TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

TEST SET, RADAR ALTIMETER

MODULE AN I APM-322

This copy is a reprint which includes current pages from Changes 1 and 2

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1970

WARNING!
115 volts 400 Hz is used in the operation of this equipment

DEATH ON CONTACT
may result if personnel fail to observe safety precautions

Be careful not to contact high voltage connection when installing or operating this equipment

CHANGE No.2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 7 July 1978

Operator's and Organizational Maintenance Manual
TEST SET, RADAR ALTIMETER MODULE AN/APM-322
(NSN 6625-00-437-7312)

TM 11-6625-179512, 31 August 1970, is changed as follows:
1. Title of the manual is changed as shown above.
2. A vertical bar appears opposite changed material.
3. Remove and insert pages as indicated in the page list below.

Remove	*Insert*
i and ii	i and ii
1-1 through 1-4	1-1 through 1-4
3-1 and 3-2	3-1 and 3-2
4-1	4-1
A-1	A-1
B-1 through B-5	B-1 through B-6

4. File this change sheet in front of the manual for reference purposes.

By Order of the Secretary of the Army:

BERNARD W.ROGERS
General, United States Army
Chief of Staff

Official:

J.C.PENNINGTON
Brigadier General, United States Ar4ny
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-31, Direct and General Support maintenance requirements for OV-1A, B, C, and OV-1D Aircraft.

Change No.1

HEADQUARTERS
DEPARTMENT OF THE ARM:
WASHINGTON, D.C., 14 July 1971

Operator's and Organizational Maintenance Manual

TEST SET, RADAR ALTIMETER MODULE, AN/APM-322

TM 11-6625-1795-12, 31 August 1970, is changed as follows:
1. Remove old pages and insert new pages as indicated below.

Remove page	*Insert pages--*
B-1 through B-5	B-1 through B-6

2. File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States An, y,
Chief of Staff.

Official.

VERNE L BOWERS,
Major General United States Army,
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 1231, Direct/General Support requirements for OV-1A, OV-1B and OV-1C aircrafts

TECHNICAL MANUAL
No.11-66251795-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 31 August 1970

Operator's and Organizational Maintenance Manual
TEST SET, RADAR ALTIMETER MODULE AN/APM-322
(NSN 6625-00-437-7312)

LIST OF ILLUSTRATIONS

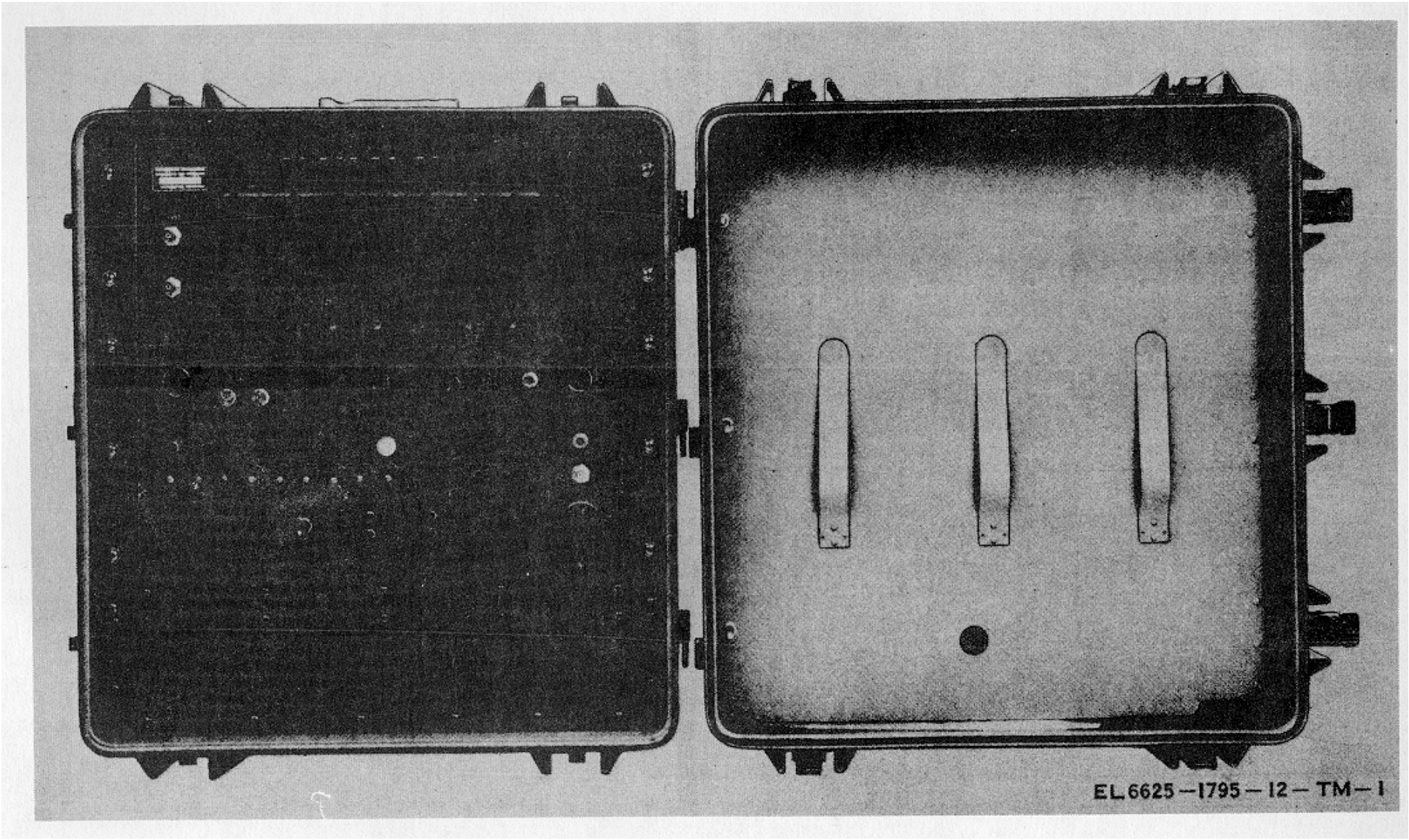

Figure 1-1. Test Set, Radar Altimeter Module AN/APM-322.

CHAPTER 1
INTRODUCTION

Section I.GENERAL

1-1.Scope

a. This manual describes Test Set, Radar Altimeter Module AN/APM-322 (module test set) (figs. 1-1 and 1-2) and covers its installation, operation, and organizational maintenance. Included are instructions for operation under usual and, unusual conditions, cleaning, inspection, troubleshooting, and replacement of assemblies available to the operator and organizational technician. The maintenance allocation chart is included as Appendix B.

NOTE

Appendix B is current as of December 1977.

b. Test Set, Radar Altimeter Module AN/APM- 322 is used with Test Set, Radar Altimeter System AN/APM-323.Operator and organization maintenance instructions for Test Set, Radar Altimeter System AN/APM-323 are contained in TM 11- 6625-1746-12.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and re- ports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DLAR 4145.8.

*c. Discrepancy in Shipment Report (DISREP) (SF 361).*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 and DLAR 4500.15.

1-3.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ.07703.

1-3.2. Reporting Equipment Improvement Recommendations (EIR)

EIR's will be prepared using DA Form 2407, Maintenance Request. Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System. EIR's should be mailed direct to Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703.A reply will be furnished direct to you.

1-4.Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with paragraph 4-2.

1-4.1. Destruction of Army Electronics Materiel

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

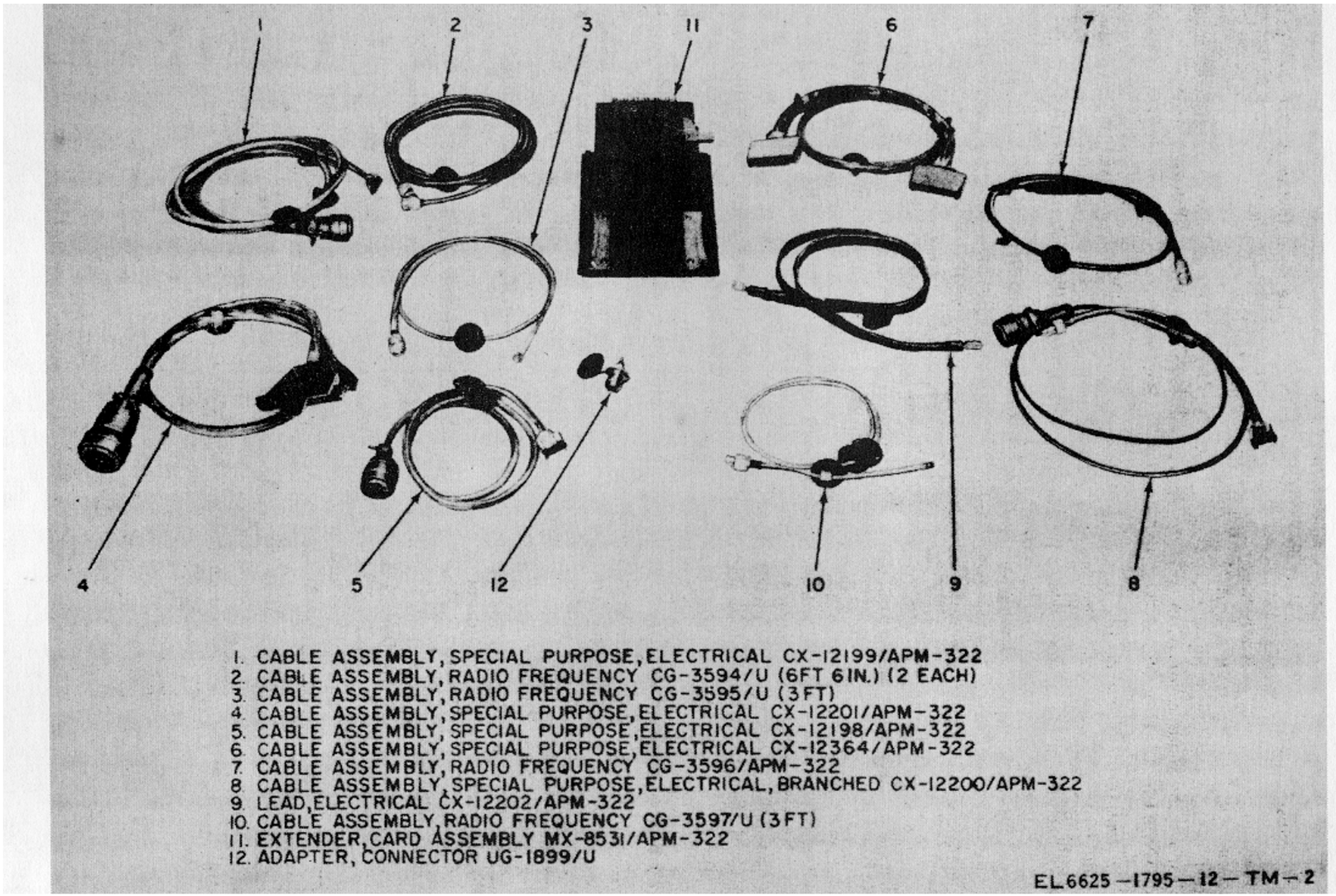

Figure 1-2. Cable assemblies and accessories supplied with Test Set, Radar Altimeter Module ANVIAPM-322.

Section II. DESCRIPTION AND DATA

1-5. Purpose and Use

a. The module test set, when used with Test Set, Radar Altimeter System AN/APM-323 (system test set), permits the operator to test and troubleshoot the modules of Altimeter Set, Electronic AN/APN-171(V) (fig.1-3).

b. The test setups for checking modules, using the module test set, are shown and described in paragraphs 2-12 through 2-15.The module test set may be used installed in Case, Test Set CY- 6789/APM or removed and installed in a stand- and relay rack.

