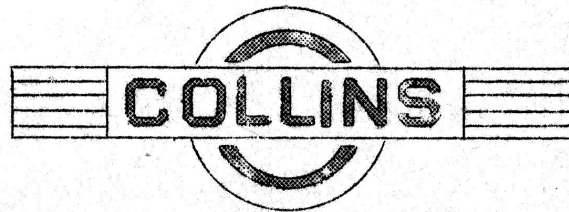


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COLLINS TYPE 6P . . . . . BROADCAST PREAMPLIFIER

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# INSTRUCTION BOOK



Collins 6P-1 Broadcast Preampfier - essential pages

Yet another obscure, decaying technical document, free as always from the [Bunker Of Doom](#)  
*Where technologies of the past live within the exciting projects of the future*

*Instructions*

**COLLINS TYPE 6P**

**MODEL I**

**BROADCAST PREAMPLIFIER**

**MANUFACTURED BY**

**COLLINS RADIO COMPANY**

**CEDAR RAPIDS, IOWA, U.S.A.**

**520 9289 00  
12159**

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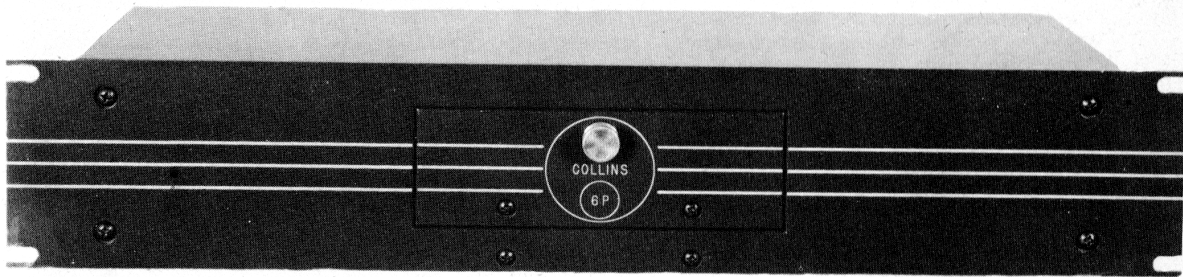


FIGURE 1-1 COLLINS TYPE 6P-1 BROADCAST PREAMPLIFIER



SECTION I  
GENERAL DESCRIPTION

1. GENERAL.

a. This instruction book is to be used as a guide to the installation, adjustment, operation and maintenance of the Collins Type 6P-1 preamplifier.

b. The Collins Type 6P-1 is a general purpose, high fidelity preamplifier designed for service in both AM or FM applications. It incorporates the following desirable feature: compactness, high fidelity performance, general utility and attractive appearance.

c. EQUIPMENT DESCRIPTION.

(1) MECHANICAL. - The Type 6P-1 preamplifier is constructed on a sturdy panel notched to fit any standard relay rack or cabinet. It requires 3-1/2 inches of vertical mounting space. The components are mounted on a vertical chassis using an inside-out type of construction. All wiring and components are accessible upon removal of a rear dust cover. This cover protects the terminals and makes the unit dustproof. The cover also conceals the incoming and outgoing wires. These wires can be admitted at either end by passing them into the slots provided for that purpose. The dust cover is provided with snap fasteners and requires no tools for removal.

(2) ELECTRICAL. - The unit consists of a two stage amplifier designed according to the best engineering standards. The impedance of any standard broadcast microphone or line can be matched by use of the Collins Universal Input feature. The output is designed to match a 600 ohm load for optimum transfer of energy. The amplifier has an overall gain of 45 VU when operating from a microphone into a 600 ohm line. Provision is made for dropping the overall gain approximately 10 VU, if desired. It has a uniform frequency response within plus or minus 0.5 db from 30 to 15,000 cycles per second. A typical response curve is shown in figure 6-1.

