TB 11-6625-821-35

CHANGE 1

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIRECTION FINDER SET TEST SET AN/ARM-93 (NSN 6625-00-999-6081)

Headquarters, Department of the Army, Washington, DC
20 June 1979

TB 11-6625-821-35, 9 August 1973 is changed as follows:

The title of the bulletin is changed as shown above.

Page 1, paragraph 2, line 7. The address is changed to "Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-ME-MQ, Fort Monmouth, NJ 07703."

Page 2, paragraph 3c, line 5. "TB 750-236" is changed to read: "TB 43-180."

Paragraph 4a. The following is added at the end of line 4: "Adjustments to be annotated on DA Form 2416 are followed by (R) in this procedure."

Table 1A is superseded as follows:

A - Authorized calibration equipment

Common name	Minimum use specifications	Calibration equipment
FREQUENCY METER	Range: 400 Hz ±10%	AN/USM-207 or SD-1037M2
VOLTMETER	Range: 30 Volts ac ±0.5%	ME-202/U or Dana 5700 series
VOLTMETER RF	For a null indication	ME-20/U or HP 400 series
OSCILLOSCOPE	For lissajous pattern	AN/USM-281 or HP 180 series
SIGNAL GENERATOR	Range: to 1700 kHz	AN/URM-25 or equal
POWER SUPPLY	Range: 27.5 Volts dc	CS36CR30 or equal

Paragraph 6, table 1B. "None required" is superseded as follows:

Banana plug to banana plug lead	2 required
Banana plug to pin adapter	2 required
Banana plug to alligator clip	Quantity as required
Fabricated cable (fig. 1)	Some modification of this cable is permissible as to size, length, and loose ends.

PIN: 010598-001

Page 3, paragraph 8a(1)(f). "Multimeter ME-26/U" is changed to read: "Voltmeter ME-202/U here, and wherever it occurs in this procedure."

Paragraph 8a(1)(g). The following is added: "If not, perform **b**(1) below.

Paragraph 8a(2)(c). The following is added: "If not, perform **b**(2) below. Readjust R8 and R1 as necessary for best possible compromise of 26 volts ac and 400 Hz, as these adjustments sometimes interact."

Paragraph 8b(1)(f), line 4. The following is added: "(R)."

Page 5, paragraph 8b(2)(g), line 4. The following is added: "(R)."

Paragraph 9a(1), line 2. The following is added: "or obtain access from the rear of the panel by removing the case screws and the rf shield which is located on the front panel rear, behind SIGNAL GENERATOR rf connector. Connection may be made at either end of the short wires, whichever is most proctical."

Paragraph 9a(2), lines 5 through 7. Lines 5 through 7 are changed to read: "the negative lead to the yellow wire on B1. Connect the hot lead from the oscilloscope to the blue wire on resolver B1 and the negative lead to the orange wire."

Page 9, paragraph 9b(5), line 3 The following is added: "(R)."

Paragraph 10. The following note is added immediately preceding: "a. Performance Procedure."

NOTE

Disassembly and manual rotation of the indicator as prescribed in the following procedure is not recommended for inexperienced personnel working outside proper instrument repair facilities. Perform paragraph 11 first. If improper indications in paragraph 11 are observed, proceed as follows or obtain assistance as required to open and adjust this indicator.

Paragraph 10a(2), lines 3 and 4. "and detach cable from each unit" is superseded as follows: "remove cable from bearing indicator and leave cable to direction finder control intact. Set DF control to ADF."

Paragraph 10a(6), line 3. "pin M" is changed to read: "pin A."

Paragraph 10a(7), line 3. "pin H" is changed to read "pin B."

Paragraph 10b(4), line 3. The following is added: "(R)."

Page 11, paragraph 11b(1), LINE 5. The following is added: "Ground pin E of J1 on Bearing Indicator."

Page 12, subparagraph 11B(5), line 9. The following is added: "(R)."

Paragraph 12 is superseded as follows:

12. In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibrated Instrument). When the unit under test receives limited or special calibration, annotate and affix DA Label 163 (US Army Limited or Special Calibration). When the unit under test cannot be adjusted within tolerance, annotate and affix DA Form 2417 (US Army Calibration System Rejected Instrument).

By Order of the Secretary of the Army:

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

Official:

J. C. PENNINGTON
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-36A, Section II, calibration requirements for AN/ARM-93.

US GOVERNMENT PRINTING OFFICE: 1979-665-012/1565

*TB 11-6625-821-35

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR DIRECTION FINDER SET TEST SET AN/ARM-93 NSN 6625-00-999-6081

Headquarters, Department of the Army, Washington, DC
9 August 1973

♦REPORTING OF ERRORS♦

You can help improve this publication by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028, Recommended Changes to Publications, should be mailed directly to Commander, U.S. Army Aviation and Missile Command, ATTN: AMSAM-TMD-EP, Redstone Arsenal, AL 35898-5000 FAX to DSN 788-2313 (commercial 256-842-2313). A reply will be furnished directly to you.

*This bulletin supersedes TB 11-6625-821-35/1, 4 August 1969.

SECTION I
GENERAL

1. Purpose and Scope

a. This bulletin provides information for the periodic calibration of Direction Finder Set Test Set AN/ARM-93 for use by calibration personnel. Since calibration personnel are trained and qualified in the use of calibration test and measuring equipment, detailed instructions concerning the operation and use of the equipment are not contained in this bulletin.

b. This bulletin contains illustrations that locate all controls and components utilized in this calibration procedure as well as diagrams showing equipment setups. Equipment ground connections are not necessarily shown in the diagrams.