1-6.Technical Characteristics

Power Requirements:

Ac input ----------	115+10 volts, 400+20 Hz, 1.5 ampere.
Dc input ----------	+27 +2 volts, 0.5 ampere.

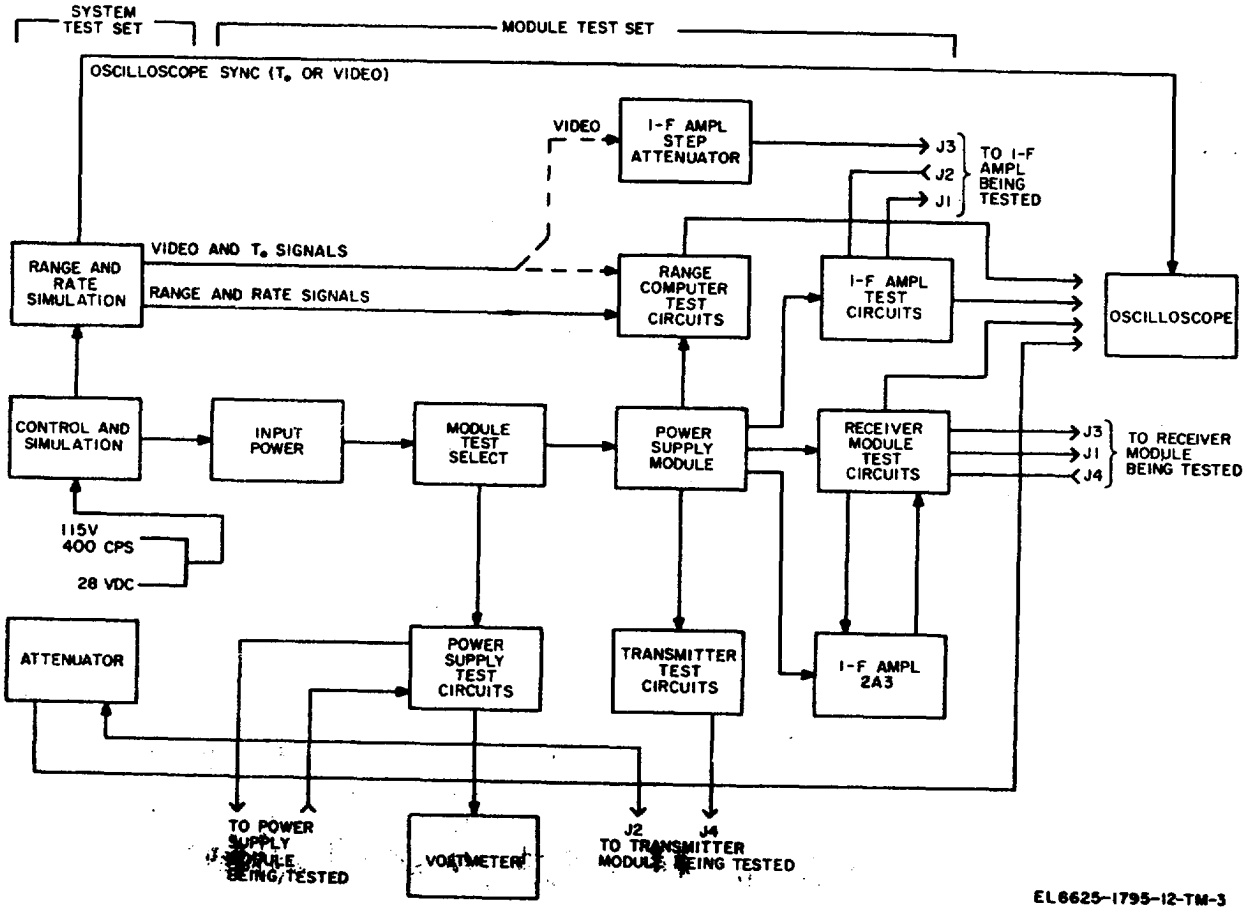

Figure 1-3. Test Set, Radar Altimeter Module AN/APM-322, block diagram

1-7. Items Comprising an Operable Equipment

NSN	Item	Quantity	Dimensions (in.) Height	Depth	Width	Weight (lb)
6625-00-437-7312	Test Set, Radar Altimeter Module AN/1 APM-322 consisting of:	1	22	14	23.5	53
6625-00-437-7310	Test Set, Radar Altimeter Module TS2932/ APM-322.	1	1513/16	5	19	
6625.00-484-5859	Case, Test Set CY-6789/APM.	1	22	14	23.5	
	Cable Assembly, Radio Frequency CG-3594/U.	2	6 Feet 6 inches long			
	Cable Assembly, Radio Frequency CG-3595/U.	1	3 feet long			
599&00-477-3878	Cable Assembly, Radio Frequency CG-3596/U.	1				
5995.00-447-3887	Cable Assembly, Radio Frequency CG-3597/U.	1	3 feet long			
5995.00-477-3879	Cable Assembly, Special Purpose, Electrical CX-12198/APM-322.	1				
5595.00-477-3886	Cable Assembly, Special Purpose, Electrical CX-12199/APM-322.	1				
5595-00-477-3888	Cable Assembly, Special Purpose, Electrical CX-12200/APM-322.	1				
5595-00-477-3880	Cable Assembly, Special Purpose, Electrical CX-12201/APM-322.	1				
	Lead, Electrical CX-12202/APM-322.	1				
	Cable Assembly, Special Purpose, Electrical CX-12364/APM-322.	1				
	Adapter, Connector UG-1899/U.					
6625-00-922-6053	Extender, Card Assembly MX-8531/APM-322.	1				

1-8. Description

The module test set consists of Test Set, Radar Altimeter Module TS-2932/APM-322 (fig. 1-4), contained on a panel assembly and mounted in Case, Test Set CY-6789/APM (fig.1-1).Test cables and Extender, Card Assembly MX-8531/APM-322 (fig. 1-2) are also mounted in the case.

a. Panel Assembly. The panel assembly is installed with protective gaskets along the mount- ing surfaces to protect against moisture, dust, or shock. A power supply and intermediate frequency amplifier are mounted in the chassis of the panel assembly. Controls and test points on the panel are grouped according to the module they test.

(1) The RANGE COMPUTER MODULE panel section is used for tests of the radar altimeter range computer module. Six connectors with slotted guides receive the tracker cards of the range computer module. Tip jacks above the card connectors provide test readout points for tracker card tests. The two connectors at the left provide input connections for video and T-zero signals from the system test set. The TEST connector receives the test cable connector plug of the system test set.

(2) The RECEIVER MODULE panel section is used with the internal intermediate frequency amplifier to permit gain tests and signal output display for receiver modules. The TRANSMIT- TER MODULE panel section includes a 91-ohm load for the T-zero output and a pulse width control switch.

(3) The INTERMEDIATE FREQUENCY AMPLIFIER MODULE panel section contains a row of toggle switches which are part of a step attenuator.The step attenuator is in series with TO IF connector J5.Each of the step attenuator switches adds attenuation when set to the in position. Two variable controls in this group control amplifier bias levels. The BAND-WIDTH CONTROL toggle switch, below the step attenuator switches, simulates a signal received from the radar altimeter in normal operation.

(4) The POWER SUPPLY MODULE panel section contains load resistors to provide power supply voltage readings at normal current. Tip jacks in this section provide voltage readout points for these voltages. The VOLTAGE SE-

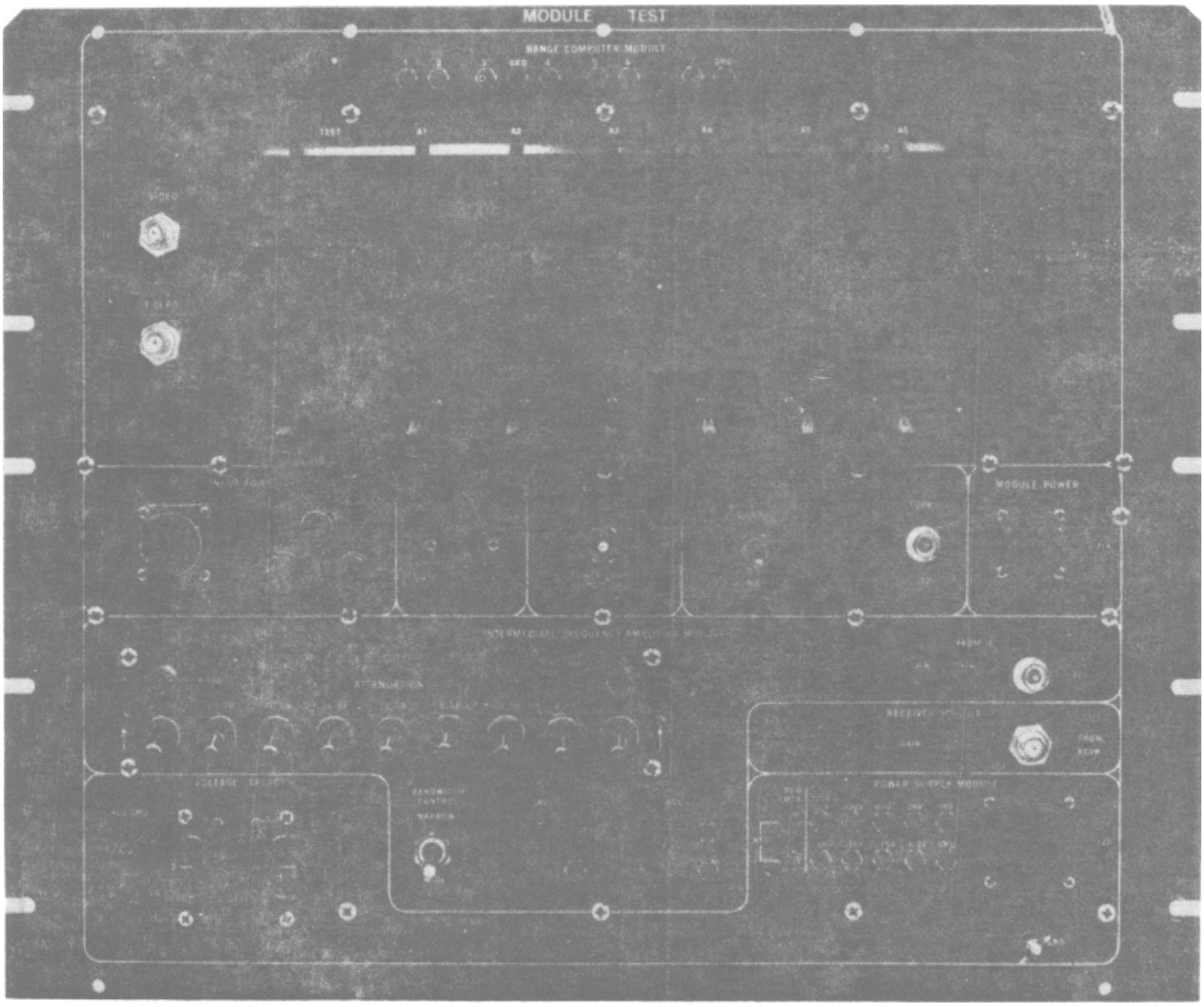

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Figure 1-4.Test Set, Radar Altimeter Module TS-2932/APM2-32.

LECT control is associated with the power' sup- ply module tests and controls input voltage.

