356H-1
Phono Equalizer

COLLINS

instruction sheet

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

©Collins Radio Company 1962, 1964
Printed in U.S.A.

523-0171000-002411
2nd Edition, 1 March 1964

1. Description.

1.1 PURPOSE OF THE MANUAL.

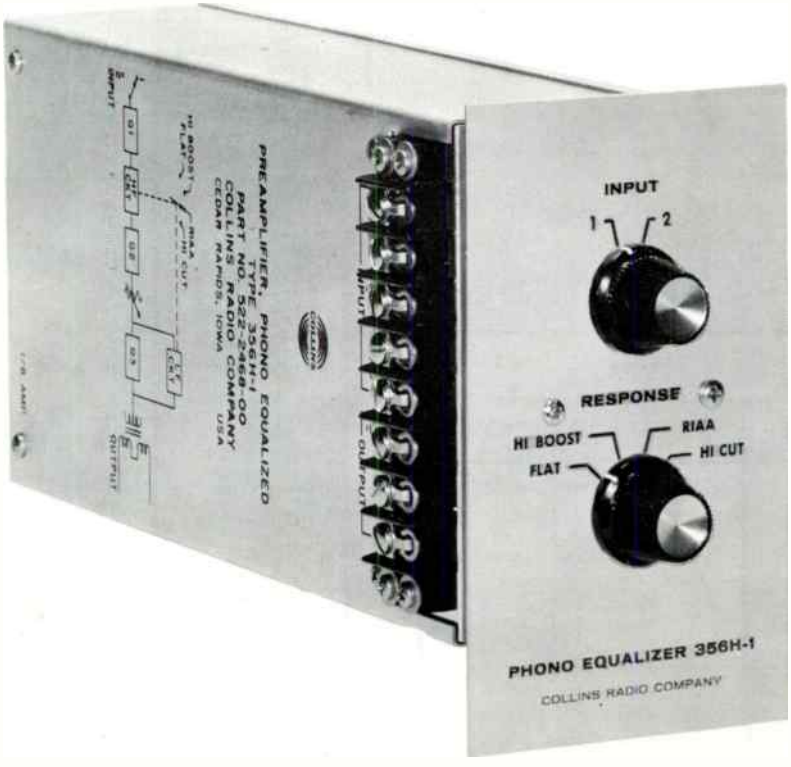
This manual provides information on the 356H-1 Phono Equalizer. Topics which are discussed include a general description of the equipment, installation, operation, principles of operation, maintenance and illustrated parts list.

1.2 PURPOSE OF THE EQUIPMENT.

The 356H-1 Phono Equalizer, Collins part number 522-2468-00, is used to equalize and amplify the output signal of a magnetic phone cartridge or microphone, see figure 1. The 356H-1 will replace passive equalizers and console or turntable preamplifiers.

1.3 TECHNICAL CHARACTERISTICS.

Frequency response . .	FLAT response, 20 to 20,000 cps ±1.5 db.
	RIAA response, RIAA (NAB) playback equalization curve.
	HI BOOST response, RIAA (NAB) normal response with a 4-db rise at 15,000 cps.



C858-07-P

Figure 1. 356H-1 Phono Equalizer, Over-all View

World Radio History

	HI CUT response, RIAA (NAB) normal response with a 4-db drop at 15,000 cps.
Output level	-10 dbm, nominal.
Output impedance	150/600 ohms, balanced or unbalanced.
Input impedance	High impedance, unbalanced.
Distortion	1.0 percent maximum, 30 to 15,000 cps at -10 dbm output.
Output noise	Signal-to-noise ratio 60 db with -50 dbm input.
Gain	40 db minimum at 1000 cps.
Power source	120/240 volts a-c, ±5 percent, 50/60 cps. (Shipped wired for 120-volt a-c operation.)
Ambient temperature	+15°C to +45°C (+59°F to +113°F).
Ambient humidity	95 percent.
Dimensions	4 in. wide, 2 in. high, 7-3/4 in. deep.
Weight	3-1/4 pounds.

1.4 TRANSISTOR, DIODE, AND FUSE COMPLEMENT.

Table 1 gives the transistors, fuse, and diode types used in the 356H-1.

TABLE 1
TRANSISTOR, FUSE, AND DIODE COMPLEMENT

REFERENCE SYMBOL	TYPE		
	1N1488	1/8 AMPERE	2N1175A
CR1, CR2	2		
F1		1	
Q1, Q2, Q3			3

2. Installation.

2.1 MOUNTING.

Figure 3 is an outline template of the 356H-1 and may be used directly when determining the location of the holes used for mounting the 356H-1 to a turntable cabinet or other surface. The dotted line is an outline of the chassis under the front plate. Refer to figure 2.

2.2 POWER INPUT.

Connect the black and white leads of the a-c power cord to 110 volts, 50/60 cps. If 230-volt operation is to be used, refer to figure 7 for instructions to revise power transformer T2.

CAUTION

Use the green wire only when no other ground is provided. If more than one ground is used, the ground loops may cause excessive noise.

3. Operation.

3.1 GENERAL.

The 356H-1 Phono Equalizer is controlled locally. Power is applied to the 356H-1 by correcting the input power cord to a 120-volt, 60-cps source. If 240-volt operation is required, refer to figure 7. Controls provide a choice between two inputs and between four response curves.

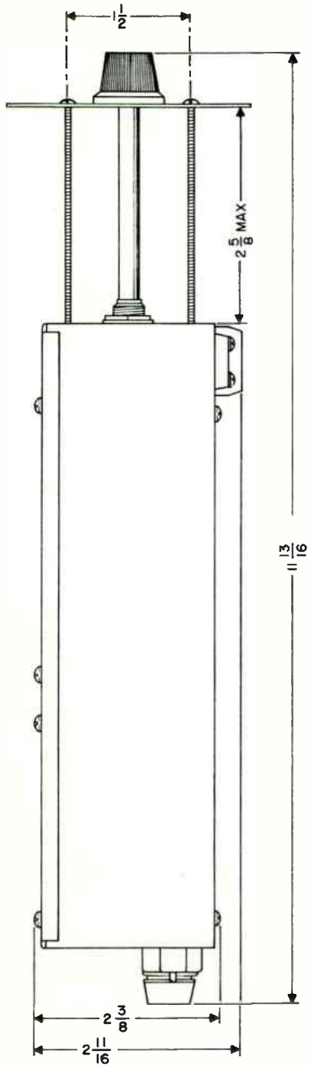
3.2 FUNCTION OF CONTROLS.

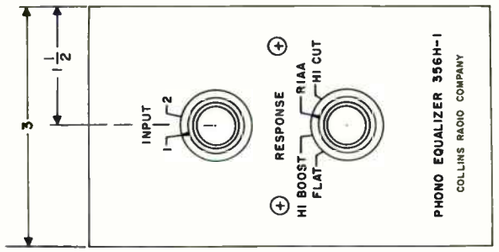
The 356H-1 controls and their functions are listed in table 2.

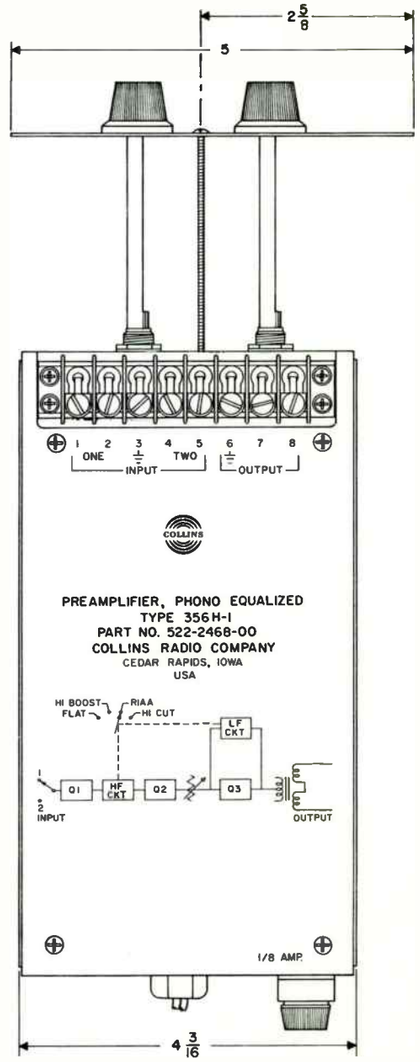
TABLE 2
356H-1 OPERATING CONTROLS

CONTROL	FUNCTION
INPUT selector (S2)	Selects one of the two inputs connected to the INPUT lugs on the 356H-1.
RESPONSE selector (S1)	Selects one of the following four responses: FLAT - Used for test purposes and mike preamplifier use. The frequency response is 20 to 20,000 cps, ±1.5 db. HI BOOST - Response has a 4-db rise above the RIAA (NAB) normal curve at 15,000 cps. RIAA - The RIAA (NAB) playback equalization response curve. HI CUT - Response has a 4-db drop below the RIAA (NAB) normal curve at 15,000 cps.

