

**TECHNICAL MANUAL**

**ORGANIZATIONAL, DIRECT SUPPORT,  
AND GENERAL SUPPORT MAINTENANCE**

**RADIO RECEIVER R-1963/ARN (5826-01-015-1574)**



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 GENERAL SUPPORT MAINTENANCE MANUAL**

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**REPORTING OF ERRORS**

You can improve this manual by recommending improvements using DA Form 2028-2 (Test) located in the back of the manual. Simply tear out the self-addressed form, fill it out as shown on the sample, fold it where shown, and drop it in the mail.

If there are no blank DA Form 2028-2 (Test) in the back of the manual, use the standard DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to the Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703.

In either case a reply will be furnished direct to you.

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RECEIVER, RADIO  
R-1963/ARN

EL00L-001

Figure 1-1. Radio receiver R-1963/ARN.

## CHAPTER 1

### INTRODUCTION

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#### Section I. GENERAL

##### 1-1. Scope

This manual describes Radio Receiver R-1963/ARN (fig. 1-1) and covers its operation, preflight check, and organization, direct and general support maintenance. It includes operating instructions, cleaning and inspection of equipment, replacement of components available to organizational maintenance, and direct support and general support bench tests.

#### CAUTION

This receiver must not be repaired by maintenance personnel under the terms of the warranty. This manual contains instructions to be followed when the receiver fails. Never break or tamper with the warranty seal.

##### 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's) pertaining to the equipment.

##### 1-3. Forms and Records

*a. Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports 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 DSAR 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.

##### 1-4. Warranty

*a.* This equipment is under a Reliability Improvement Warranty. To insure validation of the warranty, the following steps must be taken when returning discrepant equipment.

(1) DA Form 2407 is to accompany the equipment to the contractor's facility.

(2) Fill in the required information on the WARRANTY NOTICE attached to the equipment.

*b.* Failure to provide the information required by these documents may invalidate the warranty.

*c.* Opening of the unit or destruction of the tamperproof seal shall be cause to invalidate the warranty on this equipment.

*d.* Return the equipment as expeditiously as possible to the contractor at the address shown on the warranty notice (fig. 1-2).

##### 1-5. Reporting Equipment Improvement Recommendations (EIR)


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

##### 1-6. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with TM 740-90-1.

##### 1-7. Destruction of Army Electronics Materiel

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

<b>WARRANTY NOTICE</b>							
<b>1. THIS UNIT IS UNDER WARRANTY UNTIL</b> _____ / _____ / _____							
<b>2. DO NOT BREAK OR TAMPER WITH WARRANTY SEAL.</b>							
3. VERIFY FAILURES USING APPROVED PROCEDURES AND TEST EQUIPMENT OF TM 11-5826-258-24							
4. RECORD REASON FOR REMOVAL & TEST FINDINGS ON FORM DA-2407							
5. PACKAGE IN ACCORDANCE WITH SECTION 11 OF TM 11-5826-258-24 AND RETURN TO BENDIX AVIONICS 2100 N.W. 62nd ST. FT. LAUDERDALE, FLORIDA 33310							
C-10048/ARN-123(V) SERIAL NO. _____							
<b>INSTALLATION DATA</b>						<b>CONTRACTOR'S USE ONLY CODE NO.</b>	
	<b>A/C TYPE</b>	<b>A/C NO.</b>	<b>DATE &amp; TIME TOTALIZING METER</b>				
			<b>IN A/C</b>	<b>TTM</b>	<b>CUT A/C</b>		<b>TTM</b>
1							
2							
3							
4							

ELOOL003

Figure 1-2. Typical warranty notice.



## Section II. DESCRIPTION AND DATA

## 1-8. Description

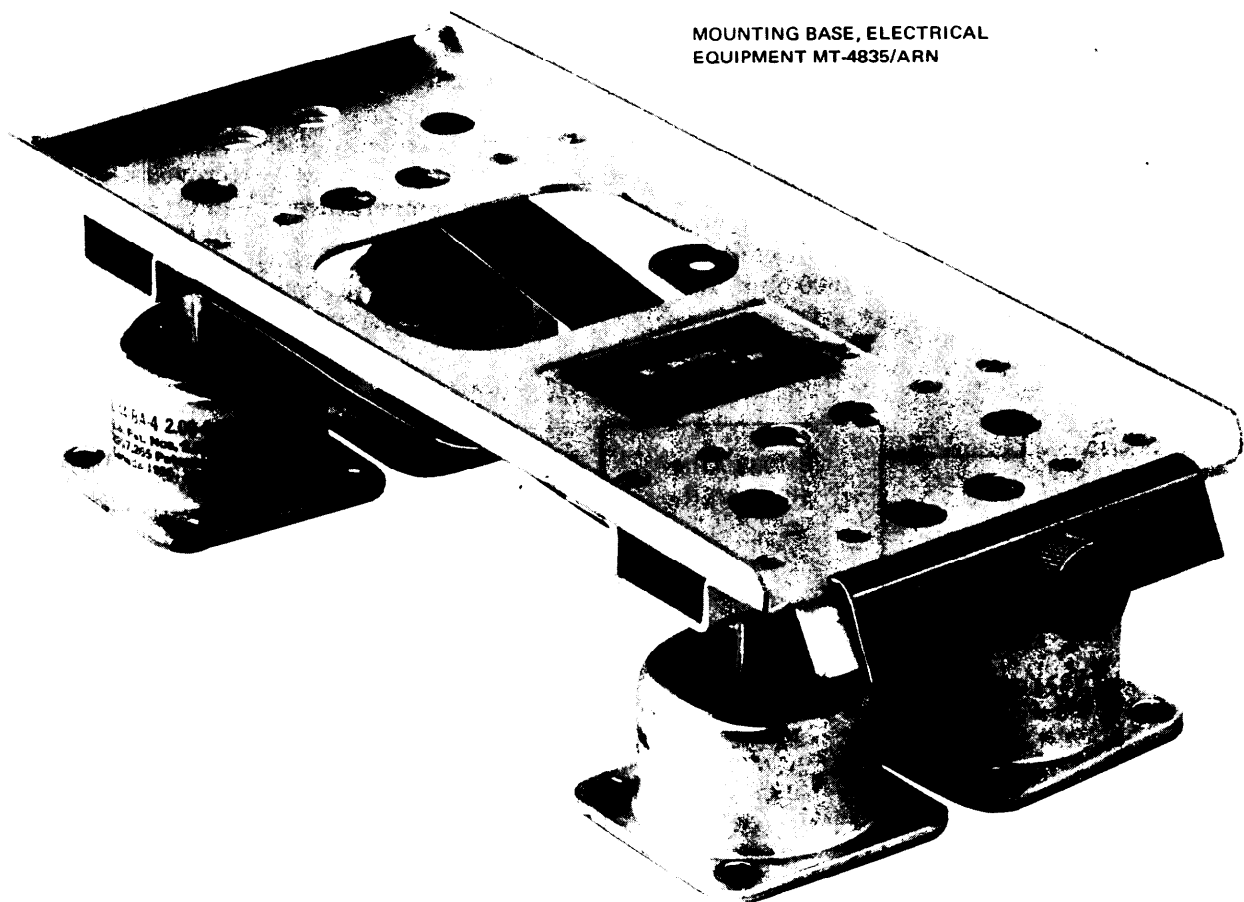
a. *Receiver.* The R-1963/ARN is a one piece remotely located and controlled combination 40 channel glideslope/marker beacon receiver. The receiver is used in conjunction with Radio Receiving Set AN/ARN-82 to provide a complete instrument landing system.

