RR986

KS-357 Service Note

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KS – 357 SERVICE NOTE

CONTENTS

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CAUTIONS FOR USERS

- Remove the batteries from the machine when the machine is not required for a period of longer than two weeks.

- Do not forcibly move knobs and the whip antenna.

- Control volume just to an audible degree. Excess volume will deplete your batteries more than necessary.

KS - 357 SERVICE NOTE

I. Specifications:

Circuit:	3 Band, 12 Transister Superheterodyne
Frequency Range:	Beacon (B) 150-420 KC B.C. (BC) 520-1650 KC Marine (M) 1.6 - 4.4 MC
Intermediate Frequency:	455 KC
Intermediate Frequency Width:	Approx. 5 KC within 6 db Variation
Voice Output:	500 mW, includes 800c/s tone generator
Batteries:	9 V 6x1.5 Volt (6 flashlight batteries UM-1)
Speaker:	4" Permanent Dynamic Speaker
Antenna:	Ferrite Core Loop Antenna and Sense Whip (telescopic type)
Sensitivity:	Beacon 30 µV/m B.C. 15 µV/m Marine 7 µV/m
Image Rejection Ratio:	Beacon in excess of 100db B.C. in excess of 80 db Marine in excess of 60 db
Dimensions:	Width, 10 1/8"; Height, 7" and Depth, 12"
Weight:	9 lbs (including batteries)
Fixed Freq Reception:	3 crystals can be inserted in M band for local oscillation

II. Features

a) With 12 transistors and 2 Diodes, this diminutive direction finder gives superior performance, unexcelled in sensitivity, image rejection ratio, intermediate frequency characteristic, audio frequency characteristic etc.

b) Its extra wide frequency range from 150 KC to 4.4 MC (except 420 to 520 KC) simplifies switching over between the three bands of Beacon, BC, and

Marine signal waves.

c) In the marine band, fixed reception is possible by means of a crystal which enables switch change-over for three frequency bands. Tuning can be adjusted as required by simply setting the tuning dial to an approximate position on the frequency scale.

d) True bearing determination is a simple operation by virtue of the built-in telescope type sense antenna.

e) The highly sensitive null meter provides a means for detecting battery voltages.

f) Gain and volume can be controlled independently. The gain being properly adjusted by bringing the indication on the null meter to any desired point, while the volume is controlled as required by means of the 'VOLUME CONTROL' knob.

g) The machine, complete with batteries weighs only nine pounds. In addition to its light weight, a convenient metal handle permits it to be carried with ease.

h) The batteries used are ordinary flashlight batteries UM-1 which can be purchased anywhere, and these are powerful enough to supply the necessary current for an average daily use of four hours or so over a period of two months.

i) Maintenance is simplified by the ease with which this machine can be dismantled into four units; the RF, IF and AF, a battery unit, and a loop antenna.

III. Circuits

a) Figure 1 shows a circuit diagram of KS - 357.

b) RF Input Circuit

This circuit is generally as illustrated in Fig. 2. For ease of understanding it has been divided into three sections, viz: Beacon, BC and Marine Band.

L_o is a ferrite core loop antenna, which has been specially designed with one coil left-wound and one coil right-wound and both connected in parallel. A high Q and well balanced noise erasing characteristic has been obtained by the efficient use of a 7" long core. In that L of the loop coil is comparatively small in the Beacon and BC bands circuits, the voltage induced on the loop antenna will reach the base of transistor RF through the tap of either L_1 or L_2 and tap (t) will not be used. L_1, L_2 and L_o comprise the input tuning circuit together with main variable condenser C1-a, contributing a superior image rejection ratio in this machine.

Figure 3 shows the marine band circuit, which will be found to differ from the Beacon and B.C band circuits in that its input tuning circuit consists of L_o and C1-a of the loop antenna. As a consequence no special coil is used like L_1 and L_2. The tap of L_o is connected to the base of TR_1.

c) RF and MIX Circuits (See Fig. 4)

Figure 4 illustrates the RF and Mix circuits which employ the high performance drift type transistor 2SA80. The gain in the RF circuit exceeds 20 db.

In receiving beacon signals only, L4 and C66, 30PF are inserted between the top of T_3 and the earth of the printed circuit board to prevent oscillation in the circuit caused by the highest range of the frequency in the band. For the same purpose a wave trap (L_4 C_{56}) is inserted in the base input circuit of RF TR_1. This trap is tuned in 500 KC, having C of 200 PF and Q of in excess of 100.

Local oscillator output is applied to the base of TR_2, used for mixing, through C15 (0.05 μF). Very high conversion gain is obtained here. C15 serves also as a bypass condenser for the base of TR_2. T_7 is the first of the IF transformers. Check point (1) is to check the sensitivity while check point (2) checks IF characteristic.

d) Local Oscillator Circuit (See Fig. 5) Fig. 6

This machine has embodied a separate oscillation mixing circuit for stabilized reception. The oscillator circuit is of emitter grounding base decoupling type. Oscillator output is supplied from the coupling coil of T_5 or T_6 to the base circuit of TR_2 through C15 (0.05μF).

Figure 5 describes the oscillator circuit for Beacon and B.C. signals. Co-c is the main tuning condenser, C_{21}, C22 and C23 are padding condensers. Check point (1) is for checking whether oscillation is present. The voltage on this point drops to approximately half the normal voltage in the absence of oscillation, thus making this check a simple matter.

One of the features of the local oscillator circuit for marine band signals is that it is possible, with the employment of a crystal, to have fixed reception. Turning switch SW3 will insert the crystal between the collector and the base. L_3 is then connected in series to the oscillator coil of T_4, thus making the reactance in the oscillator circuit capacitive so that crystal oscillation in the whole band is stabilized.

e) Intermediate Frequency Circuit (See Fig. 7)

Figure 7 illustrates a three-step amplifier circuit in which an alloy type transistor 2SA12 is employed. Between steps is a C-coupling double tuned circuit having excellent characteristic acquired by high quality coils and appropriate selection of C. The superior quality of this circuit is demonstrated by the facts that middle frequency is 455 KC with 6 db attenuation over a band of some 5 KC, and having an outside band attenuation of 8 db/KC. This amplifier circuit is neutralized and ceramic condensers for tuning, all for 200 PF, are for temperature compensation. Having heat coefficient of $-760 \times 10^{-6}/^{o}C$ they function to stabilize the temperature of the transformers compensating the changes in their temperatures. (4) is an input point of IF printed board which is used for checking characteristic. The voltage of

AVC (automatic volume control) is applied to the bases of TR_4 and TR_6.

f) Detector AVC Circuit (See Fig. 8)

Wave detection is carried out by diodes 1N34A. Distortionless high detected voltages can be obtained from T_{12} which has an impedance of some 15 Kilo ohms on its secondary side. These voltages are supplied to the base of TR_9 (2SB75) of AF_1 as voice input. A portion of the detected current flows to the base of TR_8 (2SA12). The gain control and automatic volume control may be described as follows. The gain is controlled by changing the bias voltages of TR_1 (RF), TR_4 (IF_2) and TR_6 (IF_3) for which the volume is controlled automatically through the adjustment of VR_4 (3 Kilo ohms). In the automatic volume control, when the incoming signal waves make detected current flow to the base of TR_8, current flows through the collectors but the voltage of the collectors will drop due to the action of R_{45} (5 Kilo ohms). Since this drop will be negative voltage, the voltage will in any case approach toward positive more than when no signal is evident. So long as this voltage on the negative side of the germanium diode D_2 (1N34A), i.e., the collector side of TR8, is lower than that on the positive side, there will be no current flowing through the diode. When however, an incoming signal wave raises the voltage on the positive side, thus activating the diode, it will cause the voltage on the side of the automatic volume control to move toward the positive side with a resultant lowering of gain in the end.

The automatic volume control will be brought into operation when the field intensity of incoming waves is approximately 50 $\mu V/m$ to 100 $\mu V/m$. The current in the collector will be supplied to the null meter for its indication. When the field intensity of the incoming waves reaches a degree sufficient to activate the automatic volume control, the indicator on the null meter will show its maximu. Check point (7) is to be used for both checking the detector output and as an input point of the AF circuit.

g) Audio Frequency Circuit (See Fig. 9)

After the audio frequency has been amplified in two steps by the TR_9 (2SB75) and TR_{10} (2SB77) it will go through the B class pushpull power amplification. The volume is controlled by VR_5 (3 Kile ohms) inserted between TR_9 and TR_{10}.

(8) is a check point for B voltages that have passed through the filter of R42 (500 ohms) and C65 (200μ), while (9) is a point which measures the voice coil voltage of the speaker, i.e. the output voltage. L.S. has an impedance of 3.5 ohms and the voltage on (9) is 1.2 V 0.5 W.

IV. SERVICE MEMO

1. Block Diagram is illustrated in Fig. 10.
2. How to handle any trouble

2.1. Should any trouble develop in this machine, it will be first necessary to ascertain just which part is out of order of the units shown in Fig. 10.

2.2 In checking, the following procedure will generally be found helpful.

a) Remove the botton cover (See Fig. 13)

b) Check the voltages on each TR by using a tester (See the directions under 4.6)

c) If SG or a test oscillator is available, test by applying signal waves to the AF stage, IF stage and RF stage, in that order. It will be easy to find out which unit is not working correctly by comparing the result obtained by these checks with the standard characteristics described under VI of this manual.

d) Now replace any unit that is found to be defective, with a spare unit.

In replacing, follow the directions which are given under IV-c.

e) In case there is no spare part available for replacement, first remove the defective unit and after careful reference to the connection diagram, the machine can be put into operational condition by connecting the connectors in the manner illustrated in Figure 11.

f) A spare machine kept on hand will be great help in checking the units in cases where some malfunction has developed, as the check can then be made by comparing the two sets.

g) As can be seen in Figure 13, by the removal of the bottom cover, check points from (1) to (10) will be found on the printed circuit board and speaker. These should be used freely as they are important points in the checking and adjustment of this machine. The particulars of these points will be found in the table below.

LIST OF CHECK POINTS

Number	Electrical Location	Mechanical Location	Use
1	TR_3 (2SA80) emitter	Righthand side of RF printed board	To check oscillation
2	TR_1 (2SA80) input to the base through C_5 (0.1)	Upper righthand side RF printed board	Feeding point for measuring sensitivity when the loop antenna is not in use
3	TR_2 (2SA80)	Between 1 & 2 in RF printed board	Feeding point for adjusting & measuring IF characteristic
4	TR_4 (2SA12) base	Lower righthand side of IF printed board	Feeding point for checking IF printed board only
5	TR_6 (2SA12) base	Center righthand side of IF printed board	As above
6	TR_7 (2SA12) base	Center righthand side of IF printed board	As above
7	D_1 (1N34A) negative side.	Center of IF printed board	Measuring point for detector output. Feeding point for measuring AF characteristic
8	Negative B voltage Approx 6 V TR1, 2, 3, 4, 5, 6, 7, 9.	Upper righthand side of IF printed board	To check negative B voltage
9	Speaker voice coil terminal	Speaker	To measure audio output
10	Ground circuit, body	Lefthand side center of IF printed board	common terminal for checking

3. Dismantling

3.1. Loop Antenna

a) Pull out the antenna while at the same time holding down the machine lever.

b) If the loop antenna is not functioning properly or suspected of being defective, it should be replaced with a new one.

c) The loop antenna should work properly if the ferrite core, coil and lead wire are in proper working order.

3.2. RF Unit

a) Parts which can be removed from outside: (See Fig. 13)

Knobs; (1) TUNE, (2) BAND, (3) CRYSTAL.

Screws; four screws (4), (5), (6) and (31) (at the top of the cabinet)

Switch; (7) CRYSTALS, remove nut (8) and washer (9)

Jack; Remove nut (11) from to J1 (10)

Compass plate (12), washer (13), plastic plate (14) and the brass collar will come off at the same time.

b) Parts which require to be removed from the inside: (See Figures 13 and 14)

First remove the bottom cover from the cabinet after the eight screws (16) have been loosened.

Screws; two screws (17) & (18) which hold the RF printed board in place.

Plugs; Remove P3 (7 Pins) (19) from J3

c) After removing the parts listed under a) and b) above, the RF unit can be gently removed.

3.3. IF and AF Unit

a) Parts which can be removed from the outside: (See Fig. 13)

Knob; (21) TONE, DF, BATTERY

Switch; Remove the first nut (23) and the washer (24) from switch (22), and the switch can be removed.

b) Parts which require to be removed from the inside: (See Fig. 14)

Screws; 4 screws (25), (26), (27), & (28) which hold the printed board IF and IF in place.

Plug; To remove this from the cabinet, take off J4 (9 Pins) (29) from P4.

Plug: To remove Plug (30) from the terminal of the sense antenna.

c) When all the above listed parts have been removed, the IF and LF unit can be carefully removed.

3.4. Battery Unit

This unit is connected to P4 (9 Pins). As it consists of a battery case, speaker, meter and volume control, the replacing of any of these parts which are found defective will be sufficient to remedy any trouble which may arise.

4. CAUTIONS TO BE OBSERVED IN SERVICING

It should always be remembered that a transistor circuit is different from a vacuum tube circuit.

4.1. The transistors which have been embodied in this machine are all of the PNP type and negative voltage is applied to the collector. Emitter grounding is adopted for the transistors, which means that in comparison to the vacuum tube, the emitter will correspond to the cathode of a vacuum tube, the base to the grid and the collector to the plate.

