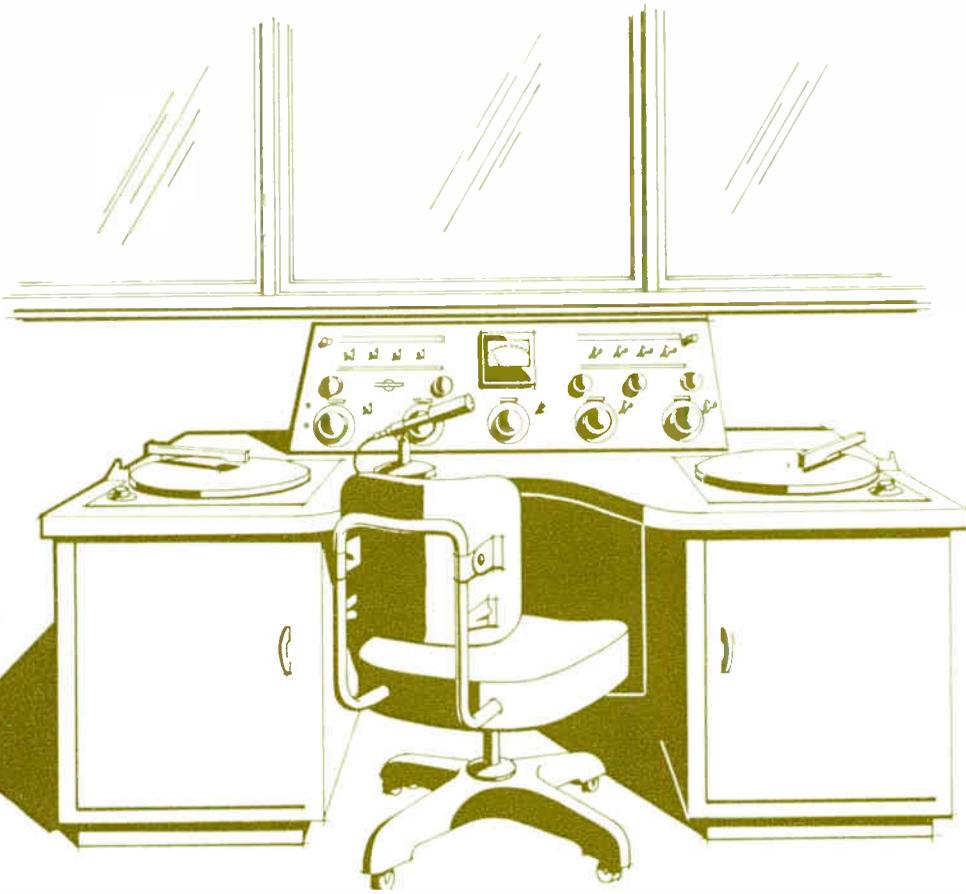




*Collins*

**SPEECH EQUIPMENT**

**CATALOG 113**



*Collins* **SPEECH EQUIPMENT**



## FOREWORD

This catalog is prepared for your convenience in selecting equipment that will meet your requirements. The consoles, amplifiers and accessories shown and described are engineered to advanced performance standards. Their operation is reliable, smooth, and straightforward. Thorough consideration has been given to operating detail, in order to incorporate every possible convenience.

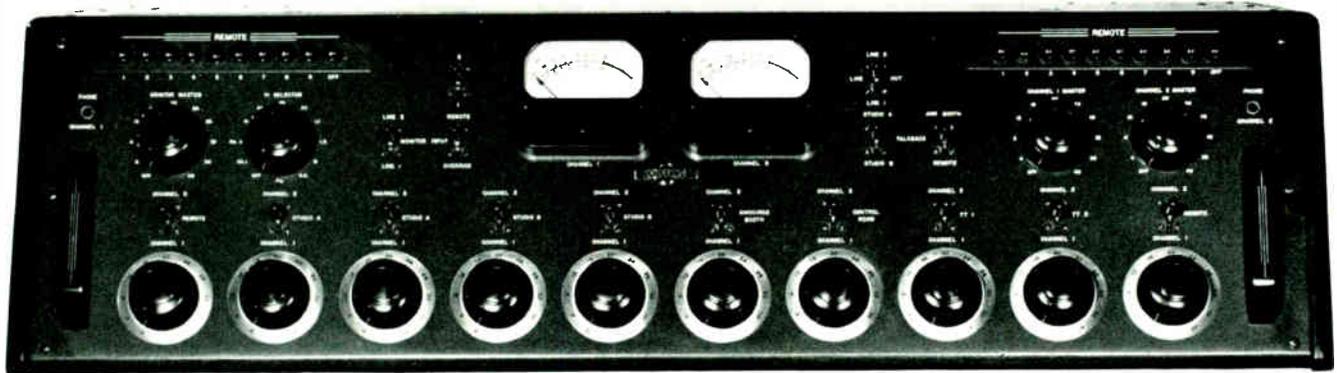
The years of successful experience in designing and producing fine audio equipment are reflected in the confidence with which many customers have asked Collins to lay out their entire station facilities.

We will be happy to work with you on the overall specifications of your individualized equipment. By obtaining your full requirements in audio equipment from us, you get not only the best individual units for your purpose, but also the assurance that you have an integrated system with superior overall performance.

## CONTENTS

SECTION	PAGE
Speech Input Consoles .....	1
Remote Equipment .....	13
Custom Equipment .....	20
Rack-Mounted Equipment .....	21
Racks and Panels .....	37
Test and Monitoring Equipment .....	38
Playback Equipment .....	39
Reproducing Equipment .....	42
Recording Equipment .....	45
Microphones and Stands .....	48
Miscellaneous .....	57
Speakers and Cabinets .....	58
Connectors .....	60
Headphones .....	62
Charts and Tables .....	63
Suggested Station Layouts .....	71

## 212A-1 SPEECH INPUT CONSOLE



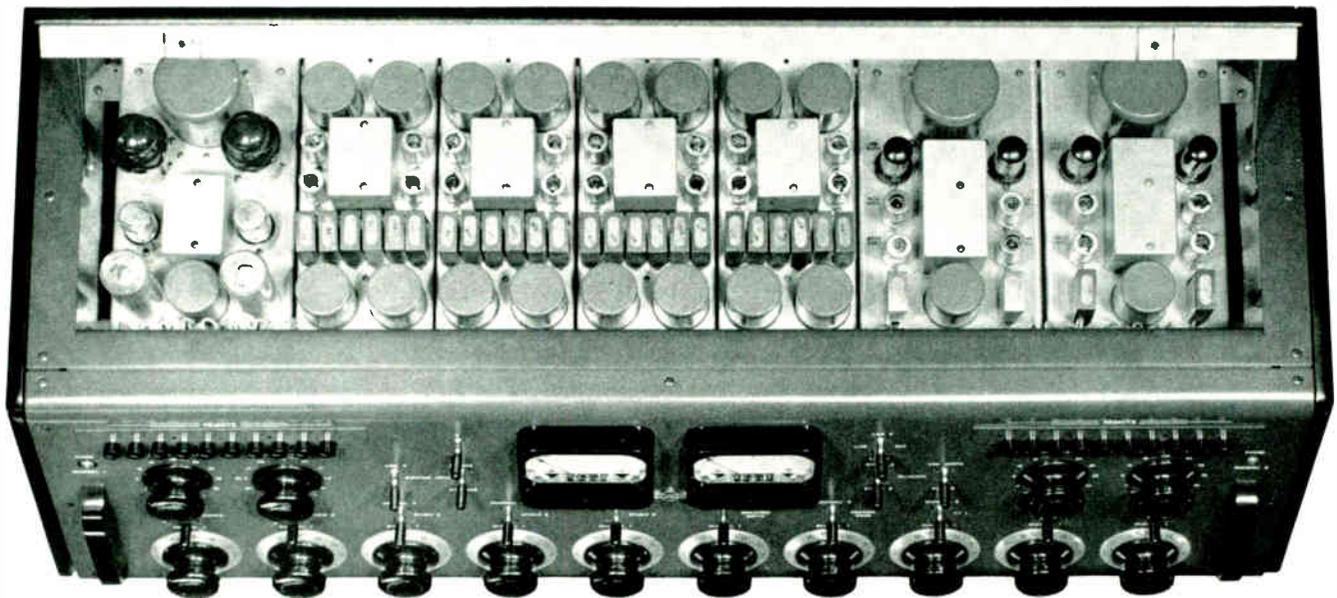
For audio control in AM, FM and television broadcasting, the Collins 212A-1 Speech Input Console provides simplicity of installation, convenience in operation and maximum versatility.

A rotating arrangement allows the entire unit to be tilted for access to the underside of the chassis without requiring additional space. The 212A can be placed against a window, wall or other obstructing surface without sacrificing accessibility or requiring external support when the chassis is tilted. Unit amplifiers are individually mounted on airplane-type shock mounts.

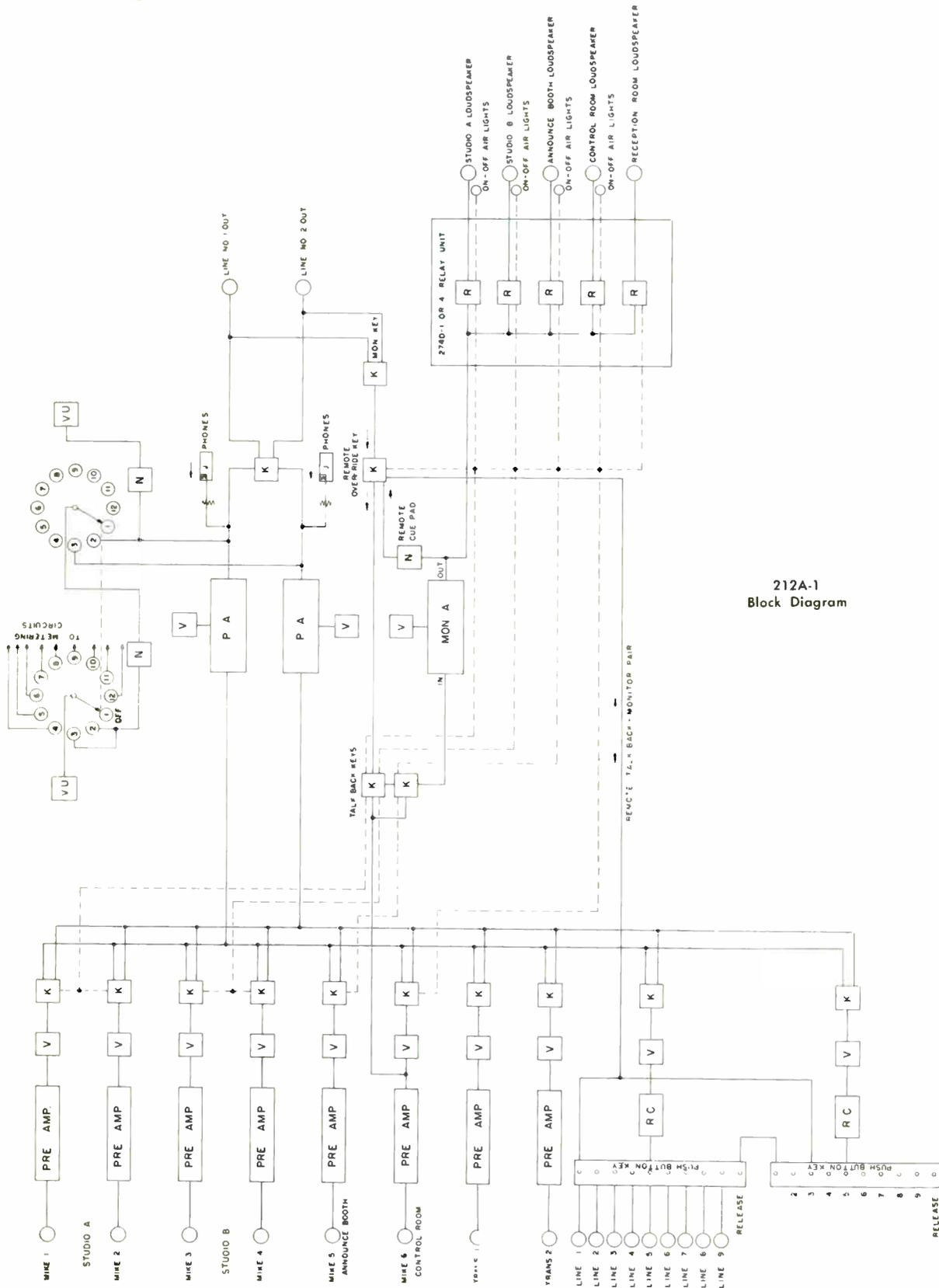
The sloping front panel provides ease of reading and hand movements. Lever-type positive-action switches are employed in line switching circuits, and

reliable telephone-type push-button controls are used to connect remote lines. The step-by-step attenuators have a smooth, easy action.

Facilities are provided for auditioning or rehearsing, cueing and broadcasting simultaneously from any combination of two studios, an announce booth, a control room microphone, two turntables, and any two of nine remote lines. Two program amplifiers are included in the 212A-1, making possible the feeding of two independent programs at once or by operating the line reversal switch, providing an emergency amplifier for normal use. A spare key switch is mounted on the panel with leads appearing on the terminal strip.

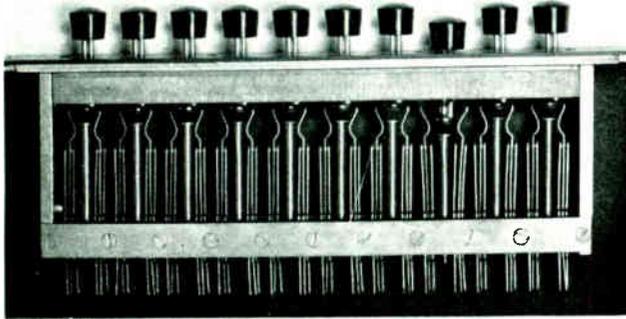


# 212A-1 SPEECH INPUT CONSOLE



212A-1  
Block Diagram

## 212A-1 SPEECH INPUT CONSOLE



TELEPHONE TYPE PUSH BUTTON SWITCH

### FEATURES AND SPECIFICATIONS:

1. Ten independent input channels, including 6 microphone inputs and 2 low level transcription inputs (eight preamplifiers, one for each of the foregoing) and 2 channels for remote pickups.

2. Any two of nine remote lines can be selected at will. Normal connections are supplied through the switches, so that override in the monitor is possible if desired. The remote channel provides for the feedback of cue to the remote lines, as well as for talkback.

3. Loudspeakers in all studios can be fed from the self-contained monitor amplifier, with selective talkback circuits interlocked to prevent program interruption. Talkback from the control room is possible into any one of three studios or into the remote lines by key switch control.

4. Connections are provided for external "ON THE AIR" lights, with power furnished by the 212A-1 relay units.

5. Two VU meters are incorporated. One is bridged continuously across Program Line 1. The other may be used as a VU meter for the second program amplifier, or to check (by means of a selector switch) individual circuits in the console.

6. Jacks are provided for headphone monitoring of either program amplifier.

7. The construction permits easy access to tubes, components and wiring, without taking the console out of operation.

8. The power is external, with provision for installation of a duplicate power supply. A single supply is capable of operating the equipment with adequate safety factors for long, trouble-free service. However, if two supplies are installed, a changeover is effected automatically in case of failure of the power supply in use. One power supply and the

relay unit are included in the purchase of the 212A-1.

Frequency response: Microphone to line, or microphone to speaker, within 2 db total variation from 30 to 15,000 cps at normal gain control settings. Not more than  $\pm 1/2$  db additional variation in frequency response over the above range at any other gain control setting.

Input impedance: Microphones 30/50 or 200/250 ohms. Remote Lines 150 or 600 ohms, with repeat coils self-contained. Turntables 30/50 or 200/250 ohms.

Output impedance: Program Line 150 or 500/600 ohms balanced Speakers, maximum of 5, each 600 ohms.

Output level: Program Line VU meter adjustable, +4 to +24 dbm in 1 db steps.

Monitor output: 8 watts.

Distortion: Less than 1% rms harmonic distortion at normal output through line amplifier. Less than 2% rms harmonic distortion at 8 watts output from monitor amplifier. In addition, combination tone distortion is of the same order at the same levels.

Gain: Maximum, microphone to Program Line, 100 db; Remote Line to Program Line, 50 db.

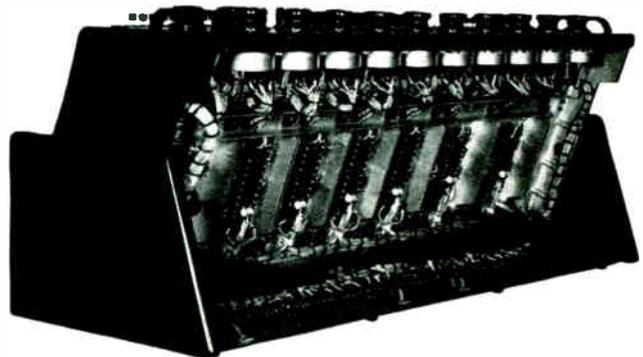
Noise level: With the gain controls adjusted for normal operation with a low level microphone input and with +16 dbm output, but with input terminated in an equivalent resistance, the combined hum and noise in the program output is at least 65 db down.

Power input: 115 volts 50/60 cycles a-c.

Weight: Approx. 150 lbs.

Dimensions: 42" w, 12" h, 17 1/2" d.

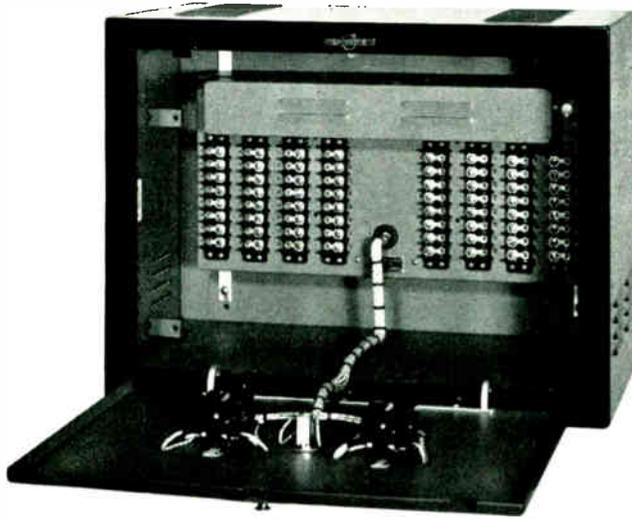
See 274D-1 or 274D-4 for relay unit, and 409U-1 or 409U-2 for power supply, both of which are furnished as part of this equipment.



212A-1 CONSOLE TILTED FOR SERVICING

# STUDIO CONSOLE, POWER SUPPLY and RELAY UNIT

## 274D-1 RELAY CONTROL UNIT



This Relay Control Unit, used with the 212A console, completely controls studio and control room loudspeakers, as well as studio on-off-the-air lights. Two switches on the hinged front panel control power to the power supply and studio warning lights.

An added feature is a relay switching system with which, by the use of two power supplies, instant uninterrupted service may be effected in case of a failure. Any portion of the operating power supply, including relay and filament power, will operate the changeover.

Terminals are provided for connection to all studio and control room warning lights. Five loudspeakers are also terminated at this point. The relay unit functions as a terminal point for all power connections between the supply and console. No additional relay circuits are necessary for the warning lights.

Number of Relays: Five—studio loudspeakers and warning light controls.

Four—power changeover relays.

Input Voltage: 115 volts, 50/60 cycles.

Warning Light Power: 115 volts, 50/60 cycles.

Circuit breaker links are supplied for currents up to 9 amperes.

Dimensions: 20½" w, 15½" h, 10" d.

Weight: 17 lbs., 9 oz.

Finish: Glossy black cabinet, metallic gray panel.

## 274D-4 RELAY CONTROL UNIT

Identical with 274D-1 with the exception that it is constructed for rack mounting.

Dimensions: 19" w, 8¾" h, 5½" d.

Weight: 10 lbs.

Finish: Metallic gray panel, velvet gray cover.

## 409U-1 POWER SUPPLY



A wall mounting Power Supply for the 212A console, it contains three supplies which furnish d-c power for preamplifiers, monitor and line amplifiers, and 12 volts for relay operation. In addition, it furnishes 6.3 volts a-c to operate all tubes in the console.

The 409U-1 is a stable power supply exceptionally well filtered in high, medium and low voltages. Electrolytic capacitors in the medium voltage circuits are of the plug-in type, while oil filled paper capacitors are used in the high voltage circuits. Tapped primaries on the transformers enable operation over wide voltage ranges. Two separate supplies are included with a single fullwave rectifier in the medium voltage supply, and two fullwave rectifiers in the higher voltage supply, wired in such a manner that program will not be stopped by a failure of one of the tubes.

Input: 105-125 volts 50/60 cycles a-c (by varying transformer taps).

Output: @ 140 volts d-c @ 60 ma max.

325 volts d-c @ 250 ma max.

12 volts d-c @ 1.0 amp.

6.3 volts a-c @ 10 amps.

Tubes: 2—5R4GY, in high voltage supply.

1—6X5GT, in medium voltage supply.

1—Selenium rectifier in 12 volt supply.

Weight: 70 lbs., 3 oz.

Dimensions: 20½" w, 15½" h, 10" d.

Finish: Glossy black cabinet with metallic gray door.

## 409U-2 POWER SUPPLY

A rack mounting Power Supply electrically the same as the 409U-1.

Dimensions: 19" w, 14" h, 9½" d.

Weight: 61 lbs., 12 oz.

## 212F-1 SPEECH INPUT CONSOLE



### 212F-1 SPEECH INPUT CONSOLE

The Collins 212F-1 Speech Input Console is a flexible packaged unit providing complete control over simultaneous broadcasting and auditioning from any combination of three of eight possible inputs, with provisions for mixing five of twelve possible inputs with the addition of two pre-amplifiers. In addition, the 212F-1 provides for monitoring of program, audition or remote lines, and control of speakers and warning lights.

Superior quality, performance and accessibility are combined in the 212F-1 to make it an outstanding contribution to high-fidelity AM, FM and TV broadcasting or program control in audio systems.

Advanced styling and construction provide an attractive appearance and quick, easy accessibility to all cabling, wiring and sub-units. Excellent ventilation is achieved by louvers in the welded steel cabinet top and sides and through the elimination of tube shields.

Use of highest quality components provides top reliability. The hinged front panel tilts forward, allowing instantaneous inspection or removal of all amplifiers, power supply and relay unit. All plug-in sub-units are provided with Howard Jones connectors and an adapter cord is provided to externally service any unit while the console is in operation. Howard Jones barrier-type terminal strips are provided for all external leads and are readily accessible when the panel is tilted forward.

For desk-top mounting, rubber feet are provided to space the cabinet above the mounting surface. The 212F-1 can be bolted to the mounting surface if desired and spacers and mounting holes are provided.

The console cabinet provides all of the space required for the amplifiers, power supply and relay unit. No additional rack cabinet space is needed and the associated interconnecting wiring is eliminated in this self-contained unit.

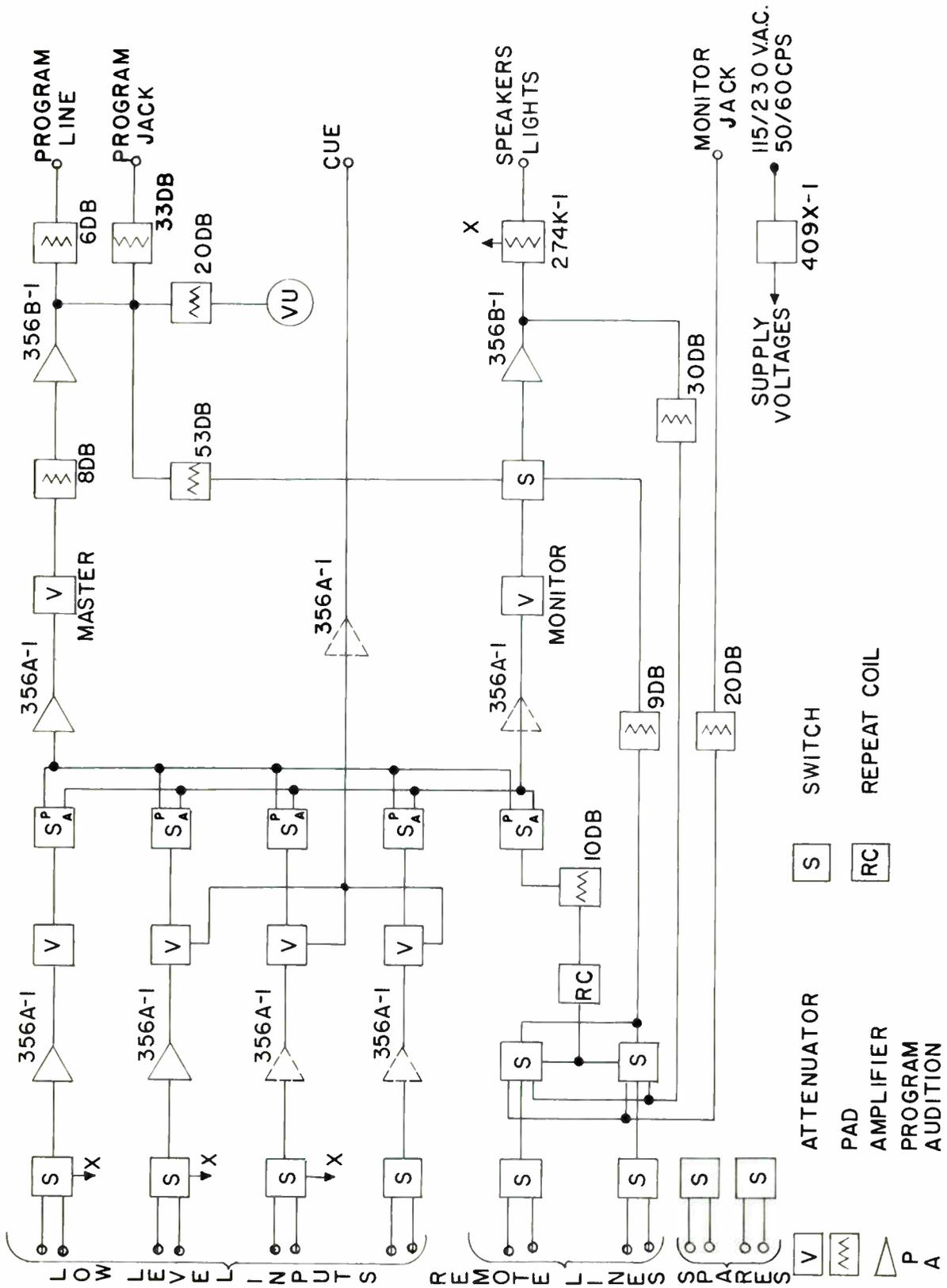
The 212F-1 is especially adaptable for initial installations. Space is provided for additional plug-in amplifiers as demands increase. The pre-amplifier, amplifiers, power supply and relay unit are of the plug-in type, and the 212F-1 may be obtained with the desired initial complement.

The 212F-1 uses only two types of amplifiers and three tube types, resulting in less spare tube maintenance.

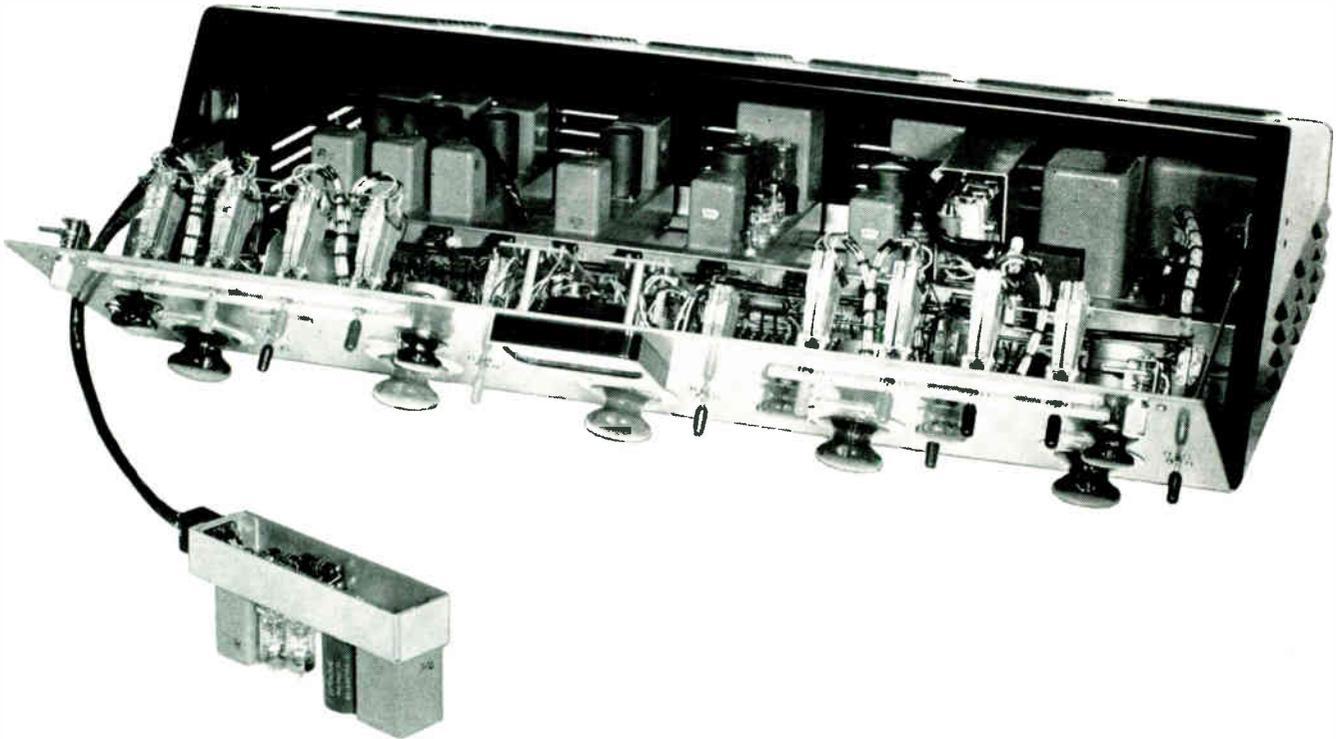
As an aid to efficient operation, all mixer knobs and associated key switches are color coded. Write-in strips are provided for the input switches, remote switches and mixer attenuators.

The 212F-1 is supplied with three 356A-1 Pre-amplifiers. Two are used as pre-amplifiers in low level inputs and the third as a booster amplifier in the program channel. Key switches at the low level input terminations allow selection of two of four possible inputs. By moving the 356A-1 Pre-amplifiers to adjacent connectors in the cabinet, four other low level inputs are available. The

# 212F-1 SPEECH INPUT CONSOLE



## 212F-1 SPEECH INPUT CONSOLE



plug-in type of construction allows easy removal or relocation of the units.

The purchase of four additional 356A-1 Preamplifiers will provide simultaneous mixing of five of twelve possible inputs, a booster amplifier for the monitor circuit and a cueing amplifier. No rework will be required to add these additional facilities, as units are plug-in type and the necessary wiring is incorporated in all of the 212F-1 broadcast consoles. Two spare lever switches are provided for any desired custom wiring.

The block diagram on the opposite page shows the 212F-1 system. Components not supplied but provided for are shown as dotted units.

Lever switches allow selection of two possible inputs for each 356A-1 Preamplifier. The 212F-1 uses high level mixing following 40 db gain in the preamplifiers. The mixer attenuators are step-type attenuators whose outputs are connected to key-type lever switches. The lever switches terminate into the program bus, audition bus or resistive termination.

The program bus feeds an additional 356A-1 Preamplifier being used as a booster amplifier for 40 db gain. A step-type ladder attenuator for the master gain control and a fixed pad precede the program amplifier. The 356B-1 Program/Monitor Amplifier

is set for a 56 db gain. The output of the program amplifier is isolated from the program line by a 6 db pad. A VU meter wired to the output of the program amplifier provides accurate measurement of the output level.

Remote line operation incorporates two lever and two rotary switches to select proper circuitry for incoming or outgoing program, audition or cue signals.

Three of the low level mixer attenuators have cueing positions. The output of the cue circuit will operate headphones, or a 356A-1 Preamplifier may be plugged in to provide 100 milliwatts to a speaker.

Four relays in the 274K-1 Relay Unit are operated by the lever switches in the first three low level input channels. These relays will control the operation of the warning lights and speakers in four studios.

An optional feature available is the Collins 356E-1 Limiter Amplifier. This plug-in module, designed for use with the 212F-1, can be inserted in place of the 356B-1 Program Amplifier, allowing unattended operation. By removing the 6AL5 bias rectifier tube, the 356E-1 becomes a straight program amplifier and the 356B-1 Program Amplifier supplied with the basic 212F-1 is not needed.