2. REFERENCE DATA.

a. The following apparatus is included with each standard shipment.

| <u>Collins<br/>Type No.</u> | <u>Description</u>                     | <u>Overall<br/>Dimensions</u> | <u>Weight</u> |
|-----------------------------|--|-------------------------------|---------------|
| 6P-1                        | Pre-amplifier with<br>one set of tubes | 3-1/2 x 19 x 6-7/8            | 9-1/2 lb      |
|                             | Instruction Book *                     |                               |               |

GENERAL DESCRIPTION

- b. OVERALL GAIN: 45 VU
  - c. INPUT IMPEDANCE: 50, 250 and 600 ohms
  - d. OUTPUT IMPEDANCE: 600 ohms, split winding
  - e. FREQUENCY RESPONSE: Uniform within plus or minus .5 db from 30 to 15,000 cycles per second
  - f. RESIDUAL NOISE LEVEL: -65 db below normal output as measured through Type 6M program amplifier.
  - g. DISTORTION: Less than 15% at normal output level
  - h. POWER: 6.3 volts at .6 amps ac or dc; 180 to 250 volts at 4.5 ma dc
  - i. GAIN CONTROL: Fixed gain with provision for dropping output approximately 10 db.
  - j. MOUNTING: Standard 3-1/2 x 19" panel. Depth, with cover, behind panel 6-7/8"
  - k. PANEL FINISH: Collins 4E gray enamel finish. Other colors upon request.
3. VACUUM TUBE COMPLEMENT.

| <u>Quantity</u> | <u>Tube Type</u> | <u>Function</u>  |
|-----------------|------------------|------------------|
| 1               | 1620             | Input Amplifier  |
| 1               | 1620             | Output Amplifier |

## SECTION II

### INSTALLATION AND INITIAL ADJUSTMENTS

#### 1. INSTALLATION.

##### a. PRELIMINARY.

(1) UNPACKING. - Remove unit from packing case and inspect carefully for shipping damage. All claims for damage should be filed promptly with the transportation company. If a claim for damage is to be filed, the original packing case and material must be preserved.

b. INSTALLATION PROCEDURE. - Place the unit in position in a Collins Type 19G-3 cabinet or similar standard relay rack cabinet.

(1) Secure the unit with hexagon or round head screws and flat washers. The oval head screws and cupped washers often used, are not satisfactory.

#### CAUTION

Do not mount speech input equipment too near a source of strong alternating magnetic field as this may introduce objectionable hum.

(2) POWER AND AUDIO LINE CONNECTIONS. - All connections are made at the rear of the chassis and are accessible upon removal of the dust cover.

(a) Remove rear dust cover. It is provided with snap fasteners and no tools are required.

(b) Connect the incoming microphone line to the INPUT terminals located at the extreme right of the units. This line should be carefully shielded to prevent hum pickup.

1. If a three wire line is used, such as one from a low impedance microphone, the center tap should be used as a ground.

2. Connect the impedance matching links in the proper position. The matching impedances are clearly marked on the bakelite strip. For optimum conditions of impedance match, the links should be placed on the terminals which match the impedance of the microphone.

(c) The Type 6P-1 preamplifier was designed primarily to be used in conjunction with the Collins Type 6M program amplifier. In this case it is necessary to interconnect the terminals marked +, -, 6.3 v and M on the two amplifiers. The power supply and metering is then obtained from the 6M unit. To

