AUDIO DATA BOOK

GENERAL ELECTRIC

BROADCAST EQUIPMENT

AUDIO

DATA BOOK

This book is recorded in your name as follows:

B. Hilliman Bailey Jr
P. O. Box 74
Natchitoches, La.

If this book is found, please return it to the above address or to

GENERAL ELECTRIC

SYRACUSE 1, NEW YORK

ECB-180

BROADCAST AND TV STUDIO EQUIPMENT PRICE LIST
BROADCAST EQUIPMENT DATA BOOK FEBRUARY 15, 1959

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
35	BC-21-A	AUDIO CONTROL FACILITIES, SINGLE CHANNEL Includes	2,500.00
	BA-21-A	(4) Preamplifier @ $140.00 each	560.00
	BA-22-A	Program Amplifier	175.00
	BA-24-A	Monitor Amplifier	240.00
	BA-28-A	Coe/Talkback Amplifier	160.00
50	BP-20-A	25V Power Supply	190.00
51	BP-21-A	50V Power Supply	190.00
	FA-47-A1	Line to Line Transformer for use with BC-21-A	28.50
	7164636-1	Master Gain Control Module	75.00
113-1	BA-1-H	Pre-amplifier	97.50
13	BA-12-C	Program Amplifier	125.00
13	BA-12-C	Monitoring Amplifier	125.00
54	BP-10-B	Power Supply	105.00
54	FA-22-F	Tray	9.75
75	FA-23-B	Shelf for BP-10-B	45.00
32	FA-45-A	Relay Assembly, plug-in	69.00
14	BA-9-A	Unilevel amplifier, plug-in	140.00
114	BA-15-A	Unilevel preamplifier plug-in	175.00
	PR-18-A	Desk	350.00
76	FA-19-J	Audio Cable 2#16 stranded 500 ft. roll	64.00
76	FA-19-M	Audio Cable 2#22 solid 500 ft. roll	30.00/
76	FA-19-R	Audio Cable 2#22 stranded 500 ft. roll	30.00/
	7477541-1	Daven Zero Set Pad	12.85
	7477541-4	Daven Meter Pad	14.00
	7774619-1	Weston VU Meter for Magnetic panel	61.00
	7774619-2	Weston VU Meter for non-magnetic panel	61.00
	BA-206	Double Headset (Brush)	19.80
	7145256	Console Control Relay Kit	135.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.
/Indicates correction or addition to former price list.

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		AUDIO CONTROL CONSOLE ACCESSORIES	
14	BA-9-A	Unilevel Amplifier	$ 140.00
114	BA-15-A	Unilevel Preamplifier	175.00
54	BP-10-B	Power Supply	105.00
54	FA-22-F	Tray	9.75
75	FA-23-B	Shelf	45.00
32	FA-45-A	Relay Assembly Plug in	69.00
75	FA-46-A2	Shelf (FA-23-B less front panel and hinges)	30.00
	PR-16-B	Base Cabinet	230.00
	7477541-1	Daven Zero Set Pad	12.85
	7477541-4	Daven Meter Pad	14.00
	7774619-1	Weston VU Meter for Magnetic Panel	61.00
	7774619-2	Weston VU Meter for non-magnetic panel	61.00
	BA-201	Single Headset, Brush	7.65
	BA-206	Double Headset, Brush	19.80
	714526	Console Control Relay Kit	135.00
		AUDIO AMPLIFIERS, POWER SUPPLIES AND ACCESSORIES	
113-1	BA-1-H	Preamplifier Plug-in	97.50
75	FA-23-B	Shelf for BA-1-H	45.00
11	BA-3-A	Equalized Transcription Preamplifier	150.00
	BA-6-B	Portable Amplifier	765.00
112	BA-7-A3	Audiomatic Limiting Amplifier	1,000.00
14	BA-9-A	Unilevel Amplifier, Plug-in	140.00
75	FA-23-B	Shelf for BA-9-A	45.00
19	BA-9-B	Uni-level Amplifier, Rack Mounted	200.00
13	BA-12-C	Program/Monitor Amplifier Plug-in	125.00
75	FA-23-B	Shelf for BA-12-C	45.00
110	BA-14-A	Program/Monitor Amplifier Plug-in	250.00
75	FA-23-C	Shelf for BA-14-A	55.00
114	BA-15-A	Unilevel Preamplifier	175.00
75	FA-23-B	Shelf for BA-15-A	45.00
54	BP-10-B	Power Supply, Plug-in	105.00
75	FA-23-B	Shelf for BP-10-B	45.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

BROADCAST AND TV STUDIO EQUIPMENT PRICE LIST
BROADCAST EQUIPMENT DATA BOOK

FEBRUARY 15, 1959

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		AUDIO CONTROL CONSOLE ACCESSORIES	
14	BA-9-A	Unilevel Amplifier	$ 140.00
114	BA-15-A	Unilevel Preamplifier	175.00
54	BP-10-B	Power Supply	105.00
54	FA-22-F	Tray	9.75
75	FA-23-B	Shelf	45.00
32	FA-45-A	Relay Assembly Plug in	69.00
75	FA-46-A2	Shelf (FA-23-B less front panel and hinges)	30.00
	PR-16-B	Base Cabinet	230.00
	7477541-1	Daven Zero Set Pad	12.85
	7477541-4	Daven Meter Pad	14.00
	7774619-1	Weston VU Meter for Magnetic Panel	61.00
	7774619-2	Weston VU Meter for non-magnetic panel	61.00
	BA-201	Single Headset, Brush	7.65
	BA-206	Double Headset, Brush	19.80
	714526	Console Control Relay Kit	135.00
		AUDIO AMPLIFIERS, POWER SUPPLIES AND ACCESSORIES	
113-1	BA-1-H	Preamplifier Plug-in	97.50
75	FA-23-B	Shelf for BA-1-H	45.00
11	BA-3-A	Equalized Transcription Preamplifier	150.00
	BA-6-B	Portable Amplifier	765.00
112	BA-7-A3	Audiomatic Limiting Amplifier	1,000.00
14	BA-9-A	Unilevel Amplifier, Plug-in	140.00
75	FA-23-B	Shelf for BA-9-A	45.00
19	BA-9-B	Uni-level Amplifier, Rack Mounted	200.00
13	BA-12-C	Program/Monitor Amplifier Plug-in	125.00
75	FA-23-B	Shelf for BA-12-C	45.00
110	BA-14-A	Program/Monitor Amplifier Plug-in	250.00
75	FA-23-C	Shelf for BA-14-A	55.00
114	BA-15-A	Unilevel Preamplifier	175.00
75	FA-23-B	Shelf for BA-15-A	45.00
54	BP-10-B	Power Supply, Plug-in	105.00
75	FA-23-B	Shelf for BP-10-B	45.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		AUDIO AMPLIFIERS, POWER SUPPLIES AND ACCESSORIES (CONTINUED)	
	TP-21-A	Power Supply, 24V (Note A)	$ 275.00
	7772418-4	Mounting Bracket for TP-21-A (pr.)	5.50
113-1	FA-22-D	Tray for BA-1-H and BA-15-A	8.00
13	FA-22-E	Tray for BA-12-C and BA-9-A	9.00
	FA-24-A	Fabric Cover for BA-6-B	8.50
15	FA-26-A	Plug-in Adaptor for BA-3-A	6.00
Note A		For mounting in Audio Rack Panel FA-5E is required	29.00
75	FA-23-B	Shelf for Plug-in Equipment	45.00
75	FA-23-C	Shelf for BA-14-A	55.00
	FA-46-A2	Shelf (FA-23-B less front panel and hinges)	30.00
180	FA-35-G	Bridging Volume Control	10.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		LOUDSPEAKERS, TAPE RECORDERS AND TRANSCRIPTION EQUIPMENT	
40	FS-1-B	MONITOR SPEAKER Includes	$ 165.00
40	FS-4-A	Cabinet	135.00
41	1201-A	Speaker	23.75
74	FA-42-A	Line to voice Coil Transformer	7.00
40	FS-2-B	WALL SPEAKER Includes	48.00
40	FS-3-A	Wall Housing	17.50
41	1201-A	Speaker	23.75
74	FA-42-A	Line to Voice Coil Transformer	7.00
41	850	8" Loudspeaker	10.95
41	1201-A	12" Loudspeaker	23.75
41	1203-A	12" Loudspeaker	17.75
11	BA-3-A	Equalized Transcription Preamplifier	150.00
11	FA-26-A	Plug in Adaptor for BA-3-A	6.00
63	FA-12-B	Transcription Equalizer	57.50
61	4GS-01D	Single Stylus Cartridge (1 Mil. Diamond)	20.50
61	4GS-02D	Single Stylus Cartridge (2.5 Mil. Diamond)	20.50
61	4GD-01D-02D	Dual Stylus Cartridge (1 Mil. 2.5 Mil Diamond)	33.50
	530	16" Turntable, 3 speed, less arm and pickup Direct Drive, Fairchild	629.50
	T-18-H	12" Turntable, 3 speed, less arm and pickup Rim Drive, Presto	131.00
	T-68-H	16" Turntable, 3 speed, less arm and pickup Rim Drive, Presto	170.00
	TC-200	Console Cabinet for Presto Turntables	150.00
	MB-201	Mounting Board for Presto T-18-H	27.00
	MB-202	Mounting Board for Presto T-68-H	27.00
	B-12-H	12" Turntable, 3 speed, less arm and pickup Rim Drive, Rek-o-Kut	129.95
	C-7BT	Console Cabinet for Rek-o-Kut B-12-H	124.95