## 212F-1 SPEECH INPUT CONSOLE

### SPECIFICATIONS

Audible Noise: None, relay noise damped by mounting relays on rubber.

Exterior Finish: Metalized blue-gray enamel front panel with white silk-screened letters. Cabinet finished with black baked enamel.

Ambient Temperature Range: +15°C to +45°C.

Ambient Humidity Range: Up to 95%.

Number of Modules: The 212F-1 consists of the cabinet assembly and the following modules:  
Three — 356A-1 Pre-amplifiers.

Two — 356B-1 Program/Monitor Amplifiers.

One — 274K-1 Relay Unit.

One — 409X-1 Power Supply.

Power Source: 115 or 230 volts a-c  $\pm 10\%$ , 50/60 cps, single phase.

Number of Channels: Two low level inputs with provision for four low level input channels with the addition of two more 356A-1 Pre-amplifiers. One remote input, one program output and four monitor outputs. Cueing output from three of the low level mixer attenuators.

Input Impedance: Low level — 30/150/250/600 ohms balanced or unbalanced.

Remote lines — 150/600 ohms.

Output Impedance: Program line — 150/600 ohms.\*

Monitor — 150/600 ohms.\*

\*Shipped wired for 600 ohms.

Input Level: Low Level: -60 db nominal (100 db gain). Remote: +10 dbm.

Gain: Low level to program line at least 100 db. Remote line to program line 50 db.

Output Level: Program Line: +18 dbm (50 mw).

Monitor: +39 dbm (8 watts).

Response: Audio  $\pm 1\frac{1}{2}$  db, 50 to 15,000 cps at program line.

Distortion: Less than 1% at +18 dbm at program line. Less than 3% at 8 watts out of the monitor amplifier.

Noise: Less than -118 dbm at low level input.

Crosstalk: Greater than 50 db below program level, 30 to 20,000 cps.

Controls: External: Four low level gain controls, one remote line gain control, one monitor gain control, one master gain control, four low level selector switches, two remote line selector switches, five program audition switches, two remote line off/cue phone mix switches, one program audition cue switch, two spare lever switches.

Internal: One toggle gain switch on each 356B-1 Program Monitor Amplifier.

One voltage adjust rheostat on the 409X-1 power supply.

Protective Devices: Protective fuses are provided in the primary supply voltage and d-c voltage leads.

Indicating Devices: A VU meter across the program line.

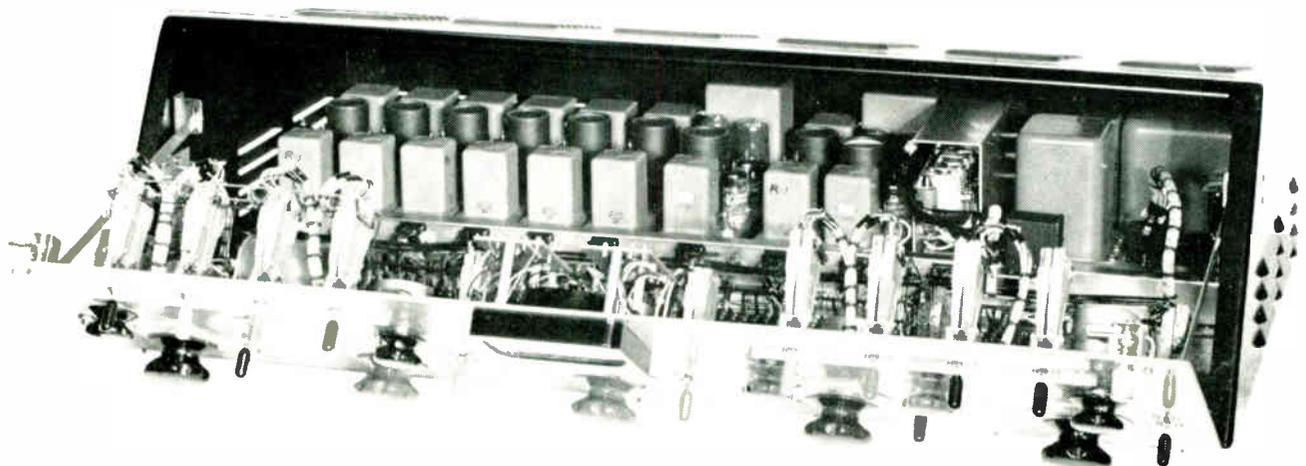
Operational Aids: Each mixing channel has colored knobs for its switches and attenuator, reducing operational errors.

Lights in the VU meter.

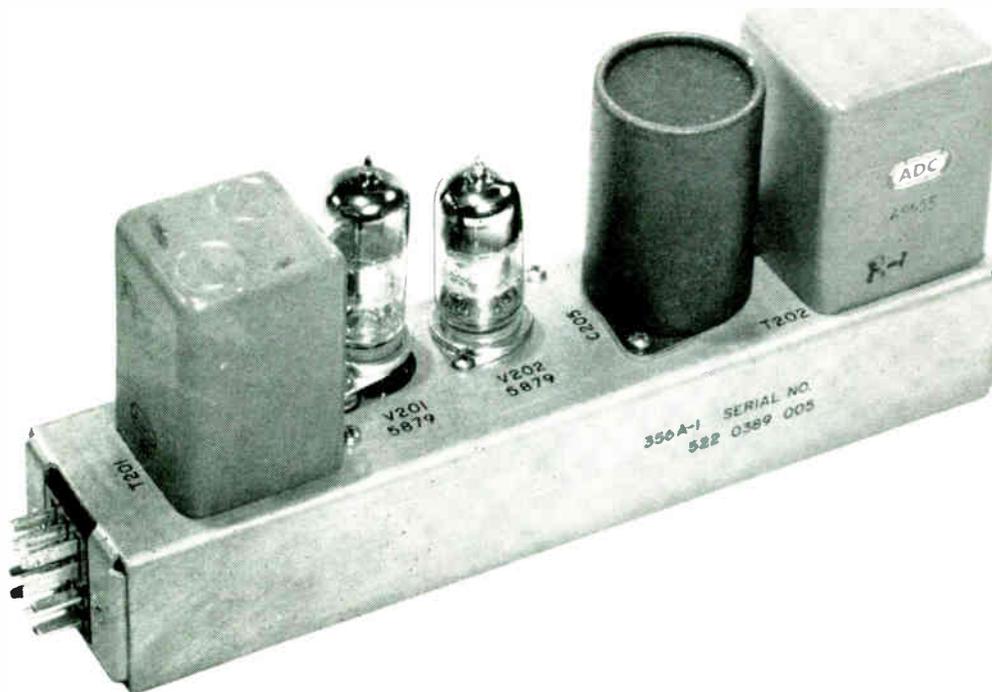
Write-in strips for the low level and remote line switches.

Weight: 100 lbs.

Size: 22" deep at base, 35" wide, 10 $\frac{1}{4}$ " high at front, 7 $\frac{1}{16}$ " high at back.



## 356A-1 PRE-AMPLIFIER



### 356A-1 PREAMPLIFIER

The Collins 356A-1 Preamplifier is a high fidelity two-stage unit for service in AM, FM and TV applications. It is usually used to feed a line amplifier in the Collins 212F-1 Speech Input Console. It operates from a low-level microphone or similar source and has sufficient output to drive a program amplifier, or audition facilities.

Input Impedance: Unloaded transformer.

Source impedance 30/150/250/600 ohms (supplied wired for 150 ohms).

Input Level: Commercial microphone; -60 db nominal.

Output Impedance: 150 or 600 ohms balanced or unbalanced.

Output level: +18 dbm maximum.

Gain: 40 db.

Frequency response:  $\pm 1$  db, 50 to 15,000 cps.

Distortion: 0.5% maximum.

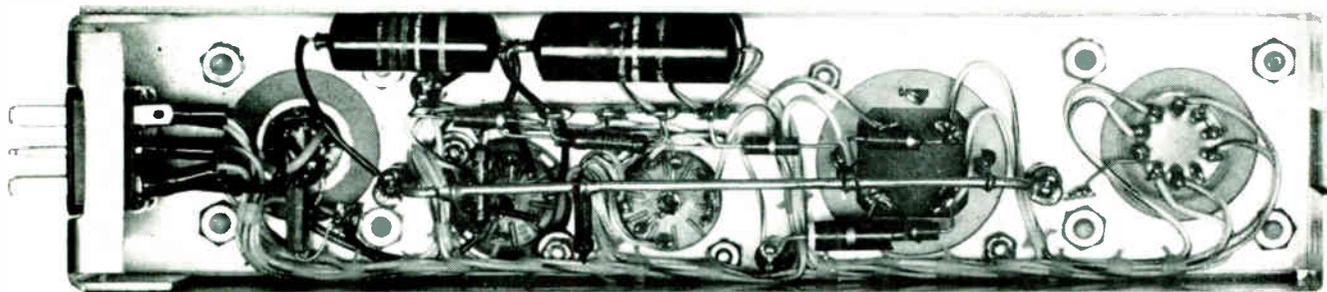
Noise: -118 at input, or 96 db below full output.

Tubes: 2-5879.

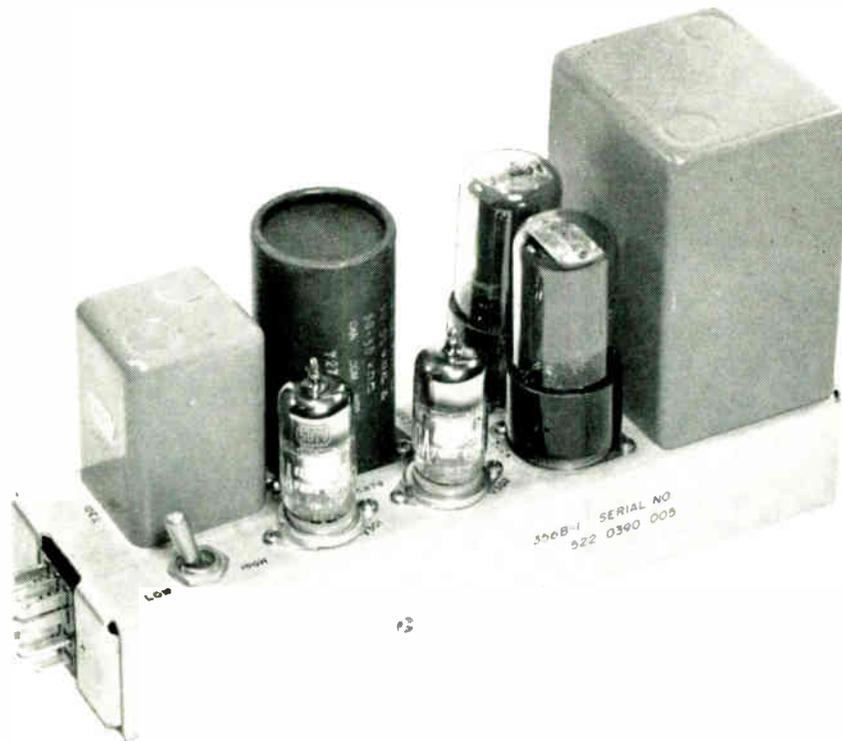
Power Requirements: 6.3 volts a-c or d-c at 0.3 amperes. 250 volts d-c at 6.5 ma., or 300 volts d-c at 7.5 ma.

Dimensions: 4 $\frac{5}{8}$ " h, 2 $\frac{1}{8}$ " w, 9 $\frac{1}{2}$ " d.

Weight: 2 $\frac{1}{4}$  lbs.



## 356B-1 PROGRAM MONITOR AMPLIFIER



### 356B-1 PROGRAM/MONITOR AMPLIFIER

The Collins 356B-1 Program Monitor Amplifier is a plug-in console sub-unit for program and monitor amplifier use in the 212F-1 Speech Input Console. It is a three-stage amplifier with push-pull output and has a switch for high or low gain.

The unit's high-fidelity lends it to many applications in AM, FM and TV broadcasting. Followed by a high fidelity speaker, the 356B-1 is excellent for custom installation.

Input Impedance: Unloaded transformer, source impedance 150/600 ohms.

Input Level: -32 dbm.

Output Impedance: 150/600 ohms.

Output Level: +30 dbm to 8 watts (+39 dbm).

Gain: 56 db or 68 db, selectable by switch.

Frequency Response:  $\pm 1$  db, 50 to 15,000 cps.

Distortion: 0.5% maximum at +30 dbm, 3% maximum at 8 watts (+39 dbm).

Noise: -116 dbm at input, or 90 db below full output of 1 watt.

Tubes: 2 — 5879, 2 — 6V6.

Power Requirements: 6.3 volts a-c at 1.2 amperes.

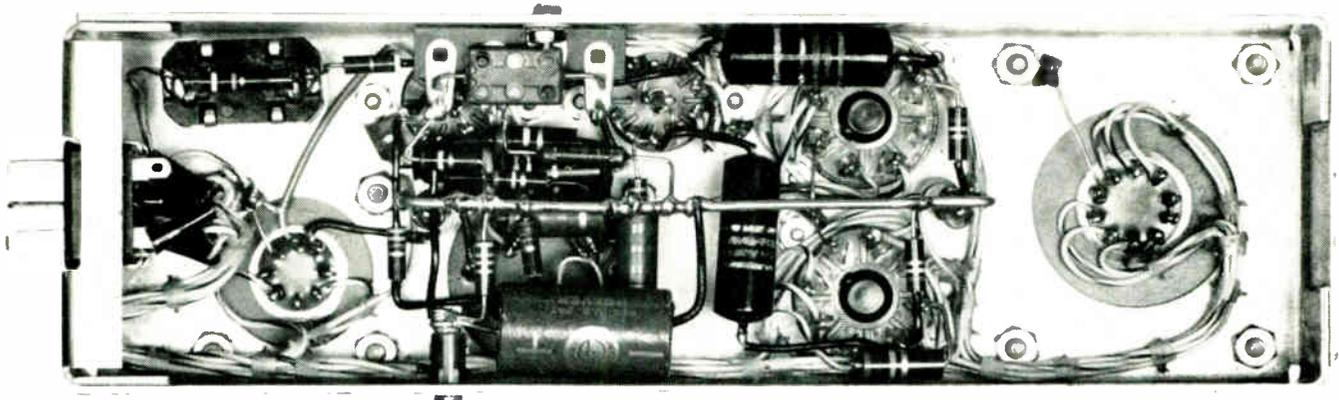
63 ma. at 250 volts d-c at 1 watt output.

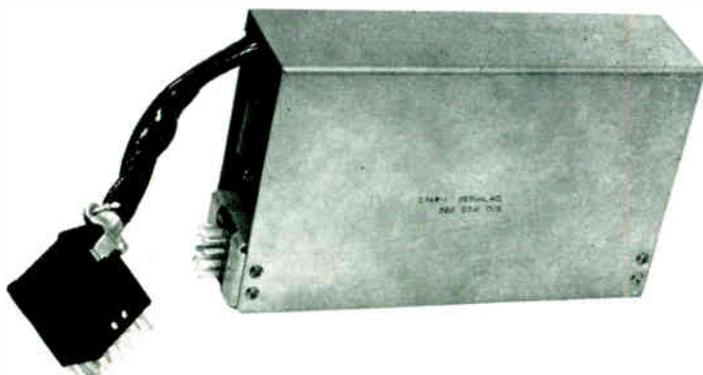
75 ma. at 300 volts d-c at 1 watt output.

88 ma. at 300 volts d-c at 8 watts output.

Dimensions: 9½" l, 2⅞" w, 5¼" h.

Weight: 6 lbs.





## 274K-1 RELAY UNIT

The 274K-1 is a plug-in module used in the 212F-1 Speech Input Console. Four relays control studio speakers and warning lights. The unit is provided with a cover to protect relay contacts from dust and damage while handling. Each relay is provided with a series shunt circuit to minimize switching transients and arcing. Noise is held to a minimum by mounting the relays on rubber. When used with the 212F-1 Console, the 409X-1 Power Supply provides the 12 volts d-c at 560 milliamperes and studio wiring provides power for the warning lights.

Connectors: Howard Jones P-312-AB connector mounted on the front surface and a Howard Jones P-315-CCE connector on a 5½" pendant cable.

Size: 5½" h, 2½" w, 9" d.

Weight: 2½ lbs.



212F-1 STUDIO CONSOLE TEST CABLE



## 409X-1 POWER SUPPLY

The 409X-1 Power Supply is a plug-in unit designed for use in the Collins 212F1 Speech Input Console.

Tubes: 2 — 5Y3.

Output Voltages: Up to 250 ma. at 300 volts d-c, adjustable.

6.0 amperes at 6.3 volts a-c.  
12 volts d-c.

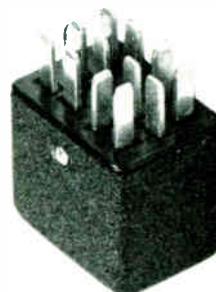
Power Source: 115 or 230 volts a-c, ±10%, 50/60 cps single phase.

Power Input: 225 watts maximum.

Protection Devices: Overload fuses in the primary supply and output voltage leads.

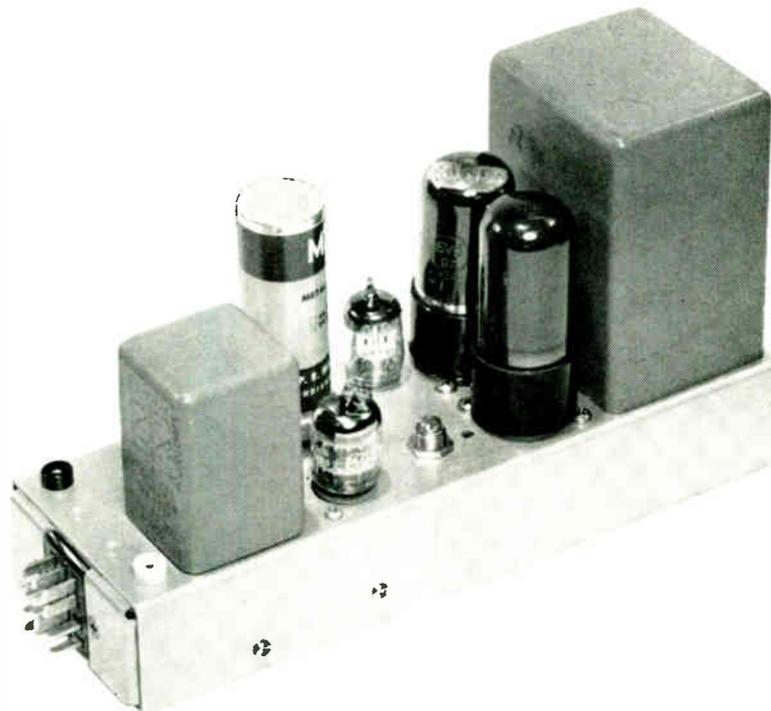
Dimensions: 9½" l, 7½" w, 6" h.

Weight: 25 lbs.



212F-1 STUDIO CONSOLE JUMPER PLUG

## 356E-1 LIMITER AMPLIFIER



### 356E-1 LIMITER AMPLIFIER

The 356E-1 Limiter Amplifier is a plug-in module which acts as an automatic average level or peak limiting amplifier in broadcast, TV and microwave audio systems. It consists of a push-pull variable gain input stage driving a push-pull output stage. A bias rectifier provides bias to regulate gain of the input stage. A decal to convert a VU meter to a gain reduction meter is furnished with the 356E-1.

The 356E-1 was designed for use with the Collins 212F-1 Speech Input Console, permitting unattended remote audio operation. However, it can be used to control level differences between two or more sources, as a program line compressor, expander-compressor operation or as a program amplifier.

**Input Impedance:** Unloaded transformer, source impedance 150 or 600 ohms.

**Input Level:** -54 dbm to -24 dbm with threshold control set at 0 dbm output.

-34 dbm to -4 dbm with threshold control set at +20 dbm output.

-24 dbm to +6 dbm with threshold control set at +30 dbm output.

**NOTE:** 0 dbm = 1 milliwatt across 600 ohms.

**Output Impedance:** 150 or 600 ohms, balanced or unbalanced.

**Output Level:** 0 dbm to +18 dbm, with threshold control set at 0 dbm output.

+20 dbm to +30 dbm, with threshold control set at +20 dbm output.

+30 dbm to +36 dbm, with threshold control set at +30 dbm output.

**Response:**  $\pm 1$  db, 50 to 15,000 cps.

**Distortion:** 1.5% maximum, 50 to 15,000 cps no compression.

2% maximum, 50 to 15,000 cps at any level up to 30 db gain reduction with threshold set at +20 dbm output.

**Output Noise:** -50 dbm or less (with threshold control set for +20 dbm output).

**Compression Ratio:** Adjustable 1.6/1 to 5/1, 3/1 optimum, over a 30 db range at input.

**Attack Time:** 11 milliseconds with switch set for dual operation.

62 milliseconds with switch set for average operation.

**Release Time:** 0.9 seconds for 63% recovery with switch set for dual operation.

5.2 seconds for 63% recovery with switch set for average operation.

**Gain:** 54 db.

**Controls:** Dual/average toggle switch at top near front of chassis.

**Operational Aid:** 1. Test points for measuring bias voltage in adjusting threshold control.

**Tubes:** 1 — GL-6386 — Variable Gain Input Amplifier.

2 — 6V6GT — Output Amplifier.

1 — 6AL5 — Bias Rectifier.

**Power Source:** 6.3 VAC at 1.55 amperes.

+300 VDC at 77 milliamperes.

**Size:** 5 $\frac{5}{16}$ " h, 3" w, 9" d, plus connector.

**Weight:** 5 lbs.

## 212Z-1 REMOTE AMPLIFIER



### 212Z-1 REMOTE AMPLIFIER

The Collins 212Z-1 four channel Remote Broadcast Amplifier is a rugged transistorized unit retaining the outstanding qualities of its predecessor, the 12Z, and adding many more. Design details of the 212Z-1 were influenced by answers to a questionnaire mailed to a representative sample of broadcast stations across the country.

Among the features of the 212Z-1 are a power source of both 115 VAC and batteries, with automatic changeover both when a-c power fails and when it is restored; self-contained batteries with life of approximately 75 hours; new light weight; maximum gain of 90 db; tone oscillator for line-level set up; auxiliary output for public address feed; transistors and printed wiring. Step faders rather than composition type faders are used. Four microphones can be accommodated.

The photograph above shows the 212Z-1 with carrying case open. Apparent are the convenient sloping panel and low height, the well placed and properly shaped knobs, the large illuminated VU

meter and individual channel plastic write-in strips.

A distinctive finish of black and metallic blue-gray gives the 212Z-1 an attractive abrasion-resistant finish.

All terminals and jacks (except the line and program monitors) are located at the rear of the unit, insuring that the operator's movements will be unimpaired by bulky cords and cables.

One or two headsets may be plugged into the monitor jacks. Where loudspeaker monitoring or feed for local PA is desired, the PA terminals are used, and an individual gain control allows the operator to handle the program and simultaneously ride gain on the PA system.

A "multiple" jack is located on the side of the unit, permitting two 212Z-1's to be used simultaneously and controlled by one master gain control.

The 212Z-1 is housed in a compact rugged Roy-alite carrying case which has space to house the power cord also supplied with the unit. The 212Z-1 is fastened to the bottom of the case and all that is necessary for most remote applications is removal

## 212Z-1 REMOTE AMPLIFIER

of the top. However, the unit can be easily removed and operated at permanent locations. The 212Z-1 weighs only 22 pounds in carrying case with batteries, a radical departure from the relatively bulky and inflexible remotes in common use.

Four Cannon XL-3-13N microphone receptacles (accommodate XL-3-12 plugs) are supplied with the standard unit, and other connectors are available on special order at no additional cost.

Batteries are not included as standard equipment with the 212Z-1 and should be ordered separately.

In the block diagram on the next page, the four preamplifiers Q1 through Q4 use 2N106 hermetically sealed low noise transistors. The input faders feed the second pre-amplifier Q5 (also a 2N106) through the tone oscillator switch. The booster Q6 feeds the master gain control, which is followed by the driver, Q7.

The booster and the driver both employ 2N64 transistors. The output amplifier (Q8 and Q9) has push-pull 2N44 transistors with transformer coupling on the input and output sides. Transformer T-2 feeds the program monitor, the VU meter, and the public address line and program switch. Provisions are made for two program lines and telephones through the output switch.

The power supply is a shielded, filtered full-wave supply employing germanium diodes and multi-section filtering. A cutover relay connects the batteries to the amplifier whenever the a-c line voltage fails.

The 400 cps tone oscillator employs a Colpitts circuit and feeds a low level signal to the second pre-amplifier through a selector switch. A power

interlock switch insures that there is no battery drain when the unit is in its closed carrying case.

The four channel mixing circuit incorporated in the amplifier is designed to work with all microphones 30 to 600 ohms.

The output circuit is designed to match a 600-ohm line. To work into 150 ohms, the use of an external repeat coil 600 ohm / 150 ohms is recommended. Minor rework of the unit will also provide 150 ohms.

When a telephone set is connected to the "Tel" posts, the line can be used for communication with the master control room.

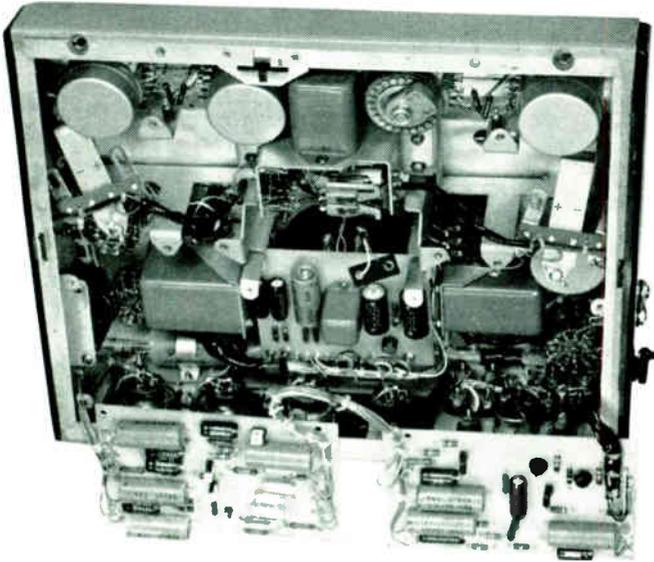
Although simultaneous program feed and communication cannot take place over a single line at the same time, the output switch allows rapid interchange between the line of the telephone set for communication and the amplifier output for program transmission. This facilitates operation where only one line is available to the control point or radio transmitter.

When two lines to the master control are available, one can be used for program feed or receipt of cue preceding transmission, and the other for simultaneous communication. With this arrangement, the communication line can be substituted immediately for broadcast by simply turning the output switch and making a corresponding switch in the master control room. This rapid interchange feature between the two lines at the remote point provides a necessary safety factor, especially valuable when important programs are being broadcast.

If a telephone set is not readily available, it is possible to carry on communication by using the



# 212Z-1 REMOTE AMPLIFIER



announcing microphone and amplifier for outgoing speech and the monitor headset for incoming speech.

## SPECIFICATIONS

- Input: Four channels selected by faders numbered to correspond with input plugs.
- Input Impedance: 25 to 600 ohms.
- Gain: 90 db minimum.
- Noise Level: -110 db equivalent noise figure.

- Power Output: Normal -3.2 milliwatts (+5 dbm).
- High - 12.7 milliwatts (+11 dbm).

Distortion: Less than 1% at typical levels.

Frequency Response:  $\pm 1.5$  db 50-15,000 cps.

Output Impedance: 600 ohms (150 ohms available).

Case: Welded aluminum with removable bottom plate for access, finished in black and medium blue-gray.

Microphone Connections: Cannon XL-3-13N supplied.

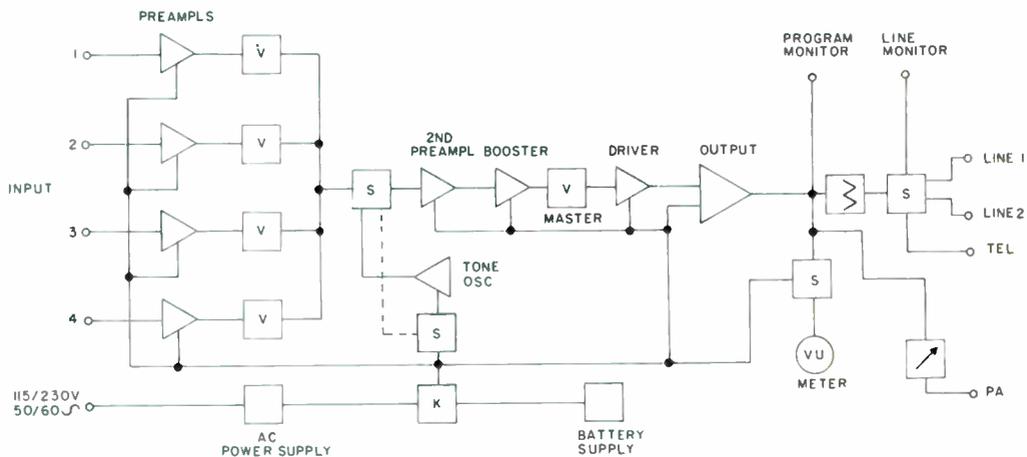
Cannon P-3-13, Hubbell 7557, Cannon UA-3-13 or UA-3-14 available at no added cost.

Power Source: 115 or 230 VAC 50/60 cps or self-contained batteries (supplied wired for 110 VAC). Batteries are low cost standard types, one 4.5 volt Burgess D-3 or Eveready 726, and two 22.5 volt Eveready 763. 22.5 volt battery life approximately 75 hours. 4.5 volt approximately 90 hours. (Batteries not supplied with 212Z-1).

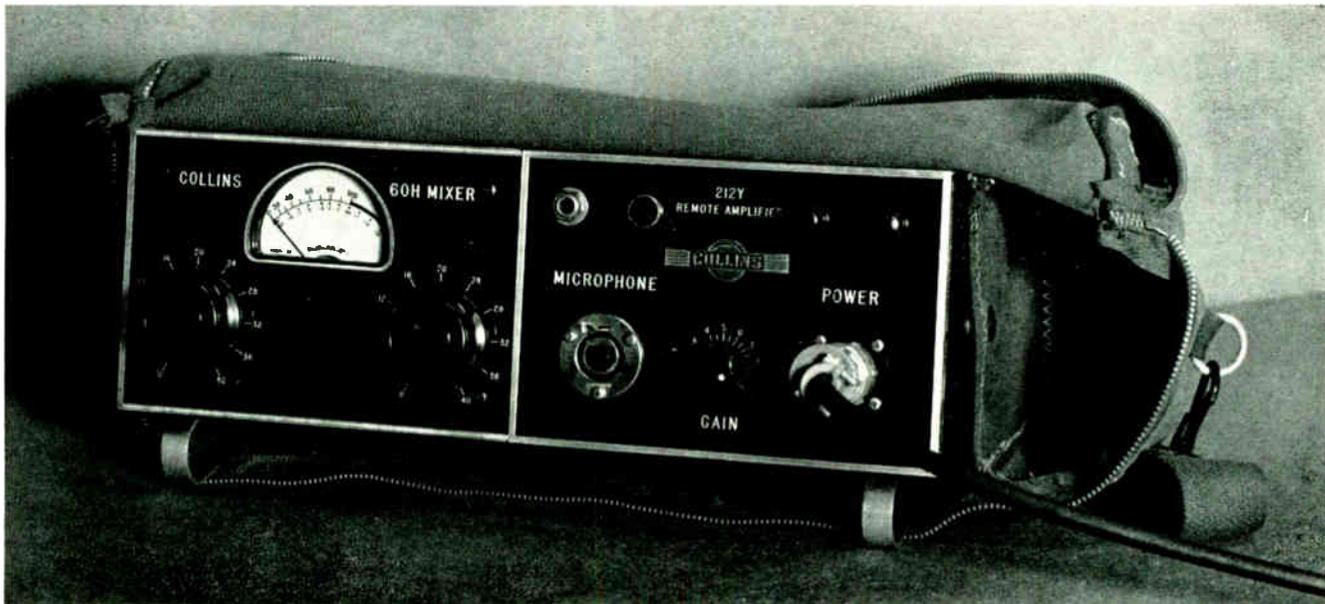
Ambient Temperature Range: 0-45°C.

Ambient Humidity Range: Up to 95%.

Weight: 22 lbs. complete with batteries in case.



## 212U REMOTE AMPLIFIER



### 212U TWO-CHANNEL REMOTE AMPLIFIER

The 212U consists of a 60H Mixer and a 212Y Amplifier. Both units are mounted in a single aluminum cabinet. A convenient carrying case with a carrying handle and a shoulder strap is provided.

