

**COASTAL HARBOR, HIGH SEAS, AND OVERSEAS RADIO
COMMON EQUIPMENT
A-1 VOGAD
MAINTENANCE**

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case of the E-1 terminal, three trunks with repeating coils are provided between the terminal and the testing position. Limits given herein are for the X-wiring on drawing SD-64377-01.

1.01.1 Reason For Reissue: To include the information of the Addendum to Issue 1.

1.02 All tests are made with the vogad out of service. In the E-1 terminal, a 15-db gain amplifier can be patched in place of the vogad temporarily, by patching the amplifier input to the SEND trunk at the test position, and the SEND trunk to TRSG LINE IN at the E-1 terminal. The amplifier output is patched through the REC trunk to TRSG LINE OUT.

1.03 The tests below are outlined for the vogad in an E-1 terminal. These tests and requirements will also be applicable to the A-1 vogad in the C-2 terminal if the following changes are made:

(1) For the jack designations TRSG VOGAD IN and TRSG VOGAD OUT substitute VOG IN and VOG OUT.

(2) Use any available trunks for connections to the necessary external repeating coils.

2. DESCRIPTION OF TESTS AND ADJUSTMENTS

PERFORMANCE OBSERVATIONS

(A) Output

2.01 Output is tested to determine whether it is satisfactory on speech as read on a volume indicator. The test voltage, which indicates the vogad gain, is also observed.

1. GENERAL

1.01 All tone measurements require a repeating coil between the attenuator and the input to the vogad and between the output of the vogad and the measuring device. The losses of these coils (94H or 111C) are included in all limits. In the

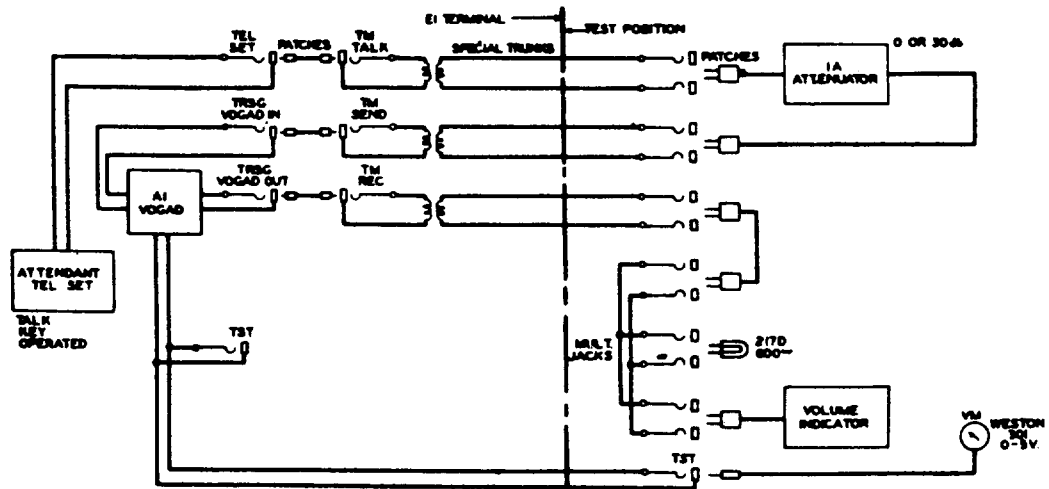


Fig. 1 - A1 Vogad Output Volume Test

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2.02 Apparatus:

- Hand telephone set
- 1-A Attenuator (or equivalent)
- Volume Indicator (Any standard VI or portable instrument such as the Weston Type 30 Model 802 or equivalent may be used.)
- Voltmeter, Weston Model 301, 0-5V, 5000 ohms per volt, flush-mounted bakelite case, mounted in a Weston style C portable mounting base.
- 217D Plug (600-ohm)
- P2A Cords with 47-type plugs
- P2AA Cords with 241-type plugs
- W2AA Cord with 47-type plug and 35 cord tips
- W2S Cords with 241-type plug and 35 cord tips