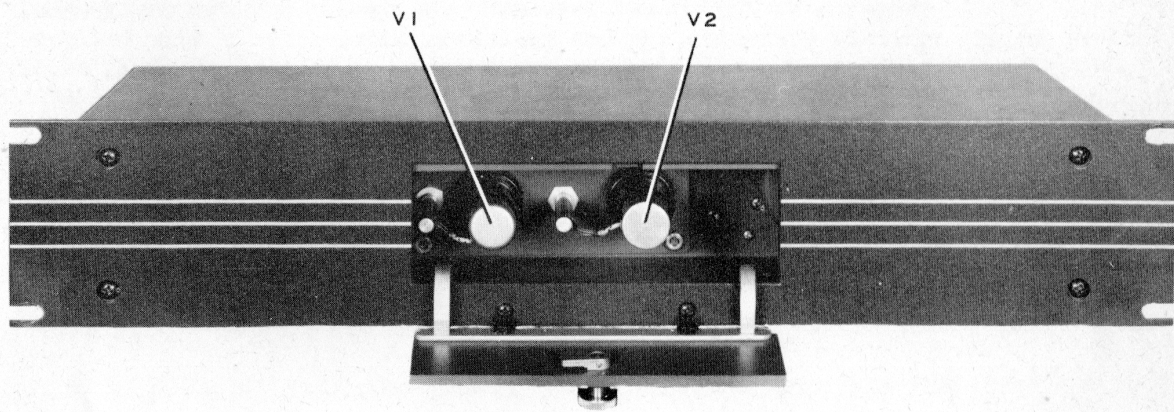


FIGURE 2-1 TYPE 6P-1 BROADCAST PREAMPLIFIER, TUBE ACCESS DOOR OPEN



## INSTALLATION AND INITIAL ADJUSTMENTS

read the plate current of the 6P-1 preamplifier when interconnected in this manner, it is only necessary to operate the metering selector switch on the Type 6M program amplifier panel.

1. If a meter other than that on the Type 6M amplifier is used, it should have an internal resistance of 100 ohms and a full scale deflection of five milliamperes.

(d) The outgoing line should be connected to the two bottom terminals on the terminal board located at the extreme right of the chassis.

1. The preamplifier is wired at the factory to work into a 600 ohm load unless ordered otherwise. However, the output transformer, T102, is supplied with a split-wound secondary and the secondary windings may be paralleled if it is desired to operate the preamplifier into a 150 ohm load.

(e) Provision is made for a gain reduction of approximately 10 db, if necessary. A moveable link is located on the center resistor board at the rear of the chassis. Refer to figure 2-2.

(3) INSERTING TUBES. - Open the tube access door located in the front panel by turning the door latch button a half turn to the left. Refer to figure 2-1. Insert tubes into their sockets.

## SECTION III

### OPERATION

#### 1. GENERAL.

The Type 6P-1 preamplifier has been designed for extreme simplicity in operation. To facilitate checking and replacing, tubes are mounted horizontally behind a small door in the panel.

#### CAUTION

Do not attempt to operate the type 6P-1 amplifier at an output level greater than zero VU as it is designed for low level operation only.

#### 2. FREQUENCY RESPONSE MEASUREMENTS.

In testing high fidelity amplifiers do not rely upon the signal generator for constant output over the entire range. It is recommended that a vacuum tube voltmeter be placed across the amplifier input and voltages be held constant when making frequency response measurements.

#### 3. INTERCHANGEABLE TUBE TYPES.

Although the amplifier is designed to operate with Type 1620 tubes, Type 6J7 tubes may be used if they are carefully selected. All tubes used, regardless of type or make, should be tested and selected for uniform characteristics and low noise in order to obtain best results from the 6P-1 preamplifier. Selected tubes can be obtained from the Collins Radio Company at any time at prevailing prices.

## SECTION IV

### MAINTENANCE

This radio equipment has been constructed of materials considered to be the best obtainable for the purpose and is carefully inspected and adjusted at the factory. Sealed capacitors and transformers are used throughout. The use of electrolytic capacitors has been restricted to cathode circuits with less than 50 volts potential. A minimum amount of maintenance should be required.

#### 1. TUBE REPLACEMENT.

The tubes furnished with the amplifier have been carefully checked at the factory for low noise level and uniform characteristics. Over a period of time, the characteristic of a tube may change so that it is advisable to check the tubes occasionally. If replacements are to be made, it is also advisable to check the new tubes for correct characteristics. In making any changes, care should be taken to see that all power to the unit has been turned off.

a. Type 6J7 tubes may be substituted for the Type 1620 tubes, if the tubes used are carefully selected for low noise level and low microphonics.