To operate this equipment the canvas carrying case may be removed, or, in bad weather, the front of the case may be opened by slide fastener for access to the controls. A snap-fastened flap at the rear of the case allows connection of the microphones. The a-c cord provided is connected to the 212Y unit. If battery operation is required, a Collins type 412C-2 battery box and interconnecting cable must be used. The battery box is not included in the 212U equipment. Line connections are made through binding posts on the 212Y unit.

The mixing controls are ladder type attenuators, with db calibrations on the front panel. The master gain is the volume control on the 212Y. Legs raise the front of the unit to a convenient operating height. The meter is a standard 3" VU meter with an adjustable range extension network. A phone jack on the 212Y panel allows headphone monitoring.

#### SPECIFICATIONS

Input Impedance: 212U-1, 30/50 ohms.  
212U-2, 150 ohms.  
212U-3, 200/250 ohms.

Output Impedance: 600 ohms.

Power Output: +17 dbm (1 milliwatt 600 ohms reference level).

Distortion: Less than 1½% between 50 and 15,000 cps.

Noise Level: Better than 65 db below program level.

Frequency Response: ±2 db between 30 and 15,000 cps.

Gain: 85 db less mixer insertion loss.

Mixer Insertion Loss: Approximately:

212U-1, 6 db.

212U-2, 10 db.

212U-3, 4.5 db.

Tubes: 2-6AQ6, 1-6AK6, 1-7Y4.

Gain Controls: Master gain, high resistance potentiometer.

Mixers: Ladder type attenuators.

Number of Input Channels: Two.

Microphone Receptacles: Cannon type XL-3-13; adapters available for other standard types.

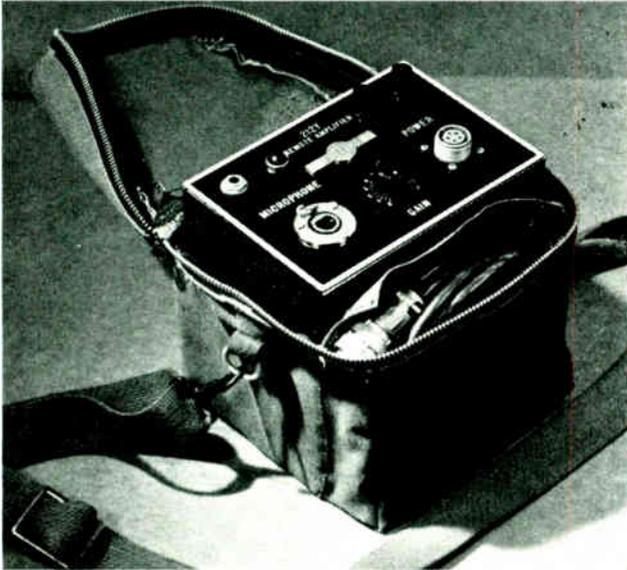
Finish: Black anodic aluminum panel, black wrinkle cover.

Carrying Case: Leather reinforced canvas with slide fastener and pouch for power and microphone cables, canvas carrying handle and shoulder strap.

Size: 14" w, 6" h with legs (4¾" less legs), 7½" d.  
Weight: 13 lbs.

Power Source: 115 volts a-c 60 cps. Power supply is self-contained.

Battery Operation: Requires 412C-2 battery box.



### 212Y SINGLE CHANNEL REMOTE AMPLIFIER

The Collins 212Y Remote Amplifier combines small size and light weight with high fidelity. Careful engineering design has produced an extremely compact, completely accessible unit suitable for dance orchestra and newsroom pickups, sports broadcasts, and any other applications where fast "set up" is important or necessary. The low cost of the 212Y further suggests its permanent installation at points where pickups are made regularly.

The design of the 212Y includes all features necessary to provide dependable remote operation. One high fidelity channel is incorporated, which operates from a low level velocity, dynamic or other self-generating microphone. A universal input transformer matches all low impedance commercial type microphones.

The 212Y Remote Amplifier is available in two models; the 212Y-1, which has a Cannon XL-3-13 microphone connector, and the 212Y-2, which has a Cannon P3-13 microphone connector.

Three stages of amplification provide an overall gain of 85 db, with an output of +17 dbm.\* A headphone jack connected across the output terminals permits program monitoring as well as talk-back from the studio.

Because of its simplified construction, installation and operation, the Collins 212Y can be handled by

non-technical personnel without fear of program failure.

The front of the leather reinforced carrying case, which has a pouch for power cord and microphone cable, opens by slide fastener to allow full access to all controls and connections. If desirable, the case may be removed completely. Line connections are made to binding posts, and the supplied a-c power cord is plugged into the front panel.

If battery operation is required, the interconnecting cable from a 412C-2 battery box is connected. Merely exchanging plugs in the power input receptacle permits quick change from a-c to d-c operation. The battery box is not supplied with the 212Y.

The amplifier slides into its case and is fastened by one Dzuz fastener.

### 212Y SPECIFICATIONS

Number of Channels: One.

Gain: 85 db max.

Input Impedance: 30/50 ohms or 200/250 ohms.

Output Impedance: 600 ohms.

Power Output: +17 dbm.\*

Distortion: Less than 1.0% between 30-15,000 cps.

Noise Level: 65 db below normal program level.

Tubes: 2 6AQ6, 1 6AK6, 1 7Y4.

Frequency Response: Within 1.0 db; 30-15,000 cps.

Gain Control: High resistance potentiometer.

Microphone Receptacle:

212Y-1—Cannon type XL-3-13 (Adapters available for other standard types.)

212Y-2—Cannon type P3-13.

Finish: Black anodic aluminum panel, black wrinkle cover.

Carrying Case: Leather reinforced canvas with pouch for power and microphone cables.

Power Source: 115 volts a-c, 50/60 cps. Power supply is self-contained.

Battery Operation: Requires 412C-2 battery box and interconnecting cable.

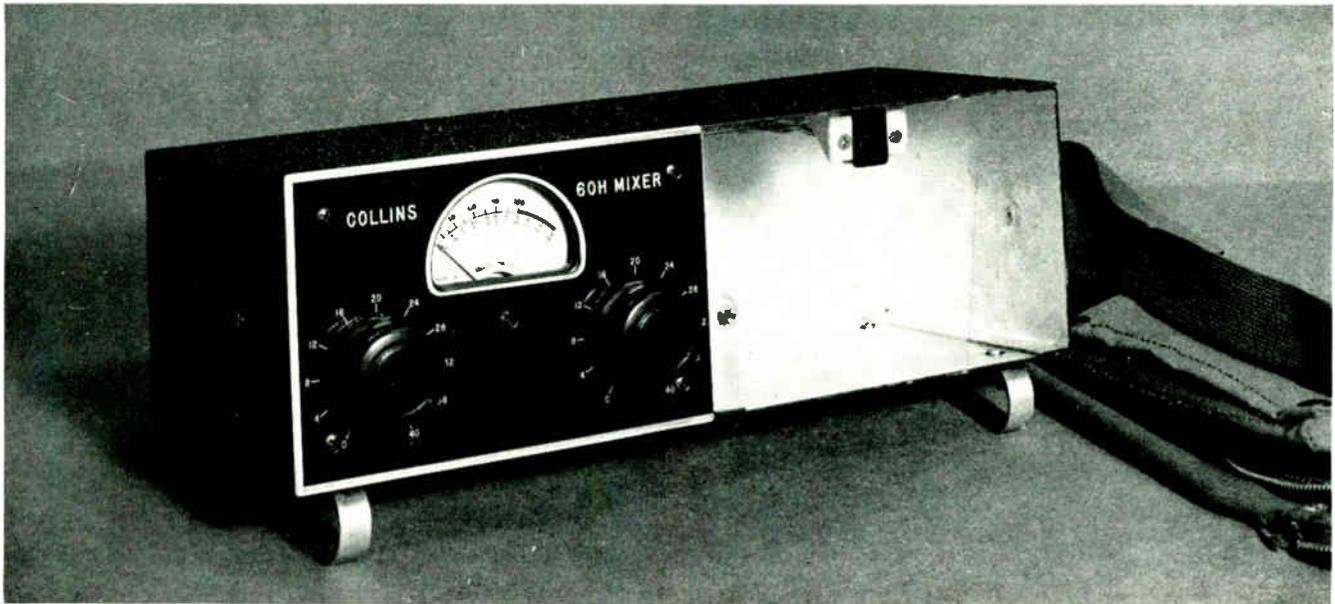
Weight of Battery Box: Approx. 16 lbs. including batteries.

Size: 7" w, 4 $\frac{3}{4}$ " h, 6 $\frac{1}{4}$ " d.

Weight: 10 lbs.

\*1 milliwatt, 600 ohm base.

## 60H REMOTE MIXER



### 60H TWO-CHANNEL REMOTE MIXER

The Collins 60H Mixer is a two-position, low-level mixer used in conjunction with the Collins 212Y Remote Amplifier. It consists of a mixer chassis in a cabinet which has an opening for the insertion of the 212Y Amplifier, and a convenient canvas carrying case with both a carrying handle and a shoulder strap.

The 212Y slides into the 60H mixer case exactly as it does into its own case. A built-in plug and socket arrangement handles the interconnection problem at the same time the amplifier is installed in the mixer case.

A standard 3-inch VU meter with adjustable range extension attenuator is provided for monitoring of the program material, while headphone monitoring is accomplished as before in the 212Y amplifier. The two ladder type attenuators are furnished with convenient control knobs having decibel calibration on the front panel. The volume control on the 212Y will then serve as a master volume control.

The mixer rests upon two removable legs which raise the knobs to a convenient height and tilt the panel at an angle to afford sight of the dial calibrations and meter scale. The microphone connections are at the rear of the cabinet. The canvas carrying case is equipped with two snap fasteners to hold the case on the mixer when operating in inclement weather. A flap on the rear of the case opens to

allow insertion of the microphone connectors and at the same time protects them from the weather.

### 60H SPECIFICATIONS

Input Impedance: 60H-2, 30/50 ohms.

60H-3, 150 ohms.

60H-4, 200/250 ohms.

Output Impedance: 60H-2, 50 ohms.

60H-3, 250 ohms.

60H-4, 250 ohms.

Insertion Loss: 60H-2, 6 db.

60H-3, 10 db.

60H-4, 4.5 db.

Gain Controls: Ladder type attenuators, step by step.

Number of Input Channels: Two.

Microphone Receptacle: Cannon type XL-3-13.

Adapters are available for other standard types.

Finish: Black anodic aluminum panel, black wrinkle cover to match 212Y.

Dimensions: 14" w, 6" h with legs (4 $\frac{3}{4}$ " h less legs), 7 $\frac{1}{2}$ " d.

Carrying Case: Leather reinforced canvas with slide fastener and pouch for power and microphone cables; canvas carrying handle and shoulder strap.

Weight: Mixer and carrying case only, 6 lbs.

## 412C BATTERY BOX and ADAPTERS



### 412C BATTERY BOX

The 412C-2 battery box is sturdily constructed, holding the batteries securely. There is room in the top of the case for storing the 6 ft. rubber-jacketed cable for transportation. Three thumb screws hold the clamp which secures all of the batteries in place. A convenient carrying handle is provided. Batteries not furnished.

Finish: Black wrinkle.

Dimensions: 10 $\frac{3}{4}$ " w, 6 $\frac{1}{2}$ " d, 9 $\frac{3}{4}$ " h.

Weight: With batteries approximately 22 lbs.



Requires standard low cost type batteries:

4—Burgess M30 or Eveready 482 or equivalent.

5—Burgess 4F or Eveready 742 batteries, or equivalent.

### MICROPHONE ADAPTERS



655-5  
WITH HUBBELL  
7555



655-6  
WITH HUBBELL  
7484



655-4  
WITH HUBBELL  
23002



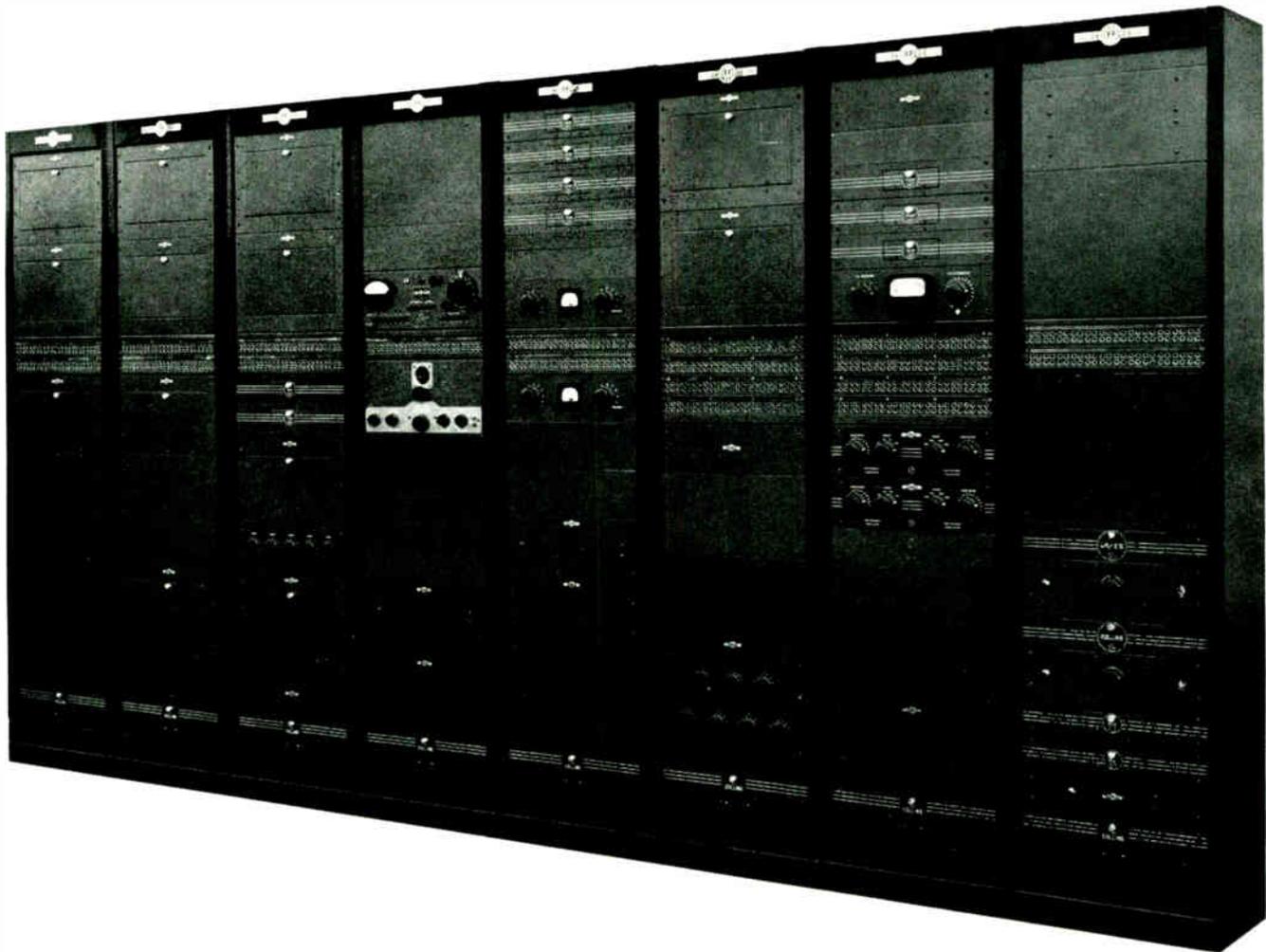
655-3  
WITH HUBBELL  
7082



655-2  
WITH CANNON  
P3-CG-115

Adapters using other type connectors available on special order

## CUSTOM DESIGNED SPEECH EQUIPMENT



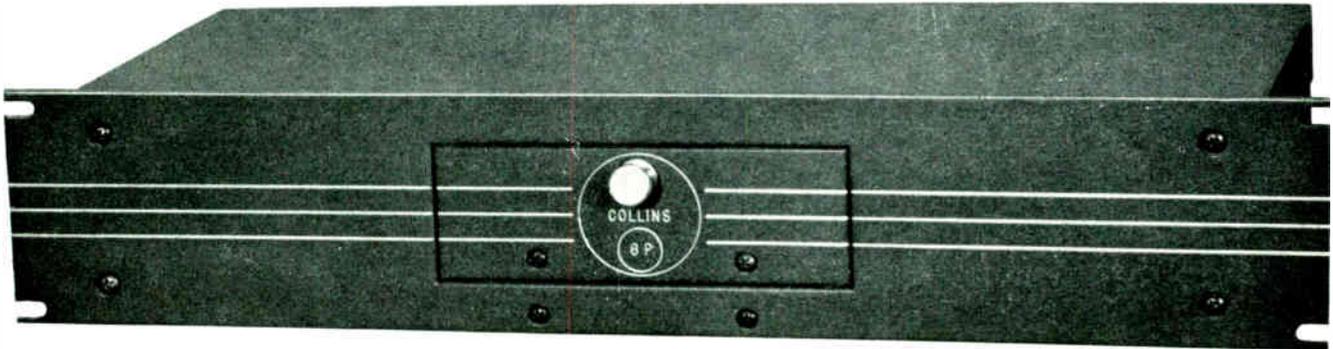
While the regular Collins line of audio equipment is very comprehensive, operating methods in individual stations sometimes demand a special combination of functions in a given piece of equipment, calling for custom building. Recognizing that fact, Collins engineers have designed the standard audio line in such a way that the standard sub-assemblies can be adapted in any wanted variety to provide custom equipment for special individual requirements, and at a surprisingly low increase in cost.

The highly skilled engineering group responsible

for Collins custom work has had years of experience in broadcasting, and is capable of building anything which may be required by the broadcaster. Collins also has all facilities for factory wiring and testing and, if desired, will be glad to cooperate with your Chief Engineer in supervising installation.

A functional block diagram of the equipment facilities required and a rough physical layout, together with information regarding any special circuit or construction features desired, should accompany your inquiry.

## 6P-1 PRE-AMPLIFIER



### 6P-1 PREAMPLIFIER

The Collins 6P is a high fidelity Preamplifier designed for service in AM, FM and TV applications. It operates from a low-level microphone or similar source and has sufficient output to drive a program amplifier, or audition facilities. As many as five of these preamplifiers, which require an external power supply, can be powered from the Collins 409T-3 Power Supply.

The 6P uses standard tubes and has two stages of amplification. It is carefully engineered for high performance through the use of the latest circuit refinements and improved components. Generous safety factors throughout insure operating reliability. The hum and noise levels are low, and the output is clean and brilliant. The frequency response is flat from 30-15,000 cps, with a variation of only  $\pm 1.0$  db. Distortion at normal program level is less than 1.0%. Adequate shielding and careful circuit arrangement prevent cross-modulation between preamplifiers when more than one are used, even when they are placed side by side. Two gain positions are provided, giving approximately 45 db or 35 db amplification respectively. Gain is constant for a given setting.

The advanced design of the 6P provides easy accessibility to all parts. An access door in the panel permits tube changing from the front. Removal of the slip-on dust cover gives immediate access to all circuit components.

Input Impedance: 30 / 50, 200 / 250, or 500 / 600 ohms.

Output Impedance: 600 ohms (150 ohms available).

Input Level: Commercial microphone level.

Output Level: -35 to -15 dbm\*.

Overall Gain: 45 db in high position, 35 db in low position.

Frequency Response: 30-15,000 cps  $\pm 1.0$  db.

Noise Level: -65 db from program level.

Distortion: Less than 1.0% at program level.

Tube Complement: 2-1620 or 2-6J7.

Power Requirements: 6.3 volts a-c @ 0.6 amperes, 180 volts d-c @ 6 ma. Use Collins 409T-1 or 409T-3 power supplies.

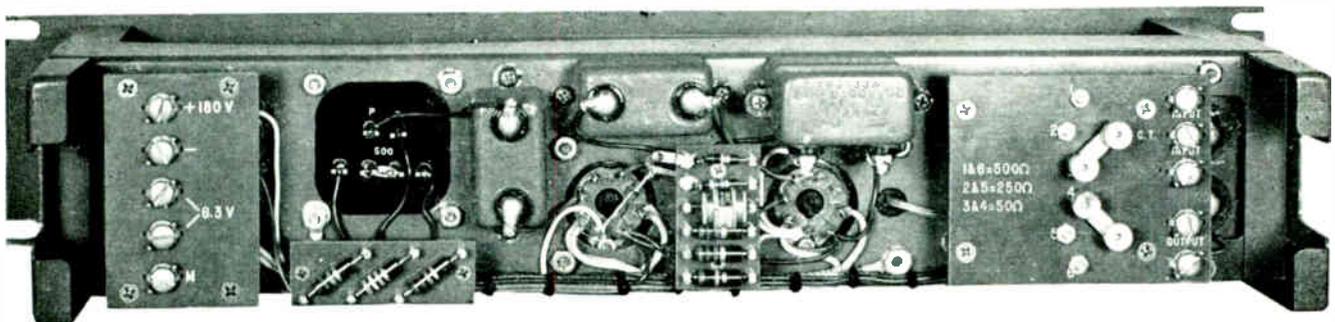
Mounting: Standard 19" rack.

Mounting Dimensions: 19" w, 3½" h, 7½" d.

Finish: Metallic gray.

Weight: 11 lbs.

\*1 milliwatt, 600 ohm base.



Rear view with dust cover removed



## 6R-2 ISOLATION AMPLIFIER

The 6R-2 is a two-stage push-pull Amplifier. The gain control has 20 steps of 2 db each, and is located immediately behind the access door. Tubes are easily accessible through a door in the front panel. Other components are easily reached by removing the dust cover, which is held in place by spring fasteners. Provisions have been made for external metering of the tube currents.

Frequency Response: 30-15,000 cps  $\pm 1.0$  db.  
 Distortion: 1% max. at any level up to +20 dbm\*.  
 Noise: -65 db.  
 Overall Gain: +45 db as line amplifier, +35 db as bridging amplifier.

Gain Control: Step by step with detent, 2 db per step.  
 Output Level: -20 to +20 dbm\*.  
 Maximum Input Level: -10 dbm\*.  
 Input Impedance: 600 ohms, or bridge with 20,000 ohms. 150 ohms available.  
 Output Impedance: 600 ohms, 150 ohms available.  
 Tube Complement: 2-6SN7.  
 Power Requirements: 6.3 volts @ 0.6 amp. a-c or d-c. 100 to 250 volts d-c at 20 ma. Power may be obtained from the Collins 409T-1 or 409T-3 power supplies.  
 Dimensions: 19" w, 3 1/2" h, 8 1/8" d.  
 Finish: Metallic gray.  
 Weight: 10 1/2 lbs.

\*dbm, 1 mw into 600 ohms.



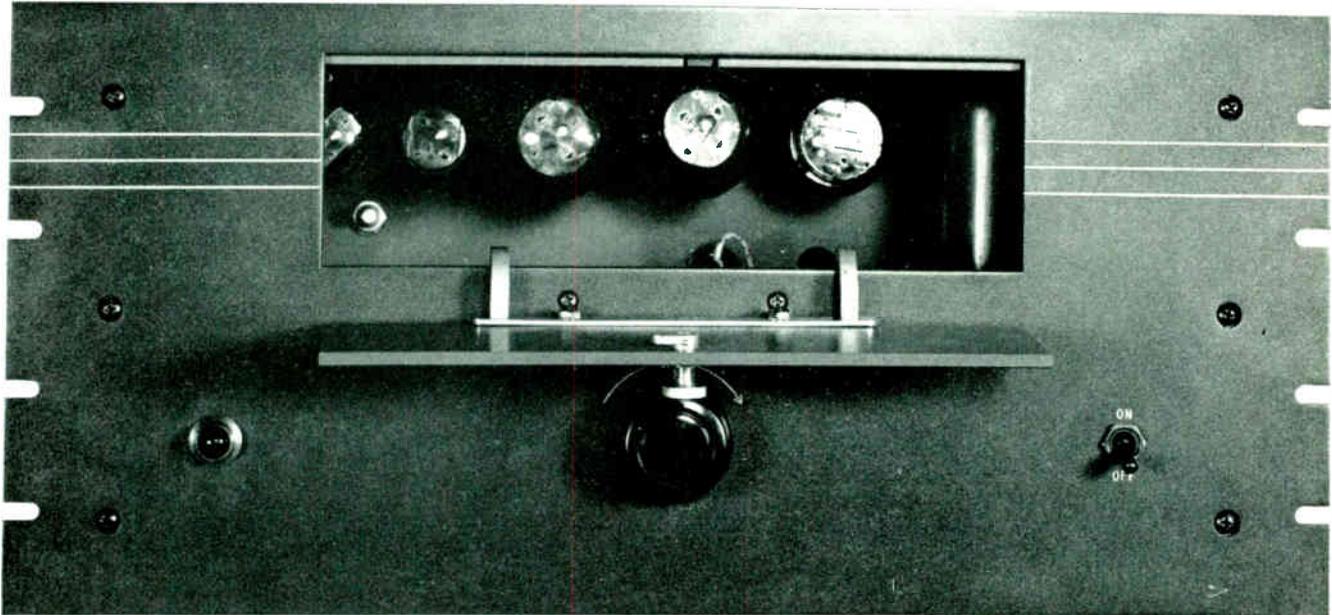
## 6T MONITOR AMPLIFIER

The 6T is a 2-watt Monitor Amplifier having a self-contained power supply. The power switch, pilot light and volume control are mounted on the front panel. Tubes are accessible from the rear.

Input Impedance: 600 ohms matching, or 20,000 bridging.  
 Output Impedance: 600, 150, 16, 8 and 4 ohms.  
 Frequency Response: 30-15,000 cps +2 db.  
 Gain: 55 db. Matching 600 ohms.  
 45 db. Bridging with 20,000 ohms.

Distortion: Less than 3%.  
 Noise: -65 db.  
 Output Level: +33 dbm\*.  
 Maximum Input Level: +10 dbm\*.  
 Tubes: 2-12AU7, 2-6AQ5, 2-6X4.  
 Finish: Metallic gray.  
 Mounting Dimensions: 5 1/4" h, 19" w, 6 1/2" d.  
 Power Requirements: 115 volts a-c, 50/60 cps.  
 Weight: Approx. 15 lbs.

\*dbm, 1 mw into 600 ohms.



### 6X-2 MONITOR AMPLIFIER

The Collins 6X-2 is a reliable 10-watt Monitor Amplifier complete with self-contained power supply. Its high fidelity, typical of all Collins speech equipment, commends its use for AM, FM and TV broadcasting and in the most exacting professional recording work.

All tubes are easily reached through the door in the front of the unit. Other components are made

available by removal of the slip-on dust cover.

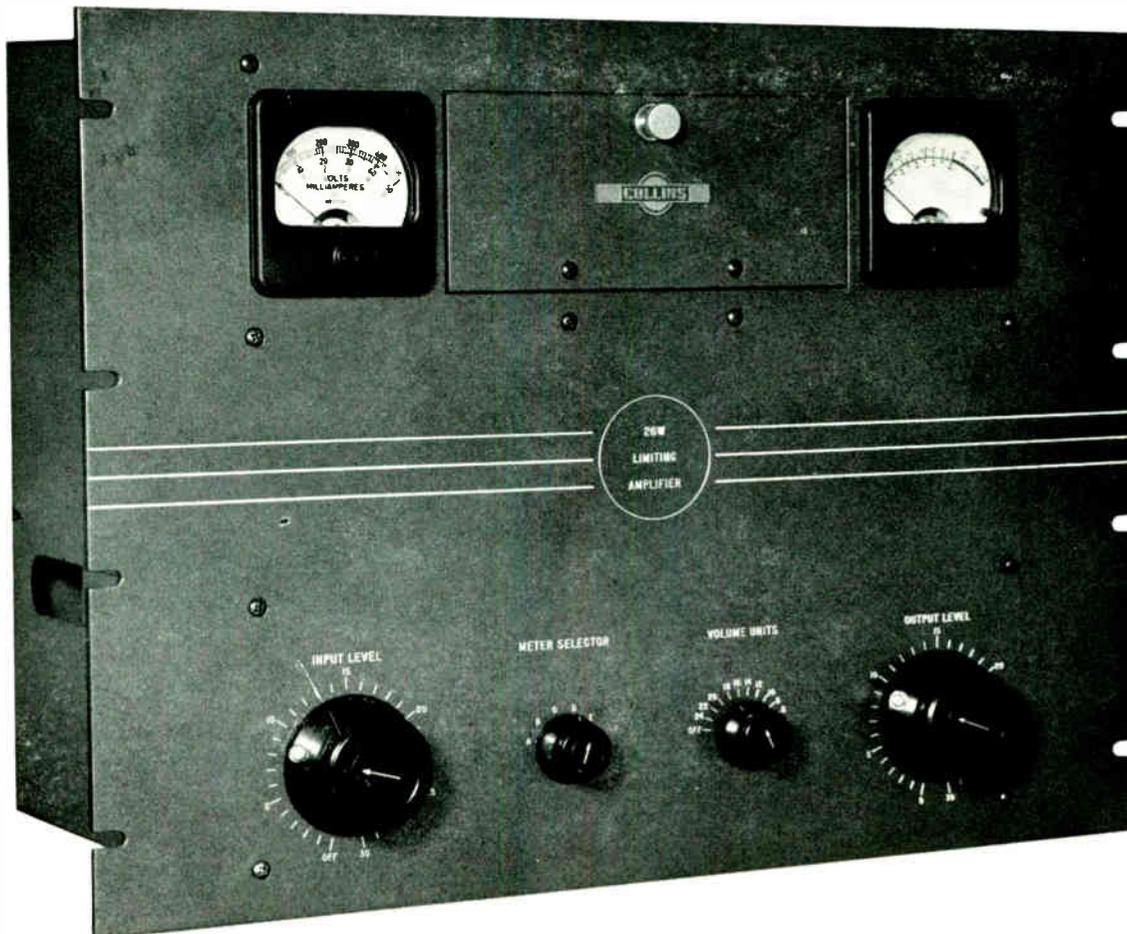
Because of its excellent electrical characteristics, its 10 watts of audio power and its built-in power supply, the 6X-2 is also an unsurpassed amplifier to follow a good AM-FM tuner and to be followed by a high fidelity speaker, for custom installation in schools, clubs, homes and other applications calling for the finest radio reception.

### SPECIFICATIONS

Number of Channels: One.  
Input Impedance: 600 ohms matching, 20,000 ohms bridging (150 ohms available).  
Output Impedance: 600 ohms, balanced.  
Output Level: +40 dbm (10 watts, 12 watts max.).  
Overall Gain: 55 db maximum.  
Frequency Response: 30 to 15,000 cps  $\pm$  1.5 db.  
Noise Level: Better than 70 db below output level.

Distortion: Less than 2% from 50 to 15,000 cps, 10 watts output.  
Tubes: 1-6SN7, 1-6SL7, 2-6L6G's, 1-5V4G.  
Power Source: 115 volts a-c, 50 60 cps.  
Mounting Dimensions: 8<sup>3</sup>/<sub>4</sub>" h, 19" w, 10<sup>1</sup>/<sub>4</sub>" d.  
Weight: 34 lbs., 10 oz.  
Finish: Metallic gray.

## 26W-1 LIMITING AMPLIFIER



### 26W-1 LIMITING AMPLIFIER

The 26W-1 Limiting Amplifier is recommended for use in any AM or FM installation where it is desired to control the amplitude of audio frequency peaks. In AM transmitter applications, it limits loud audio passages, thus preventing overmodulation and the accompanying distortion and adjacent channel interference. This limiting action permits a higher average modulation level and, consequently, a stronger transmitted signal.

In FM applications the 26W-1 Limiter is necessary to prevent excessive transmitter swing, which in general produces distortion at the receiver due to the inability of the average discriminator to handle frequency swings greater than 150 kc. In FM systems the use of wide range reproducer systems makes such distortion extremely noticeable.

The 26W-1 performs with equal satisfaction in recording equipment and high quality P.A. systems.

It regulates the audio level and prevents overloading the cutting head or speaker, and by raising the average audio level it improves signal-to-noise ratio.

The 26W-1 meets the three most important requirements of a superior product — (1) performance to comply with the specifications prescribed by the application, (2) reliability of operation, and (3) accessibility for maintenance. Thorough consideration was given the resistance-capacitance circuits and transformers to produce a true high fidelity frequency response. Distortion and noise are extremely low. Input and output levels are adjustable.

Two high quality meters provide a continuous visual indication of operating conditions. Individual tube operation, supply voltage, the amount of compression in db, and the output in VU are metered. The limiter stage can be adjusted easily from the front to precise balance, which makes it a simple

## 26W-1 LIMITING AMPLIFIER

job to hold the distortion to a very low level.

