

Handy Phone

Electrical Specifications

FREQUENCY RANGES

Channel #1	-----	260 kc
Channel #2	-----	220 kc
Channel #3	-----	180 kc
Channel #4	-----	140 kc
Channel #5	-----	100 kc

RADIOTRON COMPLEMENT

(1) Type 41	-----	Oscillator	(3) Type 41	-----	Power Output
(2) Type 6D6	-----	Audio-Amplifier	(4) Type IV	-----	Rectifier

POWER-SUPPLY RATINGS

Rating A	-----	105-125 volts, 60 cycles	-----	30 watts
Rating B	-----	105-125 volts, 25 cycles	-----	30 watts
Loudspeaker	-----	5-inch Permanent Magnet	-----	

Mechanical Specifications

CABINET DIMENSIONS

Height	-----	6¾ inches
Width	-----	10 inches
Depth	-----	6¾ inches

OPERATING CONTROLS

(1) Power Switch-Volume	(2) Channel Switch	(3) Talk-Listen Switch	
Net Weight	-----	-----	16 pounds
Shipping Weight	-----	-----	18 pounds

General Description

The Handy Phone is essentially a non-radiating inter-communication system, which uses the power lines as a transmission medium. Five channels are provided in each unit allowing five distinct two-way communications to take place simultaneously. These units are designed primarily for inter-office communications between various offices in the same building where the power supply to these offices comes from the same metering and distributing system. When communication with these units is attempted between separately metered power circuits, the results will in general be unsuccessful.

Satisfactory communication is not usually governed by physical distance, up to 1000 ft. but rather by the electrical loading and the ramification of the electrical circuit which forms the transmission medium between the two units. Evidence of this limitation will be found in the fact that one or more channels of any one or more units may fail

to operate, while communication is satisfactory over the remaining channels. If this condition is encountered in any part of an installation, the most satisfactory solution is to connect the offending unit to another outlet or lighting circuit in the same or nearby room. In many cases this will transfer the unit to another circuit, which, having more favorable loading conditions, will allow satisfactory communication to the other units in the installation. In operation it may be found that some channels will give better results than others. Between points where communication is found to be most difficult, the channels having greatest signal strength should be assigned.

In installations where suitable signal strength is available, interchannel interference and other "static" disturbances may be experienced. This condition can be remedied by increasing the diode bias on the type 41 tube, by removing the short-circuiting lead from R-1.

Description of Electrical Circuit

Talk Position:—The type 41 (V-1) acts as a Hartley shunt-fed oscillator, L-6 being the shunt choke. The type 41 (V-3) modulates the oscillator circuit by approximately 10%, and is coupled by means of the output transformer (T-3) primary.

Speech modulation voltage is provided by the permanent magnet speaker, which is amplified by the input transformer T-2 and applied to the control grid of the type 6D6 (V-2), and further amplified by the type 41 (V-3)

A potential, approximately 3 volts (across 50 ohms), is

developed across L-3 by the mutual inductances of L-1 and L-2 and transmitted to the line.

Receiver Position:—The line signal is developed across L-3, and by mutual inductance through L-2 and L-1, (L-2 and L-1 providing the required selectivity) the signal is applied to the type 41 (V-1) which acts as a diode detector. The detected signal appears across R-4, which is amplified by the type 6D6 (V-2) and type 41 (V-3) stages, and appears across transformer T-3, and the loudspeaker.