World Radio History

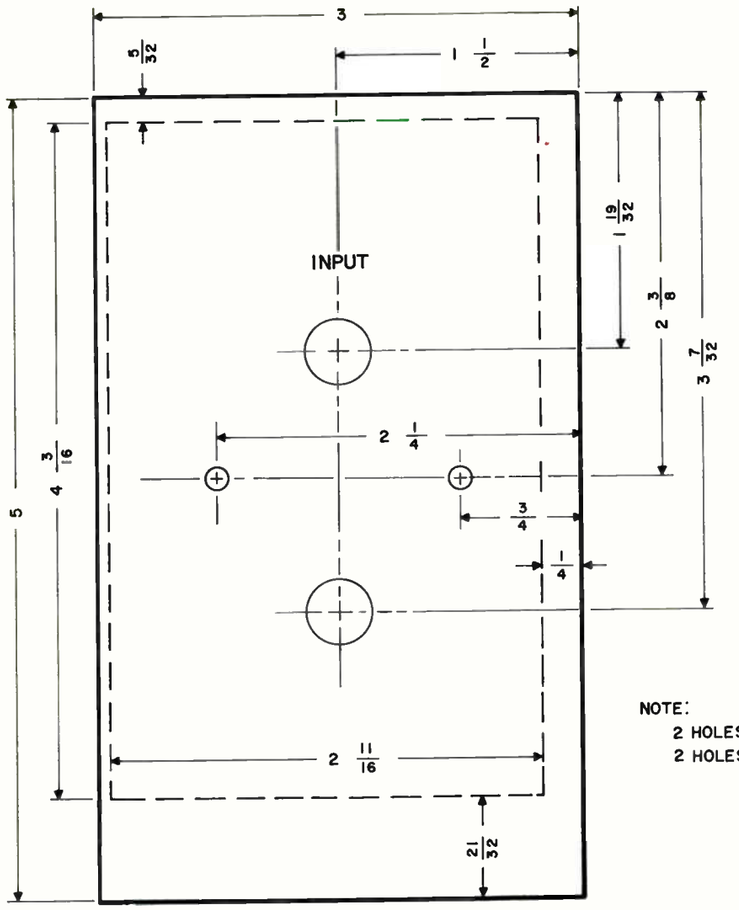






C858-02-4

Figure 2. 356H-1 Phono Equalizer, Outline and Mounting Dimensions



C858-06-4

Figure 3. Installation Template, 356H-1

World Radio History

World Radio History

4. Principles of Operation.

4.1 GENERAL THEORY.

Input signals from a turntable arm, using a magnetic cartridge or a microphone, are connected to the INPUT terminals on TB1 (figure 4). INPUT switch S2 selects one of two inputs which is coupled through capacitor C1 to amplifier Q1. The amplifier stage has a high input impedance designed to bridge magnetic phono cartridges. The stage is decoupled by an R-C filter composed of capacitor C7 and resistor R16. Resistor R5 in the emitter circuit provides current feedback. The signal is coupled through capacitor C3 to the base of transistor Q2. RESPONSE selector S1A selects various resistor-capacitor combinations from the high frequency compensation network in the base circuit of Q2. When the selector is in the FLAT position, none of the high frequency components are selected. This provides a response of 20 to 20,000 cps ±1.5 db. Components in the network are selected in the HI BOOST position to provide a high frequency boost of about 4 db above the normal RIAA (NAB) response at 15,000 cps. The RIAA (NAB) playback equalization curve is the response determined by component, selected when the selector is in the RIAA position. Components are selected in the high frequency compensation network to provide about a 4-db drop below the normal RIAA (NAB) response at 15,000 cps when the selector is in HI CUT position. A frequency compensating current feedback network, consisting of capacitors C14 and C15 and resistor R10, is in the emitter circuit of amplifier Q2. The signal is coupled through capacitor C5 to gain control R22 in the base of amplifier Q3. The gain control is adjusted to provide 40-db gain. RESPONSE selector S1B provides a means to select one of two types of feedback from the collector to the base of Q3. With the selector in FLAT position, voltage feedback is employed to give a low frequency response down to 30 cps. A low frequency compensated feedback provides the low frequency response to meet the RIAA (NAB) response curve when selector S1B is in HI BOOST, RIAA, or HI CUT position. The signal is coupled from the output of amplifier Q3, through transformer T1, to the OUTPUT terminals on TB1.

The power supply and filter, which is located in a separate compartment, provides approximately -20 volts d-c for emitter voltages. Power transformer T2 is shown, as it is shipped, wired for 120-volt a-c operation. It may be wired for 240-volt a-c operation as explained in figure 7.

5. Maintenance.

5.1 GENERAL.

This section contains maintenance procedures for servicing transistors in the 356H-1, and adjustments and voltage measurements for trouble-shooting the 356H-1.

5.2 TEST EQUIPMENT REQUIRED.

Test equipment listed in table 3, or its equivalent, is required for maintenance of the 356H-1.

TABLE 3
TEST EQUIPMENT REQUIRED

EQUIPMENT	MANUFACTURER AND TYPE
Voltmeter	Triplett 630A
VTVM	Hewlett-Packard 400D
Audio signal generator	Hewlett-Packard 200CD
Attenuator	Daven T693R
Input pad	Daven 6813
Output pad	Daven 6853

5.3 VOLTAGE MEASUREMENTS.

Table 4 gives the voltages on the elements of the transistors of the 356H-1, and the power supply voltage. Make the a-c voltage measurements with the input signal applied to the INPUT terminals to locate the defective stage. The d-c voltage measurements, to be made under no-signal conditions, will help locate the faulty component.

5.4 ADJUSTMENTS.

Gain control R22 (figure 4) is adjusted at the factory for an over-all gain in the 356H-1 of 40 db.

5.5 SERVICING TRANSISTOR CIRCUITS.

The servicing procedures and test equipments that have been used in the past with other types of electronic gear, for the most part, may be used with transistor circuits. The cases where special precautions must be used are listed below. If the equipment under test contains transistors, even though they may not be in the circuits under test, the precautions should be observed because of the possibility of accidentally contacting a transistor circuit.

5.5.1 USE OF TEST EQUIPMENT.

The damage to transistors by test equipment is usually the result of accidentally applying too much current or voltage to the transistor elements. The following equipment are common sources which may damage transistors when used for testing.

a. Transformerless power supplies. One source of such current is from the power line when test gear with transformerless power supply is used. This type of test gear can be used by employing an isolation transformer in the power line.

b. Line filter. It is still possible to damage transistors from line current, even though the test gear has a power transformer in the power supply, if the test gear is equipped with a line filter. This filter may act like a voltage divider and apply 55 volts a-c to the transistor. To eliminate trouble from this situation, connect a ground wire from the chassis of the test gear to the chassis of the equipment under test before any other connections are made.

World Radio History

TABLE 4. 356H-1 MEASUREMENTS

COMPONENT	POINT MEASURED AND VOLTAGE			
	TERMINAL 2	BASE	EMITTER	COLLECTOR
Transformer T1	-21.75 volts d-c			
Transistor Q1		.0047 volts a-c -6.2 volts d-c (12-volt d-c scale)	.0041 volts a-c -7.4 volts d-c (12-volt d-c scale)	.058 volts a-c -15.2 volts d-c (60-volt d-c scale)
Transistor Q2		.058 volts a-c -4.9 volts d-c (12-volt d-c scale)	.053 volts a-c -5.5 volts d-c (12-volt d-c scale)	.79 volts a-c -11.3 volts d-c (60-volt d-c scale)
Transistor Q3		.0037 volts a-c -12.8 volts d-c (60-volt d-c scale)	.00019 volts a-c -12.8 volts d-c (60-volt d-c scale)	1.0 volts a-c -21.0 volts d-c (60-volt d-c scale)

Conditions:

All voltages are measured under no-signal conditions using a Triplett 630A voltmeter.

All a-c voltages are measured using a Hewlett-Packard 400D VTVM with a 1000-cps signal input at -50 dbm. The 1000-cps signal is coupled through the Daven T693R attenuator, and the attenuator input and output pads, 6813 and 6853.

c. Low-sensitivity multimeters. Another source of transistor damage is a multimeter that requires excessive current for adequate indications. Multimeters that have sensitivites of less than 5000 ohms per volt should not be used. A multimeter with lower sensitivity will draw too much current through many types of transistors and damage them. Use of 20,000-ohm-per-volt meters or vacuum-tube voltmeters is recommended. Check the ohmmeter circuits (even those in vtvm's) on all scales with an external, low-resistance milliammeter in series with the ohmmeter leads. If the ohmmeter draws more than one milliampere on any range, this range cannot be used safely on small transistors.

d. Power supply. Always use fresh batteries of the proper value for the equipment under test when testing power supplies. Never use battery eliminators because the regulation of these devices is poor at the current values drawn by transistor circuits. Be certain about identification of polarity before attaching the battery to the equipment under test; polarity reversal may damage the transistor.

e. Electric soldering irons. Electric soldering irons may damage transistors through leakage current. To check a soldering iron for leakage current, connect an a-c voltmeter between the tip of the iron and a ground connection (water pipe or line ground), allow the iron to heat up, then check for a-c voltage with the meter. Reverse the plug in the a-c receptacle, and again check for voltage. If there is any indication on the meter, isolate the iron from the line with a transformer. The iron may be used without the isolation transformer if the iron is plugged in and brought to temperature then unplugged for the soldering operation. It is also possible to use a ground wire between the tip of the iron and the chassis of the equipment being repaired to prevent damage from leakage current.

Light-duty soldering irons of 20 to 25 watts capacity are adequate for transistor work and should be used. If it is necessary to use a heavier duty iron, wrap a piece of number 10 copper wire around the tip of the iron, and make it extend beyond the tip of the iron. Tin the end of the piece of copper wire, and use it as the soldering tip.

5.5.2 HEAT-SINK WHEN SOLDERING. When installing or removing a soldered-in transistor, grasp the lead, to which heat is being applied, between the solder joint and the transistor with long-nose pliers to bleed off some of the heat that conducts into the transistor from the soldering iron. Make sure that the wires that are being soldered to transistor terminals are properly pretinned so that the connection can be made quickly. Excessive heat will permanently damage a transistor.

5.5.3 REMOVAL OF TRANSISTORS FROM OPERATING CIRCUITS. Never remove or replace a plug-in transistor when the supply voltage is turned on. Transients thus produced may damage the transistor or others remaining in the circuit. If a transistor is to be evaluated in an external test circuit, be sure that no more voltage is applied to the transistor than is normally used in the circuit from which it came.

5.5.4 MAINTENANCE OF PLUG-IN TRANSISTORS. When servicing equipment that uses plug-in transistors, it is good practice to remove the transistors

World Radio History

from their sockets and reinsert them to break down any film of corrosion or dirt that may have formed.

5.5.5 MAKING RESISTANCE MEASUREMENTS IN TRANSISTOR CIRCUITS. When measuring resistances of circuits containing transistors or semiconductor diodes, remember that these components are polarity and voltage sensitive; therefore, follow the directions in the notes that are given on the resistance tables or drawings to be sure that the correct polarity and range is applied to the circuit from the ohmmeter. Any capacitors used in transistor circuits are usually of large values (especially in audio, servo, or power circuits), and it takes time to charge these capacitors when an ohmmeter is connected to a circuit in which they appear; thus, any reading obtained is subject to error if the capacitor is not allowed time to fully charge. In some cases, it may be best to isolate the components in question and individually measure them.

5.5.6 INSTALLING POWER TRANSISTOR HEAT SINKS. In some cases, power transistors are mounted on heat sinks that are designed to carry heat away from them, and in some power circuits, the transistor must also be insulated from ground. This insulating is done by means of insulating washers made of fiber and mica. When replacing transistors of this nature, be sure that the insulating washers are replaced in proper order. Before installing the mica washers, treat them with a film of silicone fluid, Collins part number 005-0273-00, or equivalent. This treatment helps in the transfer of heat. After the transistor is mounted and before making any connections to it, check from the case to ground with an ohmmeter to see that the insulation is effective.

5.5.7 USE OF TEST PRODS. Test prods should be clean and sharp. Because many of the resistors used in transistorized equipments are of low values, when checking resistance values any additional resistance produced by a dirty test prod will make a good resistor appear to be out of tolerance. In miniaturized equipment, the clearance between socket terminals, wires, and other components is usually very small. Because of this, it is easy to cause accidental short circuits with a test prod using a long exposed needle in the end. Short circuits can be very destructive to transistors, therefore it is a good practice to cover all of the exposed tip of the test prod, except about 1/8 inch, with plastic tape or other insulation.

5.5.8 TROUBLE-SHOOTING TRANSISTORS. The usual trouble-shooting practices apply to transistors. Be sure the test equipment and tools meet the requirements outlined in the above paragraphs. It is recommended that transistor testers be used to evaluate the transistor.