A door in the front panel provides access to all tubes. The dust cover is fastened by snap fasteners, and requires no tools for removal. The inside-out chassis construction reaches a new standard for accessibility of components; all resistors and circuit capacitors are on the rear of the chassis and are outermost upon removal of the dust cover.

The very best components, conservatively operated, are employed in the 26W-1. Electrolytic capacitors appear only where specified performance cannot be obtained with paper capacitors and are limited to cathode circuits with less than 50 volts potential. Transformers are sealed, and all insulating materials are the best available.

Frequency Range: 50-15,000 cps  $\pm 1.0$  db.

Input Impedance: 200, 600 ohms, or bridging.

Input Level: -25 to +25 dbm\*.

Output Impedance: 600 ohms.

Output Level: -12 to +18 dbm\*.

Gain Controls: Input and output levels adjustable in 30 steps of 1 db.

Overall Gain: 47 db max.

Compression Ratio: 18:1 in db above verge of compression.

Operate Time: Adjustable 1.0, 3.0 or 10.0 milliseconds.

Release Time: 1.0, 2.5 or 5.0 seconds.

Distortion: Harmonic distortion below 1% rms at any frequency from 100 to 15,000 cycles with no compression. 50-cycle distortion below 1.5% under same conditions. Harmonic distortion below 2% from 100 to 15,000 cycles at any value of compression up to 10 db.

Hum and Noise: -63 db below output level.

Controls: Input and output attenuators, VU range switch, and meter selector switch.

Metering Circuits: Individual tube currents, plate voltage, compression level, and output level.

Tube Complement: 3-6N7, 1-6H6, 2-1621 (2-6F6 may be used), 1-5V4G.

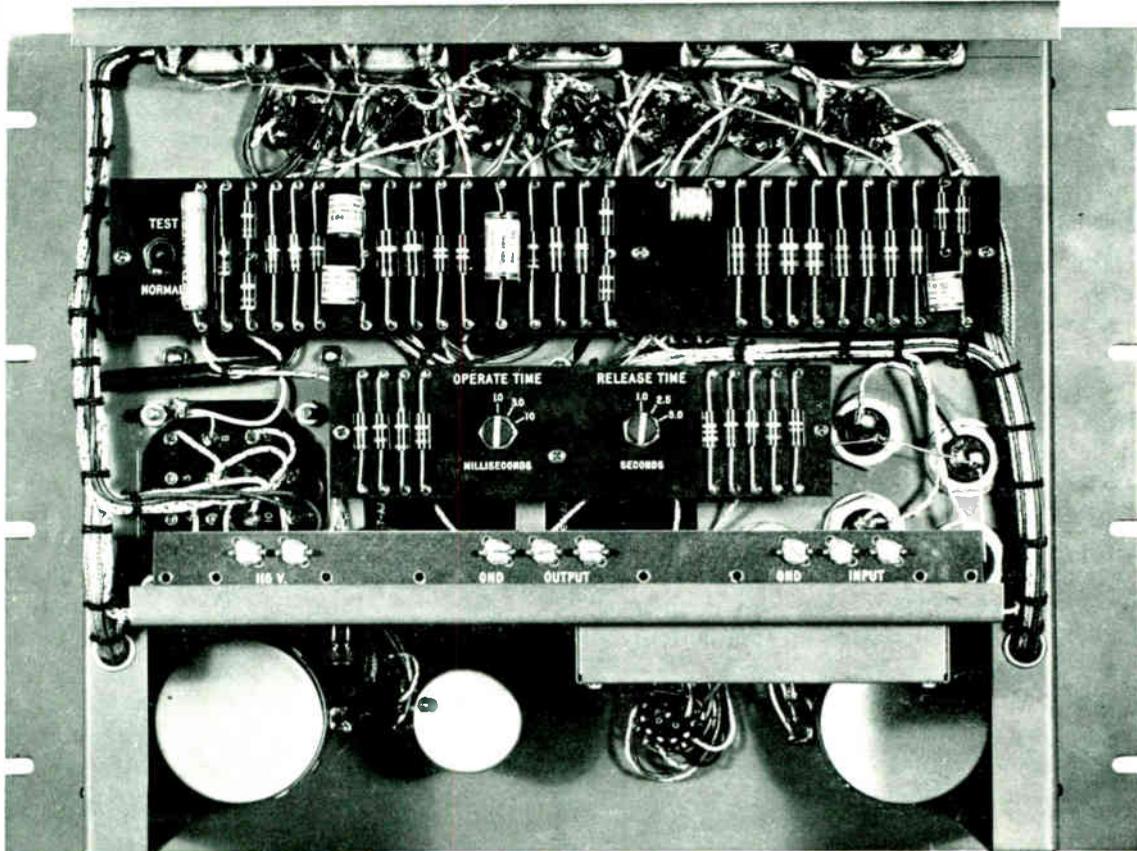
Power Source: 115 volts a-c, 50/60 cps.

Dimensions: 14" h, 19" w, 9" d, for rack mounting.

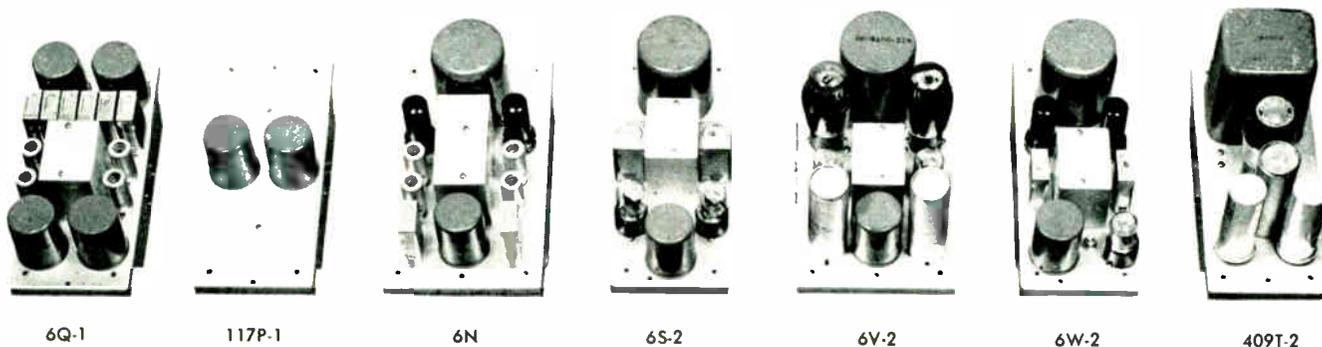
Weight: 45 lbs. (55 lbs. shipping weight).

Finish: Metallic gray panel.

\*dbm, 1 mw into 600 ohms.



## CONSOLE TYPE AMPLIFIERS



### CONSOLE TYPE AMPLIFIERS

Heretofore employed primarily in custom installations, the fine amplifiers used in Collins 212A Console are now available for mounting in other equipment. Shown above and described on this and the following pages are:

- 6Q Dual Preamplifier
- 6N Program Amplifier
- 6S-2 Two-stage Isolation Amplifier
- 6V 10-Watt Monitor Amplifier
- 6W-2 2-Watt Monitor Amplifier
- 117P-1 Repeat Coil Unit
- 409T-2 Power Supply for 6N, 6S or 6W-2

The 409T-2 Power Supply is capable of operating two 6N Program Amplifiers, five 6S-2 Isolation Amplifiers, or two 6W-2 2-watt Monitor Amplifiers. Power for the 6Q Dual Preamplifiers may be obtained from a 409T-3 Power Supply, a standard rack mounting unit listed elsewhere. The 409U-1 or -2 Power Supply, as supplied with the 212A Console, is recommended for use with these amplifiers if a complete system is contemplated.

#### 6Q-1 DUAL PREAMPLIFIER

The 6Q contains two preamplifiers on one chassis. These amplifiers usually work into a program amplifier, such as Collins 6N or 6R. An external power supply is needed.

- Input Impedance: 50 or 250 ohms.
- Input Level: Commercial microphone level.
- Output Impedance: 600 ohms.
- Gain: 47 db.

- Frequency Response:  $\pm 1$  db 30-15,000 cps.
- Distortion: Less than 1%.
- Noise: Better than -65 db.
- Tubes: 2-6AQ6, 2-6C4.
- Power Requirements: 140 volts d-c @ 8 ma.  
6.3 volts a-c or d-c @ 0.6 amp.
- Dimensions: 4 $\frac{3}{4}$ " h, 4 $\frac{1}{2}$ " w, 10 $\frac{1}{2}$ " d.
- Weight: 5 lbs., 2 oz.

#### 6N-1 PROGRAM AMPLIFIER

The 6N-1 is a Program Amplifier meeting the strictest requirements of present day broadcasting—AM, FM or TV. Mounted on a console-type chassis, it requires an external power supply. A dual section, 100,000 ohm-per-section potentiometer is also required.

- Input Impedance: 600 ohms matching or 20,000 ohms bridging. 150 ohms available.
- Input Level: Not exceeding -10 dbm\*.
- Output Level: +30 dbm\*.
- Output Impedance: 600 ohms. 150 ohms available.
- Gain: 68 db matching. 53 db bridging.
- Frequency Response:  $\pm 1$  db 30-15,000 cps.
- Distortion: Less than 1% at +30 dbm\*.
- Noise: Better than -65 db.
- Tubes: 2-6AQ6, 2-6C4, 2-6F6.
- Power Requirements: 325 volts d-c @ 50 ma.  
6.3 volts a-c or d-c @ 2 amp.
- Dimensions: 5 $\frac{3}{4}$ " h, 6" w, 10 $\frac{1}{2}$ " d.
- Weight: 4 lbs., 12 oz.

\*dbm: reference level 1 mw, 600 ohms.

## 6S-2 ISOLATION AMPLIFIER

The 6S-2 is a two-stage push-pull Isolation Amplifier. It may be used as a bridging amplifier for monitoring, as a distribution and isolation amplifier, as a program booster at studio or transmitter or as a program amplifier. An external power supply is required. The components are mounted on a console-type chassis, and are all easily accessible. A screwdriver-operated switch will vary the gain in four steps of 3 db per step.

Frequency Response: 30-15,000 cps  $\pm 1.0$  db.

Distortion: Less than 1% at any level up to +20 dbm\* output.

Noise: -65 db.

Overall Gain: +45 db line matching, +35 db bridging.

Input Level: -10 dbm\* max.

Output Level: -20 to +20 dbm\*.

Input Impedance: 600 ohms, or bridge with 20,000 ohms. 150 ohms available.

Output Impedance: 600 ohms, 150 ohms available.

Tube Complement: 2-6SN7.

Power Requirements: 6.3 volts @ 0.6 amp a-c or d-c. 100 to 250 volts d-c at 20 ma.

Dimensions: 5½" h, 4½" w, 10½" d.

Weight: 5 lbs., 4 oz.

## 6V-2 MONITOR AMPLIFIER

The 6V-2 is a 10-watt Monitor Amplifier mounted on a console-type chassis. A dual section (25,000 ohm-per-section) potentiometer is needed. This amplifier may be used on a 600 ohm circuit, matching, with 62 db gain, or as a bridging amplifier with approximately 52 db gain. An external power supply is needed.

Input Impedance: 600 ohms matching, or 20,000 ohms bridging.

Input Level: Not more than -10 dbm\*.

Output Impedance: 600 ohms balanced.

Gain: 62 db matching 600 ohms.  
52 db bridging with 20,000 ohms.

Frequency Response:  $\pm 1$  db 30-15,000 cps.

Distortion: Less than 1% at +40 dbm (vu).

Noise: Better than -75 db.

Power Requirements: 325 volts d-c @ 150 ma.  
6.3 volts a-c or d-c @ 2.7 amp.

Dimensions: 6½" h, 6" w, 10½" d.

Tube Complement: 6SN7, 6SL7, 2-6L6.

Weight: 7 lbs.

## 6W-2 MONITOR AMPLIFIER

The 6W is a 2-watt Amplifier mounted on a console-type chassis. It may be used to drive monitor speakers, or for any other applications requiring up to 2 watts. An external power supply is needed. A screwdriver-operated switch will vary the output level in four steps of approximately 3 db each.

Input Impedance: 600 ohms. 150 ohms available.

Input Level: Not over -10 dbm\*.

Output Impedance: 600 ohms. 150 ohms available.

Gain: 45 db, 600 ohms matching, 33 db at 20,000 ohm bridging.

Frequency Response: 30 to 15,000 cps  $\pm 1.5$  db.

Distortion: At +30 dbm, less than 1%.

Noise: Better than -70 db from +30 dbm\* output.

Power Requirements: 325 volts d-c @ 50 ma.  
6.3 volts a-c or d-c @ 1.7 amp.

Dimensions: 5½" h, 4½" w, 10½" d.

Tube Complement: 6SL7, 2-6F6 or 2-1621.

Weight: 4 lbs., 12 oz.

\*dbm: reference level 1 mw, 600 ohms.

## 117P-1 REPEAT COIL UNIT

The 117P-1 consists of two coils mounted on a console-type chassis. The characteristics of the repeat coils are as follows:

Input Impedance: 600, 250 or 50 ohms balanced.  
150 ohms available.

Input Level: +25 dbm\* max.

Output Impedance: 600 ohms. 150 ohms available.

Distortion: Less than 0.2% at +25 dbm\*.

Frequency Response:  $\pm 0.4$  db 30-15,000 cps.

Dimensions: 4½" h, 4½" w, 10½" d.

Weight: 1 lb., 14 oz.

\*dbm: reference level 1 mw. 600 ohms.

## 409T-2 POWER SUPPLY

A Power Supply mounted on a console-type chassis, 4½" wide. Mounting holes are standard for mounting in Collins 212A Console. By changing two resistors supplied in a kit, any one of the voltages and currents listed below may be obtained.

325 volts d-c @ 50 ma.      250 volts d-c @ 75 ma.

300 volts d-c @ 100 ma.    250 volts d-c @ 100 ma.

250 volts d-c @ 50 ma.

Also 6.3 volts a-c @ 5 amp, CT.

Tube: 5R4GY.

Output Connections: Solder-type terminals.

Input: 115 volts a-c, 50 60 cps.

Dimensions: 8½" h, 4½" w, 10½" d.

Weight: 8 lbs., 4 oz.



409T-1 Power Supply

## 409T-1 POWER SUPPLY

A rugged, reliable power supply is a necessity for innumerable applications. The 409T-1 is a well engineered unit, with sturdy components and a very low hum level. Both plate supply and filament power are available, with a tapped primary for voltage adjustment. Collins 6P Preamplifiers and 6R Isolation Amplifiers may be mounted in the same rack with

the 409T-1 power supply, and fed directly from it.

Tubes: 2—6X5.

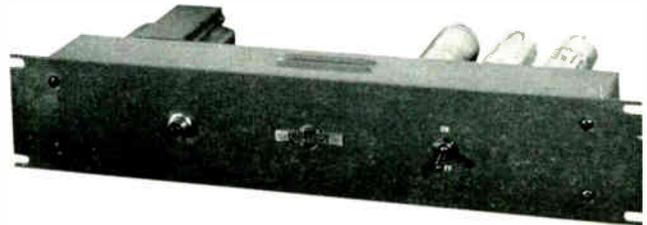
Plate Supply Voltage: 250 volts d-c @ 100 ma.

Filament Supply Voltage: 6.3 volts a-c @ 4.0 amp.

Dimensions: 19" w, 5¼" h, 7½" d.

Weight: 24½ lbs.

Finish: Metallic gray panel, velvet gray dust cover.



409T-3 Power Supply

## 409T-3 POWER SUPPLY

The 409T-3 is a rack mounting Power Supply on a 3½" panel. The power switch and pilot light are on the front panel. Connections to the unit are made to a covered terminal board at the rear. Any one of the output voltages and currents listed below is made available by changing two resistors supplied in a kit. Two plug-in high capacity electrolytic condensers of ample safety margin contribute to an extremely well filtered output. The filter input capacitor is an oil-filled paper unit.

Ripple Voltage: .005 volts at 250 volts d-c, 50 ma.

Output:

325 volts d-c @ 50 ma.    140 volts d-c @ 50 ma.

250 volts d-c @ 50 ma.    250 volts d-c @ 25 ma.

180 volts d-c @ 50 ma.    140 volts d-c @ 20 ma.

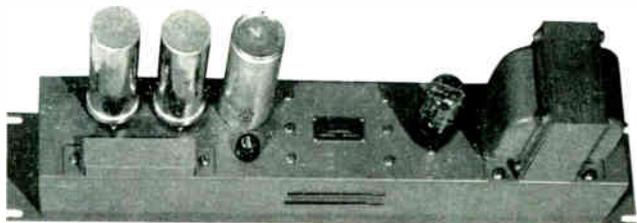
6.3 volts a-c @ 3 amp.

Tubes: 1—6X5.

Finish: Metallic gray.

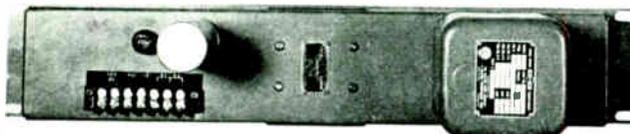
Weight: 11 lbs.

Input: 115 volts a-c, 50 60 cps.



409T-3 Power Supply (rear view)

## 414F-4 RELAY POWER SUPPLY



The 414F-4 Relay Power Supply is designed for use where a small number of relays are to be operated. This unit provides a source of 12 volts d-c at 1 ampere, and 12.6 volts a-c center tapped, at 3.5 amperes. Where low current drain is feasible for operating relays, the small size of the 414F-4 makes it especially desirable. The 12.6 volt a-c center tapped voltage is also useful for a filament supply or for operating pilot lamps.

Power Source: 115 volts a-c, 50/60 cps.

Output Voltage: 12 volts d-c @ 1 amp.

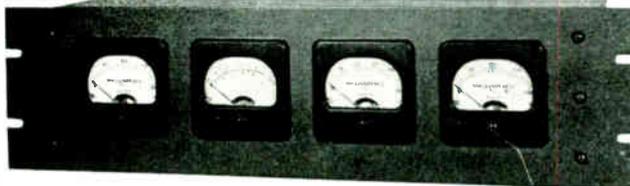
12.6 volts a-c CT @ 3.5 amps.

Dimensions: 19" w, 3½" h, 7" d.

Weight: 8¾ lbs.

Finish: Metallic gray.

## METER PANEL TYPE 82D-7



Meter panels have many applications in monitoring and measuring equipment. D-c and a-c voltages and currents can be continually metered by using this convenient rack mounting panel. The unit accommodates four meters of the Weston type 301 size (not supplied), and is equipped with a dust cover 7½" deep. Dzus fasteners are employed to hold the cover in place. The panel is made of aluminum, ⅜" thick. Meters are available to suit any requirements.

Dimensions: 19" w, 5¼" h, 5" d.

Finish: Metallic gray.

Weight: 6 lbs.

## 82T-1 METERING UNIT



The 82T-1 is a versatile unit for measuring currents of various rack mounting type amplifiers, such as the Collins 6X, 6P and 6R and the console mounting type amplifiers, such as 6Q, 6N, 6V, 6S and 6W. It is also adaptable for use with any circuit employing tapped cathode resistors of the proper multiplier values, or in circuits where the multiplier is in the plate circuit. The unit is wired to accommodate 10 plate metering circuits, and 10 cathode metering circuits. By adding jumpers on the terminal strip, the unit will operate for 20 cathode circuit measurements.

The basic meter movement is 1 ma full scale, and is calibrated 0 to 5. It will indicate currents of 0-5, 0-50, and 0-500 ma with a 25 ohm, 2.04 ohm or 0.22 ohm multiplier resistor.

In addition to the direct current measurements, a twenty-first position allows a check of the a-c voltage in the rack.

The dust cover protects switches and is held on by means of two snap fasteners.

Dimensions: 12" w, 5¼" h, 7½" d.

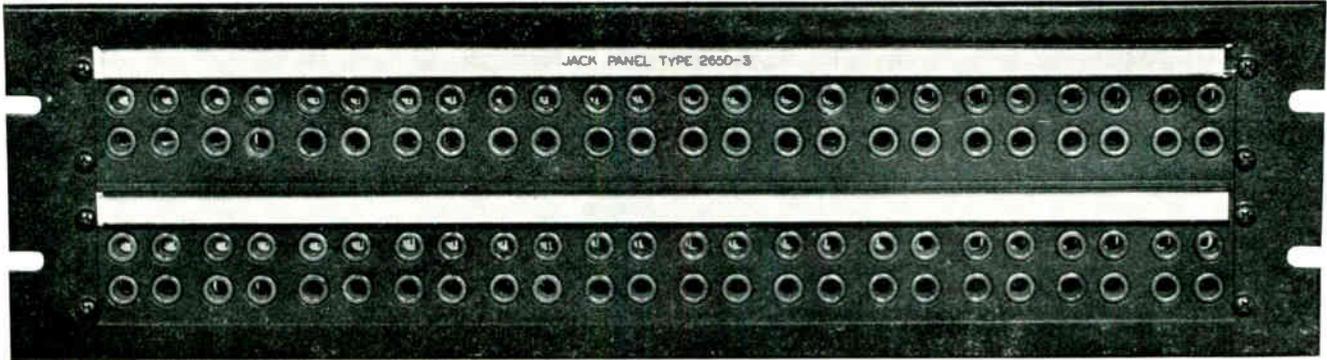
Weight: 10 lbs.

Finish: Metallic gray.

Current Range: 0-5, 50, 500 ma (with appropriate circuit).

A-c Metering: Indicates 120 volts center scale, and shows variations of 5 volts per 1 scale division from 80 to 130 volts. (Scale not calibrated for a-c volts).

# JACK PANEL - PATCH CORDS



## TYPE 265D JACK PANELS

Utmost flexibility is afforded a control room through the use of jack strips and associated patch cords. Connections can be made for test purposes or for terminating program lines and order wires. Lines, amplifiers, microphones, equalizers and other audio equipment can be speedily interchanged for maintenance or emergency operation. These jack panels mount in standard 19 inch racks. Regularly supplied with jack (break one, 2-circuit).

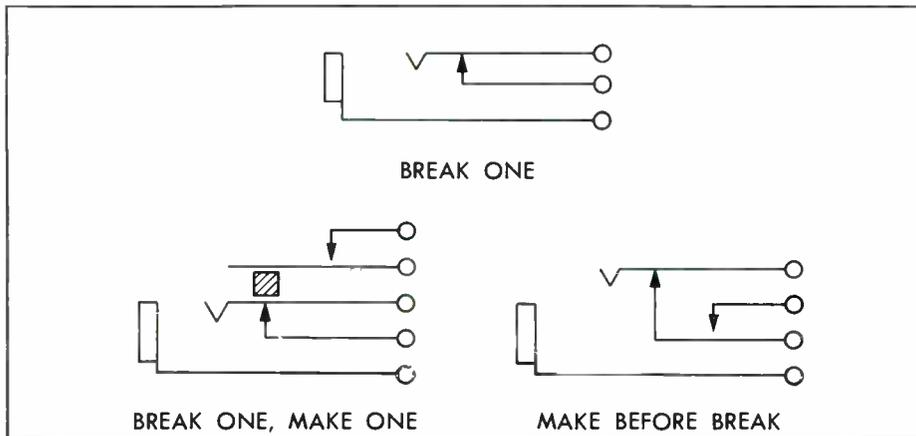
Type No.	Description	Height	Weight
265D-1	12 pr. jacks	1¾"	3¾ lbs.
265D-2	24 pr. jacks	3½"	6½ lbs.
265D-3	48 pr. jacks	5¼"	11½ lbs.
265D-4	72 pr. jacks	7"	17 lbs.
265D-5	96 pr. jacks	10½"	22½ lbs.
265D-6	120 pr. jacks	12¼"	28 lbs.

## PATCH CORDS

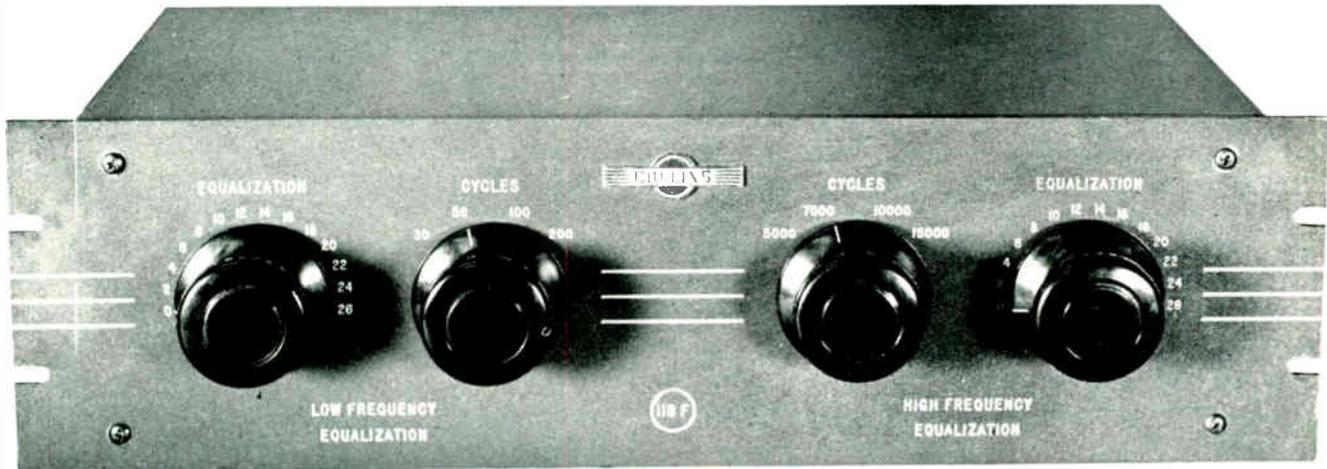
Patch cords for use with jack strips are available in lengths from 6 inches to 10 ft. The plugs are of the shielded type, with the sleeves tied together and grounded. The circuit is maintained through connections to the plug tips.



## LONG FRAME TWO-CIRCUIT JACKS



Jack Circuit Schematic



## PROGRAM EQUALIZERS

Collins Equalizers provide complete facilities for controlling the frequency response of program and communication circuits. The circuit gives simple, smooth control of equalization. As these units have an insertion loss of approximately 30 db, the Collins 6R Isolation Amplifier used in conjunction with the Equalizers will provide a means of bringing the level back to normal, plus a little gain if desired.

### 116F-1 EQUALIZER

Input and Output Impedance: 600 ohms, unbalanced.

Equalization Frequencies: 30, 50, 100 or 200 cps at low frequency. 5, 7, 10 or 15 kc at high frequency.

Maximum Boost: 26 db, in steps of 2 db each.

High and low frequency equalization independently adjustable.

Insertion Loss: 30 db at unequalized frequency.

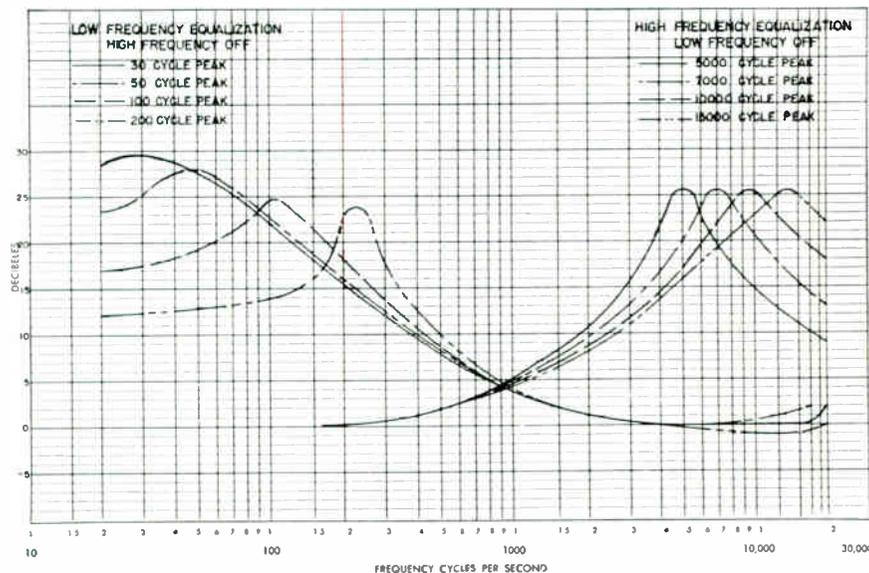
Frequency Range: 30-15,000 cps.

Dimensions: 19" w, 5 1/4" h, 7 1/2" d.

Weight: 15 lbs.

Finish: Metallic gray.

116F-1 Performance Curves



# PROGRAM EQUALIZERS

## 116E-3 AND 116E-4 EQUALIZERS

The 116E-3 and -4 Equalizers are another application of the 116F-1 circuit with a variable insertion loss dependent upon the amount of equalization used. Especially suited for stations having a variety of remote programs coming from different lines, the 116E-3 and -4 offer equalization in the high frequency ranges only. A calibrated attenuator selects the amount of equalization at the required frequency which is selected by a panel switch. Such calibration reduces line equalization time to a single run to find the line characteristics, and adjustment of the equalizer to the conjugate frequency characteristic.

The 116E-3 is a single high frequency equalizer while the 116E-4 has two identical high frequency equalizers mounted on the same panel with separate input and output terminals. Both are supplied with a flat gray-finished dust cover.

### 116E-3 EQUALIZER



Input and Output Impedance: 600 ohms unbalanced.

Equalization Frequencies: 5, 7, 10 and 15 kc.

Maximum Boost: Approx. 30 db.

Insertion Loss: Approx. equal to amount of equalization used.

Frequency Range: 30 to 15,000 cps.

Dimensions: 19" w, 3½" h, 7¼" d.

Weight: 6 lbs., 7 oz.

Finish: Metallic gray panel; flat gray back.

### 116E-4 EQUALIZER



Input and Output Impedance: 600 ohms unbalanced.

Equalization Frequencies: 5, 7, 10 and 15 kc.

Maximum Boost: Approx. 30 db each channel.

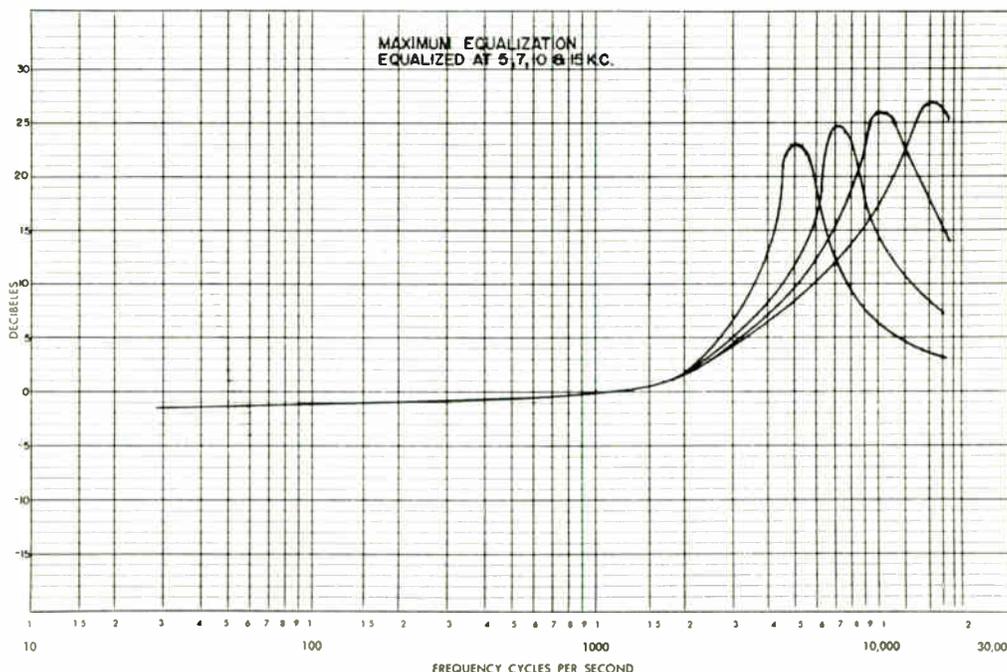
Insertion Loss: Approx. equal to amount of equalization used.

Frequency Range: 30 to 15,000 cps.

Dimensions: 19" w, 3½" h, 8¼" d.

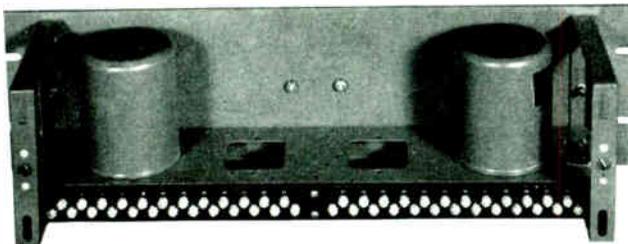
Weight: 9 lbs., 7 oz.