4.2. Transistors may be damaged when current is passed through them to test a circuit, is high voltage is applied, as for instance of a scale in the X1 ohm range of a circuit tester. Since the resistance value of a transistor will very greatly according to the polarity, before testing parts which have been parallel-connected to transistors, by flowing current through them, one end of the part must be disconnected.

4.3. It is dangerous to let the lead of a transistor touch that of another, especially when an output transistor is connectd.

4.4. The soldering of the lead of a transistor and parts on the printed board should be done quickly using a soldering iron with a small capacity, as both the transistor and the printed board could be damaged by overheating when soldering.

4.5. It is important that when switch S-W2 is set at "BATTERY" the battery voltage be kept within the green position on the voltmeter. Before servicing the machine be sure to check the battery voltage to make sure that the voltage is maintained above 7.5 V.

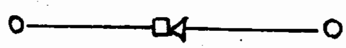
4.6. If a circuit is not working efficiently or is suspected of being out of order the easist way to check will be to measure the collector current or emitter current. However, since the printed circuit does not permit this checking, measure instead the total amount of current consumed and also the voltage in each unit. When battery voltage is 8 V, the voltage of each transistor unit should show values as given below. These values are also given in the connection diagram.

Voltage of Each Transistor

(When battery voltage is 8V)

TR	Vc	Vb	Ve
1	-5.9	-0.7(0.42)	-0.9
2	-4.6	-0.5(0.42)	-0.6
3	-3	+0.3	-0.45
4	-6	-0.7(0.5)	-0.9
5	-4.3	-0.3	-0.[illegible]
6	-6	-0.7 (0.5)	-0.8
7	-6	-0.5 (0.45)	-0.5
8	-5.8	0	0

TR	Vc	Vb	Ve
9	-4.6	-0.7(0.6)	-0.6
10	-6.2	-0.8	-0.6
11	-8	-0.2	-0.1
12	-8	-0.2	-0.1
D1	0		
D2	※-0.8(0.67)		



Check point (2) ※ When the gain control is max.

NOTE: The values in parenthesis are these measured in 2.5 V range of a circuit tester. All other values are those measured in 10V range. These values may be subject to minor changes according to the internal resistance of the tester used. When battery voltage is 9 volts these value should be increased by some 10%.

4.7. When replacing a resister or condenser, leave its lead wires as long as possible to facilitate connection with the lead wires of a new resister or condenser. In this way replacements can be speedily affected and with ease.

4.8. In adjusting or testing when either SG or a test oscillater is being used, a condenser from 0.1 to 1.0 F must be connected in series to the output terminal of either SG or the test oscillator rest the bias of the transistor should be shortcircuited by the output resistance of SG or the test oscillater used. For the detection of signals in each unit, it is advisable to use a cathode ray oscilloscope.

4.9. To check the condition of the local oscillation, measure voltage by connecting DC 2.5 V range of a tester to a point between check point (1) and the chassis. (10)

The following table shows an example of this. (Battery voltage here is 8 Volts):

	Reacon	BC	Marine
While Oscillating	-0.38 V	-0.46 V	-0.55 V
When not oscillating	-0.13 V	-0.13 V	-0.13 V

When there is no oscillation, the voltage in (1) (TR_3 emitter) will go to below half the normal value. Shortcircuiting of the main tuning condenser will not have the effect of stopping oscillations. It will be necessary for this purpose to connect a condenser of some 0.1 F to the earth of the chassis and the trimmer. A cathode ray oscilloscope of high sensitivity may also be used for checking the condition of oscillation.

4.10 The voice output stage of this machine is in the B class pushpull circuit of TR_{11} and TR_{12}. The power source current will generally show the changes as listed below according to whether signals are present or not.

When no signal is present	approx. 20 mA
When there is an output of 0.5 Watt	approx. 120 mA

These currents will increase with the battery voltage.

4.11. To measure the voltage in each unit, it will be advisable to use a circuit tester with a high internal resistance or a VTVM.

V. ADJUSTMENT

The KS - 357 is supplied with all units in perfect adjustment. The parts so adjusted have been fixed in position using wax, enamel paint or some similar method. Careless touching or handling any of these parts therefore could affect this delicate adjustment. When it does become necessary to adjust them after parts have been replaced, adjustment should be carried out in the manner described below and in accordance with the adjustment schedule.

1) The output is indicated both on the speaker and on the null meter. (Refer to the Standard characteristics). The audio output must be measured

on (9) by means of a circuit tester which will indicate it by RMS.

2) To feed the machine with signals use either a signal generator or a high class test oscillator with 400 c/s 40% as the standard modulation. In connecting the tester and the machine, make sure that the DC at the condenser is cut off as directed under IV 4.8.

3) It is advisable to use an insulated type driver for adjustment of the cores of coils, transformers, as well as trimmer condensers. Great care is required in adjusting the cores of coils and transformers as they can be very easily broken when turned. Turning a coil clockwise will increase L and turning it anti-clockwise will decrease L. After adjustment, any parts which have been disturbed must be again fixed into position by using wax or enamel.

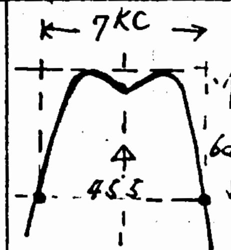
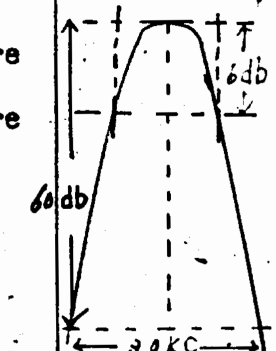
4) In adjusting IF units, it is necessary that a centre frequency and band width be indicated by a marker employing a sweep generator and cathode ray oscilloscope.

ADJUSTMENT SCHEDULE

5)

- Set 'Gain' to its maximum.
- Adjust 'Volume' to an appropriate degree.
- Turn 'SW-3 (Crystal)' to the OFF position.
- Turn 'SW-2 (TONE. DF battery)' to the DF position.
- Before adjustment make certain that the battery voltage is sufficient, by turning SW-2 to Battery.
- The figures circled like(1)and(2)in the following table in column 'SG connection point' show the numbers given to the check points.
- For the SG input, select a value at which the null-meter will indicate an appropriate figure.

Measuring Equipment

Order of Adjustment	Circuit	Band S.W.	SG Connection Point	SG Frequency	Dial Indication	Point Adjusted	How to Adjust	Remarks
1	Inter-mediate Frequency circuit	M	(6)	Sweep Generator 455 KC ± 20 KC	No	T12 core		
2	"	M	(5)	"	No	T11 core		Seeing the CRT indication, make it as shown on the left.
3	"	M	(4)	"	No	T4 core		
4	"	M	(3)	"	No	T7 core		
5	"	M	(3)					By means of the procedures under 1 to 4, see that the characteristic is such that a range of 6 db attenuation is approx. 6KC and a range of 60 db attenuation is within 30kc.
6	Beacon oscillation circuit	Beacon	(2)		160 KC	T6 core	So that the null meter indicates maximum value	
7	"	"	(2)		400 KC	C26 Trimmer	"	

Order of Adjustment	Circuit to be adjusted	Band S.W.	Measuting Equipment ~~SG~~ Connection Point	~~SG~~ Frequency	Indication	Adjusted	How to Adjust	Remarks
8	Beacon oscillation ciruit	Beacon	(2)					Repeat procedures 6 & 7 several times until the frequencies on SG agree with that on the dial. For example if C26 is increased by Step 7 and frequency is adjusted to 360 KC, it will lower 180 KC frequency adjusted by step 6 below 180 KC. To avoid this effect caused by the next step and obtain the desired adjustment result sooner, turn T6 anticlockwise before proceeding to step 9.
9	B.C. Circuit	B.C.	(2)	SG	600 KC	T5 core	So that null meter indicates maximum value.	
10	"	"	(2)	SG	1400 KC	C25 Trimmer	"	
11	"	"	(2)					Repeat steps 12 and 13 and make adjustments following the example under step 8.
12	Marine Circuit	Marine	(2)	"	1800 KC	T4 core	"	Frequency will fluctuate greatly with a minor change in the position of a point caused by its adjustment. This calls for very delicate adjustment of the position of each point.
13	"	"	(2)	"	4 MC	C24 Trimmer	"	

Order of Adjustment	Circuit	Band S.W.	Measuring Equipment: SG Connection Point	Measuring Equipment: SG Frequency	Dial Indication	Point Adjusted	How to Adjust	Remarks
14	Marine Circuit	Marine	(2)					Local oscillator frequency will have been adjusted by the steps up to 16. When this has been completed, indications of all frequencies should be as required. If frequency is as required in any band at both upper and lower ranges but not in a centre range, a padding condenser (C 24, C 25 or C 26) will need adjustment. Inasmuch as the machine has been carefully adjusted at the factory such need is not likely to occur. In the marine band it is especially important that spurious frequency is not mistaken for real one.
15	Beacon RF Tuning circuit	Beacon	(2)	SG	180 KC	T3 core	Adjust so that null meter will indicate maximum value	
16	"	"	(2)	SG	360 KC	C14 Trimmer	"	
17	"	"	(2)					Repeat steps 15 and 16 several times until the null meter shows the maximum value by either step. Refer also to the cautions outlined under step 8.
18	B.C. RF Tuning circuit	B.C.	(2)	SG	640 KC Mark	T2 core	"	
19	"	"	(2)		1240 KC Mark	C13 Trimmer	"	

Order of Adjustment	Circuit	Band S.W.	SG Connection Point	SG Frequency	Dial Indication	Point Adjusted	How to Adjust	Remarks
20	B.C. RF Tuning Circuit	B.C.	2					Repeat steps 18 and 19 until the maximum value is indicated on the null meter by either step. Refer to Step 8.
21	Marine RF Tuning Circuit	Marine	2	SG	1.8 MC	T_1 core	Adjust so that null meter will indicate maximum value	
22	"	"	2	SG	3.6 MC	C12 Trimmer	"	
23	"	"	2					Repeat steps 21 and 22 until the null meter will indicate the maximum value in either step. Refer to step 8. Adjustment may be made in the oscillator circuit in succession for each frequency band.
24	Beacon	Beacon	SG Output	SG	180 KC	12 core	"	Couple SG Output to Lo using a field generating loop antenna, if it is available, or lead if this loop antenna is not available.
25	"	"	M-couple to loop antenna	SG	360 KC	C4 Trimmer	"	
26	"	"	"					Repeat steps 24 and 25 until the null meter will indicate the maximum value by either step. Refer to Step 8.
27	B.C.	B.C.	"	SG	640 KC Mark	L1 core	"	

Order of Adjustment	Circuit	Band S.W.	SG Connection Point	SG Frequency	Dial Indication	Point Adjusted	How to Adjust	Remarks
28	B.C	B.C	M-couple to loop antenna	SG	1240 KC Mark	C3 Trimmer		
29	"	"	"					Repeat steps 27 and 28 until the null meter will indicate the maximum value by either step. Refer to Step 8.
30	Marine	Marine	"	SG	3.4 KC	C2 Trimmer	Adjust so that the null meter will show the maximum value	Prior to making (24~30) this adjustment, make sure that Lo (loop antenna) is in order as the adjustments are made with 1 of Lo as the standard.

o After completing all the 32 procedures, all the necessary adjustments will have been made. In practice however it will never require that all these be required. Only a portion of these will ever be required to meet any given situation.

o Caution in handling coils, transformers and similar parts during adjustment must be stressed again here, for if these parts become damaged their replacement will be a matter of some difficulty.

o No adjustment will be required in the audio circuit, but its wave form must be practidally without distortion when voltage at both ends 9 of the speaker coil is 1.2 volts with battery voltage above 9 volts. If the wave form in this circuit is distorted it should be sttributable to trouble in a transistor or a bias circuit.

6) Adjustment of C66 (Wave Trap)

Turn the operation knobs to the following reapective positions.

Band → B

Tune → The maximum of the frequency scale
(over 420 kc)

L1-C → Connect the roter and the stater

Gain → Max.

Volume→ proper position

Turn the C66 slowly and fix it at the point where the swing of the null meter comes to the minimum.

7) VR_1 - VR_3 (Adjustment of Amplification)

Following adjustment to be done where the radio waves and noise do not interfere (as in a shielded room)

Gain → Max

Volume → Proper

Turn the tuning knob in each band, and tune to the frequency where the swing of the null meter is max., and adjust the following:-

B band → VR_3, BC band → VR_2, M band → VR_1 in order that the meter indicates about 6.

If the swing does not reach 6, adjust it to the maximum.

VI. STANDARD CHARACTERISTICS OF [illegible]

The characteristics of the Navigator 550 are made up of the following items. These should be referred to in checking the condition of the machine after adjustment has been made to one or more units. The method of measuring each characteristic is stated on each data sheet.