b. *Glideslope Receiver Section.* The glideslope (GS) receiver section receives and processes glideslope signals over the frequency range of 329.15 to 335.00 MHz, 40 channels, with a channel spacing of 150 kHz. The glideslope receiver section provides the outputs for the operation of Course Deviation Indicator ID-1347C/ARN or equivalent.

c. *Marker Beacon Receiver Section.* The marker beacon (MB) receiver section receives and proc-

esses 75-MHz marker beacon signals modulated with one of the three audiofrequencies (400 Hz, 1300 Hz and 3000 Hz) and converts them into an output that drives a single marker beacon light system with a total lamp load range from 40 to 200 milliamperes, 28 vdc.

d. *Mount.* The mount (fig. 1-3) is a lightweight mounting frame designed to provide vibration isolation to the receiver through the use of four vibration isolators. The mount provides for remote-located mounting and contains a holddown clamp to secure the receiver into place in the mount. Flexible metal ground straps across each of the resilient absorbers provide electrical ground to the airframe.



MOUNTING BASE, ELECTRICAL  
EQUIPMENT MT-4835/ARN

EL00L004

Figure 1-3. Electrical equipment mounting base MT-4835/ARN.

**1-9. System Application**

Figure 1-4 shows interface between the receiver and other aircraft equipment.

**1-10. Tabulated Data**

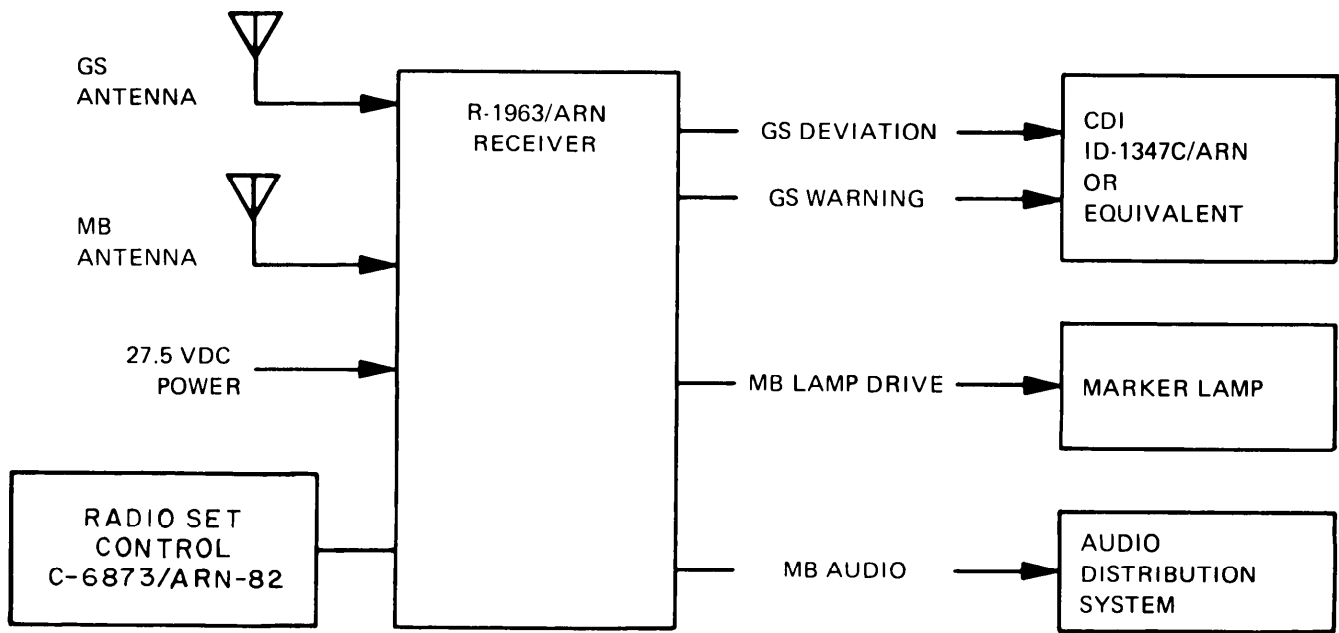
*a. Glideslope Receiver Section.*

Frequency range	329.15 MHz through 335.0 MHz
Number of channels	40
Channel spacing	150 kHz
Antenna impedance	52 ohms
Rf sensitivity	Does not require more than 20-microvolt standard GS test signal for fully concealed GS flag and satisfactory navigation performance
Operating temperature	-46°C (-51°F) to +55°C (+131°F)
Storage temperature	-54°C (-65°F) to +71°C (+160°F)
Warmup-time:	
Standard temperature	Less than 90 seconds
Extreme temperature conditions	Less than 3 minutes
Spuriour rejection	Better than 60 db
Standard outputs	Up-down deviation output capable of driving three 1000-ohm, 150-

0-150-microampere meter movements.  
Warning signal output capable of driving three 1000-ohm 250 microampere meter movements.

*b. Marker Beacon Receiver Section.*

Operating frequency	75 MHz
Antenna impedance	52 ohms
Vswr	2:1 max
Selectivity	More than 55 db attenuation at all frequencies outside the range of 74.8 MHz to 75.2 MHz.
Receiver threshold adjustment range:	
High sensitivity	Adjustable from 200 to 1,000 microvolts. Adjusted to 500 microvolts.
(Low Sensitivity Mode activated by providing a ground to receiver)	
Low sensitivity	Adjustable from 1,000 to 3,000 microvolt. Adjusted to 1,500 microvolts.
Operating temperature	-46°C (-51°F) to +55°C (+131°F)
Storage temperature	-54°C (-65°F) to +71°C (+160°F)



ELOOL002

Figure 1-4. System application.

Warmup time:  
 Standard temperature conditions Less than 90 seconds  
 Extreme temperature conditions Less than 3 minutes  
 Lamp Drive Lamp drive capable of operating single marker beacon light system with total lamp load range of 40 to 200 milliamperes at 28 vdc.

*c. Mount.*  
 Weight 1.2 lb max  
 Dimensions See table 1-1  
 Storage temperature -54°C (-65°F) to +71°C (+160°F)

**1-11. Items Comprising an Operable Equipment**

The items comprising an operable equipment are listed in table 1-1. Other equipment required for use with the receiver are listed in chapter 3.