Finish: Metallic gray.



## REPEAT COIL PANELS - ATTENUATOR PANELS

### 117N-2 REPEAT COIL PANEL



The 117N-2 Repeat Coil Panel is a complete assembly including chassis, terminal board and dust cover, but less repeat coils. This unit will accommodate four Thordarson type repeat coils with an R-4 case. There are 50 terminals on the board for making connections to external equipment. The dust cover is held on by two convenient Dzus fasteners.

Dimensions: 5¼" h, 19" w, 5" d.

Weight: 7½ lbs. (less coils).

Finish: Metallic gray panel, velvet gray dust cover.

### REPEAT COILS — THORDARSON R-4 CASE

1. Line to Line	Primary	600 ohms
	Secondary	250 ohms
2. Line to Mult. Line	Primary	600 ohms, split
	Secondary 1	600 ohms, split
	Secondary 2	600 ohms
	Secondary 3	600 ohms
3. Line to Mult. Line	Primary	600 ohms, split
	Secondary 1	600 ohms, split
	Secondary 2	600 ohms, split
4. Bridging	Primary	20,000 ohms, split
	Secondary	600 ohms
5. Line to Mult. Line	Primary	250 ohms
	Secondary	50 ohms, split
	Primary	600 ohms, split
	Secondary 1	250 ohms, split
	Secondary 2	50 ohms, split



### 268A-1/268B-1 ATTENUATOR PANELS

Separate gain control may be maintained over incoming and outgoing lines, auxiliary amplifiers and speakers by the use of the Collins 268A-1 and 268B-1 Attenuator Panels. The 268A-1 consists of two balanced ladder attenuators while the 268B-1 features two bridged-T type attenuators. Both attenuator types have 20 steps, 2 db attenuation per step, with infinite attenuation in the last step. Connec-

tions are conveniently brought out to a terminal strip on the rear. The front panel is attractively engraved to indicate decibels of attenuation.

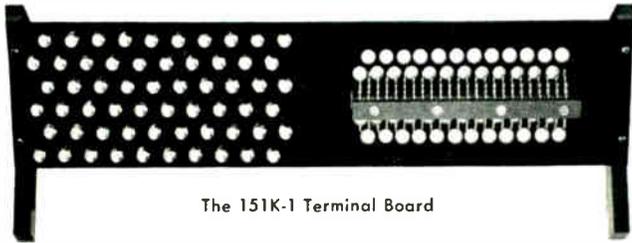
Dimensions: 3½" h, 19" w, 4" d.

Input or Output Impedance: 600 ohms. Other impedances available.

Finish: Metallic gray.

Weight: 8 lbs., 14 oz.

# 151K TERMINAL BOARDS



The 151K-1 Terminal Board

144 telephone-type terminals are provided as well as the 60 heavy duty terminals. Wt.: 3 lbs.

## 151K TERMINAL BOARDS

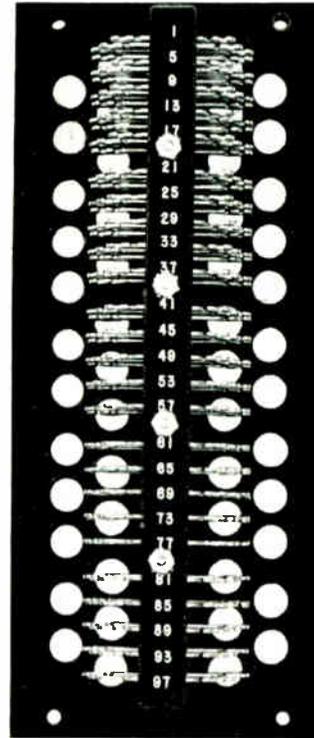
151K-1 (above) is used in the base of rack mounting cabinets. It contains 96 telephone-type solder terminals for audio connections, and 60 heavy duty threaded stud-type terminals for power connections. Wt.: 2 lbs., 14 oz.

The 151K-5 is a terminal board consisting of 100 telephone-type terminals, 25 in a row, 4 rows deep, on a 3½" x 8" bakelite board which has 7½" x 2½" mounting centers. Wt.: 1 lb.

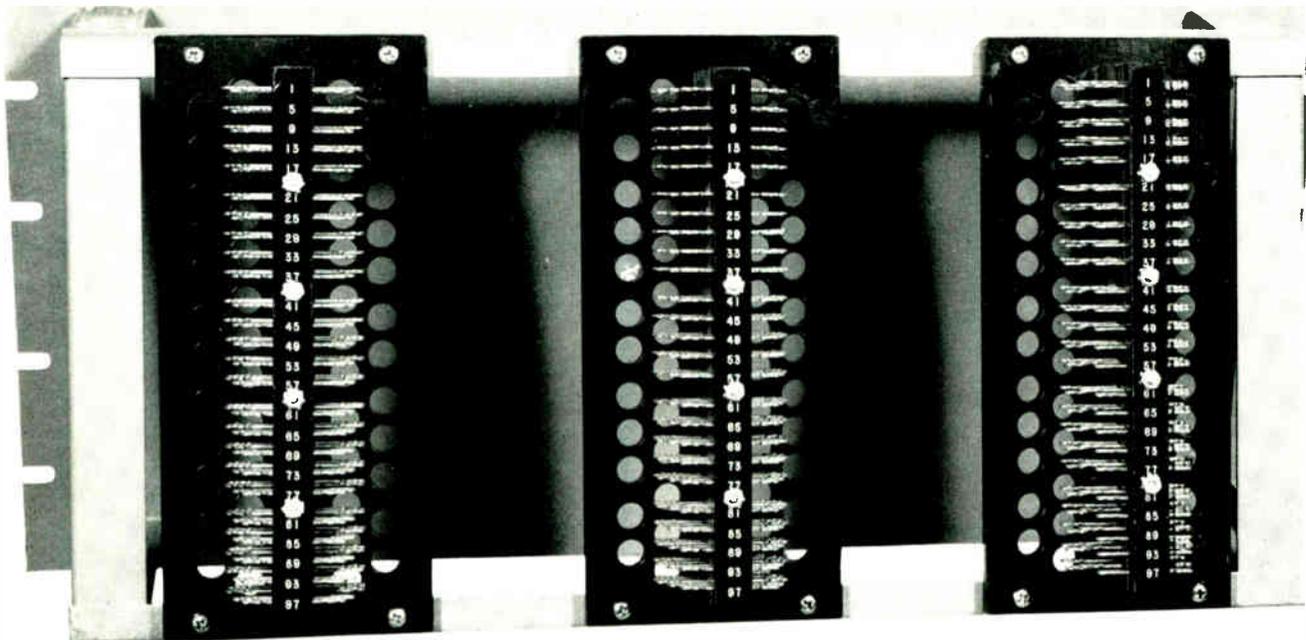
The 151K-4 has four 151K-5's assembled on an inclined plane on an 8¾" x 19" panel, for standard rack mounting. The assembly is 7½" deep. Wt.: 7 lbs.

The 151K-3 is identical to the 151K-4 except it has only three 151K-5's assembled on a panel. Wt.: 8 lbs.

The 151K-6 is similar to the 151K-1 except that



151K-5 Terminal Assembly



The 151K-3 Terminal Assembly



209A-1



209A-2

## 209A WARNING LIGHT ASSEMBLIES

The 209A Studio Warning Lights are constructed of aluminum sheet metal with a divided light compartment. Each of the two light compartments contains two 7½ watt 110 volt a-c bulbs and sockets to provide illumination of the lettering.

The 209A-1 flush type is mounted with the light box recessed in the wall, using the light box as the junction box, or mounting it to a standard junction box recessed deeper into the wall. The cover plate mounts directly to the wall with four screws.

The 209A-2 external type is mounted with the light box directly over a standard junction box, which is recessed in the wall the usual depth. The cover plate mounts directly to the light box with two screws.

### SPECIFICATIONS:

**209A-1**—For mounting flush with the wall. Sign must be ordered separately.

Dimensions: 4⅝" h, 7⅜" w, 2" d.

Weight: 11 oz.

**209A-2**—For wall mounting. Sign must be ordered separately.

Dimensions: 4⅞" h, 9½" w, 2" d.

Weight: 15 oz.

### SIGNS

The signs are made of boilable lucite with a black surface except for colored lettering.\* The weight of each sign is 2 oz. The four available signs are:

ON THE AIR	Red letters	STAND BY	Green letters
ON THE AIR	Red letters	AUDITION	Green letters
ON THE AIR	Red letters	REHEARSAL	Green letters
AM	Red letters	FM	Green letters

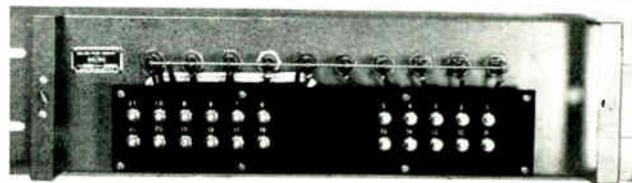
\*Special wording available at additional cost.

## 112B-1 SWITCH and FUSE PANEL



### 112B-1 SWITCH AND FUSE PANEL

The 112B-1 provides primary a-c control over 10 different circuits. A heavy-duty circuit breaker, operated by a snap action switch, carries the total a-c load, and each of the 10 circuits is individually fused. A terminal board and dust cover complete the unit. A door in the front panel furnishes convenient access to the fuses. The panel is 5¼" high, and mounts in a standard 19" rack. Metallic gray finish. Weight, 6½ pounds. Complete with set of extra circuit breaker heaters for operation at 3, 5 or 7 amperes. Furnished with 9 ampere link installed.



Rear View, Dust Cover Removed

Replacement links in 3, 5, 7 or 9 amps available.

### SHIELDED RADIO HOOKUP WIRE

**Two Conductor:** Two insulated conductors, twisted and covered by tinned copper braid.

**Each conductor:** No. 20AWG gauge, 3 amp capacity. Two solid colors, or solid color with tracers to distinguish one conductor from another.

**Shielding:** 96 strands No. 34AWG tinned copper wire braided in groups of 4 strands side by side.

#### TYPES AVAILABLE

Solid conductor Fiber glass braid insulation

Solid conductor Lacquered cotton braid insulation.

Same as above except cotton braid overall.

7 strands min. Fiber glass braid insulation.

7 strands min. Lacquered cotton braid insulation.

Same as above except cotton braid overall.

**Two Conductor:** Each conductor color coded, No. 16AWG (19 strands min.) 15 amp a-c, 1,000 volts rms. Lacquered cotton braid insulation.

**Shield:** 90 (min.) strands of No. 32 to No.

38AWG tinned copper wire with 5 (min.) strands running side by side.

Overall diameter: 0.32" max.

**Two Conductor:** Each conductor No. 12AWG (19 strands min.) 20 amp a-c, 1,000 volts rms.

Lacquered cotton braid insulation color coded.

**Shield:** 92 strands of No. 34AWG tinned copper wire with 4 strands side by side.

Overall diameter: 0.420" max.

**Microphone Cable (Rubber):** Two insulated conductors, twisted, covered by tinned copper shielding and encased in rubber. Diam. approx. 0.285".

**Each conductor:** 26 strands No. 34AWG tinned soft annealed wire twisted for flexibility. Equivalent to No. 20AWG gauge 3 amp 300 volts. Rubber covering ¼", one white, one black.

**Shield:** 96 strands of No. 34AWG tinned copper wire, braided with 4 strands running side by side.

**Jacket:** ¾" black rubber.

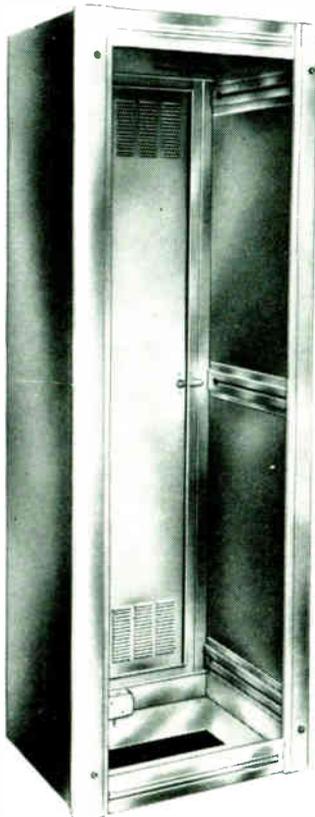
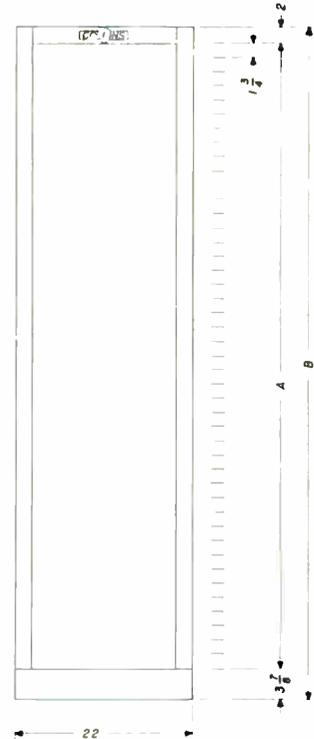
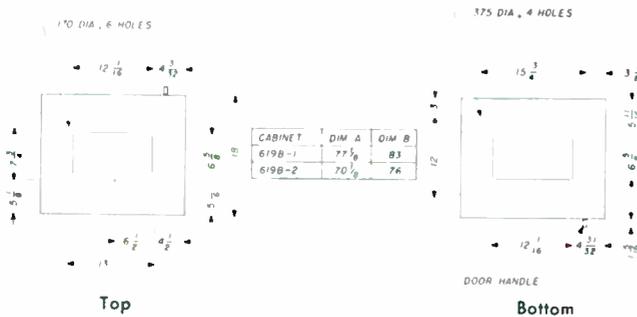
## RACK CABINETS

Type 619B cabinets are sturdily constructed of sheet metal, conveniently drilled to accommodate standard 19" panels of any height. A hinged full-length rear door provides immediate access to all units mounted in the cabinet. Adequate ventilation is obtained through properly distributed louvers in the door and through an opening in the top that is protected from dust by a baffle plate. The outside depth of the cabinet is 18 inches.

These cabinets are available in metallic gray finish.

Black lacquered style strips are furnished with each cabinet.

619B cabinets are furnished in two sizes, the 619B-1 with 77" panel mounting space, and the 619B-2 which has 70" panel mounting space. Overall heights are 83" and 76" respectively.



## PAR-METAL PX-7718 RACK CABINET

The PX-7718 cabinet is 76 1/8" high, 22" wide, and 18" deep, with 70" of panel space. The cabinet body is made of 1/16" cold rolled steel, the top is made of 5/16" steel, and the bottom of 7/16" steel. A duplex receptacle and outlet box is provided in the back under the door. Black ripple enamel finish is standard, grey ripple or "Primer Coat" only are optional at the same price. Shipping weight is 190 lbs.

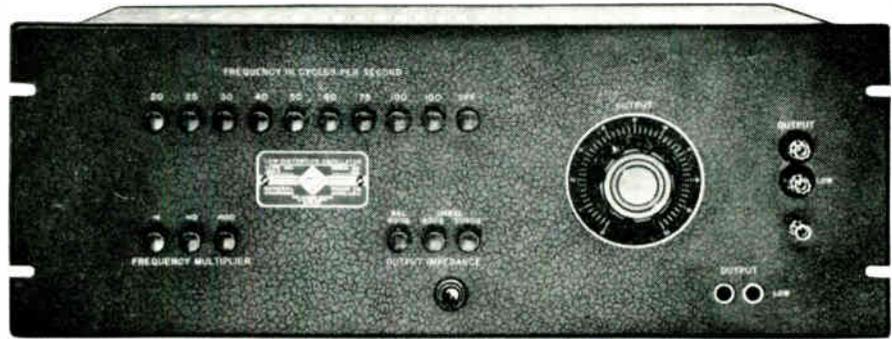
## BLANK PANELS

Useful for filling up unused space in racks and for making special equipment, blank panels have many applications. These panels are drilled to mount in standard 19" racks. The thickness is 3/16". Standard panels are aluminum, with metallic gray finish. Other metals and colors are available on special order.

Height	Weight
1 3/4"	10 oz.
3 1/2"	1 lb., 4 oz.
5 1/4"	1 lb., 14 oz.
7"	2 lbs., 8 oz.
8 3/4"	3 lbs., 2 oz.
10 1/2"	3 lbs., 12 oz.
12 1/4"	4 lbs., 6 oz.
14"	5 lbs.

## GENERAL RADIO 1301-A LOW DISTORTION OSCILLATOR

The 1301-A Oscillator is used as a tone source for distortion measurements and as a power source for bridge measurements at audio frequencies. It is also satisfactory for use as a general purpose laboratory oscillator.



1301-A

Frequency Range: 27 fixed frequencies between 20 and 15,000 cycles.

Frequency Calibration: Within  $\pm 1\frac{1}{2}\%$ ,  $+0.1$  cycle.

Frequency Stability: Not greater than 0.02% per hour after 10 minutes of operation.

Output Impedances: 600 ohms balanced to ground.  
600 ohms unbalanced.

5,000 ohms unbalanced.

Power Supply: 105-125 (or 210-250) volts, 25-60 cps (power consumption—45 watts).

Tubes: 1—6Y6G      1—6SQ7      1—6B4-G  
1—6SJ7-GT    1—NE-17      1—6SL7-GT  
1—6SK7-GT    1—6X5-GT      1—0D3

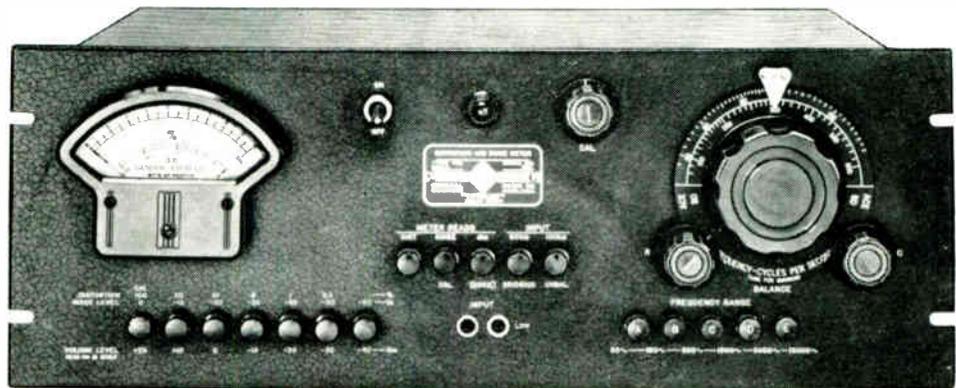
Accessories Supplied: Power cord, multipoint connector and spare fuses.

Dimensions: 19" x 7" panel, 12" deep.

Weight: 31½ lbs.

## GENERAL RADIO TYPE 1932-A DISTORTION AND NOISE METER

The 1932-A Distortion and Noise Meter measures distortion, noise and hum level in audio-frequency circuits. In conjunction with the 1931-A Modulation Monitor, it can be used to measure these quantities directly in the output of transmitters.



1932-A

Distortion Range: Full scale deflections for 0.3%, 1.0%, 3%, 10% or 30% distortion.

Noise Measurement Range: 90 db below reference calibration level, or 80 db below an AF signal of 0 dbm level at maximum sensitivity.

Audio-Frequency Range: 50-15,000 cycles (fundamental) for distortion measurements; 30-45,000 cycles for noise and hum measurements.

DBM Range: Power level range is from +20 to -60 dbm.

Residual Noise Level: Less than -80 db.

Input Impedance: 100,000 ohms unbalanced or 600 ohm bridging input.

Tubes: 4—6J5      1—6K6-GT/G    1—6X5GT  
1—6SN7-GT    1—6H6          2—0D3

Accessories Supplied: Line cord, cable for connecting to 1931-A, spare fuses.

Power Supply: 105-125 (or 210-250) volts, 50/60 cps. The line input power is 65 watts.

Dimensions: 19" x 7" panel, 12" deep.

Weight: 37¾ lbs.

## PRESTO 64-A TRANSCRIPTION TURNTABLE



The 64-A is a reliable, maintenance-free, directly gear-driven unit. The transmission is designed so that mechanical disturbances are reduced to 50 db below program level by a mechanical filter placed between the gear box and turntable. Two separate motors are employed, one for  $33\frac{1}{3}$  and the other for 78.26 rpm. Speed selection is accomplished by throwing a 3-position switch ("OFF,"  $33\frac{1}{3}$  or 78.26 rpm). Only one motor runs at a time. The 64-A includes the drive mechanism turntable and cabinet. (Reproducers are not included.)

Speed Accuracy: Zero deviation from  $33\frac{1}{3}$  and 78.26 rpm.

Power Requirements: 115 volt 60 cycles, 75 watts.

Motors: 1800 rpm synchronous.

Dimensions: Turntable in case 24" x 24" x 33".

Weight: 226 lbs. packed.



## PRESTO T-18/T-68 CHASSIS

The T-18 T-68 turntables are 3-speed units utilizing three interchangeable idler wheels mounted on the shift plate to prevent wobbling. To select speeds, the shift is moved laterally across the panel to engage the proper idler against the motor shaft. When the knob is in either of two "off" positions located between each of the speed positions, the idlers are

released from contact with the shaft to prevent flats on the rubber surface.

The T-68 is furnished with a rubber mat for cueing transcriptions and a separate 45 rpm adapter disc. Both the T-18 and T-68 are available with hysteresis synchronous motors for highest possible speed accuracy.

Panel Size: 8" x  $11\frac{3}{4}$ ".

Speeds:  $33\frac{1}{3}$ , 45, 78.26 rpm.

Speed Accuracy: 0.25% (instantaneous).

Turntable Diameter: T-18 is  $11\frac{7}{8}$ ", T-68 is  $15\frac{3}{4}$ ".

Turntable Weight: T-18 weighs  $4\frac{1}{4}$  lbs., T-68 weighs 7 lbs.

Noise: Better than 40 db (50 db with hysteresis motor).

Power Required: 115 volts 60 cycles, 40 watts.

Available Models:

T-18 12" with 4 pole motor.

T-18H 12" with hysteresis motor.

T-68 16" with 4 pole motor.

T-68H 16" with hysteresis motor.



### PRESTO 10-B TRANSCRIPTION TURNTABLE

The 10-B consists of a chassis, 16" turntable, motor, and 3-speed drive mechanism— $33\frac{1}{3}$ , 45 and 78 rpm.

Simplicity and easy maintenance are important 10-B features. The drive consists of a motor and pulley which directly contacts a rubber tire set into a groove around the rim of the turntable. The motor pulley has three different diameters, which can be brought into contact with the tire to select the required speed.

Mechanical Noise Ratio: 40 db below average program level.

Speed Regulation: Overall 0.5%, instantaneous 0.25%.

Power Required: 110 volts 60 cycle, 0.5 amp.

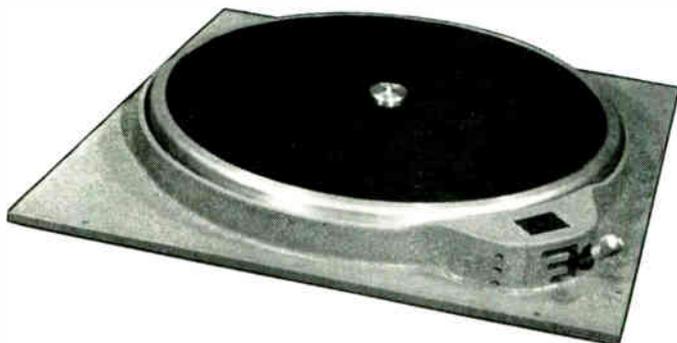
Dimensions: 20" x 18 $\frac{1}{2}$ " x 5".

Weight: 50 lbs.



### PRESTO CC-5 FLOOR MOUNTING CABINET

The CC-5 cabinet is for use in mounting the Presto 10-B Turntable chassis. The unit is 24 $\frac{1}{4}$ " x 25 $\frac{1}{4}$ " x 32" high and is made of 5-ply veneer wood.



### QRK-17B TRANSCRIPTION TURNTABLE

The 17B is a 3-speed professional turntable assembly. The table is 17", made of cast aluminum with a steel center pin, and is rim driven by a drive assembly requiring only one idler wheel. Speed change is accomplished by placing the shift lever in the desired speed channel. The QRK-17B can be used with almost any existing overhead cutting assembly or reproducer. The chassis is finished in gray crackle enamel.

Speed Accuracy: 0.4%.

Motor:  $\frac{1}{2}$ , H. P. Constant Speed.

Power Requirements: 115 volts, 60 cps.

Acceleration:  $33\frac{1}{3}$ — $\frac{1}{8}$  turn, 45— $\frac{1}{4}$  turn,  
78— $\frac{1}{2}$  turn.

Noise: Rumble is approximately 40 db under normal program level.

Dimensions: 19 $\frac{5}{8}$ " x 19 $\frac{5}{8}$ ".



## REK-O-KUT B-16H TRANSCRIPTION TURNTABLE

The B-16H offers the broadcaster finest performance at lowest cost. The turntable itself is precision lathe-turned, cast aluminum with an extra heavy rim for flywheel action. Turntable diameter is standardized at  $15\frac{3}{4}$ " to allow a  $\frac{1}{8}$ " overhang for cueing. It is internally rim-driven by means of neoprene compound idlers. Rotates on a single-ball pivot which takes the entire thrust of the turntable shaft.

Speeds:  $33\frac{1}{3}$ , 45 and 78 rpm.

Starting: From standing start to operating speed: at 78 rpm— $\frac{3}{4}$  turn, at  $33\frac{1}{3}$  and 45 rpm— $\frac{1}{4}$  turn.

Motor: Self-lubricating hysteresis synchronous.

Noise Level: -50 db.

45 RPM Hub: Built-in, retractable.

Dimensions:  $18\frac{3}{4}$ " x 20".

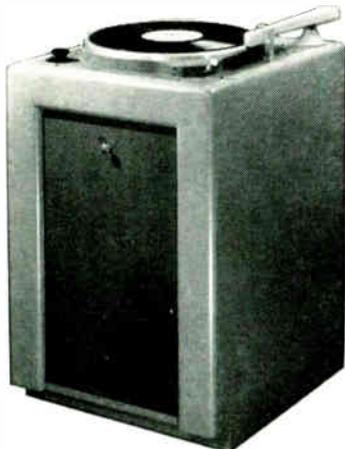
Finish: Wrinkle gray.

Weight: 30 lbs.



## QRK FLOOR MOUNTING CABINET FOR 17B

For mounting QRK-17B 3-speed transcription turntable.



## REK-O-KUT C-7B CONSOLE CABINET

Cabinet is designed to receive B-16H chassis without using screws or bolts. Floats on felt. Features two storage compartments with piano hinges and flush ring-latches. Built-in electrical outlets and adjustable leveling castors. Metallic-gray finish. Dimensions: 33" high, 22" wide,  $20\frac{1}{2}$ " deep.



### GRAY 108C TONE ARM

The Gray 108C lightweight arm incorporates viscous damping to provide high tracking accuracy. For records up to 16" in diameter. Constructed of cast aluminum. Accommodates most magnetic cartridges including Pickering, GE and Fairchild.



### GRAY 106-SP PLAYBACK ARM

The 106-SP is designed to meet the rigid requirements of high compliance cartridges such as GE and Pickering. Precisely adjustable stylus pressure for finest reproduction of 33 $\frac{1}{3}$ , 45 and 78 rpm records. Natural resonance for below standard recording limits. Adjustable pivot height. Low vertical inertia. Quick cartridge change without tool or solder, comes with three cartridge slides.



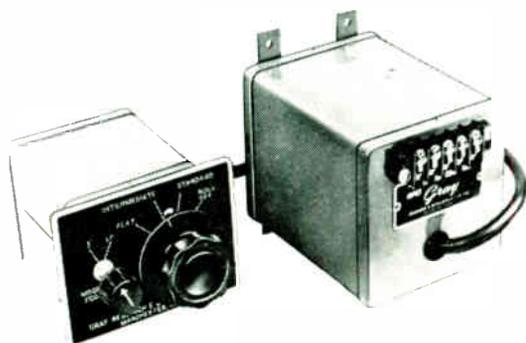
### GRAY 108-B TRANSCRIPTION ARM

The 108-B is a viscous-damped arm providing excellent tracking of records. It incorporates a slide-in cartridge permitting instant change from 78 rpm to micro-groove or 45 rpm records. The 108-B will accommodate all the most popular magnetic pick-up cartridges — Pickering, the new GE replaceable stylus (short body) and Fairchild.



### GRAY 103-LP PLAYBACK ARM

The 103-LP arm, with an angular contact ball pivot is recommended for 33 $\frac{1}{3}$ , 45 or conventional records. It has an adjustable counterweight, permitting accurate setting of precise stylus pressure for micro-groove records.



## GRAY 602C EQUALIZER

The 602C is normally used with standard microphone preamplifiers, thus making it unnecessary to purchase special audio input equipment when using magnetic cartridges. A convenient control permits instantaneous input switching from conventional records to micro-groove.

Output Impedance: 250 ohms balanced (150 or 50 ohms available).

Insertion Loss: 20 db.

Output Level: -67 VU at 4.7 em/sec.

Cable Length: 18".



SINGLE



DUAL

## GENERAL ELECTRIC VARIABLE RELUCTANCE CARTRIDGES

The General Electric RPX-145, RPX-146 and RPX-147 cartridges are designed for use with broadcast studio equipment as high quality reproducers of records and transcriptions.

The RPX-145 and RPX-146 cartridges employ a single clip-in stylus. The RPX-147, known as the "Triple-Play" cartridge, is furnished with two diamond clip-in styli mounted in its dual stylus assembly. The RPX-150 has two sapphire styli.

Replacement styli may be easily and quickly inserted in any of the cartridge mounting assemblies.

### Cartridges

RPX-145 Cartridge has a single 1-mil. diamond stylus.

RPX-146 Cartridge has a single 2.5 mil. diamond stylus.

RPX-147 Cartridge has a dual 1- and 2.5-mil. diamond styli.

RPX-150 Cartridge has a dual 1- and 2.5-mil. sapphire styli.

### Accessories

RPJ-01D Clip-in Tip Stylus with 1-mil. diamond tip.  
 RPJ-02D Clip-in Tip Stylus with 2.5-mil. diamond tip.

RPJ-03D Clip-in Tip Stylus with 3-mil. diamond tip.

RPJ-01S Clip-in Tip Stylus with 1-mil. sapphire tip.

RPJ-02S Clip-in Tip Stylus with 2.5 mil. sapphire tip.

RPJ-03S Clip-in Tip Stylus with 3-mil. sapphire stylus.

RPJ-007A Dual Stylus assembly, 1- and 2.5-mil. sapphire styli.

RPJ-011A Dual Stylus assembly, 1- and 2.5-mil. diamond styli.



DUAL STYLUS



SINGLE STYLUS



### FAIRCHILD 281A TRANSCRIPTION ARM

The 281A arm is the logical choice to accompany the 220 cartridges, but will accommodate all standard magnetic cartridges. Stylus pressure is changed by thumb screw. No arm rest is required. It is designed for 16" records.



### FAIRCHILD 202 TURN-HEAD ARM

The 202 incorporates viscous damping, mounts up to three Fairchild Cartridges and fits all transcription turntables.

Arm Dimensions: Stylus to center of base 11 $\frac{1}{8}$ ".  
Overall length 16".

Height above record surface 1 $\frac{7}{8}$ ".

Range of height adjustment  $\frac{3}{4}$ ".

Arm Mounting Dimensions: Center Pin of table to center of arm base 10 $\frac{1}{16}$ ".

Arm Weight (Total): 17 oz.

Stylus Pressure: Adjustable. Spring tension set at factory for 15 grams standard, 6 grams micro-groove.



### FAIRCHILD TYPE 220 CARTRIDGE

The 220 cartridges are moving-coil types and available in three models.

Model 220A—for micro-groove (LP) records—1.0-mil. diamond stylus, 4-8 gram stylus force.

Model 220B—for commercial transcriptions using 2.5-mil. groove—2.5-mil. diamond stylus.

Model 220C—3.0-mil. diamond stylus for standard 78 rpm records.

### SPECIFICATIONS

Frequency Response:  $\pm 2$  db, 20-17,000 cps.

Size: 1 $\frac{1}{8}$ " x  $\frac{3}{4}$ " x  $\frac{1}{16}$ ".

Weight: 12 grams.

Tracking Force: 4-8 grams recommended.



