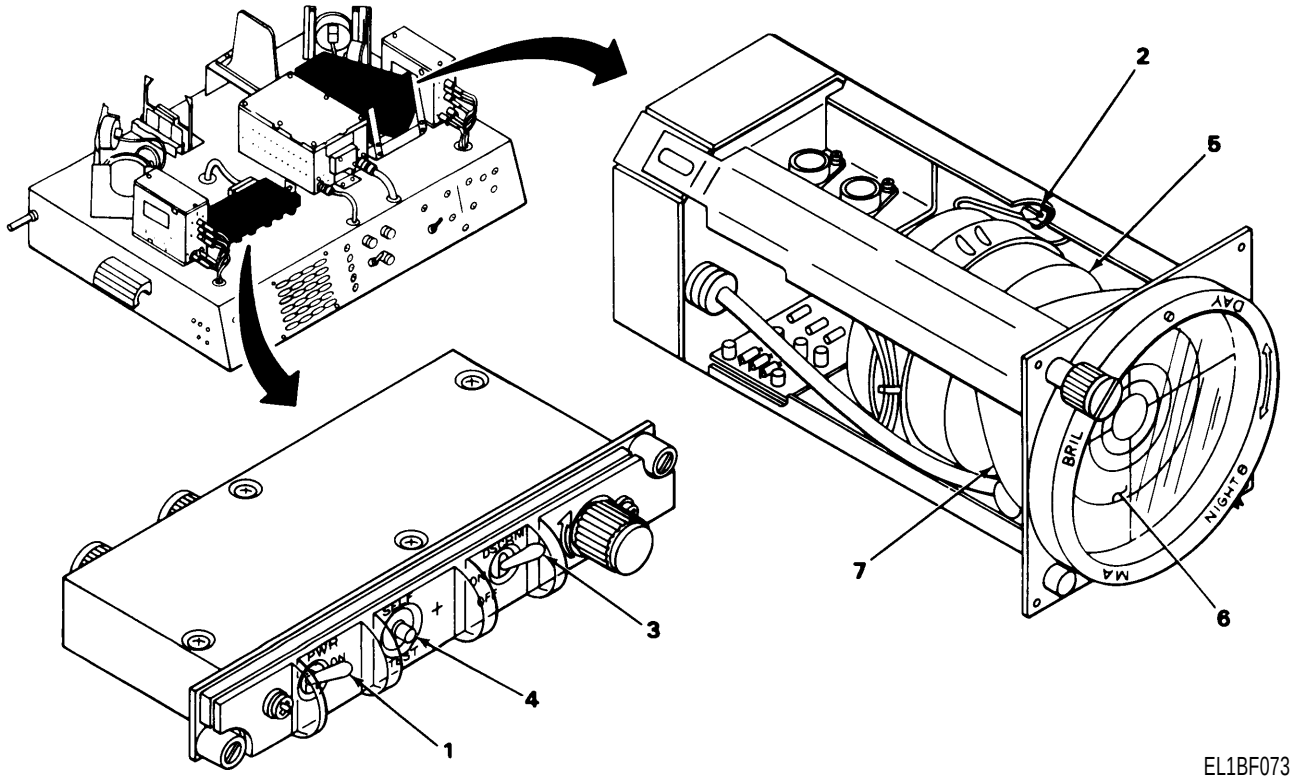
INITIAL SETUP

Tools	Personnel Required
Tool Kit, Electronic Equipment TK-105/G	Two technicians
Materials/Parts	**Equipment Condition**
Magnet, permanent, 11-00002	Radar signal indicator cover off (see paragraph 2-31) and indicator mounted on test adapter.

LOCATION	ITEM	ACTION **REMARKS**
1. Control unit	PWR ON-OFF switch (1)	Set to OFF.
2. Radar signal indicator	Yoke clamp screw (2)	Using flat-tip screwdriver, loosen.
		WARNING Dangerous voltages are present in the radar signal indicator when power is applied. Be careful when adjusting the yoke.
3. Control unit	PWR ON-OFF switch (1)	Set to ON.
4.	DSCRM ON-OFF switch (3)	Set to OFF.
5.	SELF TEST switch (4)	Press and hold.
6. Radar signal indicator	Yoke (5), CRT screen (6) and CRT bell (7)	Rotate yoke slightly to make strobe vertical on CRT screen. **Hold yoke firmly against CRT bell while rotating.**

2-44. ALINEMENT OF RADAR SIGNAL INDICATOR STROBE. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
7. Control unit	SELF TEST switch (4)	Release.
8.	PWR ON-OFF switch (1)	Set to OFF.
9. Radar signal indicator	Yoke clamp screw (2)	Using flat-tip screwdriver, tighten. **Hold yoke to prevent movement.**
10. Control Unit	PWR ON-OFF switch (1)	Set to ON.
11.	SELF TEST switch (4)	Press and hold.
12. Radar signal indicator	CRT screen (6)	Check that strobe is vertical. **If not, repeat steps 1 through 8.**
13. Control unit	PWR ON-OFF switch (1)	Set to OFF.