2. Deleted. See front page.

3. Description. Direction Finder Set Test Set AN/ARM-93 contains Direction Finder Control C-6899/ARN-83, Static Power Inverter CV-2128/ARN-83 (fig 3), and all interconnections required to test Radio Receiving Set AN/ARN-83. Additional data is listed in **a** through **c** below.

a. Identification

Nomenclature	Direction Finder Set Test Set AN/ARM-93
Federal Stock No.	6625-999-6081
Line item No	V73847
Size	$13^{1}/_{2}$ x $15^{15}/_{16}$ x $15^{3}/_{8}$ in
Weight	$20^{1}/_{4}$ lb
Reference	TM 11-6625-821-12 and TM 11-6625-821-45

b. Specifications

Inverter output	26 ±0.5 volts, 400 ±40 cps
LOOP SIMULATOR	
electrical zero	Occurs when needle set to N (0 degree)
BEARING INDICATOR	
electrical zero	Occurs when needle set to N (0 degree)
Direction Finder Control C-6899/ARN-83:	
between 1400 and -	
1500 kc	BEARING 239 ±1.0 degrees
1700 kc	BEARING 203 ±1.0 degrees
850 kc	BEARING 343 ±1.0 degrees

c. Calibration Description

Time required for calibration	2 hours (approx.)
Calibration level	Maintenance
Calibration interval	In accordance with TB 43-180

4. General Instructions

a. Calibration Reporting. During the performance of this procedure, annotate DA Form 2416 Calibration Data Card in accordance with TM 38-750. Adjustments to be annotated on DA Form 2416 are followed by (R) in this procedure.

b. Unit Under Test. Direction Finder Set Test Set AN/ARM-93 is the item being calibrated and will be referred to as the unit under test in the remaining text.

Note

Be familiar with the entire procedure prior to performing calibration.

5. Difference Among Models. None.

SECTION II
CALIBRATION

6. Equipment Required. The equipment required for performance checks and adjustments is listed in table 1. When any of the equipment listed in table 1 is not available, use an equivalent calibrated item.

Table 1. Equipment Required for Calibration Performance Checks and Adjustments
A - Authorized Calibration Equipment

Common name	Minimum use specifications	Calibration equipment
Frequency meter	Range: 400 Hz ±10%	AN/USM-207 or SD-1037M2
Voltmeter	Range: 30 Volts ac ±0.5%	ME-202/U or Dana 5700 series
Voltmeter RF	For a null indication	ME-30/U or H-P 400 series
Oscilloscope	For lissajous pattern	AN/USM-281 or H-P 180 series
Signal generator	Range: to 1700 kHz	AN/URM-25 or equal
Power supply	Range: 27.5 Volts dc	CS36CR30 or equal

B-Authorized accessories

Banana plug to banana lead. (2 required) Banana plug to pin adapter, (2 required) and Banana plug to alligator clip (quantity as required) Fabricated cable. (figure 1) Some modification of this cable is permissible as to size, length, and loose ends.

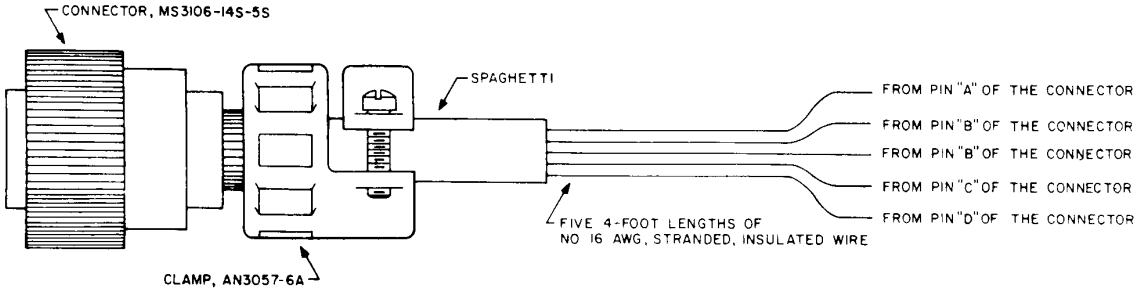

Figure 1. Fabricated cable for the BEARING INDICATOR, construction details.

7. Preliminary Procedures

a. No preliminary procedures are required to prepare the unit under test for calibration. However, procure the following parts to fabricate a cable necessary for calibration:

Connector, MS 3106A-14S-5S
Clamp, AN 3057-6A
Wire, copper, insulated, stranded, No. 16 AWG (20 ft long)
Spaghetti 3/4 inch diameter (4 ft long)

b. Fabricate a cable for the BEARING INDICATOR in accordance with the details in figure 1. This cable is required to connect the BEARING INDICATOR to power and to provide test points.

NOTE

When the performance check (a below) is within tolerance, do not perform the corresponding adjustment (b below). When the performance check is not within tolerance, perform the corresponding adjustment before continuing with the calibration procedure. When the performance check is not within tolerance and no adjustment is specified, the deficiency must be corrected before continuing with the procedure.

8. Static Power Inverter CV-2128/ARN-83 Output

a. Performance Procedure

(1) Voltage measurements.

(a) Connect the equipment as shown in figure 2.

