INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE JY TONE RECEIVERS

CAUTION Before working on this equipment, turn off the power supply and ground or open circuit the R.F. lead to the carrier set assembly.

APPLICATION

The type JY tone receivers are used primarily for operating a relay or other device in response to an audio frequency signal from Type JY carrier receiver. The tone receivers can be used to operate telemetering, supervisory control and remote trip equipment, and provide a means of operating ten such functions over a single carrier channel or a telephone.

CONSTRUCTION AND OPERATION

These units are made up of two parts, one of which is a basic unit common to all frequencies and is covered by Style #1352698. The other part is the frequency determining component for the particular frequency desired. The complete tone receiver is mounted on a panel arranged for installation on the swinging rack of a Type JY Cabinet.

The frequency determining component is a band pass filter for the frequency desired, and is completely self-contained in a metal case. It connects to the basic unit through four plainly marked wires. Since the frequency determining units are all interchangeable, a tone receiver may be changed from one frequency to another by simply changing the frequency determining unit.

The outline dimensions of this unit are shown in Fig. 2. The two tubes are accessible from the front of the unit. The audio input control is normally covered with a hexagon cap to prevent its setting from being accidentally disturbed. It is adjusted by means of a screw driver. The dial for the input control is marked with arbitrary numbers; i.e., it is not calibrated.

The circuit of this unit is shown in Fig. 1. This unit consists of a band pass filter, a single-stage Class A amplifier and a biased detector. The amplifier grid is excited through the frequency-determining band-pass filter so that there is no relay-operating d-c output from this unit except in response to its selected frequency from the carrier receiver or tone transmitter.

The potentiometer in the audio input circuit is used to adjust the amplifier tube V-1 grid voltage; the control for this potentiometer is on the front panel of the unit. An adjustable cathode-bias resistor is used to adjust the bias between the cathode and the control-grid of the amplifier tube; increasing the bias voltage reduces the plate current. The cathode-bias circuit is isolated from the input circuit by the transformer T-2. A capacitor C-3 connected in the input circuit is usually shorted out by a short length of wire on the capacitor terminals. If it is desired to prevent direct current from passing through the input circuit this jumper may be cut out of the circuit.

The input circuit and the filter circuit are 600 ohms. The transformer T-2 matches the 600 ohms to the grid of the amplifier tube V-1. The out-put of V-1 is coupled to V-2 grid thru a transformer T-1. The resistor R3 in the grid circuit of the detector tube V-2 prevents excessive grid current and helps this unit to operate at plate current saturation when