(5) The INPUT POWER receptacle at the left of the panel receives-power and signal circuit connections from the system test set. PQW- ER SUPPLY MODULE connector J7 is used to energize the power supply module being tested. MODULE POWER connector J14, at the right of the panel, energizes all other modules. A toggle switch in the center of the panel controls power input to the modules.

b. Extender. The extender is used for tracker card tests. It has a plug-in connector on one end and a card receptacle connector on the other end. The extender portion has a card guide and sup- port. Printed circuit interconnect paths connect the connector plug and receptacle end. Test points in the printed circuit provide for additional card circuit troubleshooting.

c. Test Set Case. The test set case is a standard field type case. It provides a protective cover for transport or storage when closed, and an operational bench mounting when open. The case opens in two sections: one section contains mounting positions for the module test set panel, and the other section provides storage positions for the test cables and accessories. The cable

compartment has a hinged lid with push type fasteners. Seven latches secure the case in its closed position. Both sections have mounting rails on one end that provide a bench mounting base.

1-9.Additional Equipment Required

The module test set is always used in conjunction with Test Set, Radar Altimeter System AN/APN- 323.

CHAPTER 2

OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Packaging Data

a. The module test set is packaged in a standard regular service carton. A typical packaging arrangement is shown in figure 2-1.

b. When the module test set is packaged for shipment, the dimensions are 30 by 30 by 20 inches, the volume is 10.53 cubic feet, and the weight is 60 pounds.

2-2. Unpacking Instructions

If a metal strap secures the carton, cut the strap and open carton from the top. Remove the cushioning material and lift the equipment from the carton. Save the cushioning material and carton for repacking.

2-3.Checking Unpacked Equipment

a. Inspect the equipment for damage that may occur during shipment. If the equipment is damaged, fill out and forward DD Form 6 (para 1-3b).

b. Check to see that the equipment is complete as listed on the packing slip. If the packing slip is not available, check the equipment listed in paragraph 1-7. Report all discrepancies in accordance with TM 38-750.The equipment should be placed in service even if a minor assembly or 'part that does not affect proper functioning is missing.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

c. Check to see whether the equipment has been modified. If the equipment has been modified, the MWO number appears on the front panel, near the nomenclature plate. Check also to see whether all MWO's, current at the time the equipment is placed in use, have been applied.

d. Check the latest issue of DA Pam 310-4 (never more than 1 year old) and its latest changes (never more than 6 months old) to see if you have the latest editions of all applicable maintenance literature.

2-4. Installation Instructions

a. The module test set is normally used mounted in its case. For some applications, it may be more convenient to remove the module test set and system test set panel assemblies and to rack mount them, with auxiliary test equipment, in a complete test station.

b. When the test sets are used in their cases, remove the covers and place the test sets on a suitable bench or solid flat surface. Place the covers in a convenient position for access to the test cables stored in the cable compartment. All cables shall be kept in the cable compartments except when actually being used.

c. Rack mount the module test set panel assembly as follows:

(1) Remove the screws holding the panel assembly and the holddown straps to the case. Remove the panel assembly. Retain the straps and mounting-screws.

(2) Install the panel assembly on the tack. Secure the panel assembly to the rack.

(3) Retain the case to use for storage or reshipment.

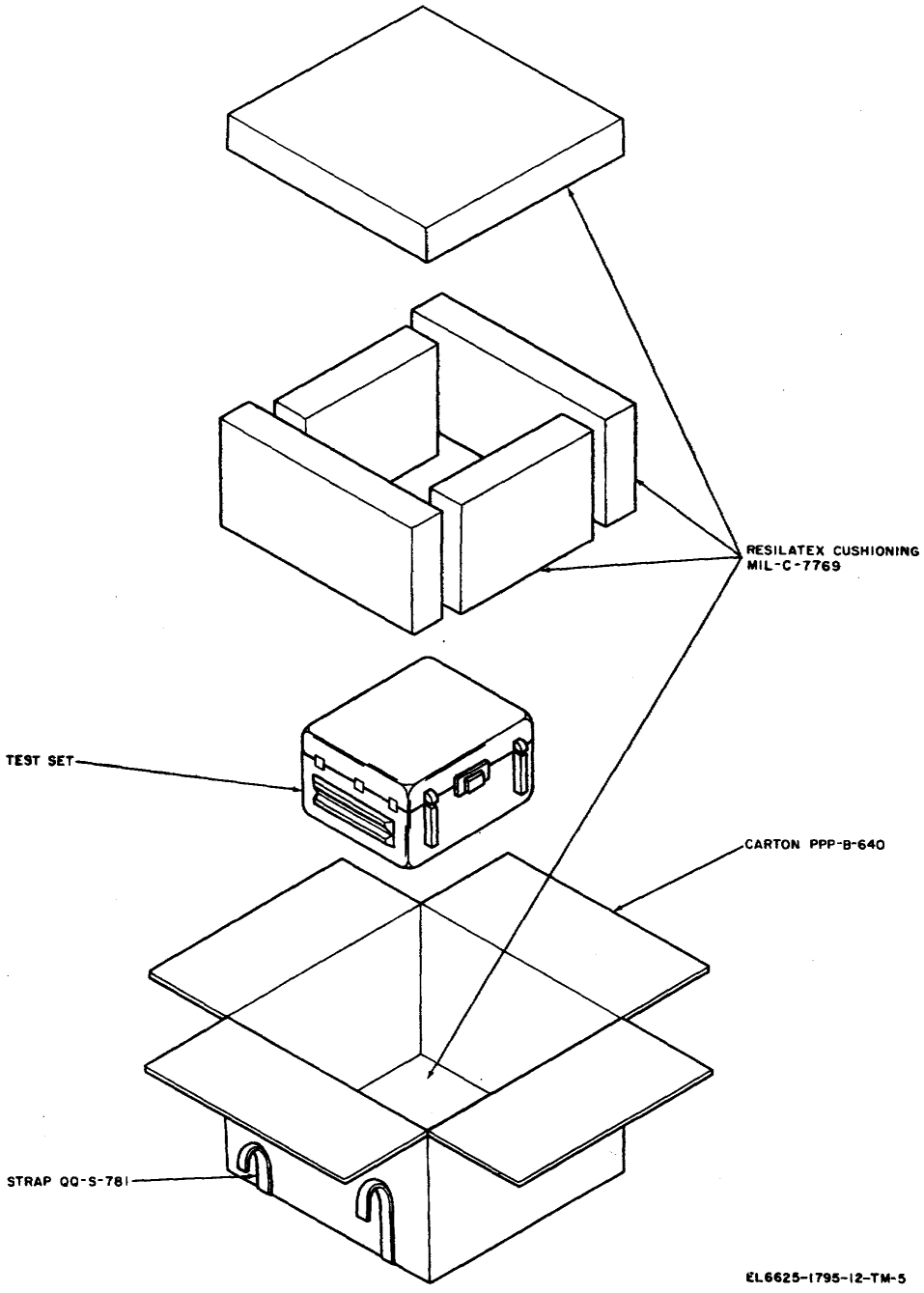

Figure 2-1. Packaging of Test Set, Radar Altimeter Module AN/APM-322.

Section II. OPERATOR'S CONTROLS AND INDICATORS

2-5. Damage From Improper Settings

No damage occurs from improper settings of module test set controls. When testing transmitter modules, observe the caution given in paragraph 2-14c about transmitter antenna.

2-6. RANGE COMPUTER MODULE

Panel Section The range computer section of the module test set panel (fig. 2-2) is used for testing and troubleshooting the tracker cards as an assembly. Functions of the controls, indicators, or connectors of this section are as follows:

Control, indicator, or connector	*Function*
VIDEO connector J1.	Connects to VIDEO TEST connector on range-rate simulation panel of system test set to apply simulated video signals to the range computer module.
T-ZERO connector J2	Connects to T-ZERO connector on range-rate simulation panel of system test set to apply the simulated T-zero pulse to the range computer module.
TEST connector	Receives Cable Assembly, Special Purpose, Electrical CX-12206/APM-323 (test cable).
Connectors A1 through A6	Plug-in mounts for range computer network cards.
Tip jack 1	AGC voltage monitor point.
Tip jack 2 _	AGC clamp voltage monitor point.
Tip jack 3	PTT track gate monitor point.
Tip jack GRD	Ground return for tip jacks 3 and 4.
Tip jack 4	PTT target monitor point.
Tip jack 5	BWC voltage monitor point.
Tip jack 6	Rate integrator clamp monitor point.
Tip jack 7	No-track signal monitor point.
Tip jack GRD	Ground return for tip jacks 1, 2, 5, 6, and 7.

2-7. Miscellaneous Panel Sections

Controls, indicators, and connectors of the miscellaneous sections of the module test set panel, used for one or more of the individual module tests, are as follows:

Control. indicator. or connector	*Function*
INPUT POWER panel section:	
Connector J3	Receives Cable Assembly, Special Purpose, Electrical CX-12205/U (system cable) from system test set control simulation panel connector J6.
115V 400 CPS indicator light	Indicates when 115-volt 400-H power is applied to the module test set.
1A fuse	Protects 115-volt 400-H 1 circuit from overloads.
ELAPSED TIME in that the dicator	Registers the total time module test set has operated.
MODULE TEST SELECT switch	Controls power input to the modules being tested: at the POWER SUPPLY MODULE position, the internal power supply is turned off and power is applied to the power supply module being tested; at the TEST MODULE position, the internal power supply is turned on and power is applied to the other modules; at the OFF position, all power to the modules and the internal power supply is off.
MODULE POWER connector J14	Provides power and signal input connections for the receiver, transmitter ,or intermediate frequency amplifier modules being tested.
VOLTAGE SELECT panel section:	
VOLTAGE SELECT	Control varies the 115-volt 400-H, input to the power supply module being tested.
400 CPS HI and LO tip jacks	Monitor point for VOLTAGE.SELECT control settings of 400-H, power level.

2-8. INTERMEDIATE FREQUENCY AMPLIFIER MODULE Panel Section

This group of controls includes a step attenuator, bandwidth switch, and gain controls required for testing performance of an IF amplifier module. Functions of these controls, indicators, and connectors are as follows:

Control, indicator or connector	*Function*
VIDEO connector J4	Input connection and monitor point for video signal input to IF amplifier module.
TO IF connector J5	Provides attenuated video signal output to IF amplifier module.
FROM IF connector J11	Receptacle for output of IF amplifier, with 91-ohm shunt load resistor.
FROM IF tip jacks	Monitor point for IF amplifier signal output.
ATTENUATION switches, 20 DB to 1 DB	Step attenuator used in IF amplifier video input for gain checks. Each switch controls