*Table 1-1. Items comprising an operable equipment*

NSN	ITEM	Dimensions (in.)				Weight (lb)
		Qty	Height	Width	Depth	
5826-01-015-1574	Radio Receiver R-1963/ARN	1	4.06 (max)	3.56 (max)	9.12 (max)	3.2
	Mounting Base, Electrical Equipment MT-4835/ARN	1	2.24 (max)	3.78 (max)	10.07 (max)	0.9



## CHAPTER 2

### SERVICE UPON RECEIPT AND INSTALLATION

#### 2-1. Packaging data

The radio receiver and mounting base are individually packaged in separate weather-resistant, corrugated fiberboard cartons with all seams and joints sealed with water-resistant, pressure-sensitive tape. Each item is enclosed within a sealed plastic bag and cushioned within the carton with preformed plastic molding material. A typical packaging configuration with contents is shown in figure 2-1. The approximate exterior dimensions of the equipment and boxes are provided in table 2-1.

#### 2-2. Unpacking Instructions

To unpack the equipment, pry off the wooden box cover, open the carton, and remove the technical manual. Remove each individual box from the consolidation container. Open the component boxes. Remove the items carefully to prevent damage to the components or destruction of the cartons, plastic bag, or internal packing material. Do not dispose of the packaging materials.

#### NOTE

The 10 reusable containers are designed with specially performed plastic molded inserts. These containers shall be retained for use in repackaging and shipping between the Government and contractor's overhaul facility.

#### 2-3. Checking Unpacked Equipment

*a.* Inspect the equipment for damage that may have occurred during shipment. If the equipment has been damaged, or packaging deficiencies are discovered, fill out and forward DD Form 6.

*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 against the items listed in table 2-1.

#### 2-4. Repacking

Repackage the equipment using reverse procedure in paragraph 2-2 and figure 2-1. If the original packaging materials are not available for use, package the equipment as follows:

*a.* Place each item within a plastic bag fabricated of material conforming to L-P-378. Wrap the item in cellulosic cushioning material conforming to PPP-B-843, type II, a minimum of 6 inches on all surfaces and secure the wrap with tape conforming to PPP-T-45. Place the cushioned item within a close-fitting fiberboard box conforming to PPP-B-636, W5c and seal all seams and joints with tape conforming to PPP-T-76. When more than one item or set is being shipped, place a quantity of packaged items within a close-fitting box.

*b.* Substitute packaging materials may be selected from those listed in SB 38-100.

#### 2-5. Shipment Marking

The packed radio sets or individual items shall be addressed to the contractor marked as follows:

Bendix Corporation  
 Avionics Division  
 2100 N.W. 62nd Street  
 Ft. Lauderdale, Florida 33310  
 ATTN: CONUS Repair Service Administrator  
 Reliability Improvement Warranty  
 M/F: Contract DAAB07-75-C-0853 For  
 Repair and Direct Return

#### 2-6. Installation Instructions

Instructions for initial installation are not part of this manual. Refer to paragraphs 4-9 and 4-10 for removal and installation procedures.

*Table 2-1. Packaging data*

Component	Item net dimen (in.)	Carton size (in. id)	Volume (cu ft)	Weight (lb)
Receiver, Radio R-1963/ARN	8.43 x 3.56 x 4.06	8 x 8 x 1 2	0.44	6.00
Mounting Base, Electrical				
Equipment, MT-4835/ARN	9.87 x 3.84 x 2.25	12 <sup>3</sup> / <sub>8</sub> x 8 x 2 <sup>5</sup> / <sub>8</sub>	0.15	2.00
Consolidation box		12 <sup>7</sup> / <sub>8</sub> x 8 <sup>1</sup> / <sub>2</sub> x 11 <sup>3</sup> / <sub>8</sub>	0.74	9.00
Wooden box		13 X 8 <sup>3</sup> / <sub>8</sub> X 11 <sup>3</sup> / <sub>4</sub>	1.13	16.00

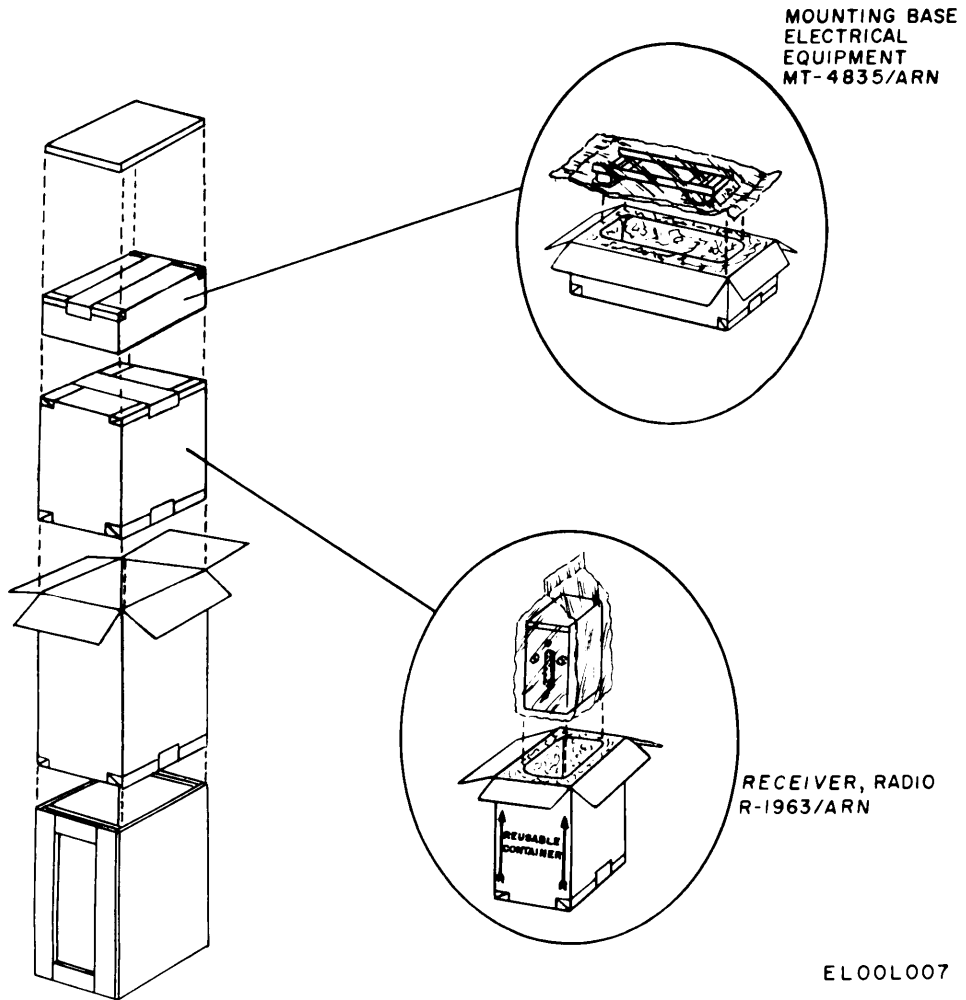


Figure 2-2. Interface conversion group packaging diagram, for receiver, radio R-1963/ARN.