2.03 Procedure: - (for an E-1 terminal)

- (1) Patch at E-1 terminal from
TEL SET to TM TALK
TRSG VOGAD IN to TM SEND
TRSG VOGAD OUT to TM REC
- (2) Patch at test position from
(TM TALK) to 1-A Attenuator In
(TM SEND) to 1-A Attenuator Out
(TM REC) to MULT JACKS
Volume Indicator to MULT JACKS
Voltmeter to TST
- (3) Insert 217D plug in MULT JACKS
- (4) Connect the telephone set by operating the TALK key.
- (5) With attenuator set at 0 db, talk into telephone in a normal manner (-8 to -12 db volume) and note the reading of the volume indicator. Then reduce the talking volume by inserting 30 db in the attenuator. Note the reading of the volume indicator. Before each reading, allow about 3 seconds for the vogad to adjust.

Requirement: The output as read on the volume indicator may decrease not more than 5 db when the 30-db loss is inserted.

- (6) Read the voltmeter.

Requirement: When the TALK key is released, the voltage shall remain temporarily at the value determined

by the previous speech input (between 0.3 and 3.6 volts). A gradual increase of 1 db in about 4 minutes is allowable.

(B) Quality

- 2.04 The quality of the speech output is tested to determine whether speech is distorted by the vogad.
- 2.05 Apparatus:

- Hand telephone set
- 528 Receiver with head band, and P2AA Cord with 241-type plug and 80 cord tips
- 1-A Attenuator (or equivalent)
- P2A Cord with 47-type plugs
- P2AA Cord with 241-type plugs
- W2S Cords with 241-type plug and 35 cord tips

2.06 Procedure: - (for an E-1 terminal)

- (1) Patch at E-1 terminal from
TEL SET to TM TALK
TRSG VOGAD IN to TM SEND
TRSG VOGAD OUT to TM REC
- (2) Patch at test position from
(TALK) to (TM SEND)
(TM REC) to 1-A Attenuator In
- (3) Connect a W2S Cord to 1-A Attenuator Out so that head receiver plug may be held against the W2S cord plug.
- (4) Connect the telephone set by operating the TALK key.
- (5) While someone else talks into the telephone set so as to operate the vogad, listen at the test position with the receiver, touching its plug alternately to the screws in the back of the plug in the (TALK) jacks and of the plug on the attenuator output cord. Adjust the attenuator to obtain approximately equal volume.

Requirement: There shall be no appreciable difference in quality at the input and output of the vogad.

(C) Noise

- 2.07 The vogad output noise is tested to determine whether the vacuum tubes and battery supply of the vogad are satisfactory from the noise standpoint.

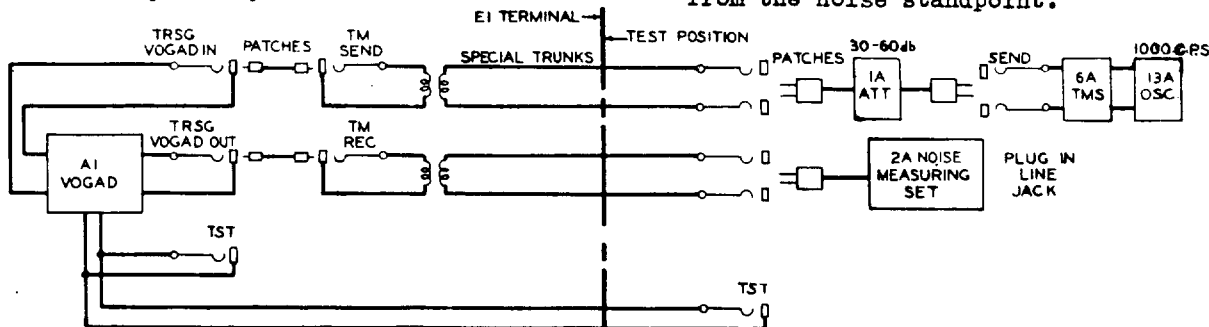


Fig. 2 - A1 Vogad Noise Test

2.08 Apparatus:

2A Noise Measuring Set
 6A Trans. Meas. Set (or equivalent)
 13A Oscillator (or equivalent)
 1A Attenuator (or equivalent)
 P2A Cords with 47-type plugs
 W2AA Cord with 47-type plug and 35 cord tips
 W2S Cords with 241-type plug and 35 cord tips