If a transistor tester is not available, a good ohmmeter may be used for testing. Be sure the ohmmeter meets the requirements as set forth in the paragraph on test equipment, above. To check a PNP transistor, connect the positive lead of the ohmmeter to the base and the negative lead to the emitter. (The red lead is not necessarily the positive lead on all ohmmeters.) Generally, a resistance reading of 50,000 ohms or more should be obtained. Connect the negative lead to the collector; again a reading of 50,000 ohms or more should be obtained. Reconnect the circuit with the negative lead of the ohmmeter to the base. With the positive lead connected to the emitter, a value of resistance in the order of 500 ohms or less should be obtained. Likewise, with the positive lead connected to the collector, a value of 500 ohms or less should be obtained. Similar tests made on an NPN transistor produces results as follows: With the negative ohmmeter lead connected to the base, the value of resistance between the base and the emitter and between the base and the collector should be high. With the positive lead of the ohmmeter connected to the base, the value of resistance between the base and the emitter and between the base and collector should be low. If the readings do not check out as indicated, the transistor probably is defective and should be replaced.

CAUTION

If a defective transistor is found, make sure that the circuit is in good operating order before inserting the replacement transistor. If a short circuit exists in the circuit, plugging in another transistor may result in another burned out transistor. Do not depend upon fuses to protect transistors.

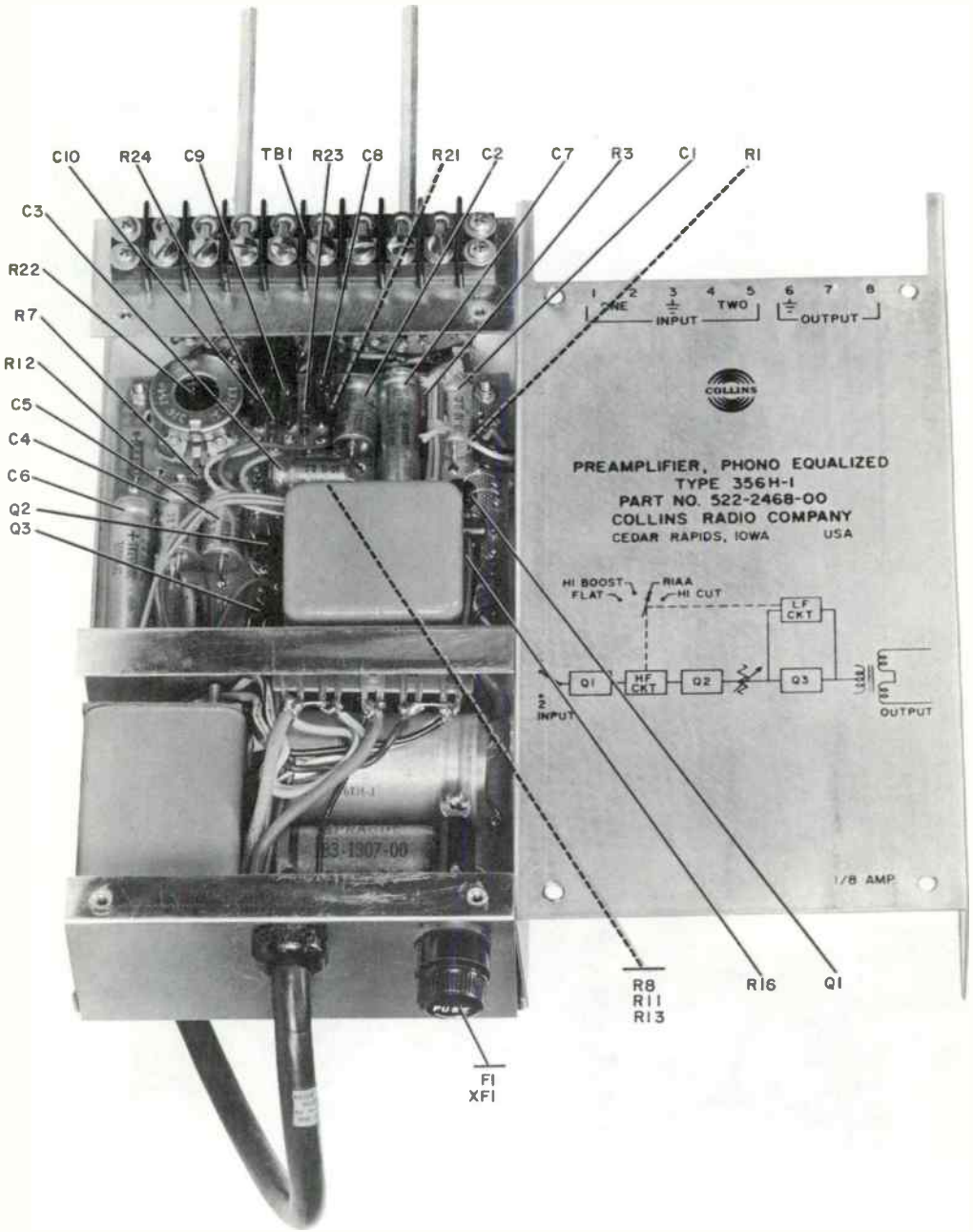
Make sure that the bias resistors in series with the various transistor elements are correct. The transistor is very sensitive to improper bias voltages; therefore, a short or open circuit in the bias resistors may damage the transistor. For this reason, do not trouble shoot by shorting various points in the circuit to ground and listening for clicks.

World Radio History

6. Parts List.

ITEM	DESCRIPTION	COLLINS PART NUMBER
	356H-1 PHONO EQUALIZER	522-2468-00
C1	CAPACITOR, FIXED, ELECTROLYTIC: 30 uf, -10% +100%, 10 v d-c	183-1377-00
C2	CAPACITOR, FIXED, ELECTROLYTIC: 50 uf, -10% +100%, 15 v d-c; Sprague Electric Co. part no. 30D170A1	183-1157-00
C3 thru C5	CAPACITOR, FIXED, ELECTROLYTIC: same as C2	183-1157-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: 250 uf, -10% +100%, 12 v d-c; Sprague Electric Co. part no. 30D157A1	183-1190-00
C7	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf, -10%, +100%, 25 v d-c; Sprague Electric Co. part no. 30D188A1	183-1192-00
C8	CAPACITOR, FIXED, MICA: 4700 uuf, ±5%, 500 v d-c Electro Motive part no. DM30F472J	912-2711-00
C9	CAPACITOR, FIXED, MICA: same as C8	912-2711-00
C10	CAPACITOR, FIXED, MICA: 8200 uuf, ±5%, 500 v d-c; Electro Motive part no. DM30F822J	912-2729-00
C11	CAPACITOR, FIXED, MICA: 6800 uuf, ±5%, 500 v d-c; Electro Motive part no. DM30F682J	912-2723-00
C12	CAPACITOR, FIXED, ELECTROLYTIC: 150 uf, +100% -10%, 50 v d-c	183-1307-00
C13	CAPACITOR, FIXED, ELECTROLYTIC: 500 uf, -15% +100%, 25 v d-c; Cornell-Dubilier part no. BRH10156V	183-1208-00
C14	CAPACITOR, FIXED, CERAMIC: 10,000 uuf, ±20%, 500 v d-c	913-1188-00
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon; General Electric Co. part no. 1N1488	353-1657-00
CR2	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353-1657-00
F1	FUSE, CARTRIDGE: glass enclosed; 1/8 amp rating; 250 v max; Bussman Mfg Co. part no. MDL-1/8	264-0290-00
O1	KNOB: round, push-on type, phenolic body; 0.840 in. dia by 21/32 in. thk	281-0415-00
O2	KNOB: same as O1	281-0415-00
P1	CONNECTOR, PLUG, ELECTRICAL: rubber body material; 15 amp at 125 v; 10 amp at 250 v	368-0030-00
Q1	TRANSISTOR: germanium; General Electric Co. part no. 2N1175A	352-0315-00
Q2	TRANSISTOR: same as Q1	352-0315-00
Q3	TRANSISTOR: same as Q1	352-0315-00
R1	RESISTOR, FIXED, FILM: 100,000 ohms, ±1%, 1/8 w	705-6692-00
R2	RESISTOR, FIXED, FILM: 147,000 ohms, ±1%, 1/8 w	705-6700-00
R3	RESISTOR, FIXED, FILM: 17,800 ohms, ±1%,	705-6656-00
R4	NOT USED	
R5	RESISTOR, FIXED, FILM: 464 ohms, ±1%, 1/8 w	705-6580-00
R6	RESISTOR, FIXED, FILM: 10,000 ohms, ±1%, 1/4 w	705-7144-00
R7	RESISTOR, FIXED, FILM: 68,100 ohms, ±1%, 1/8 w	705-6684-00
R8	RESISTOR, FIXED, FILM: 178,000 ohms, ±1%, 1/8 w	705-6704-00
R9	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1/4 w	745-0785-00
R10	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/4 w	745-0737-00
R11	RESISTOR, FIXED, FILM: same as R3	705-6656-00
R12	RESISTOR, FIXED, FILM: 2870 ohms, ±1%, 1/8 w	705-6618-00
R13	RESISTOR, FIXED, COMPOSITION: 82,000 ohms, ±10%, 1/4 w	745-0818-00
R14	RESISTOR, FIXED, COMPOSITION: same as R9	745-0785-00
R15	RESISTOR, FIXED, FILM: 51,100 ohms, ±1%, 1/8 w	705-6678-00
R16	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/4 w	745-0773-00
R17	RESISTOR, FIXED, COMPOSITION: 12 ohms, ±10%, 1/4 w	745-0680-00
R18	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/4 w	745-0749-00
R19	RESISTOR, FIXED, COMPOSITION: same as R9	745-0785-00
R20	NOT USED	
R21	RESISTOR, FIXED, COMPOSITION: 2700 ohms, ±10%, 1/4 w	745-0764-00
R22	RESISTOR, VARIABLE: composition; 5000 ohms, ±20%, 1/4 w	376-2549-00
R23	RESISTOR, FIXED, COMPOSITION: same as R21	745-0764-00
R24	RESISTOR, FIXED, COMPOSITION: 100 ohms, ±10%, 1/4 w	745-0713-00
S1	SWITCH, ROTARY: 2 circuit (2 pole), 4 positions, 1 section; 2 moving contacts, 9 fixed contacts	259-1524-00
S2	SWITCH, ROTARY: 4 circuit (4 pole), 2 positions, 1 section, 4 moving contacts, 12 fixed contacts	259-1523-00
T1	TRANSFORMER, AUDIO FREQUENCY: 8000 ohms pri; 300 ohms, 300 ohms sec; 2 mw operating power level; 50 cps to 15 kc freq range; Stancor Elect. p/n 32496	667-0105-00
T2	TRANSFORMER, POWER, STEP-DOWN: 120 v a-c, 120 v a-c pri; 50 v a-c, center tapped sec; 50 to 60 cps, continuous duty; Chicago Std Trans, p/n 30897	662-0036-00
TB1	TERMINAL, STRIP: phenolic, barrier type w/ lug for back connection, 8 terminals, 3-3/8 in. lg approx, 13/32 in. h, 7/8 in. w overall	367-0016-00
XF1	FUSE HOLDER: extractor post type; 125 v, 5 amp; accommodates 3AG cartridge fuse	265-1002-00

