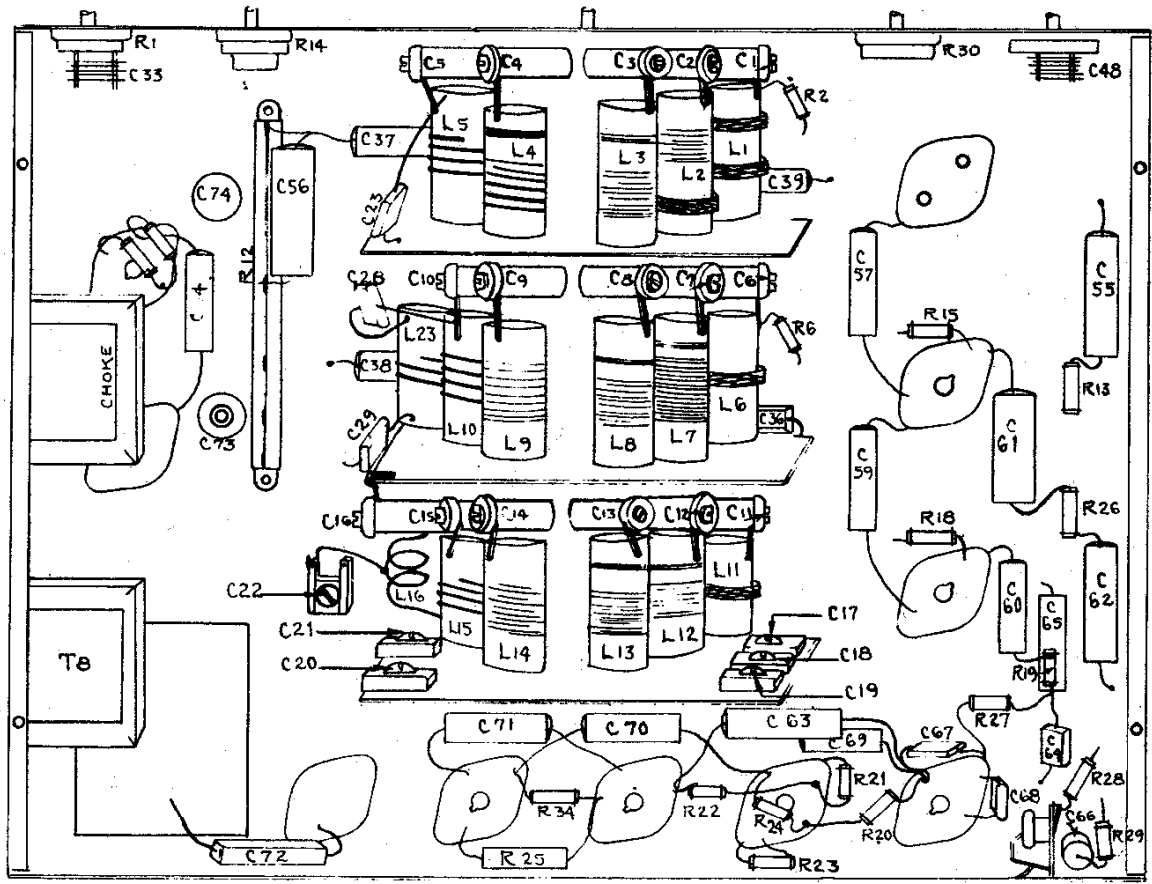
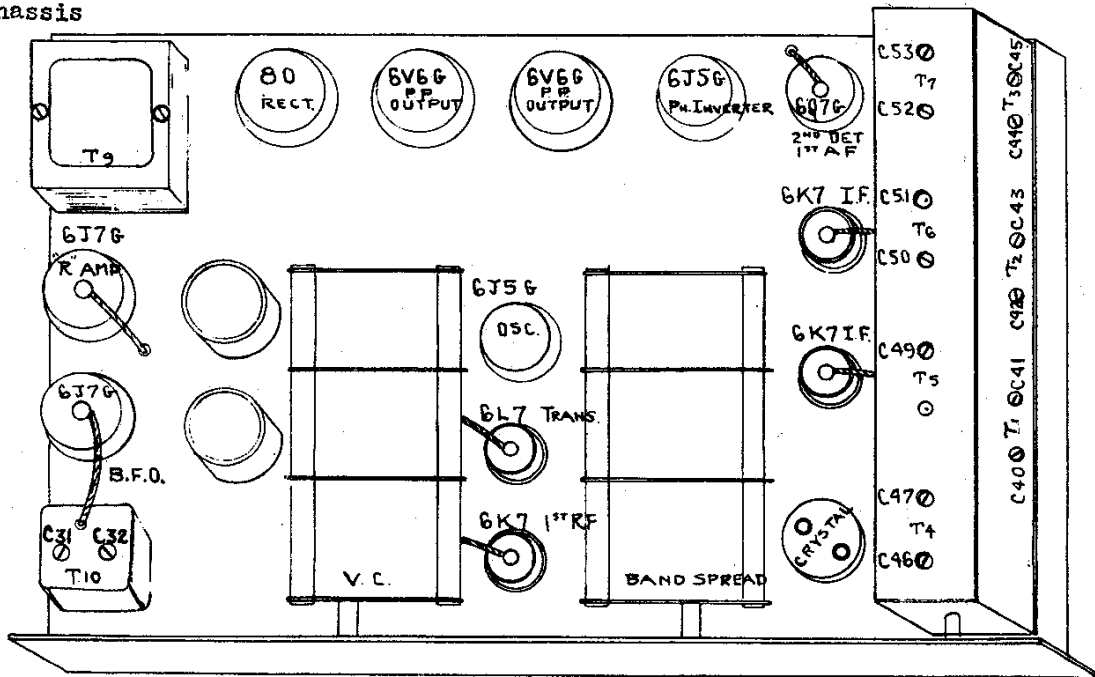