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		LOUDSPEAKERS, TAPE RECORDERS AND TRANSCRIPTION EQUIPMENT	
	PT63-A2HZ	Portable Tape Recorder (Magnecord)	$ 495.00
	PT63-A2HZX	Portable Tape Recorder (Magnecord) less case	450.00
	PT63-J	Portable Amplifier	390.00
	93X28	10-1/2" Reel Extension Arms (pair)	55.00
	71C69	Rack Panel Adaptor	18.00
	91X279	Voice Operated Relay	60.00
	PT-63-T	Throw-over Switch and Panel (for Rack Mounting) When used with matching transformer	60.00
	M89-M	Three Channel High Level Mixing Amplifier	197.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

BROADCAST AND TV STUDIO EQUIPMENT PRICE LIST
BROADCAST EQUIPMENT DATA BOOK.

FEBRUARY 15, 1959

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		MICROPHONES	
		ELECTROVOICE TYPES	
	635	Microphone Dynamic Omnidirectional	$ 48.00
	/646	Microphone Dynamic Lavalier Omnidirectional	87.00
	650	Microphone Dynamic Omnidirectional	90.00
	655C	Microphone Dynamic Omnidirectional	120.00
	666	Microphone Cardiod Dynamic	150.00/
		AMERICAN MICROPHONE TYPES	
	DR-330	Cardiod, Ribbon, Dynamic Microphone-American	150.00
	D-303A	Dynamic, Omnidirectional Microphone- 50 ohms - American	78.00
	D303B	Dynamic, Omnidirectional Microphone- 150/250 ohms - American	78.00
		MICROPHONE ACCESSORIES	
	420	Desk Stand, Electro Voice	12.00
	423A	Desk Stand, Electro Voice	3.00
	ND	Desk Stand for DR-330, American	6.00
	S-905	Desk Stand for D-303A/B, American	2.70
	345	Shock Mount Desk, Electro Voice	9.00
	366	Shock mount boom, Electro Voice	24.00
	425	Floor Stand, Electro Voice	18.00
	TS-6	Banquet Stand, Atlas	5.40
	180	8 ft. Boom Stand, Starbird	130.00
	3555	18 ft. Boom Stand, Century	440.00
20	FA-15-A	Microphone Cable	.12/ft.
20	FA-16-A	Microphone Plug, Male	3.50
20	FA-16-B	Microphone Plug, Female	4.00
20	FA-16-C	Microphone Wall Receptacle	5.50
	103B/126B	Mc. Boom and Preambulator, M.R.	2,060.00/
		CABINETRY AND RACK MOUNTED EQUIPMENT	
70	FA-2-A	Jack Strip (Double)	55.00
73	FA-3-A	Jack Panel, Single	10.00
73	FA-3-B	Jack Panel, Double	18.00
73	FA-3-C	Jack Panel, Triple	23.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.
/Indicates correction or addition to former price list.

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		CABINETRY AND RACK MOUNTED EQUIPMENT (CONTINUED)	
	FA-5-B	Panel and Mounting, 7"	$ 25.00
	FA-6-A	Blank Panel, 1-3/4"	7.10
	FA-6-B	Blank Panel, 3-1/2"	8.30
	FA-6-C	Blank Panel, 5-1/4"	9.50
	FA-6-D	Blank Panel, 7"	10.70
	FA-6-E	Blank Panel, 8-3/4"	11.90
	FA-6-F	Blank Panel, 10-1/2"	13.10
	FA-6-G	Blank Panel, 12-1/4"	14.30
113-1	FA-22-D	Tray for BA-1-H, BA-15-A	8.00
13	FA-22-E	Tray for BA-12-C	9.00
54	FA-22-F	Tray for BP-10-B	9.75
75	FA-23-B	Shelf	45.00
75	FA-23-C	Shelf for BA-14-A Amplifiers	55.00
11	FA-26-A	Plug in adapter (BA-3-A)	6.00
75	FA-46-A2	Shelf (FA-23-B less front panel & hinges)	30.00
	PR-1-A	Cabinet Rack	225.00
	PR-3-A	Front Door for PR-1-A	40.00
	PR-4-A	Terminal Board Mounting Frame	9.90
	PR-5-A	Wiring Duct Assembly	20.00
	PR-6-A	Lumiline Lamp & Outlet Assembly	62.00
	PR-7-A	Mounting Angles	13.50
	PR-8-A	Cabling Straps	4.50
	7118764-G1	Audio Terminal Block	7.00
	7118765-G1	Power Terminal Board	2.20
	7460330-G4	Door Interlock Switch Kit	1.58
	PR-11-A	Console End Cap, Right	60.00
	PR-11-B	Console End Cap, Left	60.00
	PR-16-B	Base Cabinet	230.00
	PR-16-C	Base Cabinet	230.00
	PR-17-A	Turret Cabinet	95.00
	7485321-G2	Blower Kit for PR-1-A	66.00
77	FA-1-A	VI Meter Panel	125.00
77	FA-4-A	Switch and Fuse Panel	40.00
73	FA-7-A	Patch Cord, 2 ft.	10.00
73	FA-7-B	Patch Cord, 4 ft.	10.00
73	FA-7-C	Patch Cord, 6 ft.	10.00
71	FA-14-A	Equalizer Panel	110.00
71	FA-14-B	Equalizer Unit	28.00
72	FA-18-A	Sounds Effects Filter Panel	290.00
74	FA-40-B	Line to Line Transformer	27.50
74	FA-41-C	Bridging to Line Transformer	26.00
70	PV-14-A	Card Holder Kit	4.00

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.

Section E 211

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
		CABLE	
20	FA-15-A	Microphone Cable	$ .12/ft.
76	FA-19-J	Audio Cable (Power), 500 ft. Roll	64.00
76	FA-19-M	Audio Cable (Solid), 500 ft. Roll	30.00/
76	FA-19-R	Audio Cable (Stranded), 500 ft. Roll	30.00/

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.
/Indicates correction or addition to former price list.

General Discussion of Ratings and Terminology of General Electric Broadcast Amplifiers

General Electric broadcast amplifiers operate over a frequency range of at least 50 to 15,000 cycles and will deliver their full rated power throughout this range. The distortion and noise are reduced to values suitable for the most exacting service.

Much care has been taken in the design of these amplifiers to assure maximum reliability of operation as well as convenience for servicing.

The ratings given throughout this catalog use the following gain and level ratings:

db—refers to gain or loss

dbm—Single-frequency, sine wave power referred to 1 milliwatt

$$(\text{dbm} = 10 \log \frac{P}{.001})$$

VU—Program level as read on a standard VU meter. Since program material is of a complex and transient nature, the VU meter indicates a level considerably under the instantaneous peak program level. In practical usage the amplifier dbm rating should exceed the VU level to be transmitted by at least 10 db.

The chart showing "Characteristics of G-E Broadcast Audio Amplifiers" lists the General Electric name and uses for each amplifier. The following uses are defined in RETMA Standard TR-105B dated November 1949:

Preliminary Amplifier: A preliminary amplifier is an amplifier which operates from a microphone or other low-level source. Its function is to amplify the microphone output or other signal to a level that can be fed into a subsequent circuit without the signal-to-noise ratio being degraded thereby.

Booster Amplifier: A booster amplifier is an amplifier which is connected in the main program line between the preliminary amplifier and the program amplifier.