#### 2. TROUBLE SHOOTING.

a. GENERAL. - In case of failure or improper operation of the amplifier, an attempt should be made to localize the fault. In many cases the defect will result in abnormal plate current or voltage measurements. These readings may give a clue to the source of trouble. By means of systematic checking, the trouble can be narrowed down to a single stage, after which inspection and localized checking with test instruments can be used to isolate the fault.

b. NOISE. - Noise in the Type 6P-1 preamplifier can be divided into four classes: (1) Microphonics, (2) Hum, (3) Hiss, (4) Intermittent noises other than the three just listed. The first three are usually present to some degree in any amplifying system. Their magnitude depends upon circuit design and unit construction. In the 6P-1 these undesirable effects have been reduced to a negligible value.

##### (1) MICROPHONICS.

(a) Should microphonics become excessive, the trouble will usually be found in the tubes and can be eliminated by replacing the troublesome tube or tubes.

##### (2) HUM.

(a) Induction will occur whenever any part of the unit is near a strong alternating magnetic field. For this reason, the amplifier should be located several feet away from any such fields.

## MAINTENANCE

(b) Hum caused by defective tubes can best be located by substitution of other tubes known to be in good condition. It is suggested that one or more spare tubes be kept available.

(c) No difficulty should be experienced with hum due to improper grounding providing the 6P-1 unit itself is grounded.

(d) A defective power supply can cause hum due to insufficient filtering of the high voltage supply. The filter condensers should be checked to determine whether they are open circuited if hum from this source is suspected.

(3) HISS. - Hiss can be caused by defective tubes as well as by an open circuit in a low level stage. In either case, it is not likely that a signal will pass through the defective stage and this point should be checked first.

(4) INTERMITTENT NOISE. - Intermittent noises are usually caused by faulty connections either in circuit wiring or in any circuit component. A good procedure to follow in locating such trouble is to listen to the noise in headphones while removing first the input connections, then the first tube, then each tube in turn until the noise stops. It is quite likely that the noise is associated with the apparatus or wiring connected with the tube last removed. The associated components and wiring should be checked closely and if necessary, parts thought to be defective should be replaced with others known to be in good working order.

c. The following table lists the voltages measured in the circuit during normal operation. All dc voltages were measured between ground (chassis) and the point indicated using the highest readable range on a 1000 ohm per voltmeter. The negative terminal of the meter was grounded. The supply voltage was 275 volts. Readings must be corrected for other values of plate supply voltage.

| Tube       | Point of Test       | Voltage   |
|------------|---------------------|-----------|
| V1<br>1620 | Plate               | 100 Volts |
|            | Decoupling Resistor | 225 Volts |
|            | Cathode             | 3.6 Volts |
| V2<br>1620 | Plate               | 165 Volts |
|            | Decoupling Resistor | 175 Volts |
|            | Cathode             | 6.2 Volts |



PARTS LIST

| <u>ITEM</u> | <u>CIRCUIT FUNCTION</u>  | <u>DESCRIPTION</u>  | <u>MFR. CODE NO.</u> | <u>MFR. TYPE OR CAT.NO.</u> | <u>COLLINS PART NUMBER</u> |
|-------------|--------------------------|---|----------------------|-----------------------------|----------------------------|
| C101        | V1 Cathode Bypass        | CAPACITOR: 50 mf<br>25 WV; dry<br>electrolytic;<br>15/16" x 1" x<br>2-1/2"  | 9110                 |                             | 184 6502 00                |
| C102        | V1 Coupling<br>Capacitor | CAPACITOR: Fixed;<br>paper dielectric;<br>0.25 mf +10%; 600<br>WV dc; 3/4" x 1"<br>x 2-1/2"                             | 40300                |                             | 961 5021 00                |
| C103        | V1 Plate Filter          | CAPACITOR: Oil-<br>filled paper;<br>4 mf +20%; 1200<br>TV; 600 WV;<br>rectangular case;<br>1-3/16" x 2-1/2"<br>x 3-1/4" | 9110                 |                             | 930 8240 00                |
| C104        | V2 Cathode<br>Bypass     | CAPACITOR: 50 mf;<br>25 WV; dry<br>electrolytic;<br>15/16" x 1" x<br>2-1/2"   | 9110                 |                             | 184 6502 00                |
| C105        | V2 Coupling              | CAPACITOR: Foil-<br>paper; 0.5 mf<br>+20%; 1200 TV;<br>600 WV; 15/16"<br>x 1" x 1-13/16"                                | 9110<br>44620        | DYRT                        | 956 2086 40                |
| C106        | V2 Plate Filter          | CAPACITOR: Oil-<br>filled paper;<br>4 mf +20% 1200 TV;<br>600 WV; rectangular<br>case; 1-3/16" x<br>2-1/2" x 3-1/4"     | 9110                 |                             | 930 8240 00                |