2.09 Procedure: - (for an E-1 terminal)

- (1) Patch at E-1 terminal from
 TRSG VOGAD IN to TM SEND
 TRSG VOGAD OUT to TM REC
- (2) Patch at test position from
 (TM SEND) to 1-A Attenuator Out
 1-A Attenuator In to 6-A TMS SEND
 2-A Noise Meas. Set to (TM REC)
- (3) Send 1 mw of 1000-cps tone into the vogad through the attenuator adjusted for 30 db loss.
- (4) Increase the attenuator loss in 5-db steps, at 3-second intervals, until the loss is 50 db in order to bring the vogad up to maximum gain.
- (5) Open the attenuator circuit by means of the key and measure the noise on the 2-A noise measuring set with its plug in its LINE jacks.

Requirement: The noise shall be no more than 30 db above reference noise.

(D) Range

2.10 The range test determines the range of input voltages over which the vogad regulates. From this test, the minimum sensitivity of the gain increaser, the sensitivity of the gain increase disabler and the operating point of the gain decreaser are apparent. The first two are adjustable.

2.11 Apparatus:

6A Trans. Meas. Set (or equivalent)
 13A Oscillator (or equivalent)
 1A Attenuator (or equivalent)
 Voltmeter, Weston Model 301, 0-5 V.
 5000 ohms per volt, flush-mounted bakelite case, mounted in a Weston Style C portable mounting base.
 P2A Cords with 47-type plugs
 P2AA Cords with 241-type plugs

W2AA Cord with 47-type plug and 35 cord tips
 W2S Cord with 241-type plug and 35 cord tips

2.12 Procedure: - (for an E-1 Terminal)

- (1) Patch at the E-1 terminal from
 TRSG VOGAD IN to TM SEND
 TRSG VOGAD OUT to TM REC
- (2) Patch at testing position from
 (TM SEND) to 1-A Attenuator Out
 1-A Attenuator In to 6-A TMS SEND
 6-A TMS REC to (TM REC)
 Voltmeter to TST
- (3) Adjust the output of the 6-A set so that it is sending 1 milliwatt of 1200-cps (not 1000 cps) tone.
- (4) Reduce the loss in the attenuator to zero so that the vogad gain has a low value and open the attenuator circuit by means of its key, leaving the vogad gain at the low value.
- (5) Increase the setting of the attenuator to 55 db, close its circuit by means of its key and reduce the attenuator loss in 0.5 or 1-db steps, pausing for about 3 seconds between steps, until the gain increaser operates, as indicated by a sudden increase in the voltage shown by the meter patched to the TST jack. Measure the vogad output on the 6A set and record this and the attenuator loss.
- (6) Remove the remaining attenuation in 5-db steps (see Note 1) until loss becomes zero and measure vogad output at each step. The last step may be less than 5 db.
- (7) Increase the attenuation, first introducing loss in 0.5-db steps until the output is 5 to 6 db above 1 mw (see Note 2), and then proceeding with the 5-db steps, measuring the vogad output at each 5-db step. The maximum attenuator loss shall be less than that determined in (5).

Note: It is important in testing the range in this manner that, while removing loss in 5-db steps, no loss be reinserted at any time; and, while inserting loss, no loss

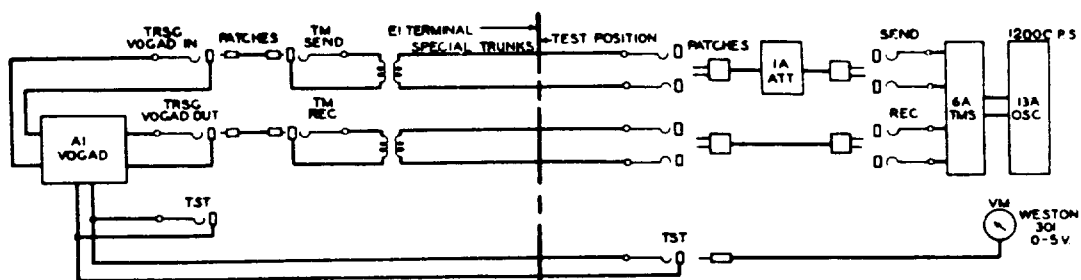


Fig. 3 - A1 Vogad Range Test

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2.12 (Continued)

be removed. The test voltages may be used to show that the gain is changing approximately as it should and that the caution of this note is not violated accidentally. If it is, the test voltage may even change in the wrong direction, but, regardless of this, the entire test should be repeated.