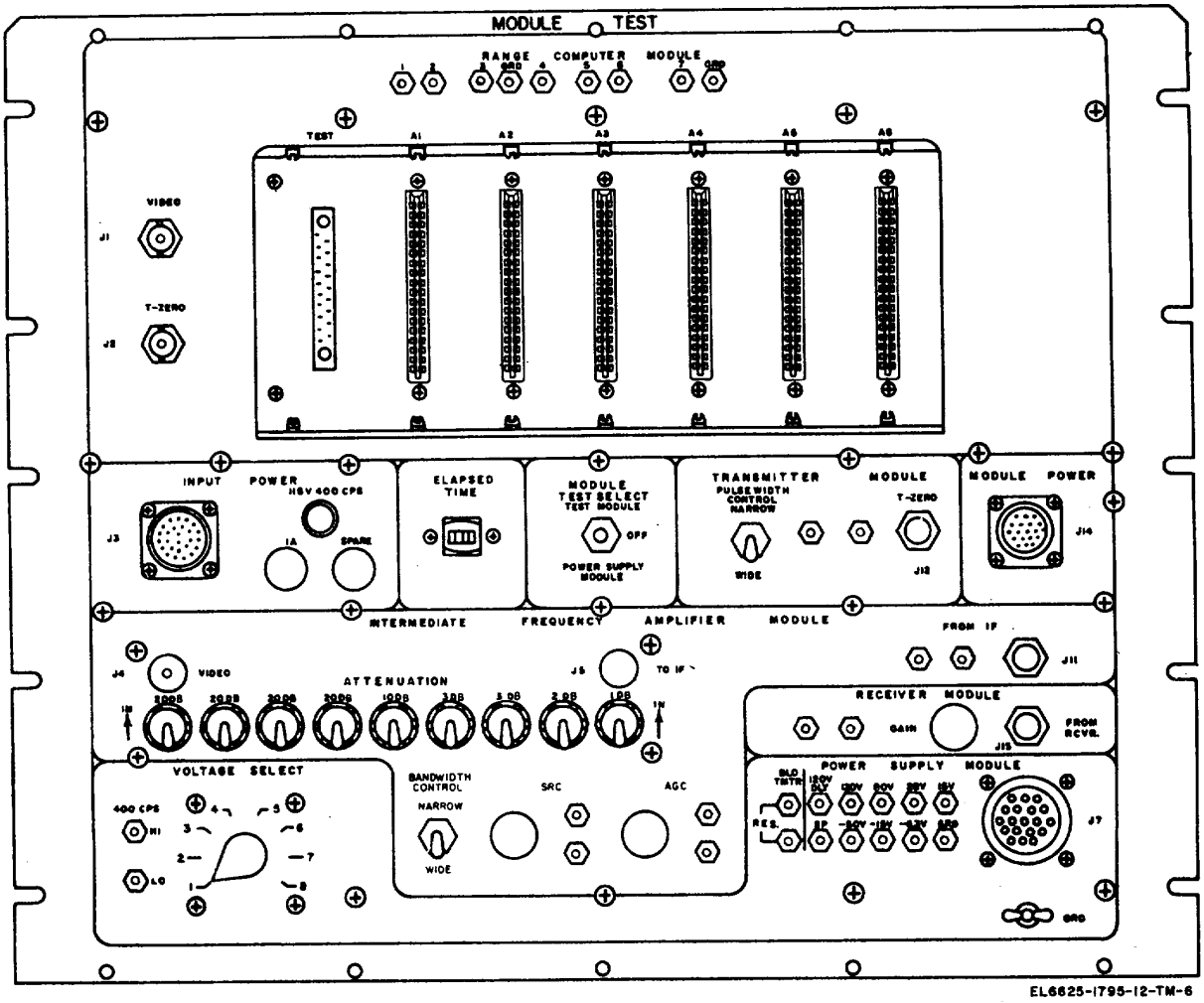

Figure 2-2. Operator's controls and indicators.

Control, indicator, or connector	*Function*
	a fixed attenuator: at the IN (up) position, the corresponding value of attenuation is inserted in the circuit; at the down position, the corresponding attenuator is bypassed. The attenuation level is the total value for each switch that is at IN position.
SRC control	Adjusts voltage applied to src circuits in IF amplifier.
SRC tip jacks	Monitor point for src voltage.
AGC control	Adjusts voltage applied to agc circuits in IF amplifier.
AGC tip jacks	Monitor point for agc voltage.

2-9. TRANSMITTER MODULE Panel Section

The transmitter module controls are used in con- junction with system test set Panel, Attenuator CN-1313./APM-323 to test the transmitter out- put. Functions of these controls and connectors are as follows:

Control, indicator, or connector	*Function*
PUTLSEWIDTH CONTROL switch.	Controls width of transmitter RF pulse.
T-ZERO connector J12.	Applies 91-ohm load across transmitter T-zero pulse output.
T-ZERO tip jacks	Monitor point for transmitted T-zero pulse.

2-10. RECEIVER MODULE Panel Section

The receiver module controls operate in conjunction with the IF amplifier contained in the module test set to check sensitivity of a receiver module. Functions of these controls and connectors are as follows:

Control, indicator, or connector	*Function*
FROM RCVR receptacle J13.	Connection for signal output of receiver module.
GAIN control	Adjusts gain of the module test set IF amplifier for checking receiver sensitivity.
Tip jacks	Monitor for module test set IF amplifier output in receiver tests.

2-11. POWER SUPPLY MODULE Panel Section

The power supply connectors and tip jacks monitor- the voltages of a power supply module connected to connector J7 for test. Functions of these connectors and tip jacks are as follows:

Control, indicator, or connector	*Function*
Connector J7	Test cable connection point for power supply module.
Tip jacks 120V through -6.3V and GRD.	Monitor point for output voltage readings of power supply module outputs across module test set load resistors.
120V DLY tip jack	Monitor point for the +120-volt delayed output in the power supply module.
SP tip jack	For future use.
BLO TMTR tip jacks	For resistance checks of blower thermistors in power supply modules so equipped.

Section III. OPERATION UNDER USUAL CONDITIONS

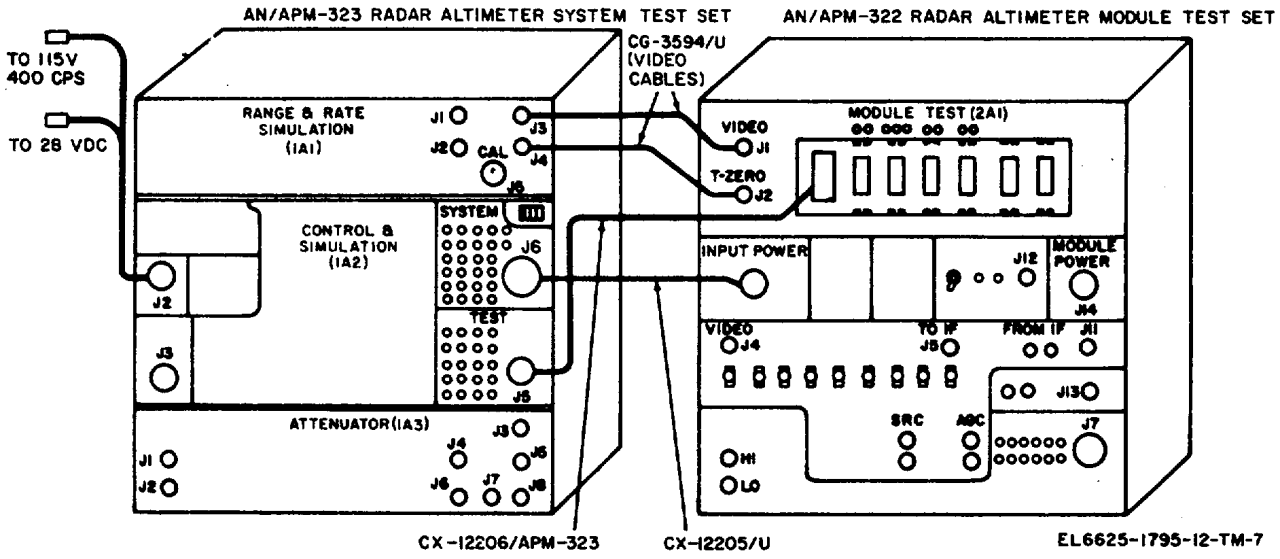

Figure 2-3. Test Set, Radar Altimeter Module AN/APM-3 2, basic test setup.

2-12. Preliminary Procedures

a. Basic Test Setup. The module test set must be interconnected with the system test set as shown in figure 2-3 for all module tests.

b. Initial Adjustments. The only initial adjustment for the module test set is the standard signal level adjustment for the video and T-zero signal inputs from the system test set. This adjustment is covered in TM 11-6624-1746-12.

2-13. Turn-On Procedures

a. After the test connections are completed according to figure 2-3, set the system test set controls as follows:

Panel	*Switch or control*	*Initial position*
Control-simulation	TESTER POWER ON/OFF	ON
	MODE CONTROL	XCVR/MODULE
	FIXED WING/ROTARY WING	ROTARY WING
	MODE	NORM.
	MANUAL SLEW ON/OFF	OFF
	MANUAL SLEW AMPLITUDE	Fully crew
	AUTO PLT RDR ALTM ENGAGE	OFF
	PRESET ALT	OFF
	ALT SIGNAL	Fully crew
	RATE TEST ON/OFF	OFF
	RATE TEST SIGNAL	Fully crew
	MONITOR	OFF
Range-rate simulation	RANGE /RATE SELECT	RANGE
	RANGE CONTROL	0
	RT-805 /RT-804/RT-829	RT-804/RT-829
	IN BOUND/HOLD/OUT BOUND	HOLD
	VIDEO POS/NEG	POS
	PWC	AUTO
Attenuator	40-90 DB/85-135 DB	40-90 DB
	ATTENUATION	50

b. Set the switches and controls on the module test set as shown below.

Switch or control	*Initial position*
MODULE TEST SELECT	OFF
PULSEWIDTH CONTROL	NARROW
BANDWIDTH CONTROL	WIDE
Step ATTENUATION switches	Out (down)
VOLTAGE SELECT	5

2-14. Typical Operating Procedure

a. Range Computer Module Test.

(1) Each tracker card of the range computer module is identified by a part number etched into the printed circuit board. The corresponding reference designation for each card is listed below.

Part number	Reference designation
962581	A1
962582	A2
962583	A3
962584	A4

(2) Connect the test equipment as shown in figure 2-4.

(3) Install tracker card A1 into Extender, Card Assembly MX-8531/APM-322.Install the extender into the Al slot of module test set RANGE COMPUTER module section. Install the other three cards in corresponding slots of test panel.

(4) Refer to paragraph 2-6 for test functions measured at the tip jacks above the tracker card slots.

NOTE

If measurements or waveforms are taken directly from the test points within the card circuits, it may be necessary to remove the card from the extender, connect the test probes to the test points, and replace the card in the extender before measurements are taken.

(5) Energize the Oscilloscope AN/VSM-281 and Electronic Voltmeter ME-202/V and allow 5 minutes for them to warm up.

(6) Set the system test set MODE CONTROL switch to XVCR/MODULE. Set the module test set MODULE TEST SELECT switch to TEST MODULE.

(7) Refer to TM 11-5841-27235 for test procedures (to be published).

b. IF Amplifier Module Test.

(1) Connect the basic test setup as shown in figure 2-3.

(2) Connect the IF amplifier module to be tested, the (oscilloscope, voltmeter, electronic, AN/ URM-145, and the ME-202/V as shown in figure. 2-5.Use the Lead, Electrical CX-12202/APM-322 to ground the IF amplifier module can. Connect one end of the lead to the module test set GRD terminal in POWER SUPPLY MODULE section. Secure the other end of the lead to the module can, using one of the module mounting screws. Failure to do so may cause the module to go into oscillation.

(3) Connect the oscilloscope channel B input to the module test set FROM IF jacks, using a high impedance probe. Adjust the system test set VIDEO AMPLITUDE control for 1.0 + 0.1peak amplitude pulse on the oscilloscope channel A input. This is the standard test signal input.