Figure 2-1. Packaging diagram.

**CHAPTER 3**  
**EQUIPMENT USED IN CONJUNCTION WITH RADIO**  
**RECEIVER R-1963/ARN**

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**3-1. General**

The equipment listed in paragraph 3-2 is required in addition to the equipment listed in table 1-1 for a complete installation. Operating instructions are contained in TM 11-5826-226-20.

**3-2. Equipment Used With Receiver**

One each of the following equipments is used in conjunction with the R-1963/ARN:

a. Antenna, Glideslope Receiver AS-5071/ARN.

b. Antenna, Marker Beacon, Receiver AT-640/ARN.

c. Indicator, Course ID-1347G/ARN-82.

d. Indicator, Marker Beacon.

e. Control, Receiver G6873/ARN-82.

**NOTE**

The ZERO SWITCH in the rear of the ID-1347C/ARN-82 course indicator must be set to the R-1388A position.





## CHAPTER 4 MAINTENANCE INSTRUCTIONS

### Section I. INTRODUCTION

#### 4-1. Tools and Equipment Required

Tools and equipment required for maintenance of the R-1963/ARN are specified in appendix C.

#### 4-2. Repainting and Refinishing

*a. Original Protective Finish.* The outside surfaces of the receiver are treated in accordance with MIL-F-14072A and a final film of black

lusterless enamel No. 37078. Nonpainted internal surfaces and functional parts are chemically passivated.

*b. Retouching/Repainting.* After cleaning (paragraph 4-8), remove corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to TB 43-0118 for further information.

### Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

#### 4-3. General

The preventive maintenance checks and services are defined herein for specific intervals. These checks and services will maintain Army electronic equipment in serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist the organizational electronic equipment technician or crew chief in maintaining combat serviceability, the table indicates what to check and the normal conditions. The references list the paragraphs or manuals that contain supplementary information. If the defect cannot be remedied by the organizational electronic equipment technician or crew chief, higher category of maintenance is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

#### 4-4. Flight Line Preventive Maintenance

Perform the preventive maintenance functions indicated in table 4-1 every 25 hours of flying time (concurrently with the aircraft intermediate maintenance checks and services).

*Table 4-1. Flight line preventive maintenance checks and services*

Total task hours required: 1.24

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Worktime
1	POWER OFF EXTERIOR SURFACES	0.08

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Worktime
2	Clean the receiver in accordance with paragraph 4-8. Check all exposed metal surfaces for rust and corrosion. Retouch in accordance with paragraph 4-2. EXTERIOR ITEMS Check safety wiring on the mount fasteners. Refer to TM 55-1500-323-25. Tighten any loose mounting screws.	0.08
3	POWER ON GLIDESLOPE OPERATIONAL CHECK Check the receiver glideslope for proper operation (para 4-11 and 4-12).	0.25
4	MARKER BEACON OPERATIONAL CHECK Check the receiver marker beacon for proper operation (para 4-11 and 4-13).	0.25

#### 4-5. Bench Test Preventive Maintenance

*a.* During the aircraft periodic preventive maintenance checks and services, the electronic equipment will be removed from the aircraft for bench tests and inspections given in table 4-2. Replacement electronic equipment will be reinstalled from float stock. These tests and inspections are performed by direct support personnel.

*b.* The flight line maintenance indicated in table 4-1 are performed on the float stock being installed in the aircraft.

Table 4-2. Bench test preventive maintenance

Total task hours required: 1.24

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Worktime
1	PUBLICATIONS Check to see that all pertinent publications are available. They must be complete and in usable condition, without missing pages. All changes pertinent to this publication must be on hand. Refer to DA Pam 310-4.	0.08
2	MODIFICATION WORK ORDERS Check to see that all URGENT MWO's have been applied to the equipment and that all NORMAL MWO's have been scheduled. Refer to DA Pam 310-7.	0.08
	RECEIVING SET Manhours required:	

Sequence number	ITEM TO BE INSPECTED PROCEDURE	Worktime
3	RECEIVING SET Check to see that receiving set is complete. Refer to table 1-1.	0.08
4	GLIDESLOPE RECEIVER SECTION Perform the following tests in accordance with paragraph 4-16: a. Rf sensitivity test. b. Course centering test. c. Deflection sensitivity test. d. Agc response test. e. Warning signal test.	0.5
5	MARKER BEACON RECEIVER SECTION Perform the following tests in accordance with paragraph 4-17: a. Audio output power test. b. Lamp actuation test. c. Threshold sensitivity test.	0.5

### Section III. TROUBLESHOOTING INFORMATION

#### 4-6. General

Troubleshooting the receiver is limited to the flight line tests in paragraphs 4-11, 4-12 and 4-13 and the bench tests in paragraphs 4-14 through 4-17. Corrective action is limited to replacing faulty components as described in paragraphs 4-9 and 4-10. No further troubleshooting or corrective action is authorized. When any defect in the receiver operation is found during the bench tests, stop all testing and return the receiver to the manufacturer. The mount, vibration isolators, and ground straps can be replaced.

#### 4-7. General Maintenance Information

Maintenance of the radio receiver is limited to the procedures in this section and the following sections in this chapter. Personnel are cautioned that the manufacturer's warranty is voided if the receiver is opened by military personnel or if repair beyond that covered in this manual is attempted. Components found defective in the bench tests in paragraphs 4-16 and 4-17 are to be returned to the manufacturer.

#### 4-8. Cleaning

Inspect the exteriors of the receiver and mounting. The exterior surfaces and vibration isolators on the mounting should be free of dust, dirt, grease, and fungus.

- 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 the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

- b. Remove grease, fungus, and ground-in dirt from the equipment case and mounting; use a cloth damp (not wet) with trichloroethane.
- c. Remove dust or dirt from cable and equipment connectors with a soft brush. Remove grease or grime with a lint-free cloth moistened with trichloroethane. Dry with compressed air.

#### 4-9. Removal and Replacement of Receiver

##### a. Removal.

- (1) Disconnect the cables from the front of the receiver.
- (2) Loosen the thumbscrew on the front of the mounting tray enough so that the lip on the bottom of the receiver will clear the clamp.
- (3) Lift the front end of the receiver slightly and slide it off the mounting tray.

##### b. Replacement.

- (1) Slide the receiver into the mounting tray. Be sure that the lip on the rear of the receiver fits snugly under the lip on the back of the mounting tray.
- (2) Place the clamp over the lip on the front of the receiver and tighten the thumbscrew.
- (3) Connect the cables to the front of the receiver.

**4-10. Removal and Replacement of Mount***a. Removal.*

(1) Remove the receiver as described paragraph 4-9a.

(2) Remove the four screws that attach each of the vibration isolators and the ground straps to

the airframe, and remove the mount.

*b. Replacement.*

(1) The receiver mount is installed in the reverse order of removal (para 4-9b).