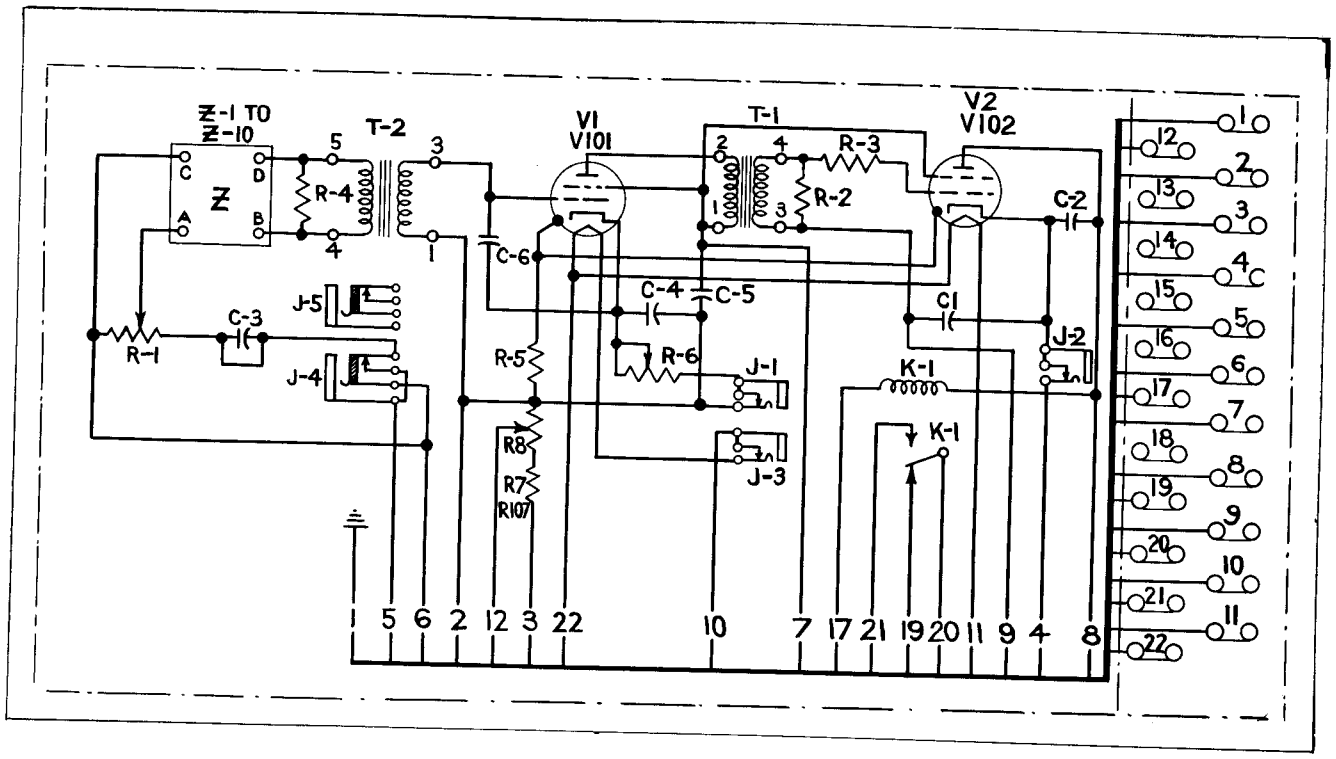

Fig. 1—Internal Schematic Of The Type JY Tone Receiver.

large signals are applied to it. The grid is normally at a negative potential with respect to the cathode because of the fixed bias established by the tap on R-8.

This bias resistor is adjusted so that the detector tube conducts only on positive half cycles of the tone signal voltage. Thus detector plate current consists of unidirectional pulses. A by-pass capacitor in the detector output circuit filters this current so that the result is a current with relatively little ripple. The detector plate load is the coil of a relay, either the relay in this unit or an external relay. The tube filaments (heaters) are usually connected in series, in which case the heater current may be measured by a plug-to-jack connection in the front panel of this unit. The detector plate current, the amplifier plate current, and the input signal can also be measured at jacks on the front of the panel.

CHARACTERISTICS

Tone receiver units are supplied for the following frequencies by combining the proper style of the filter component to the basic unit Style #1352698.

Frequency	Style No.	
	Frequency Component	Complete Tone Receiver
150	1352699	1352709
209	1352700	1352710
290	1352701	1352711
403	1352702	1352712
560	1352703	1352713
778	1352704	1352714
1080	1352705	1352715
1500	1352706	1352716
2085	1352707	1352717
2900	1352708	1352718

Tone receiver units can be operated from either a 125 or 250 volt station battery or from a 50 to 60 cycle a-c source in conjunction with suitable power supply units. For 125 volt d-c and 50-60 cycle applications, two 25L6 tubes are used, and for 250 volt d-c operation, two 6L6 tubes are used. Metering jacks are provided to measure the cathode currents (plate plus screen current) and the heater current of the tubes. A jack is also provided for aurally checking the input of the tone receiver with a handset.

The energy requirements are as follows:

Operating Voltage	Plate Load Milliamperes d-c	Heater Amperes a-c or d-c
125 d-c	110	0.3
250 d-c	100	0.9
115 a-c	110*	0.6

* 50 ma. d-c if V2 grid bias is obtained from separate power supply.