1. Sensitivity
2. Image rejection ratio.
3. Sensitivity without loop antenna.
4. Intermediate frequency amplifier.
5. Frequency stability for battery voltage variation.
6. Frequency stability for temperature variation.
7. Audio amplifier frequency characteristic.
8. Modulated signal characteristic.
9. Audio amplifier output.
10. AVC characteristic.

a

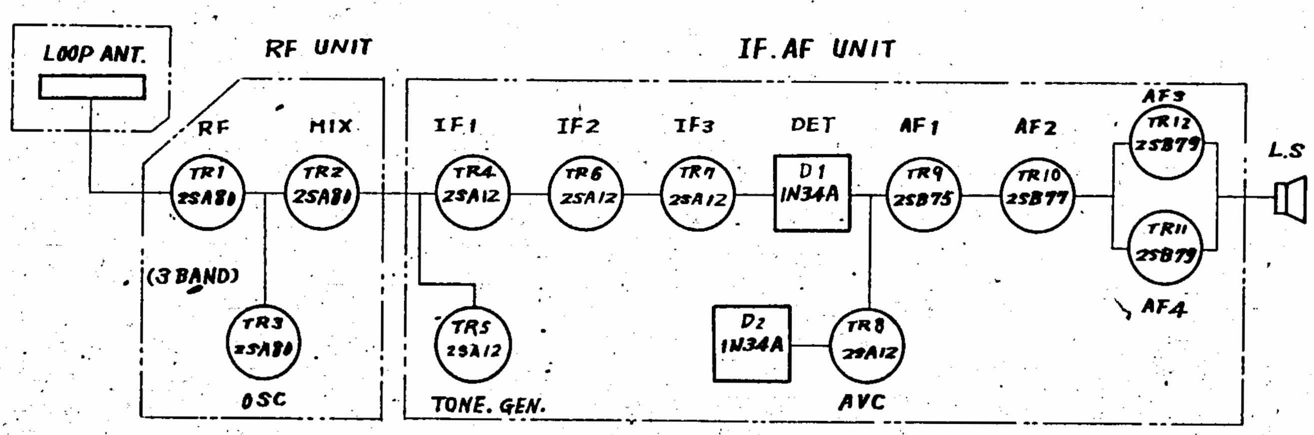


Fig 1

a) BEACON & B.C BAND

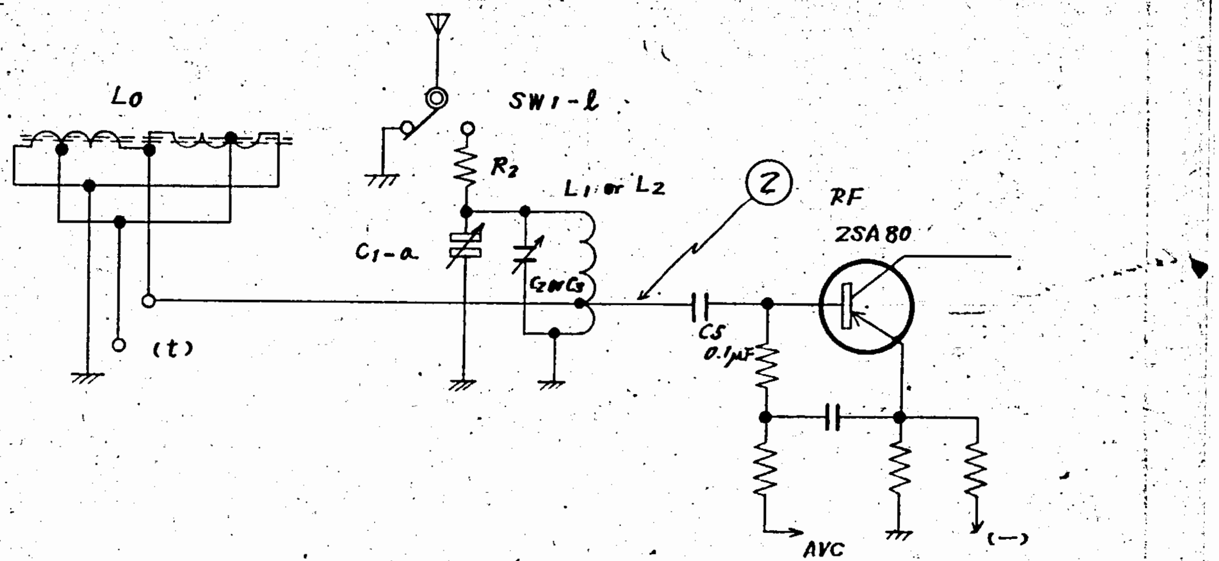


Fig 2

b) MARINE BAND

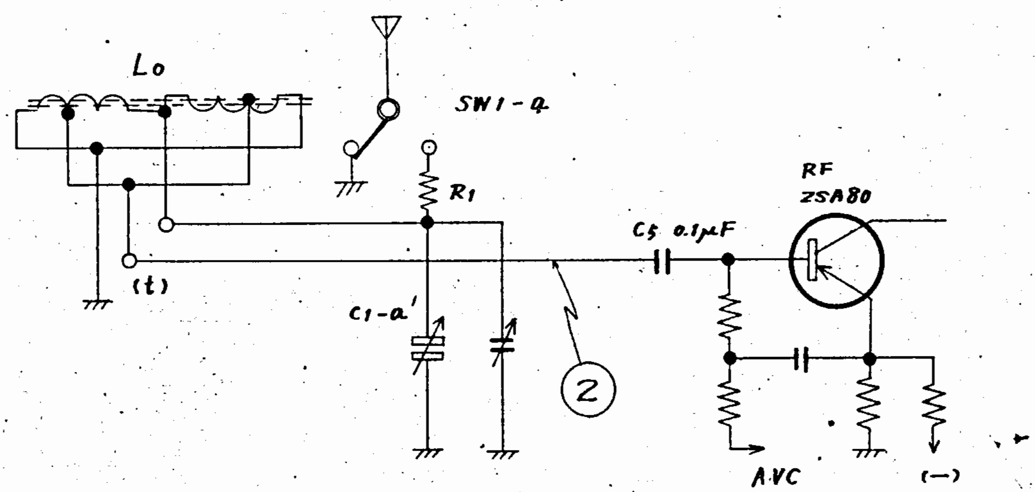


Fig 3

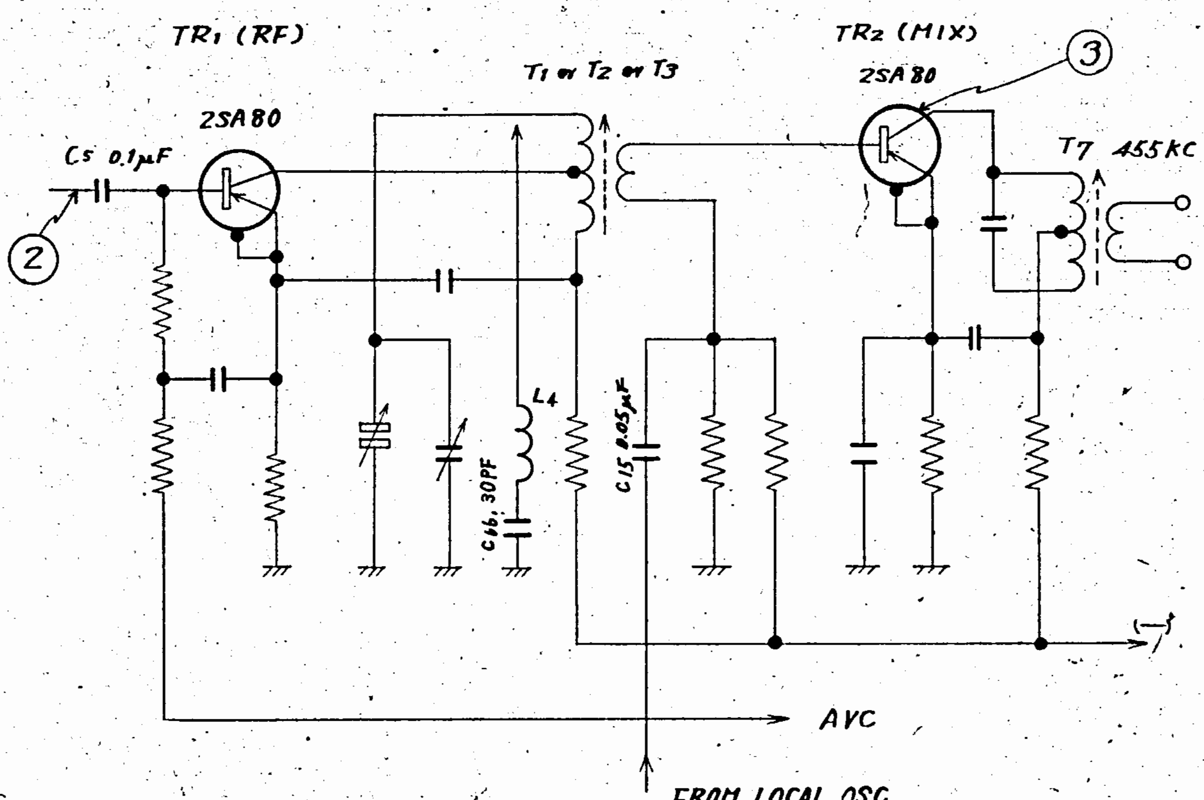


Fig 4

C

a) BEACON, B.C BAND

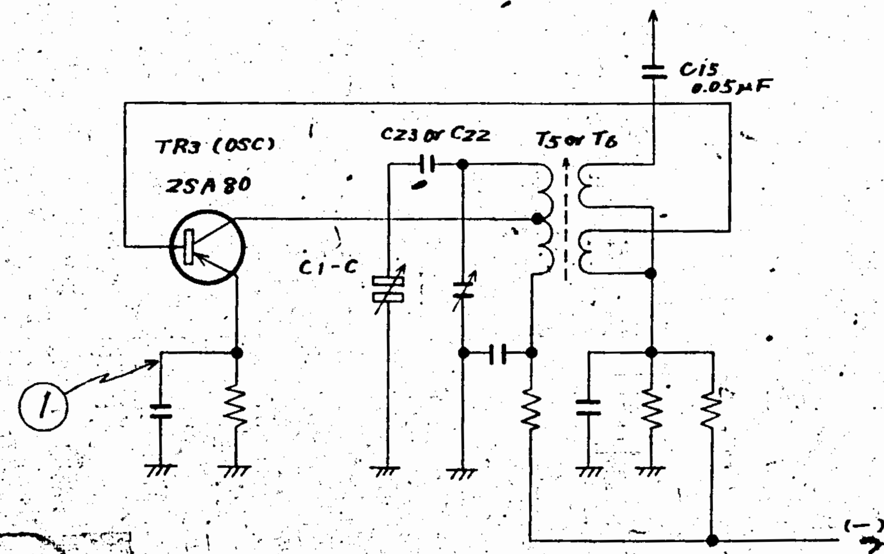


Fig 5

b) MARINE BAND

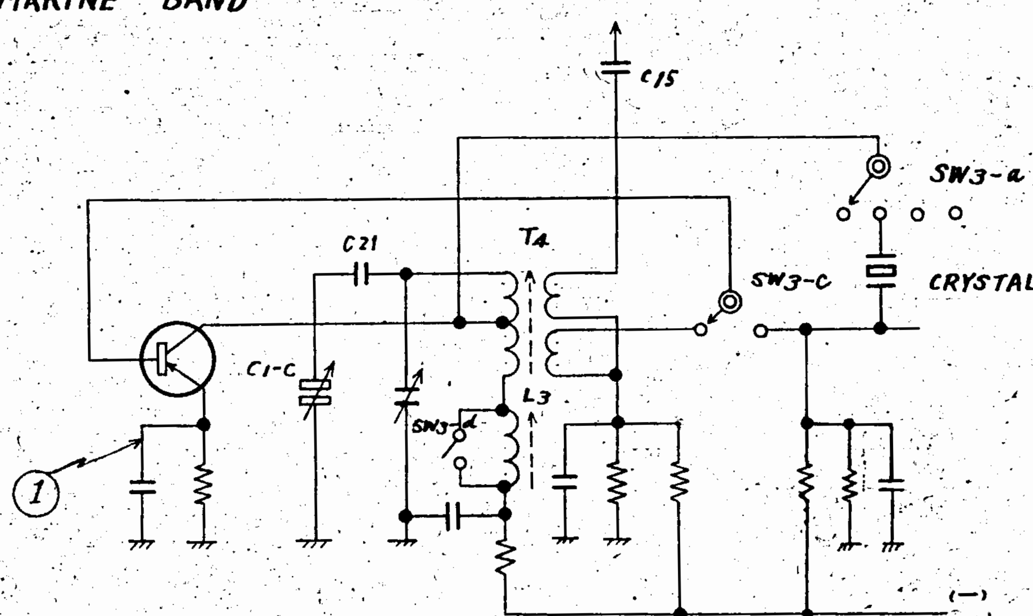
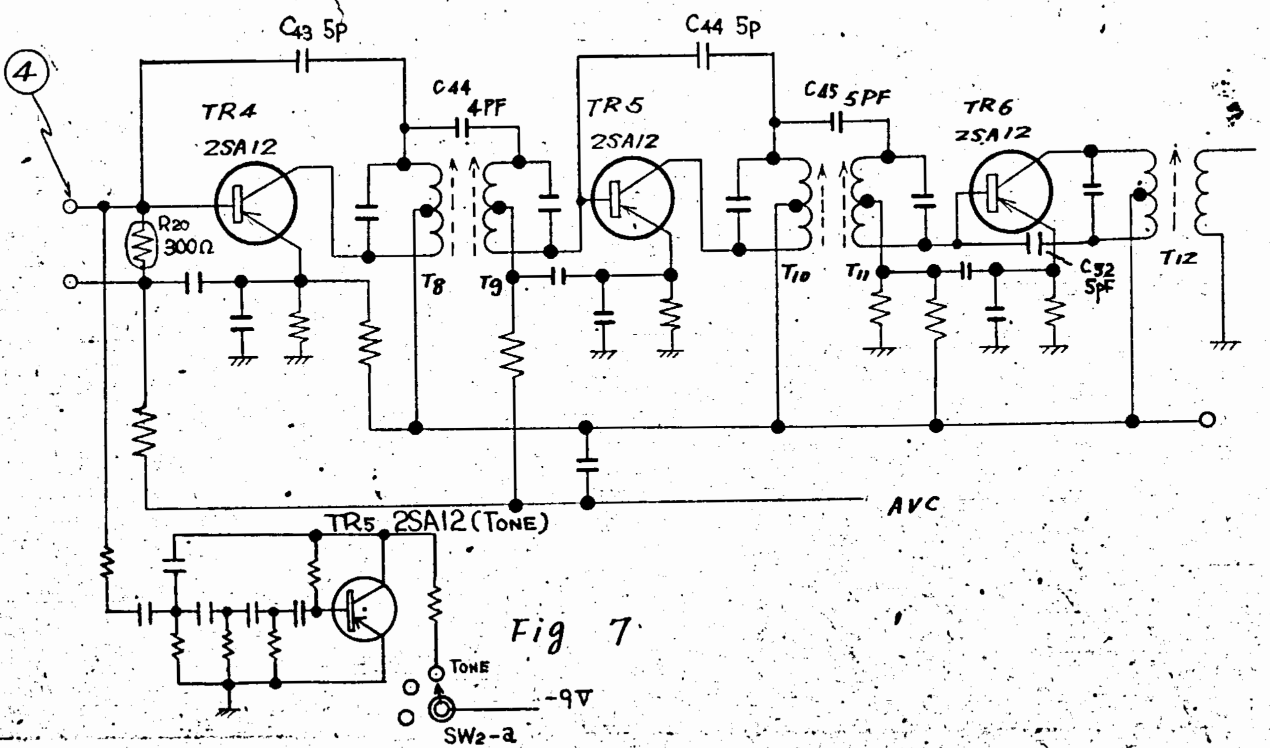
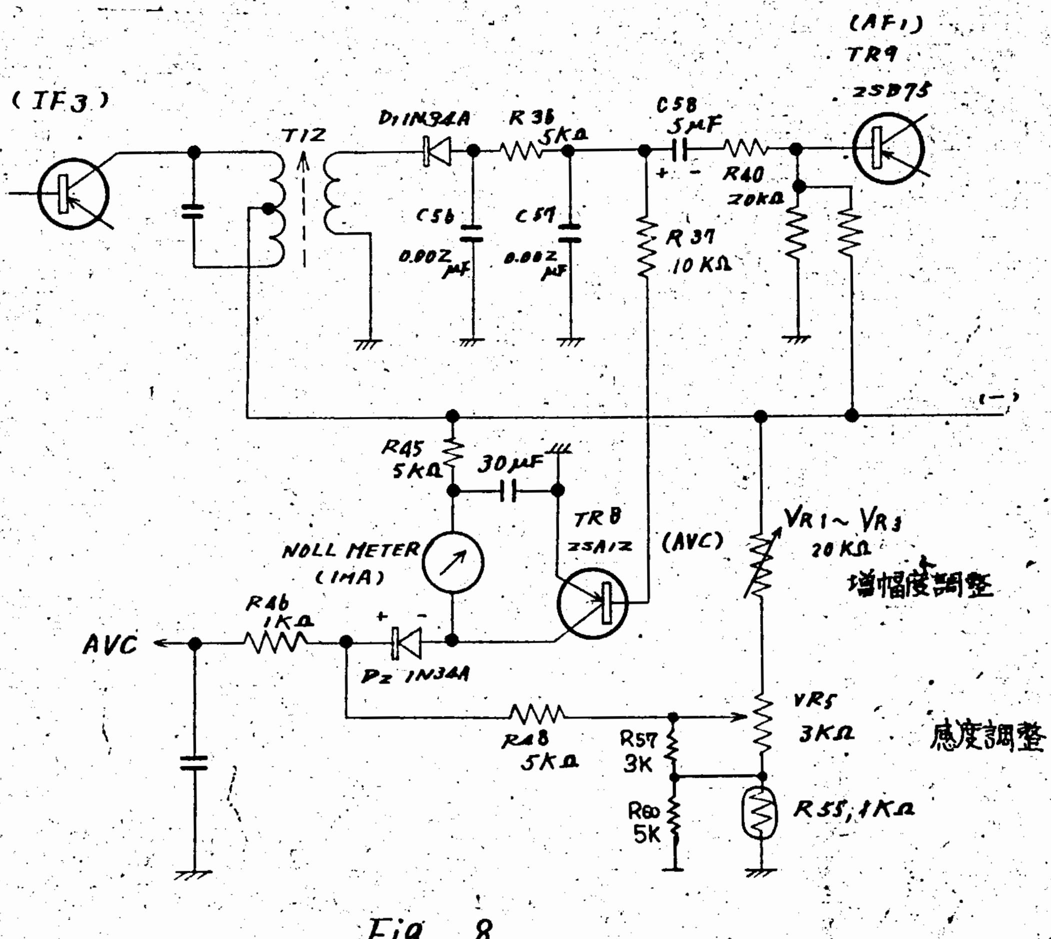