MODEL 450
 MODEL 450A
 Socket, Trimmers
 Chassis

HOWARD RADIO CO.



MODEL 450
 MODEL 450A
 Antenna Data

HOWARD RADIO CO.

Color Code Data

ALIGNMENT FREQUENCIES:

Band A	.....	600 AND 1200 KC
Band B	.....	1.3 AND 2.6 MC
Band C	.....	3.0 AND 6.0 MC
Band D	.....	7.0 AND 15 MC
Band E	.....	16 AND 36 MC
Band F	.....	40 AND 60 MC

BANDS E & F 1560 KC

LOUD SPEAKER:

Type Permanent Magnet Dynamic
 Size Within Separate Case 10 Inch

INTERMEDIATE FREQUENCY = BANDS A, B, C, & D - 465 KC

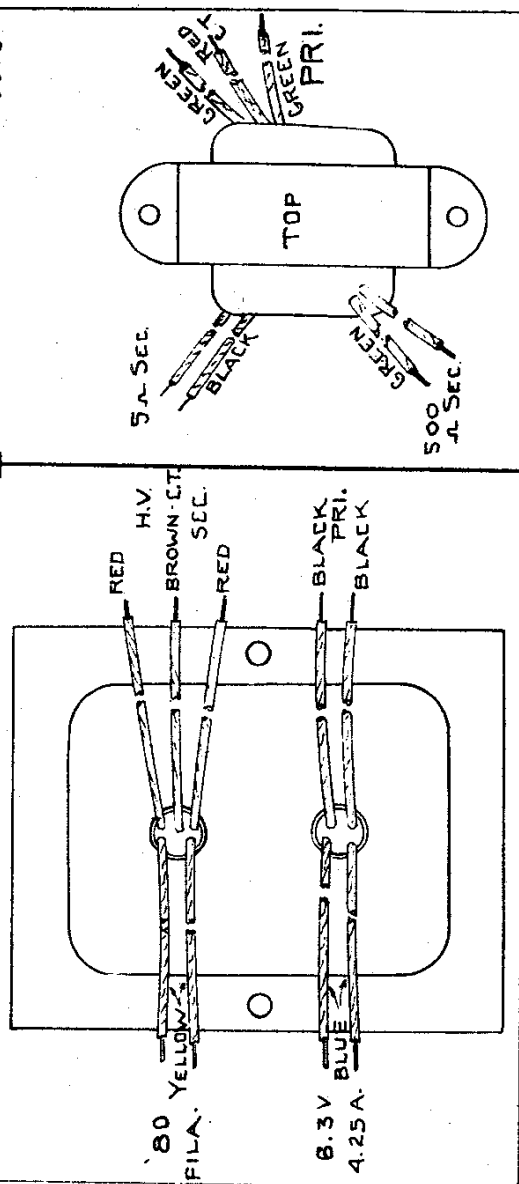
CHASSIS FEATURES:

SEND-RECEIVE terminals in rear of chassis for break-in connection.
 RF Stages One
 VARIABLE CONDENSER Three Gang
 ANTENNAE TWO REQUIRED
 TYPE SEE PAGE 3
 TELEPHONE JACK ON FRONT PANEL
 Crystal Phaser.
 Beat Frequency Oscillator, Pitch Control.
 B.F.O. OFF-ON Switch with Injection Control.
 Two range B.F.O. switch

OPERATING FEATURES:

A.V.C. with ON-OFF Switch
 Three Gang Electrical Band Spread
 A.F. Gain or Audio Level
 R.F. Gain or Sensitivity
 Tone Control
 "R" Meter Showing Signal Strength
 "R" Meter Zero Adjustment
 Four-position IF Setting: 1560 KC
 Iron Core Broad 465 KC
 Iron Core Sharp 465 KC
 Crystal Filter-In Position

POWER TRANS. 1693B
 COLOR CODE AND LEAD POSITION
 OUTPUT TRANS. 3996I



POWER OUTPUT:

Type Push Pull Output
 Undistorted 9 Watts
 Maximum 15 Watts

SPECIFICATIONS FOR A 5 METER ANTENNA

On the "F" band, we have found very good results by the use of a vertical rod 3/16" in diameter and about 58" long. Note that the lead from the base of this rod to the antenna terminal of the set should not be more than about eight inches.

The "G" terminal is for the connection to ground.

THE THREE TERMINALS - A, D, and G in the middle back of the chassis are for the ANTENNA AND GROUND connections. When using the conventional flat-top and lead-in type of antenna, CONNECT THE LEAD-IN TO THE TERMINAL MARKED "A", being sure that a wire jumper connects from D to G terminals. The G terminal is for the ground connection.

For any DOUBLET TYPE of antenna, remove the shorting jumper from D to G and connect the two leads of the doublet system to A and D.
 Note* For maximum performance on short waves especially the two highest bands, a little experimenting can be done regarding the antenna location, length and type which is very important.

THE TERMINALS MARKED 500 OHMS which are connections from the out-put transformer can be connected when and if desired to any output load having 500 ohms impedance.

THE TERMINALS MARKED S W are for use of an external switch to turn the set on or off for a stand by. This set of contacts may be connected to a relay or separate switch. Since these terminals are in the circuit across the panel switch for SEND and RECEIVE the switch would therefore have to be in the SEND position if the back CONTACTS are used in any way.

HOWARD RADIO CO.

MODEL 450
MODEL 450A

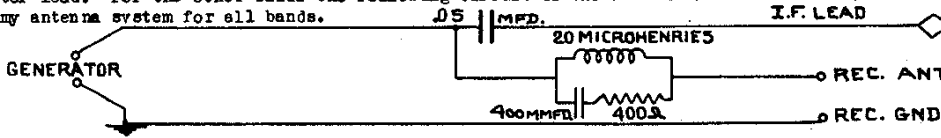
PRELIMINARY:

ALIGNMENT PROCEDURE

Alignment

- Output meter connection.....4,000 ohm or more copper oxide meter across 5 ohm terminals. Shunt with speaker
- Output meter reading to indicate .5 watt.....1.575 V.
- Average sensitivity in microvolts for .5 watt output.....See chart below
- Generator ground lead connection.....Direct to chassis
- Dummy antenna value in series with generator output..... See Note 1 below
- Connection of generator output lead.....See Chart Below
- Generator modulation.....30%, 400 cycles
- Position of volume control A.F. gain.....Full on
- Position of volume control R.F. gain.....Full on
- A.V.C. Switch.....On
- Band spread dial set at 100.....Min. Capacity

NOTE 1 When aligning the two I.F. channels a condenser of .05 MFD. may be used in series with the generator lead. For the other bands the following circuit is shown with the values that make a universal dummy antenna system for all bands.



(50-60 MC = 144°)
(7-7.5 MC = 150° + 180°)
(80-90 MC = 140°)

However, for those who wish to DOUBLE the amount of band spread, it is only necessary to remove one ROTOR plate from each section of the BAND SPREAD CONDENSER. This accomplished by merely cutting the separating link holding the two plates together and pulling the plate from the rotor shaft.