INSTALLATION

The tone receiver is usually supplied as part of a type JY power line carrier equipment assembly. In these cases, it is shipped, assembled with the other units in a cabinet, completely wired.

When the unit is shipped separately, unpack and install it on a standard relay rack in the equipment assembly with which it is to be used. The mounting screws are contained in a bag attached to the unit.

An external heater resistor must be used for 125 and 250 volt d-c applications. This resistor must be adjustable and should be 450 ohms using a 25L6 tube, (125 volt d-c) and 300 ohms, using a 6L6 tube (250 volt d-c). Make connections as follows:

1. Connect a double-pole, single-throw switch, which is fused for 3 amperes, between the power supply and terminals 2(-) and 3(+).

2. Connect as directed in (a), (b), (c), or (d) following, depending on the power supply.

a. For 125 volt d-c operation, connect a 450 ohm, 0.3 ampere adjustable heater resistor between terminals 3 and 10, and connect terminal 2 to terminal 11.

b. For 250 volt d-c operation, connect a 300 ohm, 0.9 ampere adjustable resistor between terminals 3 and 10, and connect terminal 2 to terminal 11.

c. For operation with a 125 volt d-c rectifier, connect terminals 10 and 22 through 3 ampere fuses and double-pole, single-throw switch to the 25 volt tap on the filament transformer, and connect terminal 11 to terminal 22.

d. For operation with a 250 volt d-c rectifier, connect terminals 10 and 22 through 3 ampere fuses and a double-pole, single-throw switch to the 6.3 volt tap on the filament transformer, and connect terminal 11 to terminal 22.

3. Connect terminals 3, 7, and 17 to the positive line and terminals 2, 6, and 9 to the negative line.

4. Connect the audio input to terminals 5 and 6.

5. Connect the control circuit to be operated by this unit to the proper combination of terminals 19, 20 and 21.

ADJUSTMENTS AND MAINTENANCE

The adjustments required for this unit are the heater current and the audio input. If the unit is received as a part of an equipment assembly, make these adjustments in accordance with the instructions in the book of the equipment assembly. If the unit is received alone, make these adjustments as follows:

1. Before closing the power switch, adjust resistor R-6 for maximum resistance and set the tap on resistor R-8 to the position which is nearest to the Panel of this Unit.

2. Make the tube heater adjustments as directed in (a), (b), or (c) following, depending on the power supply.

a. For 125 volt d-c operation, adjust the external, 450 ohm heater resistor, starting with maximum resistance, so that the heater current is 0.28 ampere d-c after two minutes.

b. For 250 volt d-c operation, adjust the external 300 ohm heater resistor, starting with maximum resistance, so that the heater current is 0.85 ampere d-c after two minutes.