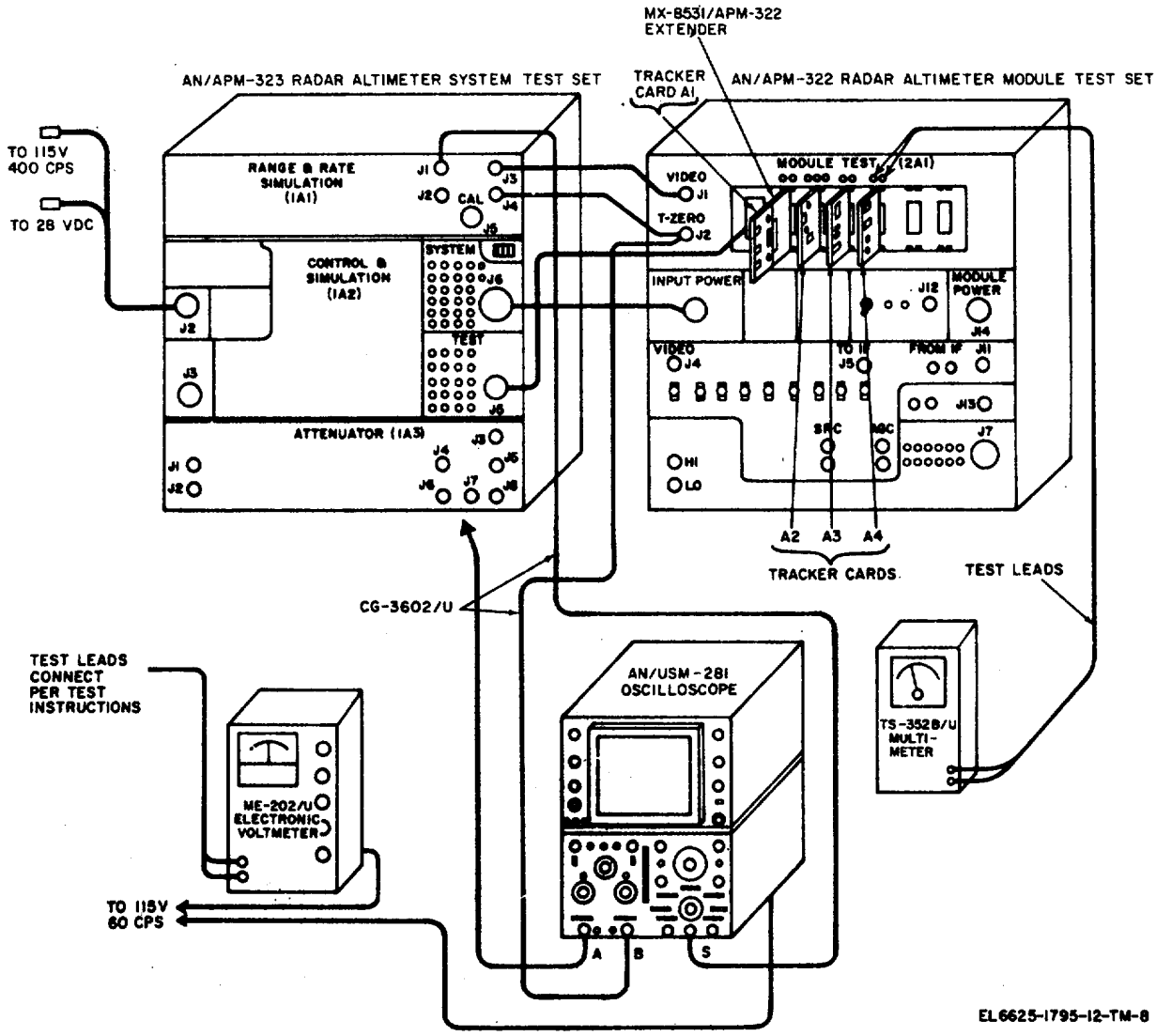

Figure 2-4. Test Set, Radar Altimeter Module AN/APM-322, tracker card test setup.

(4) Set the system tets set MODE CON- TROL switch to XCVR/MODULE. Set the VI- DEO POS/NEG switch to POS. Set the module test set MODULE TEST SELECT switch to TEST MODULE. Energize the oscilloscope, the AN/URM-145, and the ME-202/V.Allow the equipment 5 minutes to stabilize.

(5) Connect the ME-202/V to the module test set AGC jacks. Adjust the AGC amplitude control to obtain -1.0 ± 0.1 volt dc. Then connect the ME-202/V to the module test set SRC jacks and adjust the SRC amplitude control for 0.0 ± 0.1 volt dc. Maintain these voltages through- out the following tests.

(6) Check IF amplifier gain by applying the standard test input of step (3) above, and setting in enough attenuation to reduce the output pulse level on channel B to the same level as the input pulse on channel A. The attenuation value is used as the gain figure.

(7) To set in attenuation, place the step ATTENUATION switches to IN, until a combination of switches is obtained to produce the desired result. Compute the total attenuation by adding the value indicated for each switch set in and adding the 10-db attenuation provided in Cable Assembly CG-3596/APM-322.

(8) Disconnect the oscilloscope and connect

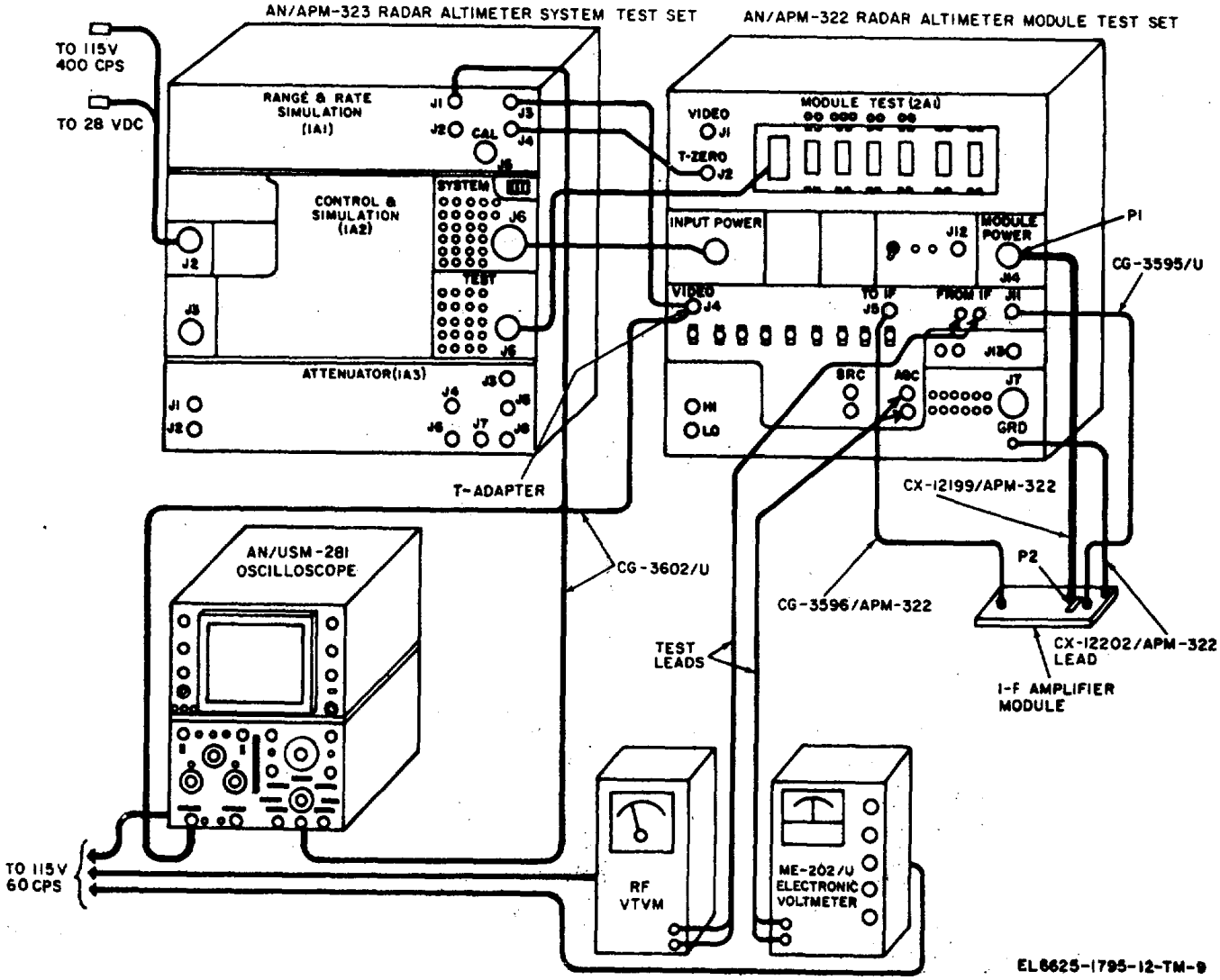

Figure 2-5. Test Set, Radar Altimeter Module AN/APM-322,If amplifier module test setup.

the AN/URM-145 to the FROM IF jacks. Set in 100-db total attenuation; then, read the noise level.

(9) Refer to TM-5841-272-35 (to be published) for test parameters and complete test procedures.

CAUTION

Never apply power to the transmitter module without first making certain that connector J2 is connected. Failure to do so will cause damage to the transmitter.

c. Transmitter Module.

(1) With the system test set and the module test set connected as shown in figure 2-3, connect the transmitter module according to figure 2-6.Connect Cable Assembly CC-3601/U (transmitter RF cable supplied with the system test set) to transmitter connector J2.Connect Cable Assembly CX-12198/APM-322 (transmitter power cable) to module test set connector J14 and transmitter connector JI. Connect the oscilloscope external trigger input to the module test set tip jacks adjacent to T-ZERO connector J12 and connect the A input to system test set DET OUT' J4, using Cable Assembly CG-3602/U supplied with the system test set. Connect the transmitter T- zero output to module test set T-ZERO connector J12, using Cable Assembly CG-3595/U' (RF signal cable).The system test set jumper cable shall be in place between attenuator panel connectors J5 and JS.

(2) Calibrate the oscilloscope for 0-dbm power level. To do this, connect Signal Generator AN 'USM-44 to the power meter with Cable Assembly C(E-3598./U (RF power calibration cable).

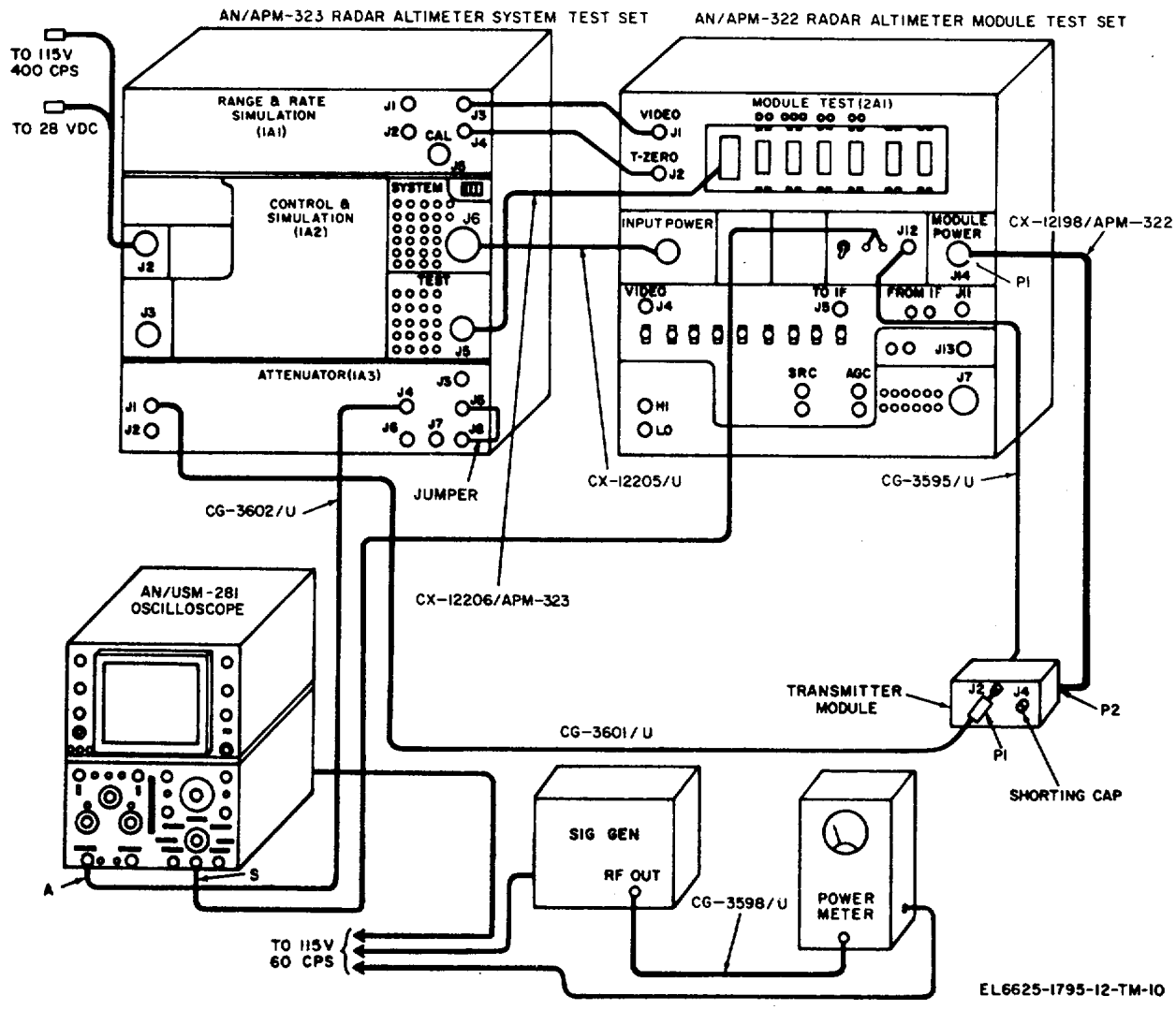

Figure 2-6. Test Set, Radar Altimeter Module AN/APM-322, transmitter module test setup.