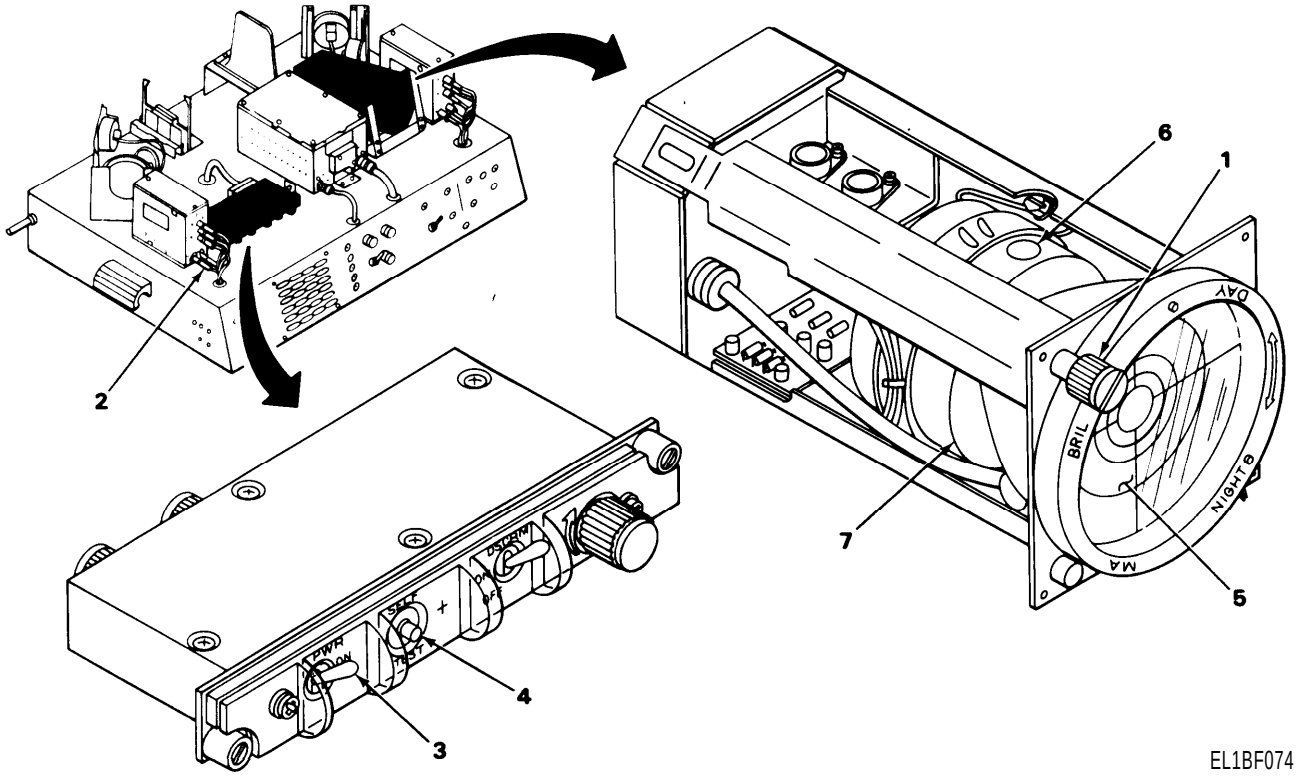
EL1BF073

2-44. ALINEMENT OF RADAR SIGNAL INDICATOR STROBE. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
14. Radar signal indicator	BRIL control (1)	Set control fully counterclockwise.
15. Receivers	Cables (2)	Disconnect.
16. Control unit	PWR ON-OFF switch (3)	Set to ON.
17.	SELF TEST switch (4)	Press and hold.
18. Radar signal indicator	BRIL control (1) and CRT screen (5)	Slowly turn control clockwise until a dot appears on CRT screen. **Keep brilliance of dot to lowest usable level.**
19.	CRT screen (5)	The dot must appear no more than 1/32 inch from center. If **not, follow steps 18 through 25.**
20. Control unit	PWR ON-OFF switch (3)	Set to OFF. **Return radar signal indicator to service. See paragraph 2-31 for installation of cover.**
21. Radar signal indicator	Magnet (6), yoke (7) and CRT screen (5)	Place magnet on yoke and move along surface until dot appears at center of CRT screen.
		NOTE Magnet may be on back of yoke on some units.
22. Control unit	SELF TEST switch (4)	Release.
23. Radar signal indicator	Magnet (6) and yoke (7)	Mark spot on yoke and remove magnet.
24.	Magnet (6)	Apply adhesive on magnet and place magnet on marked spot.
25.	SELF TEST switch (4)	Press and hold.

2-44. ALINEMENT OF RADAR SIGNAL INDICATOR STROBE. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
26. Radar signal indicator	CRT screen (5)	Check that dot appears at center of CRT screen.
27. Control unit	SELF TEST switch (4)	Release.
28.	PWR ON-OFF switch (3)	Set to OFF. **Return radar signal indicator to service. See paragraph 2-31 for installation of cover.**



EL1BF074

2-45. REPLACEMENT OF COMPARATOR COVER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

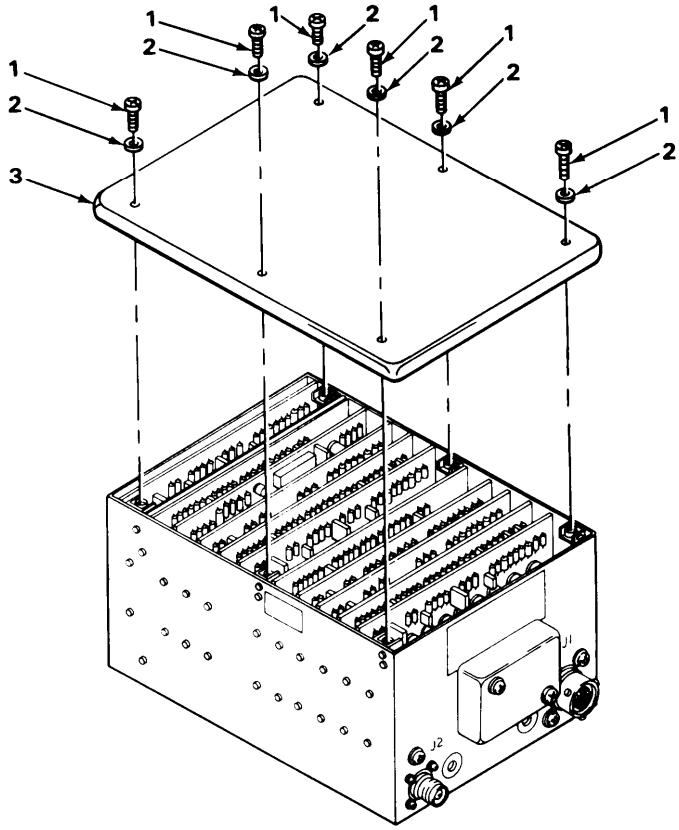
Cover assembly, SMC877210
NSN

Equipment Condition

Comparator on workbench.

LOCATION	ITEM	ACTION / REMARKS
REMOVAL		
1. Comparator top	Screws (1) and flat washers (2)	Using cross-tip screwdriver, remove.
2.	Cover (3)	Remove.
INSTALLATION		
		NOTE When installing cover, be sure to aline ground strap on cover to metal of case.
1. Comparator top	Cover (3)	Put in place.
2.	Flat washers (2) and screws (1)	Using cross-tip screwdriver, install.

2-45. REPLACEMENT OF COMPARATOR COVER. (CONT)



EL1BF075

2-46. REPLACEMENT OF COMPARATOR CIRCUIT CARD ASSEMBLY.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Equipment Condition

Comparator cover off. See paragraph 2-45.

Materials/Parts

Circuit cord assembly, connector board, SMC877001

LOCATION	ITEM	ACTION	REMARKS

CAUTION

Be careful to avoid bending card extractor hooks on comparator captive nut brackets.

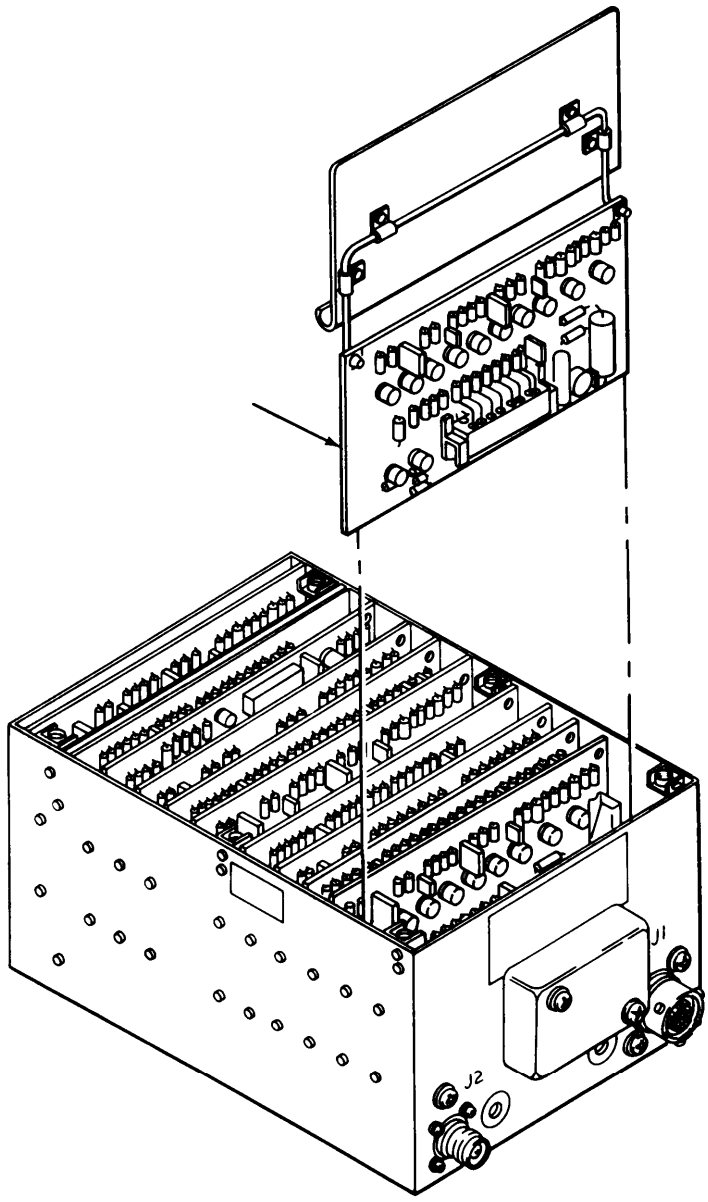
REMOVAL

Comparator	Circuit card assembly (1)	Using card extractor, remove.	