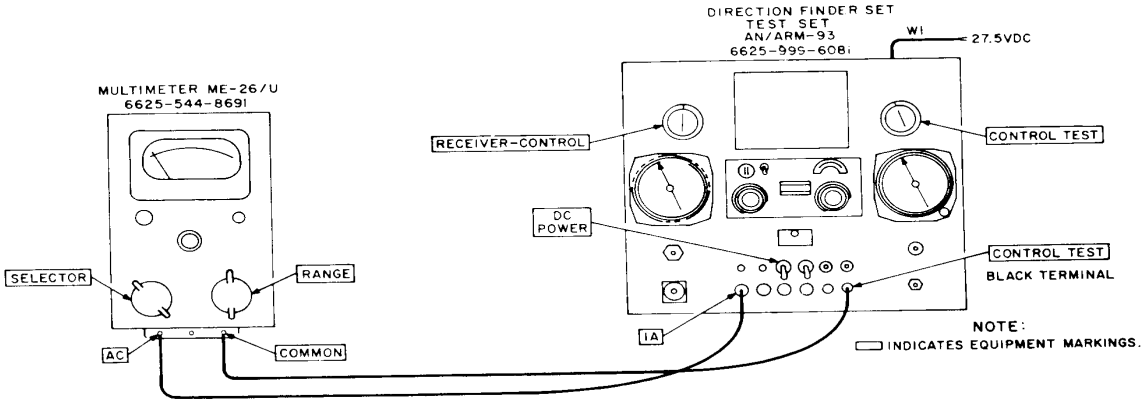

Figure 2. Test equipment connections for voltage measurement of Static Power Inverter CV-2128/ARN-83 output.

(b) Turn RECEIVER-CONTROL switch on the unit under test (see fig. 3) to CONTROL.

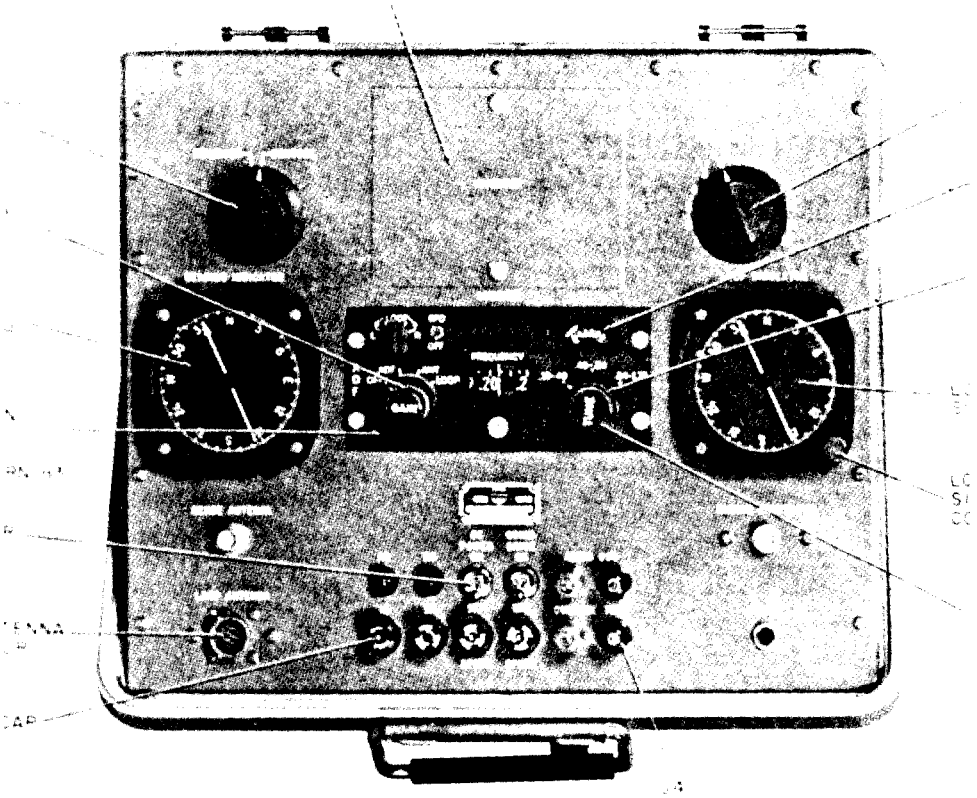

Figure 3. Direction Finder Test Set SN/ARM-93, front panel.

(c) Set DC POWER switch on the unit under test to ON.

(d) Turn the function switch on the unit under test to ADF.

(e) Turn CONTROL TEST of the unit under test to 1.

(f) Insert the ac probe of Voltmeter ME-202/U into the center of the 1A fuse cap.

(g) Multimeter should indicate 26 ±0.5 volts ac. If not perform **b**(1) below.

(2) Frequency Measurement.

(a) Connect the equipment as shown in figure 4.

(b) Insert the probe of frequency meter AN/USM-26 into the center of the 1A fuse cap.