PARTS LIST

| <u>ITEM</u> | <u>CIRCUIT FUNCTION</u>     | <u>DESCRIPTION</u>   | <u>MFR. CODE NO.</u>  | <u>MFR. TYPE OR CAT. NO.</u> | <u>COLLINS PART NUMBER</u> |
|-------------|-----------------------------|--|-----------------------|------------------------------|----------------------------|
| R101        | V1 Cathode                  | RESISTOR: 2200 ohms<br>+5%; Fixed; 1 watt;<br>.280" diam; .750" lg               |                       |                              | 745 3099 00                |
| R102        | V1 Plate                    | RESISTOR: Fixed;<br>75000 ohms +5%; 1<br>watt; .280" diam;<br>.750" long         | 900                   |                              | 745 3165 00                |
| R103        | V1 Plate<br>Decoupling      | RESISTOR: Fixed; 47000<br>ohms +10%; 1 watt;<br>.280" diam; .750" lg             |                       |                              | 745 3156 00                |
| R104        | V2 Grid                     | RESISTOR: Fixed; 0.10<br>megohms +10%; 1/2<br>watt; .249" diam;<br>.468" long    | 23600<br>900<br>13790 |                              | 745 1170 00                |
| R105        | V2 Grid                     | RESISTOR: Fixed;<br>47000 ohms +10%;<br>1/2 watt; .249"<br>diam; .468" lg        | 23600<br>900          |                              | 745 1156 00                |
| R106        | V2 Plate                    | RESISTOR: Fixed;<br>22000 ohms +10%;<br>1 watt; .280"<br>diam; .750" lg          | 42300<br>900          |                              | 745 3142 00                |
| R107        | V2 Plate<br>Decoupling      | RESISTOR: Fixed;<br>10,000 ohms +5%;<br>1 watt; .280" diam;<br>.750" long        | 900                   |                              | 745 3127 00                |
| R108        | V2 Cathode                  | RESISTOR: Fixed; 2200<br>ohms +5%; 1 watt;<br>.280" diam; .750" lg               |                       |                              | 745 3099 00                |
| R109        | Cathode Current<br>Metering | RESISTOR: Fixed; 25<br>ohms +1% wire wound;<br>1 watt; 9/16" diam;<br>9/16" long | 23600                 | WW3                          | 721 2506 00                |

PARTS LIST

| <u>ITEM</u> | <u>CIRCUIT FUNCTION</u> | <u>DESCRIPTION</u>  | <u>MFR. CODE NO.</u> | <u>MFR. TYPE OR CAT.NO.</u> | <u>COLLINS PART NUMBER</u> |
|-------------|-------------------------|---|----------------------|-----------------------------|----------------------------|
| T101        | Input Transformer       | TRANSFORMER: High fidelity input audio; 30 to 15000 cps; 1000 TV; solder post type; CT for 50, 250 & 600; 2-5/8" x 3-1/8" x 3-1/4"; -70 to +15 dbm operating level. Pri: 50, 250 & 600 ohms; Sec: 30000 ohms CT | 46320                | 96043                       | 677 0059 00                |
| T102        | Output Transformer      | TRANSFORMER: High fidelity output audio; solder post type; 30 to 15000 cps; 1500 TV; 1-13/16" x 2-3/16" x 2-7/8"; -40 to 15 dbm operating level. Pri: 15000 ohms CT; Sec: 600 ohms                              | 46320                | 94507                       | 677 0058 00                |
| V1          | Input Amplifier         | TUBE: Type 1620; triple grid amplifier; for applications critical as to microphonics  | 38110                |                             | 257 0043 00                |
| V2          | Output Amplifier        | TUBE: Type 1620; triple grid amplifier; for applications critical as to microphonics  | 38110                |                             | 257 0043 00                |
| X101        | Socket for V1           | SOCKET: Eight prong tube socket; mtg plate moulded in socket; low loss mica filled bakelite; 1-3/16" x 1-5/8"   | 2000                 | 88-8TM                      | 220 1005 00                |
| X102        | Socket for V2           | SOCKET: Eight prong tube socket; mtg plate moulded in socket; low loss mica filled bakelite; 1-3/16" x 1-5/8"   | 2000                 | 88-8TM                      | 220 1005 00                |