Fig 6



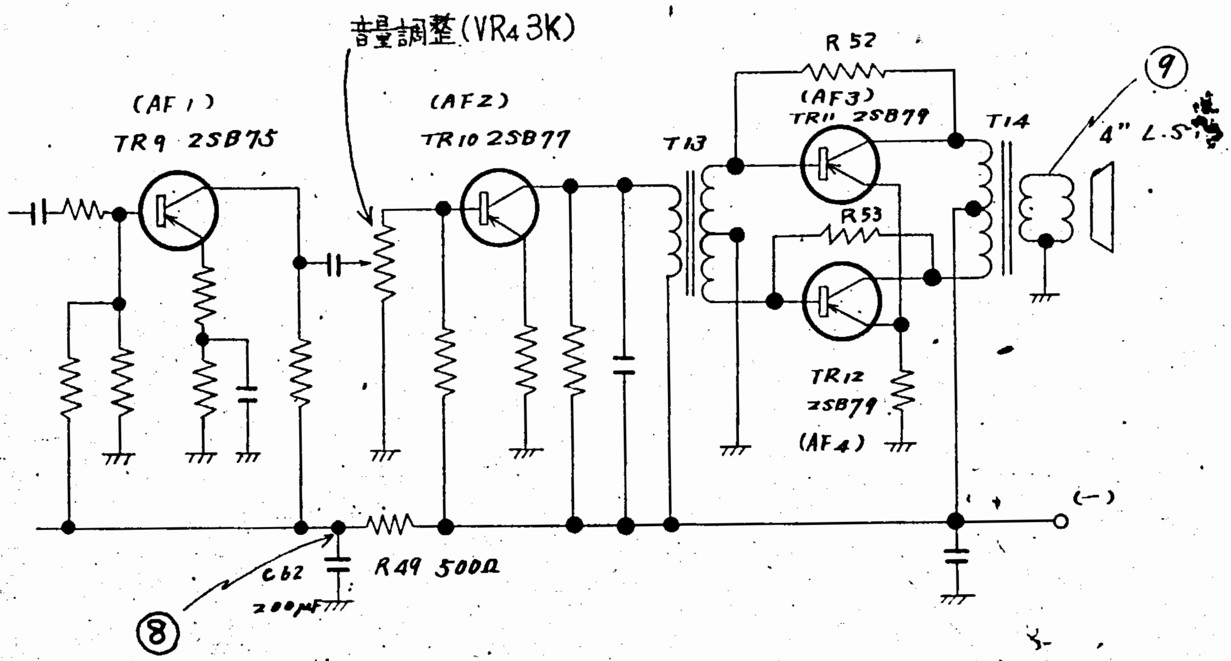
4
C43 5p
C44 4PF
C44 5p
C45 5PF
TR4
2SA12
TR5
2SA12
TR6
2SA12
R20
300Ω
T8
T9
T10
T11
T12
C52
5pF
AVC
TR5 2SA12 (TONE)
TONE
-9V
SW2-a

Fig 7



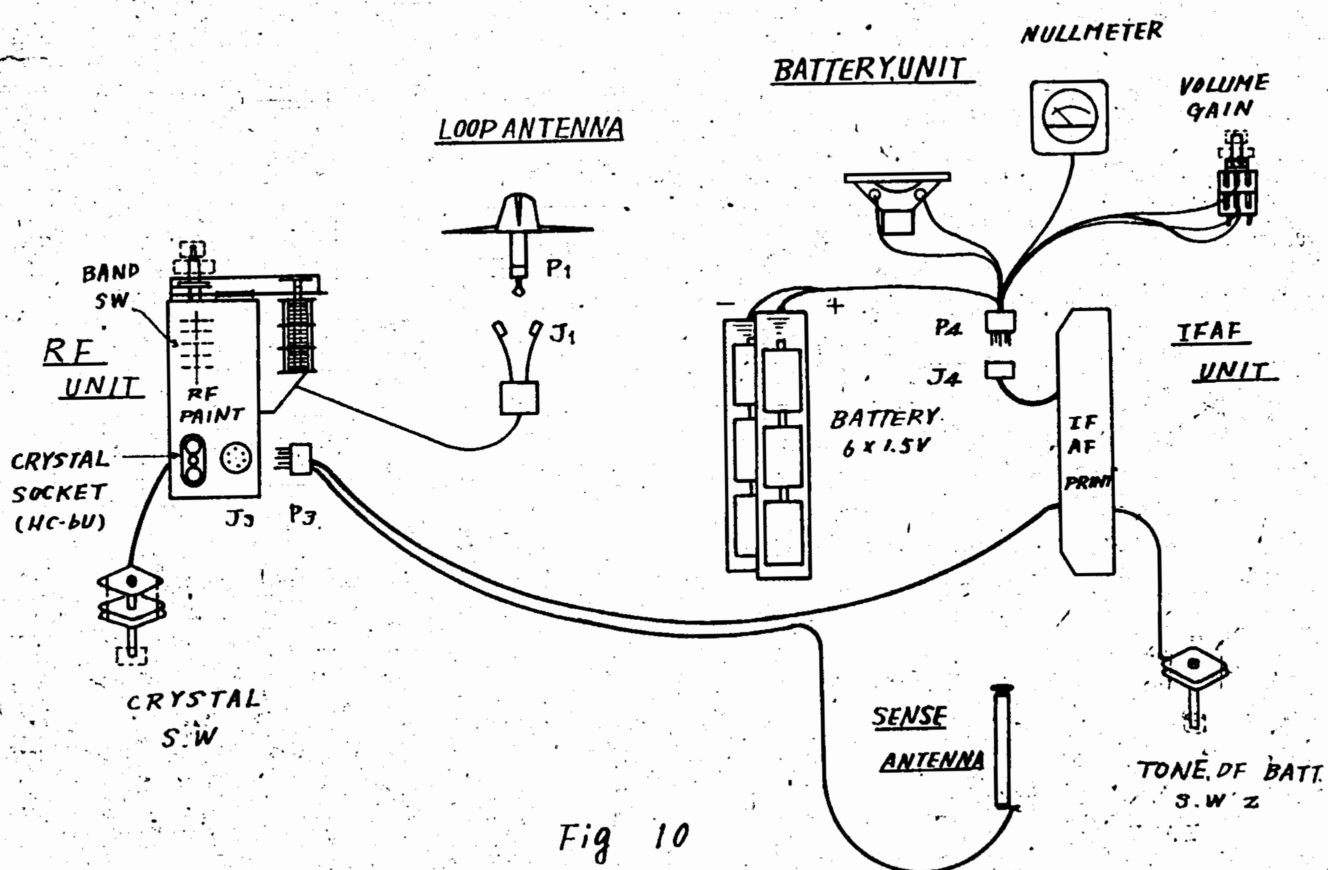
(IF3)
T12
D1 1N34A
R36
5KΩ
C56
0.002 μF
C57
0.002 μF
C58
5μF
R40
20KΩ
R37
10KΩ
(AF1)
TR9
2SB75
(-)
R45
5KΩ
30μF
TR8
2SA12
(AVC)
NOLL METER
(1MA)
R46
1KΩ
AVC
D2 1N34A
VR1～VR3
20KΩ
増幅度調整
VR5
3KΩ
感度調整
R48
5KΩ
R57
3K
R60
5K
R55, 1KΩ

Fig 8



音量調整(VR4 3K)
(AF1)
TR9 2SB75
(AF2)
TR10 2SB77
R 52
(AF3)
TR11 2SB79
T13
T14
⑨
4" L.S
R53
TR12
2SB79
(AF4)
(−)
C62
200μF
R49 500Ω
⑧

Fig 9



NULLMETER
BATTERY UNIT
VOLUME
GAIN
LOOP ANTENNA
P1
BAND
SW
RF
UNIT
RF
PAINT
J1
−
+
P4
J4
IFAF
UNIT
BATTERY
6 x 1.5V
IF
AF
PRINT
CRYSTAL
SOCKET
(HC-6U)
J3
P3
CRYSTAL
S.W
SENSE
ANTENNA
TONE.OF BATT
S.W 2