Program Amplifier: A program amplifier is an amplifier which is connected in the main program channel and is capable of delivering standard output level.*

Bridging Amplifier: A bridging amplifier is an amplifier whose internal input impedance is such that it may be connected across a circuit without appreciably affecting the circuit performance in any respect. Its function is to operate into program circuits or similar loads.

Monitoring Amplifier: A monitoring amplifier is an amplifier connected to a program circuit so as to provide a means of checking the program.

The term "Program Amplifier" is now used in place of the non standard term "Line Amplifier" or "Main Amplifier." The term "Bridging Amplifier" is now used in place of "Isolation Amplifier."

*+ 18 dbm to lines or + 12 dbm to transmitters

DISCUSSION OF GAIN RATINGS: (as applied to a typical amplifier—General Electric Type BA-1-H).

Unloaded-Input Transformer (40-db gain): When the full generated voltage of a microphone, turntable pick-up, or similar device is applied to the input terminals of the amplifier which it is feeding, the operating conditions are referred to as those of an unloaded-input transformer since no resistance loading of the transformer, either primary or secondary, is used. Under these conditions the highest signal-to-noise ratio of a microphone-amplifier combination is obtained because the amplifier does not load the microphone.

Operating with an unloaded-input transformer, as explained above, the Type BA-1-H Plug-In Pre-Amplifier has a gain of 40 db. This gain is defined as the ratio of "power delivered to the load" to the "power which would be delivered to the load" if the pre-amplifier were replaced by an ideal transformer connected to match the load and source impedance. The gain is determined as follows: (See Fig. 1.)

A source resistance (R_S) fed by an oscillator is connected to a load resistance (R_L) of equal value. The oscillator output is adjusted until the power dissipated in R_L is −40 dbm, as indicated by the power measuring instrument P_1. The output voltage of the oscillator, as indicated by voltmeter V is recorded, R_L is then disconnected for R_S and the oscillator, and the Pre-Amplifier is connected in place of R_L. A tap on the input transformer of the amplifier is used which is equal to the value of R_S (150-ohm tap for 150-ohm R_S). The output of the oscillator, as indicated by voltmeter V, is held constant at the value previously recorded. The resulting output as indicated by P_2 which the amplifier will deliver to its proper load resistor R_O is "O" dbm.

Thus the gain of the amplifier is 40 db.

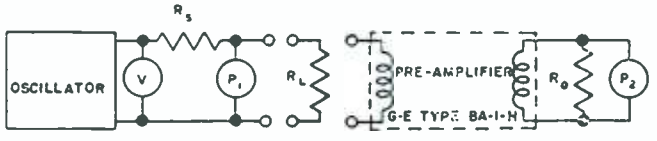


Fig. 1

Matching Input (34-db gain): When the input circuit of an amplifier constitutes a resistive load equal in value to the impedance of the source feeding it, the amplifier is said to have a matching input. Under these conditions the voltage at the terminals of the input transformer of the amplifier is only one half the voltage generated by the source. This constitutes a 6-db drop in the voltage input to the amplifier which effectively produces a 6-db decrease in amplifier gain as compared with the gain obtained with unloaded-input transformer operation. Thus, the gain of the amplifier with matching input is 34 db.

Bridging Input (10-db gain): When an amplifier or similar low-impedance device is connected across a low-impedance line in such a way that only a small fraction of the energy in the line (insufficient to affect the operation of the line) is diverted into the amplifier, the amplifier is said to employ a bridging input. This is accomplished by stepping up the input impedance of the amplifier (to 10,000 or 20,000 ohms, for example) so that in connecting it across the low-impedance line (0-1000 ohms) it has negligible effect.

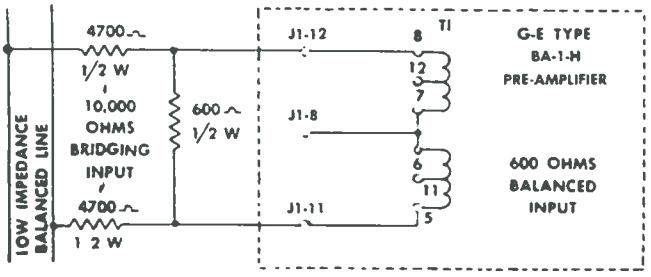


Fig. 2

Figs. 2 and 3 show the circuits of resistive pads either of which, when connected to the 600-ohm input terminals of the Type BA-1-H Pre-Amplifier, converts the 600-ohm unloaded transformer input to a 10,000-ohm resistive-input impedance. With such a pad the amplifier may be "bridged" directly across a low-impedance line.

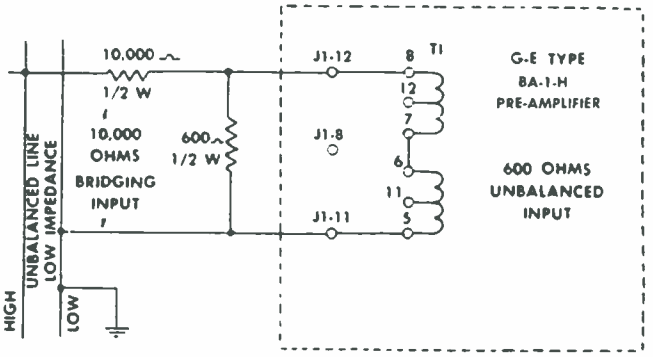
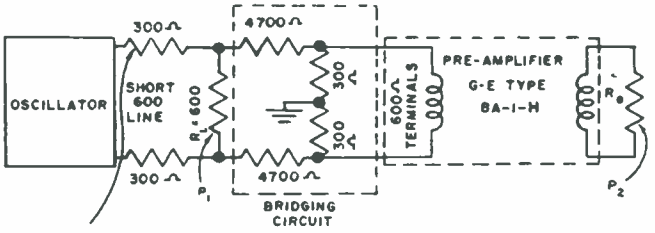


Fig. 3

Used as a bridging amplifier, the Pre-Amplifier has a gain of 10 db, where the gain is defined as the ratio of the "power (P_1) in the 600-ohm line terminating resistance (R_L)" to the "output power (P_2) of the amplifier"; that is GAIN (db) = 10 log $P_2 \div P_1$. Fig. 4 shows the circuit employed in measuring gain with bridging input.



R_g (TOTAL) = 600 Ω
R_g = SOURCE RESISTANCE
R_L = LINE TERMINATING RESISTANCE
R_O = AMPLIFIER LOAD RESISTANCE
P_1 = POWER IN R_L
P_2 = POWER IN R_O

Fig. 4

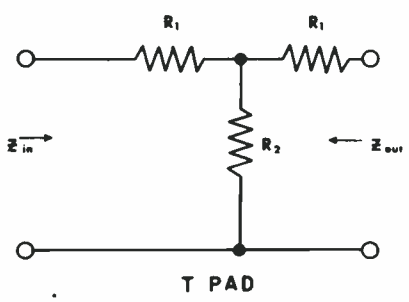
Characteristics of G-E Broadcast Audio Amplifiers