Note 2: An output of 5 or 6 db above 1 mw shall be tried initially. If the next reading of output, with the attenuator setting raised 5 db, changes more than ± 0.5 db, test (7) shall be repeated starting from the 0 db attenuator setting. If the output increased by more than 0.5 db when the 5 db was added, increase the initial output in steps of 0.5 db until the insertion of 5 db attenuation produces an output within 0.5 db of the initial output used. Similarly, if the output with 5 db added is more than 0.5 db less than the initial output, reduce the initial output in 0.5-db steps.

Note 3: A typical characteristic is shown below.

TYPICAL CHARACTERISTIC

Decreasing Attenuator Loss		
(a) Atten. Setting db	(b) Test Volts	(c) Vogad Output db
42.5	2.85	+ 5
37.5	2.8	+ 9.5
32.5	2.4	+10.1
27.5	2.1	+10
22.5	1.85	+10.2
17.5	1.6	+10.1
12.5	1.3	+10.3
7.5	1.1	+10.1
2.5	.85	+10
0	.8	+10.1

Increasing Attenuator Loss		
(d) Atten. Setting db	(e) Test Volts	(f) Vogad Output db
4.5	.75	+ 5.5
9.5	1	+ 5.2
14.5	1.25	+ 5
19.5	1.55	+ 6
24.5	1.75	+ 5.2
29.5	2	+ 5.7
34.5	2.3	+ 5.7
39.5	2.6	+ 4.5

Requirement: Neglecting the highest and lowest reading in each case, the vogad output when decreasing attenuator loss shall be 8 to 12 db above 1 mw; and the vogad output when increasing attenuator loss shall be 3.5 to 8 db above 1 mw. The test voltages are given only as a check, showing that the procedure has been correctly followed.

(8) If the requirement is not met, trouble is indicated in one of the branch circuits; and it will be desirable to proceed with Trouble Location Tests indicated from the following relations. The first attenuator reading of column (a) (See Note 3) gives the minimum sensitivity of the gain increaser. The average value of the column (c) vogad output gives the operating point (sensitivity) of the gain decreaser with sign reversed. (See Note below). The sensitivity of the gain increase disabler was adjusted at -3 db for this typical characteristic; and hence the difference in sensitivity between the gain decreaser and the gain increase disabler was 7.2 db.

Note: Negative sensitivity means that more than a milliwatt is required to operate the device.

(3) Vacuum and Gas Tubes

2.13 In case of failure of the vogad to meet the overall tests and as a routine maintenance test, vacuum tubes should be tested for filament activity and for grid current to detect gas or low grid insulation; and gas tubes should be tested for control gap breakdown and sustaining voltages.

2.14 Apparatus:

Vacuum tube test set

Note: Any vacuum tube test set capable of measuring the change in transconductance when the heater (or filament) voltage of a tube is reduced from normal by 10 per cent as well as detecting grid currents in the order of a fraction of a microampere may be used. The Weston Model 686 Type 7 Vacuum Tube Test Set or its equivalent is suitable for this purpose.

2.15 Procedure:

(1) Remove tubes from vogad sockets and test with a vacuum tube test set.

Requirements: All 313-type tubes shall meet the requirements of the 313-CA. In addition, the transconductance Gm of the tubes shall not be below the following values:

Type of Tube	Minimum Sm in Micromhos
262A	650
309A	750
310A	1200

(F) Relay

2.16 The 209FA relay GI is adjusted in accordance with BSP 040-231-711. The relay should operate on an input 5 db less than that required to change the test voltage during the test of the gain increaser sensitivity given in 2.22. This may be checked by observing the point at which the relay operates during the test of the gain increaser sensitivity given in 2.22.