(2) Tighten the vibration isolator mounting screws.

**Section IV. FLIGHT LINE TESTS****4-11. General**

*a.* The operational tests given in paragraphs 4-12 and 4-13 are performed on the flight line with the equipment installed in the aircraft. These tests should be performed before removal and replacement of components as a result of inflight problems or malfunctions observed during operational checks and should be performed as part of the aircraft intermediate preventive maintenance checks and services. Components found to be malfunctioning should be removed for bench testing in accordance with paragraphs 4-16 and 4-17.

*b.* The glideslope tests are made using Signal Generator SG-13/ARN; and the marker tests are made using Test Oscillator BC-376. The aircraft and receiver power must be on.

**NOTE**

If the aircraft engines are operated during the following tests, the pilot or an authorized crewmember will start and operate the engines. If the aircraft engines are not operated, use an auxiliary power source to prevent excessive drain on the aircraft battery. Refer to the aircraft manuals for connection and power requirements, and for setting of communication power controls.

*c.* The tests should be conducted at a location which is free of electromagnetic energy reflecting surfaces such as buildings, other aircraft, etc.

**4-12. Flight Line Glideslope Operational Tests***a. Test Setup.*

(1) With the SET LINE TO 21V control OFF, connect the SG-13/ARN to a 21- to 29-volt dc portable power source.

(2) Set METER switch to LINE.

(3) Rotate SET LINE TO 21V control for 21 volts  $\pm 0.5$  on meter.

(4) Set the MEGACYCLES control to 109.30 (332.00 MHz), and set receiver frequency (in aircraft) to 109.30, or any frequency with a reported discrepancy.

(5) Set AUDIO SELECTOR switch to GLIDESLOPE.

(6) Set NAV GS switch to GS.

(7) Set MICROVOLTS control to 1K microvolt.

(8) Set METER switch to CAR.

(9) Adjust CARRIER SET control for redline indication on meter.

(10) Set LOC-GS switch to DOWN.

(11) Position the SG-13/ARN 50 feet directly in front of the aircraft center and move towards the aircraft until the glideslope warning flag is driven out of view.

*b. Glideslope Test Procedure.*

(1) Set MICROVOLTS control to 10K microvolt.

(2) Set LOC-GS control to center (white line).

(3) Check to see that the glideslope deviation indicator in the aircraft is within the center donut.

(4) Set LOC-GS control to UP.

(5) Check to see that glideslope deviation indicator in the aircraft deflects fullscale upward.

(6) Set LOC-GS control to DOWN.

(7) The glideslope deviation indicator in the aircraft shall deflect fullscale downward.

**4-13. Flight Line Marker Beacon Operational Tests**

Flight line tests of the marker beacon receiver are performed using Test Oscillator BC-376. The BC-376, with its antenna fully extended, must be placed 10 to 20 feet from the marker beacon receiver antenna. A headset can be used to monitor the marker beacon audio output.

*a.* Turn on the BC-376 and move it toward the receiver antenna until a strong signal is heard in the headset.

*b.* Set the BC-376 MODULATION switch to 400. The OUTER marker lamp on the aircraft instrument panel must light, and the MIDDLE and AIRWAY lamps must not light.

c. Set the BC-376 MODULATION switch to 1300. The MIDDLE marker lamp on the aircraft instrument panel must light, and the OUTER and AIRWAY lamps must not light.

d. Set the BC-376 MODULATION switch to 3000. The AIRWAY marker lamp on the aircraft

instrument panel must light, and the MIDDLE and OUTER lamps must not light.

**NOTE**

Test must be performed with aircraft away from electromagnetic energy and reflecting surfaces such as buildings or other aircraft.

**Section V. BENCH TESTS**

**4-14. General**

a. This section contains bench testing procedures for the receiver. The test procedures specify the minimum performance limits within which the receiver may operate and still be suitable for installation in an aircraft. As such, the tests may be used to check a unit which has been removed from an aircraft or a unit which has been in storage.

b. If the receiver tests within the acceptable limits given, no further testing is required and the receiver may be considered suitable for installation in an aircraft.

c. If the unit fails to meet any requirement of the tests, all further tests need not be performed and the receiver must be returned to the manufacturer for corrective action under the equipment warranty.

**NOTE**

Personnel must be aware that any attempts at maintenance beyond the testing specified herein will void the manufacturer's warranty.

**4-15. Preliminary Procedures**

The following general test conditions must be observed:

a. Receiver chassis must be grounded.

b. Before connecting the receiver to the radio test set, check the resistance of the pins listed in table 4-3 by connecting multimeter AN/URM-223, or equivalent, between the pin and the receiver chassis. The negative lead must be connected to the receiver chassis.

c. Allow 1 minute warmup time.

**4-16. Glideslope Bench Tests**

a. *Test Setup.*

(1) All bench tests are performed with the test setup shown in figure 4-1. Coaxial cables with 52 ohms characteristic impedance are used for all rf and modulation interfaces. The test set cable

Table 4-3. Pretest resistance check

Pl pin number	VOM range setting	Resistance measured (ohms)
2	X1K	50K (rein)
3	X1K	50K (rein)
4	X1K	30K (rein)
5	X1K	1K (rein)
19	X1	0.1 (max)
20	X1K	50K (rein)
21	X1K	50K (rein)

plug P7 mates with jack J7 on the Receiver Adapter Cable CX-13035/AR. Plug P11001 on the receiver adapter cable connects to J1 on the receiver panel.

(2) The radio test set must be connected to a 115 vac 400 Hz power source (gray wire, high). The red wire from the radio test set must be connected to a 28 vdc power source. The black, white, and green wires from the radio test set are ground wires, and must be connected to a common ground.

b. *Initial Switch Settings.* Before performing the glideslope bench test procedures, the controls of all items of test equipment should be set as follows:

*Radio Test Set AN/ARM-92B*

OFF/PWR/TEST	PWR
MODE	400 Hz
BEARING control	0
BEARING switch	BRG
FLAG LOAD	4
SENS	LO
IND TEST	GS RCVR
DEVIATION	0
CONTROL frequency	109.30