INSTALLATION

Comparator	Circuit card assembly (1)	Install.	**Be sure to install circuit card assembly into track.**

2-46. REPLACEMENT OF COMPARATOR CIRCUIT CARD ASSEMBLY. (CONT)



EL1BF076

2-47. REPLACEMENT OF COMPARATOR BAND PASS FILTER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

Filter, band pass, BC126

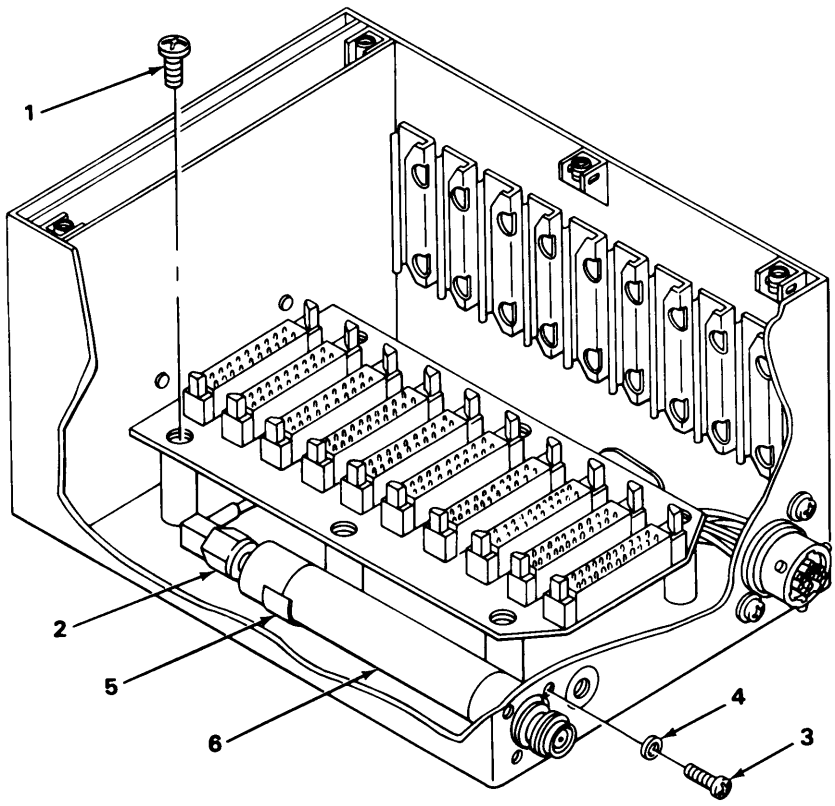
Equipment Condition

Comparator cover off (see paragraph 2-45) and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION / **REMARKS**
REMOVAL		
1. Circuit card connector board	Screws (1)	Using cross-tip screwdriver, remove.
		NOTE Reposition circuit card connector board so that the following step can be performed.
2.	Coaxial connector hex nut (2)	Using 3/8-inch wrench, remove.
3.	Screws (3) and lockwashers (4)	Using cross-tip screwdriver, remove.
4.	Clip (5) and band pass filter (6)	Remove filter from clip.
INSTALLATION		
1. Comparator	Band pass filter (6) and clip (5)	Install filter in clip.

2-47. REPLACEMENT OF COMPARATOR BAND PASS FILTER. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
2.	Lockwashers (4) and screws (3)	Using cross-tip screwdriver, install.
3. Comparator	Coaxial connector hex nut (2)	Using torque wrench, tighten to 7 inch pounds.
4.	Screws (1)	Using cross-tip screwdriver, install.



EL1BF077

2-48. REPLACEMENT OF COMPARATOR DETECTOR

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

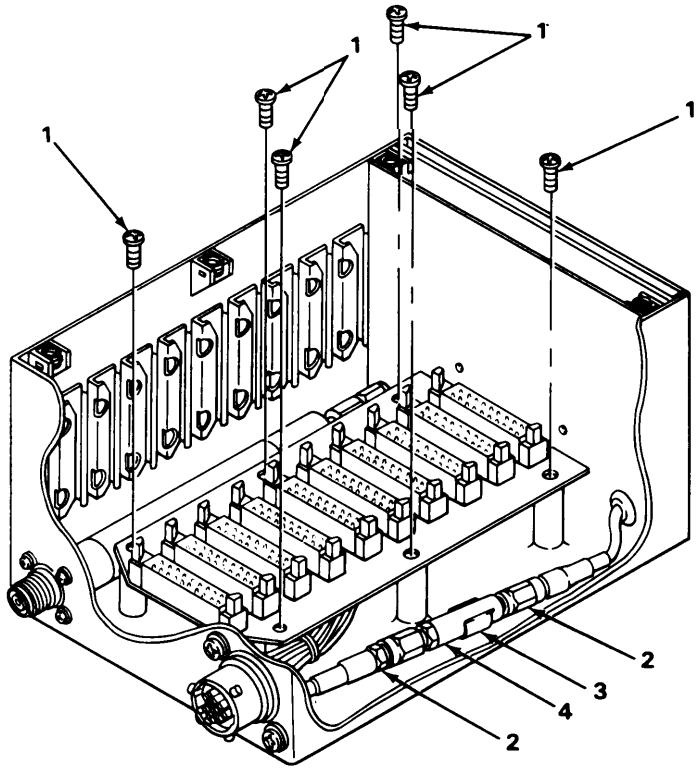
Detector, limiter, MA7715A0104

Equipment Condition

Comparator cover off (see paragraph 2-45) and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Circuit card connector board	Screws (1)	Using cross-tip screwdriver, remove.
	NOTE Reposition circuit card connector board so that the following step can be performed.	
2. Detector	Coaxial connectors (2)	Using 3/8-inch wrench, remove.
3. Comparator	Clip (3) and detector (4)	Remove detector from clip.
INSTALLATION		
1. Comparator	Detector (4) and clip (3)	install detector in clip.
2. Detector	Coaxial connectors (2)	Using torque wrench, tighten to 7 inch pounds.
3. CompWator	Screws (1)	Using cross-tip screwdriver, install.

2-48. REPLACEMENT OF COMPARATOR DETECTOR. (CONT)



EL1BF078

2-49. REPLACEMENT OF COMPARATOR TRANSISTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