S36-B

## S36-B SINGLE UNIT RECORDER AND PREAMPLIFIERS

For studio and professional uses. Panel 7" x 19" for rack mounting in attractive portable carrying case. Record amplifier printed circuit. Two inputs: one high impedance microphone and one unbalanced bridge (available with LO-Z input). Playback amplifier output 600 ohms balanced or unbalanced: level plus 8 VU maximum. Frequency response 50 to 15,000 cycles. Tape speeds 7½" and 15" per second by capstan change. Hysteresis synchronous motor drive. Weight in case approximately 40 lbs. Uses 7-inch reels. Rewind 40 seconds. Illuminated VU meter. Wow and flutter .3%.

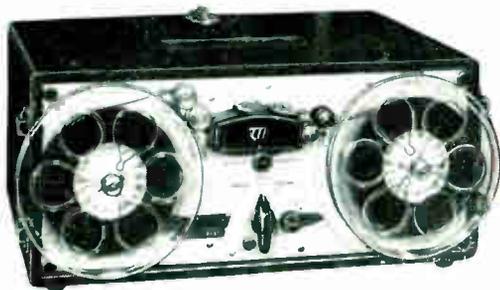


P60-A

M81-C

## P60-A RECORDER AND M81C AMPLIFIER

In portable carrying case. Tape speeds 7½" and 15" per second. Direct drive. Hysteresis synchronous drive motor. Reel size 10½" NAB. Push button controls deep slot loading. Automatic tape lifter for fast forward and rewind. Instantaneous start and stop. Fail-safe brakes and tape-break control. Frequency response 40 to 15,000 cycles. Signal-to-noise ratio 55 db at 3% THD full track. Wow and flutter .2% at 15" per second. Timing accuracy ± 3 sec. in 30 minutes. Panel size 10½" x 19". Separate erase, record and playback heads allow simultaneous record and playback. Adjustable bias current. High speed cueing control.



PT63-A2HZ

## PT63-A2HZ BASIC RECORDER

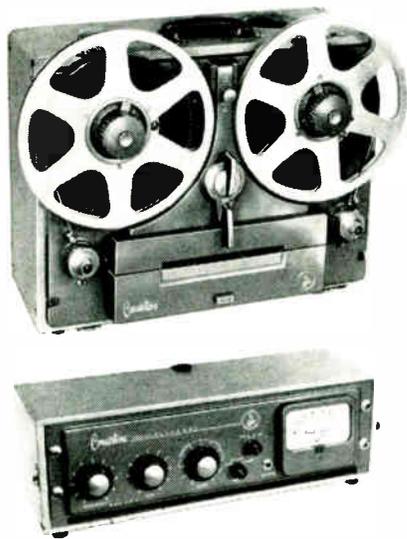
In portable carrying case, two-speed motor and capstan change give speeds of 3¾", 7½" and 15" per second. Solenoid actuated pressure roller allows remote control. Separate erase, record and playback heads allow monitoring from the tape. High speed forward for fast cueing. Hysteresis synchronous motor. Full or half-track heads. Connector cables furnished with amplifier. Panel 17" x 7". Uses 7" reel.



PT63-J

## PT63-J

Has separate record and playback amplifiers, plus 10W audio and monitor speaker. Switch for equalization of 7½"-15" sec. Switch for record, playback, bias reading. Includes tubes, case and connector cables. 3" VU meter. Panel 19" x 7".



CONCERTONE, IN CASES

## BERLANT-CONCERTONE RECORDERS BERLANT RECORDERS

**BRX-1 Recorder** is a complete broadcast recorder consisting of separate matched amplifier and drive mechanism with two-speed direct-drive hysteresis synchronous motor. Features a two-channel input mixer (type MCM-2), Cannon connectors, tape motion regulator, single track erase and record heads, dual track playback to play both single and dual track tapes, less carrying case.

**BRX-2 Recorder** is the same as the BRX-1 except with three dual track heads.

**BRDBX-4 Recorder** is the same as the BRX-1, adapted for transmitting a delayed broadcast and simultaneously recording an incoming program.

**BAX-1 Recorder** is the same as the BRX-1 except that it is solenoid operated. RCU remote control unit extra. Single track erase and record heads, dual track playback.

**BAX-2 Recorder** is identical to the BAX-1 except with three dual track heads.

## BERLANT RECORDER ACCESSORIES

- CC-1 Carrying Case for amplifier only.
- BRDC Carrying Case for drive unit.
- BRAC Carrying Case for MCM mixer and amplifier.
- RCU Remote Control Unit with 25 ft. cable.

## CONCERTONE RECORDERS

**TWR-2 20/20 Recorder** is identical to the BRX series except the exterior finish is brown and a two-speed capacitor induction motor for direct drive, and shaded pole take-up and supply motors are used. 7½ and 15 IPS, complete with matched drive mechanism and amplifier, dual track heads, less cases.

**TWR-1 20/20 Recorder** is identical to the TWR-2 except with single track erase and record heads.

## CONCERTONE RECORDER ACCESSORIES

- TWAC Carrying Case for 20/20 amplifier.
- TWDC Carrying Case for 20/20 drive mechanism.
- TWDA Carrying Case for 20/20 amplifier and drive.

## ACCESSORIES FOR BERLANT AND CONCERTONE RECORDERS

- MCM-2J Basic Mixer fitted with two contact jacks.
- MCM-2C Mixer fitted with Cannon XL connectors.
- T-3344 Input Transformer for matching high impedance input to 50/250 ohm microphones.
- T-2560 Output Transformer for matching cathode follower output to 600 ohm balanced line output.

NOTE: 50-cycle drive motors on Berlant recorders and Cannon connectors on Concertone recorders can be supplied at an additional charge.

Either Berlant or Concertone recorders with 3¾ and 7½ IPS speeds can be supplied at an additional charge.

## SPECIFICATIONS

Tape Speeds: BRX series—15 or 7.5"/sec. or 3¾ and 7½"/sec.  
20/20 series—15 or 7.5"/sec.

Frequency Response:  
±2 db from 40 to 15,000 cps at 15 IPS.  
±4 db from 40 to 15,000 cps at 7.5 IPS.  
±2 db from 50 to 5,000 cps at 3.75 IPS.

Signal-to-Noise Ratio: 55 db as measured by proposed NARTB standard (400 cps at 3% T. H. D.).

Total Harmonic Distortion:  
BRX series—1% at zero VU.  
20/20 series—2% at zero VU.

Timing Accuracy:  
BRX series—better than 99.8%.

## Total Flutter and Wow:

- Less than 0.1% RMS at 15 IPS.
- Less than 0.2% RMS at 7.5 IPS.
- Less than 0.3% RMS at 3.75 IPS.

## Rewind and Fast Forward:

Less than 60 secs. for 2,500 feet.

From Stop to 15 IPS: 0.1 second.

Input Impedance: One megohm on high impedance microphone input. 50 250 ohms balanced or unbalanced with piug-in transformer No. T-3344. 200,000 ohms unbalanced bridging input.

Output Impedance: Cathode follower. 600 ohms balanced output with No. T-2560 transformer.

Output Level: 6 volts from cathode follower output zero dbm across 600 ohm line.

Dimensions: Drive mechanism—14" x 19" x 6½".  
Amplifier—5¼" x 19" x 6".

Weight: Drive mechanism—35 lbs.  
Amplifier—10 lbs.

## Power Requirements:

- BRX series—160 watts—60 cps 115V.
- 20 20 series—220 watts—60 cps 115V.

## PENTRON "PACEMAKER" RECORDER

The model T-90 Pentron portable tape recorder features a single lever "Unimagic" control with three positions—Play-Record, Fast Forward and Fast Rewind. Two speakers with filter provide high fidelity reproduction. Automatic Index Counter instantly locates any selection on tape. Straight line slot loading of tape. Separate Record-Playback and Erase heads. Supplied with microphone.

### Frequency Response:

- 7½"/sec.—50 to 10,500 cycles.
- 3¾"/sec.—50 to 5,000 cycles.

Signal-to-Noise Ratio: 50 db.

### Speakers:

2 Alnico 5, one woofer-6", one tweeter-4".

Power Output: 5 watts.

Flutter: Less than 0.3% at 7½ IPS.

Record Level Indicator: Magic Eye.

Motor: Shaded four pole self-starting induction type, balanced.

Tubes: 1—5879; 1—6SL7, 1—6E5, 1—6X5, 1—6V6.

Dimensions: 13" x 15" x 10".

Weight: 27 lbs.

Power Source: 105/120 volts a-c 60 cycle, 80 watts. 220-volt 50-cycle models, full width (single track) head models available.

## PRESTO SR-27 TAPE RECORDER

The SR-27 fits the gap between the high priced model and the small home recorder with its limited functions. It consists of the R-27 tape transport mechanism and the A-920B amplifier.

The R-27 utilizes three individual magnetic heads to record, erase and play back tape on 7" or 8" reels with the NARTB hub. Three motors are used for tape transport and fast-speed rewind. The capstan is driven by a hysteresis motor. A single lever sets the mechanism for record, playback or fast-speed operation, and the desired speed of 7½ or 15 inches/second is selected by moving the speed shift knob up or down.

The A-920B amplifier is furnished in a separate case with mike and playback pre-amps, power supply, and two speakers.

### R-27 Mechanism

Tape Speeds: 7½ and 15 IPS, fast forward and rewind.

Bias/Erase Frequency: 85 kc.

Oscillator Tube: 6Y6G.

Power Requirements: 115V 60 cps, 210 watts (50 cps available).

Size: 16" x 13" x 10".

Weight: 39 lbs.

### A-920B Amplifier

Microphone Input: 50 or 250 ohms.

Additional Input: High level mike or radio tuner.

Output: 10 watts at 15 ohms, 0 db line level at 500 ohms.

Monitor Output: For high impedance phones.

Tubes: 2—6J7, 3—6SL7GT, 2—6V6GT, 1—5Y3GT.

Speakers: 2—5" PM.

Power Requirements: 115 V, 50/60 cps, 110 watts.

Size: 20" x 9" x 8".

Weight: 38 lbs.

### Performance Data

Frequency Response: Uniform from 50-15,000 cps at 15"/sec.; 50-10,000 cps at 7½"/sec.

Signal-to-Noise Ratio: Better than 50 db.

Flutter: Not more than 0.15% RMS at 15 IPS, 0.25% RMS at 7½ IPS.

Timing Accuracy: .3% to .5%.

## TAPE - MICROPHONE STANDS

### RECORDING TAPE AUDIOTAPE

Type 1251 Plastic Base (1200 ft. on 7" reel) is the finest, professional quality tape obtainable with maximum fidelity, uniformity, frequency response and freedom from noise and distortion. Base material 1½-mil. acetate.

Type 1861 "LR" (Longer Recording) tape is made on 1-mil. Mylar, providing 50% more recording time per reel. Polyester film base material has excep-

tional strength and durability, plus longer storage life. 1800 feet on 7" plastic reel.

### SCOTCH BRAND

Type 111A-12 Plastic Base (100 ft. on 7" reel) is a high fidelity plastic tape for every recording need. Dry lubricated. Output variation within the reel at 1,000 cps is less than  $\pm 1/4$  db and is less than  $\pm 1/2$  db from reel to reel.



### GIBSON GIRL TAPE SPLICER-CUTTER

This splicer-cutter is used for magnetic recording tape and cuts two rounded indentations in the tape slice giving the splice a "Gibson girl" shape, leaving the edges of the tape free of adhesive. The unit can be removed from its base and mounted directly on any tape recorder. It comes complete with a roll of splicing tape and tape feed. (Type No. TS4-DLX).

### ALTEC-LANSING GB-800A MICROPHONE STAND

The GB-800A is a floor stand adjustable in height from 45" to 75". Base 12" in diameter, weight approximately 15 lbs. Equipped with a clutch which is locked and unlocked by a quarter turn with a positive, smooth action.

### ALTEC-LANSING GB-720A MICROPHONE STAND

The GB-720A floor stand is adjustable in height from 39" to 68". Base 12" in diameter, weight approximately 14 lbs.

### ALTEC-LANSING 23A DESK STAND

For use with Altec 633A, 639A and 639B microphones.

Base: 4½" x 6½" oval.

Finish: Aluminum gray lacquer.

Thread: 5/8" x 27.



GB-800A

GB-720A



23A



670A



660A/B



639A/B

### ALTEC-LANSING 670A CARDIOID MICROPHONE

The 670A utilizes a ribbon to provide continuously adjustable patterns to permit "tuning out" undesirable noises by shifting the null point.

- Frequency Response: 30-15,000 cycles.
- Power Output Level: -58 dbm (10 dynes sq. cm.).
- Impedance: Adjustable 30, 50 or 150, 250 ohms.
- Dimensions: 7½" x 3¾" x 2½".
- Finish: Dull gray plastic.
- Weight: 20 oz.

### ALTEC-LANSING 660A/B DYNAMIC MICROPHONE

The 660A B Microphone is a rugged broadcast quality unit. Equipped with a swivel head with 5/8" x 27 stand thread allowing a 90° vertical tilt.

- Frequency Response: 35-12,000 cycles.
- Power Output Level: -57 dbm (10 dynes cm<sup>2</sup>).
- Impedance: 660A—30 ohms.  
660B—30, 150, 20,000 ohms.
- Dimensions: 4" long—1 1/16" diameter.
- Finish: Silver satin-die-cast aluminum.
- Weight: 660A—11 oz.  
660B—13 oz.

### ALTEC-LANSING 633A DYNAMIC MICROPHONE

The 633A is a non-directional mike or may be given directivity by using the 8B baffle. For non-directional use the microphone is mounted vertically on a stand or suspended by its cordage.

- Impedance: Approximately 20 ohms. Works into 25 to 50 ohms.
- Frequency Response: 40 to 10,000 cps.
- Power Output Level: -59 dbm (1 mw 600 ohms) for a sound pressure of 10 dynes per square centimeter. (Produced at conversational level 3 feet from microphone.)

Accessories Available: 311A Plug Kit, 8B Baffle, 712A Adapter, 442A Jack, 9A Swivel Joint, 713A Adapter.



### ALTEC-LANSING 639A, 639B CARDIOID MICROPHONES

Each of these mikes is a combination of a dynamic moving coil type pressure element and an improved ribbon type velocity actuated element.

The 639A has three patterns selected by a screw-driver-operated switch. Yoke mounting, type 11A, available.

C—Cardioid D—Dynamic R—Ribbon

The 639B has three additional patterns which are variations of the cardioid.

Impedance: Approximately 40 ohms. Works into 25-50 ohms.

Frequency Response: Uniform 40 to 10,000 cps.

Power Output: -56 dbm (1 mw 600 ohms) for a sound pressure of 10 dynes per sq. centimeter. (Produced at conversational level 3 feet from microphone.)



44-BX

## RCA 44-BX

Output Impedance (tapped transformer): 50/250 ohms. Supplied connected for 250 ohms.

Effective Output Level: -55 db (referred to 1 milliwatt and a sound pressure of 10 dynes per sq. cm).

Response: 30-15,000 cycles "Music" connection. Low frequencies suppressed in "Voice" connection.

Finish: Polished black and chromium.

Supplied with 30 feet, two-conductor shielded cable. Less plug. 1/2" pipe thread.



BK-1A

## BK-1A

Pressure-actuated microphone complete with 30 ft., 2-conductor shielded cable.

The high-fidelity BK-1A "Commentator" pressure microphone is designed for broadcast use in AM, FM and TV stations. Its construction makes it particularly well suited for remote pickups where, if used in the open air, the modern design practically eliminates the effect of air currents. The BK-1A features a smooth response and frequency range which make it suitable for reproducing both music and speech.

Non-directional or semi-directional.

Output Impedance: 30/250 ohms (tapped transformer).

Effective Output Level: 52 db (referred to 1 milliwatt and sound pressure of 10 dyn per sq. cm).

Response: 60-10,000 cycles.

Finish: TV Gray and Chrome.

1/2" pipe thread.



77-DX

## RCA 77-DX

This microphone has uni-directional, bi-directional, and non-directional characteristics, adjustable by means of a slotted shaft on the rear side of the wind-screen. Supplied with three-position "Voice-Music" switch for selection of best operating characteristics.

Output Impedance (tapped transformer): 50/250/600 ohms. Supplied connected for 250 ohms.

Effective Output Level: -59 db (referred to 1 milliwatt and a sound pressure of 10 dynes per sq. cm).

Response: 50 to 15,000 cycles. With variations selected by Voice-Music switch.

Supplied with 30-foot, two-conductor shielded cable, less plug. 1/2" pipe thread.

Finish: Two-tone umber gray.

## MICROPHONE STAND, MI-4068-D

The MI-4068-D floor stand is for use with the BK-1A, SK-45 and the 77-D. The column and telescoping tube are finished in polished chrome and the base in dark umber gray wrinkle. It has a smooth-operating clamping and release device.

The stand as supplied may be used with any microphone having a  $\frac{5}{8}$ "-27 fixture thread.

Height of Stand: Adjustable from 34" to 62".

Microphone Mounting:  $\frac{5}{8}$ "-27 fixture thread.

Diameter of Lower Tube: 1".

Diameter of Base: 12".

Weight (unpacked): 14 lbs.



MI-4068-D

## DESK STAND, MI-11008

The MI-11008 desk stand was specifically designed for use with the type BK-1A "commentator" microphone. The BK-1A microphone fits into the center hole and is secured by a knurled thumb screw and a retaining washer. A rubber cushion around its perimeter prevents marring of any surface.

Weight, packed: 1½ lbs.

Finish: Dark, umber gray.



MI-11008

## ANNOUNCE STAND, TYPE 91-A

The 91-A is a simple but attractive desk stand for 44-BX Microphones. It is finished in TV gray and its base rests on three felt buttons. Height of the 44-BX center above desk is 8 $\frac{3}{8}$ ". Base diameter, 7". Use only with Type 44-BX Microphone. Weight (unpacked): 3½ lbs.



91-A

## DESK STAND, TYPE 91-B

The 91-B is a heavy-based desk stand designed especially for studio or announce use. It can accommodate Type 77-D, BK-1A, and BK-4A microphones. The 91-B is finished in umber gray with satin chrome trim. The base is felt-covered to prevent marring the surface on which it is placed. The stand is provided with alternate mounting extensions—one  $\frac{3}{4}$ " and one 1 $\frac{3}{4}$ ", the choice depending on the type microphone to be mounted.

Microphone Mounting:  $\frac{1}{2}$ " pipe thread.

Base Dimensions: 4 $\frac{1}{2}$ " x 6 $\frac{5}{8}$ " x  $\frac{3}{4}$ ".

Weight: 4 lbs.



91-B



50D, 51D



57, 57A



U9S



211



999

## TURNER 50D-TV MICROPHONE

The Turner model 50 is an ultra wide-range high fidelity dynamic, finished in satin black with matching desk stand. Available with high impedance (Cannon XL-3 connector) or 50 200 ohm impedance (Cannon XL-4 connector). 20-foot cable supplied.

Frequency Response: 50 to 15,000 cps.

Output Level: 55 db below 1 volt /dyne /sq. cm at high impedance.

Polar Pattern: Essentially non-directional.

Mounting: Hinged coupler swings microphone in 60° arc. Standard 5/8"-27 thread.

Dimensions: 1 5/8" maximum diameter; 6 1/2" long (less cable connector).

Weight: 16 oz. (less cable).

## TURNER 51D-TV MICROPHONE

Similar to above, except frequency response of 60 to 13,000 cps and output level 57 db below 1 volt /dyne sq. cm at high impedance.

## TURNER MODEL 57 DYNAMIC MICROPHONE

The Turner 57 is designed to meet TV and broadcast performance requirements. Matching stand with built-in shockmount available as an accessory. Black satin finish. The 57 has a built-in Cannon XL-4 connector, permitting selection of high or low impedance by making connection to proper pair of conductors. 20-foot cable furnished.

Frequency Response: 50 to 13,000 cps.

Output Level: 55 db below 1 volt /dyne/sq. cm.

Mounting: Standard 5/8"-27 thread.

Dimensions: 8 3/4" x 1 1/8".

Weight: 14 oz. (less cable).

## TURNER MODEL 57A DYNAMIC MICROPHONE

Same as above, except wired for quick selection of 50 or 200 ohm impedance.

## TURNER MODEL 211 DYNAMIC MICROPHONE

The Turner 211 is a high quality dynamic microphone. 20-foot cable furnished.

Frequency Response: 50 to 10,000 cps.

Output Level: -54 db at high impedance.

Mounting: 90° tilting head.

Impedance: 50, 200, 500 ohms or high impedance.

## TURNER MODEL U9S DYNAMIC MICROPHONE

The Turner U9S is not affected by heat, cold or humidity. Has adjustable saddle, 5/8"-27 thread mounting. 20-foot cable furnished.

Frequency Response: 80 to 9,000 cps.

Output Level: -52 db at high impedance.

Pattern: Semi- or non-directional operation.

## TURNER MODEL 999 DYNAMIC MICROPHONE

The Turner 999 is the same as the U9S but it is not furnished with multi-impedance switch. Specify 50, 200, 500 ohms or high impedance. 20-foot balanced line furnished.



## ELECTRO-VOICE MODEL 666 SUPER CARDIOID MICROPHONE

Model 666 affords another octave of uniform HF response over that found in conventional broadcast cardioids. Permits close talking with no bass accentuation. Increases working distance over pressure microphones by factor of 1.7:1 due to reverberation reduction. Uses only one moving element with exclusive, rugged Acoustalloy diaphragm. Response range: Typical, 40-15,000 cps; output, -55 db. Impedance changed on internal terminal board. Wired for 50 ohms, taps at 150 and 250 ohms. Aluminum cast case finished in TV gray. Built-in Cannon UA-3 connector. Clamp-on stand mount included with  $\frac{5}{8}$ "-27 thread and  $\frac{1}{2}$ " pipe thread adapter. 20-foot cable. Size 7 $\frac{1}{2}$ " long, 1 $\frac{3}{4}$ " maximum diameter. Net weight, 11 oz.

## ELECTRO-VOICE MODEL 665 CARDIOID

Similar in design and function to the Model 666, but for less exacting applications. Uniform response 50-14,000 cps. Pressure-cast zinc case. Non-reflecting gray finish. Dia. 1 $\frac{7}{8}$ ", length 7 $\frac{3}{16}$ ". 18-foot cable. Net weight, 1 lb., 10 oz.

## ELECTRO-VOICE MODEL 655C SLIM-TRIM TV DYNAMIC

Frequency response 40-20,000 cps. Output level -55 db. Acoustalloy diaphragm. Impedance 50, 150 and 250 ohms. Impedance easily changed at internal terminal board. Cannon UA-3 connector. Clamp-on stand mount included with  $\frac{5}{8}$ "-27 thread and  $\frac{1}{2}$ " pipe thread adapter. Size, 10 $\frac{1}{2}$ " long without connector, 1" diameter. 18-ft. cable. Net weight, 11 oz.

## ELECTRO-VOICE MODEL 654 SLIM-TRIM BROADCAST DYNAMIC

Frequency response 50-16,000 cps. Output level -55 db. Recessed selector provides 50 or 250 ohms impedance. Pop-proof head. Acoustalloy diaphragm. TV gray enameled finish. Built-in Cannon XL-3

connector,  $\frac{5}{8}$ "-27 thread. 18-foot cable. Size: 10" long with stud, 1" diameter. Net weight, 15 $\frac{1}{2}$  oz.

## ELECTRO-VOICE MODEL 650 BROADCAST DYNAMIC

Uniform frequency response 40-15,000 cps. Output level -48 db. Dual-type external shock mount. Recessed impedance selector switch gives 50 or 250 ohms. Tiltable head. Pressure-cast case, with durable satin chrome finish. Acoustalloy diaphragm. Built-in Cannon XL-3 connector.  $\frac{5}{8}$ "-27 stand coupler. 18-foot cable. Size, 2 $\frac{1}{4}$ " x 4 $\frac{5}{8}$ " x 5 $\frac{1}{4}$ " including stud. Shock mount is 1 $\frac{1}{2}$ " x 3 $\frac{7}{8}$ ". Net weight, including shock mount, 3 lbs.

## ELECTRO-VOICE MODEL 646 LAVALIER DYNAMIC

Neck cord and support clips supplied. Response uniform from 40 to 10,000 cps in flat position. Recessed screw in grille permits adjustment of high-frequency response to suit application. Output level -57 db. Choice of either 50, 150, 250 ohms impedance. Flat or rising response adjustment. Acoustalloy diaphragm. Omnidirectional pattern. Built-in cable connector. Gray enamel finish. 30-foot cable. Size 6 $\frac{1}{4}$ " long, 1 $\frac{1}{8}$ " diameter. Net wt., less cable, 7 oz.

## ELECTRO-VOICE MODEL 635 BROADCAST DYNAMIC

Uniform response from 60-13,000 cps. Output level -55 db. 50-250 ohms impedance selector. Acoustalloy diaphragm. Head tilts through 90° arc.  $\frac{5}{8}$ "-27 thread. Built-in Cannon XL-3 connector. Satin chrome finish. 18-ft. cable. Size 2" x 6 $\frac{1}{4}$ ". Net weight, 1 $\frac{1}{2}$  lbs.

## ELECTRO-VOICE MODEL 300 DETACHABLE MICROPHONE CLAMP

Light weight adapter fits any cylindrical microphone with 1" diameter. Provides positive means to mount on stand. Easily installed without tools with finger-operated clamp. Rubber insert prevents slippage on microphone. 1" pipe thread or adapter for  $\frac{5}{8}$ "-27 thread.



345



346

### ELECTRO-VOICE MODEL 345 SHOCK MOUNT

Dual-type external shock mount prevents reproduction of external shocks and stand vibrations. Permits tilting microphone head.  $\frac{5}{8}$ "-27 thread. Easily attached or removed. Satin chrome. Size  $1\frac{1}{2}$ " x  $3\frac{7}{8}$ ". Net weight, 10 oz.

### ELECTRO-VOICE MODEL 346 SHOCK MOUNT

Designed specifically for use with Model 666 microphone. Similar in every feature to Model 345 but constructed for 11-oz. microphone.



420



366

### ELECTRO-VOICE MODEL 420 DESK STAND

Use with E-V 666, 655, 646, or microphone with 1" diameter. Clamp attachment for mounting 1" cylindrical microphones without tools. Heavy cast iron, gray finish. Net weight, 3 lbs.

### ELECTRO-VOICE MODEL 366 SUSPENSION SHOCK MOUNT

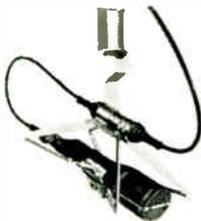
Extremely light boom suspension shock mount designed for use with 666 microphone. Combined weight of 366 and 666 is 17 oz., thus solving many problems of boom operation. No tools required for installing microphone. Pigtail cable connection with UA-3 connectors provides cable loop, isolating boom shock noises. Made for any microphone with 1" diameter (EV 666, 655, 646).



416

### ELECTRO-VOICE MODEL 416 DESK STAND

For 646, 647 microphones. Black rubber. Size,  $3\frac{1}{8}$ " base dia., 1" high. Net weight, 2 oz.



512

### ELECTRO-VOICE MODEL 425 DeLUXE FLOOR STAND

Push-button. One-hand height control from 37" to 66". Locks on release. Shaft rotates freely. Locking-type adjustable legs permit placing flush against wall or table. Easy to set up or take apart. Folds compactly. Die-cast base. Three-leg spread 17". Satin chrome. Net weight,  $7\frac{1}{2}$  lbs.



425

### ELECTRO-VOICE MODEL 512 WIND SCREEN

Designed specifically for use with Model 666 microphone. Minimizes wind effect on boom operation or when used outdoors. Made of strong black bemberg. Net weight, 2 oz.



419



418

### ELECTRO-VOICE MODEL 418 DESK STAND

Used with microphones using small-type stud such as Models 611, 623, 630, 635, 636, 911 and 950. Cast iron, gray finish.

### ELECTRO-VOICE MODEL 419 DESK STAND

Similar to above but for use with microphones using large-type stud.

## ATLAS CS-33 COLLAPSIBLE FLOOR STAND

For fixed or portable operation. Removable base legs. Can be collapsed to length of 22½".

Finish: Full Chrome.

Height Adjust: 26"-64".

Weight: 3 lbs.

## ATLAS BC-1 BRACKET CLAMP

Can be used with a boom arm, goose neck, etc. Chrome tube 6" long. Clamp can be removed and top flange screwed or bolted into position. ⅝"-27 thread.

## ATLAS GN-13 FLEXIBLE GOOSE NECK

Can be attached to any microphone stand or fixture. Ends have ⅝"-27 male and female threads. 13" long. Finished in polished chrome.

## ATLAS BB-1 "BABY BOOM" ATTACHMENT

A versatile device that can be attached to any microphone stand. Can also be used with bracket clamp model BC-1. ⅝"-27 thread.

Boom Length: 32".

Finish: Chrome tube, gun metal castings.

Weight: 3½ lbs.

## ATLAS BS-36/36W BOOM STANDS

The BS-36 features "safety air-lock cushion" built into the vertical section preventing slippage of the upright. A gyromatic swivel joint is provided at the microphone end of the boom. Model BS-36W is identical to the BS-36 except this mobile model is supplied with a DeLuxe base having ball bearing swivel castors of hard rubber composition. "Snap-On" hangers furnished to hold mike cable to boom section.

Boom Length: 62".

Vertical Adjust: 48" to 72".

Base Diameter: 17".

Finish: Chrome and gun metal shrivel.

Weight: 33 lbs.

## FLEXO MIKESTER MODEL ONE

This arm will handle any mike up to 4 lbs. It can be instantly positioned, incorporates a patented spring-controlled swivelling device, swings out 36" in any direction when fully extended. Clamps or screws to any position. Clips hold cable in place. Weight 4¾ lbs. packed.





MS-25

## ATLAS MS-25 FLOOR STAND

Features "Safety Air-Lock Cushion" to prevent slippage of telescoping section. Uses a large diameter, oversize telescoping tube ( $\frac{7}{8}$ " telescoping tube —  $1\frac{1}{8}$ " base tube). Terminated in  $\frac{5}{8}$ "-27 thread.

Base Finish: Chrome and gray shrivel.

Tube Finish: Full Chrome.

Height Adjust: 37" to 66".

Base Diameter: 17".

Weight: 24 lbs.



MS-11C

## ATLAS MS-11C FLOOR STAND

Features an extended length clutch body, inner lined with a wear-proof locking collet which grips without jamming, slipping or sudden dropping. Includes self leveling, shock absorbing base pads, plus three additional "anti-tip" points located between the base pads. Terminates in a  $\frac{5}{8}$ "-27 thread.

Base Finish: Full Chrome.

Tube Finish: Full Chrome.

Height Adjust: 35" to 65".

Base Diameter: 10".

Weight: 12 lbs.



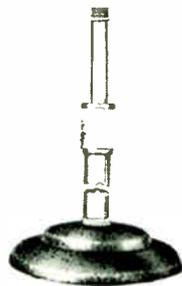
CS-1

## ATLAS DS-7 DESK STAND

The model DS-7 employs a full sized clutch mechanism and  $\frac{5}{8}$ "- $\frac{7}{8}$ " tube combination. The base casting is 6" in diameter, finished in gun metal shrivel. Base pads included to prevent damage to desk or table tops. All tubular sections finished in chrome.

Vertical Adjust: 8" to 13".

Weight: 3 lbs.



DS-7

## ATLAS CS-1 MICROPHONE STAND

This collapsible stand is excellent for portable and remote applications. Designed specifically for broadcast use. Collapsible length of 23".

Base Finish: Cadmium plated.

Tube Finish: Full chrome.

Height Adjust: 23" to 62".

Weight: 5 lbs.



**TELECHRON STUDIO CLOCK**

The Telechron 14162 "Commerce" commercial clock has a 12" dial, rich brown case.

**KAAR CONALERT**

Designed expressly for CONELRAD Radio Alert. Built for 24-hour service, it gives automatic alarm with visual and aural warning; at time of Radio Alert, the speaker is connected, you hear Conelrad message and see red pilot lamp on panel. Provision is also made for external alarm. Available in either cabinet or rack mounting models.



**ARGOS WALL BAFFLES**

Argos now offers a completely new look in baffles. Entire front is inset, with plastic grille cloth covering panel. Units may be covered with any color of paint or enamel (not lacquer). Constructed of plywood and hardboard for improved acoustical properties with good resonant tone. Richly grained, plastic coated leatherette covering. Extra reinforcing blocks. Four 8-32 bolts already installed for mounting speakers. Available in following styles and sizes:

**Corner Baffles:** Corner location aims sound better, is less conspicuous. Base reflex.

- CB-8A—Mahogany, for 8" speaker,  
12 1/4" w x 14" h x 6" d.
- CB-12A—Mahogany, for 12" speaker,  
18" w x 20 1/4" h x 9" d.
- CB-8BA—Blonde, for 8" speaker,  
12 1/4" w x 14" h x 6" d.
- CB-12BA—Blonde, for 12" speaker,  
18" w x 20 1/4" h x 9" d.

