

HIGH SEAS AND OVERSEAS RADIO B3 PRIVACY DEVICE DESCRIPTION

BSPM 107 RECOM'D DATE FWD.
KPS 5/16/46

1. GENERAL

1.01 The B-3 Privacy consists of two independent copper-oxide modulators to both of which a vacuum-tube oscillator supplies a carrier tone of such frequency that the speech band passing through each modulator is inverted around the center point of the band. Single-tube amplifiers compensate for the loss in the modulators and provide such additional gain as may be required.

1.02 One modulator with or without its amplifier is connected in the transmitting path and the other modulator with or without its amplifier is connected in the receiving path of the 4-wire portion of a circuit, for example, in a radiotelephone control terminal. Outgoing normal speech coming from the subscriber becomes inverted so as to be unintelligible to the casual listener. Incoming inverted speech, where the distant terminal has the same type of privacy equipment (that is, the inverter type with the same oscillator carrier frequency), is restored by the privacy to produce normal speech.

1.03 The privacy apparatus is self-contained on a 12-1/4 inch metal panel and requires only a source of 105-125 volt, 50-60 cps a-c power for its operation. Terminal strips provide for a flexible arrangement of the modulators and amplifiers and of the repeating coils which may be used to balance the input or output of the unbalanced modulators.

2. CIRCUIT DESCRIPTION

2.01 The schematic circuit of the privacy is shown in Figure 2, page 6. Two oscillator frequencies, involving only different oscillator tuning condensers, and two types of modulator filters are available. Where it is desired to transmit a speech band of 250-2750 cps, a 3000-cps oscillator frequency is used so that the lower side-band of the modulator output will invert this band around the 1500-cps point. Where the speech band is 250-3000 cps, a 3250-cps oscillator frequency is used so that this band is inverted around the 1625-cps point. The same inversion point must be used at both ends of a circuit. The 250-2750 cps speech band is more generally used.

Note: In a few cases, privacy panels originally made for an inversion point frequency of 1625 cps have been converted for operation at a 1500-cps inversion point frequency

by changing the oscillator frequency from 3250 to 3000 cps. This change was made by replacing the AN11 condenser originally used as condenser H by an AL6 condenser. The original 130E filters were retained.

2.02 The high-stability vacuum-tube oscillator, common to both modulators, consists of a 311A vacuum tube OSC whose output frequency is determined by fixed condenser H and variable condenser OSC which provides for adjustment of the output frequency to compensate for aging of the oscillator elements. The oscillator output is connected to each modulator at the mid-points of the repeating coil windings between which each varistor is connected; and an adjustable condenser and potentiometer are used to balance the carrier in the two paths of the modulator so that no appreciable amount of carrier is present in the output of this circuit.

2.03 The transmitting and receiving circuits in the privacy are practically identical. By means of straps on the T and R terminal blocks each amplifier may be connected so as to come after or before its associated modulator. In the first case, the input may be connected directly to the unbalanced modulator circuit and so be unbalanced or it may first be balanced by a repeating coil. In the second case, the unbalanced modulator circuit may be used directly as an unbalanced output circuit or a repeating coil may be added so as to give a balanced output circuit. The groups of straps for these alternative arrangements are as follows:

Amplifier After Modulator		Amplifier Before Modulator	
On T Terminal Strip		On T Terminal Strip	
Input	Strap from	Output	Strap from
Balanced	(9 to 11	Balanced	(17 to 11
	(10 12		(18 12
	(13 15		(13 9
	(14 16		(14 10
	(3 5		(5 3
	(4 6		(6 4
Unbalanced	(3 to 11	Unbalanced	(17 to 11
	(4 12		(18 12
	(13 15		(13 3
	(14 16		(14 4

Amplifier After Modulator		Amplifier Before Modulator	
On R Terminal Strip		On R Terminal Strip	
Input	Strap from	Output	Strap from
Balanced	(13 to 15		(17 to 11
	(14 16		(18 12
	(5 11	Balanced	(13 5
	(6 12		(14 6
	(3 7		(7 3
	(4 9		(9 4
Unbalanced	(13 to 15		(17 to 11
	(14 16		(18 12
	(3 11	Unbalanced	(13 3
	(4 12		(14 4

2.04 The description of the transmitting circuit as shown on the schematic drawing will serve to illustrate the general features of both circuits: The speech band passes through the repeating coil T, if the input is to be balanced, and through the low-pass filter T IN which cuts off at the upper limit of the speech band and allows only the speech band to pass through repeating coil T IN to the varistor T. In this varistor, the carrier supplied from the oscillator is modulated by the speech band; and upper and lower sidebands result. The amount of carrier passing through the repeating coil T OUT is kept to a minimum by balancing the amplitude and phase of the carrier currents flowing in windings 4-3 and 7-8. Condenser K and potentiometer T BAL are used to secure a close balance. The two sidebands pass through the repeating coil T OUT but the upper sideband is attenuated by the low-pass filter T OUT so that only the lower sideband passes to the amplifier. This lower sideband is inverted with respect to the original speech band since the lower frequency limit of the speech band is now represented by the upper limit of the lower sideband and vice versa. It may be said that original speech frequencies spaced equally above and below the mid-point of the speech band have been interchanged.

2.05 The negative feed-back amplifier consists of a 310A vacuum tube T, an adjustable input to its grid by means of the taps on the input transformer TA IN, which give gain adjustments in 4-db steps over a range of about 15 to 35 db, and a finer gain adjustment by means of the potentiometer T GAIN, which controls the amount of negative feedback and has a gain range of about 5 db.

2.06 The distant terminal of the circuit must also have the inverter type of privacy with the same oscillator carrier frequency. The inverted speech band which comes to it is re-inverted in the receiving modulator and sent to the distant subscriber in its normal condition.

2.07 The power supply consists of transformer P, some of whose flexible leads have been brought out to a terminal block. On this block, terminals 4 to 8 serve as input taps so that connections of the a-c power supply may be made in accordance with the average voltage of that supply. There are four output windings: One (O-W, Y, Y-W) provides approximately 475 volts a-c (mid-point grounded) across the full-wave 274A rectifier tube RECT whose nominal 132-volt d-c filtered output is the plate and screen grid supply for the vacuum tubes; another (BR-W, O) provides the 5-volt a-c filament supply for the RECT tube; the third (G-W, BR) provides the 24-volt a-c supply for the heaters of the vacuum tubes; and the fourth (W, BK-W) provides a 45-volt a-c supply which may be used for operating relays in associated apparatus, if required.