Transistor, 2N3584

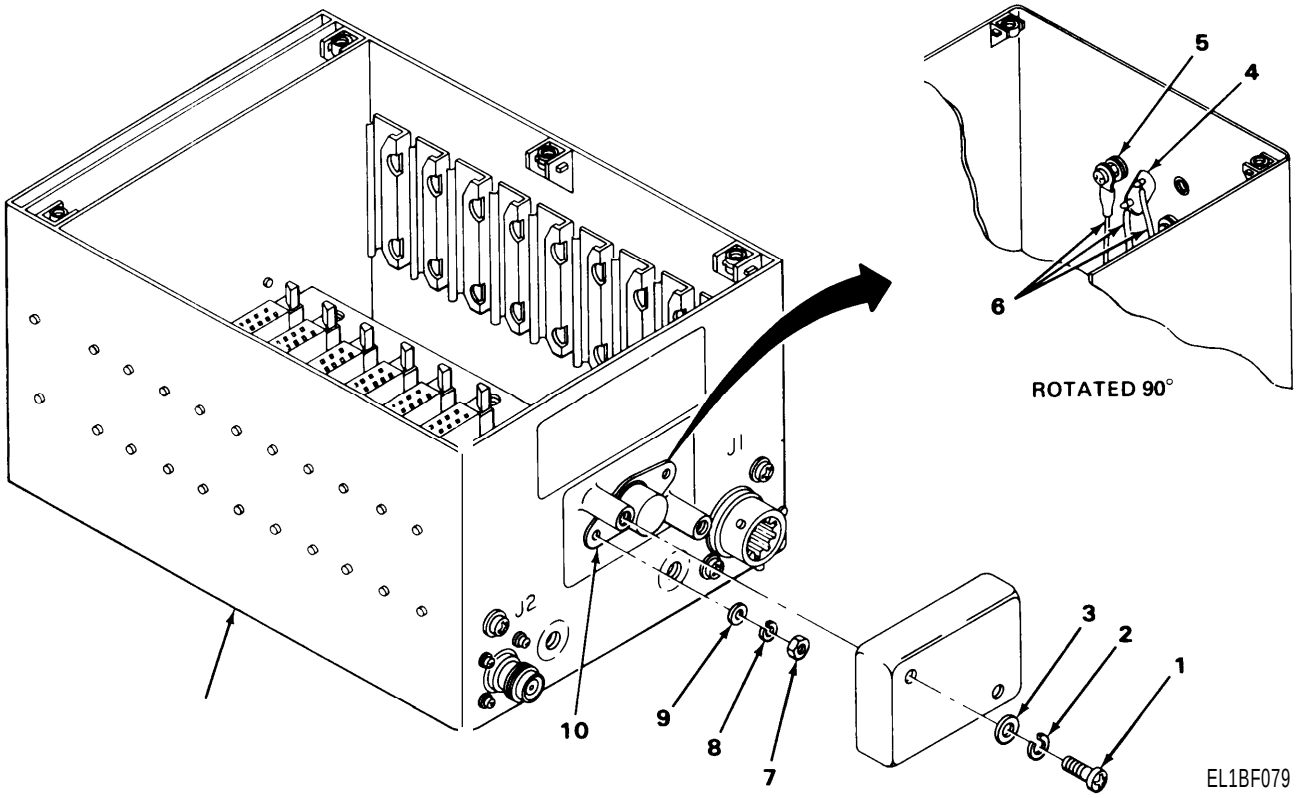
Equipment Condition

Comparator cover off (see paragraph 2-45) and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Transistor cover	Screws (l), lockwashers (2) and flat washers (3)	Using cross-tip screwdriver, remove.
2. Transistor; inside comparator case	Terminal E (4), terminal B (5) and leads (6)	Tag leads. Using soldering iron and aid, unsolder.
3. Transistor; outside comparator case	Hex nut (7), lockwasher (8) and flat washer (9)	Using l/8-inch wrench, remove.
4. Outside comparator case	Transistor (10)	Remove.

2-49. REPLACEMENT OF COMPARATOR TRANSISTOR. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION		
1. Outside comparator case	Transistor (10)	Install.
2. Transistor; outside comparator case	Flat washer (9), lockwasher (8) and hex nut (7)	Using l/8-inch wrench, install.
3. Transistor; inside comparator case	Leads (6), terminal B (5) and terminal E (4)	Using soldering iron and aid, solder. Remove tags.
4. Transistor cover	Flat washers (3), lockwashers (2) and screws (1)	Using cross-tip screwdriver, install.



2-50. REPLACEMENT OF COMPARATOR RESISTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

Resistor, fixed, composition
NSN 5905-00-106-3666

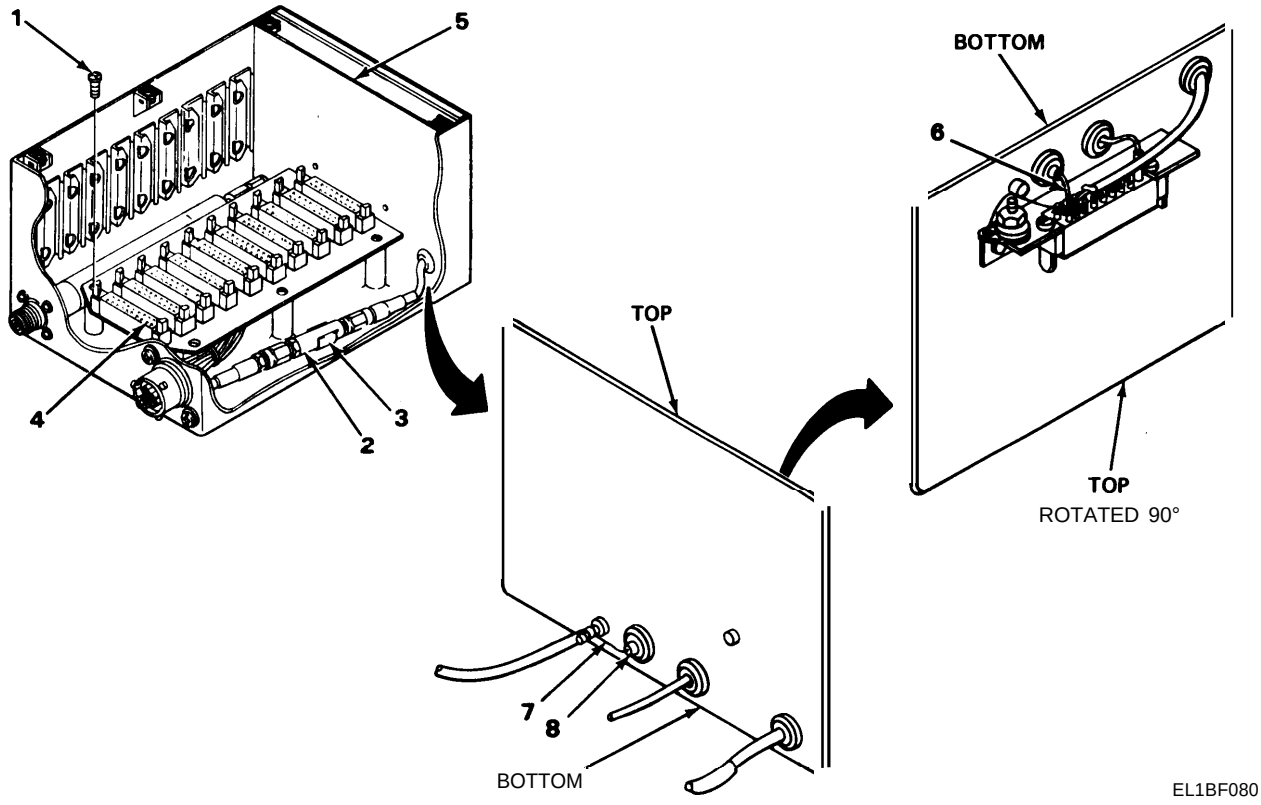
Equipment Condition

Comparator cover removed (see paragraph 2-45) and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Circuit card connector board	Screws (1)	Using cross-tip screwdriver, remove.
2. Comparator	Detector (2) and clip (3)	Pull detector out of clip.
3.	Connector board (4) and partition (5)	Lift board away from partition and hold.
4.	Partition (5)	Pull from comparator housing.
5. Back of partition	Resistor lead (6)	Unsolder.
6. Front of partition	Resistor lead (7)	Unsolder.
7.	Resistor (8)	Remove.
INSTALLATION		
1. Front of partition	Resistor (8)	Install.
2.	Resistor lead (7)	Solder.
3. Back of partition	Resistor lead (6)	Solder.

2-50. REPLACEMENT OF COMPARATOR RESISTOR. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
4. Comparator	Partition (5)	Install in comparator housing.
5.	Connector board (4)	Set in place.
6.	Clip (3) and detector (2)	Set detector in clip.
7. Circuit card connector board	Screws (1)	Install.



2-51. REPLACEMENT OF COMPARATOR CIRCUIT CARD CONNECTOR BOARD.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

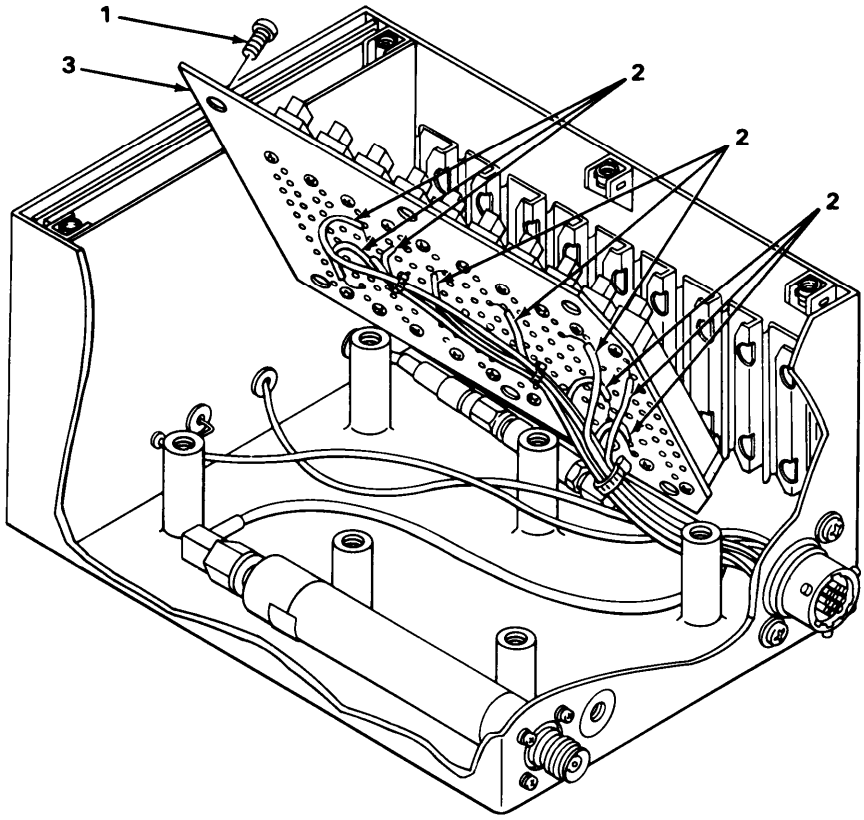
Circuit card assembly, connector board, SMC 877001