*Radio Test Set AN/ARM-5*

POWER	STAND BY
OMNI TRACK	0
MODULATION	AMP LOC ⊕
IDENTIFIER	OFF
ATTENUATOR	0
MC	B

*Frequency Converter AN/ARM-69*

POWER	OFF
FREQ MC	332.0

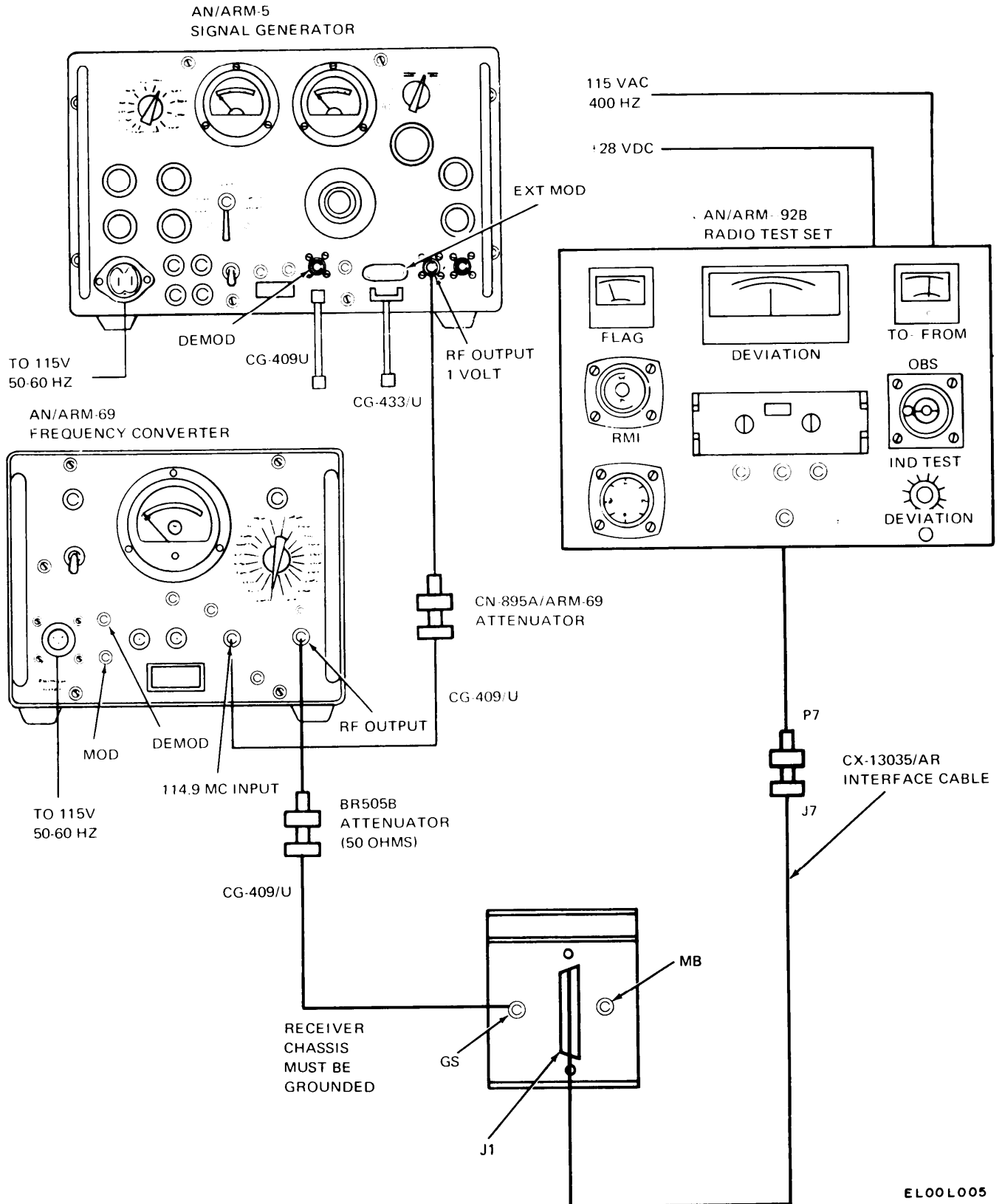


Figure 4-1. Bench test setup, glideslope.

*c. Glideslope Test Signal.* The glideslope test signal is an rf carrier, amplitude modulated 22.5 percent by a 90-Hz signal and 22.5 percent by a 150-Hz signal. The rf carrier supplied by Radio Test Set AN/ARM-5 is converted in frequency by Frequency Converter AN/ARM-69. The two modulation signals can be varied in relative amplitude by the MODULATION and ATTENUATOR controls on the AN/ARM-5. The glideslope test signal is set up on the bench test equipment as follows:

(1) Set the AN/ARM-69 power switch to ON. The power lamp shall light.

(2) Set the AN/ARM-5 controls as follows:

- (a) POWER-STANDBY switch to POWER.
- (b) MC switch to B.
- (c) MODULATION switch to 90~.
- (d) Adjust 90~ MOD for 22.5 on %M meter.
- (e) MODULATION switch to 150~.
- (f) Adjust 150~ MOD for 22.5 on %M meter.

(g) MODULATION switch to AMP LOC  $\emptyset$ . The %M meter should indicate approximately 40.

(3) Set the AN/ARM-69 FREQ MC to 332.0.

(4) Adjust RF LEVEL SET until LEVEL SET meter pointer is centered.

(5) Remove the Cable CG-409/U (without attenuator) from the AN/ARM-5 RF OUTPUT 1 VOLT jack and connect it to the RF OUTPUT ATTEN jack.

*d. Rf Sensitivity Test.*

(1) Adjust the AN/ARM-5 ATTENUATOR to 50 microvolts.

(2) Set MODULATION switch to AMP LOC  $\emptyset$ .

(3) Check to see that the AN/ARM-92B DEVIATION meter indicates 90  $\pm$ 30 microamperes right of 0.

(4) Set AN/ARM-69 FREQ MC and AN/ARM-92B CONTROL frequency to each glideslope channel in table 4-4 and verify the AN/ARM-92B DEVIATION meter indicates 90  $\pm$ 30 microamperes right of 0 at each setting.

(5) Repeat the test on all frequencies with the AN/ARM-5 MODULATION switch set to AMP LOC  $\emptyset$ . The AN/ARM-92B DEVIATION meter must indicate 90  $\pm$ 30 microamperes left of 0 at each setting. Return the controls to 332.0 and 109.30.

*e. Course Centering Test.*

(1) Adjust the AN/ARM-5 ATTENUATOR to 700 microvolts.

(2) Set the AN/ARM-5 MODULATION switch to AMP LOC  $\emptyset$ .

(3) Check to see that the AN/ARM-92B DEVIATION meter indicates 0  $\pm$ 30 microamperes.

*f. Deflection Sensitivity Test.*

(1) Adjust the AN/ARM-5 ATTENUATOR to 700 microvolts.

(2) Set the AN/ARM-5 MODULATION switch to AMP LOC  $\emptyset$ .

(3) Check to see that the AN/ARM-92B DEVIATION meter indicates 90  $\pm$ 30 microamperes right of 0.

(4) Set the AN/ARM-5 MODULATION switch to AMP LOC  $\emptyset$ .

(5) Check to see that the AN/ARM-92B DEVIATION meter indicates 90  $\pm$ 30 microamperes left of zero.

*g. Agc Response Test.*

(1) Adjust the AN/ARM+ ATTENUATOR to 700 microvolts.

(2) Set the AN/ARM-5 MODULATION switch to AMP LOC  $\emptyset$ .

(3) Check to see that the AN/ARM-92B DEVIATION meter indicates 90  $\pm$ 30 microamperes right of zero.