3. EQUIPMENT FEATURES

3.01 Photograph A, page 4, shows the front and rear views of the 12-1/4 inch metal panel designed for standard relay rack mounting. The basic panel is List 1 of J68317A. The filters and the condenser for adjusting the oscillator frequency depend upon the speech band to be passed: for a 250-2750 cps speech band, 130A filters and an AL6 condenser are provided as List 2; and for a 250-3000 cps speech band, 130B filters and an AN11 condenser are provided as List 3. If a 94H repeating coil R is required, it is provided as List 4 and mounted in the space provided below the OSC tube, as shown in the photograph. Six pairs of jacks are provided for testing. Apparatus that is adjustable from the front is designated on the front.

3.02 On the rear of the panel a cover with a warning sign is provided for the power supply unit to prevent contact with the high voltages developed in this unit. There are three holes in the cover: The large hole gives access to the prong base to which the external a-c power lead is connected; the two small holes provide for the insertion of 0.6-amp. FUSTAT plugs in the FUSTAT assemblies shown in the photograph. Blown fuses may thus be replaced without removing the cover.

3.03 The external circuit connections to the privacy unit are made at the T and R terminal strips. The a-c power connection is made by means of a 15-ft. KS-7586 2-conductor rubber-covered cord. One end of this cord is equipped with a non-polarized

plug cap for insertion in an a-c power outlet. The other end of the cord is equipped with a receptacle that is passed part way through the cover hole to engage with the prongs of the base receptacle seen in the photograph.

3.04 The following vacuum tubes are used in the privacy unit:

WE Type	Quantity	Circuit Designation
274A	1	RECT
310A	2	T, R
311A	1	OSC
Total	4	

3.05 The 105-125 V., 50-60 cps, a-c power load of the privacy unit is about 50 watts.

Circuit Input Volume vu	Circuit With Amplifier After Modulator		Circuit With Amplifier Before Modulator	
	Nominal Output Volume Available	Nominal Carrier Leak After Adjustment Measured at +6 vu Point dbm	Nominal Output Volume Available	Nominal Carrier Leak After Adjustment Measured at +6 vu Point dbm
	vu	dbm	vu	dbm
-60	-	-	-58 to -36	+14 to -8
-50	-	-	-48 to -26	+4 to -18
-40	-	-	-38 to -16	-6 to -28
-30	-28 to -6	-4	-28 to -6	-16 to -38
-20	-18 to +4	-14	-18 to -4	-26 to -40
-10	-8 to +11	-24	-8 to -4	-36 to -40
0	+2 to +11	-34	-	-
+6	+8 to +11	-40	-	-

4.03 The above table indicates the nominal carrier leak at a +6 vu point for various operating conditions. Where a choice is available, the arrangement providing the lowest carrier leak should, of course, be chosen. For example, if an input volume of -30 vu is available and an output volume of -10 vu is desired, the carrier leak will be -4 dbm (or less) if the amplifier is placed after the modulator and -34 dbm (or less) if the amplifier is placed before the modulator; the latter arrangement would, of course, be chosen.

4.04 The noise at the outputs of the privacy unit is less than 45 db above reference noise (message weighting).

4. TRANSMISSION CHARACTERISTICS

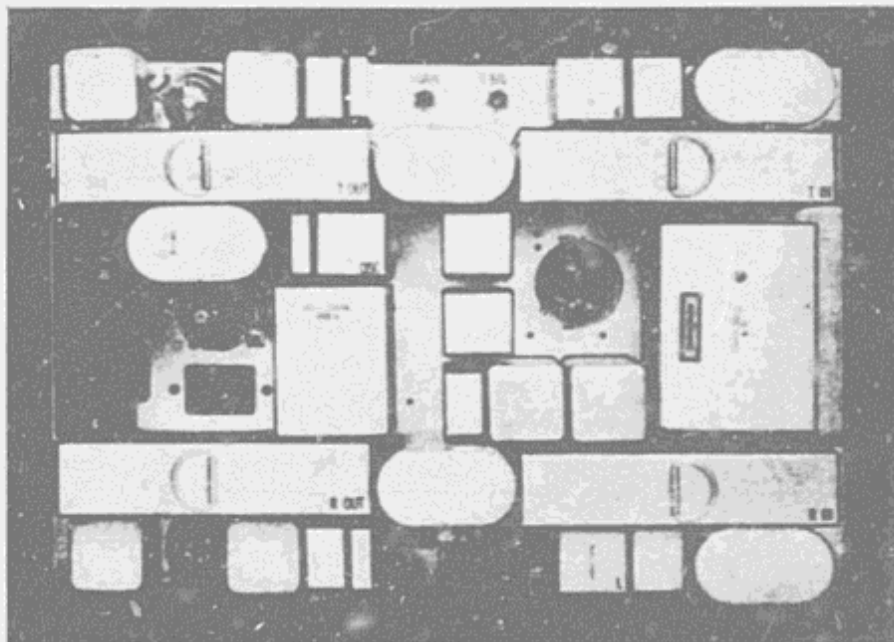
4.01 A typical gain-frequency characteristic of the privacy unit arranged for 250-2750 cps speech band is shown in Figure 1, page 5.