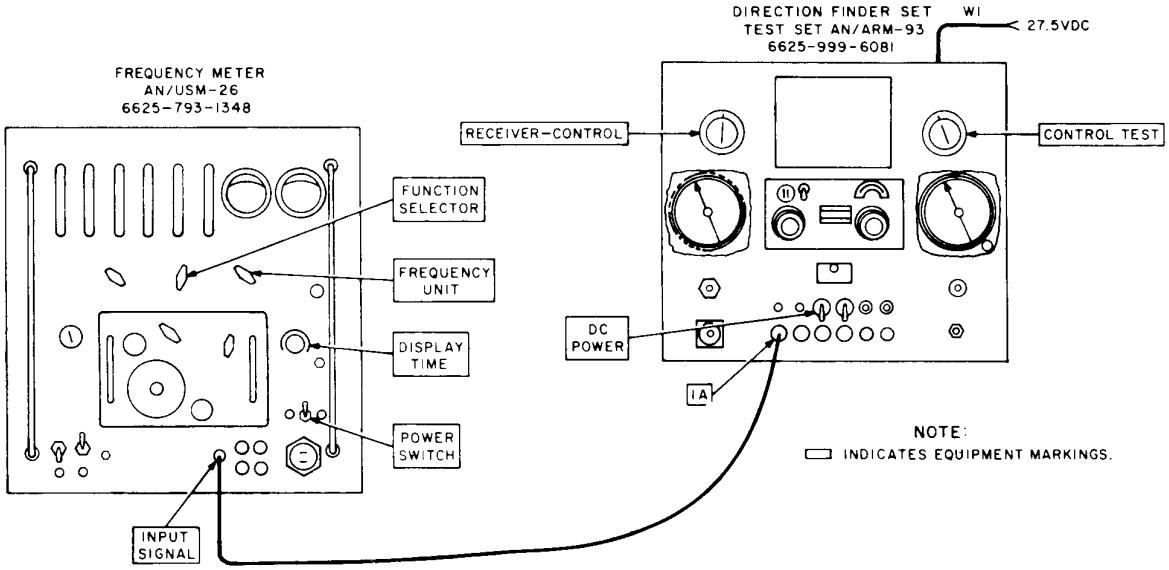

Figure 4. Test equipment connections for frequency measurement of Static Power Inverter CV-2128/ARN-83 output.

(c) Frequency meter should indicate 400 ±40 cps. If not, perform **b**(2) below. Readjust R8 and R1 as necessary for best possible compromise of 26 volts ac and 400 Hz, as these adjustments sometimes interact.

(d) Set D.C. POWER switch on the unit under test to OFF.

b. Adjustments

(1) Voltage adjustments.

(a) Set D.C. POWER switch on the unit under test to OFF.

(b) Loosen the screws holding the front panel to the unit under test. Remove the front panel.

(c) Connect the equipment as shown in figure 2.

(d) Set D.C. POWER switch on the unit under test to ON.

(e) Turn the function switch to ADF.

(f) Adjust potentiometer R8 (see fig 5 for location) in the unit under test until multimeter indicates 26 volts ac. (R)

(g) Set D.C. POWER switch to OFF. (R)

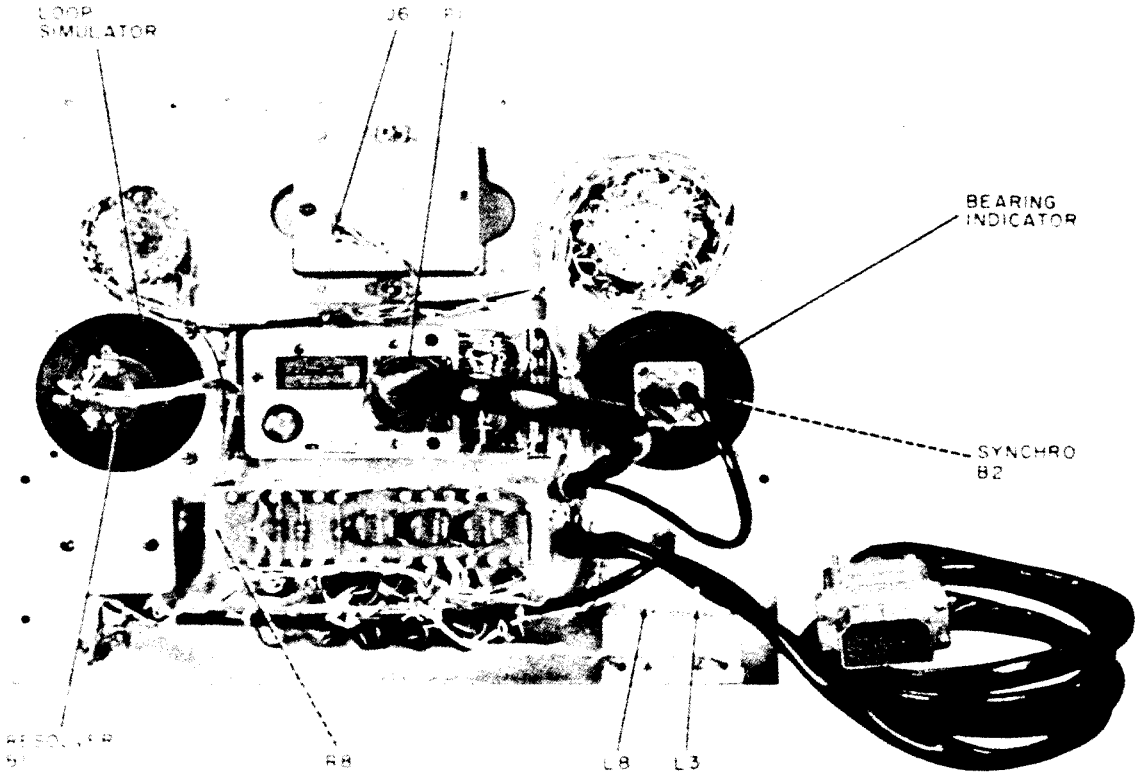

Figure 5. Direction Finder Set Test Set AN/ARM-93, parts location.

(2) Frequency Adjustment.

(a) Set D.C. POWER switch on the unit under test to OFF.

(b) Remove the screws holding the plate on Static Power Inverter CV-2128/ARN-83. Remove the plate.

(c) Loosen the screws holding Static Power Inverter CV-2128/ARN-83 to the unit under test and remove it.

(d) Connect Static Power Inverter CV-2128/ARN-83 to J6 (INVERTER connector) of the unit under test with Special Purpose Electrical Cable Assembly CX-11571/ARM-93 (cable W4), which is supplied with the unit under test.

(e) Connect the equipment as shown in figure 6.

(f) Set D.C. POWER switch on the unit under test to ON.