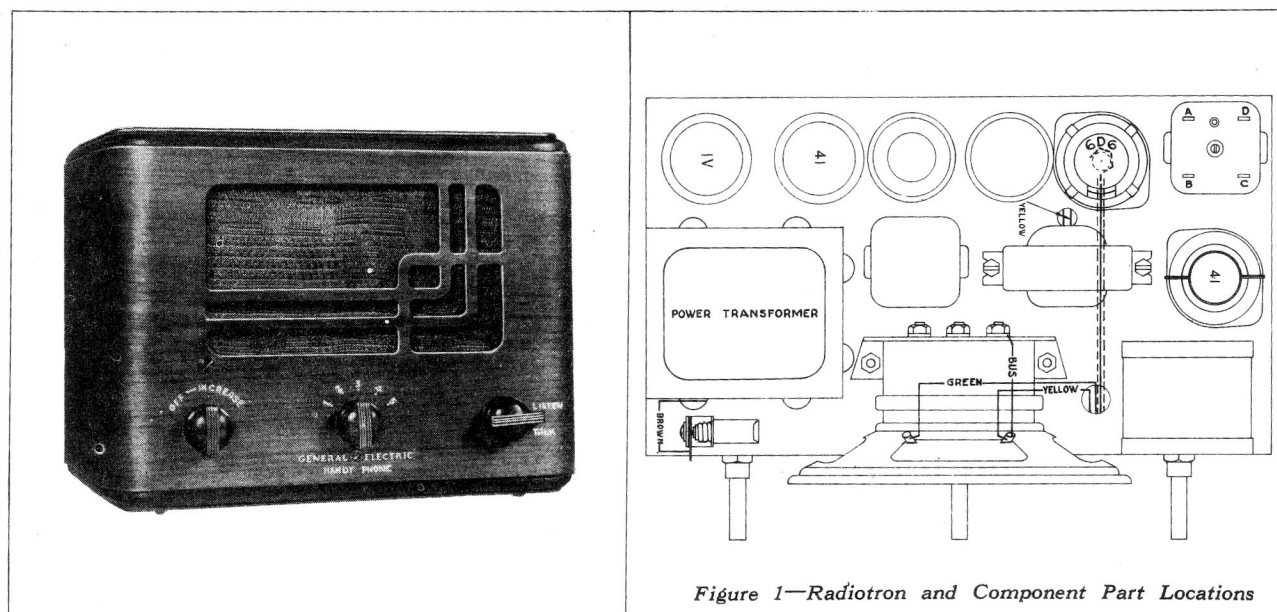


Figure 1—Radiotron and Component Part Locations

Alignment Procedure

These units are carefully aligned and tested at factory, and usually should not require any attention in the field.

If a unit is suspected of being out of alignment, it may be ascertained by measuring the output of each channel with a dummy load and r-f output meter, channels #2, 3, and 4 should approximate the outputs of channel #1 and 5.

The two red leads of the coil assembly stock #S-1900 are disconnected from across the coil L-4, and a .05 mfd capacitor and 30 ohm resistor in series with a 100 milliamper R-F thermo-couple type meter are connected across these leads which is the output of coil L-3.

A test oscillator capable of producing accurately the five required frequencies—viz—100 Kc., 140 Kc., 180 Kc., 220 Kc. and 260 Kc., is setup, the output of which is fed to the antenna post of a radio receiver with an "X" band. If no "X" band receiver is available, the "A" band may be used, but great care must be exercised in selecting the correct harmonic of the alignment frequency which will appear on this band.

A second wire is connected to the antenna post, which is loosely coupled to the dummy load and output meter circuit of the Handy Phone.

The voice coil of the Handy Phone is shorted to prevent howl, and the Listen-Talk switch is placed in the Talk position.

Adjustment #1:—The channel selector switch is placed in position #5, which is to be aligned at 100Kc. The test oscillator and radio receiver are tuned to 100Kc., a

small signal is fed from the oscillator and if this channel is aligned correctly, a beat note will be heard in the receiver (0-500 cycles), if not adjust the magnetite core L-1 (top of coil assembly) to obtain this beat.

Adjustment #2:—The selector switch is now placed in channel #1 position, the test oscillator and radio receiver being tuned to 260Kc., trimmer capacitor C-1 is adjusted to obtain the beat note.

ADJUSTMENT No. 1 AND No. 2 are now repeated to obtain a more accurate alignment, as these circuits have a tendency to interlock.

It is highly desirable that channels #1 and #5 are correctly aligned, channels #2, #3 and #4 may have a 1½% deviation of oscillator frequency. These channels are checked by feeding the required frequency signal to the radio receiver, and listening for the beat note.

Adjustment 3:—The channel selector switch is placed in position #5, with the Listen-Talk switch in the talk position. Magnetite core L-2 (bottom of coil assembly) is adjusted for maximum output as measured on the output meter.

Adjustment #4:—The channel selector switch is placed in position #1, with the Listen-Talk switch in the talk position, trimmer capacitor C-2 is adjusted for maximum output as measured on the output meter. Adjustments #3 and #4 are now repeated to obtain a more accurate alignment.

Precautionary Lead Dress

- (1) Keep the shielded lead to the type 6D6 grid away from the r-f choke L-6, and the black plate lead of the Type 41 Oscillator.
- (2) Dress the twisted black and yellow leads, which are connected to the volume control and the transfer switch closely to the front apron of the chassis.
- (3) The blue grid return lead of the input transformer should be dressed above the choke coil L-6 and as close to the base shield as possible.
- (4) If "howl" is encountered, it may be remedied by reversing the primary leads on the output transformer.