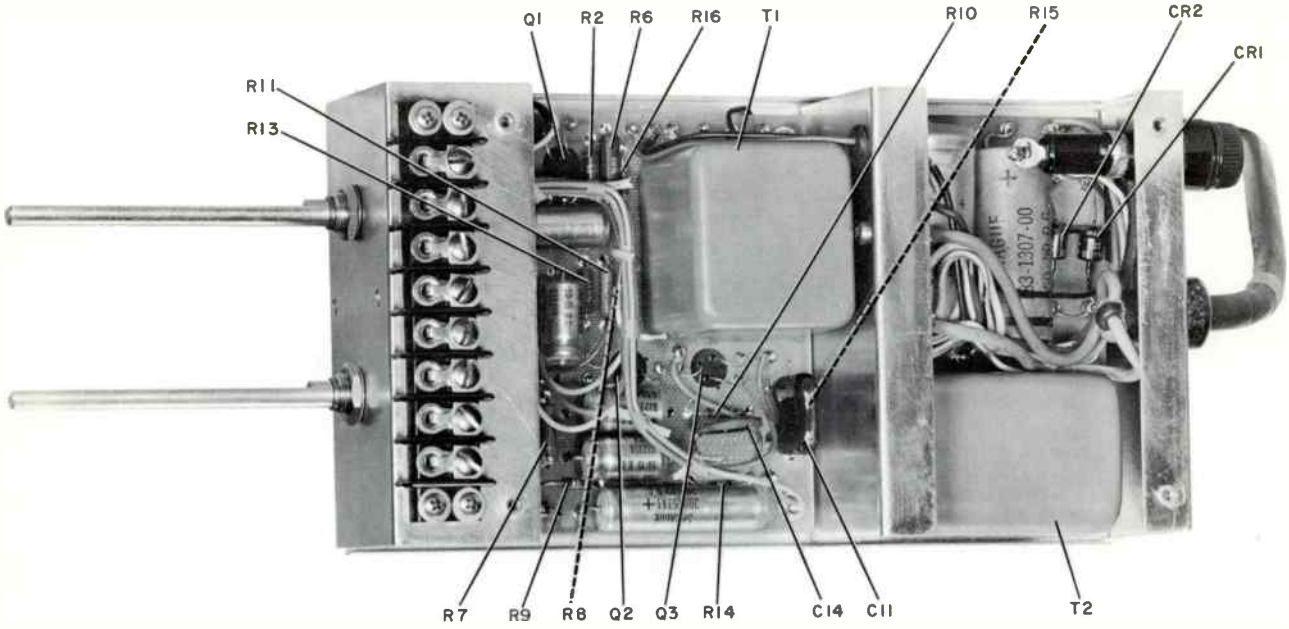
World Radio History



C858-05-P

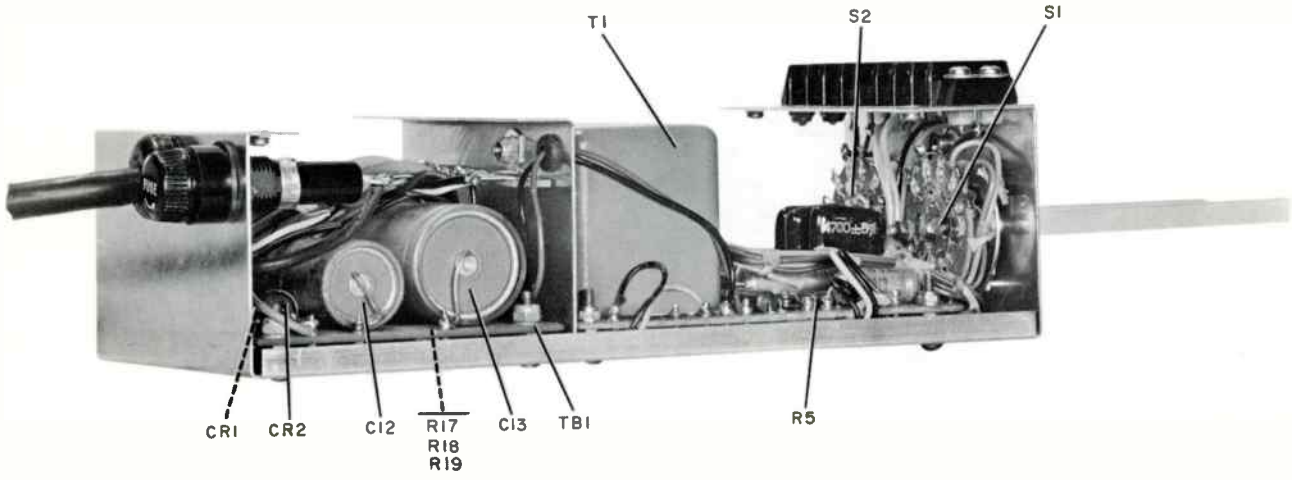
Figure 4. 356H-1 Phono Equalizer, Top View, Cover Off

World Radio History



C858-03-P

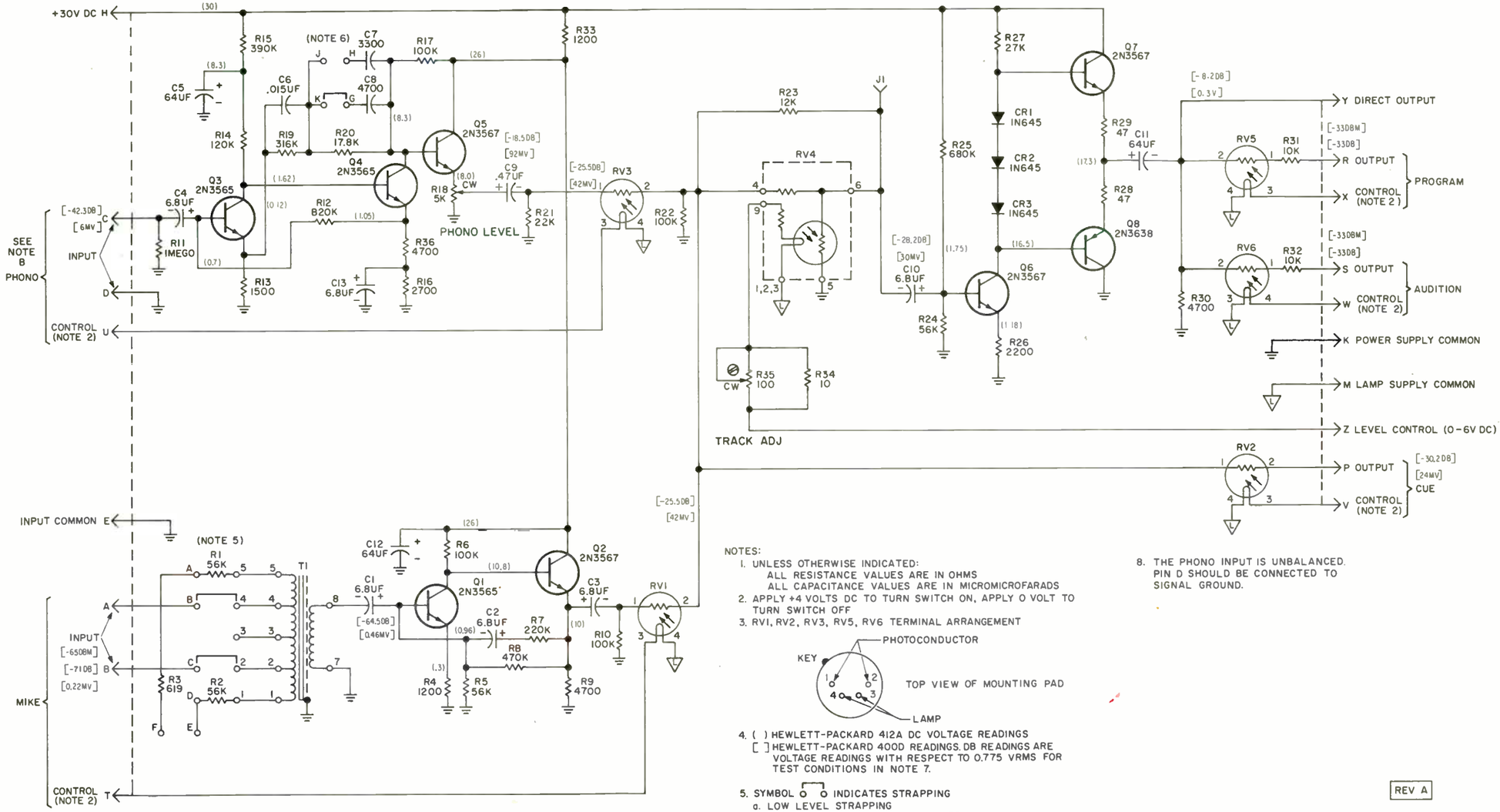
Figure 5. 356H-1 Phono Equalizer, Top View, Cover Removed



C858-04-P

Figure 6. 356H-1 Phono Equalizer, Side View, Cover Removed

World Radio History



NOTES:

1. UNLESS OTHERWISE INDICATED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
2. APPLY +4 VOLTS DC TO TURN SWITCH ON, APPLY 0 VOLT TO TURN SWITCH OFF
3. RV1, RV2, RV3, RV5, RV6 TERMINAL ARRANGEMENT