Fig 10

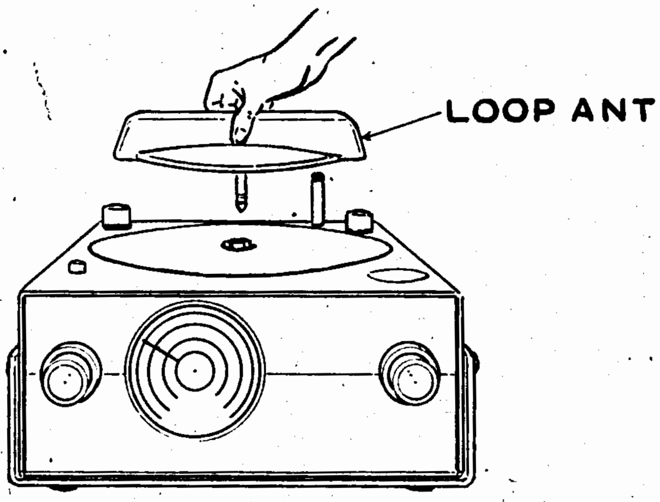

LOOP ANT

Fig. 11

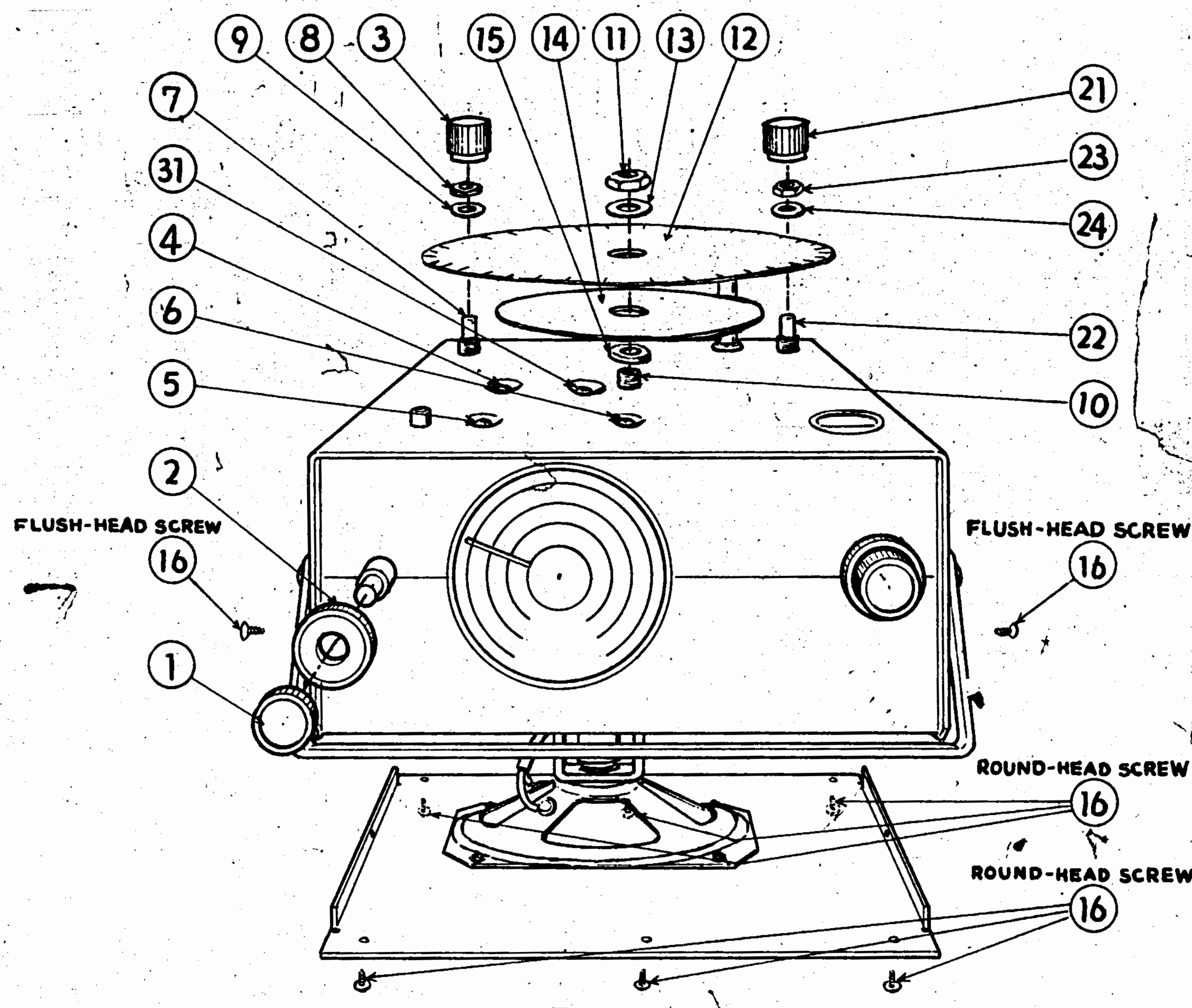

9
8
3
15
14
11
13
12
7
31
4
6
5
2
FLUSH-HEAD SCREW
16
1
21
23
24
22
10
FLUSH-HEAD SCREW
16
ROUND-HEAD SCREW
16
ROUND-HEAD SCREW
16

Fig. 12

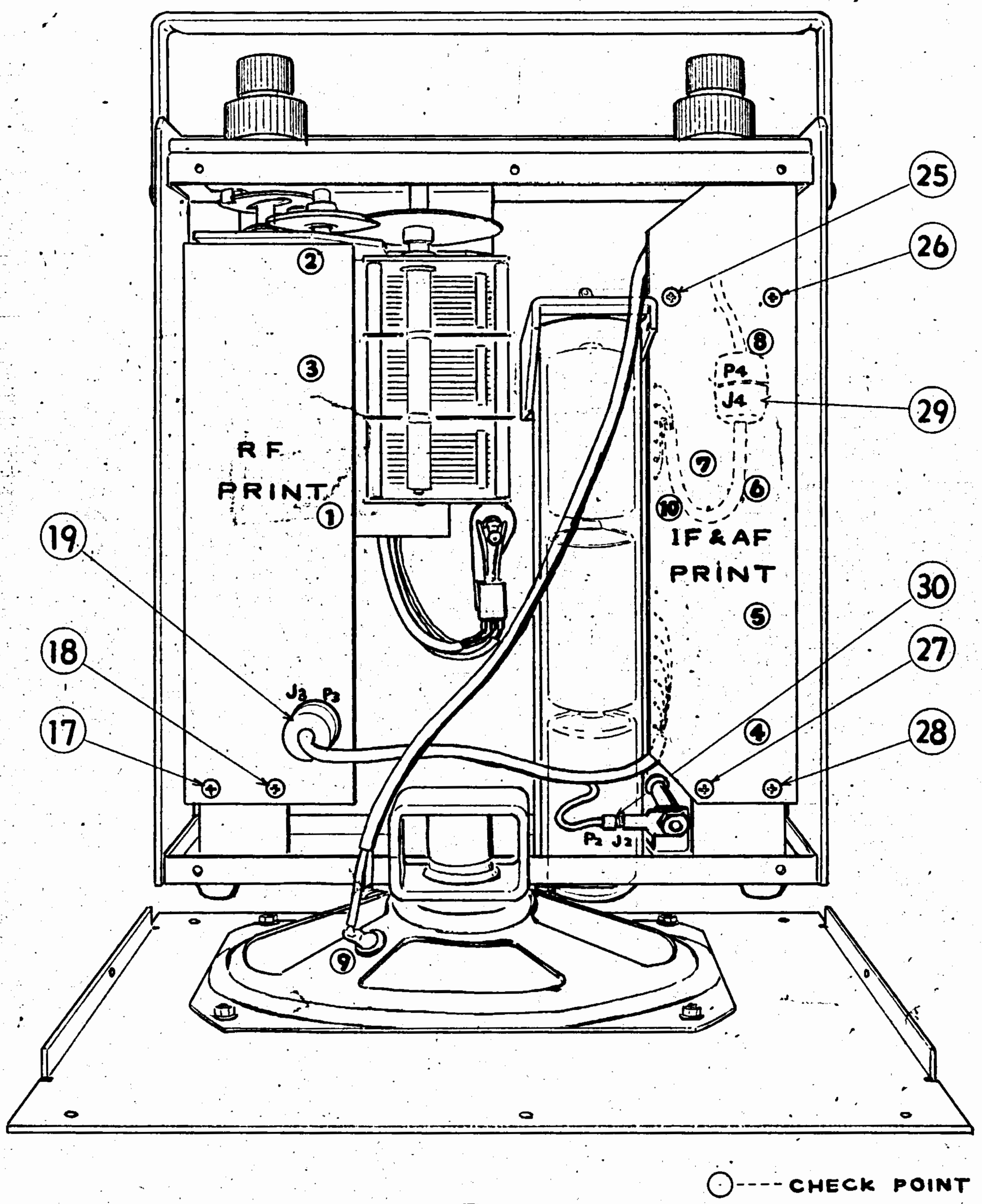
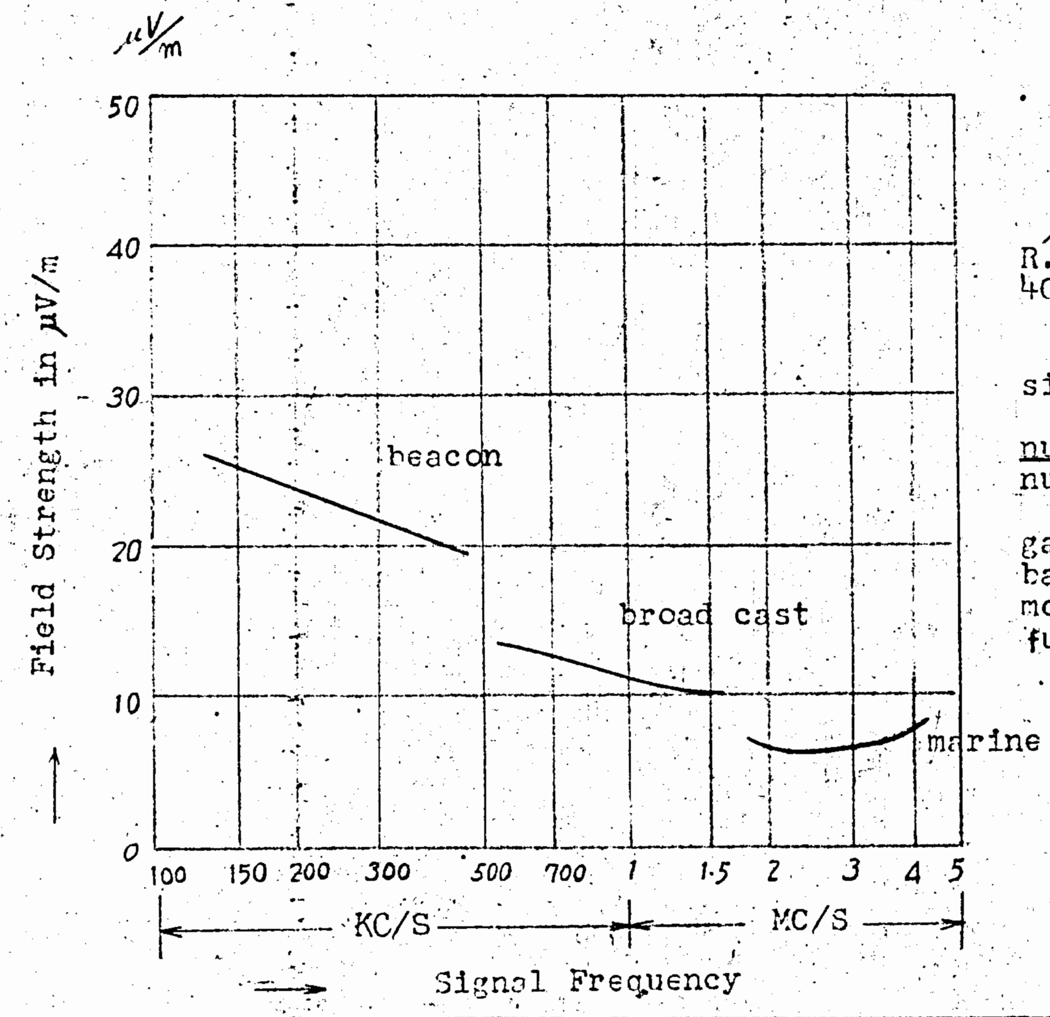