(G) Vario-Amplifier

2.17 This test is made in case trouble is suspected and is for the purpose of checking the vario-amplifier when isolated from the different control circuits.

2.18 Apparatus:

6A Trans. Meas. Set (or equivalent)
 13A Oscillator (or equivalent)
 1A Attenuator (or equivalent)
 Voltmeter, Weston Model 301, 0-5 V.
 5000 ohms per volt, flush-mounted bakelite case, mounted in a Weston Style C portable mounting base.
 P2A Cords with 47-type plugs
 P2AA Cords with 241-type plugs
 W2AA Cord with 47-type plug and 35 cord tips
 W2S Cord with 241-type plug and 35 cord tips

2.19 Procedure: - (for an E-1 terminal)

- (1) Patch at the E-1 terminal from
 TRSG VOGAD IN to TM SEND
 TRSG VOGAD OUT to TM REC
- (2) Patch at the test position from
 (TM SEND) to 1-A Attenuator
 Out
 (TM REC) to 6-A TMS REC
 1-A Attenuator Into 6-A TMS SEND
 Voltmeter to TST
- (3) Place a temporary strap across the gain control condenser G which is located at about the center of the rear top edge of the panel.
- (4) Adjust the 6-A set and attenuator to send tone of 300, 1200 and 6000 cps at -39 db and measure the vogad gain. The output should be between 5 and 8 db above 1 mw. If the output is not within this range, the input shall be adjusted so as to bring the output within the range.

Requirements:

- (a) The 1200 cps gain shall be between 42.5 and 46.5 db. (This is not quite the maximum gain.)
- (b) The gain-frequency characteristic shall be within 3 db of the 1200 cps value.
- (5) Remove the strap from condenser G and send 1 mw of 1200 cps tone with the attenuator set at zero.
- (6) Increase the attenuator loss in 5-db steps, measuring the vogad gain and test voltage at each step, until the attenuator loss is 40 db.

Requirement: The gain for any given test voltage shall be within the following limits:

Test Voltage Volts	Vogad Gain Range db
1	8.5-21
1.5	20-31
2	31-41.5
2.5	40-49
2.75	42.5-51

Note: Add 4 db to the gain range values when the 4-db output pad is removed. See drawing ES-821405, page 104, for a typical characteristic.

- (7) If the limits are not met, readjust the gain as follows: The vario-amplifier is adjusted initially to have an overall gain of 42.7 to 46.3 db by strapping the W resistances so that with no input and condenser G strapped out, the voltage between terminals 1 and 3 of the LOSS varistor is a minimum, not exceeding 0.3 volt. The gain is then adjusted by strapping the M1 resistance in or out of the circuit and changing the tap on the AMP INT transformer. Changing the AMP INT transformer from tap 6 to tap 5 reduces the gain by about 6 db. Adding the M1 resistance increases the gain by about 2.5 db. The circuit has been designed so that the gain changes very slowly when no input is applied. Unusual gain changes might result if the insulation of the circuits connected to condenser G is reduced.

(H) Gain Increaser Sensitivity

2.20 The purpose of the sensitivity test is to determine the operating point of the gain increaser which determines the lower limit of its range of adjustment.

2.21 Apparatus:

6A Trans. Meas. Set (or equivalent)
 13A Oscillator (or equivalent)
 1A Attenuator (or equivalent)
 Voltmeter, Weston Model 301, 0-5 V.
 5000 ohms per volt, flush-mounted bakelite case, mounted in a Weston Style C portable mounting base.
 P2A Cords with 47-type plugs

P2AA Cords with 241-type plugs
 W2AA Cord with 47-type plug and 35
 cord tips
 W2S Cord with 241-type plug and 35
 cord tips