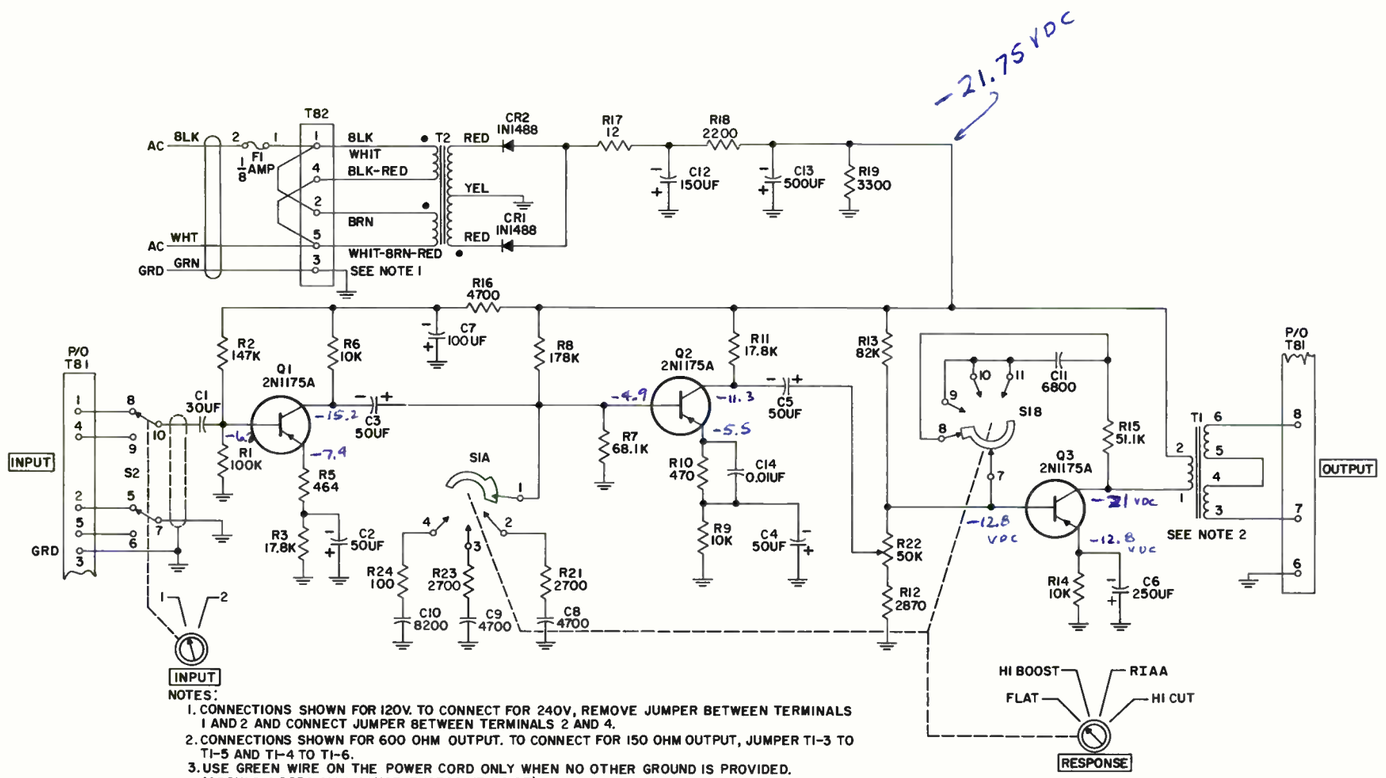
4. ( ) HEWLETT-PACKARD 412A DC VOLTAGE READINGS
   [ ] HEWLETT-PACKARD 400D READINGS. DB READINGS ARE VOLTAGE READINGS WITH RESPECT TO 0.775 VRMS FOR TEST CONDITIONS IN NOTE 7.
5. SYMBOL O O INDICATES STRAPPING
   a. LOW LEVEL STRAPPING
      50 OHMS STRAP B TO 3 AND C TO 2
      150 OHMS STRAP B TO 4 AND C TO 2
      600 OHMS STRAP B TO 5 AND C TO 1
   b. HIGH LEVEL STRAPPING
      BRIDGING (100K) B TO A AND C TO D
      TERMINATING (600 OHMS) B TO A AND C TO D AND F TO E
6. EQUALIZATION STRAPPING
   RIAA - STRAP K TO G
   +3DB HF - STRAP J TO H
   -3DB HF - STRAP K TO G AND J TO H
7. TEST LEVEL CONDITIONS:
   FREQUENCY 1000 CPS, ZERO VOLTS ON PIN Z, 4 VDC ON PINS W, X AND V (ONE AT A TIME), PINS R AND S TERMINATED IN 600 OHMS, PIN P TERMINATED IN 2.61 K OHMS, CIRCUIT STRAPPED AS SHOWN ON SCHEMATIC. RIB ADJUSTED TO PROVIDE 42 MV AT PIN 1 OF RV3. DBM READINGS ARE DB BELOW ONE MILLIWATT
8. THE PHONO INPUT IS UNBALANCED. PIN D SHOULD BE CONNECTED TO SIGNAL GROUND.

REV A

Figure 3. Microphone-Phonograph Preamplifier 356R-1, Schematic Diagram

World Radio History

World Radio History



NOTES:
1. CONNECTIONS SHOWN FOR 120V. TO CONNECT FOR 240V, REMOVE JUMPER BETWEEN TERMINALS 1 AND 2 AND CONNECT JUMPER BETWEEN TERMINALS 2 AND 4.
2. CONNECTIONS SHOWN FOR 600 OHM OUTPUT. TO CONNECT FOR 150 OHM OUTPUT, JUMPER T1-3 TO T1-5 AND T1-4 TO T1-6.
3. USE GREEN WIRE ON THE POWER CORD ONLY WHEN NO OTHER GROUND IS PROVIDED. (GROUND LOOPS MAY CAUSE EXCESSIVE NOISE)

Figure 7. 356H-1 Phono Equalizer, Schematic Diagram

World Radio History

World Radio History

WIRE CODE (Cont)

STYLE (Cont)	
CODE	DESCRIPTION
PL	POLYVINYL CHLORIDE, MIL-W-16878, TYPE C (1,000 VOLTS), TIN COATED COND., FUSED STRANDS
PM	POLYVINYL CHLORIDE, JAN-C-76, TYPE WL, (600 VOLTS) WITH GLASS YARN BRAID, VARNISHED AND LACQUERED
PN	POLYVINYL CHLORIDE, (600 VOLTS) TIN COATED CONDUCTOR
PO	POLYVINYL CHLORIDE, TYPE SHFS, 15C1, (750 VDC)
PP	POLYETHYLENE, RF, (2600 VOLTS)
PR	POLYAMIDE (NYLON) (600 VOLTS)
PS	POLYETHYLENE, NEON SIGN TYPE, 20,000 VDC -55 C to +105 C
PT	POLYETHYLENE, COTTON BRAIDED, FLAME + MOISTURE RESISTANT, TYPE W-146, MIL SPEC 71-3189
PV	POLYVINYL CHLORIDE, MIL-W-16878, MIN. 00. (.053)
PW	POLYVINYL, HIGH FLEXIBILITY
PX	POLYVINYL, U.L. STYLE 1061, 300 V -10 C TO +80 C
RA	RUBBER, TYPE RH-RW (HEAT AND MOISTURE RESISTANT) NEC TYPE
RB	RUBBER, MIL-C-13486, TYPE I, CLASS A (30 VOLT DC) NEOPRENE JACKET, FIBER GLASS BRAID
RC	RUBBER, NEC TYPE RHH (POLYCHLOROPRENE) -40 C to +90 C
RD	RUBBER, LACQUERED COTTON BRAID (NEON CABLE) 15,000 VOLTS
RE	RUBBER, BUNA-S (TEST LEADS) MIL-W-13169
RF	RUBBER, TEST LEADS, COMM., 5000 VOLTS
SA	SILICONE, MIL-W-16878, TYPE F (600 VOLTS) TIN COATED CONDUCTOR
SB	SILICONE, MIL-W-16878, TYPE FF (1,000 VOLTS) TIN COATED CONDUCTOR
SC	SILICONE, MIL-W-16878, TYPE FFW (1,000 VOLTS) TIN COATED CONDUCTOR
SD	SILICONE, 5,000 VOLTS
SE	SILICONE, 10,000 VOLTS
SF	SILICONE, 15,000 VOLTS
SG	SILICONE, 20,000 VOLTS
SH	SILICONE, 25,000 VOLTS, +150 C.
SJ	SILICONE, 30,000 VOLTS
SK	SILICONE, 600 VOLTS, LACQUERED NYLON BRAID COVER, +105 C.
SL	SILICONE, RUBBER, 500 VOLTS, 200 C, .008 WALL
TA	TEFLON, MIL-W-16878, TYPE E, (600 VOLTS) SILVER COATED CONDUCTOR
TB	TEFLON, MIL-W-16878, TYPE E, (600 VOLTS) NICKEL COATED COPPER ALLOY CONDUCTOR (210-0229-00) (210-0230-00)
TC	TEFLON, MIL-W-16878, TYPE EE, (1,000 VOLTS) SILVER COATED CONDUCTOR

STYLE (Cont)	
CODE	DESCRIPTION
TD	TEFLON, MIL-W-16878, TYPE EE (1,000 VOLTS) NICKEL COATED COPPER ALLOY CONDUCTOR (210-0231-00) (210-0232-00)
TE	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) SILVER COATED CONDUCTOR
TF	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) NICKEL COATED CONDUCTOR
TG	TEFLON, MIL-W-16878, TYPE K (600 VOLTS) SILVER COATED CONDUCTOR
TH	TEFLON, MIL-W-16878, TYPE K (600 VOLTS) NICKEL COATED CONDUCTOR
TJ	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) SILVER COATED CONDUCTOR
TK	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) NICKEL COATED CONDUCTOR
TL	TEFLON, (3,000 VOLTS) SILVER COATED CONDUCTOR. NOT COVERED BY MIL-W-16878 BUT SIMILAR TO TYPE EE
TM	MIL-W-16878, TYPE E, (600 VOLTS) EXCEPT SOLID CONDUCTOR, SILVER PLATED
TN	TEFLON, MIL-W-16878, TYPE KT, EXCEPT 300 V SILVER PLATED ANNEALED COPPER CONDUCTOR
TP	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COND. INSULATION BONDED
TR	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0527-00) (210-0528-00) (210-0534-00) (210-0535-00) (210-0533-00)
TS	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) SILVER COATED COPPER ALLOY EXCEPT WITH A 0.001 MIN. COATING OF "ML" POLYMER OVER TEFLON (210-0424-00)
TT	TEFLON, MIL-W-16878, TYPE KT (250 VOLTS) NICKEL COATED COPPER ALLOY EXCEPT WITH A 0.001 MIN. COATING OF "ML" POLYMER OVER TEFLON (210-0278-00)
TV	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0425-00) (210-0469-00) (210-0418-00) (210-0419-00) (210-0455-00) (210-0454-00)
TW	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR
TX	TEFLON, MIL-W-16878, TYPE E (600 VOLTS) EXCEPT NICKEL, 99.5% CONDUCTOR 1/8H, WELDABLE PER MIL-N-46026 (210-0401-00)
TY	TEFLON, MIL-W-16878, TYPE ET (250 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0522-00) 210-0537-00)
TZ	TEFLON, MIL-W-16878, TYPE EE (1,000 VOLTS) SILVER COATED COPPER ALLOY CONDUCTOR (210-0420-00) (210-0421-00) (210-0529-00) (210-0530-00)
VA	VINYL, MIL-W-5086, TYPE II, (600 VOLTS) SIZE 22-12
VB	VINYL, MIL-W-5086, TYPE II, (600 VOLTS) SIZE 0000-10
VC	VINYL, MIL-W-5086, TYPE III, (600 VOLTS) SIZE 22-12
VD	VINYL, MIL-W-5086, TYPE IV, (600 VOLTS) SIZE 0000-10

STYLE (Cont)	
CODE	DESCRIPTION
VE	VINYL, MIL-W-5086, TYPE I, (600 VOLTS) SIZE 22-12
ZA	POLYOLEFIN, IRRADIATED, MODIFIED, (300 VOLTS)
ZB	POLYOLEFIN, IRRADIATED, MODIFIED, (600 VOLTS)