Type No. and Name	Use	Input (dbm)	Output (dbm)	Gain (db)	Source Impedance (ohms)	Load Impedance (ohms)	Self Contained Gain Control	Power Supply	Type of Mounting
BA-1-H Pre-amplifier (Plug-in)	Pre-amplifier Booster Ampl. Bridging Ampl.	−22 (max.) +8	+18	40 10	30/150/250/600 10,000	150/600	No Use Bridging Volume Control FA-35-G	Separate Use BP-10-B	Rack Mounting with FA-23-B Shelf Base Mounting with FA-22-D Tray
BA-3-A Equalized Pre-amplifier	Transcription Pre-amplifier for Use with G-E Cartridges 4GS-01D, 4GS-02D, 4GS-01D-02D	−38	−5	33	G-E Variable Reluctance Broadcast Cartridge Low Impedance	150/600 Balanced or Unbalanced	No	Internal 117 V, 20 W	Base Mounting Inside Turntable or FA-26-A Plug-in Adapter
BA-7-A Limiting Amplifier	Audio Peak Limiting Amplifier	−30/0	+12/27	57	150/600 Balanced or Unbalanced	600 Unbalanced	Input and Output Level Control	Internal 117 V, 110 W	Rack Mounting
BA-9-A Uni-Level Amplifier (Plug-in)	Automatic Audio Level Control Amplifier	−34	+20	54	150/600 Balanced	150/600 Balanced	No	Separate Use BP-10-B	Rack Mounting with FA-23-B Shelf Base Mounting with FA-22-E Tray
BA-9-B Uni-Level Amplifier	Automatic Audio Level Control Program Ampl.	−34	+20	54	150/600 Balanced	150/600 Balanced	No	Internal 117 V, 65 W	Rack Mounting
BA-12-C Program/Monitoring Amplifier (Plug-in)	Program Ampl. Monitor Ampl. Bridging Pgm. Ampl. Bridging Mon. Ampl.	−17 −32 +13 −2	+39	56 71 26 41	150/600 150/600 10,000 10,000	150/600	No Use Bridging Volume Control FA-35-G	Separate Use BP-10-B 88 ma.	Rack Mounting with FA-23-B Shelf Base Mounting with FA-22-E
BA-14-A Program/Monitoring Ampl.	Program Ampl. Monitor Ampl. Bridging Pgm. Ampl. Bridging Mon. Ampl.	−24 −65 0 −5 +40 (max)	+36 +40 +36 +40 +40	60 105 36 45 0	30/150/250/600 Balanced or Unbalanced	150/600 Line 2/8 Speaker	Yes	Internal 117 V, 85 W	Rack Mounting with FA-23-C Shelf
BA-15-A Uni-Level Pre-ampl. (Plug-in)	Automatic Audio Level Control Pre-amplifier	−70 −40 (max)	−10 0	60 40	30/150/250/600 Balanced or Unbalanced	150/600	No	Separate Use BP-10-B 25 ma.	Rack Mounting with FA-23-B Shelf

VOLUME LEVEL TO POWER AND VOLTAGE CONVERSION TABLE

Reference Level
0 dbm = 1 milliwatt, 600 ohms

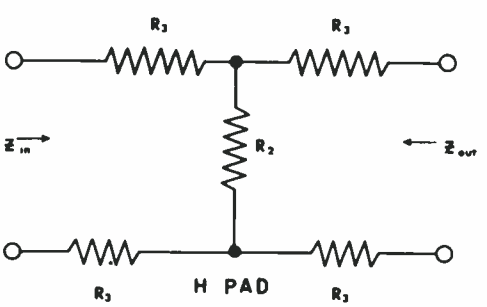
Milliwatts	Volts	DBM
.000001	.0007746	−60
.000010	.002449	−50
.000100	.007746	−40
.001	.02449	−30
.010	.07746	−20
0.100	.2449	−10
1.000	.7746	0
Watts	**Volts**	**DBM**
.001000	.7746	0
.002512	1.228	+ 4
.006310	1.946	+ 8
.01000	2.449	+10
.1000	7.746	+20
1.000	24.49	+30
10.00	77.46	+40



T PAD

For impedances other than 600 ohms, multiply all resistors by Factor $\frac{Zx}{600}$

$Z_{in} = Z_{out} = 600$ ohms

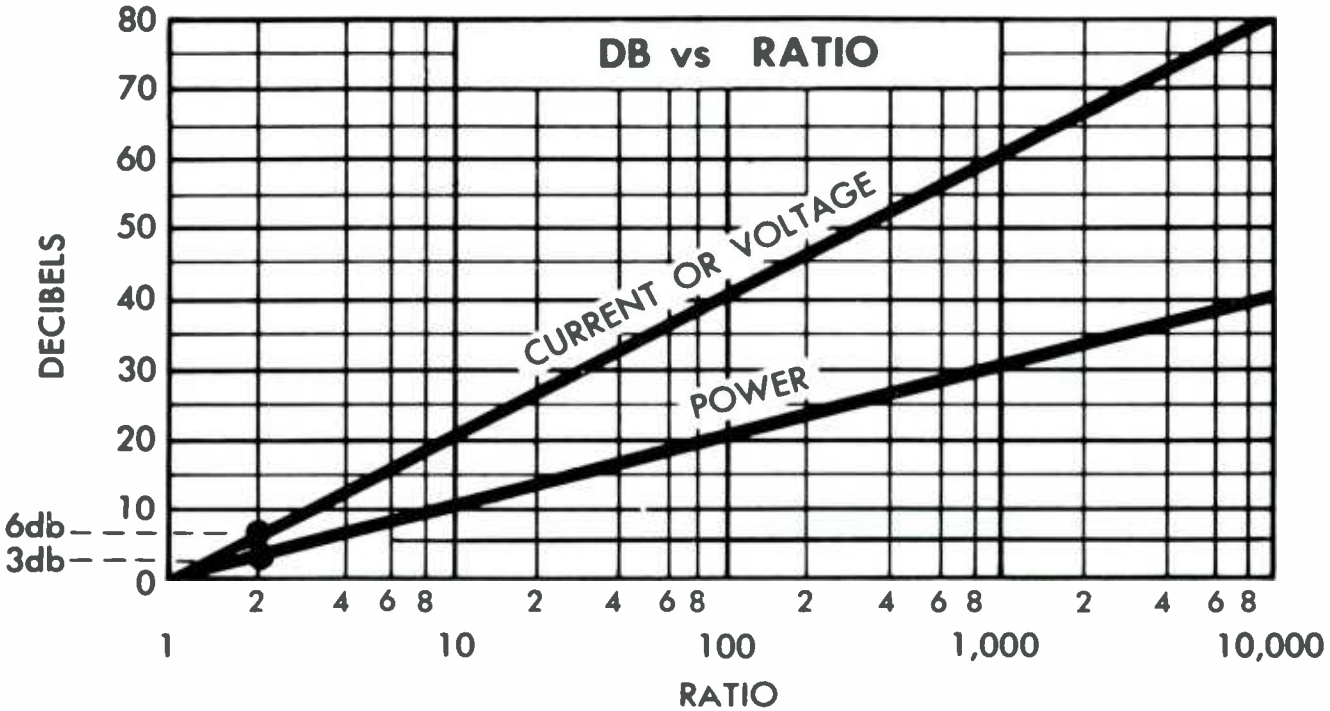


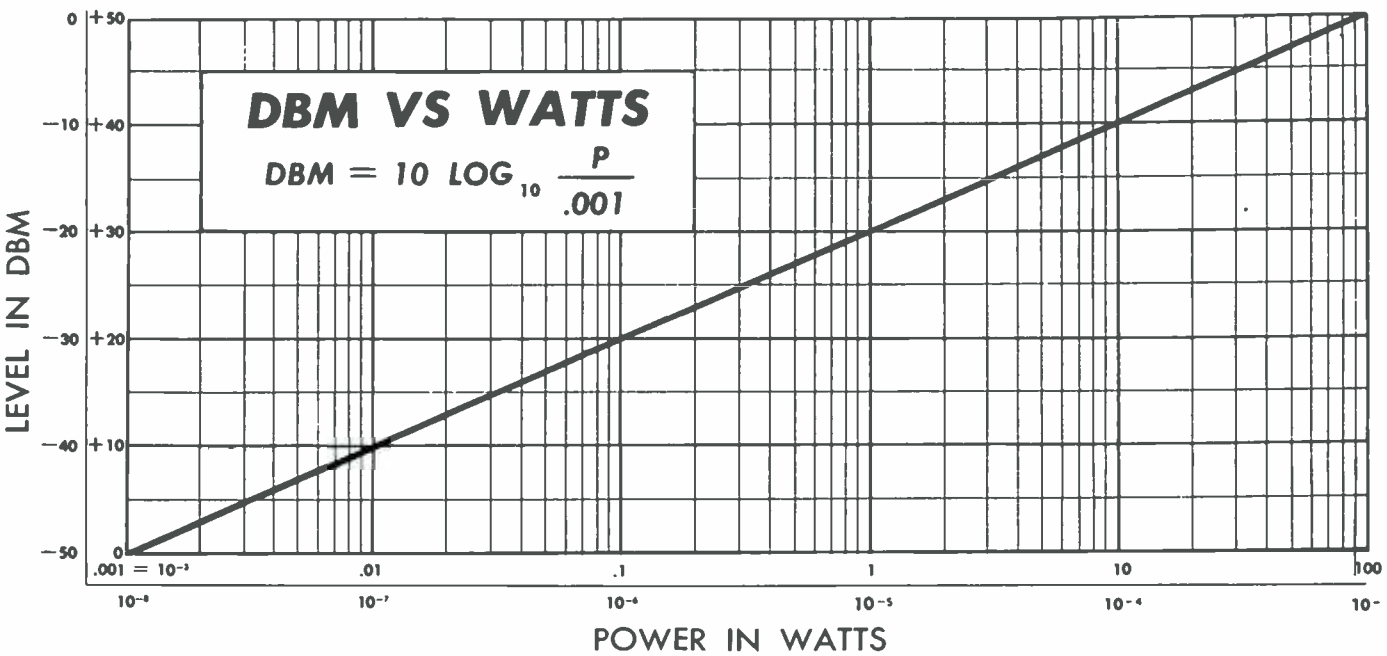
H PAD

Loss in DB	EIA Resistor Values*			Loss in DB	EIA Resistor Values*		
	R1	R2	R3		R1	R2	R3
½	18	10,000	8.2	16	430	200	220
1	36	5,100	18	17	470	180	220
2	68	2,700	36	18	470	150	240
3	100	1,800	51	19	470	130	240
4	130	1,200	68	20	510	120	240
5	160	1,000	82	22	510	100	270
6	200	820	100	24	510	75	270
7	220	680	110	26	560	62	270
8	270	560	130	28	560	47	270
9	300	470	150	30	560	39	270
10	300	430	160	32	560	30	300
11	330	360	160	34	560	24	300
12	360	330	180	36	560	18	300
13	390	270	200	38	560	15	300
14	390	240	200	40	560	12	300
15	430	220	200				