2.22 Procedure: - (for an E-1 terminal)

- (1) Patch at the E-1 terminal from
 TRSG VOGAD IN to TM SEND
 TRSG VOGAD OUT to TM REC
- (2) Patch at the test position from
 (TM SEND) to 1-A Attenuator
 Out
 (TM REC) to 6-A TMS REC
 1-A Attenuator In to 6-A TMS SEND
 Voltmeter to TST
- (3) Adjust the 6-A set to send 1 mw of
 1200 cps tone with zero loss in the
 attenuator. Then open the attenuator
 circuit by means of its key.
- (4) Increase the setting of the attenu-
 ator to 55-db loss, close its cir-
 cuit by means of its key and reduce the
 attenuator loss in 0.5 or 1-db steps,
 pausing for about 3 seconds between steps,
 until the gain increaser operates, as
 indicated by a sudden change in the test
 voltage. The sensitivity of the GI relay
 may be observed during this test.

Note: This point is a measure of
 the sensitivity of the gain in-
 creaser for an initial attenuator
 loss of zero, the so-called mini-
 mum sensitivity of the gain in-
 creaser. (Vogad output and gain
 about 10.5 db).

- (5) Open the attenuator circuit by means
 of its key, adjust for 55-db loss
 and close the attenuator circuit. Slowly
 remove the loss in 5-db steps until
 10 db remains. Open the attenuator cir-
 cuit, adjust to 55-db loss and close the
 attenuator circuit. Read the test volt-
 age. Remove the loss in 0.5 or 1-db
 steps until the gain increaser operates
 (test voltage increases). This point
 is a measure of the sensitivity for an
 initial attenuator setting of 10 db.
 (Vogad gain of about 20.5 db and output
 about 10.5 db).

- (6) Repeat the above procedure (5) with
 initial attenuator settings of 20,
 30 and 35 db.

Requirement: The minimum sensitiv-
 ity of the gain increaser (4) is
 adjusted initially by means of the
 taps on the GI IN transformer in
 steps of about 1-db each and on
 the GI INT transformer in steps
 of about 6-db each to be 1 to 3-
 db less than the vogad gain as
 finally adjusted (see note under
 Range Test). In case this results
 in a setting of less than 42.5 db,
 use a minimum setting of 42.5 db.

The following table gives the re-
 quirement for (5) and (6) relative
 to this minimum sensitivity:

Initial Attenuator Loss db	Sensitivity in db relative to 1200-cps Minimum Sensitivity
10	-0.5 to +2.5
20	+0.5 to +5.5
30	+3.5 to +10.5
35	+5.5 to +11.5

Note: Positive sign means more sen-
 sitive, i.e., less input.

- (7) If the minimum sensitivity of the
 gain increaser has once been adjust-
 ed and does not later meet the original
 adjustment within 5 db, the trouble can-
 not be fixed by adjusting the transfor-
 mer taps. If the gain increaser is less
 sensitive, try replacing the 310A tubes
 A5 and A6. If this makes little or no
 improvement, repeat the measurement, not-
 ing at what input the GI relay operates.
 It should be at least 5-db more sensi-
 tive than the gain increaser itself. Try
 replacing 313-type tubes R1 and R2. If
 the minimum sensitivity of the gain in-
 creaser is greater than originally, or
 if the minimum sensitivity is met, but
 the relative values in the above table
 are not met, the trouble may be in the
 bias supplied to the LOSS varistor through
 the V, W and AC resistances as shown in
 Fig. 4.

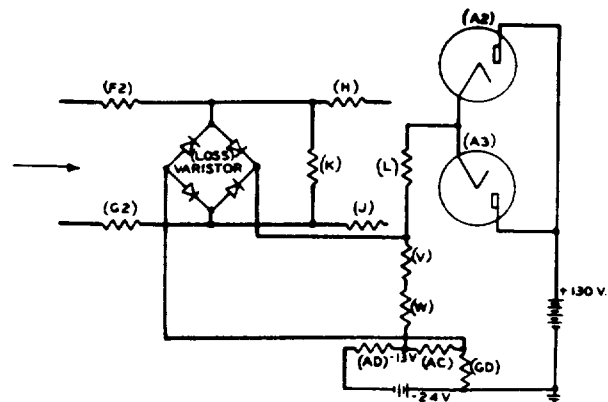


Fig. 4 - A1 Vogad Biasing Circuit

TROUBLE LOCATION TESTS

(I) Heater Current

- 2.23 To check adjustment of 116A ballast
 resistances.