Equipment Condition

Comparator cover off (see paragraph 2-45) and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Circuit card connector board	Screws (1)	Using cross-tip screwdriver, remove. **Reposition circuit card connector board with foil side up.**
2.	Leads (2)	Tag leads. Using soldering iron and aid, unsolder.
3. Comparator	Circuit card connector board (3)	Remove.
INSTALLATION		
1. Comparator	Circuit card connector board (3)	Install. **Put into comparator with foil side up.**
2. Circuit card connector board	Leads (2)	Using soldering iron and aid, solder. Remove tags.
3.	Screws (1)	Using cross-tip screwdriver, install.

2-51. REPLACEMENT OF COMPARATOR CIRCUIT CARD CONNECTOR BOARD. (CONT)



EL1BF081

2-52. REPAIR OF COMPARATOR WIRE HARNESS.

This task covers:

Repair

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

Type E-22 Wire MIL-W-16878/HA
Tie-down straps, item 7,
appendix D

Equipment Condition

Comparator cover off (see paragraph 2-45 and circuit cards A2 through A11 removed (see paragraph 2-46).

LOCATION	ITEM	ACTION	**REMARKS**

REPAIR

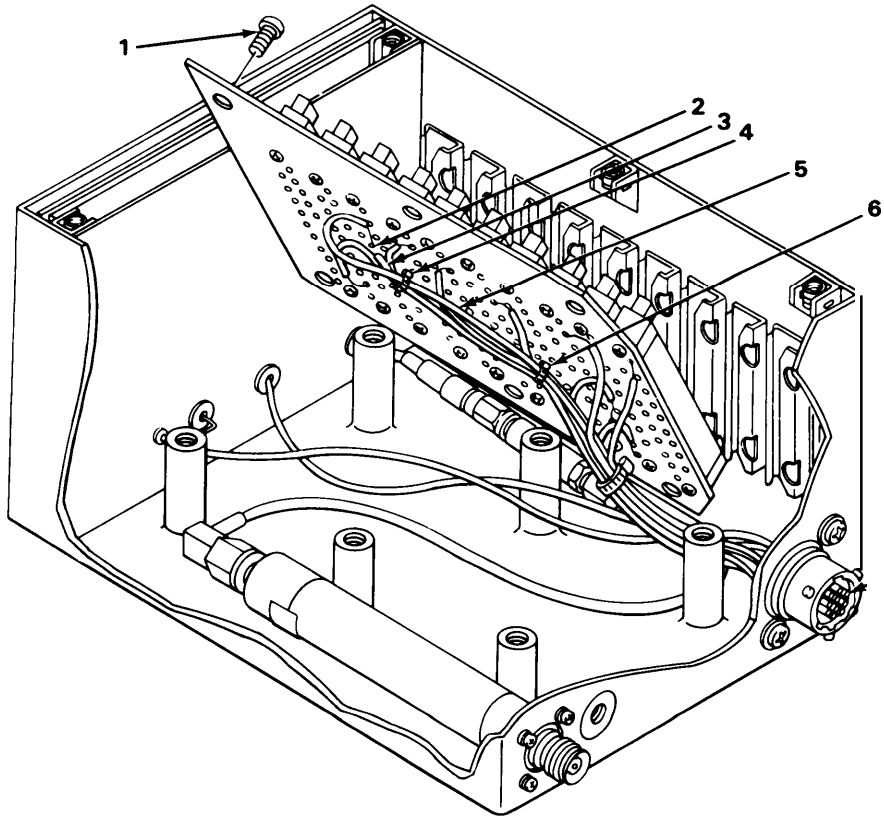
NOTE

The following procedure shows typical removal and installation.

1.	Circuit card connector board	Screws (1)	Using cross-tip screwdriver, remove. **Reposition circuit card connector board with foil side up.**
2.	Circuit card connector board	Circuit card connection (2) and lead (3)	Using soldering iron and aid, unsolder.
3.	Wire harness	Tie-down strap (4) and lead (3)	Using diagonal cutters, cut tie-down strap and remove lead.
4.	Circuit card connector board	New lead (5) and circuit card connection (2)	Using soldering iron and aid, solder.

2.52. REPAIR OF COMPARATOR WIRE HARNESS. (CONTj

LOCATION	ITEM	ACTION **REMARKS**
5. Wire harness	New lead (5) and new tie-down strap (6)	Install. **Repeat steps 4 and 6 along wire harness until old lead is removed and new lead is installed.**
		NOTE Before performing the following step, be sure the soldering iron is clean.
6. Electrical connector	Pin (7) and lead (3)	Using soldering iron and aid, heat pin and remove lead.
7.	New lead (5) and pin (7)	Using soldering iron and aid, heat pin and install new lead.



EL1BF082

2-53. REPLACEMENT OF RECEIVER TOP COVER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

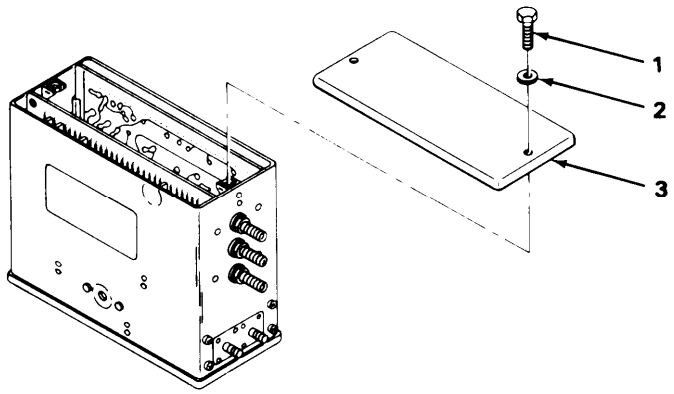
Equipment Condition

Receiver on workbench.

Materials/Parts

Cover assembly, top, SMC877208

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
Receiver top	Screws (l), flat washers (2) and cover (3)	Using cross-tip screwdriver, remove.
INSTALLATION		
Receiver top	Cover (3), flat washers (2) and screws (1)	Using cross-tip screwdriver, install.



EL1BF083

2-54. REPLACEMENT OF RECEIVER BOTTOM COVER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electonic Equipment TK-105/G

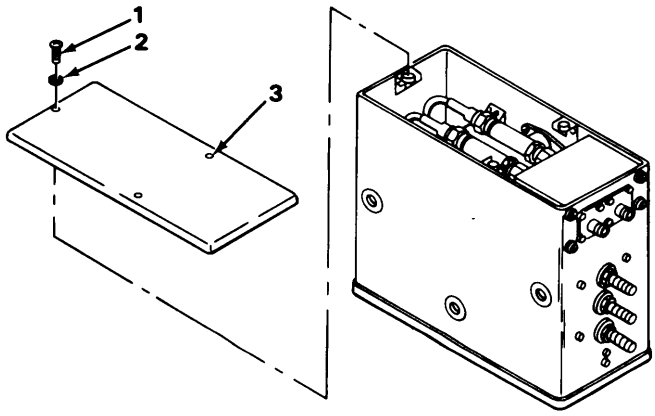
Materials/Parts

Cover assembly, bottom, SMC877209

Equipment Condition

Receiver on workbench.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
Receiver bottom	Screws (l), flat washers (2) and cover (3)	Using cross-tip screwdriver, remove.
INSTALLATION		
Receiver bottom	Cover (3), flat washers (2) and screws (1)	Using cross-tip screwdriver, install.