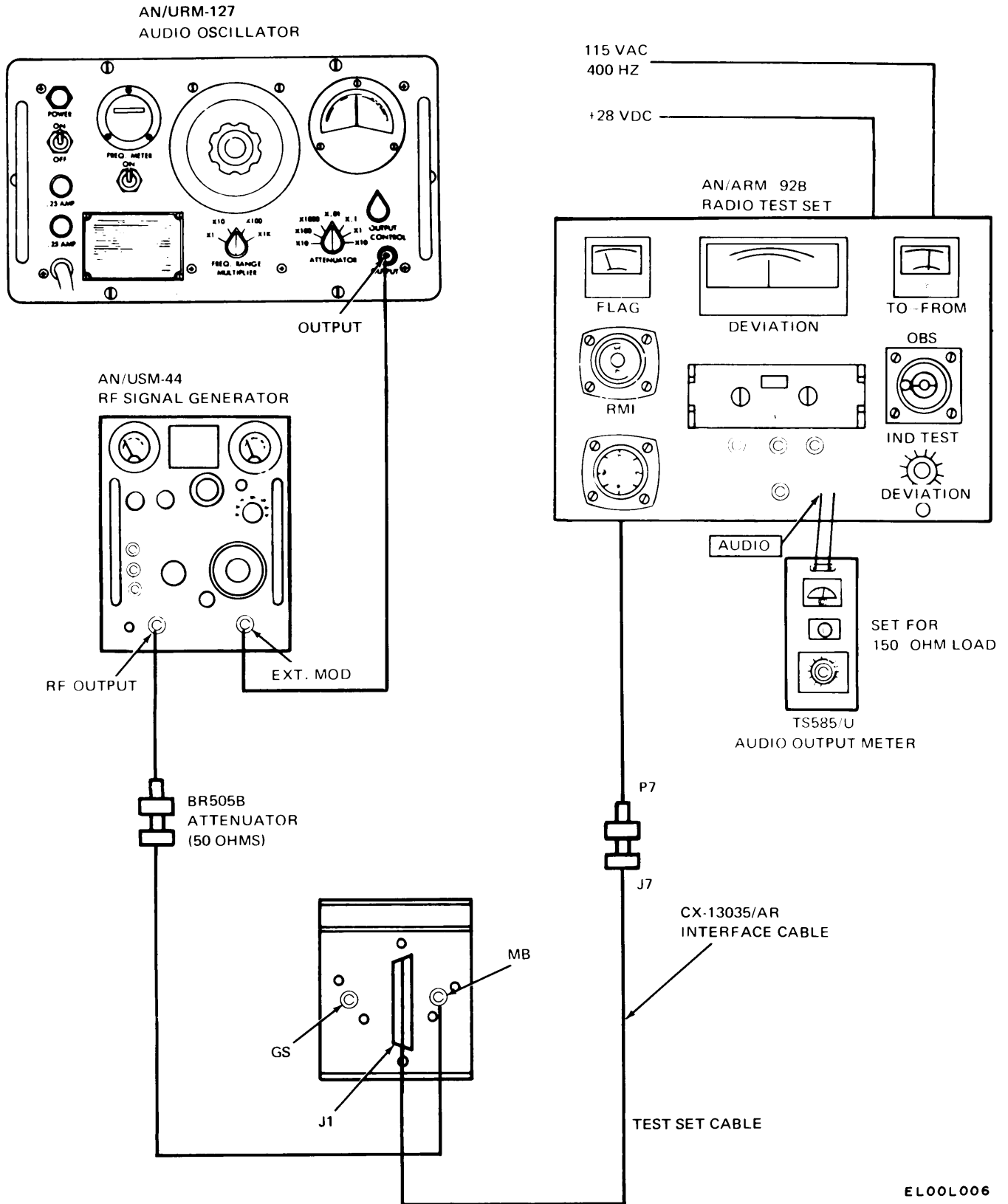
(4) Adjust the AN/ARM-5 ATTENUATOR slowly between 100 and 10,000 microvolts. The AN/ARM-92B DEVIATION meter indicate within 30 microamperes of the previously noted reading throughout the entire output level range.

*h. Warning Signal Test.*

(1) Adjust the AN/ARM-5 ATTENUATOR to 700 microvolts.

Table 4-4. Frequency pairs for glideslope sensitivity test

AN/ARM-92B Freq sel (mHz)	Sig gen freq (mHz)
108.10	334.70
108.30	334.10
108.50	329.90
108.70	330.50
108.90	329.30
109.10	331.40
109.30	332.00
109.50	332.60
109.70	333.20
109.90	333.80
110.10	334.40
110.30	335.00
110.50	329.60
110.70	330.20
110.90	330.80
111.10	331.70
111.30	332.30
111.50	332.90
111.70	333.50
111.90	331.10



ELOOL006

Figure 4-2. Bench test setup, marker beacon.

**CAUTION**

Disconnect Cable CG-409/U and CG483/U from the AN/ARM-69 DEMOD and MOD jacks except while performing the warning signal test. Maintain approximately 22.5 percent modulation (each tone) on the AN/ARM-5.

- (2) Set the AN/ARM-5 MODULATION switch to 90~.
- (3) Adjust the AN/ARM-5 90~ MOD control for 22.5 on %M meter. The AN/ARM-92B FLAG meter must indicate less than 180 microamperes.
- (4) Set the AN/ARM-5 MODULATION switch to 150~.
- (5) Adjust the AN/ARM-5 150~ MOD control for 22.5 on %M meter. The AN/ARM-92B FLAG meter must read less than 180 microamperes.
- (6) Connect Cable CG-409/U between AN/ARM-5 DEMOD jack and AN/ARM-69 DEMOD jack.
- (7) Connect Cable CG-433/U between AN/ARM-5 EXT MOD terminals and AN/ARM-69 MOD jack.
- (8) Set the AN/ARM-5 MODULATION switch to AMP LOC O.
- (9) Set the AN/ARM-5 DEMOD adjust (screwdriver adjustment) for 80 on %M meter. The AN/ARM-92B FLAG meter must indicate 220 microamperes minimum.

**4-17. Marker Beacon Bench Test.**

*a. Test Setup.* the marker beacon bench tests are performed with the test setup shown in figure 4-2.

*b. Initial Switch Settings.* Before performing the marker beacon bench test procedures, set the controls of all items of test equipment as follows:

Radio Test Set AN/ARM-92B	
OFF/PWR/TEST	PWR
MODE	400 HZ
BEARING control	0
BEARING switch	BRG
FLAG LOAD	4
SENS	LO
IND TEST	GS RCVR
DEVIATION	0
CONTROL	
frequency	109.30
AUDIO	MB
Audio Oscillator AN/URM-127	
ATTENUATOR	X.1
OUTPUT CONTROL	Midrange

FREQ. RANGE	
MULTIPLIER	X10
Frequency control	40
FREQ. METER	
switch	ON
POWER switch	ON
RF Signal Generator AN/USM-44	
Power switch	ON
ATTEN.	5 mv. (-33 dbm)
MOD SELECTOR	EXT MOD
FREQUENCY	C (42-90 MHz)
RANGE	Adjust to 75 MHz
FREQUENCY	(using Electronic Counter, Digital Readout AN/USM-207)
AMP. TRIMMER	Peak on meter
OUTPUT LEVEL	SET LEVEL (red arrow)
MOD LEVEL	80%
Audio Output Meter	TS-585/U
IMPEDANCE	X1, 150
MULTIPLY BY	10

*c. Marker Test Signal.* The marker test signal is a 75-MHz rf carrier amplitude modulated 80 percent by a single tone of 400 Hz, 1300 Hz, or 3000 Hz.