Calibrate the signal generator 0-dbm output. Then disconnect the signal generator from the power meter and connect the signal generator to the oscilloscope A input. Adjust the oscilloscope for a convenient low-level pulse display. Record the settings and the peak pulse level.

(3) Connect the oscilloscope A input to system test set DET OUT connector J4.Set the module test set PULSEWIDTH CONTROL switch to WIDE to measure the high altitude p6wer output of the transmitter, or to NARROW to measure the low altitude power output. Adjust the attenuator panel total loop attenuation to reduce the transmitter output pulse to the same level as the 0-dbm pulse. The attenuation setting is used as the peak power level reading.

(4) Measure the transmitter pulse repetition frequency by adjusting the oscilloscope to display two pulses. The interval between the pulse peaks is the transmitter pulse repetition frequency.

(5) To measure transmitter frequency, connect Cable Assembly CG-3601/U to system test set FRM IN connector J2.Connect the oscilloscope to FRM OUT connector J3.Set the frequency meter to 4, 300 MHz. Set the oscilloscope horizonal time base to 0.1w sec /cm, and vertical amplitude to 20 mv/cm. Allow 5 to 10 minutes warmup time for the transmitter. Tune the frequency meter for maximum pulse amplitude on the oscilloscope. The dial reading is the transmitter center frequency, within ± 5 MHz.

d. Receiver Module.

(1) With the basic test setup of figure 2-3 completed, the receiver module shall be connected for test according to figure 2-7.

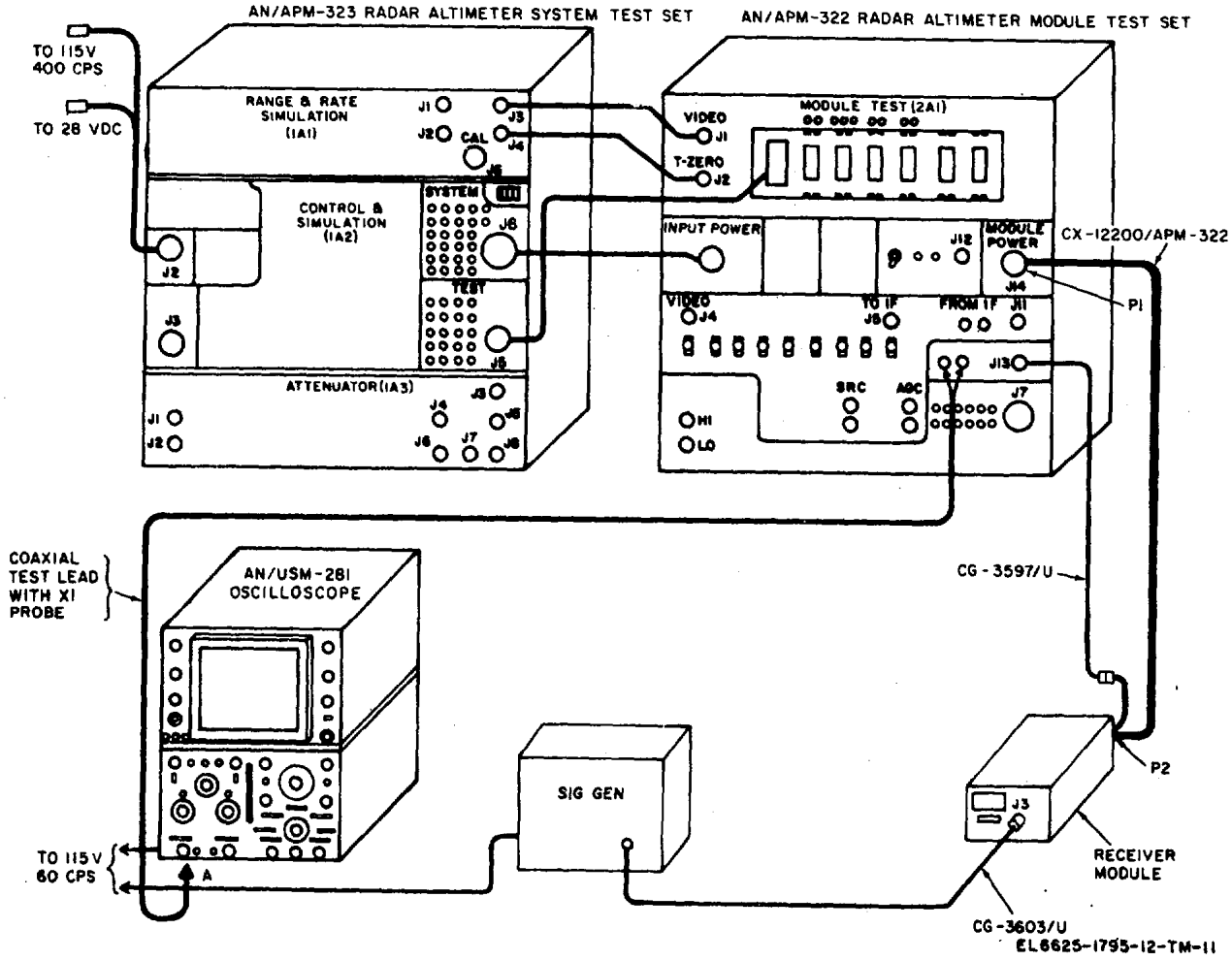

Figure 2-7. Test Set, Radar Altimeter Module AN/APM-322, receiver module test setup.

(2) Connect Cable Assembly CX-12200/A-PM322 (receiver power cable) to receiver connector AllJ1 and module test set MODULE PO- WER connector J14.Connect Cable Assembly CG- 3597/U (receiver output cable) to module test set FROM RCVR connector J13 and the branched connector- of Cable Assembly CX-12200/APM- 322.Connect the oscilloscope input to the tip jacks adjacent to connector J13, using an oscilloscope X1 probe.

(3) Apply a signal generator signal at 4, 300 MHz into receiver antenna connector J3.Adjust the GAIN control as required to control the internal IF amplifier gain. Measure the receiver output on the oscilloscope. Refer to TM 11-5841- 272-35 (to be published) for complete procedures.

WARNING

Do not place printed circuit card A8TB3 on a metal or conductive surface. Insulate it from all potential grounds before applying power to a module. Do not short adjacent pins or connections together during the bench tests. Injury to operator or permanent module damage may result if these warnings are not observed.

e. Power Supply Module.

(1) Disassemble the power supply and re- move printed circuit card A8TB3.Interconnect the power supply and printed circuit card A8TB3 according to figure 2-8.

(2) Use the ME-202/V to measure power supply outputs at the POWER SUPPLY MODULE tip jacks. Use Multimeter AN/USM-223 to monitor the input voltage at the 400 CPS HI and LO jacks. Adjust the VOLTAGE SELECT switch to the low, normal, and high input settings specified in the power supply test procedures.

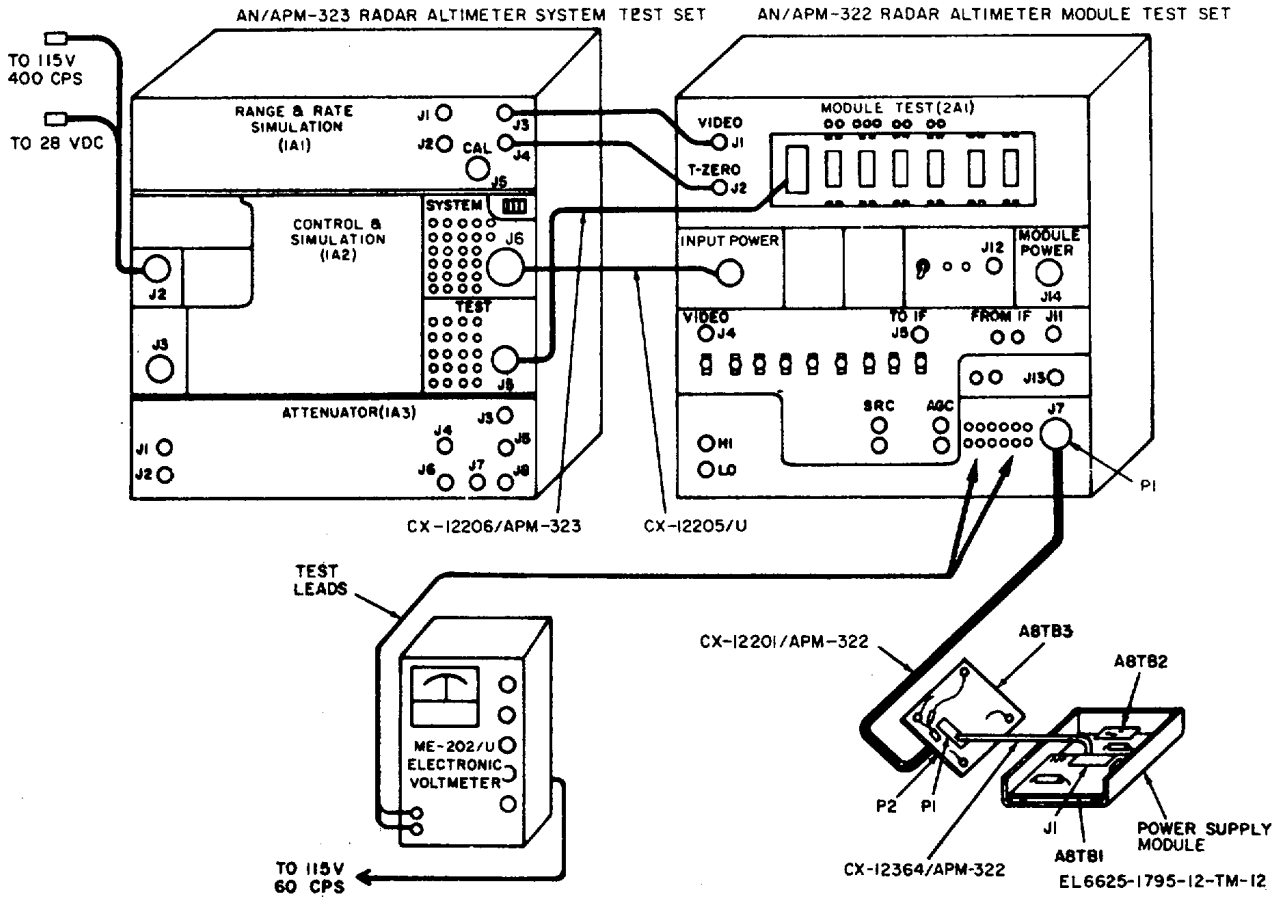

Figure 2-8. Test Set, Radar Altimeter Module AN/APM-322, power supply module test setup.