EL1BF084

2-55. REPLACEMENT OF RECEIVER COMPRESSION AMPLIFIER CIRCUIT CARD.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

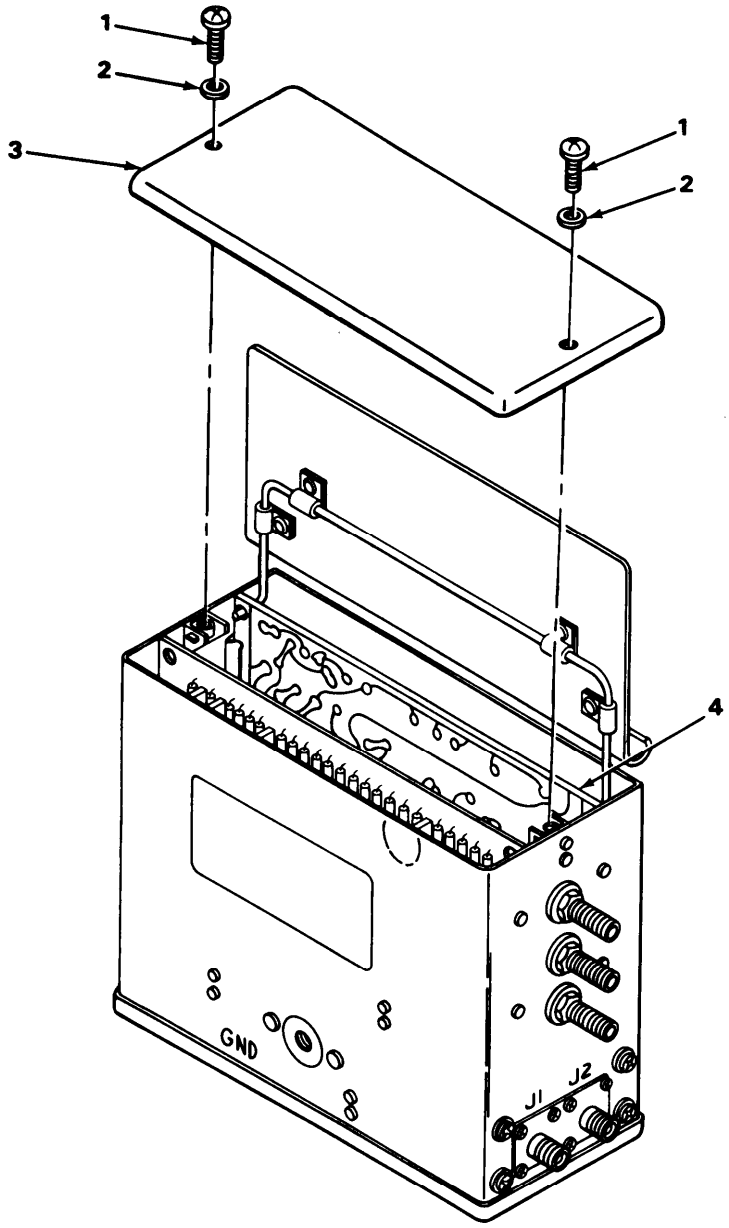
Circuit card assembly, compression amplifier, SMC877032

Equipment Condition

Receiver on workbench.

LOCATION	ITEM	ACTION / REMARKS
REMOVAL		
1. Receiver top	Screws (1) and flat washers (2)	Using cross-tip screwdriver, remove.
2.	Cover (3)	Remove.
3.	Compression amplifier circuit card (4)	Using card extractor, remove.
INSTALLATION		
1. Receiver top	Compression amplifier circuit card (4)	Install.
2.	Cover (3)	Install.
3.	Flat washers (2) and screws (1)	Using cross-tip screwdriver, install.

2-55. REPLACEMENT OF RECIEVER COMPRESSION AMPLIFIER CIRCUIT CARD. (CONT).



EL1BF0M5

2-56. REPLACEMENT OF RECEIVER FILTER ASSEMBLY.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

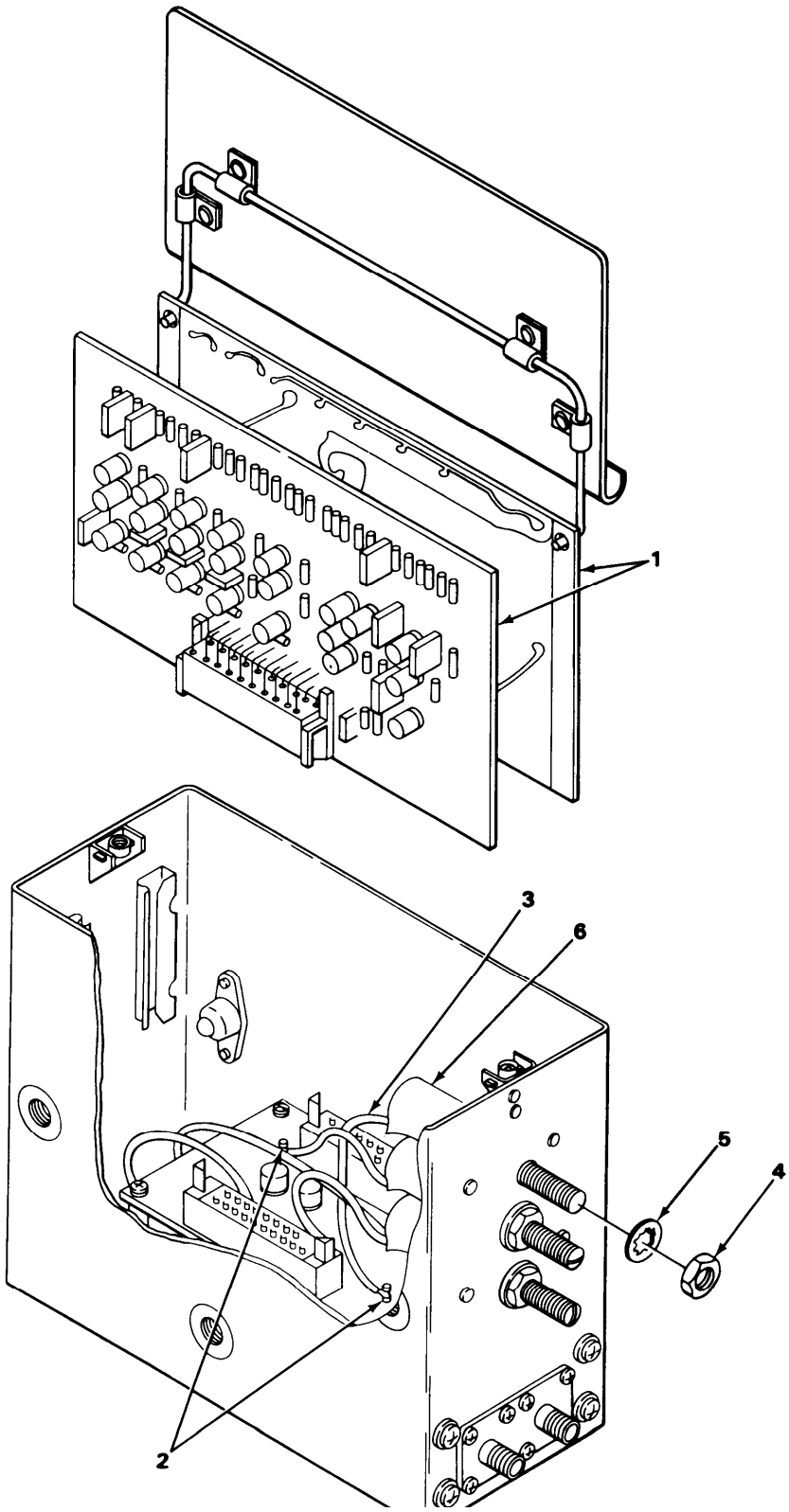
Filter assembly, SMC876974
NSN

Equipment Condition

Receiver top cover off. See paragraph 2-53.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Receiver top	Compression amplifier circuit cards (1)	Using card extractor, remove.
2. Filter assembly	Terminals (2) and lead (3)	Using soldering iron and aid, unsolder.
3. Receiver case	Hex nut (4) and lockwasher (5)	Using 5/16-inch wrench, remove.
4.	Filter assembly (6)	Remove.
INSTALLATION		
1. Receiver case	Filter assembly (6)	Install.
2.	Lockwasher (5) and hex nut (4)	Using 5/16-inch wrench, install.
3. Filter assembly	Lead (3) and terminals (2)	Using soldering iron and aid, solder.
4. Receiver top	Compression amplifier circuit cards (1)	Install.