4.02 Some pertinent data on the operation of the modulators and amplifiers are as follows:

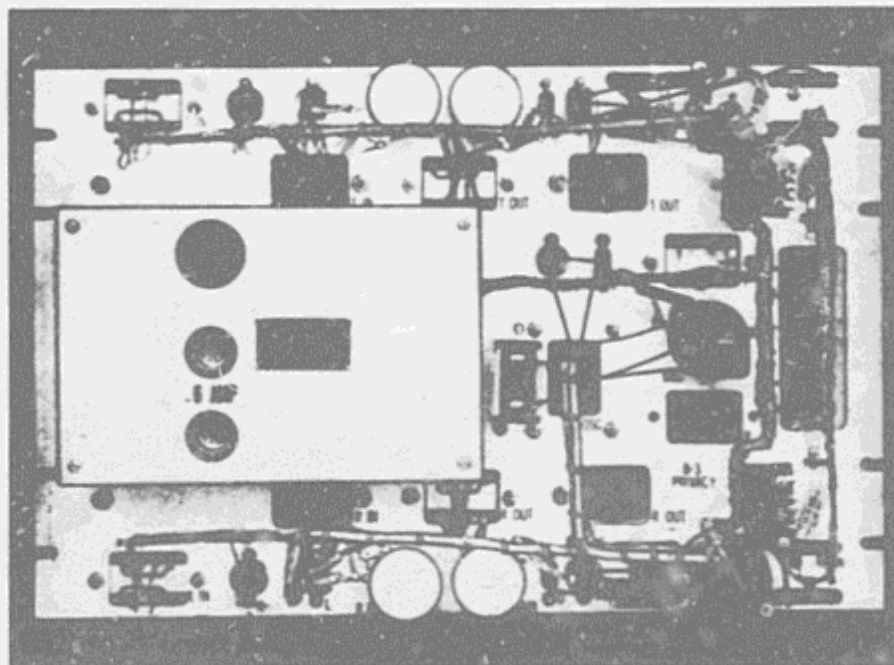
Modulators	
Max. Input Volume	+6 vu
Nominal Loss	10 db
Max. Output Volume	-4 vu
Carrier Leak at Output when properly adjusted	-50 dbm or less
Amplifiers	
Nominal Max. Gain	34 db
Nominal Min. Gain	12 db
Max. Output Volume	+11 vu

5. PHOTOGRAPHS, FIGURES, AND REFERENCES

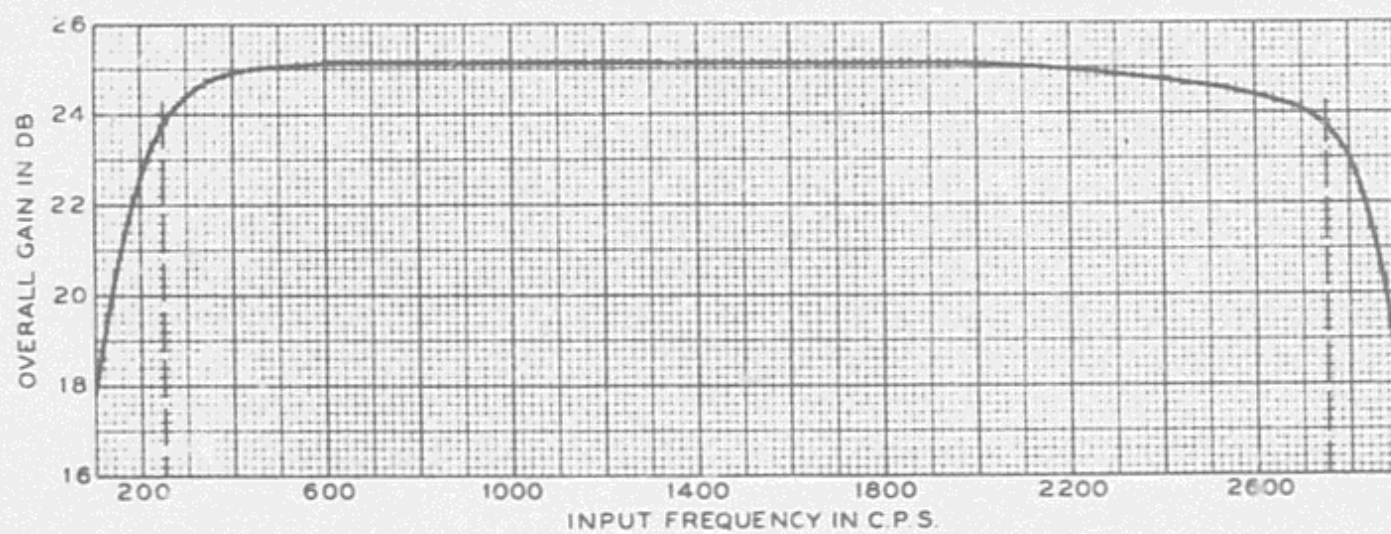
(A) Photograph	Page
B-3 Privacy - Front and Rear	4
(B) Figures	
ES-798632 Gain-Frequency Characteristic	5
SD-59022-01 B-3 Privacy Schematic	5
(C) Drawings For Reference	
ED-61947-01 B-3 Privacy Assembly	
T-59022-30 B-3 Privacy Wiring Diagram	