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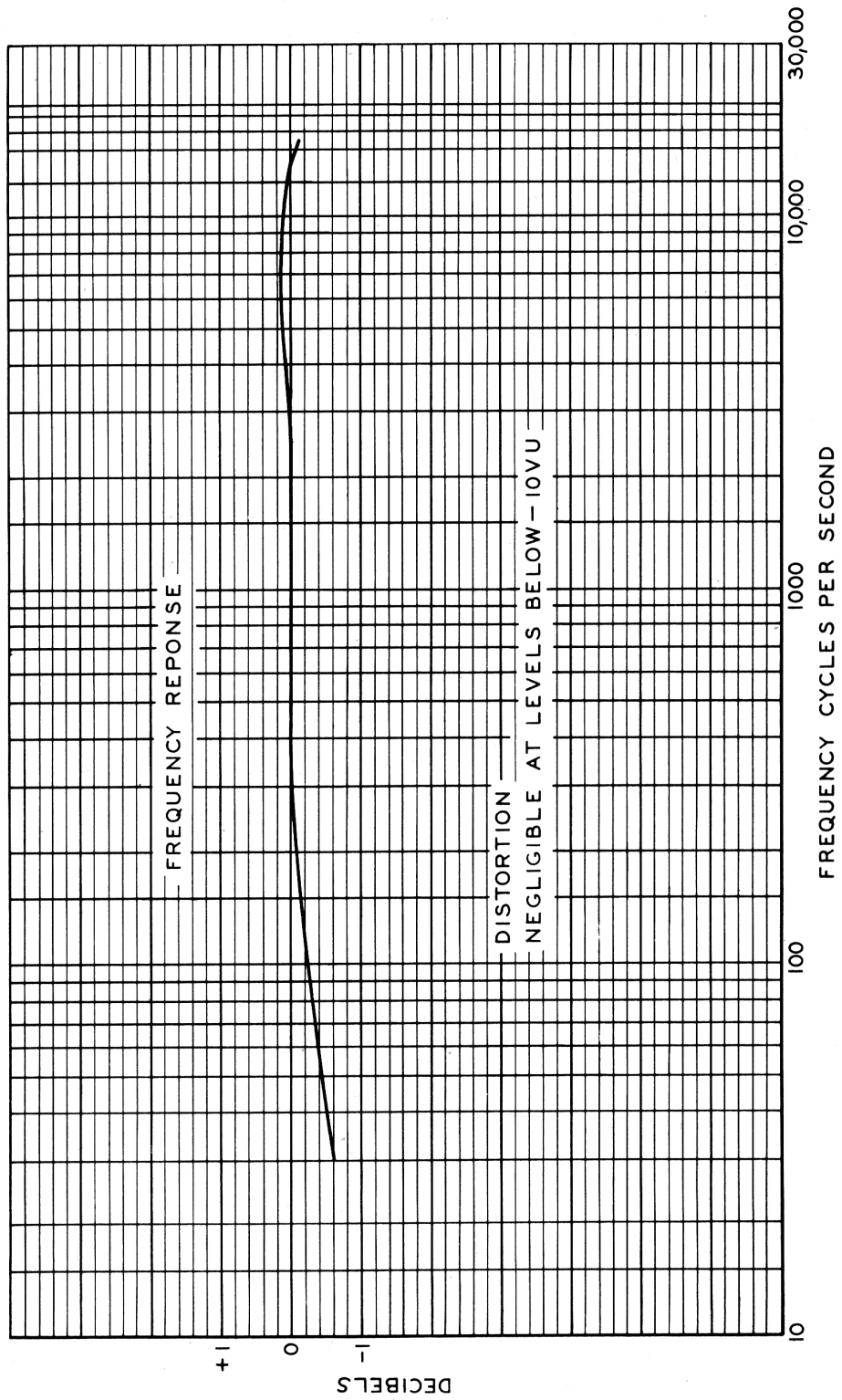
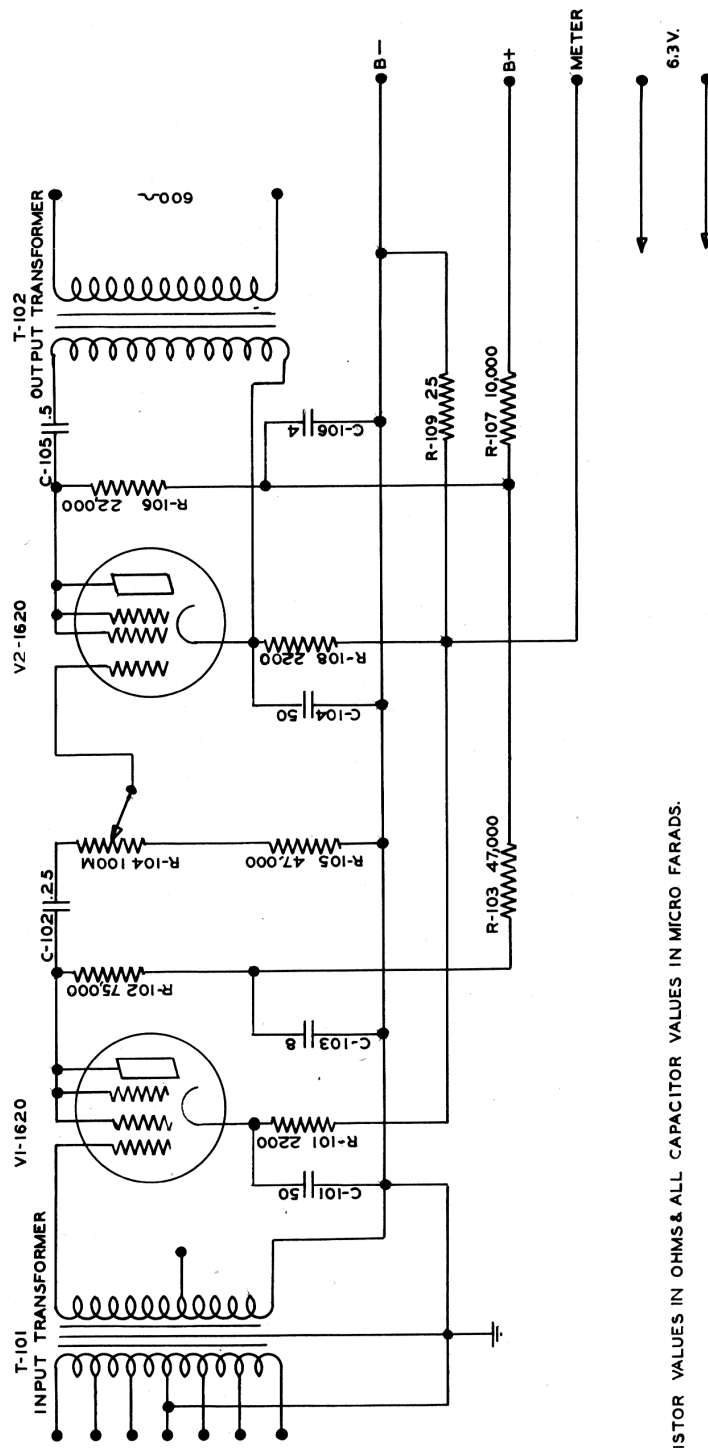


Figure 6-1 Typical Frequency Response Curve





ALL RESISTOR VALUES IN OHMS & ALL CAPACITOR VALUES IN MICRO FARADS.

Figure 6-2 Type 6P-1 Schematic Wiring Diagram