2-56. REPLACEMENT OF RECEIVER FILTER ASSEMBLY. (CONT)



EL1BF086

2-57. REPLACEMENT OF RECEIVER CIRCUIT CARD CONNECTOR BOARD.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G
Card extractor

Materials/Parts

Circuit card assembly, connector board, SMC877025

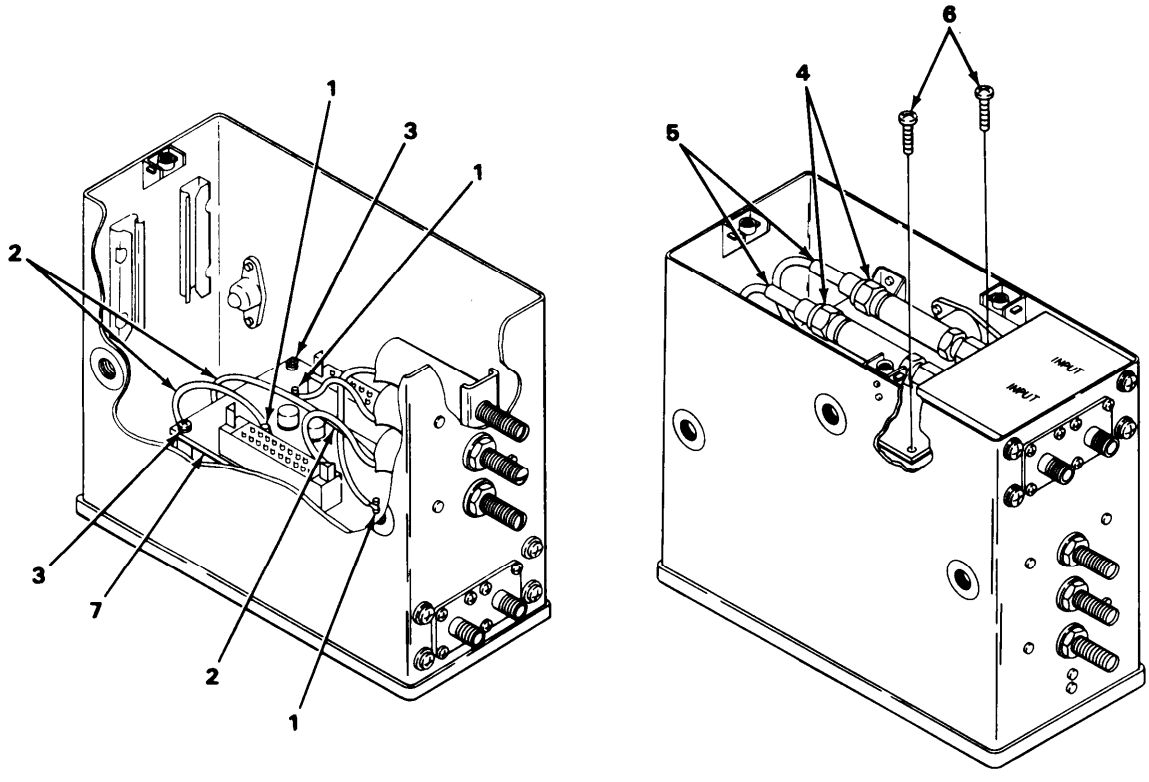
Equipment Condition

Receiver covers off (see paragraphs 2-53 and 2-54) and circuit cards removed (see paragraph 2-46).

LOCATION	ITEM	ACTION	**REMARKS**
REMOVAL			
1. Filter assemblies	Terminals (1) and leads (2)	Using soldering iron and aid, unsolder.	
2. Circuit card connector board	Screws (3)	Using cross-tip screwdriver, remove.	
3. Detector	Hex nuts (4) and coaxial cables (5)	Using 3/8-inch wrench, remove.	
4. Receiver	Screws (6) and board (7)	Using cross-tip screwdriver, remove.	**Remove board.**
INSTALLATION			
1. Receiver	Board (7) and screws (6)	Using cross-tip screwdriver, install.	
2. Detector	Coaxial cables (5) and hex nuts (4)	Using 3/8-inch wrench, install.	

2-57. REPLACEMENT OF RECEIVER CIRCUIT CARD CONNECTOR BOARD. (CONT)

LOCATION	ITEM	ACTION **REMARKS**
INSTALLATION (CONT)		
3. Circuit card connector board	Screws (3)	Using cross-tip screwdriver, install.
4. Receiver top	Leads (2) and terminal lugs (1)	Using soldering iron and aid, solder.



EL1BF(M7

2-58. REPLACEMENT OF RECEIVER DETECTOR.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

Detector, wide band, MA7715A0103

Equipment Condition

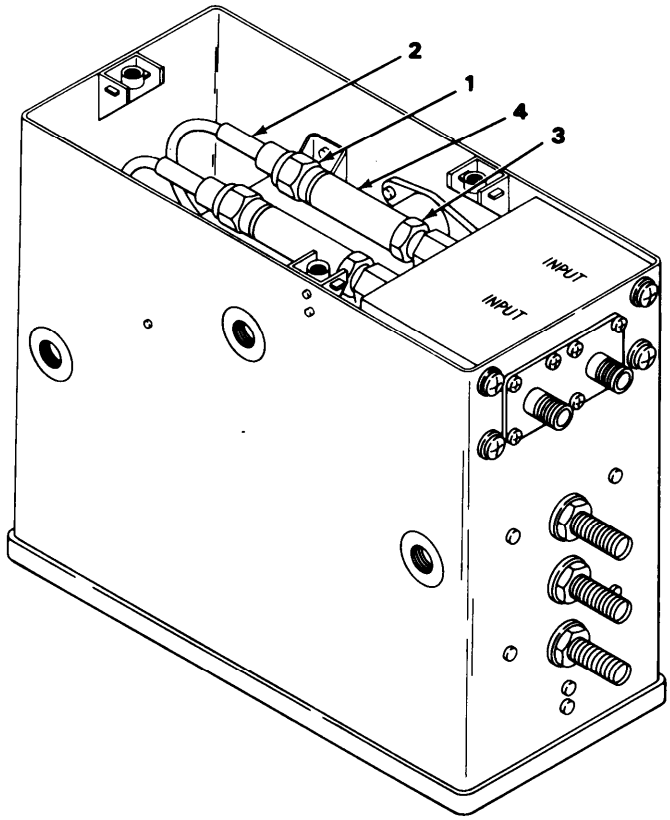
Receiver bottom cover off. See paragraph 2-54.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Receiver bottom, detector	Hex nut (1) and coaxial cable (2)	Using 3/8-inch wrench, remove.
2.	Coupling nut (3) and detector (4)	Using 3/8-inch wrench, remove.
INSTALLATION		
1. Receiver bottom, detector	Detector (4) and coupling nut (3)	Using 3/8-inch wrench, install.
2.	Coaxial cable (2) and hex nut (1)	Using 3/8-inch wrench, install.

NOTE

See paragraph 2-54 for installation of bottom cover.

2-58. REPLACEMENT OF RECIEVER DETECTOR. (CONT)



EL1BF088

2-59. REPLACEMENT OF RECEIVER HIGH PASS FILTER.