SHIELD	
CODE	DESCRIPTION
00	NONE
01	BRAIDED, 3 ENDS, 36 AWG, 20 PICKS, 16 CARRIERS
02	BRAIDED, 3 ENDS, 38 AWG, 22 PICKS, 16 CARRIERS
03	BRAIDED, 4 ENDS, 36 AWG, 14 PICKS, 16 CARRIERS
04	BRAIDED, 4 ENDS, 36 AWG, 16 PICKS, 16 CARRIERS
05	BRAIDED, 4 ENDS, 38 AWG, 23 PICKS, 16 CARRIERS
06	BRAIDED, 5 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
07	BRAIDED, 5 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
08	BRAIDED, 6 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
09	BRAIDED, 6 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
10	BRAIDED, 6 ENDS, 36 AWG, 10 PICKS, 24 CARRIERS
11	BRAIDED, 6 ENDS, 36 AWG, 12 PICKS, 24 CARRIERS
12	BRAIDED, 7 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
13	BRAIDED, 7 ENDS, 36 AWG, 12 PICKS, 16 CARRIERS
14	BRAIDED, 7 ENDS, 36 AWG, 10 PICKS, 24 CARRIERS
15	BRAIDED, 8 ENDS, 33 AWG, 8 PICKS, 24 CARRIERS
16	BRAIDED, 8 ENDS, 33 AWG, 9 PICKS, 24 CARRIERS
17	BRAIDED, 8 ENDS, 34 AWG, 8 PICKS, 24 CARRIERS
18	BRAIDED, 9 ENDS, 36 AWG, 9 PICKS, 24 CARRIERS
19	BRAIDED, 9 ENDS, 36 AWG, 8.5 PICKS, 24 CARRIERS
20	BRAIDED, 9 ENDS, 36 AWG, 9 PICKS, 24 CARRIERS
21	BRAIDED, 4 ENDS, 36 AWG, 10 PICKS, 16 CARRIERS
51	SPIRAL WRAPPED 5 ENDS OF #38 AWG, 8 CARRIERS
52	SPIRAL WRAPPED 100% COVERAGE
90	90% MINIMUM COVERAGE
91	91% MINIMUM COVERAGE

SHIELD (Cont)	
CODE	DESCRIPTION
92	92% MINIMUM COVERAGE
93	93% MINIMUM COVERAGE
94	94% MINIMUM COVERAGE
95	95% MINIMUM COVERAGE
96	96% MINIMUM COVERAGE
97	97% MINIMUM COVERAGE
98	98% MINIMUM COVERAGE
99	99% MINIMUM COVERAGE

OVERALL JACKET	
CODE	DESCRIPTION
F	FIBER GLASS
L	SYNTHETIC RESIN
N	NEOPRENE
P	POLYAMIDE (NYLON)
R	RUBBER
S	TEFLON, (TFE)
T	TEFLON, (FEP)
V	VINYL, (POLYVINYL CHLORIDE)
W	IRRIDATED MODIFIED POLYOLEFIN
X	NONE

OVERALL JACKET OVER COLLINS STANDARD SHIELDED WIRE IS WHITE. ANY DEVIATION MUST BE CALLED OUT ON THE DRAWING.

COLOR	
CODE	DESCRIPTION
X	NONE
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	VIOLET
8	GREY
9	WHITE

World Radio History

WIRE CODE

EXAMPLES					
A	20	TA	90	T	9123
TYPE	SIZE	STYLE	SHIELD	JACKET	COLOR

HOOKUP WIRE, STRANDED, SIZE 20 AWG, TEFLON INSULATION PER MIL-W-16878, TYPE E, (600 VOLTS), SILVER COATED CONDUCTORS, SHIELDED 90% MINIMUM COVERAGE, WITH TEFLON (FEP) OVERALL JACKET: WHITE WIRE WITH A BROWN, RED AND ORANGE TRACER

SOME POSSIBLE COMBINATIONS

A20TA00X9XXX

A20TA21T91XX

A22TB14S912X

A18PC92P9123

B26BA00XXXXX

NOTE: ALL DRAWINGS MUST SHOW A (X) IN THE VACANT FIELD OF THE CODE TO PREVENT MISINTERPRETATION.

TYPE	
CODE	DESCRIPTION
A	HOOKUP WIRE, STRANDED
B	BUS WIRE, SOLID
C	STRANDED HOOKUP WIRE, COPPERWELD, 30% COND.
D	STRANDED HOOKUP WIRE, COPPERWELD, 40% COND.
E	ELECTRICAL (CONSTRUCTION)
L	LITZ
M	MAGNET
N	NEON
T	TELEPHONE
W	TEST LEADS
Y	HOOKUP WIRE, COPPERCLAD STEEL, SOLID
Z	HOOKUP WIRE, SOLID

SIZE	
CODE	DESCRIPTION
01	1 AWG (817 x #30 IF STRANDED)
02	2 AWG (665 x #30 IF STRANDED)
03	3 AWG
04	4 AWG (133 x #25 IF STRANDED)
05	5 AWG
06	6 AWG (133 x #27 IF STRANDED)
07	7 AWG
08	8 AWG (133 x #29 IF STRANDED)
09	9 AWG
10	10 AWG (37 x #26 IF STRANDED)
11	11 AWG
12	12 AWG (19 x #25 IF STRANDED)
13	13 AWG
14	14 AWG (19 x #27 IF STRANDED)
15	15 AWG

SIZE (Cont)	
CODE	DESCRIPTION
16	16 AWG (19 x #29 IF STRANDED)
17	17 AWG
18	18 AWG (7 x #26 IF STRANDED)
19	19 AWG
20	20 AWG (7 x #28 IF STRANDED)
21	21 AWG
22	22 AWG (7 x #30 IF STRANDED)
23	23 AWG
24	24 AWG (7 x #32 IF STRANDED)
25	25 AWG
26	26 AWG (7 X #34 IF STRANDED)
27	27 AWG (7 X #35 IF STRANDED)
28	28 AWG (7 x #36 IF STRANDED)
29	29 AWG
30	30 AWG (7 x #38 IF STRANDED)
31	31 AWG
32	32 AWG (4 x #38 IF STRANDED)
33	33 AWG
34	34 AWG SOLID
35	35 AWG SOLID
36	36 AWG SOLID
37	37 AWG SOLID
38	38 AWG SOLID
39	39 AWG SOLID
40	40 AWG SOLID
41	41 AWG SOLID
42	42 AWG SOLID
43	43 AWG SOLID
44	44 AWG SOLID
45	45 AWG SOLID
46	46 AWG SOLID
47	47 AWG SOLID
48	48 AWG SOLID
49	49 AWG SOLID
50	50 AWG SOLID
51	1 AWG STRANDED (259 x #25)
52	6 AWG STRANDED (266 x #30)
53	8 AWG STRANDED (168 x #30)
54	10 AWG STRANDED (49 x #27)
55	14 AWG STRANDED (37 x #29)
56	16 AWG STRANDED (96 x #36)
57	18 AWG STRANDED (65 x #36)
58	18 AWG STRANDED (41 x #34)
59	18 AWG STRANDED (19 x #30)
60	20 AWG STRANDED (19 x #32)
61	20 AWG STRANDED (16 x #34)
62	22 AWG STRANDED (19 x #34)

SIZE (Cont)	
CODE	DESCRIPTION
63	22 AWG STRANDED (27 x #36)
64	26 AWG STRANDED (10 x #36)
65	26 AWG STRANDED (19 x #38)
66	26 AWG STRANDED (8 x #36)
67	18 AWG STRANDED (16 x #30)
68	24 AWG STRANDED (19 x #36)
70	18 AWG STRANDED (19 x #28)
71	12 AWG STRANDED (7 x .0305)
72	16 AWG STRANDED (37 x #26)
73	20 AWG STRANDED (41 x #36)
74	14 AWG STRANDED (168 x #37) (7 x 24 ROPE LAY)
75	16 AWG STRANDED (26 x #30)
76	20 AWG STRANDED (10 x #30)
77	8 AWG STRANDED (7 x .0486)
78	6 AWG STRANDED (7 x .0612)
79	18 AWG STRANDED (16 x #30)
80	36 AWG STRANDED (10 x #36)
81	14 AWG STRANDED (41 x #30)
82	2 AWG STRANDED (7 x .0974)
83	4 AWG STRANDED (7 x .0772)
84	10 AWG STRANDED (105 x #30)
85	12 AWG STRANDED (65 x #30)
86	12 AWG STRANDED (84 x #31)
87	26 AWG STRANDED (65 x #44)
88	10 AWG STRANDED (7 x .0385)
89	14 AWG STRANDED (7 x .0242)
91	0 AWG (1045 x #30 IF STRANDED)
92	00 AWG (1330 x #30 IF STRANDED)
93	000 AWG (1665 x #30 IF STRANDED)
94	0000 AWG (2109 x #30 IF STRANDED)

STYLE	
CODE	DESCRIPTION
AA	ASBESTOS, TYPE AA(BRAIDED) (300 VOLTS)
AB	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (1000 VOLTS)
AC	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (600 VOLTS)
AD	ASBESTOS, PLIOFILM, GLASS YARN BRAID, LACQUERED, (5000 VOLTS)
AE	ASBESTOS, DENSE SEAMLESS, IMPREGNATED WALL OF FELTED ASBESTOS, COVERED BY ASBESTOS BRAID. (300 VOLTS) (RHEOSTAT AND STOVE WIRE)
BA	BUS, QQ-W-343, TYPE S, SOFT OR DRAWN AND ANNEALED TIN COATED
BB	BUS, QQ-W-343, BARE ANNEALED, COPPER SOFT DRAWN
BC	BUS, QQ-W-345, TYPE I, TINNED COPPER-CLAD STEEL