FRONT VIEW



REAR VIEW



SPEECH BAND 250-2750 C.P.S.
AMPLIFIER SET AT MAXIMUM GAIN

Fig. 1 - Typical Gain v Frequency Characteristic

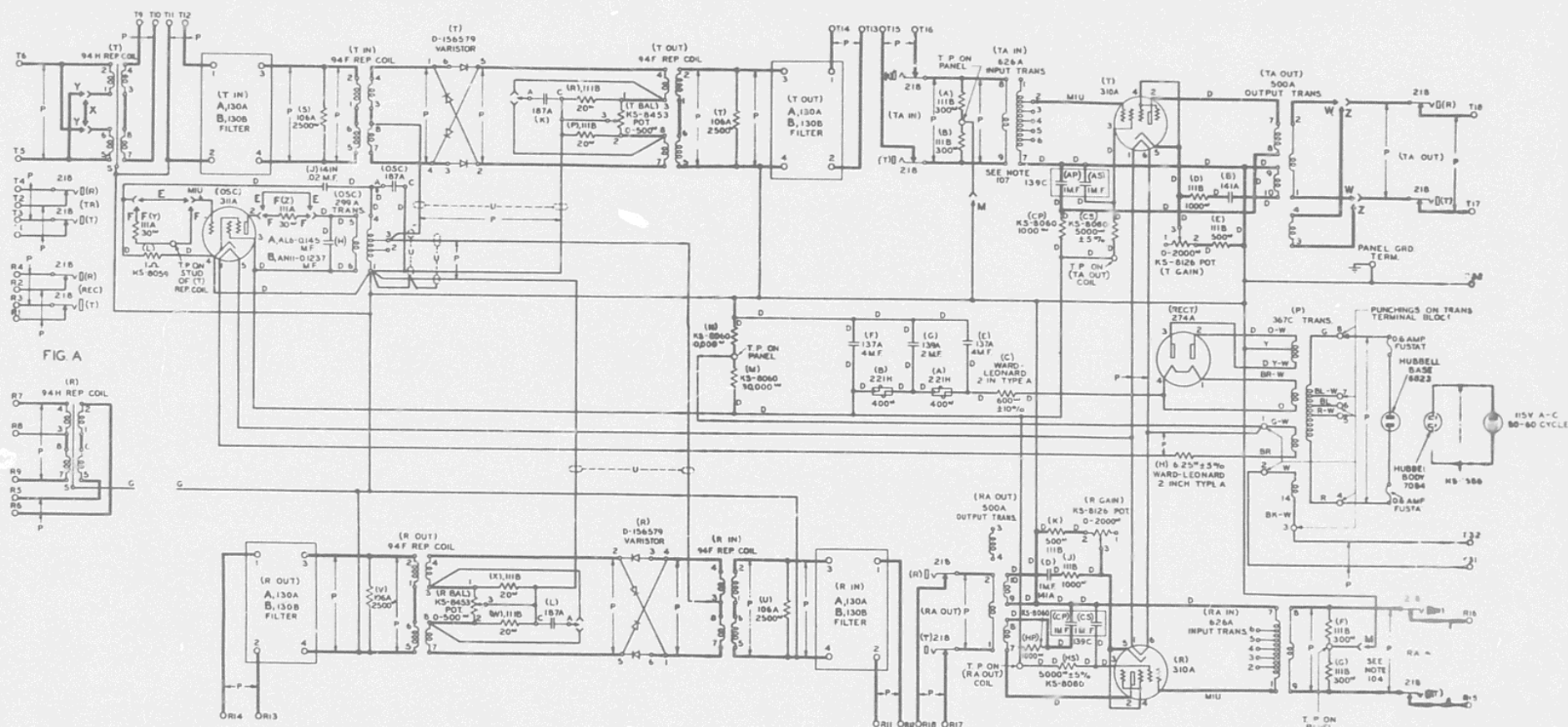


Fig. 2 – Typical Scheme

HIGH SEAS AND OVERSEAS RADIO
B3 PRIVACY DEVICE
J-68317A
(INSTALLED IN 14ORT TRAILER)

1. GENERAL

1.01 This addendum is issued to specify the wiring and strapping of the B-3 privacy panel when it is installed in a 14ORT trailer for use with a portable 221 emergency radiotelephone equipment.

1.02 When so used it is per J-68317A, Lists 1, 2 and 4. This has a 250-2750 cps speech band inverted around the 1500 cps point (Lists 1 and 2) with a second 94H repeating coil (List 4) Fig. A of Drawing SP-59022-01.

1.03 The attached Drawing GP-1053-902 specifies the wiring and strapping of the B-3 privacy panel. This arrangement:

- (1) Connects the amplifier ahead of the modulator on the transmitting side and after the modulator on the receiving

side. Thus both amplifiers are connected on the wire line side of the privacy panel.

- (2) Connects 2 repeating coils so that both inputs and outputs of the privacy panel are balanced to ground.

- (3) Straps both amplifiers for a nominal 12 to 17 db gain depending on the position of the GAIN potentiometer.

- (4) Straps the AC power transformer for a 111-119 volt supply

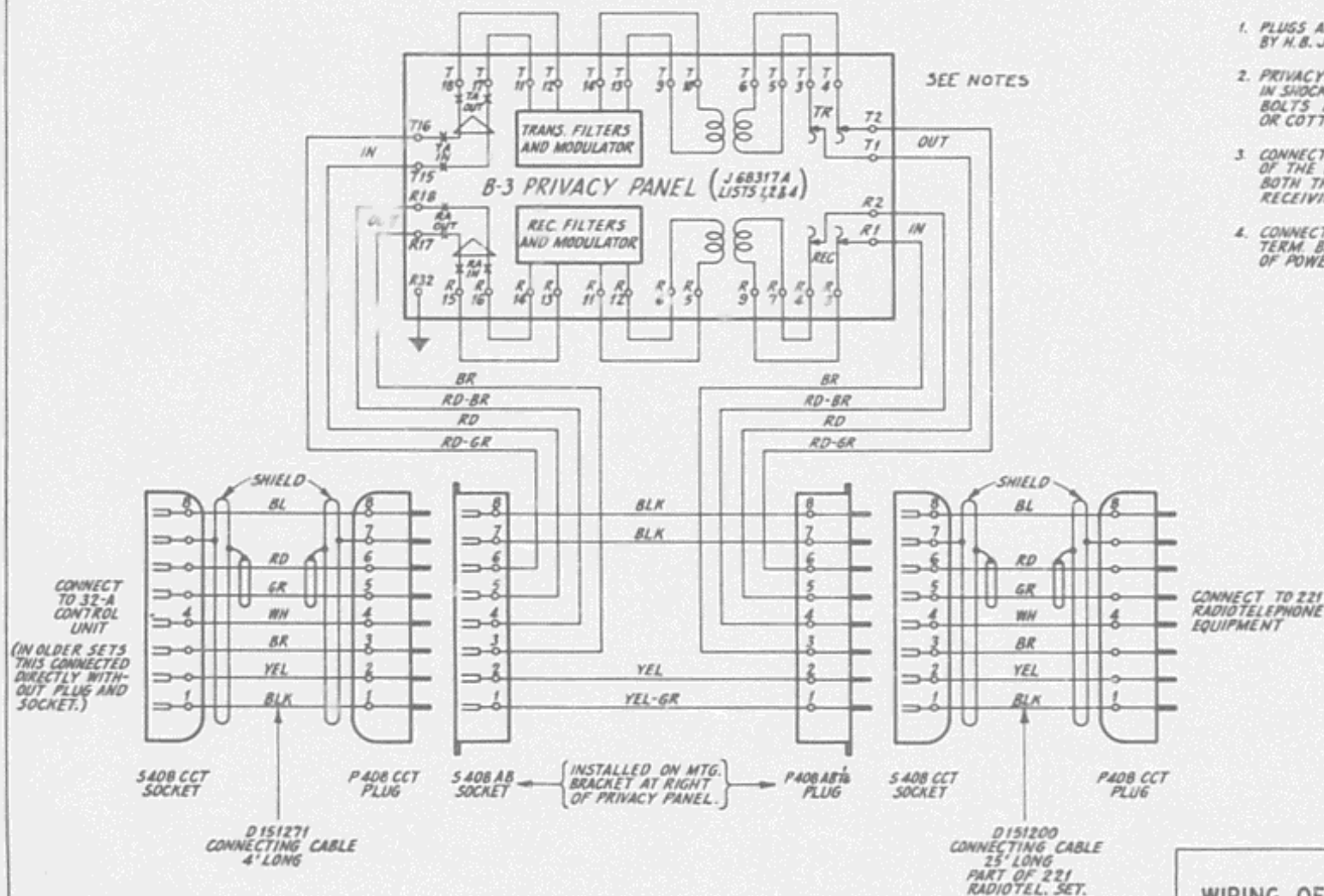
IN SECTION 403-323-500

- 2.03 Since the gasoline generator which supplies the AC voltage to the B-3 privacy panel is adjusted to 115 volts the connections to power transformer (P) should be to terminal block Punchings 4 and 7.