EIA resistor values nearest to the exact values are given

RESISTIVE PADS





Equalized Transcription Pre-Amplifier, Type BA-3-A

BA-3-A Equalized Transcription Pre-Amplifier

APPLICATION

The Type BA-3-A Equalized Transcription Pre-Amplifier is a high-quality, AC operated, equalized audio amplifier. It is designed to enable broadcasters to fully realize the superior play-back performance possible with G-E Variable Reluctance Pickups. A four-position switch allows control of high-frequency response. Approximately −15 VU audio output is available for feeding console mixer systems. For the convenience of the operator, the Type BA-3-A provides a cueing circuit which will feed headphones independent of the program circuit.

FEATURES

1. Full "NARTB" low-frequency response.
2. Adjustable high-frequency response including "NARTB" position.
3. Sufficient level to feed directly into conventional mixer systems.
4. Low-noise type 1620 input tube.
5. Tubes and chassis shock mounted.
6. Magnetically shielded output and power transformers.
7. Provision for tube current checks.
8. Output circuits are 600 150 ohms and may be run either balanced or unbalanced.
9. Low distortion.
10. Cueing circuit for headphones.

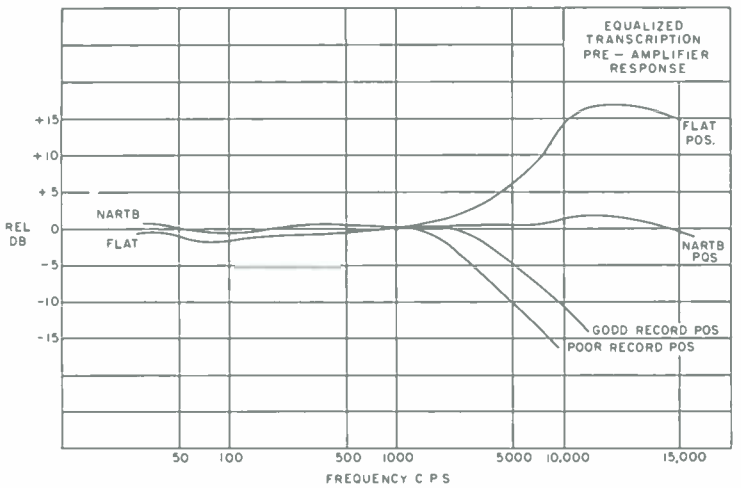
DESCRIPTION

The amplifier is built on a flat-plate chassis which mounts inside the turntable cabinet. The four-position switch which allows control of the high-frequency response mounts on the turntable either at the top or the side. Included with the switch is an escutcheon plate and knob which mounts on the top of the turntable.

The four positions of the switch are "Flat", "NARTB", "Good Records", and "Poor Records". The "Flat" position provides essentially flat high-frequency response from material recorded at constant velocity. The "NARTB" position provides essentially flat high-frequency response from material recorded in accordance with the "NARTB" lateral curve. The "Good Records" position provides a high-frequency response somewhat more attenuated than that given by the "NARTB" position. The fourth position, "Poor Records", provides a high-frequency response considerably more attenuated than that given by the "NARTB" position. All switch positions provide low-frequency response essentially the complement of the "NARTB" curve.

Shielded leads are provided which connect the amplifier to the pickup and to the equalizer switch. If it is desirable, leads can be connected from the amplifier to a headphone cueing jack. These are not furnished as part of the equipment.

The usual power and audio output leads interconnect with the station facilities. Terminals are provided for metering of tube cathode voltages.



Average Performance Characteristics of the Transcription Equalizer with the "New Orthophonic" Test Record G-E 4GS-01D or 4GD-01D-02D Cartridge using the 1-mil Diamond Stylus.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	7 inches (over-all)
Width	8¾ inches
Depth	8¾ inches
Weight:	Approx. 6 lbs. 3 oz. (unpacked)

Mounting: The amplifier mounts inside the turntable cabinet and the switch is designed to mount on the turntable, either at the top or the side.

ELECTRICAL SPECIFICATIONS

Power Input:

110 117/125 volts, 50 60 cycles
20 watts

Tube Complement:

1 G-E Type 1620*
1 G-E Type 6SN7-GT
1 G-E Type 6X5

*Type 6J7 may be used where a minimum of microphonics and hum is not required.

Output Level: When used with the G-E Variable Reluctance Broadcast Cartridges, 4GS-01D, 4GS-02D or 4GD-01L-02D, the output will be approximately −15 VU maximum from 78 rpm records; −20 VU maximum from microgroove records.

Noise Level: 65 db below output level of −5 dbm.

Cueing: Approximately 1½ volts program peak, one side grounded, for use with high impedance headphones. Output isolated from program circuit.

Output Circuits

Load Impedance:	600/150 ohms.
Output Connections:	600 or 150 ohms—balanced, or either side may be grounded.

Distortion: 1% or less, 50 to 15,000 cycles with up to −5 dbm output. This includes equalizing circuits.

Metering: Cathode resistors tapped at 1 volt for connection to an external 5000 ohms-per-volt 2-volt meter.

ORDERING INFORMATION

When ordering, please specify:

Type BA-3-A Equalized Transcription Pre-Amplifier.

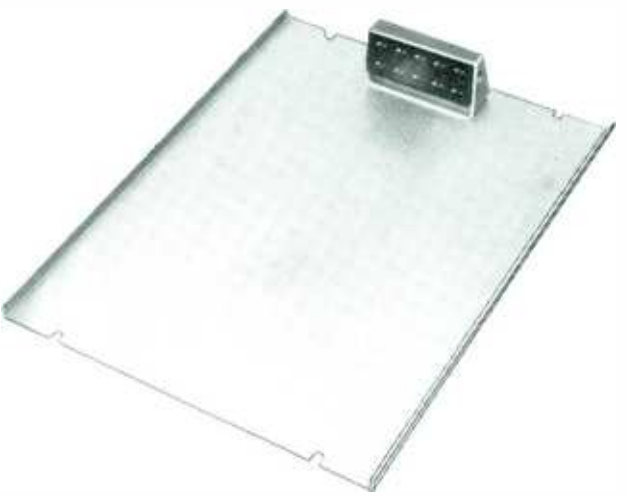
Type number includes amplifier, one set of operating tubes, instruction book and AC power plug.

ACCESSORIES

Type FA-26-A Plug-in Adapter for converting unit to a plug-in chassis.

Type FA-22-F Tray to provide a plug-in base for the FA-26-A Adapter.

FA-26-A Plug-in Adapter



FA-22-F Tray

Plug-In Program/Monitoring Amplifier, Type BA-12-C

Plug-In Program/Monitoring Amplifier, Type BA-12-C and Tray, Type FA-22-E

APPLICATION

The Type BA-12-C, Plug-In Program/Monitoring Amplifier is a high fidelity, compact, fixed gain, plug-in audio unit, recommended for use as a program, line, monitoring or isolation amplifier.

FEATURES

1. **Small, compact design.** Four of these amplifiers can be mounted in 7 inches of rack space.
2. **Plug-in construction** with point-to-point wiring makes maintenance extremely easy.
3. **Only two tube-types used.**
4. **Easy removal for servicing.** Uses Jones "2400" series plug.
5. **Chassis punched for addition of bridging controls and metering switches.**
6. **No shock hazard.** Voltage is applied to the unit only when plugged into a mating source and when so plugged in, no voltage is exposed.
7. **Versatile:** fulfills all medium and high-level audio system requirements. Toggle switch allows selection of 56- or 71-db gain.