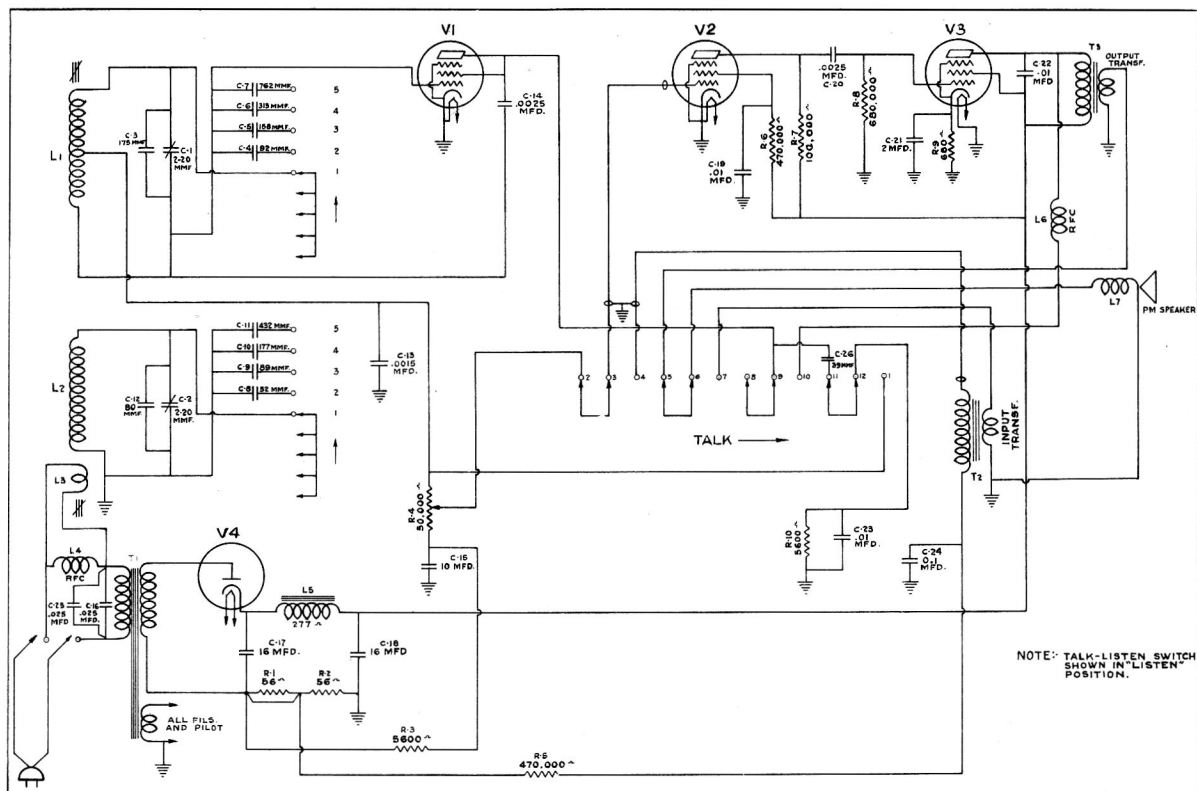


Figure 2—Chassis Wiring Diagram

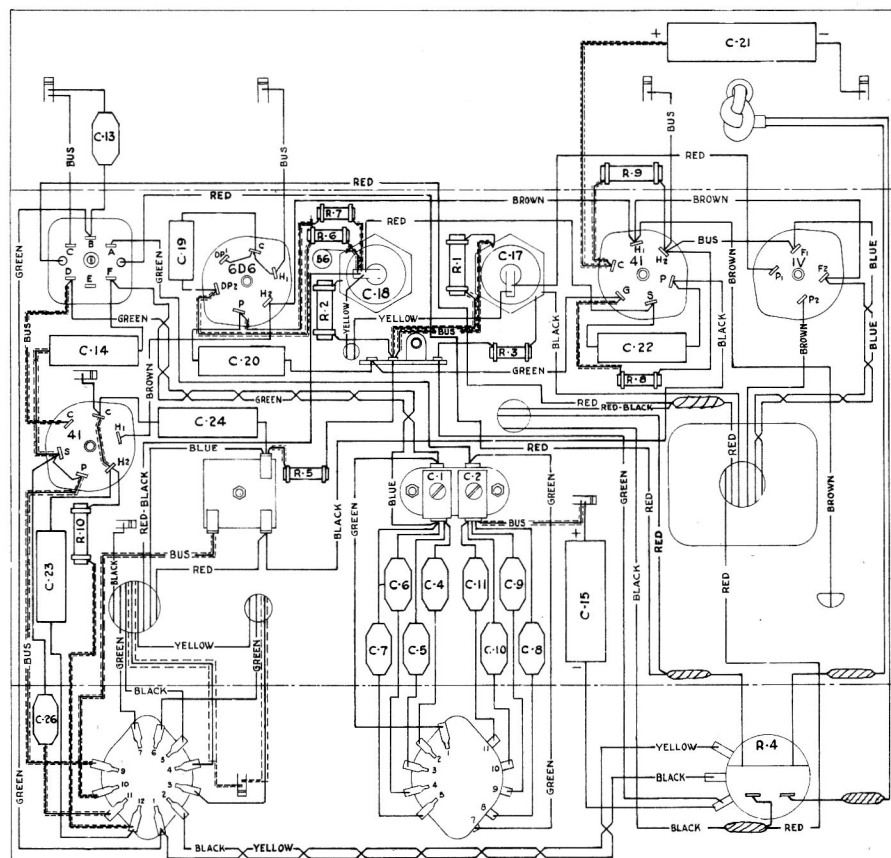


Figure 3—Chassis Wiring Diagram

REPLACEMENT PARTS—Handy Phone

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
RECEIVER ASSEMBLIES			
S-1875	Cable-Shielded cable & grid clip assembly-approximately 9" long.....	5226	Lamp-Pilot Lamp-Package of 2.....
12118	Cap-Grid contact cap-Package of 5.....	S-1903	Reactor-Filter reactor (L5).....
S-1876	Capacitor-Adjustable dual trimmer (C1,C2).....	S-1892	Resistor-56 ohms,insulated, $\frac{1}{2}$ watt (R1,R2).....
S-1877	Capacitor-39 Mmfd. (C26).....	S-1893	Resistor-680 ohms,insulated, $\frac{1}{2}$ watt (R9).....
S-1878	Capacitor-52 Mmfd. (C8).....	S-1839	Resistor-5600 ohms,insulated, $\frac{1}{2}$ watt (R10).....
S-1879	Capacitor-80 Mmfd. (C12).....	S-1894	Resistor-5600 ohms,insulated, $\frac{1}{4}$ watt (R3).....
S-1880	Capacitor-89 Mmfd. (C9).....	S-1895	Resistor-100,000 ohms,insulated, $\frac{1}{4}$ watt (R7).....
S-1881	Capacitor-92 Mmfd. (C4).....	12285	Resistor-470,000 ohms,insulated, $\frac{1}{4}$ watt (R5,R6).....
S-1882	Capacitor-158 Mmfd. (C5).....	S-1896	Resistor-680,000 ohms,insulated, $\frac{1}{4}$ watt (R8).....
S-1883	Capacitor-175 Mmfd. (C3).....	3858	Socket-Pilot lamp socket.....
S-1884	Capacitor-177 Mmfd. (C10).....	S-1905	Switch-Range switch.....