c. For operation from a rectifier power

Tone Receiver Parts List

Diagram Symbol	Number Required	Function	Rating
		Capacitors	
C-1	1	By-Pass	0.5 MFD 600 V. D. C. Paper
C-2	1	By-Pass	0.5 MFD 600 V. D. C. Paper
C-3	1	By-Pass	0.5 MFD 600 V. D. C. Paper
C-4	1	By-Pass	4.0 MFD 600 V. D. C. oil filled
C-5	1	By-Pass	2.0 MFD 600 V. D. C. oil filled
C-6	1	By-Pass	.001 MFD 500 V. D. C.
		Filters	
Z-1	1	Band Pass	150 Cycles
Z-2	1	Band Pass	209 Cycles
Z-3	1	Band Pass	290 Cycles
Z-4	1	Band Pass	403 Cycles
Z-5	1	Band Pass	560 Cycles
Z-6	1	Band Pass	778 Cycles
Z-7	1	Band Pass	1080 Cycles
Z-8	1	Band Pass	1500 Cycles
Z-9	1	Band Pass	2085 Cycles
Z-10	1	Band Pass	2900 Cycles
		Jacks	
J-1	1	Current (V1 cathode)	One Circuit Opening
J-2	1	Current (V2 plate)	One Circuit Opening
J-3	1	Current (Tube heater)	One Circuit Opening
J-4	1	Audio Input	One Circuit and One Break
J-5	1	Spare	One Circuit and One Break
		Relay	
K-1	1	Output	One Make-Break Contact Ass'y.
		Resistors	
R-1	1	Potentiometer	10,000 Ohms
R-2	1	Loading	56,000 Ohms 1 Watt
R-3	1	Grid (Current Limiting)	100,000 Ohms 1 Watt
R-4	1	Filter Termination	680 Ohms 1 Watt
R-5	1	Static Leak	150,000 Ohms 1 Watt
R-6	1	Amplifier Bias	800 Ohms Adjustable-One Band
R-7	1	Detector Bias	1000 Ohms
R-8	1	Detector Bias	1000 Ohms Adjustable-One Band
R-107	1	Detector Bias	4000 Ohms
		Transformers	
T-1	1	Interstage	Plate-to-grid
T-2	1	Filter Output	Line-to-grid
		Tubes	
V-1	1	Amplifier	Type-25L6
V-2	1	Detector	Type-25L6
V-101	1	Amplifier	Type-6L6
V-102	1	Detector	Type-6L6
		Tube Sockets	
X-1	1	V-1 Socket	Ceramic Wafer-Octal Base
X-2	1	V-2 Socket	" " " "