25
26
2
3
8
P4
J4
29
RF
PRINT
1
7
6
10
19
IF & AF
PRINT
30
5
18
J3
P3
27
17
4
28
P2
J2
9
○----CHECK POINT

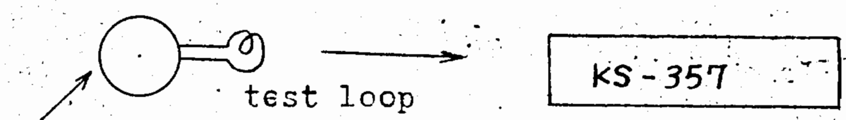
Fig. 13

No. 1

Standard Characteristics for KS-357

Sensitivity





R.F. signal generator,
400c/s, 40% modulation

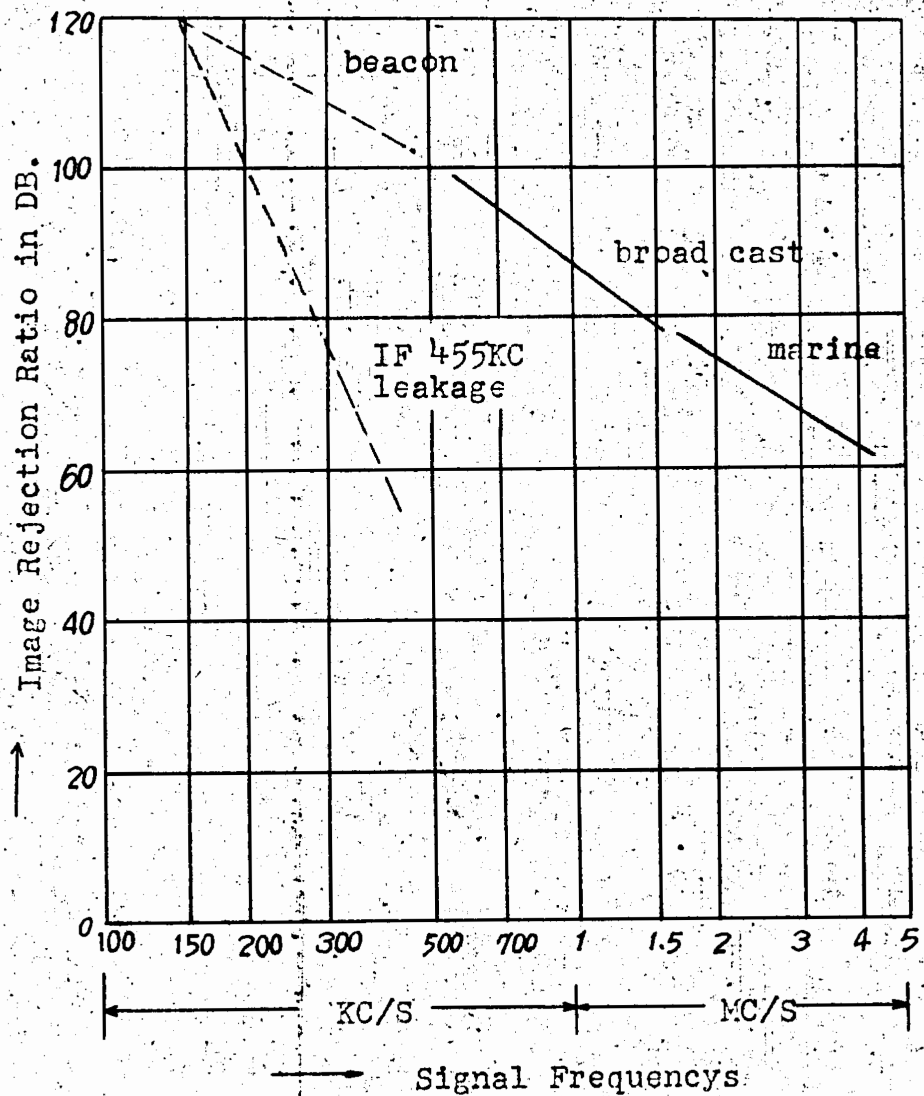
signal to noise ratio →

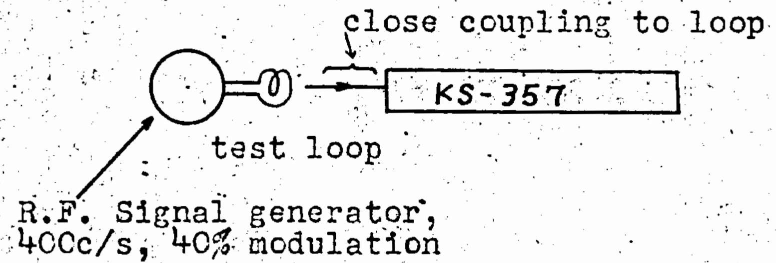
$$\frac{\text{null meter readings for noise + signal}}{\text{null meter readings when signal to zero}} \simeq 2$$

gain control → max.
battery voltage ≃ 9V
modulation → 400c/s, 40%
function → DF.

Standard Characteristics for KS-357

Image Rejection Ratio



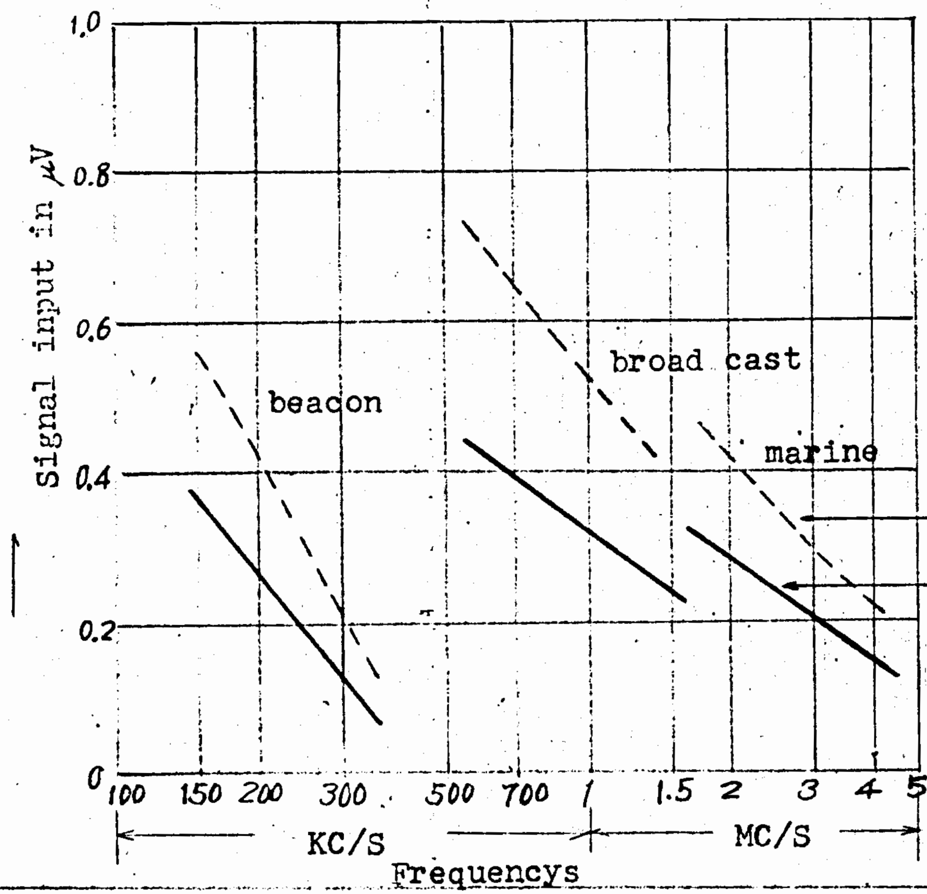


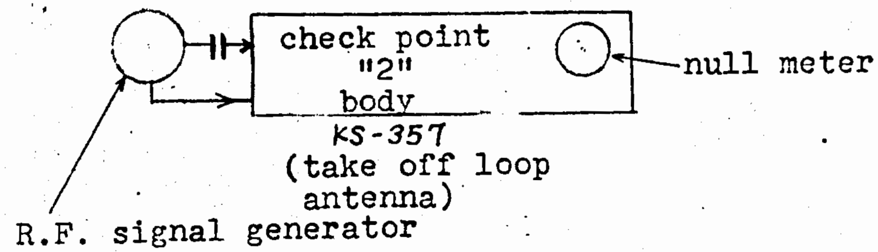
null meter readings → ≃3 const.
Function switch → DF
battery voltage ≃ 9V
modulation → 400c/s, 40%
signal generator output → 10μV for tuned freq.
gain control → adj. to null meter readings 3 when signal generator output at 10μV.

NO. 2

Standard Characteristics for KS-35T

Sensitivity with out loop antenna





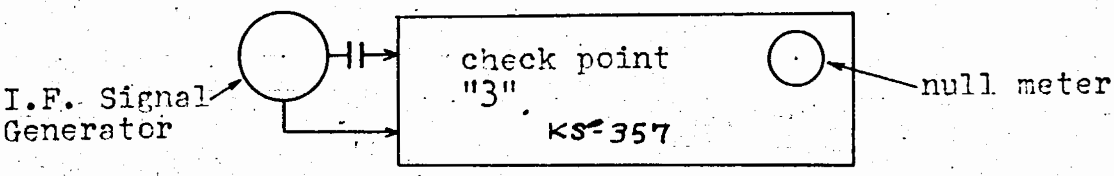
Function Switch → DF
gain control → max.
modulation → 400c/s, 40%
null meter readings → adj. to 10 by signal input.

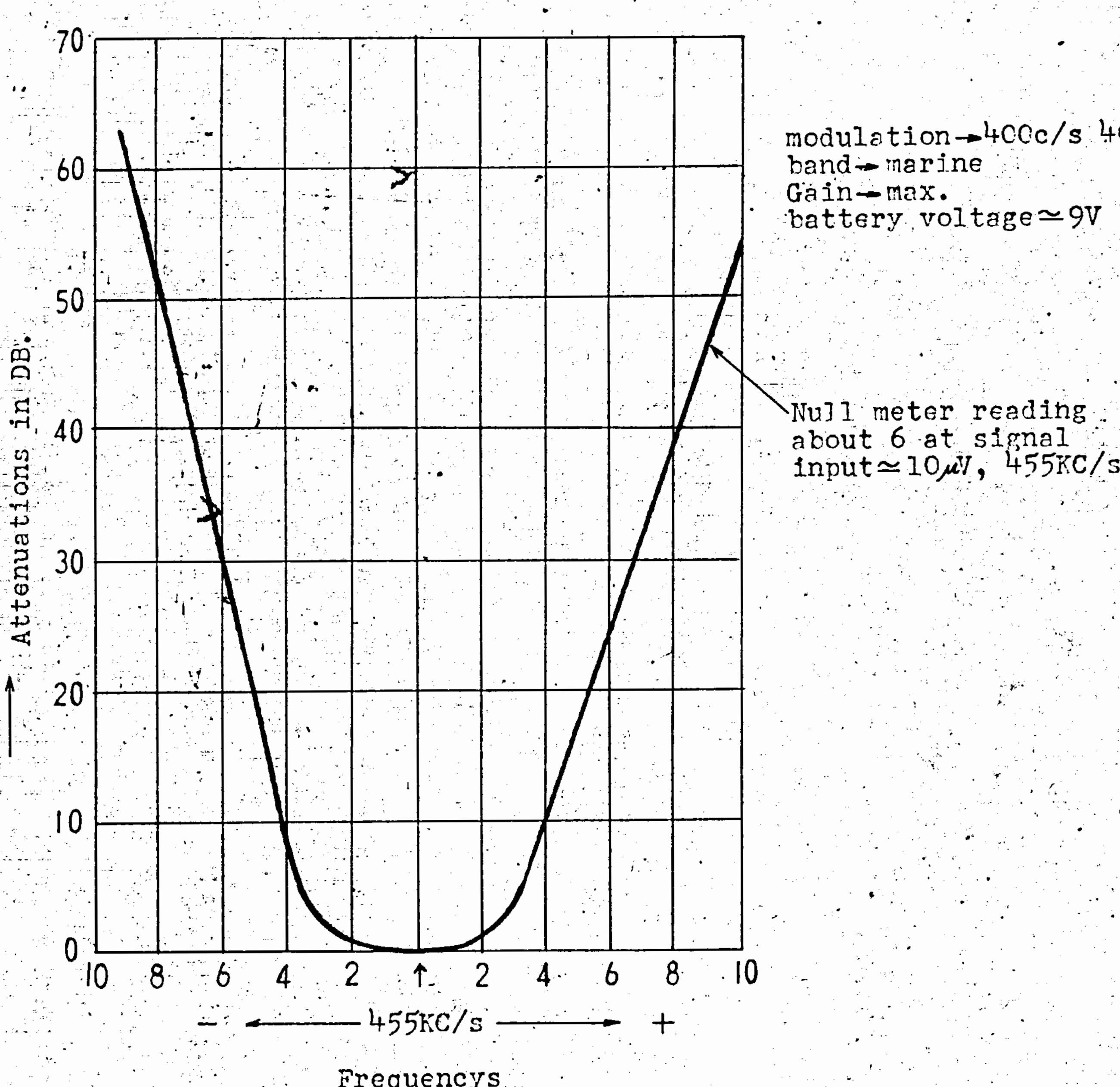
battery voltage ≃ 8.4V

battery voltage ≃ 9.2V

Standard Characteristics for KS-357

Intermediate Frequency Amplifier



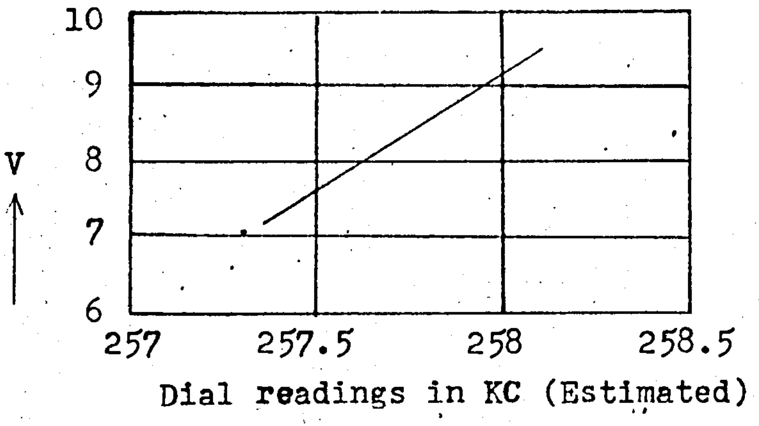


modulation→400c/s 40%
band→marine
Gain→max.
battery voltage≃9V

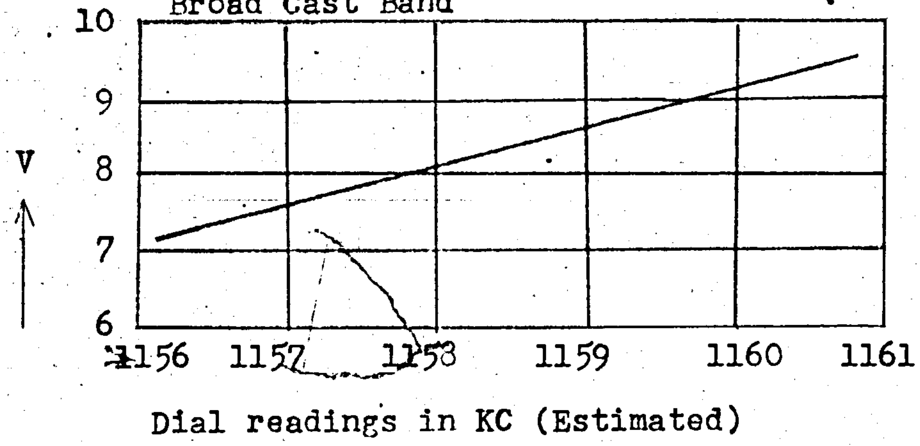
Standard Characteristics for KS-357.