(g) Adjust potentiometer R1 (see fig 7 for location) in Static Power Inverter CV-2128/ARN-83 until frequency meter indicates 400 cps. (R)

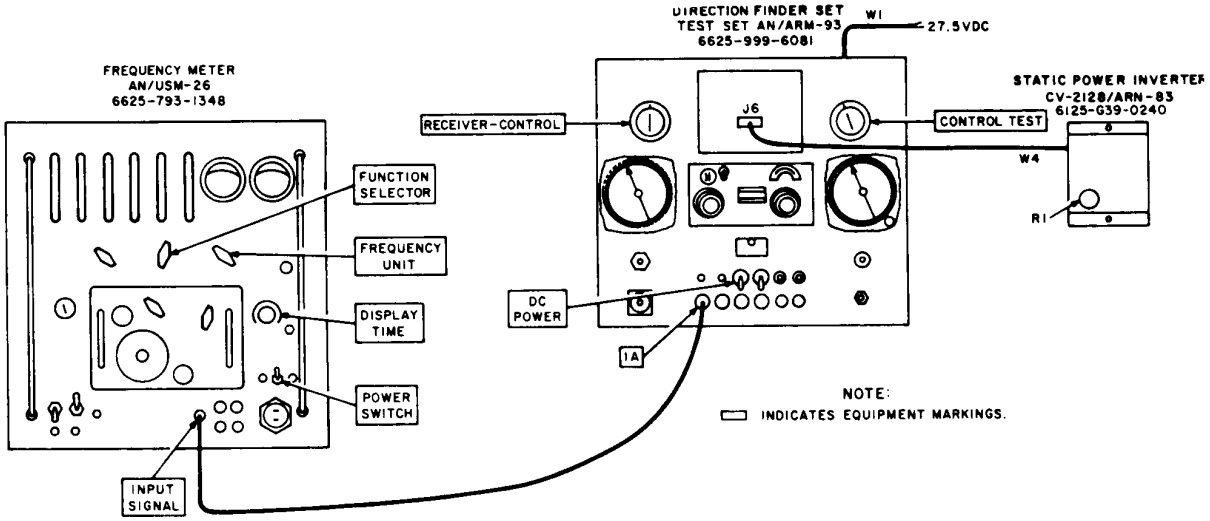

Figure 6. Test equipment connections for frequency adjustment of Static Power Inverter CV-2128/ARN-83 output.

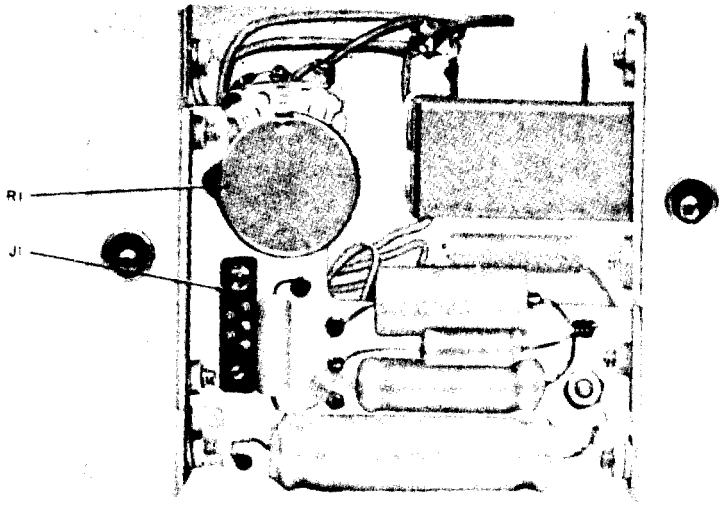

Figure 7. Static Power Inverter CV-2128/ARN-83, parts location.

(h) Set D.C. POWER switch to OFF, and replace Static Power Inverter CV-2128/ARN-83.

9. LOOP SIMULATOR Zero

a. Performance Procedure

(1) Remove the LOOP SIMULATOR from the unit under test or obtain access from the rear of the panel by removing the case screws and the rf shield which is located on the

front panel rear, behind SIGNAL GENERATOR rf connector. Connection may be made at either end of the short wires, whichever is most practical.

(2) Connect the equipment, as shown in figure 8, with the hot lead from signal generator AN/URM-25 connected to the green lead of resolver B1 and the negative lead to the yellow wire on B1. Connect the hot lead from the oscilloscope to the blue wire on resolver B1 and the negative lead to the orange wire.

(3) Set the POWER switch of signal generator to ON, and allow 15 minutes for equipment to warm up and stabilize.

(4) Adjust the output of signal generator to 100 kc at 0.1 volt, unmodulated.

(5) Set the LOOP SIMULATOR needle to E.

(6) Rotate the LOOP SIMULATOR toward N while observing voltmeter indication.

(7) Voltmeter will indicate a null when the LOOP SIMULATOR is set to N.

(8) Rotate the LOOP SIMULATOR 5 degrees clockwise from N. Center the pattern on oscilloscope.

(9) A 1-to-1 Lissajous pattern will appear on oscilloscope with the top of the pattern tilted into the upper right-hand quadrant.

(10) If the LOOP SIMULATOR performs properly, disconnect the equipment and replace the LOOP SIMULATOR. If it does not meet specifications, leave the equipment connected and proceed with the adjustment procedures.

b. Adjustment Procedure

(1) Set the LOOP SIMULATOR needle to N.

(2) Loosen the three resolver clamps holding resolver B1 to the resolver housing.

(3) Rotate the entire resolver until a null is indicated on voltmeter.

(4) A 360-degree rotation of resolver B1 will produce two nulls 180 degrees from each other. To determine which is the correct null, perform the following procedure:

(a) As viewed from the rear of the LOOP SIMULATOR, rotate resolver B1 approximately 5 degrees clockwise from the null position.