DESCRIPTION

The General Electric Type BA-12-C Plug-In Program/Monitor Amplifier is a dual purpose amplifier. By means of a switch, located on the chassis top, this amplifier may be instantly changed from a line amplifier to an 8 watt monitor amplifier.

With the switch set in low position, the amplifier serves as a program or line amplifier. In this position the amplifier has a gain of 56 db. With an output level of +30 dbm, the distortion is less than one-half of one percent with a maximum input of −26 dbm.

When the switch is in the high position, the amplifier may be used as a monitor amplifier with a gain of 71 db. In this application an output level of +39 dbm (8 watts) is possible with a distortion figure of less than 3% at maximum input level of −32 dbm.

Electrically the BA-12-C Amplifier consists of a 5879 pentode input stage plus a triode-connected 5879 used as a split load phase inverter and two 6V6 tubes in the push-pull output stage. Feedback from a tertiary winding on the output transformer is fed to the cathode of the first stage. For high gain applications, the "HI"

position of the above mentioned switch decreases the feedback by 15 db.

Holes are provided on the chassis for installation of an accessory FA-35-G Bridging Volume Control and two tube metering switches if such are desired.

The BA-12-C Amplifier is equipped with a male, 10-pin "2400" series Jones plug for mating use in the G-E BC-11-A Console. It may also be mounted on an accessory FA-22-E Tray with mating receptacle for rack use. When so mounted, the tray and amplifier combination is usually mounted on an FA-23-A standard cabinet-rack mounting shelf (Accessory). Power can then be obtained from a rack-mounted BP-10-B Power Supply.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	5¾"
Width	3½"
Depth	10¾"

Weight: 6 lbs.

Mounting: Each BA-12-C Amplifier mounts on a Type FA-22-E Tray. Four of these Trays mount on one Type FA-23-A Shelf, occupying 7 inches (4 rack units) of cabinet space.

Operating Conditions:

Maximum ambient temperature:	113°F (45°C)
Maximum relative humidity:	95%

Safety Provisions: Voltage is applied to the unit only when it is plugged into a mating source and when so plugged, no voltage is exposed.

ELECTRICAL SPECIFICATIONS

Type of Circuit: Consists of a 5879 pentode input stage plus a triode connected 5879 used as a split load phase inverter and two Type 6V6 tubes as the push-pull output. Feedback is used from a tertiary winding on the output transformer to the cathode of the input stage. For high gain applications, a switch is provided to decrease the feedback by 15 db.

Performance:

Program Amplifier (*low gain position*):

Frequency Range:	50–15,000 cps. ±1 db.
Gain:	56 db.
Output Level and Distortion:	+30 dbm (1 watt) ½% or less distortion (maximum input −26 dbm).
	+39 dbm (8 watts) 1% or less distortion (maximum input −17 dbm).
Output Noise:	Less than −60 dbm.

Monitoring Amplifier (*high gain position*):

Frequency Range:	50–15,000 cps. ±1½ db.
Gain:	71 db.
Output Level and Distortion:	+39 dbm (8 watts) 3% or less distortion (maximum input −32 dbm).

For high level loudspeaker applications, the BA-12-C can be modified to give 15 watts output by using Type 6L6 or 5881 tubes, and increasing the B+ supply voltage.

Plug-In Program/Monitoring Amplifiers, Type BA-12-C and Trays, Type FA-22-E; plus Plug-In Pre-Amplifiers, Type BA-1-F mounted in Broadcast Shelf, Type FA-23-A.

Signal Inputs:

Input Impedance:	Unloaded transformer.
Source Impedance:	600/150 ohms; 600 ohms as shipped.

Power Inputs:

Filaments:	1.2 amps at 6.3 volts AC.
Bias:	Biased at +20 to +50 volts DC.
B+ Requirement:	88 ma at 300 volts DC (at 8 watts output).

Outputs: Output impedance, 600/150 ohms; 600 ohms as shipped.

Tube Complement:

2 Type 5879 (input and phase inverter)
2 Type 6V6 (push-pull output)
(Type 6L6 or Type 5881 tubes may be used to obtain higher power output when desired)

ORDERING INFORMATION

When ordering, please specify:

Type BA-12-C Plug-In Program/Monitoring Amplifier (requires an external power supply).

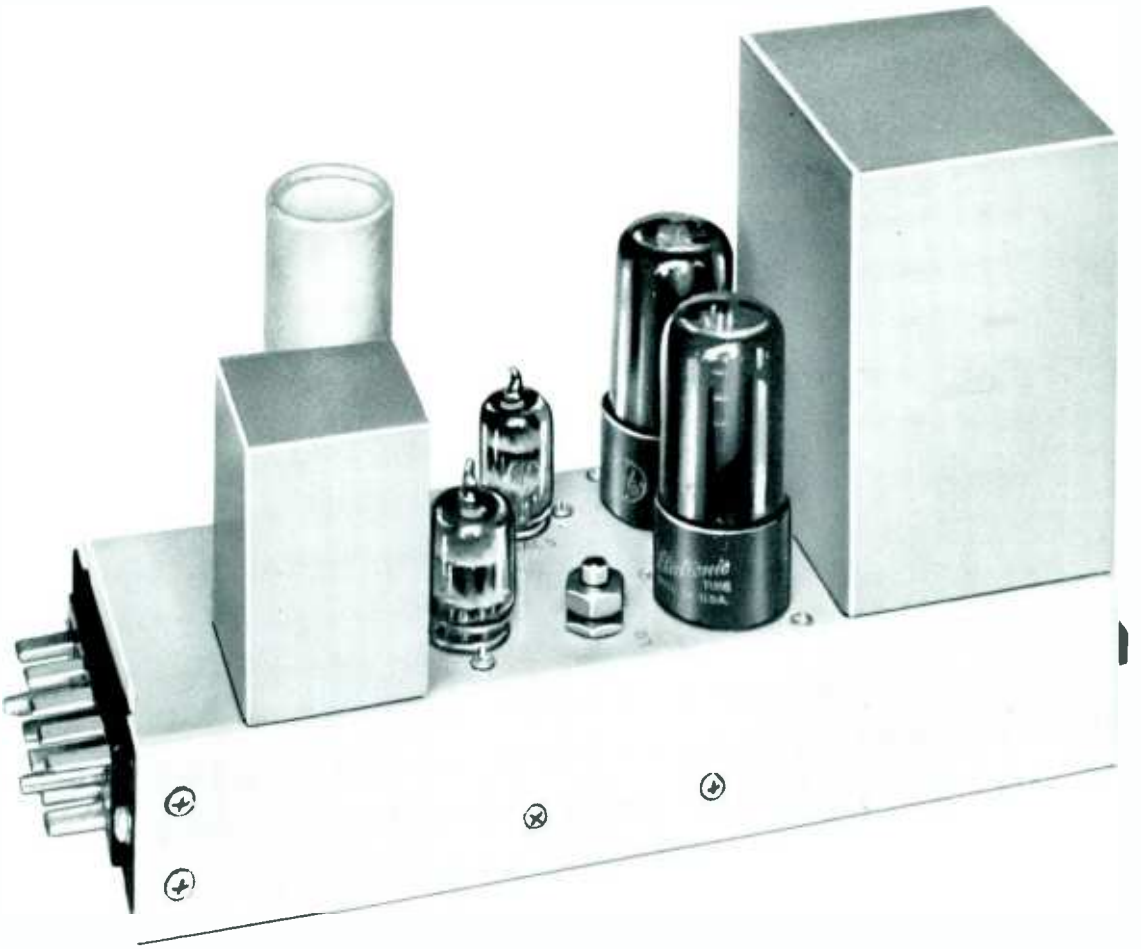
ACCESSORIES

Type FA-22-E Tray, for mounting BA-12-C.

Type BP-10-B Plug-In Power Supply, for BA-1-F's and/or BA-12-C's. (Type BP-10-B uses 200 watts at 110 volts AC and will supply power for 25 Type BA-1-F Pre-Amplifiers or 3 Type BA-12-C Program/Monitoring Amplifiers.)