**Slanting Corner Baffles:** Aims sound down.

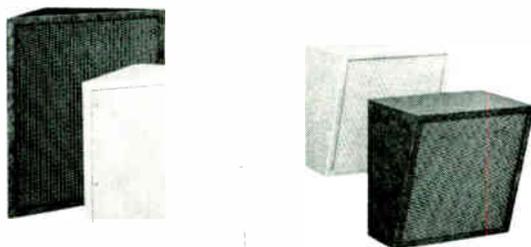
- SCB-8 — Mahogany or blonde, for 8" speaker,  
15 3/8" w x 14" h x 7 3/4" d.
- SCB-12—Mahogany or blonde, for 12" speaker,  
21" w x 21 1/4" h x 10 1/2" d.

**Wall Baffles:**

- WB-8A — Mahogany, for 8" speakers,  
9 3/8" w x 10 1/2" h x 6 1/2" d.
- WB-12A—Mahogany, for 12" speakers,  
13 1/4" w x 14 1/4" h x 9" d.
- WB-8BA—Blonde, for 8" speakers,  
9 3/8" w x 10 1/2" h x 6 1/2" d.
- WB-12BA—Blonde, for 12" speakers,  
13 1/4" w x 14 1/4" h x 9" d.



SCB



CB

WB



P12-SX



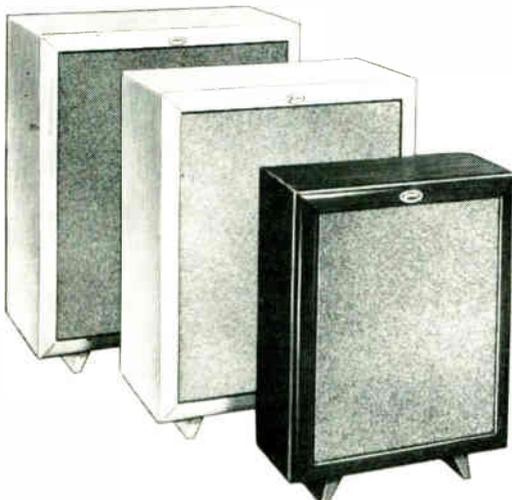
P12-T



K-310A



K-210



## JENSEN K-210 COAXIAL SPEAKER

High fidelity reproduction in a small unit. Built-in frequency-dividing system. Power rating, 12 watts. Impedance, 8 ohms. Baffle opening 10½"; OD, 12½"; depth, 6⅝".

## JENSEN ST-901 HF BALANCE CONTROL

Flush satin brass cup escutcheons, appropriately marked, mounting in 1 1/16" holes, and matching bar knobs. 25" leads attached. For adjusting balance of H-F units. 16 ohms impedance.

## JENSEN K-310A COAXIAL SPEAKER

A fine, low-cost, true two-way 15" hi-fi speaker. Integral frequency division system. Power rating, 16 watts. Impedance 16 ohms. Baffle opening, 13¼"; OD, 15⅝"; depth, 8⅝".

## JENSEN P12-T LOUDSPEAKER

Gap Energy Level: 1.1 million ergs.  
 Outside Diameter: 12⅝".  
 Depth: 6⅝".  
 Baffle Opening: 10½".  
 Voice Coil Impedance: 3-4 ohms.  
 Power: 9 watts.

## JENSEN P12-SX LOUDSPEAKER

The P12-SX direct-radiator loudspeaker is a PM speaker utilizing Alnico 5 magnets.

Gap Energy Level: 1.5 million ergs.  
 Outside Diameter: 12⅝".  
 Depth: 6⅝".  
 Baffle Opening: 10½".  
 Voice Coil: 6-8 ohms, 9 watts.

## JENSEN TYPE C "BASE REFLEX" CABINETS

These Type C enclosures combine acoustically correct performance with attractive wood cabinetry at moderate cost. Models to fit 8", 12" or 15" speakers, in choice of blonde or mahogany finishes. Two concealed cut-outs in Model C-151, one cut-out in C-121, for easy installation of flush H-F and Level Controls, or Jensen tweeters.

Model C-151 for 15" speakers: 32" x 28" x 15" deep.  
 Model C-121 for 12" speakers: 29" x 25" x 13½" deep.  
 Model C-81 for 8" speakers: 23½" x 20" x 9" deep.

## JENSEN P8-SX LOUDSPEAKER

The P8-SX speaker is a PM speaker utilizing Alnico 5 magnets.

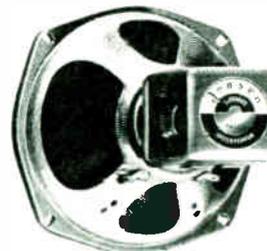
Gap Energy Level: 1.5 million ergs.

Outside Diameter: 8 $\frac{1}{8}$ ".

Depth: 3 $\frac{1}{16}$ ".

Baffle Opening: 6 $\frac{3}{4}$ ".

Voice Coil: 6-8 ohms, 7 watts.



P8-SX

## JENSEN P8-T LOUDSPEAKER

Gap Energy Level: 1.1 million ergs.

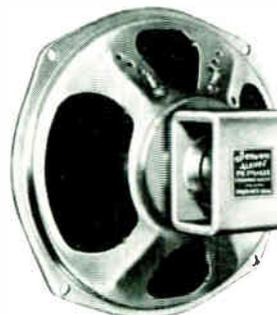
Outside Diameter: 8 $\frac{1}{8}$ ".

Depth: 3 $\frac{5}{8}$ ".

Baffle Opening: 6 $\frac{3}{4}$ ".

Voice Coil Impedance: 3-4 ohms.

Power: 7 watts.



P8-T

## JENSEN IMPEDANCE MATCHING TRANSFORMERS

Jensen speakers are all of the moving coil type and as such are low impedance. The ZY series of transformers are selected where speakers must be matched to output tubes of amplifiers. They permit matching one or several speakers to such an amplifier.

ZY-2002 Transformer for use with P8-SX, P12-SX

Core Size:  $\frac{3}{4}$ " x  $\frac{3}{4}$ ".

Power: 10 watts.

Primary: 500, 1,000, 1,500, 2,000 ohms.

Secondary: 6-8 ohms.

Mtg. Centers: 2 $\frac{1}{16}$ ".

ZY-4002 Transformer for use with P8-T, P12-T.

Core Size:  $\frac{5}{8}$ " x  $\frac{5}{8}$ ".

Power: 6.5 watts.

Primary: 500, 1,000, 1,500, 2,000 ohms.

Secondary: 3-4 ohms.

Mtg. Centers: 2 $\frac{3}{8}$ ".

ZY-2003 Transformer for use with K-210A

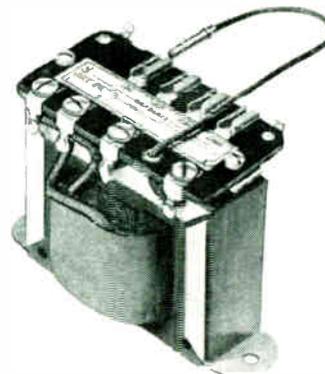
Core Size:  $\frac{7}{8}$ " x  $\frac{7}{8}$ ".

Power: 16 watts.

Primary: 500, 1,000, 1,500, 2,000 ohms.

Secondary: 6-8 ohms.

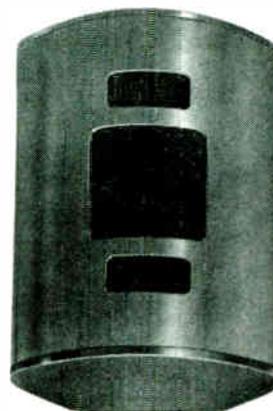
Mtg. Centers: 3 $\frac{1}{8}$ ".



ZY TRANSFORMERS

## JENSEN TYPE "H" SECTOR CABINET

The Type H cabinet for 8" speakers was designed for installations where multiple speakers are required. Bass Reflex design. They are built around a solid wood frame with wood composition covering. Finished in brown lacquer. Brackets and screws for mounting are furnished. Height 22 $\frac{3}{4}$ "; width 17 $\frac{3}{4}$ "; depth 8 $\frac{1}{2}$ ". Weight 14 lbs.



"H" CABINET

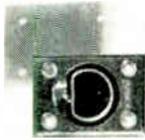
D-1



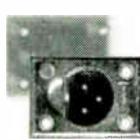
D-2



D-3



D-4



D-5



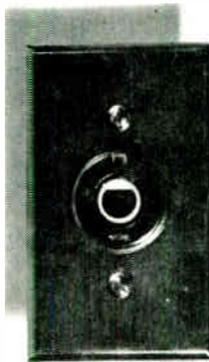
C-1



C-2



C-3



C-4



C-5



B-1



B-2



B-3



B-4



B-5



B-6



A-1



A-2



A-3



A-4



A-5



## AUDIO CONNECTORS

A-1	P3-CG-11S	Straight female cable type cord plug with latchlock.	B-6	XL-3-14	Flush mounting male panel receptacles.
A-2	P3-CG-12S	Straight male cable type cord plug.	C-1	XL-3-13N	Female panel mounting receptacle with lock nut.
A-3	P3-13	Flush mounting female panel receptacle with latchlock.	C-2	XL-3-14N	Male panel mounting receptacle with lock nut.
A-4	P3-14	Flush mounting male panel receptacle.	C-3	XL-3-35	Single gang female wall receptacle with latchlock.
A-5	P3-35	Single gang female wall receptacle with latchlock.	---	XL-3-36	Single gang male wall receptacle.
---	P3-36	Single gang male wall receptacle.	---	XL-3-35-2G	Two gang female wall receptacle with latchlock.
---	P3-35-2G	Two gang female wall receptacle with latchlock.	---	XL-3-36-2G	Two gang male wall receptacle.
---	P3-36-2G	Two gang male wall receptacle.	C-4	UA-3-11	Straight female cable type cord plug with latchlock.
B-1	XL-3-11	Straight female cable type cord plug with latchlock cable spring.	C-5	UA-3-12	Straight male cable type cord plug.
B-2	XL-3-12	Straight male cable type cord plug with cable spring.	D-1	UA-3-13	Flush mounting female panel receptacle with latchlock.
B-3	XL-3-11SC	Straight female cable type cord plug with latchlock cable clamp.	D-2	UA-3-14	Flush mounting male panel receptacle with spring release.
B-4	XL-3-12SC	Straight male cable type cord plug with cable clamp.	D-3	UA-3-31	Female wall mounting receptacle.
B-5	XL-3-13	Flush mounting female panel receptacle with latchlock.	D-4	UA-3-32	Male wall mounting receptacle.
			D-5	UA-3-42	Mike or panel mounting male receptacle.

(Other Cannon, Hubbell, and Howard Jones Connectors available)

# HEADPHONES

## MODEL "A-1" BRUSH

For use where HIGH FIDELITY and extended frequency response are of paramount importance. (60 to 10,000 cps. Corrected for rising response below 200 cps). Especially suited to monitoring, sound measurement, audiometry, and similar exacting headphone applications. Sensitivity approx. 1.5 dynes cm<sup>2</sup> volt at 1,000 cps. Impedance over 80,000 ohms at any frequency within audio range. Headset complete with 5-foot cord and headband.

## MODEL "A" BRUSH

Designed for GENERAL PURPOSE applications including laboratory, studio and skilled amateur home use. The crystal drive element insures wide ranges, response 100 to 8,000 cps and high sensitivity. High impedance; ideal for multiple installations. Headset complete with 5-foot cord and adjustable headband.



TRIMM MODEL 156 is a 600 ohm magnetic headphone furnished with plug.

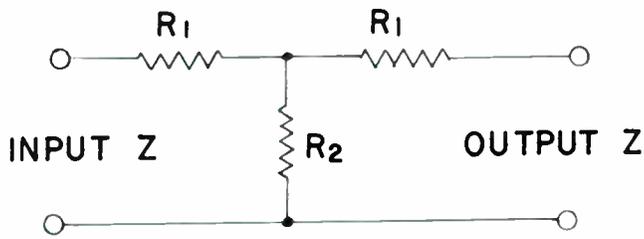


TRIMM MODEL 157 is a 17,000 ohm magnetic headphone furnished with plug.

## DECIMAL EQUIVALENTS OF FRACTIONS

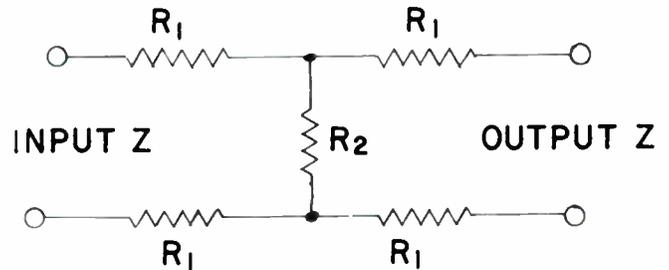
1/32	.03125	9/32	.28125	17/32	.53125	25/32	.78125
1/16	.0625	5/16	.3125	9/16	.5625	13/16	.8125
3/32	.09375	11/32	.34375	19/32	.59375	27/32	.84375
1/8	.125	3/8	.375	5/8	.625	7/8	.875
5/32	.15625	13/32	.40625	21/32	.65625	29/32	.90625
3/16	.1875	7/16	.4375	11/16	.6875	15/16	.9375
7/32	.21875	15/32	.46875	23/32	.71875	31/32	.96875
1/4	.25	1/2	.5	3/4	.75	1	1.0

# ATTENUATOR NETWORK



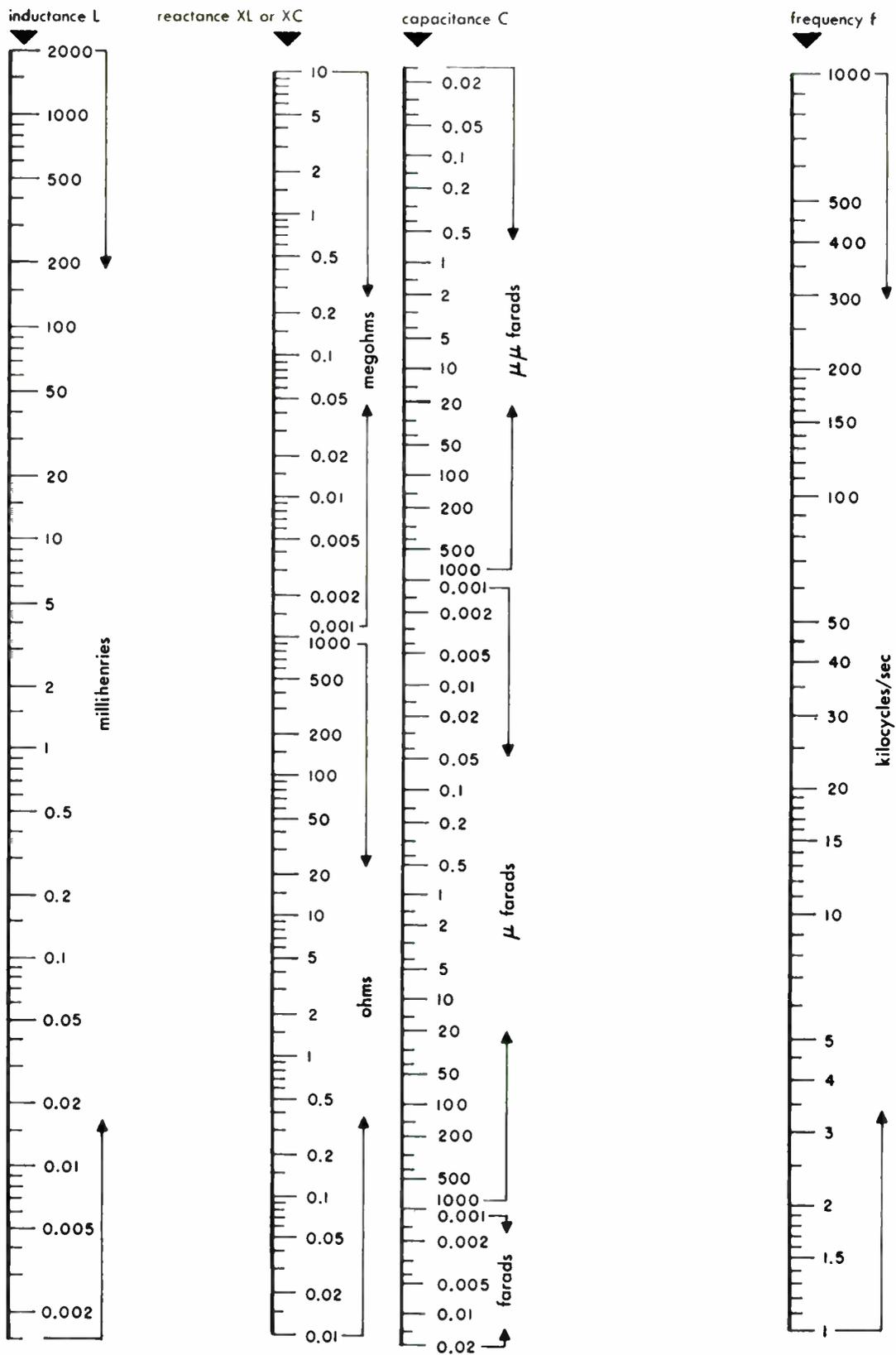
Input and Output Z = 600 Ohms

DB LOSS	R <sub>1</sub>	R <sub>2</sub>
0.5	17.2	10464
1	34.5	5208
2	68.8	2582
3	102.7	1703
4	135.8	1249
5	168.1	987.6
6	199.3	803.4
7	229.7	685.2
8	258.4	567.6
9	285.8	487.2
10	312.0	421.6
11	336.1	367.4
12	359.1	321.7
13	380.5	282.8
14	400.4	249.4
15	418.8	220.4
16	435.8	195.1
17	451.5	172.9
18	465.8	152.5
19	479.0	136.4
20	490.4	121.2
22	511.7	95.9
24	528.8	76.0
26	542.7	60.3
28	554.1	47.8
30	563.0	38.0
32	570.6	30.2
34	576.5	24.0
36	581.1	19.0
38	585.1	15.1
40	588.1	12.0

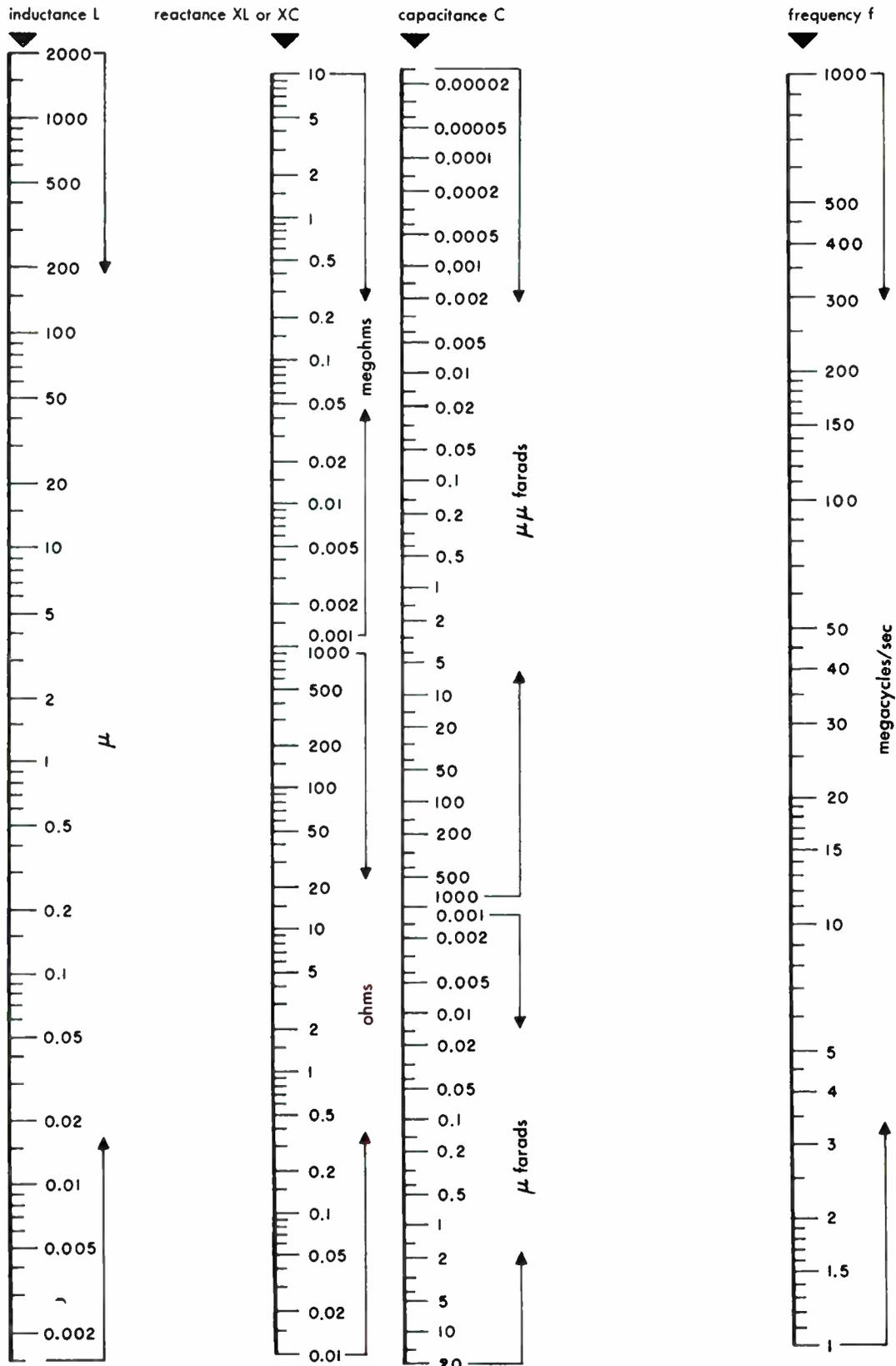


DB LOSS	R <sub>1</sub>	R <sub>2</sub>
0.5	8.6	10464
1	17.25	5208
2	34.4	2582
3	51.3	1703
4	67.9	1249
5	84.1	987.6
6	99.7	803.4
7	114.8	685.2
8	129.2	567.6
9	142.9	487.2
10	156.0	421.6
11	168.1	367.4
12	179.5	321.7
13	190.3	282.8
14	200.2	249.4
15	209.4	220.4
16	217.9	195.1
17	225.7	172.9
18	232.9	152.5
19	239.5	136.4
20	245.2	121.2
22	255.9	95.9
24	264.4	76.0
26	271.4	60.3
28	277.0	47.8
30	281.6	38.0
32	285.3	30.2
34	288.3	24.0
36	290.6	19.0
38	292.5	15.1
40	294.1	12.0

# REACTANCE CHART



# REACTANCE CHART



# RESISTOR CAPACITOR COLOR CODE

## FIXED CONDENSERS

The methods of marking "postage-stamp" mica condensers, molded paper condensers, and tubular ceramic condensers are shown in Fig. 2. Condensers made to American War Standards or Joint Army-Navy specifications are marked with the 6-dot code shown at the top. Practically all surplus condensers are in this category. The 3-dot RMA code is used for condensers having a rating of 500 volts and  $\pm 20\%$  tolerance only; other ratings and tolerances are covered by the 6-dot RMA code.

## CERAMIC CONDENSERS

Conventional markings for ceramic condensers are shown in the lower drawing of Fig. 2. The colors have the meanings indicated in Table 2. In practice, dots may be used instead of the narrow bands indicated in Fig. 2.

## FIXED COMPOSITION RESISTORS

Composition resistors (including small wire-wound units molded in cases identical with the composition type) are color-coded as shown in Fig. 1. Colored bands are used on resistors having axial leads; on radial-lead resistors the colors are placed as shown in the drawing. When bands are used for color coding the body color has no significance.

## I.F. TRANSFORMERS

Blue — plate lead.  
Red — "B" + lead.  
Green — grid (or diode) lead.  
Black — grid (or diode) return.

NOTE: If the secondary of the i.f.t. is center-tapped, the second diode plate lead is green-and-black striped, and black is used for the center-tap lead.

## LOUDSPEAKER VOICE COILS

Green — finish.  
Black — start.

## LOUDSPEAKER FIELD COILS

Black and Red — start.  
Yellow and Red — finish.  
Slate and Red — tap (if any).

## POWER TRANSFORMERS

- 1) Primary Leads ..... Black  
If tapped:  
Common ..... Black  
Tap ..... Black and Yellow Striped  
Finish ..... Black and Red Striped
- 2) High-Voltage Plate Winding ..... Red  
Center-Tap ..... Red and Yellow Striped
- 3) Rectifier Filament Winding ..... Yellow  
Center-Tap ..... Yellow and Blue Striped
- 4) Filament Winding No. 1 ..... Green  
Center-Tap ..... Green and Yellow Striped
- 5) Filament Winding No. 2 ..... Brown  
Center-Tap ..... Brown and Yellow Striped
- 6) Filament Winding No. 3 ..... Slate  
Center-Tap ..... Slate and Yellow Striped

## A.F. TRANSFORMERS

Blue — plate (finish) lead of primary.  
Red — "B" + lead (this applies whether the primary is plain or center-tapped).  
Brown — plate (start) lead on center-tapped primaries. (Blue may be used for this lead if polarity is not important.)

Green — grid (finish) lead to secondary.  
Black — grid return (this applies whether the secondary is plain or center-tapped).

Yellow — grid (start) lead on center-tapped secondaries. (Green may be used for this lead if polarity is not important.)

NOTE: These markings apply also to line-to-grid and tube-to-line transformers.

TABLE I  
Resistor-Condenser Color Code

Color	Significant Figure	Decimal Multiplier	Tolerance (%)	Voltage Rating*
Orange	9	1,000,000,000	9*	2000
Black	0	1	—	—
Brown	1	10	1*	100
Red	2	100	2*	200
Orange	3	1000	3*	300
Yellow	4	10,000	4*	400
Green	5	100,000	5*	500
Blue	6	1,000,000	6*	600
Violet	7	10,000,000	7*	700
Gray	8	100,000,000	8*	800
White	9	1,000,000,000	9*	900
Gold	—	0.1	5	1000
Silver	—	0.01	10	2000
No color	—	—	20	500

\*Applies to condensers only.

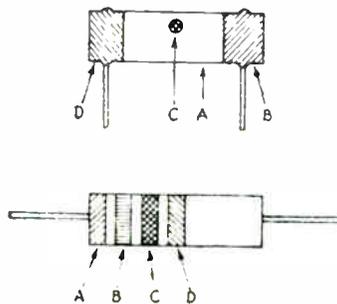


Fig. 1 — Color coding of fixed composition resistors. The color code is given in Table 1. The colored areas have the following significance:

- A — First significant figure of resistance in ohms.  
B — Second significant figure.  
C — Decimal multiplier.  
D — Resistance tolerance in per cent. If no color is shown, the tolerance is  $\pm 20\%$ .

TABLE II  
Color Code for Ceramic Condensers

Color	Significant Figure	Decimal Multiplier	Capacitance Tolerance		Temp. Coeff. p.p.m./deg. C.
			More than 10 $\mu\text{fd.}$ (in %)	Less than 10 $\mu\text{fd.}$ (in $\mu\text{fd.}$ )	
Black	0	1	$\pm 20$	2.0	0
Brown	1	10	$\pm 1$	—	30
Red	2	100	$\pm 2$	—	80
Orange	3	1000	—	—	150
Yellow	4	—	—	—	220
Green	5	—	$\pm 5$	0.5	330
Blue	6	—	—	—	470
Violet	7	—	—	—	750
Gray	8	0.01	—	0.25	30
White	9	0.1	$\pm 10$	1.0	500

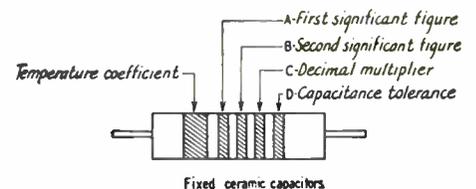
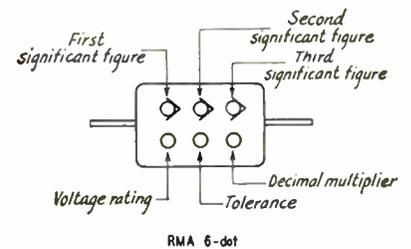
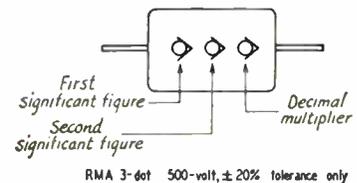
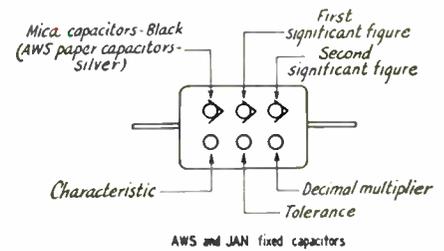


Fig. 2—Color coding of fixed mica, molded paper, and tubular ceramic condensers. The color code for mica and molded paper condensers is given in Table 1. Table 2 gives the color code for tubular ceramic condensers.

# TELEPHONE CABLE COLOR CODE

<i>Pair No.</i>	<i>Color</i>	<i>Mate</i>	<i>Pair No.</i>	<i>Color</i>	<i>Mate</i>
1	Blue	White	26	Blue White	Red
2	Orange	White	27	Blue Orange	Red
3	Green	White	28	Blue Green	Red
4	Brown	White	29	Blue Brown	Red
5	Slate	White	30	Blue Slate	Red
6	Blue White	White	31	Orange White	Red
7	Blue Orange	White	32	Orange Green	Red
8	Blue Green	White	33	Orange Brown	Red
9	Blue Brown	White	34	Orange Slate	Red
10	Blue Slate	White	35	Green White	Red
11	Orange White	White	36	Green Brown	Red
12	Orange Green	White	37	Green Slate	Red
13	Orange Brown	White	38	Brown White	Red
14	Orange Slate	White	39	Brown Slate	Red
15	Green White	White	40	Slate White	Red
16	Green Brown	White	41	Blue	Black
17	Green Slate	White	42	Orange	Black
18	Brown White	White	43	Green	Black
19	Brown Slate	White	44	Brown	Black
20	Slate White	White	45	Slate	Black
21	Blue	Red	46	Blue White	Black
22	Orange	Red	47	Blue Orange	Black
23	Green	Red	48	Blue Green	Black
24	Brown	Red	49	Blue Brown	Black
25	Slate	Red	50	Blue Slate	Black

NOTE—The last pair in all cables is a Red with White mate, viz.