SINCE THE BAND SPREAD SYSTEM is accomplished by means of a separate three-gang condenser, the spread in degrees over the assigned amateur bands is as follows:-
(5.5-4 MC = 540° + 180°)
(14.005-14.595 MC = 810°)
(1.710-3 MC = 560° + 168°)

POSITION OF VARIABLE AND BAND SW.	GENERATOR FREQ.	GENERATOR CONNECTION	POSITION OF I.F. BAND SWITCH	TRIMMER ADJUSTMENTS IN ORDER	TRIGGER FUNCTION	APPROX. MICROVOLTS
Closed "A" Band	465 KC	6L7 Grid	"XTAL" See Note 2	C53, 52, 51 50, 49, 47, 46	I.F.	15
Closed, "A" Band	1560 KC	6L7 Grid	"E" & "F"	C45, 44, 43 42, 41, 40	I.F.	15
60 MC "F" 40 MC "F"	60 MC 40 MC	A-G Ant. Term. A-G Ant. Term.	"E" & "F" "E" & "F"	C16 C22	Osc. Padder	Approx. 10 Approx. 10
36 MC "E" 16 MC "E"	36 MC 16	A-D-G Ant. Term. A-D-G Ant. Term.	"E" & "F" "E" & "F"	C15, 10, 5 C21	Osc. Trans. Ant. Padder	Approx. 3 Approx. 3
15 MC "D" 7 MC "D"	15 MC 7 MC	A-D-G Ant. Term. A-D-G Ant. Term.	XTAL or "Sharp" XTAL or "Sharp"	C14, 9, 4 C20	Osc. Trans. Ant. Padder	Approx. 1 Approx. 1
6 MC "C" 3 MC "C"	6 MC 3 MC	A-D-G Ant. Term. A-D-G Ant. Term.	XTAL or "Sharp" XTAL or "Sharp"	C13, 8, 3 C19	Osc. Trans. Ant. Padder	Approx. 1 Approx. 1
2.6MC "B" 1.3MC "B"	2.6 1.3	A-D-G Ant. Term. A-D-G Ant. Term.	XTAL or "Sharp" XTAL or "Sharp"	C12, 7, 2 C18	Osc. Trans. Ant. Padder	Approx. 1 Approx. 1
1.2MC "A" .6 MC "A"	1200 KC 600 KC	A-D-G Ant. Term. A-D-G Ant. Term.	XTAL or "Sharp" XTAL or "Sharp"	C11, 6, 1 C17	Osc. Trans. Ant. Padder	Approx. 1 Approx. 1

NOTE 2: When using a CRYSTAL, set PHASING CONTROL to almost minimum capacity. See special alignment instructions below for Crystal. Align set in "sharp" position if set is without crystal.

ALIGNMENT INSTRUCTIONS - FOR RECEIVERS EQUIPPED WITH CRYSTALS

- (A) REMOVE CRYSTAL, set crystal phasing condenser to almost minimum capacity and throw IF switch to "XTAL" position.
 - (B) With the 465 KC signal, re-adjust the I.F. Trimmer C-46 - the one nearest the front panel of the receiver - by turning the screw counter-clockwise. The signal now may be slightly weaker than before and sound "off-side". This, however, is a normal condition.
 - (C) REPLACE THE CRYSTAL - A very noticeable drop in signal strength may be noted, due to the filtering action of the crystal, and the frequency control of the signal generator must be "rocked" slowly back and forth, until the increase in signal strength indicates the exact frequency of the crystal being used. Now re-align the entire I.F. system to this frequency.
 - (D) Adjust "XTAL" phasing condenser for the lowest pitched note possible and re-adjust signal generator frequency. Repeat and continue to repeat this alignment procedure until no further improvement in the alignment can be accomplished.
- NOTE: If the IF switch should now be thrown to another position, an apparent rise in gain will be noticed, which is caused by the addition of higher frequencies and background noise, so it does not mean that the sensitivity of this set is impaired in any way by use of the crystal.
- NOTE 3: THE BEAT FREQUENCY OSCILLATOR is adjusted for the A, B, C, D, Bands with Trimmer C31. With models having an "E" & "F" Band B.F.O. - Adjust C32 with dial at 1560 on Band D to 1560 KC. Recheck C31. Set pitch control to half capacity.