Type FA-23-A Shelf, for mounting Plug-in units with trays. (Type FA-23-A occupies 7 inches (4 units of rack height) in a Type PR-1-A Cabinet Rack and will accommodate 6 Pre-Amps, Type BA-1-F, with trays, 4 Type BA-12-C Program/Monitoring Amplifiers, with trays or 2 Type BP-10-B Power Supplies, with trays.)

Type FA-35-G, Bridging Volume Control. (Bridging Volume Control for use with BA-1-F and BA-12-C Amplifiers. It is designed to convert a 600-ohm amplifier input to a 10,000-ohm balanced-bridging service and may be used in line levels up to +40 dbm.)



Plug-In Uni-Level Amplifier, Type BA-9-A.

APPLICATION

The General Electric Type BA-9-A Plug-In Uni-Level Amplifier is an automatic level control unit designed to automatically control variations in audio program level. This compact, plug-in unit replaces or may be used in addition to the BA-12-C Plug-In Program/Monitoring Amplifier when the latter is used as a program amplifier.

The BA-9-A Uni-Level Amplifier may be used as an average level control device or as a peak level control amplifier.

Maximums of up to 30 db in program variations may be successfully controlled by this amplifier. Such variations are sometimes encountered when switching between the outputs of turntable pre-amps, projectors, or other sources. This amplifier may be used in any audio system where −34 dbm is available to its input.

FEATURES

1 **Extremely versatile.**

a. **Permits unattended remote audio operation.** This amplifier used on an incoming remote line automatically controls level variations from an unattended remote amplifier. (See Fig. 3—Typical Applications.)

b. **Controls level differences between two or more program sources.** Level differences automatically controlled between:
   (a) Turntables and/or projector outputs.
   (b) Network incoming signal (when properly padded) and projectors, turntables, or announce mike pre-amps.

c. **May be used as a program line compressor.**

d. **May be used as an automatic master gain control for program line.** (See Fig. 1—Typical Applications.)

e. **May be used as a microwave input audio control.** (See Fig. 4—Typical Applications.)

f. **May be used as an Expander-Compressor Amplifier.** With average program material set for 15 db of gain reduction, output will be compressed for incoming signals exceeding 15 db and expanded for signals below 15 db.

g. **May be used as an automatic fader control.** (See Fig. 2—Typical Applications.)

h. **May be used as a straight program amplifier,**

with or without level control. Removal of one tube disables automatic level control and permits use as a normal program amplifier.

2 **Physically and functionally interchangeable with Type BA-12-C Plug-In Program/Monitor Amplifier** when used for program purposes. Can be used in BC-11-A Audio Console in place of the program amplifier to provide automatic master gain control for this console.

3 **Small, compact, plug-in construction.**
   a Compact design permits four units to be mounted in 7 inches of rack space.
   b Plug-in construction speeds maintenance.

4 **Used as a peak level control,** amplifier will operate over a 30 db range with only a 10 db change in output.

5 **Used as an average level control device,** amplifier will operate over a 30 db range of input level with only a 10 db change in output level.

6 **Variable threshold level.** Amplifier will operate with the threshold level set at any output between +10 dbm and +30 dbm.

7 **Average Program/Dual Recovery Switch** permits use of amplifier as an average level control or as a peak level control.

8 **Dual time constant eliminates program "pumping."** Recovery time is an automatic function of program material.

DESCRIPTION

The BA-9-A Plug-In Uni-Level Amplifier is an automatic level control device designed to replace the Type BA-12-C Plug-In Program/Monitor Amplifier when used as a program amplifier, and when features of automatic level control are desired.

The Type BA-9-A Amplifier, when operated at an output level of +20 dbm, supplies gain control characteristics over a range of 30 db with a rise in output level of only 10 db. This is a 3:1 compression ratio. At +30 dbm output, the *BA-9-A* has a compression ratio over a 30 db range of 5:1.

The threshold control may be set for a range varying from 0 dbm at a compression ratio of 1.6:1, to +30 dbm at a compression ratio of 5:1. Recommended threshold level is +20 dbm with a resultant compression ratio of 3:1.

A switch is incorporated on the front of the amplifier which permits changes in attack and recovery time.

In the "down" position of the switch, the amplifier has a dual recovery time —wherein the recovery time is an automatic function of the nature of the program material. For short, single peaks, approximately 0.9 seconds is required for 63% recovery of gain after the signal has dropped below the gain reducing level. For sustained or rapidly reoccurring peaks, approximately 0.9 seconds is required for 40% of gain recovery, increasing automatically up to about 34 seconds for 90% of gain recovery. The typical attack time is approximately 11 milliseconds.

In the "up" position of the switch, the amplifier is an average level control device which will work on average levels of program material changes. In essence, single short peaks will not cause gain reduction, but sustained increases in over-all program level or rapidly reoccurring short peaks will cause automatic gain reduction depending upon the over-all amplitude of the incoming signals. The typical attack time is approximately 62 milliseconds. The average recovery time is 13 seconds for 90% recovery.

These effects are accomplished by the use of a bias generator which in turn is composed of a full wave rectifier circuit charging simple RC networks. The output of the bias generator supplies a variable DC bias to the control grids of a G-E Type GL-6386 tube (a dual remote cutoff triode).

Gain reduction may be read on any standard VU meter. A third scale, in the form of a decal supplied with the amplifier, may be applied to the VU meter's face. By the use of a suitable switch connected between the VU meter multiplier and meter movement, gain reduction will be indicated over a 30 db range.

MECHANICAL SPECIFICATIONS

Units: One BA-9-A Plug-In Uni-Level Amplifier.

Dimensions: Height: 5¾ inches
Width: 3½ inches
Depth: 10¾ inches

Weight: 6 lbs.

Mounting: Four amplifiers may be mounted in one FA-23-B Shelf which in turn mounts flush in the front of a standard EIA Cabinet Rack. Mounting height of the FA-23-B Shelf (accessory) is 7 in. (4 rack units).

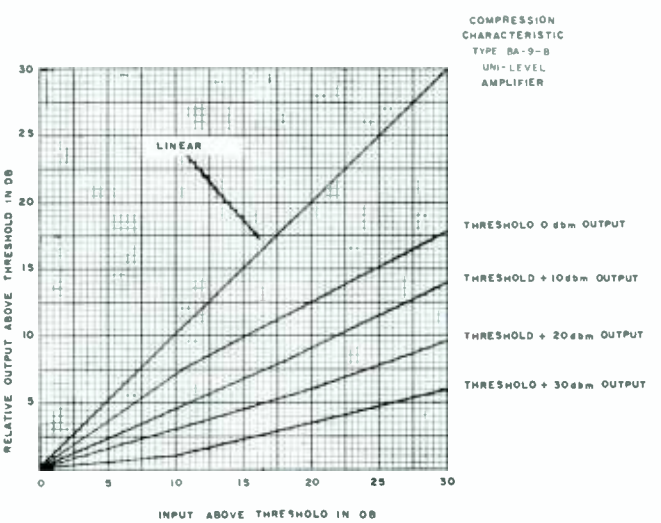
Operating Conditions: Maximum ambient temperature: 113°F (45°C).
Maximum relative humidity: 95%.

Electrical Connections:

Power and Signal: Through Cinch-Jones 2400 series plug, plugging into female mate on FA-23-B Shelf. Connections on plugs are solder terminal.

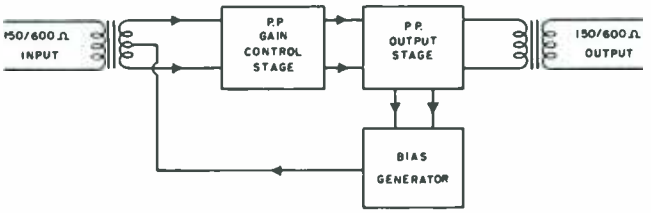
Threshold bias voltage: Tip jacks.

Safety Provisions: No voltage applied to unit until plugged into mating source. No exposed voltages.



ELECTRICAL SPECIFICATIONS

CircuitOperation: Consists of a G-E Type GL-6386 push-pull triode variable gain input stage supplying signal to a push-pull output stage utilizing two Type 6V6 GT power tubes. The signal for the bias generator rectifier is supplied from the plates of the output stage. The bias generator uses a full wave rectifier Type 6AL5 whose output supplies a bias voltage to the control grids of the GL-6386 tube. A switch selects time constants so that either an average control of program material or a peak compression of program material is obtained.



Simplified Block Diagram, Plug-In Uni-Level Amplifier, Type BA-9-A.