Attached:
Drawing GP-1053-902

NOTES

1. PLUGS AND SOCKETS MANUFACTURED BY H.B. JONES, CHICAGO.
2. PRIVACY PANEL SHOULD BE SECURED IN SHOCKPROOF MOUNTING WITH BOLTS EQUIPPED WITH LOCKNUTS OR COTTER PINS.
3. CONNECT THE M11 CORD TO LUG 6 OF THE INPUT TRANSFORMER ON BOTH THE TRANSMITTING AND RECEIVING AMPLIFIERS.
4. CONNECT A.C. POWER SUPPLY TO TERM. BLOCK PUNCHINGS 4 AND 7 OF POWER TRANSFORMER (P).



WIRING OF B-3 PRIVACY PANEL
WHEN USED IN A 140 RT TRAILER
MOUNTED 221 RADIOTELEPHONE
EQUIPMENT

WITH SPECS

DRAWN BY
P. A.CHECKED BY
R. L. R.DATE
1-4-43AMERICAN TEL. & TEL. CO.
L. L. GENERAL PLANT DEPT.

GP-1053-902

HIGH SEAS AND OVERSEAS RADIO
B3 PRIVACY DEVICE
PERIODIC TEST INTERVALS

R 55. 083 + Add A

BSPM 1007	RECOM'D	DATE FWD.
ENG.	KPS	5/26/66
POE	A	7/8/66
MR. WHITMAN RM.		
ENG. FILE RM.		

1. GENERAL

1.01 This section outlines the routine maintenance tests and adjustments for the B3 Privacy together with suggested maximum testing intervals.

1.02 The schedule of tests is given in the following table which includes references to the subdivision in the Maintenance Methods section in which each test is described.

TEST	PAR. REFERENCE 403-323-500	TEST INTERVAL		SERVICE ADJUSTMENT
		6 Mo.	Yr.	
A-C Line and Heater Voltages	2(A)			X
Grid Bias Voltage	2(B)			X
Plate Voltage	2(C)			X
Vacuum Tubes	2(D)	X		
Oscillator Frequency	2(E)			X
Oscillator Output Voltage	2(F)			X
Gain-Frequency Characteristics	2(G)		X	
Carrier Leak	2(H)			X
Noise	2(I)			X

HIGH SEAS AND OVERSEAS RADIO

B3 PRIVACY DEVICE

PERIODIC TEST INTERVALS

<u>Transmission Test</u>	<u>Described in Addendum 403-323-500</u>	<u>Test Interval</u>
(A) Gain Frequency Characteristic	(A) Para. 2.01-2.03	Annual
(B) Carrier Leak	(B) Para. 2.04-2.05	Monthly
(C) Insertion Loss	(C) Para. 2.06-2.07	Semi-Annually

HIGH SEAS AND OVERSEAS RADIO B3 PRIVACY DEVICE MAINTENANCE

BSPM /08/ ~~W~~ RECOM'D	DATE FWD.
ENG. <i>hps</i>	<i>5/26/44</i>
For Average A-C Line Voltage from	Connect to Transformer Term. Block Punchings
96 - 104	4 and 5
104 - 111	4 and 6
111 - 119	4 and 7
119 - 126	4 and 8

1. GENERAL

1.01 The B-3 Privacy unit, when used in a radiotelephone circuit, is normally connected permanently in the control terminal and is energized continuously. Jacks are provided in the control terminal so that a spare privacy unit may be patched into the circuit when the regular unit is to be taken out of service for maintenance tests.

2. DESCRIPTION OF TESTS AND ADJUSTMENTS

(A) A-C Line and Heater Voltages

2.01 Power shall be connected to the circuit for at least two minutes before the heater voltage tests are made. At time of the initial installation (unless the average line voltage is already known), measurements of the a-c line voltage shall be made over a period of at least 24 hours. At the end of the test period, the average a-c line voltage shall be determined, neglecting short time surges in the voltage, and appropriate connections made to the transformer terminal block which is mounted beneath the protective cover associated with the power supply unit on the panel.

Caution: The voltages under the protective cover on the rear of the panel are dangerous. This cover may be removed with the aid of a screwdriver; but the power lead must first be disconnected and not reconnected until the cover has been replaced.

2.02 Apparatus

A-c Voltmeter, Weston Model 341, 0-50-150V (or equivalent)
Screwdriver, 4-inch

2.03 Procedure

- (1) Disconnect a-c power lead and, with voltmeter plugged into the body at the end of the lead, measure the a-c line voltage.
- (2) With lead still disconnected, remove protective cover and observe to what terminals on the power transformer the incoming leads are connected.

Requirements:

Connections to the transformer P terminal block shall be made in accordance with the following table:

- (3) Reconnect the input leads as required, replace cover and reconnect the a-c power lead.

- (4) After power has been applied for at least two minutes, measure the a-c heater voltage of each vacuum tube with the voltmeter connected to the indicated socket terminals.

Requirements:

Tube	Measure between Socket Terminals	A-C Voltage
T	1 and 6	8.7 - 11.3
R	1 and 6	8.7 - 11.3
OSC	1 and 5	8.7 - 11.3
RECT	1 and 4	4.7 - 5.3

(B) Grid Bias Voltage

2.04 The grid bias voltage for the transmitting and the receiving amplifier tubes T and R is obtained through cathode resistance drop so that it is a measure of the plate currents in the tubes. Since the settings of the T GAIN and R GAIN potentiometers affect not only the gain but the grid bias on the associated tube, specific values cannot be given for all operating conditions. Extreme grid bias voltage values are given for maximum and minimum gain settings of the potentiometers.