(b) Disconnect the horizontal lead from oscilloscope and adjust the vertical gain for a 4-centimeter vertical trace, centered on the vertical axis.

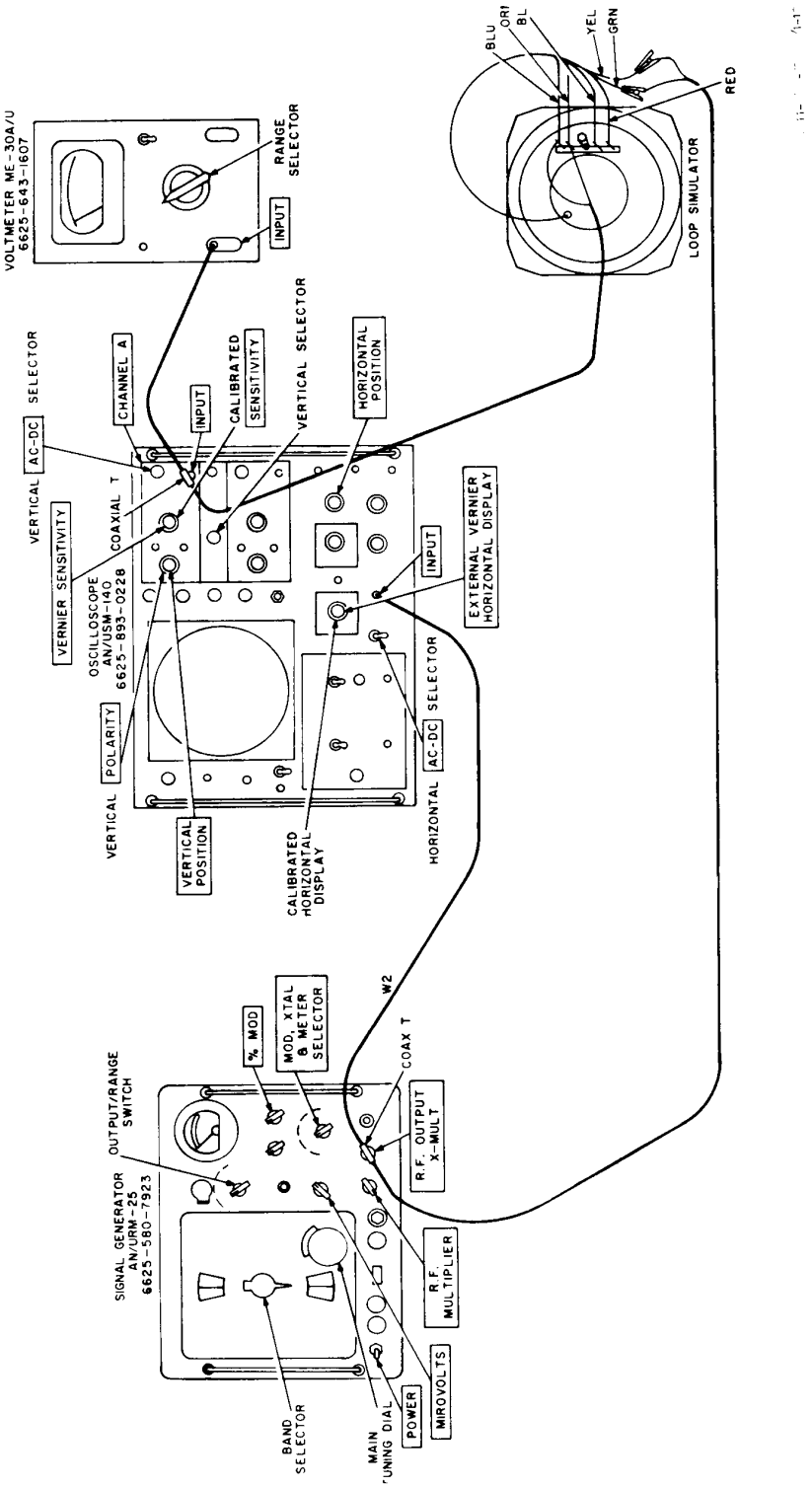

Figure 8. Test equipment connections for LOOP SIMULATOR Zero Calibration.

(c) Reconnect the horizontal lead, and disconnect the vertical lead from oscilloscope.

(d) Adjust the horizontal gain of oscilloscope for a 4-centimeter horizontal trace, centered on the horizontal axis.

(e) Reconnect the vertical lead to oscilloscope.

(f) A 1-to-1 Lissajous pattern should be observed on oscilloscope. If the top of the pattern is tilted into the upper right-hand quadrant, the null obtained in (3) above was the correct null. Readjust resolver B1 for the null obtained in (3) above, and proceed to (5) below

(g) If the top of the 1-to-1 Lissajous pattern is tilted into the upper left-hand quadrant, rotate resolver B1 approximately 175 degrees clockwise as viewed from the rear of the LOOP SIMULATOR, and adjust for another null indication on voltmeter.

(5) Tighten the three resolver clamps holding resolver B1 to the resolver housing. (R)

(6) Disconnect the equipment, and replace the LOOP SIMULATOR.

10. BEARING INDICATOR Zero

a. Performance Procedure

NOTE

Disassembly and manual rotation of the indicator as prescribed in the following procedure is not recommended for inexperienced personnel working outside proper instrument repair facilities. Perform paragraph 11 first. If improper indications in paragraph 11 are observed, proceed as follows or obtain assistance as required to open and adjust this indicator.

(1) Set the DC POWER switch of the unit under test to OFF.