2-15. turn-Off Procedures

a. Turn-Off Procedure for Standby Condition. Set the MODULE TEST SELECT switch to OFF. Set the system test set MODE CONTROL switch to OFF. This removes all power output and input from the module test set.

b. Turn-Off Procedure for Shutdown Status. Set the MODULE TEST SELECT switch to OFF. Set the system test set MODE CONTROL and TESTER POWER switches to OFF. Disconnect all cables from the module test set receptacle connectors. Close the module test set cover and se- cure the latches.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-16. Operation at Low Temperatures

a. The module test set is designed to operate in ambient temperatures as low as +32° F. Operation at temperatures as low as +20° F. is possible without damage. Operation at lower temperature is not recommended.

b. For temperatures below +32° F., allow at least 5 minutes additional time for warm up of the module test set.

2-17. Operation in Desert Climates

a. The module test set case is designed with a dust protective seal to eliminate entrance of dust.

b. Since the module test set is not absolutely dustproof when used under prolonged and extreme conditions, check the components periodically for excessive dust. Refer to paragraph 3-9 for cleaning instructions.

c. Install polyethylene or other protective cov- ers when the module test set is not in use.

d. The module test set is designed to operate in ambient temperatures up to + 131° F. Operation at higher temperatures is not recommended.

e. Shield the module test se' from direct sun rays to prevent temperature rise to above the high temperature limits.

2-18. Operation Under Tropical Conditions

Check the module test set components daily for the collection of excess moisture. Refer to paragraph 3-9 for cleaning instructions.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE

Section I. GENERAL

3-1. Scope of Organizational Maintenance

The maintenance duties assigned to the organizational technician of the module Test Set are listed in paragraphs 3-3 through 3-8 together with references to the paragraphs covering specific maintenance functions. The duties include preventive maintenance, troubleshooting, and repairs.

3-2. Test Equipment, Tools, and Materials Required

a. Test Equipment.

(1) Electronic Voltmeter ME-202/U.

(2) Multimeter AN/USM-223.

(3) Oscilloscope AN/USM-281.

b. Tools. Toolkit, Electronic Repairman TK-105/ G.

c. Materials. Only trichloroethane is required for maintenance.

d. .Special Tools. No special tools are required.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-3. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, reduce downtime, and assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 3-5, 3-6, and 3-7 cover routine systematic care and cleaning essential to proper up-keep and operation of the equipment.

b. Maintenance Checks and Services. The preventive maintenance checks and services charts (paras 3-5 through 3-8) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in serviceable condition, that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining serviceability, the charts indicate what to check and what the normal indications are. The *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or re- placement procedures. If the defect cannot be remedied by performing the corrective action indicated, a higher category of maintenance or repair' is required. Records and reports of these checks and services shall be made in accordance with requirements set forth in TM 38-750.

3-4. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the module test set are required daily in accordance with paragraph 3-5, weekly in accordance with paragraph 3-6, monthly in accordance with paragraph 3-7, and quarterly in accordance with paragraph 3-8.

3-5. Daily Preventive Maintenance Checks and Services Chart

SEQ.	ITEM	PROCEDURE	REFERENCES
1	Cleanliness	Check exterior of equipment for cleanliness. Exterior surface should be free of dust, dirt, grease, and fungus.	Para 3-9.
2	Controls	Check rotary and toggle switches for proper action. Check control knobs for binding.	Para 3-14.
3	Cables	Check ac power cord and interconnection cables for cuts, cracks, and breaks.	Para 3-14.

3-6. Weekly Preventive Maintenance Checks and, Services Chart

Seq No.	Item to Inspected	Procedure	Reference
1	Case and exposed metal surfaces.	Inspect for corrosion and moisture. Clean and/ or touch up paint.	Paras 3-9 and 3-11.
2	Latches and slip hinges	Check for smoothness of operation----------	Fig. 1-1 and para 3-14.
3	Switches, knobs, connec-tors, fuses and panel lamp.	Check for security and operation ----------	Fig. 2-2 and paras 3-14 and 3-16.
4	Extender board	Check for corrosion or damage----------	Fig. 1-2 and para 3-14.

3-7. Monthly Preventive Maintenance Checks and Services Chart

Perform the maintenance functions indicated in tile following monthly preventive maintenance checks and services chart once each month. Periodic daily (para 3-5) and weekly (para 3-6) services constitute a part of the monthly checks. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval shall be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition shall have monthly preventive maintenance checks and services. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

Seq No.	Item to Inspected	Procedure	Reference
1		Check for cuts, cracks, or breaks	Para 3-14.
2	Control knobs ----------	Check for tightness of control knobs. Check for chipped or broken knobs.	Para 3-14.
3	Toggle and rotary switches	Check tightness of mounting hardware and action of switches.	Para 3-14.
4	Connectors ----------	Check for evidence of broken, bent, or corroded terminals.	Para 3-14.
5	Panel lamp----------	Check the INPUT POWER 115V 400 CPS light for tightness and signs of blackening.	Para 3-16.
6	Modifications----------	Check DA Pam 310-7 to determine if new appli-cable MWO have been published.A11 URGENT MWOs shall be applied immediately.All NOR-MAL MWOs shall be-scheduled.	DA Pam 310-7.

3-8. Quarterly Preventive Maintenance Checks and Services Chart

Quarterly preventive maintenance checks and services of the module test set are required. Periodic daily, weekly, and monthly services constitute a part of the quarterly preventive maintenance checks and services and shall be performed concurrently. A11 deficiencies or shortcomings shall be recorded in accordance with the requirements of TM 38--750.Perform all the checks and services listed in the following quarterly preventive maintenance checks and services chart in the sequence listed. Adjustment of the maintenance interval shall be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition shall have quarterly preventive maintenance checks and services. Equipment in limited storage (requires service before operation) does not require quarterly preventive maintenance.

Seq No.	Item to be Inspected	Procedure	Reference
1	Publications----------	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	Modifications ----------	Check DA Pam 310-7 to determine whether new applicable MWOs have been published'.All URGENT MWO shall be applied immediately. All NORMAL MWO shall be scheduled.	TM 38-750 and DA Pam 310-7.

SEQ.	ITEM	PROCEDURE	REFERENCES
3	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage. No overstock should be evident, and all shortages shall be on valid requisitions.	Para 1-7.
4	Module test set operation.	*a.* With the module test set connected to the system test set, place the controls to the following initial positions: MODULE TEST SELECT: OFF PULSEWIDTH CONTROL: WIDE BANDWIDTH CONTROL: WIDE Step ATTENUATION (20 DB to 1 D-B) switches: Down (out) VOLTAGE SELECT: 5 *b.* Set the system test set TESTER POWER ON/OFF switch to ON and the MODE CONTROL switch to XCVR/MODULE. The module test set panel 115V 400 CPS indicator light shall be on, and the ELAPSED TIME indicator shall be running.	Para 3-13, items 1 and 2.
5	Transformer 2T1	Connect the ac voltmeter range of the multimeter to the 400 CPS HI and LO tip jacks. Set the MODULE TEST SELECT switch to POWER SUPPLY MODULE. Set the VOLTAGE SELECT switch to the positions listed below. Voltage readings shall be within +3 volts of the values listed below, when the input voltage is maintained within, -+1. 2 volt. Switch position — AC volts (± SV) 1---------- 92 2---------- 98 3----------103 4----------109 5----------115 6----------121 7----------127 8 ----------132	Para 3-13, item 5.
6	Power supply 2A2	Connect the electronic voltmeter to control-simulation panel TEST tip jacks listed below. Voltages shall be within the limits shown. Test tip jack — Dc toltage 3---------- +120 ± 12 4---------- +80. 0 ± 1.6 5---------- +28 ± 4 18---------- +15. 00 ± 0.45 11---------- -6. 300 ± 0.126 19---------- -15. 00 ± 0.45 10---------- 50.000 ± 0.125	Para 3-13, item 3.
7	PULSEWIDTH CONTROL switch.	Set the MODULE TEST SELECT switch to OFF. Check for continuity between pins S and M in MODULE POWER receptacle connector 'J14. Resistance shall be 0. 5 ohm or less with the PULSEWIDTH CONTROL Switch set to NARROW. Resistance shall be at least 10 megohms with the switch set at WIDE.	Para 3-13, item 8.
8	IF amplifier	Measure the gain of IF amplifier 2A3. It shall meet the following requirements. If it does not, install a new IF amplifier in the module test set. a. Remove the panel from the module test set case. Connect the system power cable to INPUT POWER receptacle J3. Disconnect the ca-	Para 3-13, item 4 .

SEQ.	ITEM	PROCEDURE	REFERENCES
		ble from input jack J2 on the IF amplifier module. b. Connect the video cable between the system test set range-rate simulation panel VIDEO Test jack J3 and the module test set panel VIDEO jack J4, using a T-adapter. Use Cable Assembly CG-3596/APM-322 (IF input RF cable) to connect TO IF jack J5 to input jacks J2 of the IF amplifier. c. Set the MODULE TEST SELECT switch to TEST MODULE. Allow about 5-minute warm-up time. d. Adjust the range-rate simulation panel VIDEO AMPLITUDE control for a +0. 9 to +1.1-pulse input to module test set panel VIDEO jack J4. e. Adjust the RECEIVER MODULE GAIN control for a voltmeter reading of -1. 00 + 0. 01 vdc at terminal board TB1 pin 10 at the rear of the module test set panel. f. Connect the oscilloscope A input to the T-adapter at jack J4. Connect the oscilloscope B input to the RECEIVER MODULE tip jacks. Compare'the signal levels; and insert sufficient step attenuation until the two signals have identical amplitudes. g. The gain of the amplifier is the sum of the attenuation set in the step attenuator plus the 10-db fixed attenuation in the IF cables. The total attenuation shall be 83 db or more. h. Repeat steps d through g above, using a pulse of -0. 9- to -1. 1-volt amplitude. The gain shall be 83 db or more.	
9	AGC voltage	Connect the electronic voltmeter to the module test set panel AGC jacks. Vary the AGC control through its range. Voltage shall vary smoothly from 0 to -15 vdc.	Para 3-13, item 6.
10	SRC voltage	Connect the electronic voltmeter to the module test set panel SRC jacks. Vary the SRC control through its range. Voltage shall vary from 0 to -15 vdc.	Para 3-13, item 7.

3-9. Cleaning

Inspect the exterior of the equipment. The exterior surfaces should be clean and free of dust, dirt, grease, and fungus. If necessary, clean equipment as follows:

a. Remove dust and loose dirt with a clean soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. Do NOT use near an open flame. Trichloroethane is not flammable, but exposure of fumes to an open flame converts fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt from the cases, using a cloth dampened (not wet) with trichloroethane.

c. Remove dust and dirt from plugs and jacks with a brush.

d. Clean the front panels, meters, and control knobs, using a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water. Mild soap may be used for more effective cleaning.

3-10. Lubrication

There are no lubrication requirements for the module test set.

3-11. Touchup Painting instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of MILE-15090 light gray enamel (Federal stock No. 8010-285-4868) on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB 746-10.

Section III. TROUBLESHOOTING

3-12. General

The troubleshooting chart is based on the checks contained in the quarterly preventive maintenance checks and services chart (para 3-8). To troubleshoot the equipment, perform all the checks in paragraph 3-8. Proceed through the checks until an abnormal condition or result is observed. When an abnormal condition or result is observed, refer to the appropriate troubleshooting chart item number (listed in the References column) for symptoms, and corrective action. If the corrective measures listed in the troubleshooting chart do not result in correction of the trouble, higher category of maintenance is required.