Frequency Stability for Battery Voltage Variation

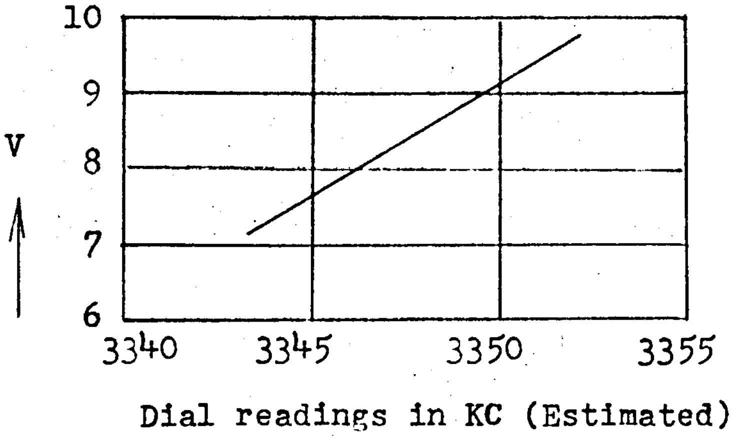
Beacon Band SIGNAL FREQ= 258 KC at 9.1V



Broad Cast Band SIGNAL FREQ=1160 KC at 9.1V



Marine Band SIGNAL FREQ = 3350 KC at 9.1V



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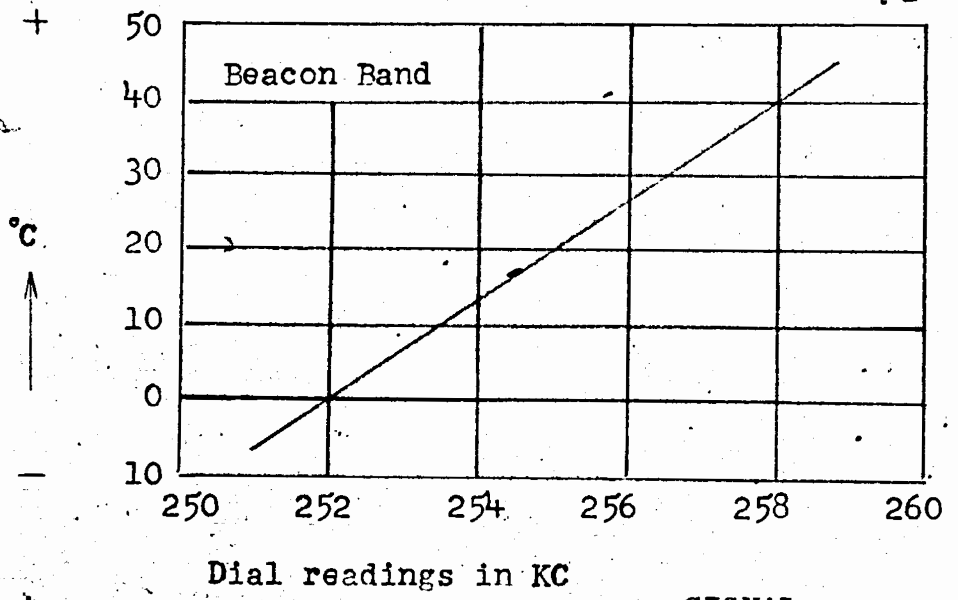
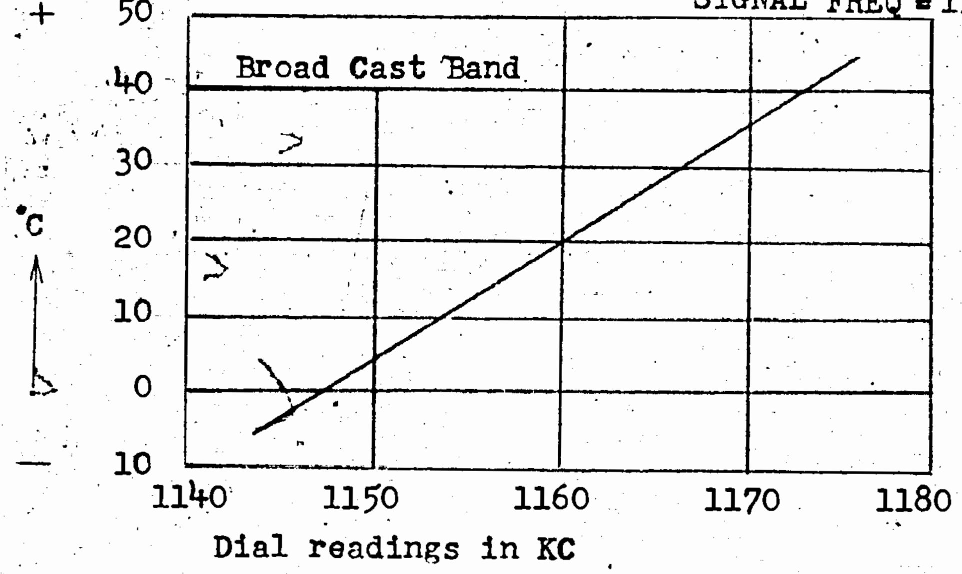
Standard Characteristics for KS-357

Frequency Stability for Temperature Variation

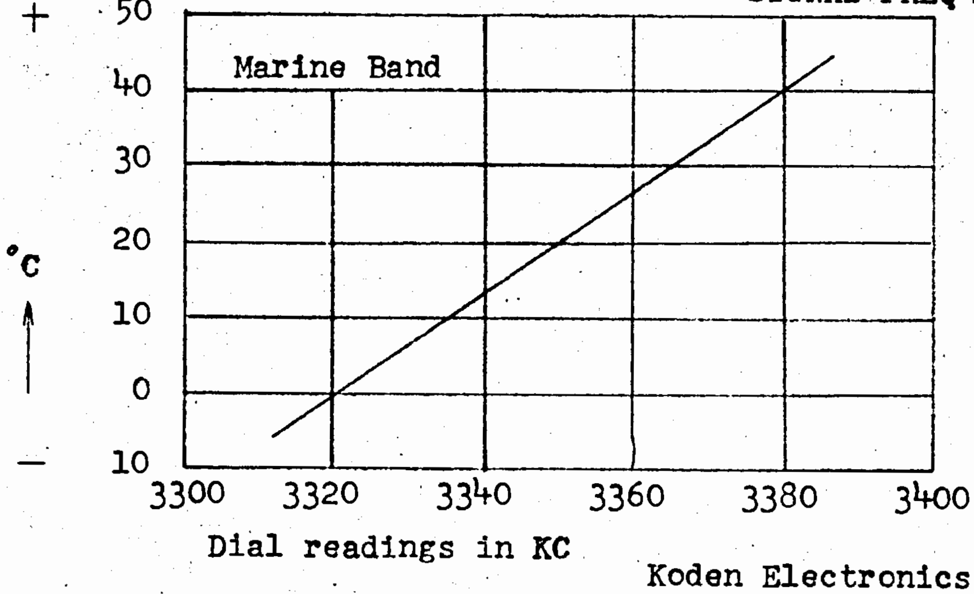
SIGNAL FREQ = 255 KC



SIGNAL FREQ = 1160 KC



SIGNAL FREQ = 3350 KC



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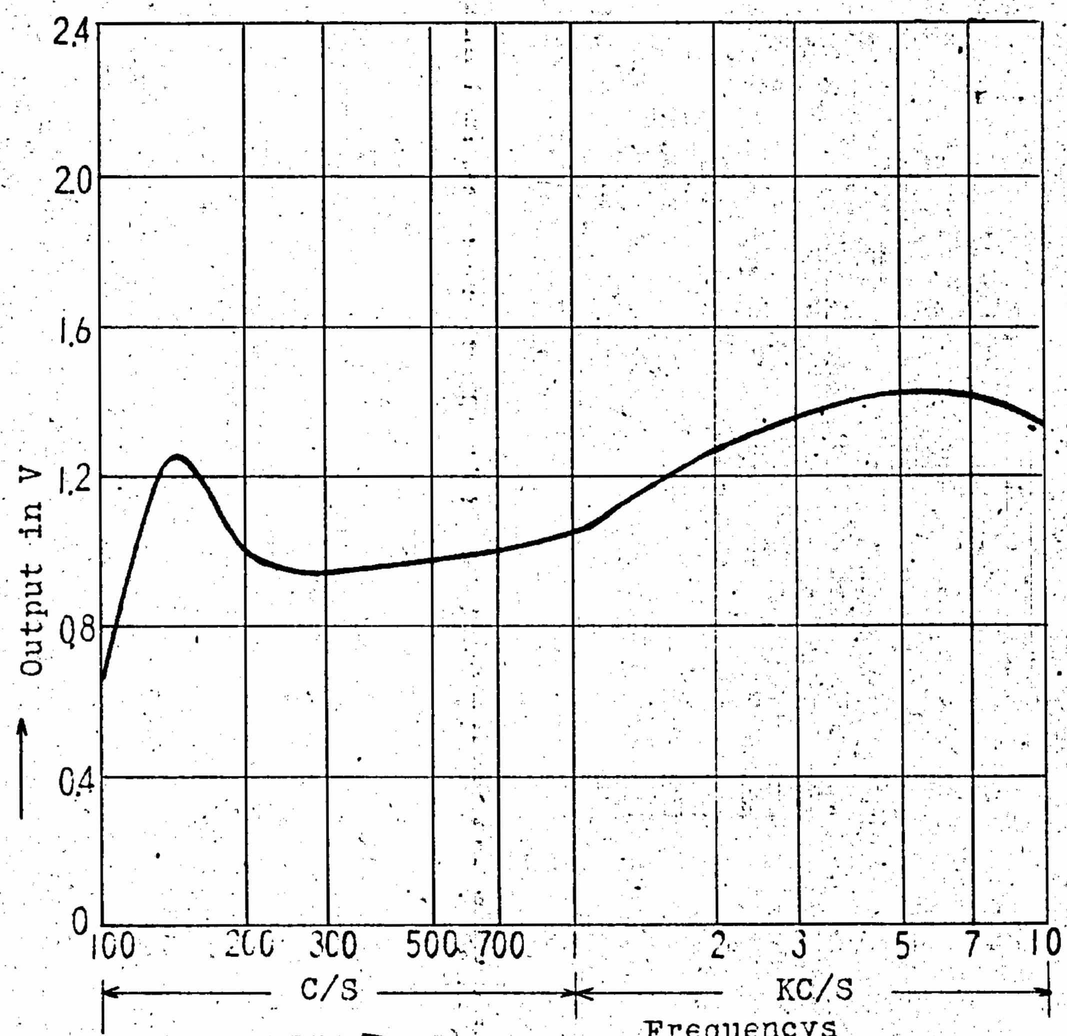
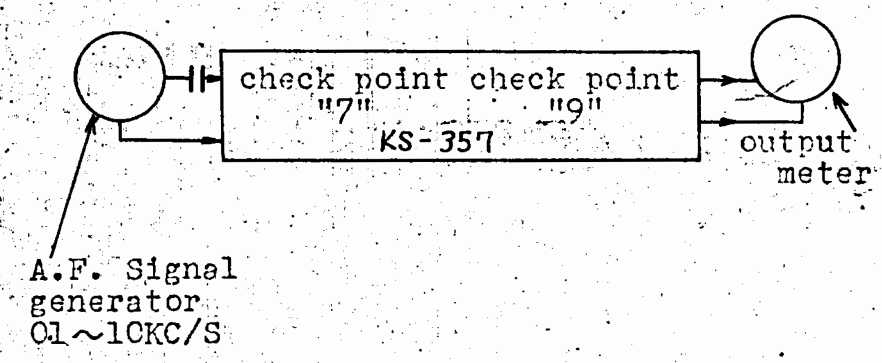
Standard Characteristics for KS-357

Audio Amplifier.





volume control → max.