(2) Remove the BEARING INDICATOR and Direction Finder Control C-6899/ARN-83 from the unit under test. Remove cable from bearing indicator and leave cable to direction finder control intact. Set DF control to ADF.

(3) Remove the front cover from the BEARING INDICATOR by removing the screws located around the perimeter on the rear side of the housing.

(4) Set the RECEIVER-CONTROL switch of the unit under test to CONTROL.

(5) Connect the equipment as shown in figure 9. Connect the fabricated cable to the connector on the BEARING INDICATOR.

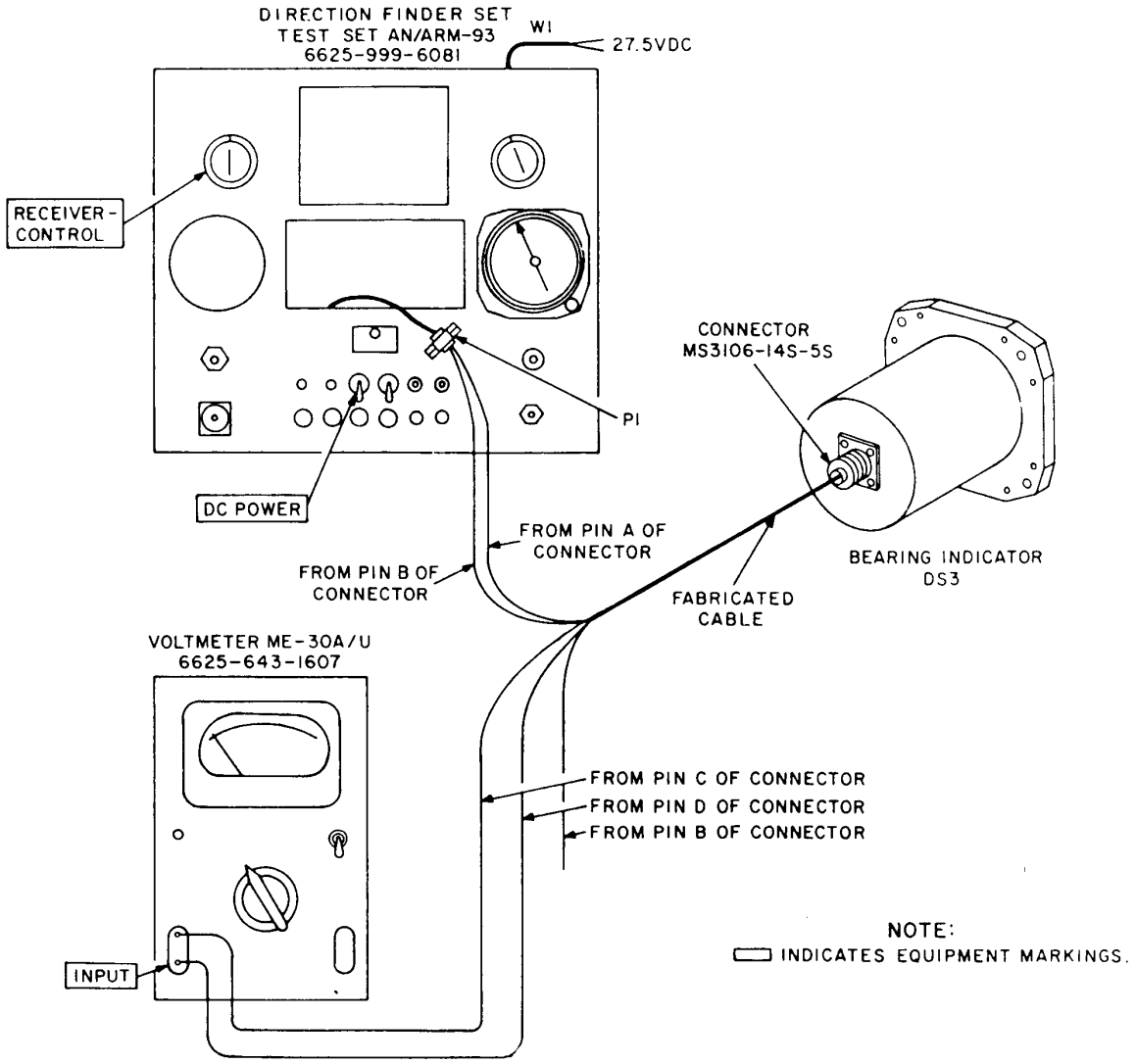

Figure 9. Test equipment connections for BEARING INDICATOR Zero Calibration.

(6) Connect the wire from pin A of the connector on the fabricated cable to pin A of connector P1 on the unit under test.

(7) Connect the wire from pin B of the connector on the fabricated cable to pin B of connector P1 on the unit under test.

(8) Connect the wires from pins C and D of the connector on the fabricated cable to the INPUT of voltmeter.

CAUTION

Voltmeter power connector must be removed from ground to eliminate the possibility of shorting out the 26 volts, 400 cps from Static Power Inverter CV-2128/ARN-83.

(9) Set the DC POWER switch of the unit under test to ON.

(10) Manually rotate the BEARING INDICATOR needle to N.

(11) A null will be observed on voltmeter with the BEARING INDICATOR needle to N.

(12) If the BEARING INDICATOR performs properly, disconnect the equipment, replace the front cover on the BEARING INDICATOR, connect the units removed to the proper cables, and replace Direction Finder Control C-6899/ARN-83 and the BEARING INDICATOR in the unit under test. If it does not meet specifications, leave the equipment connected and proceed with the adjustment procedures.

b. Adjustment Procedure

(1) Manually rotate the BEARING INDICATOR for a null indication on voltmeter.