3-13. Troubleshooting Chart

Item No.	Malfunction	Probable cause	Corrective action
1	Ac power indicator does not light.	Defective lamp (INPUT POWER 115V 400 CPS)	Check lamp and replace if necessary (para 3-16).
2	Ac power indicator does not light.	Defective fuse (INPUT POWER fuse 1A)	Check fuse and replace if necessary (para 3-16).
3	Power supply checks show no voltage or incorrect voltage at checkpoints.	a. Improperly connected or defective cable.	a. Check cable connection (para 3-14).
		b. Defective power supply	b. Return module test set to higher category of maintenance.
4	IF amplifier gain checks not in limits.	Defective IF amplifier	Return module test set to higher category of maintenance.
5	Voltage select checks show no voltage or incorrect voltage at switch positions.	a. Defective VOLTAGE SELECT switch.	a. Check feel of switch positions. If faulty, return module test set to higher category of maintenance.
		b. Improperly connected or defective cable.	b. Check cable and connections. Tighten or repair (para 3-14).
6	Agc voltages net correct	Defective power supply 2A2 or faulty AGC control.	Return module test set to higher category of maintenance.
7	Src voltages not correct	Defective power supply or faulty control.	Return module test set to higher category of maintenance.
8	PULSEWIDTH CONTROL switch resistance over 0. 5 ohm, or less than 10 megohms	Faulty switch	Return module test set to higher category of maintenance.

3-14. Repairs

a. Connector Contacts.

(1) Reposition card and extender board connector contracts that are bent to provide good contact for the mating card contacts.

(2) Straighten cable connector contacts that do not align properly with the mating connector contacts.

b. Control Knobs.

(1) Reposition knobs that have become loose on the control shaft and tighten the setscrew.

(2) Install a new setscrew of the correct size in knobs where a setscrew may have fallen out.

(3) Replace missing or broken knobs. Re- place knobs if threads are stripped.

c. Cables. Cable repair is limited to repair of damaged insulation and straightening of connector pins. Repair breaks in insulation by first covering them with rubber tape and then with friction tape. Replace cables with broken wires or connector pins.

3-15. Removal

Removal from the module test set of components other than control knobs, burnt out lamps and burnt out fuses is not authorized at direct sup- port category of maintenance.

3-16. Replacement

a. Panel Lamp.

(1) Use Panel Lamp MS25252NE2D, a complete lamp and lens unit, for replacement.

(2) Unscrew the faulty lamp and replace with a new lamp.

b. Fuse.

(1) Press in on the fuse holder cap and rotate it counterclockwise to unlock it.

(2) Pull the fuse holder cap and fuse out of the fuse holder.

(3) Remove the defective fuse from the fuse holder cap.

(4) Replace the defective fuse with a new one with the same rating.

(5) Insert the fuse and fues holder cap in the fuse holder. Push in on the fuse holder cap and rotate it clockwise to lock it.

3-17. Adjustments

No adjustments to components of the module test set are required at organizational category of maintenance.

3-18. Fuses

Component	Panel designation or circuit	Fuse	Fuse rating		Fig. No.
			Amp	Volts	
Test Set, Radar Altimeter Module AN/APM322.	INPUT POWER 1A ----------	F1	1	115	2-2

CHAPTER 4
SHIPMENT AND LIMITED STORAGE

4-1. Disassembly of Equipment

a. If the module test set is rack mounted, remove the unit from the rack and mount it in the case.

b. Stow all cables and accessories under the lid of the module test set cover (figs. 1-1 and 1-2).

c. Align the hinge pins on the cover with the hinges on the module test set case. Slide the hinge pins into the hinges until they are completely seated. Check to see that the cover sealing surfaces match when the cover is closed.

d. Close the case cover and secure the latches.

4-2. Storage

The case on the module test set provides adequate protection for normal storage conditions. Install the case cover and secure the latch fasteners. Use ordinary care in handling the module test set to avoid damage. No special procedures are required for storage.

4-3. Repackaging of Equipment

Repackaging of equipment for shipment or limited storage normally is performed at a packaging facility or by a repackaging team. Should emergency packaging be required, select the materials from those listed in SB 38100. Package the equipment in accordance with the original packaging, so far as possible, with the available materials (para 2-1).

APPENDIX A
REFERENCES

The following publications contain information applicable to the operation and maintenance of Test Set, Radar Altimeter Module AN/APM-322.

DA Pam 310-4	Index of Technical Manual, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U. S. Army Equipment Index of Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing, and Marking Materials, Supplies, and Equipment Used by the Army.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment. (Including Camouflage Pattern Painting of Electrical Equipment Shelters).
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 9-6625-2362-12	Operator's Manual: Oscilloscope AN/USM-181.
TM 11-5841-272-20	Organizational Maintenance Manual: Altimeter Set, Electronic AN/APN-171A(V)1.
TM 11-5841-272-34P	Direct Support and General Support Maintenance: Repair parts and Special Tools Lists (Including Depot Maintenance Repair Parts and Special Tools) For Altimeter Set, Electronic AN/APN-171A(V)1.
TM 11-6625366-15	Operator's, Organizational, DS, GS, ' and Depot Maintenance Manual: Multimeter TS-352B/U.
TM 11-6625-524-14	Operator, Organizational, and Field Maintenance Manual: Voltmeter, Electronic AN/URM-145.
TM 11-6625-537-15	Operator's, Organizational, Field, and Depot Maintenance Manual: Voltmeter, Electronic ME-202/U.
TM 11-6625-1746-12	Operator's and Organizational Maintenance Manual, for Test Set, Radar Altimeter Systems AN/APM-323.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command)

APPENDIX B
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B-1. General

This appendix provides a summary of the maintenance operations for AN/APM-322. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

B-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i. e. ,to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

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

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

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

g. Install, The act of emplacing, seating, or fixing into position an item, part, module (component or assembly), in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

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

j. Overhaul. That maintenance effort (service/ action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i. e. , DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

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

B-3. Column Entries

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

b. Column 2, Components/Assembly Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to

restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

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

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

f: Column 6, Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Tool and Test Equipment Requirements (sect III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

B-5. Remarks (sect IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

SECTION II. MAINTENANCE ALLOCATION CHART FOR TEST SET, RADAR ALTII¢TER M0DULE MA/APM-322

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
00	RADAR ALTIIR IDODULE AN/AP1-322 TEST SET	Inspect		0.3				1, 3	
		Test		0.5				1 thru 4	
		Test				0.5		1, 3.6	A
		Adjust				1.0		6	
		Calibrate				2.0		1 thru 8	B
		Repair					8.0	1 thru 13	
		Replace				0.5		4	
		Repair		0.2				4	C
		Repair				0.5		1 thru 8	D
01	TEST SET, RADAR ALTIMETER ODDULE (2A1)	Inspect		0.3				4	
		Test		0.5				1 thru 4, 8	
		Test					0.5	1, 3.6, 10	A
		Adjust					1.0	6	
		Calibrate					2.0	1 thru 8	B
		Repair					8.0	1 thru 13	
		Repair		0.2				4	C
		Replace				0.3		4	
0101	POWER SUPPLY SUBASSEBLY	Test				0.3		2, 6	
		Adjust				0.3		6	
		Replace				0.3		4	
		Repair					0.5	1 thru 13	
010101	POWER SUPPLY SUBASSEBLY N0.1	Test		0.2				2, 14 thru 6	
		Replace		0.3				4	
		Repair				0.5		4	
010102	POWER SUPPLY SUBASSEMBLY N0.2	Test					0.2	2, 4 thru	
		Replace				0.3		4	
		Repair					0.5	4	
010103	POWER SUPPLY SUBASSMBLY N0.3	Test				0.2		2, 4 thru 6	
		Replace				0.3		4	
		Repair					0.5	4	
0102	INTERMDIATE FREQUEIICY AMPLIFIER	Test				0.5		1 thru 3, 7, 8, 10	
		Replace				1.0		7	
		Repair					2.0	4, 7 thru 13	
010201	AMPLIFIM DETECTOR ASSEMBLY (2A1A3TBl)	Test				0.2		1 thru 3, 7, 8	
		Replace				0.3		7	
		Repair					2.0	4, 7 thru 13	
02	CG-3594/U (2W1, 2W2)	Inspect		0.2					
		Test				0.3		1, 7	
		Replace		0.1				1, 4	
		Repair				0.5		1, 7	
03	CX-12198/APM-322(2W3)	Inspect		0.2					
		Test				0.3		1, 4	
		Replace		0.1				1, 7	
		Repair				0.5		1, 7	
04	CX-12199/APM-322(2V5)	Inspect		0.2					
		Test				0.3		1	
		Replace		0.1				1, 7	
		Repair				0.5		1, 4	

SECTION II MAINTENANCE ALLOCATION CHART
FOR
TEST SET, RADAR ALTII¢TER M0DULE MA/APM-322

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
05	CX-12200/APM-322 (2W7)	Inspect		0.2					
		Test				0.3		1	
		Replace		0.1				1, 7	
		Repair				0.5		1, i	
06	CX-12201/APM-322 (2W9)	Inspect		0.2					
		Test				0.3		1	
		Replace		0.1				1, 7	
		Repair				0.5		1, 4	
07	CX-123614/APH-322 (2W10)	Inspect		0.2					
		Test				0.3		1	
		Replace		0.1				1, 7	
		Repair				0.5		1, 4	

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR TEST SET, RADAR ALTIMETER MODULE AN/APM-322

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O, H, D	MULTIMETER AN/USM-223	6625-00-999-7465	
2	0, H, D	VOLTMETER, ELECTRONIC ME-202/U	6625-0-709-0288	
3	0, H, D	OSCILLOSCOPE AN/USM-281	6625-00-228-2201	
-,	o, H, D	TOOL KIT, ELECTRONIC REPAIRMAN TK-1O5/G	5180-00-610-817,	
5	H, D	RESISTANCE BRIDGE ZM-4/U	6625-00-166-039	
6	H, D	VOLTMETER, DIGITAL AN/GSM-64	6625-00-870-2264	
7	H, D	TOOL KIT, ELECTRONIC REPAIRMAN TK-100/G	5180-00-605-0079	
8	H, D	GENERATOR, SIGNAL AN/USM-44	6625-00-669-4031	
9	D	MEASURING SET, SWR AN/ASM 37A	f625-00-814-8357	
10	D	VOLTMETER, ELECTRONIC AN/URM-145	6625-00-973-3986	
11	D	OUTPUT MONITORING EQUIPMENT PA-2, WEINSCHEL ENGINEERING COMEPANY		
12		VOLTMETER, DIGITAL X-1, NON-LINEAR SYSTEMS INC.		
13	D	AC/DC OHMS CONVERTER 1109, NON-LINEAR SYSTEMS INC.		

SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	REQUIRES AN AN/APM-323 TEST SET RADAR ALTIMETER SYSTEM TO TEST.
B	EVERY TWELVE MONTHS OR AFTER REPAIRS.
C	BY REPLACEMENT OF KNOBS, LAMPS, FUSES, AND ALL ACCESSORIES STORED IN COVER.
D	CABLE EXTENDER (MX-8531/APM-322 (2NI)) AND THE FOLLOWING CABLES NOT IDENTIFIED SEPARATELY: UG-1899/U(2CPI), CG-3595/U(2W4), CG-3596/APM-322(2W6), CG-3597/U(2W8) AND CX-12202/APM-322(2WII).

GLOSSARY

The unusual terms used in this manual are explained below.

AGC	Automatic gain control.
BWC	Bandwidth control.
DBM	Power level referenced to 1 milliwatt.
PTT	Push to test.
SRC	Sensitivity range control.
T-zero or T_o	Time zero of pulse frequency transmission.
Tracker module	Part of the range computer circuits (tracker cards).

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