STYLE (Cont)	
CODE	DESCRIPTION
BE	BUS, QQ-W-343, TYPE S, SOFT DRAWN COPPER WITH 99% MIN. PURE SILVER COATING, .001 INCH MIN. THICK
BF	BUS, 1/2 H TEMP. COPPER .001 MIN. 10KT. GOLD PLATING
BG	BUS, HARD DRAWN
BH	BUS, QQ-W-343, STRANDED ANNEALED, COPPER SOFT DRAWN
BJ	STRANDED, NICKEL PLATED ALLOY WIRE
BK	STRANDED, SOFT OR DRAWN AND ANNEALED
BL	STRANDED, MIL-W-3861, TYPE RB, CLASS K
BM	BUS, MIL-N-46026, SOLID NICKEL, ANNEALED
BN	BUS, SOLID NICKEL PER MIL-N-46026
BR	BUS MIL-19424, CLASS 2, CONDITION 4, SOLID SILVER
BS	BUS, MIL-N-46026, ANNEALED NICKEL ALLOY, GOLD PLATED
BT	BUS, QQ-W-343, TYPE S, (210-0475-00)
CA	CAMPRIC VARNISHED, GLYPTAL TREATED BRAID
EA	THERMOPLASTIC, TYPE THW (MOISTURE AND FLAME RETARDANT). NEC TYPE
EB	THERMOPLASTIC, TYPE TW (FLAME AND MOISTURE RETARDANT). NEC TYPE
EC	THERMOPLASTIC, SD COPPER COND., .010 WALL, MIN. HOOKUP
FA	POLYURETHANE, MIL-W-583, TYPE T, RD
FB	POLYURETHANE, MIL-W-583, TYPE T2, RD
FC	POLYURETHANE, MIL-W-583, TYPE T3, RD
FD	POLYURETHANE, MIL-W-583, TYPE T4, RD
FE	VINYL ACETAL, MIL-W-583, TYPE T, RD
FF	VINYL ACETAL, MIL-W-583, TYPE T2, RD
FG	VINYL ACETAL, MIL-W-583, TYPE T3, RD
FH	VINYL ACETAL, MIL-W-583, TYPE T4, RD
FJ	POLYMIDE, MIL-W-583, TYPE K (ML), RD
FK	POLYMIDE, MIL-W-583, TYPE K2 (ML), RD
FL	POLYESTER, MIL-W-583, TYPE L, RD
FM	POLYESTER, MIL-W-583, TYPE L2, RD
FN	POLYESTER, MIL-W-583, TYPE B, RD
FP	POLYESTER, MIL-W-583, TYPE B2, RD
GA	POLYURETHANE, MIL-W-583, TYPE T2, RD (3 STRANDS)
GB	POLYURETHANE, MIL-W-583, TYPE T2, RD (4 STRANDS)
GC	POLYURETHANE, MIL-W-583, TYPE T2, RD (5 STRANDS)
GD	POLYURETHANE, MIL-W-583, TYPE T2, RD (6 STRANDS)
GE	POLYURETHANE, MIL-W-583, TYPE T2, RD (7 STRANDS)
GF	POLYURETHANE, MIL-W-583, TYPE T2, RD (8 STRANDS)
GG	POLYURETHANE, MIL-W-583, TYPE T2, RD (9 STRANDS)

STYLE (Cont)	
CODE	DESCRIPTION
GH	POLYURETHANE, MIL-W-583, TYPE T2, RD (10 STRANDS)
GJ	POLYURETHANE, MIL-W-583, TYPE T2, RD (11 STRANDS)
GK	POLYURETHANE, MIL-W-583, TYPE T2, RD (13 STRANDS)
GL	POLYURETHANE, MIL-W-583, TYPE T2, RD (16 STRANDS)
GM	POLYURETHANE, MIL-W-583, TYPE T2, RD (20 STRANDS)
GN	POLYURETHANE, MIL-W-583, TYPE T2, RD (26 STRANDS)
GP	POLYURETHANE, MIL-W-583, TYPE T2, RD (32 STRANDS)
GR	POLYURETHANE, MIL-W-583, TYPE T2, RD (41 STRANDS)
GS	POLYURETHANE, MIL-W-583, TYPE T2, RD (50 STRANDS)
GT	POLYURETHANE, MIL-W-583, TYPE T2, RD (52 STRANDS)
KA	KEL-F, MIL-W-12349, (600 VOLTS), SILVER COATED COND. 125 C.
KB	KEL-F, MIL-W-12349, (1000 VOLTS), SILVER COATED COND. 125 C.
KC	KEL-F, MIL-W-12349, EXCEPT 4000 VOLTS, SILVER COATED COND. 125 C.
MA	TWO SERVINGS CELANESE, ONE SERVING COTTON WRAP, COATED WITH PLASTICIZED BUTYRATE LACQUER (300 VOLTS) (TELEPHONE TYPE)
MB	TWO SERVINGS CELLULOSE ACETATE RAYON YARN, ONE SERVING COTTON WRAP WITH PLASTICIZED CELLULOSE BUTYRATE LACQUER
PA	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS) SILVER COATED COND.
PB	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS) TIN COATED COND.
PC	POLYVINYL CHLORIDE, MIL-W-16878, TYPE C (1,000 VOLTS) TIN COATED COND.
PD	POLYVINYL CHLORIDE, MIL-W-16878, TYPE D (3,000 VOLTS) TIN COATED COND.
PE	POLYVINYL CHLORIDE, NON-MIL, TELEPHONE TYPE
PF	POLYVINYL CHLORIDE, JAN-C-76, TYPE WL (600 VOLTS)
PG	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (1000 VOLTS)
PH	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRHV (2500 VOLTS)
PI	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (600 VOLTS)
PJ	POLYVINYL CHLORIDE, JAN-C-76, TYPE SRIR (1000 VOLTS), WITH GLASS YARN BRAID, VARNISHED AND LACQUERED
PK	POLYVINYL CHLORIDE, MIL-W-16878, TYPE B (600 VOLTS), TIN COATED COND. FUSED STRANDS

World Radio History

ADDENDUM

STEREO CONSOLE	523-0558572-001439
MONAURAL CONSOLE	523-0558571-001439
PREAMPLIFIER CARD 356T-1	523-0558093-001438
HIGH-LEVEL INPUT CARD 356V-1	523-0558092-001438
MICROPHONE-PHONOGRAPH PREAMPLIFIER 356R-1	523-0558097-001438
PROGRAM AMPLIFIER 356P-1	523-0558094-001438
POWER SUPPLY 409Z-1	523-0558095-001438

1 August 1966
523-0558572-011439
523-0558571-011439
523-0558093-011438
523-0558092-011438
523-0558097-011438
523-0558094-011438
523-0558095-011438

©Collins Radio Company 1966
Printed in United States of America

World Radio History

Page 1-3/1-4
Change High-Level Input Level from -10 dbm to 0 dbm.

Page 2-8, paragraph 2.2.4.1
Change fourth sentence to:
Set resistor R20 for +6 volts at TP6.

Page 2-10, paragraph 2.3.1
Change step c. to:
c. Connect a 0.003-volt, 1-kc signal from an unbalanced, 600-ohm signal generator to TB8-2 and TB8-4 (common).

Page 2-10, paragraph 2.3.2
Change step f. to:
f. Connect a 0.003-volt, 1-kc signal from an unbalanced, 600-ohm signal generator to TB8-2 and TB8-4 (common).

Page 2-10, paragraph 2.3.3
Change step g. to:
g. Set the signal generator to 1 kc at 0 dbm.

Page 4-2, paragraph 4.5.2
Insert the following after 4.5.2 REVERSE CUE CIRCUITS:
Refer to figure 4-3. The MIXER 6 control, and the associated NET/RMT and AUD/PGM switches, and the REMOTE LINES switches can connect the program output to a remote line. With the switches properly arranged, the remote site operator can listen to the program being broadcast. The MIXER 6 control must not be in the CUE position. The NET/RMT switch must be in the RMT position. The AUD/PGM switch must be in the center off position. The desired REMOTE LINES switch must be in the MIX position. When the switches are set as stated above, the program output connects to the desired remote line through the reverse cue amplifier, the closed contacts on relay A1A1K1, and switch matrix A2A1.

Pages 6-19, 6-20, 6-21/6-22
Replace these pages with the enclosed pages.

World Radio History

Page 1-3/1-4
Change High-Level Input Level from -10 dbm to 0 dbm.

Page 2-3, paragraph 2.2.4.1
Change the fourth sentence to:
Set resistor R20 for +6 volts at TP6.

Page 2-12, paragraph 2.3.3
Change step h. to:
h. Set the signal generator to 1 kc at 0 dbm.

Page 2-12, paragraph 2.3.3
Insert after step k.:

Note

When both VU meters indicate 0 vu, the associated MIXER control must be near the 12-o'clock position. Otherwise, the two stereo channels will not track together.

Page 4-2, paragraph 4.5.2
Insert the following after 4.5.2 REVERSE CUE TO A REMOTE SITE.
The MIXER 6 control, and the associated NET/RMT and AUD/PGM switches, and the REMOTE LINES switches can connect the channel 1 program amplifier output to a remote line. With the switches properly set, the remote site operator can hear the program being broadcast. The MIXER 6 control must not be in the CUE position. The NET/RMT switch must be in the RMT position. The AUD/PGM switch must be in the center off position. The desired REMOTE LINES switch must be in the MIX position. When the switches are set as stated above, the channel 1 program output connects to the desired remote line through the reverse cue amplifier, the closed contacts on relay A1A1K1, and switch matrix A2A1.

Pages 6-19, 6-20, 6-21/6-22
Replace these pages with the enclosed pages.

World Radio History

PREAMPLIFIER CARD 356T-1

Change the schematic and parts list as follows:

COMPONENT	FROM	TO
RESISTOR R9	56K OHMS, 10% TOL, 1/4 WATT	12K OHMS, 5% TOL, 1/4 WATT
RESISTOR R12	470K OHMS, 10% TOL, 1/4 WATT	680K OHMS, 5% TOL, 1/4 WATT
RESISTOR R14	4700 OHMS, 10% TOL, 1/4 WATT	2200 OHMS, 5% TOL, 1/4 WATT

HIGH-LEVEL INPUT CARD 356V-1

Change input level in paragraph 2.3 as follows:

FROM	TO
-10 dbm, nominal +10 dbm, maximum	-10 dbm, minimum 0 dbm, nominal +10 dbm, maximum

MICROPHONE-PHONOGRAPH PREAMPLIFIER 356R-1

Change the parts list as shown:

COMPONENT	FROM	TO
RESISTOR R4	1500 OHMS, 5% TOL, 1/4 WATT	1200 OHMS, 5% TOL, 1/4 WATT
RESISTOR R6	68K OHMS, 5% TOL, 1/4 WATT	100K OHMS, 5% TOL, 1/4 WATT
RESISTOR R7	68K OHMS, 5% TOL, 1/4 WATT	220K OHMS, 5% TOL, 1/4 WATT

From paragraph 3., delete the following:

The phonograph preamplifier is normally used with a magnetic pickup. The shunt cable capacity between the pickup and the preamplifier input should normally be less than 300 pf to prevent the loss of high frequencies. Adjustment of this shunt capacity, and in some cases a shunt resistance, may be required to achieve optimum performance from a specific pickup.