2.05 Apparatus

D-c Voltmeter, Weston Volt-Ohmmeter Model 564, KS-7045, 1000 ohms per volt (or equivalent)
Screwdriver, 4-inch

2.06 Procedure

- (1) Note the normal settings of the T GAIN and R GAIN potentiometers and turn them first to their full clockwise and then to their full counter-clockwise positions.
- (2) Measure voltage drop across the "E" and "K" resistances which are designated 11B500 and located on the rear of the panel at the right of the T GAIN and R GAIN potentiometers respectively.

Requirements:

For Maximum Gain Setting of Potentiometer (Full Clockwise Pos.)	For Minimum Gain Setting of Potentiometer (Full Counter- Clockwise Pos.)
1.6 - 4.5 v	3.7 - 7.1 v

- (3) Restore potentiometers to normal settings.

(C) Plate Voltage2.07 Apparatus

D-c Voltmeter, Weston Volt-Ohmmeter
Model 564, KS-7345, 1000 ohms per
volt (or equivalent)

2.08 Procedure

- (1) Measure between socket terminals 3 and 4 of the OSC tube.

Requirement: The plate voltage shall be in the range of 115-150 volts.

(D) Vacuum Tubes2.09 Apparatus

Hickok Model 530B Tube Tester (or equivalent)

2.10 Procedure

- (1) Remove each vacuum tube from its socket and test it in the tube tester in accordance with BSP 100-640-101.

Note: The tube tester settings and test requirements for the three types of tubes as given in BSP 100-640-101 should be used rather than those indicated on the tester roll chart.

- (2) Replace any tube that does not meet the requirements.

(E) Oscillator Frequency

2.11 When the panel is manufactured, the oscillator frequency is adjusted to within 0.6 cps of its nominal value. It should not be necessary to change this adjustment (unless the strapping of the OSC condenser becomes broken) until the aging of the circuit elements causes the frequency to depart from its nominal value by more than 5 cps.

Note: If no precision oscillator is available for the frequency test, the test shall not be made since the frequency change attributable to aging is less than the probable error in the ordinary oscillator.

2.12 Apparatus

Oscillator, 6010B (or equivalent)
Telephone Receiver, 528 equipped with
2W2A Cord

or

Volume Indicator, 753-B (or equivalent)
Resistance, 300-ohm
Patch Cord, 3P14B

2.13 Procedure

- (1) Temporarily connect a 300-ohm resistance between terminals 12 and 14 on the T terminal strip so as to apply a portion of the precision oscillator output directly to terminals 13 and 14 on the T terminal strip.
- (2) Adjust precision oscillator for 1 MW of 1500-cps tone, if H condenser is an AL6, or 1625-cps tone, if H condenser is an AN11.
- (3) Connect precision oscillator output to TR jacks, if terminals 11 and 12 on the T terminal strip are connected to terminals 9 and 10 or to 3 and 4; otherwise use TA IN jacks.
- (4) Connect telephone receiver or volume indicator to TA OUT jacks, if terminals 13 and 14 on the T terminal strip are connected to terminals 15 and 16; otherwise use TR jacks.
- (5) Listen at the receiver or observe the volume indicator meter needle as the portion of the precision oscillator output that has passed through the modulator beats against the unmodulated portion; and adjust OSC condenser by strapping for "zero beat".

Note: Do not apply a soldering iron to the condenser terminals until the proper strapping has been completely determined.

- (6) Remove 300-ohm resistance.

(F) Oscillator Output Voltage2.14 Apparatus

40B Transmission Measuring System
or
6A Transmission Measuring Set
Patch Cord, 2W24A

2.15 Procedure

- (1) Connect input of measuring set to terminal 8 of transformer T IN and center terminal "3" of potentiometer T BAL.

- (2) Calibrate measuring set for 3000 cps, if H condenser is an AL6, or 3250 cps, if H condenser is an AN11, and measure level.

Requirement: The oscillator output level shall be at least +11 dbm (2.8 v).

- (3) Make same measurement for the connection to terminal 8 of transformer R IN and center terminal "3" of potentiometer R BAL.

(G) Gain-Frequency Characteristics

2.15 The privacy gain measurements are divided into three parts: Amplifier alone, Modulator alone, Amplifier plus Modulator. Only those tests that correspond with the arrangements actually used in the circuit need be made. However, for trouble location tests, it may be desirable to test the individual parts. The tests are based on the privacy wired for operation in a 600-ohm impedance circuit.

2.17 Apparatus

40B Transmission Measuring System
19C or 13A Oscillator

or

6A Transmission Measuring Set
13A Oscillator

- 2 - Patch Cords, 3P14B
2 - Patch Cords, 2W24A
Screwdriver, 4-inch

2.18 Procedure (Amplifier)

- (1) Patch from SEND jacks of measuring set to TA IN or RA IN jacks of transmitting or receiving amplifier; and from TA OUT or RA OUT jacks to REC jacks of measuring set.
- (2) Observe to which terminal of amplifier input transformer TA IN or RA IN the flexible lead from the grid cap of the associated amplifier vacuum tube is connected. Refer to table below and use corresponding tone input power.
- (3) Note the normal settings of the T GAIN and R GAIN potentiometers and turn them first to their full clockwise and then to their full counter-clockwise positions.
- (4) Measure output of each amplifier at 200, 1000 and 3000 cps for both maximum and minimum gain conditions. Check to see that amplifier gain is within the correct ranges for the input transformer terminal in use.

Requirements:

a. Grid Cap Connected to Input Trans. Terminal	Send- ing Tone Power dbm	Gain at 1000 cps with GAIN potentiometer Set for	
		Max. Gain db	Min. Gain db
1	-30	33 -37	26.7-32.1
2	-30	28.5-33.5	22.2-28.6
3	-30	24.5-29.5	18.2-24.6
4	-20	20.5-25.5	14.2-20.6
5	-20	16.5-21.5	10.2-16.6
6	-20	12.5-17.5	6.2-12.6

- b. The gain at 200 cps shall not differ from the measured value of 1000-cps maximum gain by more than +0.4 to -1.6 db and from the measured value of minimum gain by more than 0 to -2 db.