6-pair cable	6th pair	Red	White
11-pair cable	11th pair	Red	White
16-pair cable	16th pair	Red	White
26-pair cable	26th pair	Red	White
51-pair cable	51st pair	Red	White

# DB CHART

## DECIBELS

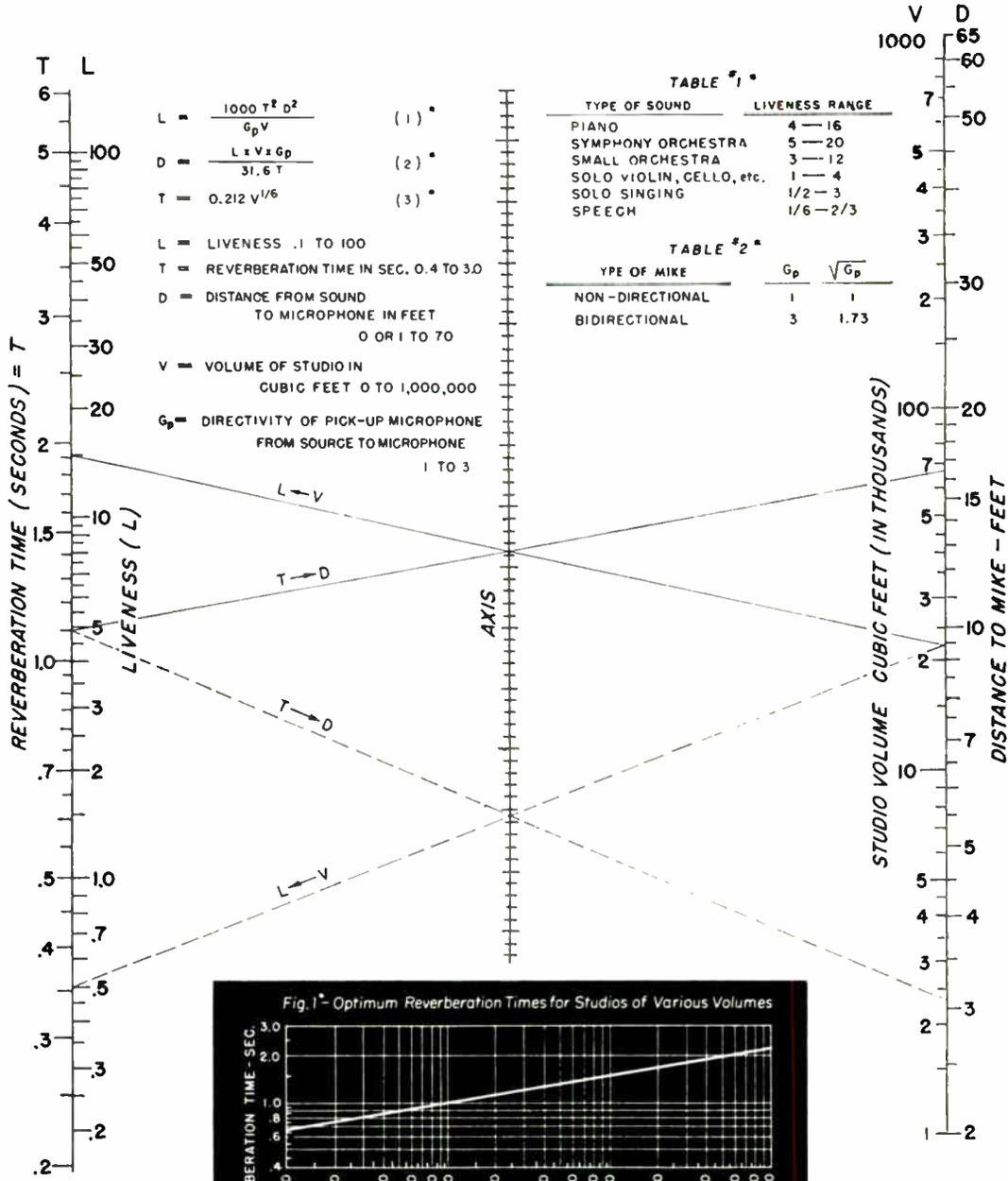
Power Ratio	Voltage or Current Ratio	-db+	Voltage or Current Ratio	Power Ratio	Power Ratio	Voltage or Current Ratio	-db+	Voltage or Current Ratio	Power Ratio	Power Ratio	Voltage or Current Ratio	-db+	Voltage or Current Ratio	Power Ratio
10 <sup>-1</sup>	10 <sup>-1</sup>	10	10	10	.251	.501	6.0	2.00	3.98	.0501	.224	13.0	4.47	19.95
10 <sup>-2</sup>	10 <sup>-2</sup>	20	10	10 <sup>2</sup>	.246	.496	6.1	2.02	4.07	.0490	.221	13.1	4.52	20.42
10 <sup>-3</sup>	10 <sup>-3</sup>	30	10 <sup>3</sup>	10 <sup>3</sup>	.240	.490	6.2	2.04	4.17	.0479	.219	13.2	4.57	20.89
10 <sup>-4</sup>	10 <sup>-4</sup>	40	10 <sup>4</sup>	10 <sup>4</sup>	.234	.484	6.3	2.07	4.27	.0468	.216	13.3	4.62	21.38
10 <sup>-5</sup>	10 <sup>-5</sup>	50	10 <sup>5</sup>	10 <sup>5</sup>	.229	.479	6.4	2.09	4.37	.0457	.214	13.4	4.68	21.88
10 <sup>-6</sup>	10 <sup>-6</sup>	60	10 <sup>6</sup>	10 <sup>6</sup>	.224	.473	6.5	2.11	4.47	.0447	.211	13.5	4.73	22.39
10 <sup>-7</sup>	10 <sup>-7</sup>	70	10 <sup>7</sup>	10 <sup>7</sup>	.219	.468	6.6	2.14	4.57	.0437	.209	13.6	4.79	22.91
10 <sup>-8</sup>	10 <sup>-8</sup>	80	10 <sup>8</sup>	10 <sup>8</sup>	.214	.462	6.7	2.16	4.68	.0427	.207	13.7	4.84	23.44
10 <sup>-9</sup>	10 <sup>-9</sup>	90	10 <sup>9</sup>	10 <sup>9</sup>	.209	.457	6.8	2.19	4.79	.0417	.204	13.8	4.90	23.99
10 <sup>-10</sup>	10 <sup>-10</sup>	100	10 <sup>10</sup>	10 <sup>10</sup>	.204	.452	6.9	2.21	4.90	.0407	.202	13.9	4.96	24.55
1.000	1.000	0	1.00	1.00	.200	.447	7.0	2.24	5.01	.0398	.200	14.0	5.01	25.12
.977	.989	.1	1.01	1.02	.195	.442	7.1	2.27	5.13	.0389	.197	14.1	5.07	25.70
.955	.977	.2	1.02	1.05	.191	.437	7.2	2.29	5.25	.0380	.195	14.2	5.13	26.30
.933	.966	.3	1.04	1.07	.186	.432	7.3	2.32	5.37	.0372	.193	14.3	5.19	26.92
.912	.955	.4	1.05	1.10	.182	.427	7.4	2.34	5.50	.0363	.191	14.4	5.25	27.54
.891	.944	.5	1.06	1.12	.178	.422	7.5	2.37	5.62	.0355	.188	14.5	5.31	28.18
.871	.933	.6	1.07	1.15	.174	.417	7.6	2.40	5.75	.0347	.186	14.6	5.37	28.84
.851	.923	.7	1.08	1.18	.170	.412	7.7	2.43	5.89	.0339	.184	14.7	5.43	29.51
.832	.912	.8	1.10	1.20	.166	.407	7.8	2.46	6.03	.0331	.182	14.8	5.50	30.20
.813	.902	.9	1.11	1.23	.162	.403	7.9	2.48	6.17	.0324	.180	14.9	5.55	30.90
.794	.891	1.0	1.12	1.26	.159	.398	8.0	2.51	6.31	.0316	.178	15.0	5.62	31.62
.776	.881	1.1	1.14	1.29	.155	.394	8.1	2.54	6.46	.0309	.176	15.1	5.69	32.36
.759	.871	1.2	1.15	1.32	.151	.389	8.2	2.57	6.61	.0302	.174	15.2	5.75	33.11
.741	.861	1.3	1.16	1.35	.148	.385	8.3	2.60	6.76	.0295	.172	15.3	5.82	33.88
.724	.851	1.4	1.18	1.38	.145	.380	8.4	2.63	6.92	.0288	.170	15.4	5.89	34.67
.708	.841	1.5	1.19	1.41	.141	.376	8.5	2.66	7.08	.0282	.168	15.5	5.96	35.48
.692	.832	1.6	1.20	1.45	.138	.372	8.6	2.69	7.24	.0275	.166	15.6	6.03	36.31
.676	.822	1.7	1.22	1.48	.135	.367	8.7	2.72	7.41	.0269	.164	15.7	6.10	37.15
.661	.813	1.8	1.23	1.51	.132	.363	8.8	2.75	7.59	.0263	.162	15.8	6.17	38.02
.646	.804	1.9	1.25	1.55	.129	.359	8.9	2.79	7.76	.0257	.160	15.9	6.24	38.90
.631	.794	2.0	1.26	1.59	.126	.355	9.0	2.82	7.94	.0251	.159	16.0	6.31	39.81
.617	.785	2.1	1.27	1.62	.123	.351	9.1	2.85	8.13	.0246	.157	16.1	6.38	40.74
.603	.776	2.2	1.29	1.66	.120	.347	9.2	2.88	8.32	.0240	.155	16.2	6.46	41.69
.589	.767	2.3	1.30	1.70	.118	.343	9.3	2.92	8.51	.0234	.153	16.3	6.53	42.66
.575	.759	2.4	1.32	1.74	.115	.339	9.4	2.95	8.71	.0229	.151	16.4	6.61	43.65
.562	.750	2.5	1.33	1.78	.112	.335	9.5	2.99	8.91	.0224	.150	16.5	6.68	44.67
.550	.741	2.6	1.35	1.82	.110	.331	9.6	3.02	9.12	.0219	.148	16.6	6.76	45.71
.537	.733	2.7	1.37	1.86	.107	.327	9.7	3.06	9.33	.0214	.146	16.7	6.84	46.77
.525	.724	2.8	1.38	1.91	.105	.324	9.8	3.09	9.55	.0209	.145	16.8	6.92	47.86
.513	.716	2.9	1.40	1.95	.102	.320	9.9	3.13	9.77	.0204	.143	16.9	7.00	48.98
.501	.708	3.0	1.41	2.00	.1000	.316	10.0	3.16	10.00	.0200	.141	17.0	7.08	50.12
.490	.700	3.1	1.43	2.04	.0977	.313	10.1	3.20	10.23	.0195	.140	17.1	7.16	51.29
.479	.692	3.2	1.45	2.09	.0955	.309	10.2	3.24	10.47	.0191	.138	17.2	7.24	52.48
.468	.684	3.3	1.46	2.14	.0933	.306	10.3	3.27	10.72	.0186	.137	17.3	7.33	53.70
.457	.676	3.4	1.48	2.19	.0912	.302	10.4	3.31	10.96	.0182	.135	17.4	7.41	54.95
.447	.668	3.5	1.50	2.24	.0891	.299	10.5	3.35	11.22	.0178	.133	17.5	7.50	56.23
.437	.661	3.6	1.51	2.29	.0871	.295	10.6	3.39	11.48	.0174	.132	17.6	7.59	57.54
.427	.653	3.7	1.53	2.34	.0851	.292	10.7	3.43	11.75	.0170	.130	17.7	7.67	58.88
.417	.646	3.8	1.55	2.40	.0832	.288	10.8	3.47	12.02	.0166	.129	17.8	7.76	60.26
.407	.638	3.9	1.57	2.46	.0813	.285	10.9	3.51	12.30	.0162	.127	17.9	7.85	61.66
.398	.631	4.0	1.59	2.51	.0794	.282	11.0	3.55	12.59	.0159	.126	18.0	7.94	63.10
.389	.624	4.1	1.60	2.57	.0776	.279	11.1	3.59	12.88	.0155	.125	18.1	8.04	64.57
.380	.617	4.2	1.62	2.63	.0759	.275	11.2	3.63	13.18	.0151	.123	18.2	8.13	66.07
.372	.610	4.3	1.64	2.69	.0741	.272	11.3	3.67	13.49	.0148	.122	18.3	8.22	67.61
.363	.603	4.4	1.66	2.75	.0724	.269	11.4	3.72	13.80	.0145	.120	18.4	8.32	69.18
.355	.596	4.5	1.68	2.81	.0708	.266	11.5	3.76	14.13	.0141	.119	18.5	8.41	70.79
.347	.589	4.6	1.70	2.88	.0691	.263	11.6	3.80	14.45	.0138	.118	18.6	8.51	72.44
.339	.582	4.7	1.72	2.95	.0676	.260	11.7	3.85	14.79	.0135	.116	18.7	8.61	74.13
.331	.575	4.8	1.74	3.02	.0661	.257	11.8	3.89	15.14	.0132	.115	18.8	8.71	75.86
.324	.569	4.9	1.76	3.09	.0646	.254	11.9	3.94	15.49	.0129	.114	18.9	8.81	77.62
.316	.562	5.0	1.78	3.16	.0631	.251	12.0	3.98	15.85	.0126	.112	19.0	8.91	79.43
.309	.556	5.1	1.80	3.24	.0617	.248	12.1	4.03	16.22	.0123	.111	19.1	9.02	81.28
.302	.550	5.2	1.82	3.31	.0603	.246	12.2	4.07	16.60	.0120	.110	19.2	9.12	83.18
.295	.543	5.3	1.84	3.39	.0589	.243	12.3	4.12	16.98	.0118	.108	19.3	9.23	85.11
.288	.537	5.4	1.86	3.47	.0575	.240	12.4	4.17	17.38	.0115	.107	19.4	9.33	87.10
.292	.530	5.5	1.88	3.55	.0562	.237	12.5	4.22	17.78	.0112	.106	19.5	9.44	89.13
.275	.525	5.6	1.91	3.63	.0550	.234	12.6	4.27	18.20	.0110	.105	19.6	9.55	91.20
.269	.519	5.7	1.93	3.72	.0537	.232	12.7	4.32	18.62	.0107	.104	19.7	9.66	93.33
.263	.513	5.8	1.95	3.80	.0525	.229	12.8	4.37	19.05	.0105	.102	19.8	9.77	95.50
.257	.507	5.9	1.97	3.89	.0513	.227	12.9	4.42	19.50	.0102	.101	19.9	9.89	97.72
										.0100	.100	20.0	10.00	100.00

CONVERSION TABLE FOR UNITS OF LENGTH

MULTIPLY NUMBER OF OF → BY ↘ TO OBTAIN NUMBER OF	ANGSTROMS	MICRONS	MILS	INCHES	FEET	MILES	MILLIMETERS	CENTIMETERS	KILOMETERS
ANGSTROMS	1	$10^4$	$2.540 \times 10^5$	$2.540 \times 10^8$	$3.048 \times 10^9$	$1.609 \times 10^{13}$	$10^7$	$10^8$	$10^{13}$
MICRONS	$10^{-4}$	1	$2.540 \times 10$	$2.540 \times 10^4$	$3.048 \times 10^5$	$1.609 \times 10^9$	$10^3$	$10^4$	$10^9$
MILS	$3.937 \times 10^{-6}$	$3.937 \times 10^{-2}$	1	$10^3$	$1.2 \times 10^4$	$6.336 \times 10^7$	$3.937 \times 10$	$3.937 \times 10^2$	$3.937 \times 10^7$
INCHES	$3.937 \times 10^{-9}$	$3.937 \times 10^{-5}$	$10^{-3}$	1	12	$6.336 \times 10^4$	$3.937 \times 10^{-2}$	$3.937 \times 10^{-1}$	$3.937 \times 10^4$
FEET	$3.281 \times 10^{-10}$	$3.281 \times 10^{-6}$	$8.333 \times 10^{-5}$	$8.333 \times 10^{-2}$	1	$5.280 \times 10^3$	$3.281 \times 10^{-3}$	$3.281 \times 10^{-2}$	$3.281 \times 10^3$
MILES	$6.214 \times 10^{-14}$	$6.214 \times 10^{-10}$	$1.578 \times 10^{-8}$	$1.578 \times 10^{-5}$	$1.894 \times 10^{-4}$	1	$6.214 \times 10^{-7}$	$6.214 \times 10^{-6}$	$6.214 \times 10^{-1}$
MILLIMETERS	$10^{-7}$	$10^{-3}$	$2.540 \times 10^{-2}$	$2.540 \times 10$	$3.048 \times 10^2$	$1.609 \times 10^6$	1	10	$10^6$
CENTIMETERS	$10^{-8}$	$10^{-4}$	$2.540 \times 10^{-3}$	$2.540$	$3.048 \times 10$	$1.609 \times 10^5$	0.1	1	$10^5$
KILOMETERS	$10^{-13}$	$10^{-9}$	$2.540 \times 10^{-8}$	$2.540 \times 10^{-5}$	$3.048 \times 10^{-4}$	$1.609$	$10^{-6}$	$10^5$	1

# MIKE NOMOGRAPH

## NOMOGRAPH for MICROPHONE DISTANCES in LIVENESS BROADCASTING



$$L = \frac{1000 T^2 D^2}{G_p V} \quad (1)$$

$$D = \frac{L \times V \times G_p}{31.6 T} \quad (2)$$

$$T = 0.212 V^{1/6} \quad (3)$$

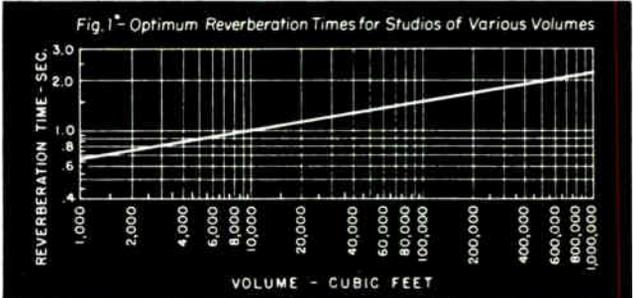
L = LIVENESS .1 TO 100  
 T = REVERBERATION TIME IN SEC. 0.4 TO 3.0  
 D = DISTANCE FROM SOUND TO MICROPHONE IN FEET 0 OR 1 TO 70  
 V = VOLUME OF STUDIO IN CUBIC FEET 0 TO 1,000,000  
 G<sub>p</sub> = DIRECTIVITY OF PICK-UP MICROPHONE FROM SOURCE TO MICROPHONE 1 TO 3

TABLE #1\*

TYPE OF SOUND	LIVENESS RANGE
PIANO	4—16
SYMPHONY ORCHESTRA	5—20
SMALL ORCHESTRA	3—12
SOLO VIOLIN, CELLO, etc.	1—4
SOLO SINGING	1/2—3
SPEECH	1/6—2/3

TABLE #2\*

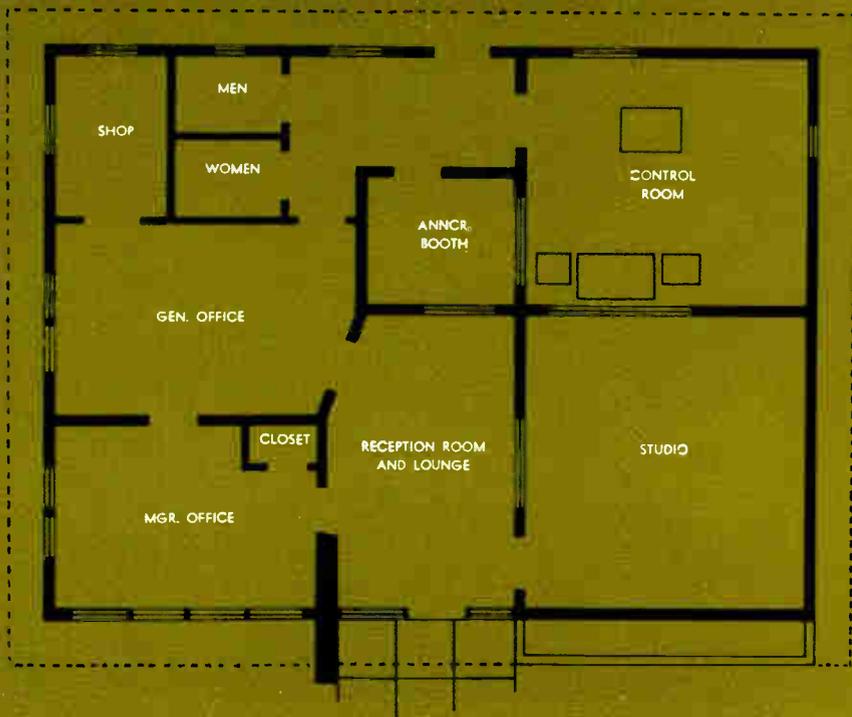
TYPE OF MIKE	G <sub>p</sub>	√G <sub>p</sub>
NON-DIRECTIONAL	1	1
BIDIRECTIONAL	3	1.73



(\* COURTESY OF WESTERN ELECTRIC CO.)

R.R.B.

# SUGGESTED STATION LAYOUTS

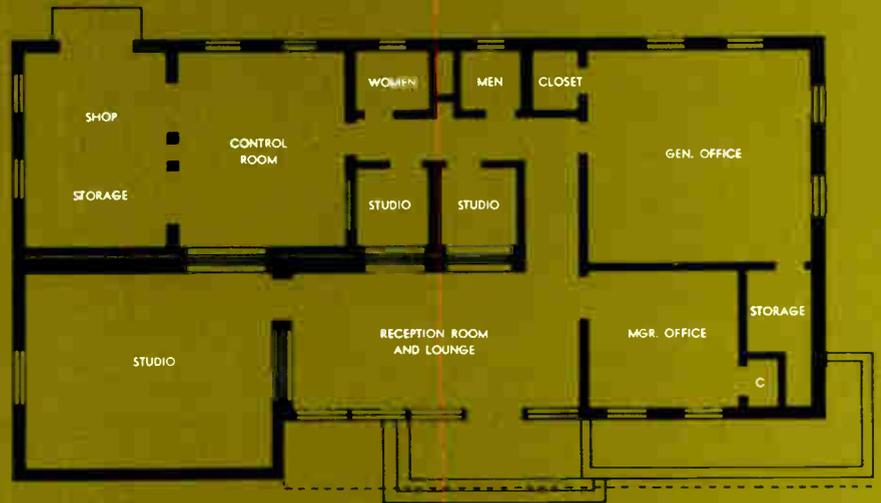


**250W-1 KW AM**

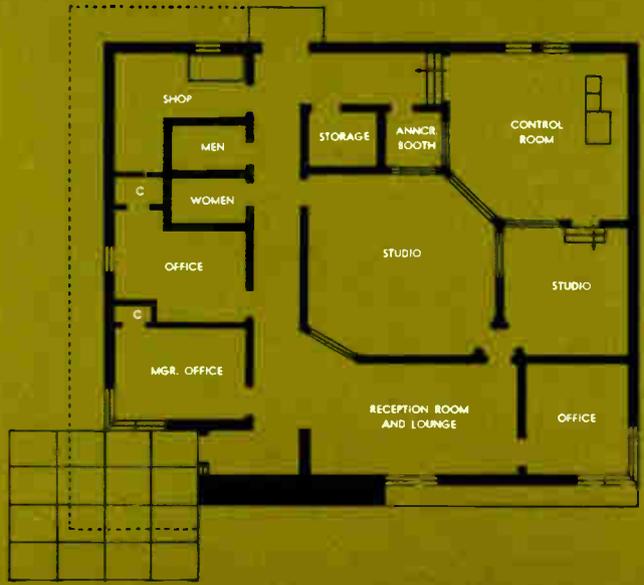
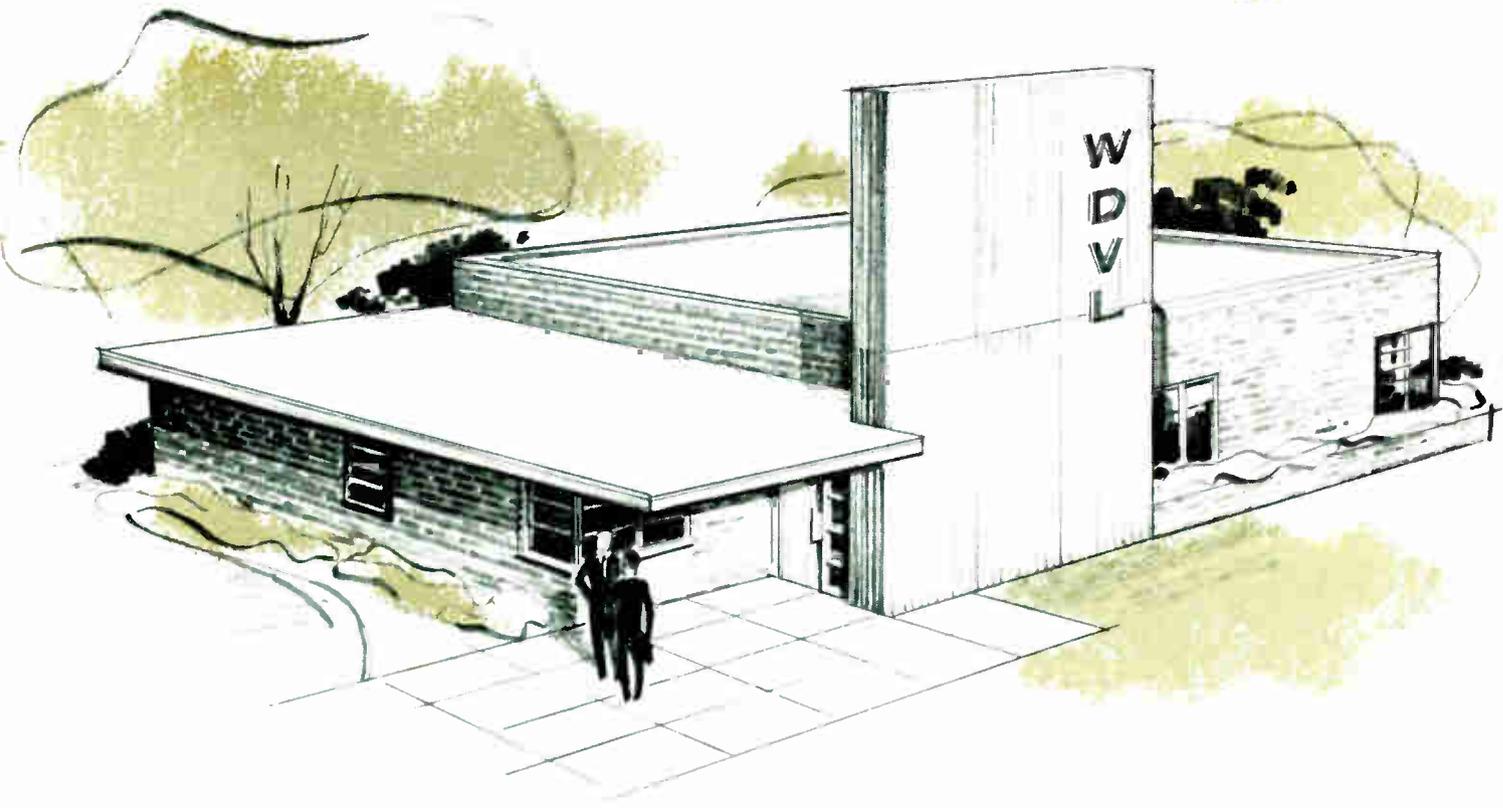
# SUGGESTED STATION LAYOUTS



**250W-1 KW AM**

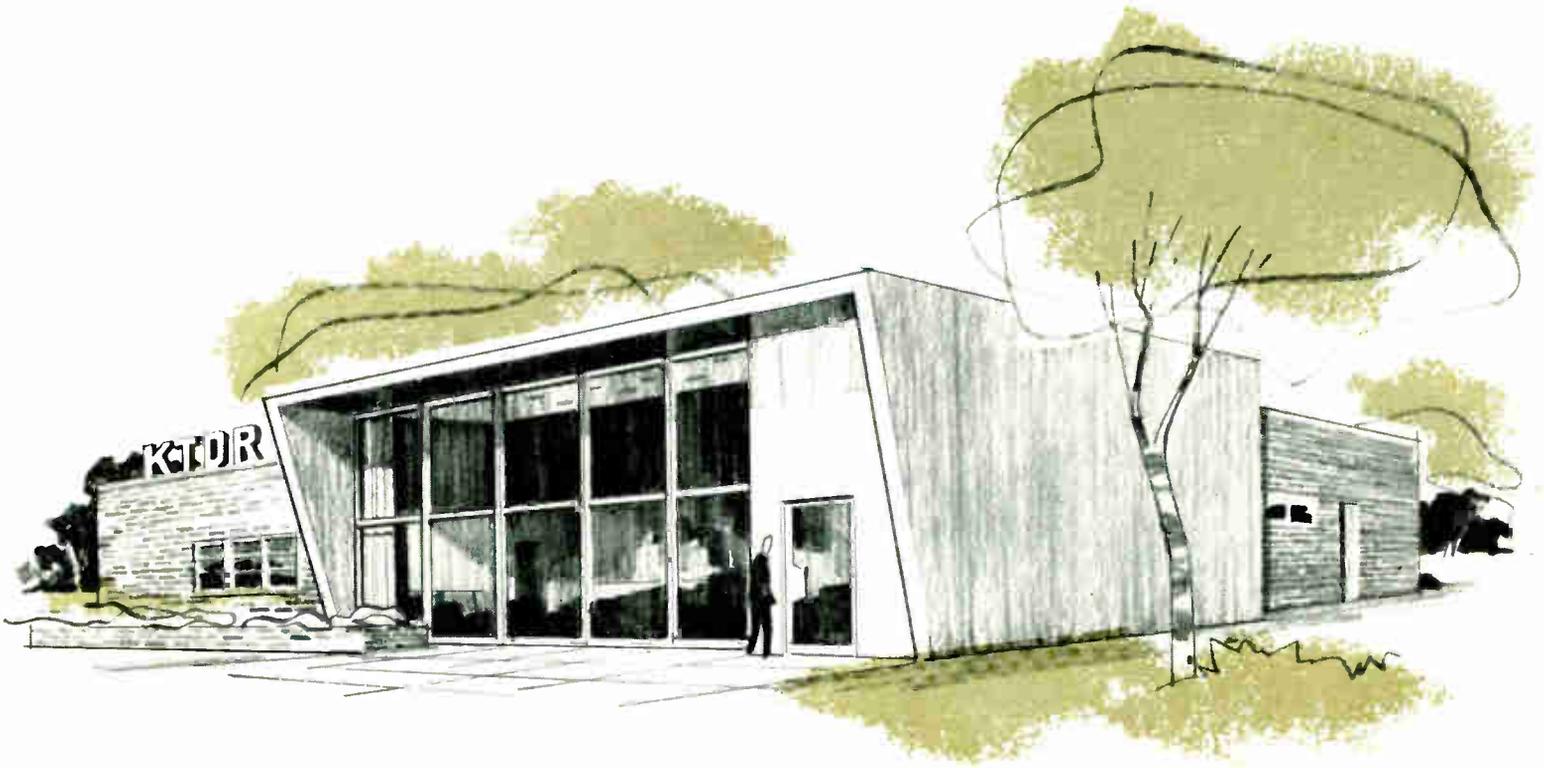


# SUGGESTED STATION LAYOUTS

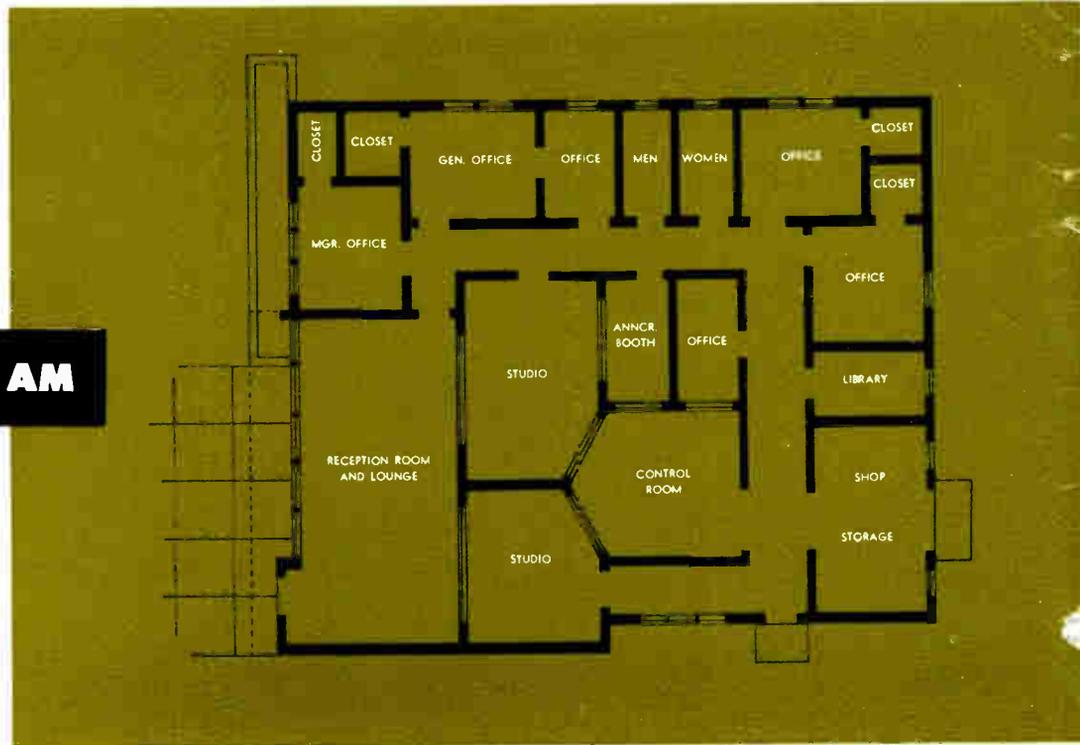


**250W-1 KW AM**

# SUGGESTED STATION LAYOUTS



**5,000-10,000 WATT AM**





## **COLLINS RADIO COMPANY**

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2700 W. Olive Avenue, BURBANK, CALIFORNIA  
Dogwood Road, Fountain City, KNOXVILLE, TENNESSEE  
222 West Pensacola Street, TALLAHASSEE, FLORIDA  
1318 4th Avenue, SEATTLE, WASHINGTON  
4711 N.W. 36th Street, MIAMI SPRINGS, FLORIDA

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