*d. Audio Output Power Test.*

(1) Adjust the AN/USM-44 FREQUENCY control for a peak reading on Audio Output Meter TS-585/U.

(2) Adjust the AN/USM-44 ATTEN. dial until the blue lamp (outer) on the AN/ARM-92B glows dimly.

(3) Note the reading in millivolts on the AN/USM-44 ATTEN. dial; then adjust the ATTEN. dial to 10 times the noted reading.

(4) The TS-585/U must indicate at least 40 milliwatts.

*e. Lamp Actuation Test.*

(1) Adjust the AN/URM-127 frequency control to 40 (400 Hz).

(2) Adjust the AN/USM-44 ATTEN. dial to 50 millivolts.

(3) Check to see that the blue OUTER marker lamp on the AN/ARM-92B lights. The amber and white lamps must not light.

(4) Adjust the AN/URM-127 frequency control to 130 (1300 Hz).

(5) Check to see that the amber MIDDLE



marker lamp on the AN/ARM-92B lights. The blue and white lamps must not light.

(6) Set the AN/URM-127 FREQ. RANGE MULTIPLIER to X100.

(7) Adjust the AN/URM-127 frequency control to 30 (3000 Hz).

(8) Check to see that the white AIRWAY marker lamp on the AN/ARM-92B lights. The blue and amber lamps must not light.

*f. Threshold Sensitivity Test.*

(1) Set the AN/ARM-92B SENS switch to HI.

(2) Set the AN/URM-127 FREQ. RANGE MULTIPLIER to X10.

(3) Set the AN/URM-127 frequency control to 130 (1300 Hz).

(4) Adjust the AN/USM-44 ATTEN. dial until amber lamp (middle) on AN/ARM-92B glows dimly.

(5) Check to see that the rf output level on the AN/USM-44 ATTEN. dial is 1000 microvolts.

(6) Set the AN/ARM-92B SENS switch to LO.

(7) Adjust the AN/USM-44 ATTEN. dial until amber lamp on AN/ARM-92B lights.

(8) Check to see that the rf output level on the AN/USM-44 ATTEN. dial is between 1.0 and 3.0 millivolts.



## APPENDIX A

### REFERENCES

---

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
SB 11-641	Repair and Return Procedures under Reliability Improvement Warranty (RIW) for AN/ARN-123(V)1, Receiving Set, Radio and the R-1963/ARN, Receiver, Radio.
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 11-5017	Output Meters TS-585A/U, TS-585B/U, TS-585C/U, and TS-585D/U.
TM 11-5556	Signal Generator SG-13/ARN.
TM 11-5826-226-20	Organizational Maintenance Manual: Radio Receiving Sets AN/ARN-82 and AN/ARN-82A.
TM 11-6625-508-10	Operator's Manual: Signal Generators AN/USM-44 and AN/USM-44A.
TM 11-6625-522-14-2	Operator's, Organizational, and General Support Maintenance Manual: Test Oscillator BC-376P (FSN 6625-098-3668).
TM 11-6625-588-15	Organizational, Direct Support, General Support, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Modulator MD-83/ARN.
TM 11-6625-636-12	Operator and Organizational Maintenance Manual: Converter, Frequency, Electronic AN/ARM-69.
TM 11-6625-654-14	Operator's, Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tools Lists (including Depot Maintenance Repair Parts and Special Tools Lists) for Multimeter AN/USM-223.
TM 11-6625-700-10	Operator's Manual: Digital Readout, Electronic Counter AN/USM-207.
TM 11-66292709-12	Operator's and Organizational Manual: Test Set, Radio AN/ARM-92B.
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 55-1500-323-25	Organizational, DS, GS, and Depot Maintenance Manual: Installation Practices for Aircraft Electric and Electronic Wiring.
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).



## APPENDIX D

### MAINTENANCE ALLOCATION

---

#### Section I. INTRODUCTION

##### D-1. General

This appendix provides a summary of the maintenance operations for R-1963/ARN. 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.

##### D-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, re-machining, 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. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

*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.

##### D-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, Component/Assembly.* Column 2 contains the noun names of components, assem-

blies, 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 and Equipment.* Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and sup-

port 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.

**D-4. Tool and Test Equipment Requirements (Sec 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.

**D-5. Remarks (Sec 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.

(Next printed page is D-3.)

SECTION II MAINTENANCE ALLOCATION CHART  
FOR

RADIO RECEIVER R-1963/ARN

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	RADIO RECEIVER R-1963/ARN	Inspect Test Replace Inspect Test Repair		0.1 0.2 0.2	0.1 0.2			2,3 1 4 thru 11	A
01	MOUNTING BASE, ELECTRICAL EQUIPMENT MT-4835/ARN	Inspect Replace Repair		0.1 0.1				1	A

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
 FOR  
 RADIO RECEIVER R-1963/ARN

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL / NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
2	O	SIGNAL GENERATOR SG-13/ARN	6625-00-539-8575	
3	O	TEST OSCILLATOR RC-376	6625-00-519-9408	
4	F,H	TEST SET, RADIO AN/ARM-92F	6625-00-999-5118	
5	F,H	SIGNAL GENERATOR AN/USM-44	6625-00-669-4031	
6	F,H	SIGNAL GENERATOR AN/URM-127	6625-00-126-0196	
7	F,H	TEST SET, RADIO AN/ARM-5	6625-00-669-0872	
8	F,H	FREQUENCY CONVERTER AN/ARM-69	6625-00-082-0481	
9	F,H	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0089	
10	F,H	AUDIO OUTPUT METER TS-585/U	6625-00-044-0501	
11	F,H	MULTIMETER AN/USM-223	6625-00-084-5170	



SECTION IV. REMARKS

REFERENCE CODE	REMARKS
A	REPAIR IS ACCOMPLISHED BY CONTRACTOR UNDER A 4-YEAR WARRANTY.



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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
----------	------------	------------	-----------

2-25	2-28		
------	------	--	--

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

3-10	3-3		
------	-----	--	--

		3-1	Item 5, Function column. Change "2 db" to "3db."
--	--	-----	--

REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

5-6	5-8		
-----	-----	--	--

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

REASON: To replace the cover plate.

		F03	
--	--	-----	--

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SSG I. M. DeSpirito 999-1776

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*SSG I. M. DeSpirito*

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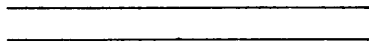
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