- c. The gain at 3000 cps shall not differ from the measured value of 1000-cps maximum gain by more than 0 to -1 db and from the measured value of minimum gain by more than +0.3 to -1.5 db.

- (5) Restore the GAIN potentiometers to their normal operating settings.

2.19 Procedure (Modulator)

- (1) Temporarily disconnect straps from terminals 11, 12, 13 and 14 on the T and R terminal strips.
- (2) Connect the SEND jacks of the measuring set to terminals 11 and 12 on the T or R terminal strip (for transmitting or receiving modulator); and connect terminals 13 and 14 on the T or R terminal strip to the REC jacks of the measuring set.

Note: If a 6A TMS is used, it will be necessary, for each test frequency used, to adjust its SEND and CAL positions with its oscillator set for the output frequency to be measured and then to adjust its SEND position for the input frequency to be used. Its key is then operated directly from the SEND to the MEAS position when the loss measurement is to be made.

- (3) Send 1 MW of tone at the frequencies shown below, measure the output (calibrating the measuring set at the frequencies of column 2 or 3) and calculate the loss in the modulator.

Requirements:

Input Freq. cps	Output Frequency If H Condenser is an		Loss at 1500 cps db	Loss Relative to Measured Value of 1500-cps Loss db
	AL6 cps	AN11 cps		
1500	1500	1750	8.3-11.3	-
250	2750	3000	-	+1 to -3
2750	250	-	-	+0.2 to -3.8
3000	-	250	-	+1 to -3

- (4) Reconnect straps to terminals 11, 12, 13 and 14 on T and R terminal strips.

2.20 Procedure (Amplifier and Modulator)

- (1) If the amplifier follows the modulator, patch from the SEND jacks of the measuring set to the TR or REC jacks (for the transmitting or receiving side of the privacy) and from the TA OUT or RA OUT jacks to the REC jacks of the measuring set.
- (2) If the amplifier precedes the modulator, patch from the SEND jacks of the measuring set to the TA IN or RA IN jacks and from the TR or REC jacks to the REC jacks of the measuring set. (See Note under step (2) of Paragraph 2.19)

- (3) Observe the designated number of the terminal of amplifier input transformer TA IN or RA IN to which the flexible lead from the grid cap of the amplifier vacuum tube T or R is connected.

- (4) Note the normal setting of the associated GAIN potentiometer and turn it to full clockwise position for maximum gain.

- (5) Send tone at -25 dbm and at the frequencies shown below, measure the output (calibrating the measuring set at the frequencies of column 2 or 3) and calculate the gain of the amplifier and modulator.

Requirements:

Input Freq. cps	Output Frequency If H Condenser is an		Overall Maximum Gain		Gain Relative to Measured Value of 1500- Cycle Gain db
	AL6 cps	AN11 cps	With Rep. Coil T or R db	Without Rep. Coil T or R db	
1500	1500	1750	22.7-27.7 less 4(N-1)*	23.1-28.1 less 4(N-1)*	-
250	2750	3000	-	-	+0.1 to -3.5
500	2500	2750	-	-	+0.7 to -0.7
1000	2000	2250	-	-	+0.9 to -0.5
2000	1000	1250	-	-	+0.9 to -1.1
2500	500	750	-	-	+0.9 to -2.3
2750	250	-	-	-	-0.5 to -3.7
3000	-	250	-	-	-0.5 to -3.7

* N is the numerical designation of the terminal on the amplifier input transformer to which the flexible lead is connected. For example, if the flexible lead connects to terminal 4 the overall gain range is 12 db less than that shown.

- (6) Restore the GAIN potentiometers to their normal operating settings.

2.22 Procedure

(H) Carrier Leak

2.21 Apparatus

Telephone Receiver, 528 equipped with
2W2A Cord
2-Patch Cords, 2P13A
Screwdriver, 4-inch

- (1) Note their normal settings and turn the T GAIN and R GAIN potentiometers to their full clockwise position for maximum gain.

- (2) Note their normal connections and connect flexible leads from caps of T and R vacuum tubes to terminal 1 of TA IN and RA IN input transformers.

- (3) If amplifiers come before modulators, patch from TR jacks to TA IN jacks and from REC jacks to RA IN jacks.

- (4) Connect telephone receiver to TA OUT jacks and, while listening to oscillator tone (3000 or 3250 cps), adjust the T BAL potentiometer until the tone is minimum.

Requirement: The minimum tone shall be barely audible and there shall be a sharp balance.

- (5) If this requirement cannot be met by the adjustment of the potentiometer alone, it will be necessary to adjust the capacity of condenser K and perhaps to change its connection to the T OUT repeating coil from terminal 3 to terminal 8 or vice versa.
- (6) Connect telephone receiver to RA OUT jacks and, using the R BAL potentiometer (and condenser L, if necessary), repeat the test of step (4).
- (7) Restore GAIN potentiometers to their normal settings and the flexible leads of the T and R vacuum tubes to their normal terminals on the TA IN and RA IN input transformers.

(I) Noise

2.23 Apparatus

- 2B Noise Measuring Set (or equivalent)
- 2 Plugs, 600-ohm 217-D
- 2 Resistances, 600-ohm
- 2 Patch Cords, 2P13A
- Screwdriver, 4-inch

2.24 Procedure

- (1) Note their normal settings and turn the T GAIN and R GAIN potentiometers to their full clockwise position for maximum gain.
- (2) Note their normal connections and connect flexible leads from caps of T and R vacuum tubes to terminal 1 of TA IN and RA IN input transformers.
- (3) If amplifiers come after modulators, terminate TR and REC jacks in 600 ohms.
- (4) If amplifiers come before modulators, patch from TR jacks to TA IN jacks and from REC jacks to RA IN jacks. Temporarily connect 600-ohm resistances across terminals 17 and 18 on the T and R terminal strips.
- (5) Insert measuring set plug in its LINE jack, connect the set in turn to the TA OUT and RA OUT jacks and measure noise.

Requirement: The noise shall be less than 46 db above reference noise (message weighting).

- (6) If requirement is not met, check the plate supply filter (retard coils A and B and condensers E, F and G).
- (7) Remove 600-ohm terminations, restore GAIN potentiometers to their normal settings and the flexible leads of the T and R vacuum tubes to their normal terminals on the TA IN and RA IN input transformers.