Insert the following:

The phonograph preamplifier is normally used with a magnetic cartridge. For optimum performance, a magnetic cartridge must be terminated in a specific impedance. The 356R-1 has no terminating impedance. An external impedance allows adjustment for various cartridges. For most 47K cartridges,

World Radio History

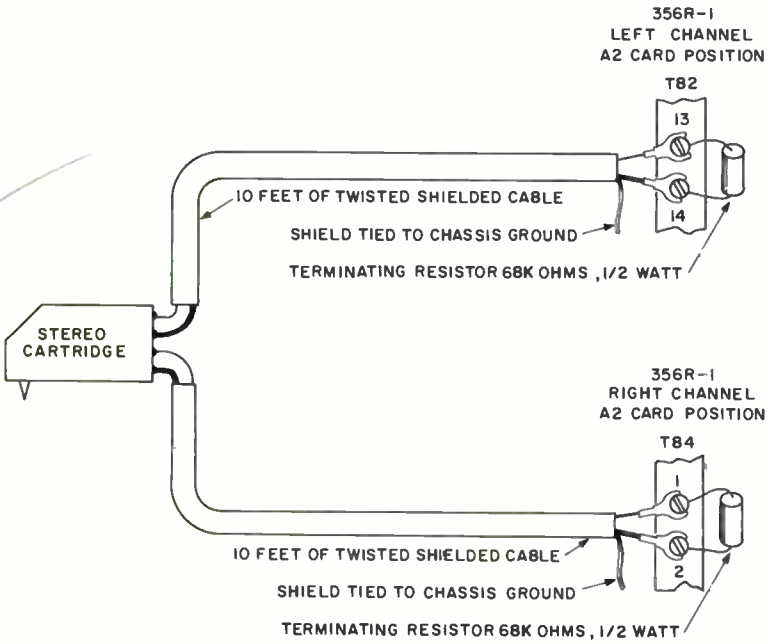
the shunt cable capacity between the cartridge and the preamplifier should be about 500 pfd. Connect a 68K, 1/2-watt resistor across the terminals where the cartridge cable connects to the 356R-1. See figure 1A. The cable between the cartridge and the 356R-1 should be a twisted, shielded pair approximately 10 feet long. The input impedance of the 356R-1, the 68K resistor, and the shunt capacity of the cable provide a near optimum load for a Shure M-44-7 cartridge.

The phonograph input is unbalanced. Pin D must connect to signal ground.

Change Input Level:

FROM	TO
-20 dbm, maximum	-26 dbm, maximum

Insert figure 1A at the bottom of page 3.



*LEFT CHANNEL CARD POSITION	T82	
	SIGNAL	GROUND
A2	13	14
A3	15	16
A4	17	18
A5	19	20
A6**	21	22

RIGHT CHANNEL CARD POSITION	T84	
	SIGNAL	GROUND
A2	1	2
A3	3	4
A4	5	6
A5	7	8
A6**	9	10

NOTES:
** FOR CONSOLE SERIAL NUMBERS LESS THAN 60, IT MAY BE NECESSARY TO MOVE THE CARD CAGE BRACE 1.25 INCHES TO THE RIGHT (BETWEEN A6 AND A7)
* MONAURAL CONNECTIONS SAME AS LEFT CHANNEL

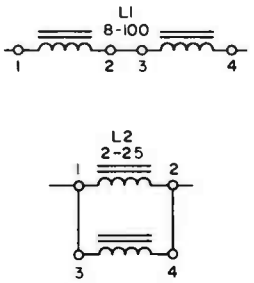
Figure 1A. Connection Diagram for 356R-1 in Broadcast Consoles 212S-1 or 212M-1

Destroy the old schematic. Insert the enclosed schematic.

World Radio History

POWER SUPPLY 409Z-1

On the parts list, change the manufacturer's part number for CR7 from 1RP47B to 1R47B. On the schematic, change L1 and L2 as shown below:



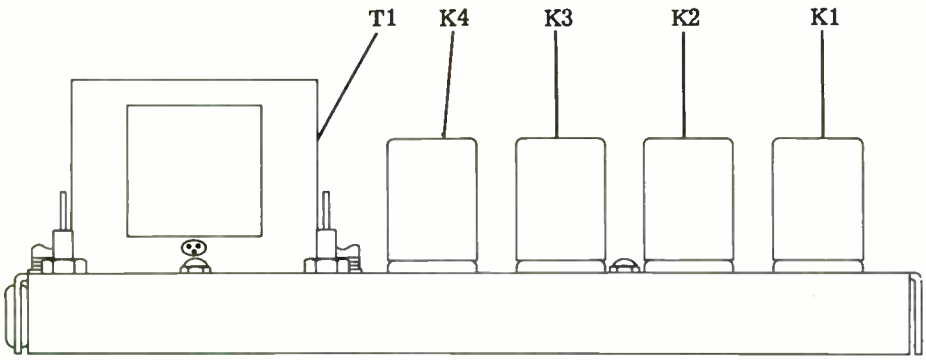
L1 and L2 in Power Supply 409Z-1

PROGRAM AMPLIFIER 356P-1

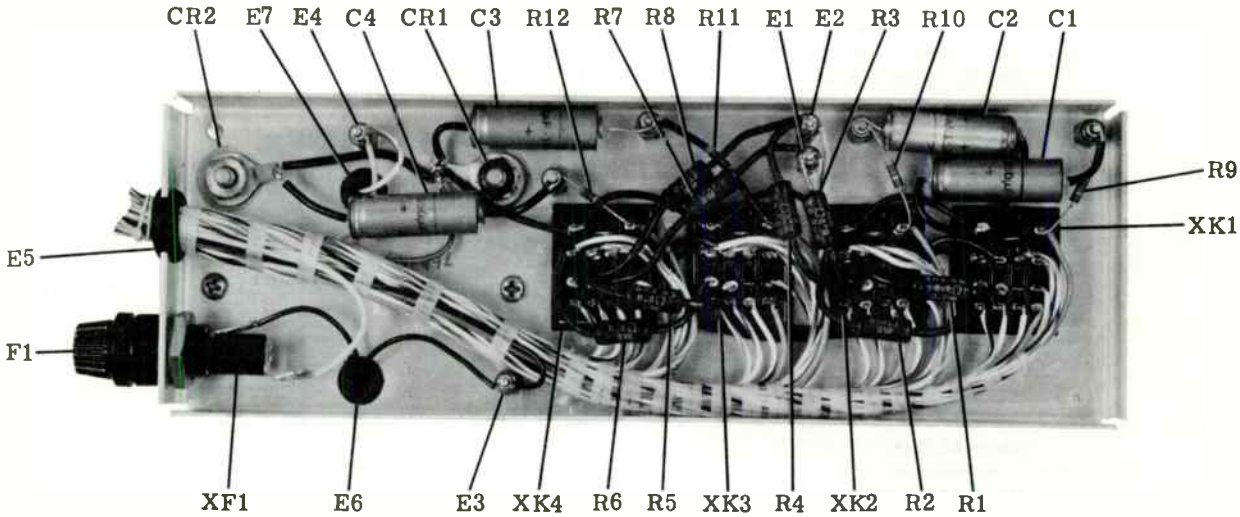
Change the schematic as follows:

COMPONENT	FROM	TO
RESISTOR R1	390 OHMS	330 OHMS
RESISTOR R21	1K	1200 OHMS
RESISTOR R30	27K	33K
CAPACITOR C10	390 PFD	560 PFD

World Radio History



Side View



Bottom View

Figure 6-7. Relay Unit

World Radio History

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RELAY UNIT			764-7429-001
C1	CAPACITOR, FXD, ELECTROLYTIC 250 UF, 16 VOLTS	C437ARE250	73445	183-2355-060
C2	SAME AS C1			
C3	SAME AS C1			
C4	SAME AS C1			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N1612	01295	353-6449-010
CR2	SAME AS CR1			
E1	TERMINAL, STUD	RTMT12M	91663	306-0976-000
E2	SAME AS E1			
E3	SAME AS E1			
E4	SAME AS E1			
E5	GROMMET, RUBBER	43-104	74970	201-1080-000
E6	GROMMET, RUBBER	MS35489-4	96906	201-0001-000
E7	SAME AS E6			
F1	FUSE, CARTRIDGE 1/2 AMP CURRENT RATING	F02A250V1-2AS	81349	264-4030-000
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	KH4394	77342	970-2427-060
K2	SAME AS K1			
K3	SAME AS K1			
K4	SAME AS K1			
R1	RESISTOR, FXD, WIRE WOUND 8.2 OHMS, 5% TOL, 3 WATTS	RW69V8R2	81349	747-5318-000
R2 THROUGH R8	SAME AS R1			
R9	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R10	SAME AS R9			
R11	SAME AS R9			
R12	SAME AS R9			
T1	TRANSFORMER, POWER OPEN FRAME	76331	81095	662-0245-010
XF1	FUSEHOLDER 15 AMP CURRENT RATING	265-1097-000	13499	265-1097-000
XK1	SOCKET, RELAY 14 CONTACTS	27E008	77342	220-1543-000
XK2	SAME AS XK1			
XK3	SAME AS XK1			
XK4	SAME AS XK1			

MANUFACTURERS CODES

CODE	MANUFACTURER
GOTHA	GOTHAM AUDIO CORP. NEW YORK, N. Y.
00348	MICROTRAN CO., INC. VALLEY STREAM, N. Y.
01295	TEXAS INSTRUMENTS, INC. SEMICONDUCTOR-COMPONENTS DIVISION, DALLAS, TEX.
01548	CAPITOL MACHINE CO. DANBURY, CONN.
01939	SPRAGUE ELECTRIC CO. OF WISCONSIN GRAFTON, WIS.
05574	VIKING INDUSTRIES, INC. CANOGA PARK, CALIF.
07688	MILITARY SPECIFICATIONS
07716	INTERNATIONAL RESISTANCE CO. BURLINGTON, IOWA
07933	RAYTHEON MFG. CO. SEMICONDUCTOR DIVISION MOUNTAIN VIEW, CALIF.

World Radio History

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
08806	MINIATURE LAMP DEPARTMENT GECO CLEVELAND, OHIO			
13499	COLLINS RADIO CO. CEDAR RAPIDS, IOWA			
33173	TUBE DEPARTMENT GECO OWENSBORO, KY.			
56289	SPRAGUE ELECTRIC CO. NORTH ADAMS, MASS.			
72619	DIALIGHT CORP. BROOKLYN, N. Y.			
73445	AMPEREX ELECTRONIC CO. DIVISION OF NORTH AMERICAN PHILIPS CO., INC. HICKSVILLE, N. Y.			
74199	QUAM NICHOLS CO. CHICAGO, ILL.			
74970	E.F. JOHNSON CO. WASECA, MINN.			
75173	HOWARD B. JONES DIVISION OF CINCH MFG. CO. CHICAGO, ILL.			
75382	KULKA ELECTRIC CORP. MT. VERNON, N. Y.			
76854	OAK MFG. CO. CRYSTAL LAKE, ILL.			
77342	AMERICAN MACHINE AND FOUNDRY CO. POTTER AND BRUMFIELD DIVISION, PRINCETON, IND.			
78189	SHAKEPROOF DIVISION OF ILLINOIS TOOL WORKS ELGIN, ILL.			
80223	UNITED TRANSFORMER CO. NEW YORK, N. Y.			
81095	TRIAD TRANSFORMER CORP. 4055 REDWOOD AVE. VENICE, CALIF. ZIP CODE 90293			
81349	MILITARY SPECIFICATIONS			
81450	ERCO RADIO LABORATORIES, INC.			
91662	ELCO CORP. WILLOW GROVE, PA.			
91663	ARMEL ELECTRONICS, INC. NORTH BERGEN, N. J.			
96256	THORDARSON-MEISSNER DIVISION OF MACGUIRE INDUSTRIES, INC., MT. CARMEL, ILL.			
96906	MILITARY SPECIFICATIONS			

World Radio History

World Radio History