2.24 Apparatus:

Ammeter, Weston Model 280 Volt-Ammeter,
 0.3-3-15 amp 100 ohms per volt
 W2BC Cord equipped with 110 plug and
 35 cord tips

2.25 Procedure:

- (1) Read filament battery voltage on power board voltmeter and find the difference between this reading and the average reading.
- (2) Insert ammeter plug into each of the AMP, GD and GI jacks in turn and record the circuits.

Note: Hold meter at least 6 inches from iron work.

- (3) Add to measured AMP and GD currents 0.003 ampere and to measured GI current 0.0015 ampere for each 0.1 volt filament voltage is above average or subtract if below average.

Requirement: Corrected values shall be between 0.58 and 0.7 amp for AMP and GD currents, and between 0.29 and 0.35 amp for GI.

- (4) If these limits are not met, the heater currents shall be checked in accordance with BSP 024-720-801.

(J) Power Supply Voltages

2.26 To determine whether the power supplies applied to the vogad are satisfactory.

2.27 Apparatus:

Voltmeter, Weston Model 564 Volt-Ohmmeter KS-7345, 15-30-150-300 V. 1000 ohms per volt.
 893 Cord with 360A tools at each end to hold 364 tools (spade tips) at one end and 411A tools (test picks) at the other end.

<u>Voltage</u>	<u>Measured Across</u>	<u>Meter Scale Used</u>	<u>Voltage in the Range</u>
E_g	Terminals A5 to A8	150 or 300	125-135
E_{sg} for lossier stage	Terminals 3-4 screen to cathode of tube A2 or A3	150	66.5-88.5
Varistor Bias (A)	Across AC1 unit	30 or 15	12.1-14.1
Varistor Bias (B)	Across AD1 resistance	30 or 15	6.3-7.5
Tube A5	Across AS resistance	150	36.5-54.5
Bias for R1	Across AY resistance	150	32-46
Part of E_p and E_{sg} for AS	Across AE resistance	150	26-36
Bias for GID	Across AF resistance	30 or 15	7.8-12

2.28 Procedure:

- (1) Place a temporary strap across the G condenser which is located at about the center of the rear top edge of the panel.
- (2) Measure the voltages indicated in the following table with no input to the vogad.

Requirements: (See table below)

- (3) Remove the temporary strap from the G condenser.

(K) Gain Inceasrer Frequency Characteristic

2.29 The purpose of the frequency characteristic test is to determine that the frequency discrimination in the gain increaser is suitable for reducing the effect of input noise.

2.30 Apparatus:

6A Trans. Meas. Set (or equivalent)
 13A Oscillator (or equivalent)
 1A Attenuator (or equivalent)
 Voltmeter, Weston Model 301, 0-5 V. 5000 ohms per volt, flush-mounted bakelite case, mounted in Weston Style C portable mounting base.
 P2A Cords with 47-type plugs
 P2AA Cords with 241-type plugs
 W2AA Cord with 47-type plug and 35 cord tips
 W2S Cord with 241-type plug and 35 cord tips

2.31 Procedure: - (for an E-1 terminal)

- (1) Patch at the E-1 terminal from TRSG VOGAD IN to TM SEND
 TRSG VOGAD OUT to TM REC

2.31 (Continued)

- (2) Patch at the test position from
(TM SEND) to 1-A Attenuator
Out
(TM REC) to 6-A TM REC
1-A Attenuator In to 6-A TM SEND
Voltmeter to TST
- (3) Send 1 mw of tone of the desired frequency with the attenuator loss at zero so as to reduce the vogad gain to a low value.
- (4) Open the attenuator circuit by means of its key and set the attenuator loss to 55 db.
- (5) Close the attenuator circuit by means of its key and remove loss in 0.5 or 1-db steps pausing for about 3 seconds between steps, until the gain increaser operates, as indicated by a sudden increase in test voltage.