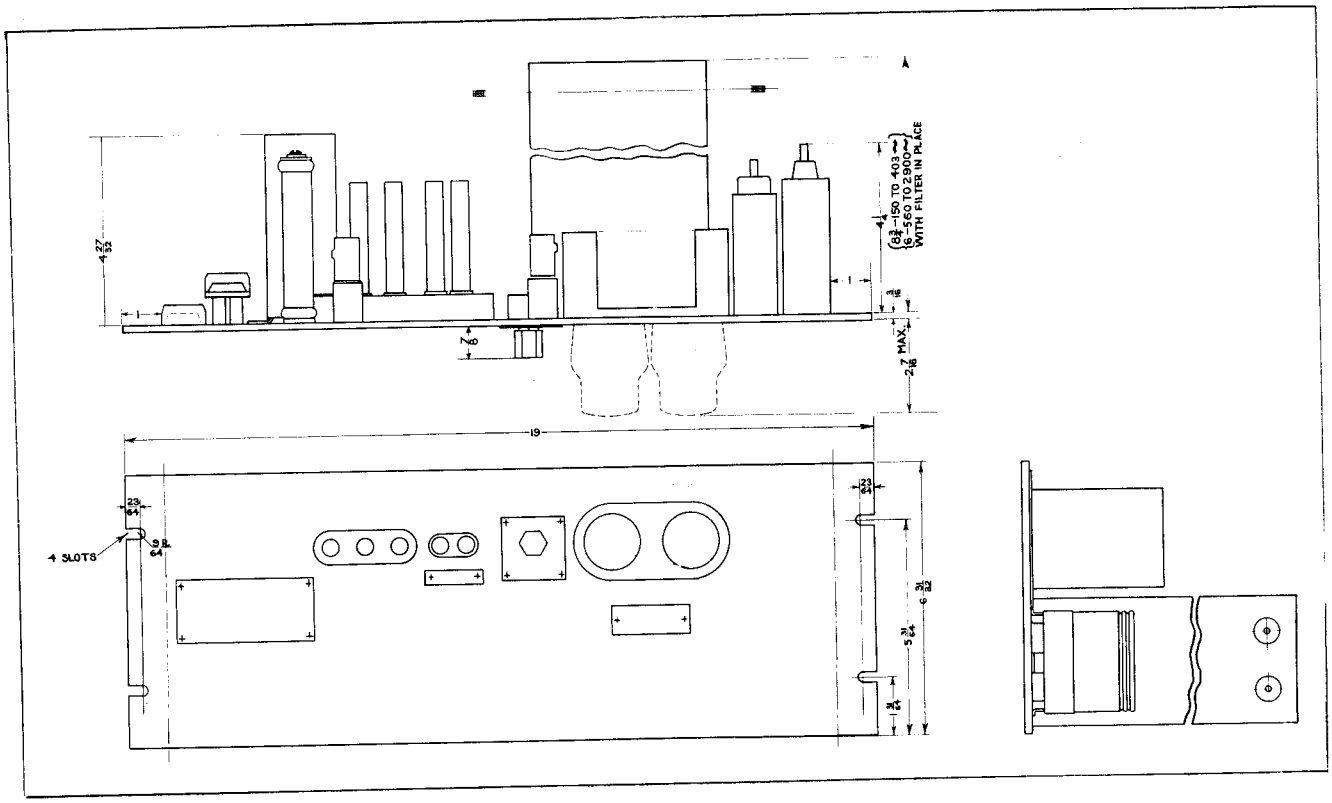

Fig. 2—Outline Of The Type JY Tone Receiver. For Reference Only.

supply where all the heaters are connected in parallel across filament transformer, such a transformer is usually designed to give the correct heater current without any adjustment.

3. Adjust resistor R-6 so that the amplifier plate current at jack 1 measures 30 milliamperes (125 or 250 volt d-c supply).

4. Adjust the tap on resistor R-8 so that the V2 plate current at jack 2 is not more than 0.2 milliampere. The approximate bias voltage for this adjustment (measured between tone receiver terminals 2 and 12) is 27 volts for 125 volt supply or 40 volts for a 250 volt supply. Be sure there is no input signal voltage present during this adjustment.

Note:

If the tone receiver input is energized from a circuit having a high noise level it may be necessary to operate at a higher bias voltage than indicated to overcome the noise level and reduce the plate current to a low enough value to prevent incorrect operation of the device connected to the output of the tone receiver.

5. Set the audio input control as follows:

a. Apply the desired input to terminals and 6.

b. Remove the cap-cover from the control.

c. Adjust the control so that the detector plate current at jack 2 is 20 milliamperes.

d. Replace the cap-cover.

This completes the adjustments for the tone receiver. The values of heater and plate currents should be recorded,and if the values show a progressive departure during inspection periods from their original values, it is probable that one or more tubes need replacement. Variation in station battery voltage and line conditions(switching,sleet) should be taken into account in interpreting the readings of detector plate current. Check the tubes in a tube tester. The limits given in the tube tester instructions will usually be

found satisfactory for indicating a defective tube.

RENEWAL PARTS

When ordering renewal parts for this unit, include the following data from the nameplate.

(1) The name of the unit.

(2) The style or DL number.

(3) The serial number.

During regular maintenance periods, the contacts of the relays may be cleaned if necessary with a fine file. Style #1002110 file is recommended for this purpose.

Remove the resistors from their mounting clips and clean the ferrules and clips with fine sandpaper to remove any corrosion.

COMPONENT PARTS

Alternative components for the tubes V1 and V2, and the resistor R7 are used for different d.c. supply voltages. These are listed in the Parts List and are covered by the following style numbers.

Accessory Style No.	D. C. Supply Voltage	Description	
867949	100-150	Resistor R7	Detector Bias, 1000 ohms
		Tube V1	Amplifier, Type 25L6
		Tube V2	Detector, Type 25L6
867950	200-300	Resistor R107	Detector bias, 4000 ohms
		Tube V101	Amplifier, Type 6L6
		Tube V102	Detector, Type 6L6

WESTINGHOUSE ELECTRIC CORPORATION
METER DIVISION
NEWARK, N.J.
Printed in U.S.A.