NOTE

A 360 degree rotation of the BEARING INDICATOR needle will produce two nulls 180 degrees from each other-, To determine which is the correct null, measure the ac voltage between the wires from pins B and D of the connector on the fabricated cable. This ac voltage will be less than 26 volts when the BEARING INDICATOR needle is set to correct null.

(2) When the BEARING INDICATOR needle is set to the correct null, loosen the three synchro clamps holding synchro B2 to the synchro housing.

(3) Rotate the entire synchro until the BEARING INDICATOR needle points to N.

(4) Tighten the three synchro clamps holding synchro B2 to the synchro housing. (R)

(5) Set the DC POWER switch on the unit under test to OFF.

(6) Replace the front cover of the BEARING INDICATOR, disconnect the equipment, connect the units removed to the proper cables and replace the BEARING INDICATOR Direction Finder Control C-6899/ARN-83 in the unit under test.

11. Direction Finder Control C-6899/ARN-83

a. Performance Procedure

(1) The unit under test is connected to its power source.

(2) Turn the function switch on Direction Finder Control C-6899/ARN-83 to ADF, and set the DC POWER switch on the unit under test to ON.

(3) Turn the range switch on Direction Finder Control C-6899/ARN-83 to 850-1750, and rotate the TUNE control until the hairline on the FREQUENCY indicator bisects the small circle located between 1400 and 1500 kc.

(4) The BEARING INDICATOR on the unit under test should indicate 240 ±1.0 degrees.

(5) Rotate Direction Finder Control C-6899/ARN-83 TUNE control until the FREQUENCY indicator indicates 1700 kc.

(6) The BEARING INDICATOR on the unit under test should indicate 204 ±1.0 degrees.

(7) Rotate Direction Finder Control C-6899/ARN-83 TUNE control until the FREQUENCY indicator indicates 850 kc.

(8) The BEARING INDICATOR on the unit under test should indicate 344 ±1.0 degrees.

(9) The tuning meter should be deflected to midscale.

(10) Set the DC POWER switch to OFF.

b. Adjustment

(1) The unit under test is connected to its power source. Connect the AC VTVM to P-3 Receiver Pendant Cable: positive to Pin 9 and negative to Pin 11. Ground pin E of J1 on Bearing Indicator.

(2) Remove Direction Finder Control C-6899/ARN-83 by loosening the four Dzus fasteners. Reconnect the cable attached to it after removing the rear cover of Direction Finder Control C-6899/ARN-83.

(3) Rotate the TUNE control until the hairline on the FREQUENCY indicator bisects the small circle located between 1400 and 1500 kc.

(4) Set the DC POWER switch on the unit under test to ON.

NOTE

In the following step, do not allow the spur gears to become disengaged. Disengagement will cause loss of spring loading between the spur gears.

(5) Loosen the two setscrews on the hub of the tuning synchro gear of Direction Finder Control C-6899/ARN-83 (see fig 10 for location), and use a narrow-bladed screwdriver to rotate the shaft on the tuning synchro of Direction Finder Control C-6899/ARN-83 until the VTVM indicates null. (R)

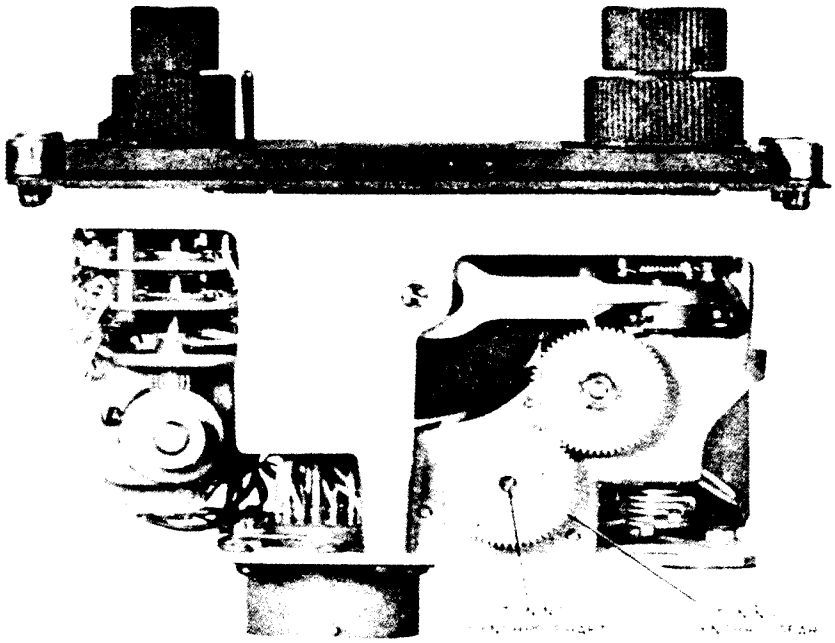

Figure 10. Direction Finder Control C-6899/ARN-83, parts location.

(6) Apply blue varnish to the threads of the two setscrews and tighten.

(7) Set DC POWER switch on the unit under test to OFF, and replace Direction Finder Control C-6899/ARN-83.

12. Final Procedure. In accordance with TM 38-750, annotate and affix DA Label 80 (US Army Calibrated Instrument). When the unit under test receives limited or special calibration, annotate and affix DA Label 163 (US Army Limited or Special Calibration). When the unit under test cannot be adjusted within tolerance, annotate and affix DA Form 2417 (US Army Calibration System Rejected Instrument).

TB 11-6625-821-35

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

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

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To be distributed in accordance with DA Form 12-36A, (QTY RQR BLOCK No. 803) calibration procedures AN/ARM-93.

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