Requirement: The sensitivity relative to the 1200-cps value as determined in 2.12 (5) or 2.22 (4) shall be as follows:

<u>Frequency in cps</u>	<u>Sensitivity in db Referred to 1200-cps value</u>
500	-5.5 to -12.5
2000	-7.5 to -14.5

Note: Negative sensitivity means that more than a milliwatt is required to operate the device. Negative sensitivity relative to a particular value, such as 1200 cps means that the device is less sensitive, i.e., requires more operating voltage.

(L) Gain Decreaser

2.32 These tests should be made in case trouble is suspected in the gain de-
creaser.

2.33 Apparatus:

6A Trans. Meas. Set (or equivalent)
13A Oscillator (or equivalent)
1A Attenuator (or equivalent)
Voltmeter, Weston Model 301, 0-5 V.
5000 ohms per volt, flush-mounted
bakelite case, mounted in Weston Style
C portable mounting base.
P2A Cords with 47-type plugs
P2AA Cords with 241-type plugs
W2AA Cord with 47-type plug and 35 cord
tips
W2S Cord with 241-type plug and 35 cord tips

2.34 Procedure: - (for an E-1 terminal)

- (1) Patch at the E-1 terminal from
TRSG VOGAD IN to TM SEND
TRSG VOGAD OUT to TM REC

- (2) Patch at the test position from
(TM SEND) to 1-A Attenuator
Out
(TM REC) to 6-A TMS REC
1-A Attenuator In to 6-A TMS SEND
Voltmeter to TST

- (3) Adjust the 6A set to send 1 mw of 1000-cps tone with the attenuator set for zero loss.

Requirement: The sensitivity shall be between 9 and 11 db at 1000 cps. (This value will be 4-db greater when the output pad is removed.)

- (4) Increase attenuator loss to 20 db, open the attenuator circuit by means of its key and momentarily short-circuit the G condenser. Close the attenuator circuit by means of its key and reduce the attenuator loss to zero and wait about 10 seconds for the output to stabilize. Measure the output.

- (5) Repeat steps (3) and (4) at 300 and 6000 cps.

Requirement: The sensitivity at 300 and 6000 cps shall not vary more than ± 2.5 db from that at 1000 cps.

- (6) If this limit is not met, apply 1 mw of 1200 cps tone to the vogad and, using the 5000 ohms per volt test meter, measure the enabling voltage across the YT resistance.

Requirement: The enabling voltage shall be from 0.3 to 1 volt, when measured with the test voltmeter.

- (7) If this voltage requirement is met, try other 313 type tubes in the GD position.

(M) Gain Increase Disabler

2.35 This test is made in case trouble is suspected in the gain increase dis-
abler.

2.36 Apparatus:

6A Trans. Meas. Set (or equivalent)
13A Oscillator (or equivalent)
1A Attenuator (or equivalent)
P2A Cords with 47 plugs
P2A Cord with 241-type plugs
W2S Cords with 241 type plug and 35
cord tips

2.37 Procedure: - (for an E-1 terminal)

- (1) Patch at the E-1 terminal from
TRSG VOGAD IN to TM SEND
TRSG VOGAD OUT to TM REC
- (2) Patch at the test position from
(TM SEND) to 1-A Attenuator Out
(TM REC) to 6-A TMS REC
1-A Attenuator In to 6-A TMS SEND

2.37 (Continued)

(3) Send 1 mw of 1200-cps tone with the attenuator set for zero loss and note the 6A set reading.

(4) Increase attenuator loss in 0.5 or 1-db steps until the output of the voad as read on the 6A set no longer reduces linearly. This output is taken as the sensitivity of the gain increase disabler.

(5) For the typical characteristic which follows, the gain increase disabler sensitivity is taken as 3 db since the next 0.5-db increase in the attenuator loss reduced the voad output by only

0.1 db whereas it might actually have increased and been +3.5 or +4 db.

Attenuator Loss db	Voad Output db
0	+10.5
0.5	+10
5	+ 5.5
5.5	+ 5
6	+ 4.5
6.5	+ 4
7	+ 3.5
7.5	+ 3
8	+ 2.9

Requirement: The sensitivity of the gain increase disabler shall be from +1.5 to +3.5 db.