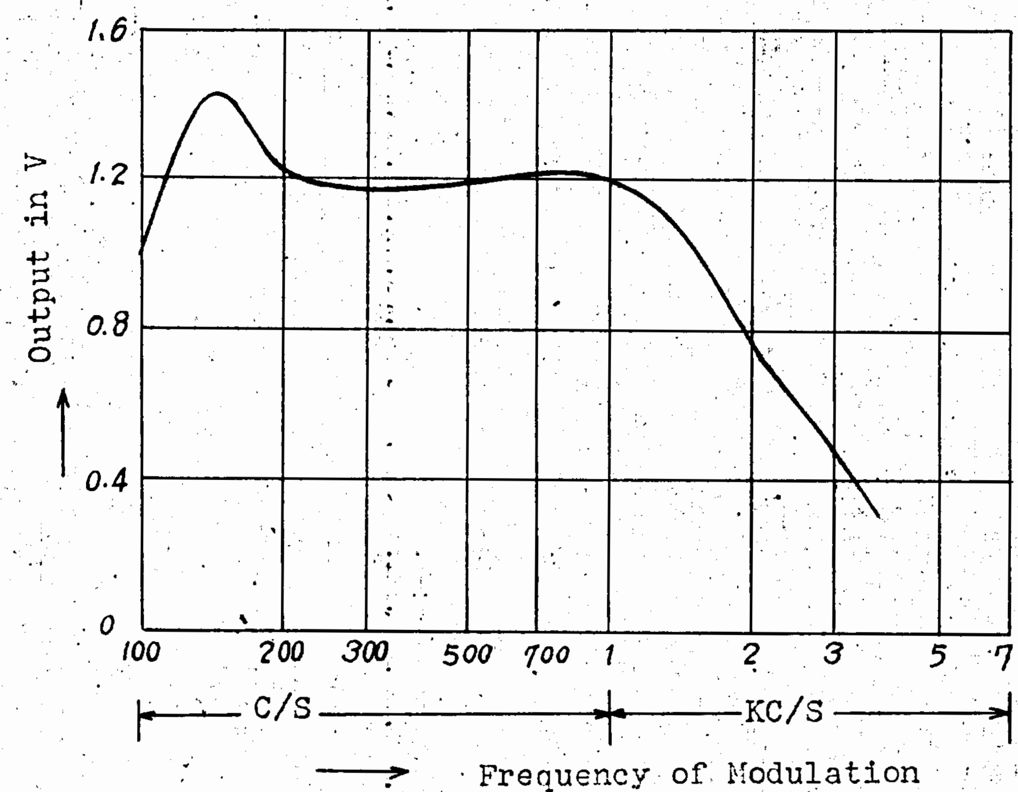
gain control → min.

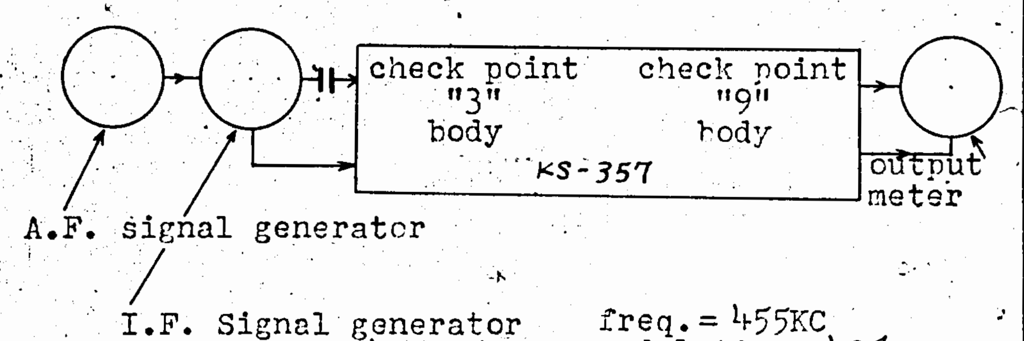
battery voltage ≃ 9V

signal input ≃ 0.1V

Standard Characteristics for KS-357

Modulated Signal Characteristics.

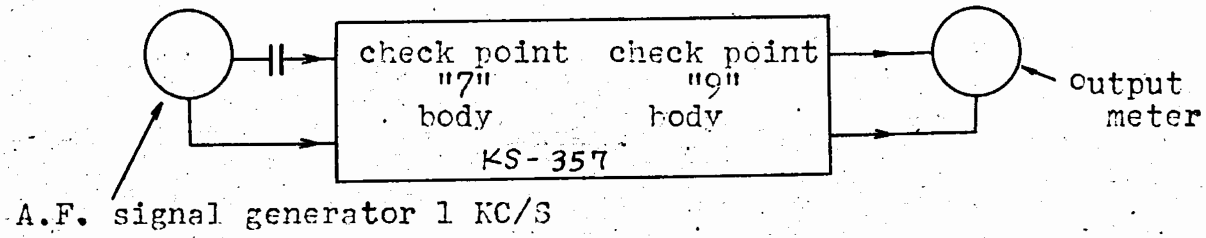




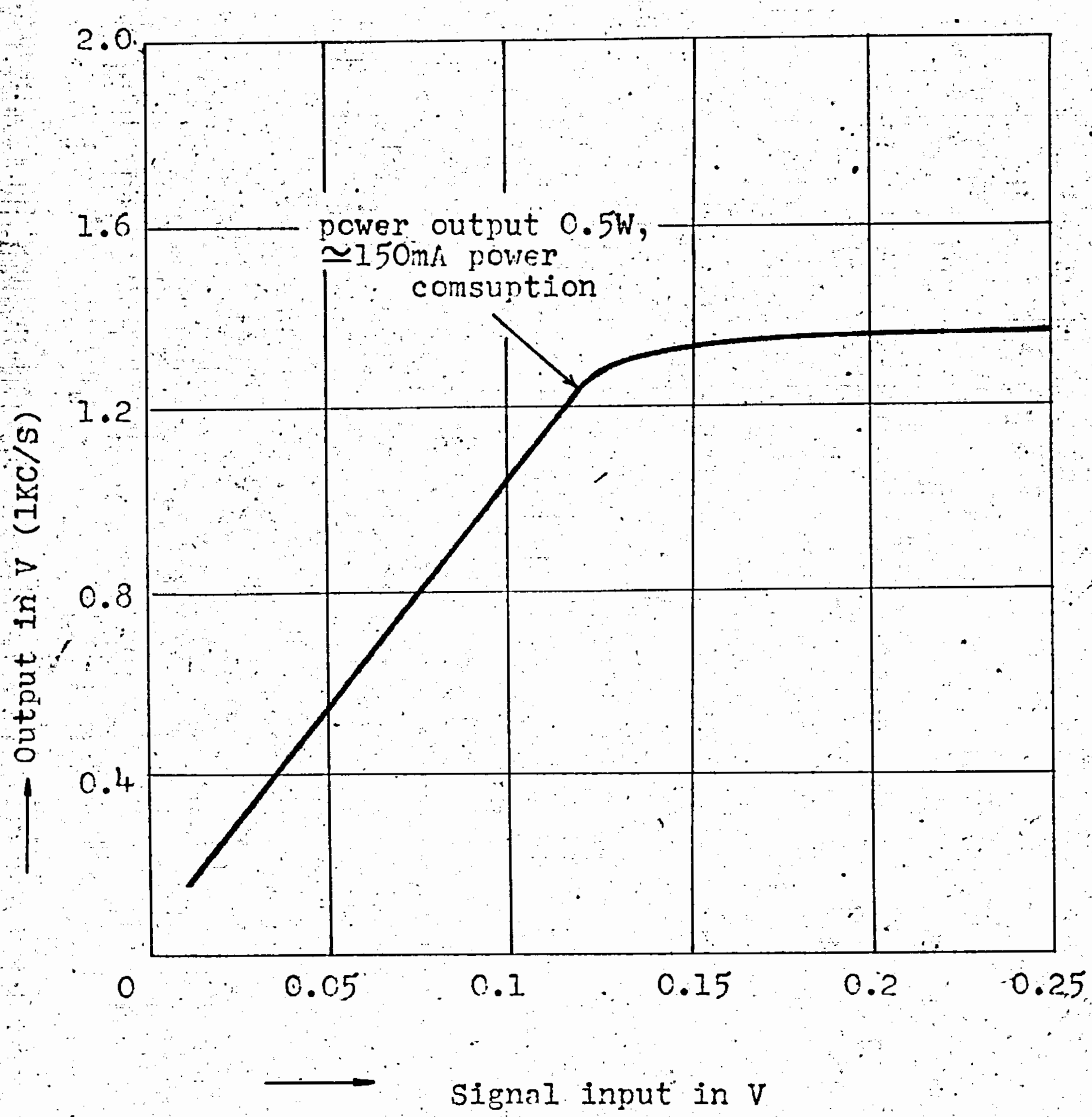
freq. = 455KC
modulation = 40%
signal output ≃ 100μV

null meter reading ≃ over 10
volume control ⟶ adj to 0.5W output at 1000c/s
gain control ⟶ max.
band ⟶ marine
battery voltage ≃ 9V

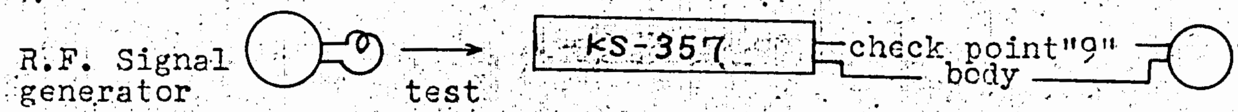
Standard Characteristics of KS-357 Audio Amplifier.

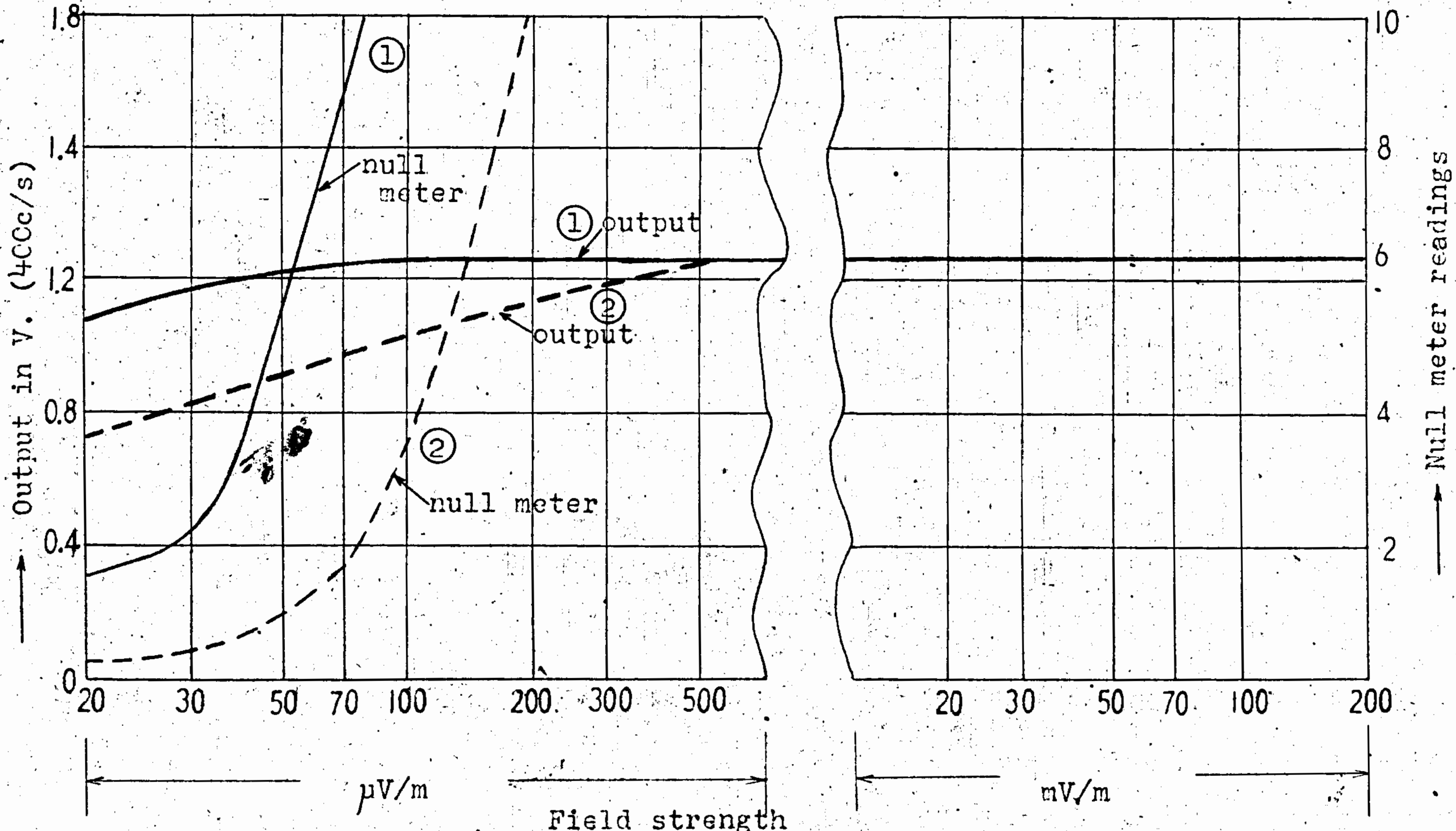


volume control→max.
battery voltage≃9V
gain control →min..



Standard Characteristics of KS-357
AVC Characteristics





battery voltage≃9V

modulation→400c/s,40%

volume control→adj.to 0.5W output at 1mV/m field strength.

①——
gain control→adj.null meter reading 1 at zero signal.

②----
gain control→adj.null meter reading 1 at 60μV/m signal

NO.10