S-1885	Capacitor-313 Mmfd. (C6).....	S-1906	Switch-Listen-Talk switch.....
S-1886	Capacitor-432 Mmfd. (C11).....	S-1891	Shield-Type 6D6 radiotron shield... 12218
S-1887	Capacitor-762 Mmfd. (C7).....	12581	Shield-Type 41 radiotron shield... 12581
13140	Capacitor-1500 Mmfd. (C13).....	S-1897	Transformer-Input and output transformer assembly (T2,T3).....
3932	Capacitor-.0025 Mfd. (C14).....	S-1898	Transformer-Power transformer,105-125 volt,60 cycle (T1).....
5107	Capacitor-.0025 Mfd. (C20).....	S-1899	Transformer-Power transformer,105-125 volt,25 cycle (T1).....
13138	Capacitor-.01 Mfd. (C19).....	S-1904	Volume control and "ON-OFF" switch (R4).....
4858	Capacitor-.01 Mfd. (C22).....	REPRODUCER ASSEMBLIES	
4883	Capacitor-.01 Mfd. (C23).....	S-1907	Cone-Reproducer cone.....
4839	Capacitor - 0.1 Mfd. (C24).....	S-1908	Reproducer, complete.....
S-1889	Capacitor-2 Mfd. (C21).....		
S-1890	Capacitor-10 Mfd. (C15).....		
5212	Capacitor-16 Mfd. (C17).....		
14377	Capacitor-16 Mfd. (C18).....		
S-1900	Coil-Tuning coil (L1,L2,L3,C3,C12).....		
S-1901	Coil-Line coupling assembly(L4,C25,C16).....		
6321	Coil-Choke coil(L6).....		
12006	Core-Core and stud assembly for tuning coil.....		
S-1797	Indicator Jewel (Brown).....		
S-1910	Knobs-Range switch knob.....		
S-1909	Knobs-Talk-Listen switch knob.....		
S-1911	Knobs-Volume control knob.....		