HIGH SEAS AND OVERSEAS RADIO

B3 PRIVACY DEVICE

MAINTENANCE

CONTENTS	PAGE	2. TRANSMISSION MAINTENANCE
1. GENERAL	1	(A) Gain Frequency Characteristics
2. TRANSMISSION MAINTENANCE	1	2.01 The following test includes the amplifier and modulator as in Control Office application, that the amplifier follows the modulator. For trouble location, however, it may be necessary to test the components separately. Referency should be made in this even to the Original Section, (G), Par. 2.16-2.19.
(A) Gain Frequency Characteristics	1	2.02 Apparatus
(B) Carrier Leak	2	40B Transmission Measuring System
(C) Insertion Loss	2	19C or 13A Oscillator
(D) Oscillator Frequency	2	or
1. GENERAL		Transmission Measuring Set
1.01 The purpose of this addendum is to describe and authorize certain modifications in, and additions to, the test procedures specified in the original section. These procedures are more closely related to B-3 privacy installations in Overseas Central Offices, and reflect improvements in methods which experience with this equipment has brought to light. This issue replaces Issue A.		1. Oscillator
1.02 The specific tests which this addendum modifies are those described in the original Section 403-323-500, Subheadings (E), (G) and (H), dealing with, Oscillator Frequency Gain Frequency Characteristics and Carrier Leak respectively. In addition, another test, "Insertion Loss", is described in this addendum, though not contained in the original section.		Patch Cords, 3P14B
1.03 Some of the test described make use of the Privacy Input and Output jacks which, in Overseas Control offices, appear in a separate jack field.		Screwdriver, 4-inch
1.04 The Gain Frequency Characteristics Test described in this addendum (Part 2, A) differs from that in the original only by the use of the privacy IN and OUT jacks, rather than the jacks on the Inverter panel; and by the elimination of those parts which are not applicable to existing Control Office installations.		2.03 Procedure
1.05 The oscillator frequency tests, described in this addendum (Part 2, D) differs from that in the original in that it specifies a 72A frequency meter (if available) to check the 3000 cycle oscillator frequency.		(1) Patch from the SEND jacks of the measuring set to the PRV IN jacks on the separate jack field; and from the PRV OUT jacks to the REC jacks of the measuring set.
		NOTE: The Privacy jacks to which the measuring set is patched will be either TRSG or REC, depending on whether the transmitting or receiving privacy unit is being measured.
		(2) Observe the designated number on the terminal of the amplifier input transformer TA IN or RA IN to which the flexible lead from the grid cap of the amplifier tube T or R is connected.
		(3) Note the normal setting of the associated GAIN potentiometer and turn it to full clockwise position for maximum gain.
		(4) Send tone at -25 dbm and at the frequencies shown below; measure the output with the measuring set calibrated at the frequencies shown in Column (2) and calculate the gain of the modulator-amplifier combination.

Requirements

Input Freq. * (cps)	Output Freq. (cps)	Overall Max. Gain (db)	Gain Relative to Measured Value of 1500 cps Gain (db)
1500	1500	22.7-27.7 Less 4 (N-1) ϕ	
250	2750	--	+0.1 to -3.5
500	2500	--	+0.7 to -0.7
1000	2000	--	+0.9 to -0.5
2000	1000	--	+0.9 to -1.1
2500	2500	--	-0.9 to -2.3
2750	250	--	-0.5 to -3.7

N is the numerical designation of the terminal on the amplifier input transformer to which the flexible lead is connected. For example, if the flexible lead connects to Terminal 4, the overall gain range is 12 db less than that shown.

- (5) Restore the GAIN potentiometers to their normal operating settings.

(B) Carrier Leak

2.04 Apparatus

2B Noise Measuring Set
217-D 600 ohm plug
Patch cords and dummy plugs

2.05 Procedure

- (1) Terminate the TRSG (or REC) PRV IN jacks with the 600 ohm plug.
- (2) Using the LINE jacks of the 2B set (properly calibrated) patch the set to TRSG (or REC) PRV OUT jacks; throw Key K3 to FLAT; insert dummy plugs in SOUND jacks; place Key FLA-144, on 144.
- (3) Adjust the T BAL (or R BAL) potentiometer until the carrier leak, as measured on the 2B set, is at a minimum.

Requirement: The carrier leak shall measure at least -40 dbm.

NOTE: With the 2B set adjusted as described under (2), the measurable range of power is -21 to -96 dbm. The measured carrier leak, in db with respect to one milliwatt, is obtained by adding a correction of -106 to the potentiometer dial

reading plus the meter reading, in db. For example, if the dial is set on 30 and the meter reads +2, the carrier leak would be 30 +2 -106 = -74 dbm. In exceptional cases where the carrier leak exceeds -21 dbm, dummy plugs should be inserted in the VOL jacks, which will permit measuring values between +9 and -66 dbm. Under these circumstances, a correction of -76 should be added to the dial plus meter readings to obtain the power in dbm.

(C) Insertion Loss

2.06 Apparatus

40B Transmission Measuring System

or

6A Transmission Measuring Set
19C or 13A Oscillator
Patch Cords, 3P14B

2.07 Procedure

- (1) Adjust the oscillator to send +5 dbm of 1500 cycle tone.
- (2) Patch the oscillator into the PRV IN jacks (TRSG or REC) located on the separate jack field.
- (3) Patch from the PRV OUT jacks (TRSG or REC) to the measuring set.
- (4) Measure the 1500 cycle output of the inverter (transmitting and receiving).

Requirement: The output shall measure +5 $\pm$ 2.5 dbm.

- (5) If this requirement cannot be met, and the test described in the Original Section (G, Para. 2.18, Amplifier) is satisfactory, adjust the GAIN potentiometer to obtain the specified value.

(D) Oscillator Frequency

- 2.08 The following procedure which uses a 72A Frequency meter (if available) may be followed for checking the 3000 cycle oscillator frequency.

2.09 Apparatus:

72A Frequency Meter
Patch Cords, as required

2.10 Procedure:

(1) Patch from Terminals 1 and 3 of the (OSC)
299A Transformer to (BRDG) jacks of the
72A Frequency Meter.

(2) Observe the 3000 cycle stationary pattern on the Oscilloscope screen.

Requirement: The rate of fluctuation should not exceed 2 cycles per second.

(3) If this requirement is not met, adjust the strapping on the OSC capacitor as required.