This task covers:

1. Removal
2. Installation

INITIAL SETUP

Tools

Tool Kit, Electronic Equipment TK-105/G

Materials/Parts

High pass filter, dual channel

Equipment Condition

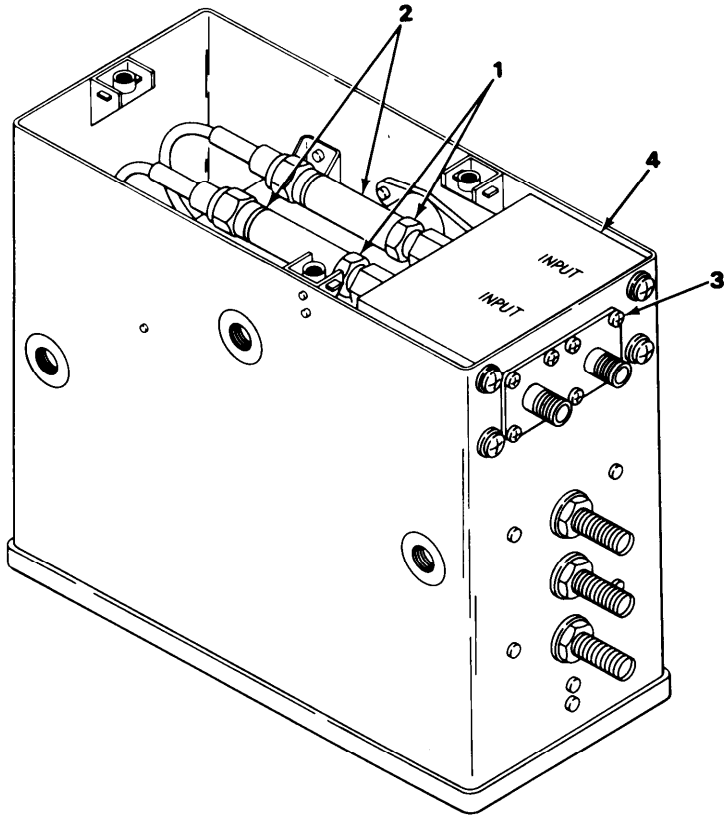
Receiver bottom cover off. See paragraph 2-54.

LOCATION	ITEM	ACTION **REMARKS**
REMOVAL		
1. Receiver bottom	Coupling nuts (1) and detectors (2)	Using 3/8-inch wrench, remove.
2.	Mounting screws (3) and high pass filter (4)	Using cross-tip screwdriver, remove.
INSTALLATION		
1. Receiver bottom	High pass filter (4) and mounting screws (3)	Using cross-tip screwdriver, install.
2.	Detectors (2) and coupling nuts (1)	Using 3/8-inch wrench, install.

NOTE

See paragraph 2-54 for installation of bottom cover.

2-59. REPLACEMENT OF RECEIVER HIGH PASS FILTER. (CONT)



EL1BF089

Section VI PREPARATION FOR STORAGE OR SHIPMENT

For instructions covering preparation for storage and shipment, refer to TM 11-5841-283-12, chapter 4, section V.

APPENDIX A

REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals and miscellaneous publication references in this manual.

A-2. PAMPHLETS.

Consolidated Index of Army Publications and Blank Forms	DA Pam 310-1

A-3. FORMS AND RECORDS.

Recommended Changes to Publications and Blank Forms.	DA Form 2028-2

A-4. TECHNICAL BULLETINS.

Field Instructions for Painting and Preserving Electronics Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters	TB 43-0118

A-5. TECHNICAL MANUALS.

Operator and Organizational Maintenance Manual for Detecting Set, Radar Signal AN/APR-39(V)1 (NSN 5841-01-023-71 12)	TM 11-5841-283-12
Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools List for Radar Signal Detecting Set AN/APR-39(V)1 (NSN 5841-01-023-71 12).	TM 11-5841-283-24P
Operator's and Organizational Maintenance Manual: Simulator, Radar Signal SM-674/UPM (NSN 6940-01-031-5887) and Test Adapter, Radar Signal MX-9848/APR-39(V)1 (5841-01-025-0379)	TM 11-6940-211-12
(C) Direct Support and General Support Maintenance Manual: Simulator, Radar Signal SM-674/UPM (NSN 6940-01-031-5887) and Test Adapter, Radar Signal MX-9848/APR-39(V) (5841-01-025-0379) (U).	TM 11-6940-211-34
The Army Maintenance Management System (TAMMS).	TM 38-750
Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)	TM 750-244-2

APPENDIX B

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I INTRODUCTION

B-1. SCOPE.

This appendix lists expendable supplies and materials you will need to operate and maintain the Radar Signal Detecting Set AN/APR-39(V)1. These items are authorized to you by CTA 50-970, Expendable Items (Expect Medical, Class V, Repair Parts, and Heraldic Items).

B-2. EXPLANATION OF COLUMNS.

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 cleaning compound, item 1, appendix E").

Column (2)-LEVEL. This column identifies the lowest level of maintenance that requires the listed item.

C - Crew/Operator
O - Organizational
F - Direct Support
H - General Support

Column (3)-NATIONAL STOCK NUMBER. This is the national stock number assigned to the item; use it to request or requisition the item.

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.

Column (5)-UNIT OF MEASUREMENT (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical (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

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, FSCM	(5) U/M
1	C	6850-00-105-3084	Trichlorotrifluoroethane	qt
2	C	8305-00-267-3015	Cleaning cloth	yd
3	C	8020-00-205-6512	Sash brush	ea
4	C	5350-00-598-5908	Sandpaper, No. 000	sh
5	C	5350-00-221-0872	Cloth, abrasive	sh
6	F		Wire, type E-22 MIL-W-16878/4A .	ft
7	F	5975-00-727-5153	Tie-down strap	ea
8	F		Tubing, heat shrinkable RT 876-1-8 white	ft
9	F		Tubing, heat shrinkable, .38 LG RT850-1-8	ea
10	F		Tubing, heat shrinkable, .50 LG RT850-3-16	ea
11	F	5961-00-410-5450	Insulator, plate 2-113	ea
12	F		Thermal conductive grease	ea

GLOSSARY

The following special terms and words are used in this manual.

Alinement. A procedure for adjusting a circuit to produce a desired frequency response or impedance.

Alternating Current. A flow of electricity which reverses in direction continuously.

Amplifier. A circuit that increases the power of a signal.

Bandwidth. A limited range of frequencies.

Calibration. A procedure for comparing a test equipment reading of a circuit to a standard and correcting any difference from the standard.

Carrier. A wave of non-changing frequency, amplitude, and phase which is changed in amplitude or phase by a video (or audio) signal.

Decibel. The standard unit for expressing relative power, voltage or current.

Direct Current. A current that flows in only one direction and has a constant value.

Filter. A circuit that allows only certain frequencies to pass.

Half Power. A point on a waveform where the voltage is reduced to 70.7°/0 of its peak value.

Hertz. A term meaning cycle per second.

Load. Any energy or power consuming device connected to a circuit supplying power or energy.

Power Output. The power in watts delivered to a load.

Pulse Repetition Interval (PRI). The interval, in units of time, between the leading edges of sequential pulses in a train.

Pulse Repetition Frequency (PRF). The number of sequential pulses in a train in a certain interval of time.

Tangential Signal. A noise signal raised by a dc value equal to its amplitude as shown on an oscilloscope.

GLOSSARY (CONT)

This list contains abbreviations that are used in this manual.

Abbreviation	Word or Term
ac	alternating current
aFT	to the rear
CRT	cathode ray tube
dB	decibel
dBm	decibel (referenced to 1 milliwatt)
dc	direct current
fWD	forward
Hz	Hertz
kHz	kilohertz
mA	milliampere
MAC	Maintenance Allocation Chart
MHz	Megahertz
ms	millisecond
NSN	National Stock Number
PRF	Pulse Repetition Frequency
PRI	Pulse Repetition Interval
RPSTL	Repair Parts and Special Tools List
SAM	Surface-to-Air Missile
TAMMS	The Army Maintenance Management System
TMDE	Test Measurement Diagnostic Equipment
TP	Test point
us	microsecond

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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

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

LIQUID MEASURE

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

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

CUBIC MEASURE

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

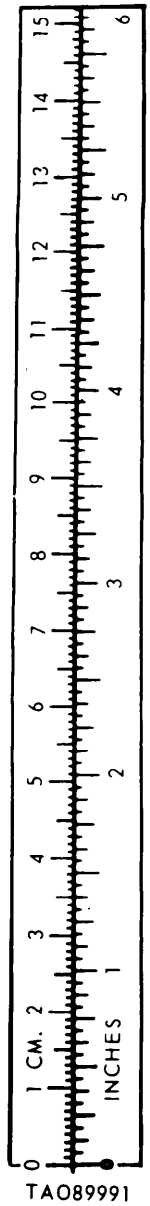
TEMPERATURE

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

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
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

TO CHANGE	TO	MULTIPLY BY
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**



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