Performance:

Frequency response: + or −1 db, 50–15,000 cycles under any condition of gain reduction up to 30 db.

Gain: 54 db.

Harmonic distortion: (Threshold control set for +20 dbm output.) At any level up to 30 db of gain reduction, the total harmonic distortion between 100 and 15,000 cycles is 1½% or less; from 50 to 100 cycles the distortion rating is 2% or less.

Output noise: −Less than-55 dbm.

Attack time:

Dual	Average
11 milliseconds	62 milliseconds

Recovery time: (Dual)
Single short peaks: 0.9 seconds for 63% recovery.
Sustained peaks: 0.9 seconds for 40% recovery.
34 seconds for 90% recovery.
(Average)
13 seconds for 90% recovery.

Inputs: Power
Plate—300 volts DC @ 77 milliamperes.
Heater—6.3 volts AC @ 1.55 amperes.
Signals
Threshold control @ 0 dbm output:
−54 dbm to −24 dbm input.
Threshold control @ 20 dbm output:
−34 dbm to −4 dbm input.
Threshold control @ 30 dbm output:
−24 dbm to +6 dbm input.
Input impedance: Unloaded transformer.
Source impedance: 150/600 ohms, shipped wired for 600 ohms. Balanced input.

Outputs: Signal—150/600 ohms impedance, shipped wired for 600 ohms. Balanced output.
Threshold control @ 0 dbm:
0 dbm to +18 dbm output.
Threshold control @ 20 dbm:
+20 dbm to +30 dbm output.
Threshold control @ 30 dbm:
+30 dbm to +36 dbm output.
(All signals below and up to threshold level, linearly amplified.)

Test: Two tip jacks for threshold bias setting.

External VU Meter (as Compressor meter):
Pins 8 and 9 on Cinch-Jones 2400 series plug.

External Power Supply: BP-10-B (Accessory).

Controls: Threshold setting control.
Average Program/Dual Recovery Switch.

Tube Complement: 1—GL-6386
1—6AL5
2—6V6GT

Tip Jacks and Switch, Plug-In Uni-Level Amplifier, Type BA-9-A.

ORDERING INFORMATION

When ordering please specify:

. . . . . BA-9-A Plug-In Uni-Level Amplifier. (The type number includes the amplifier; one set of operating tubes; one gain reduction scale (decal) for applying to a standard 4-in. VU meter; and installation and operating instructions.)

ACCESSORIES

1—FA-23-B Shelf—for rack mounting four Type BA-9-A Amplifiers.
1—BP-10-B Power Supply.
1—FA-22-F Tray (for mounting BP-10-B).
1—FA-46-A2 Shelf for mounting four Type BA-9-A Amplifiers in base cabinet.
1—FA-22-E Tray (for mounting single *BA-9-A*).
1—7774619P1 VU Meter (for steel panels).
1—7774619P2 VU Meter (for aluminum or non-magnetic panels).

Typical Applications, BA-9-A Uni-Level Amplifier

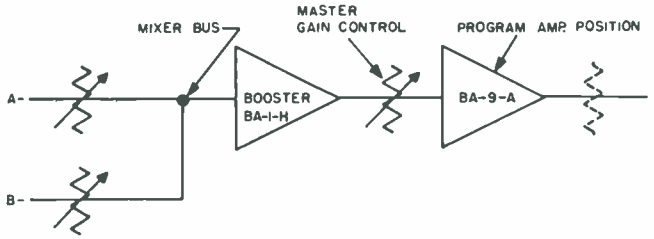


Fig. 1. The BA-9-A Uni-Level Amplifier as an Automatic Level Control Amplifier

The application of automatic level control to a studio system is outlined in Figure 1.

The Uni-Level Amplifier can be used to control level differences between two or more program sources, as a program line compressor, automatic master gain control, expander-compressor operation, or as a straight program amplifier.

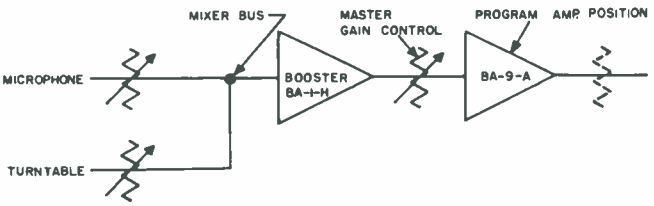


Fig. 2. Using the BA-9-A Uni-Level Amplifier as an Automatic Fader Control

The use of the "Uni-Level" Amplifier as an automatic fader control is outlined in Figure 2. In this application, the turntable signal level should be set so that it results in a GR scale reading of about 2 to 3 db of gain reduction. The microphone level at the mixer bus is set about 20 db higher than the turntable signal at the same point.

The microphone and turntable inputs can now be used together with no manual fading required. Whenever it is desired to use the microphone channel to make an announcement, it is only necessary to talk into the microphone. The turntable will fade into the background and will be separated from the microphone announcement by 20 db.

The resultant increase in output signal level will be less than 7 db, which can be easily handled by the transmitter limiting amplifier. Depending upon which position the AVER/DUAL switch is in will determine the speed with which the turntable level will return to normal.

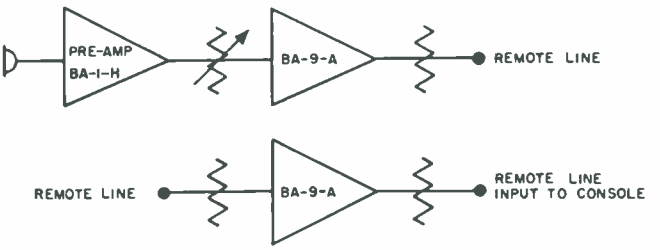


Fig. 3. Unattended Remote Operation

When it is desirable to operate the Uni-Level Amplifier on unattended remote operations, either of the above single-line diagrams can be used. A typical setup would be to set levels so that what is considered a normal signal level causes about 15 db gain reduction. For a signal increase of ±15 db line variations will be only 5 db.

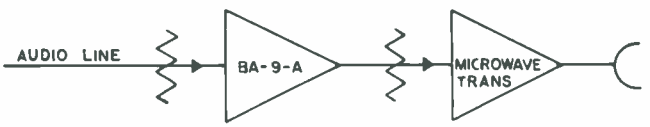
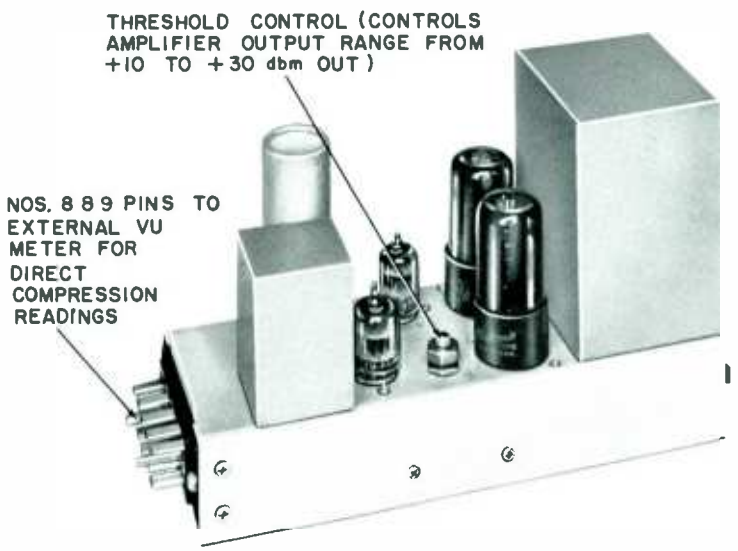


Fig. 4. Microwave Relay Application of the Uni-Level

The Uni-Level Amplifier can be used to prevent excessive audio variations in an audio line feeding the audio input of a microwave system. Such an application is shown in Figure 4.



Plug-Pins and Control, Plug-In Uni-Level Amplifier, Type BA-9-A.

Uni-Level Amplifier, Type BA-9-B

BA-9-B Uni-Level Amplifier

APPLICATION:

The General Electric Type BA-9-B Uni-Level Amplifier is a rack mounted, AC powered version of the familiar and popular BA-9-A Plug-in Uni-Level Amplifier. It is intended for automatic level control applications in radio and TV stations, sound recording studios, and industrial and public address systems.

In radio and TV stations it may be used to control level differences between two or more medium level program sources, as a program line compressor, as an automatic master gain control for program or remote line, for expander-compressor operation (including automatic fading of music for voice-over-music announcements) or as a straight program amplifier.

In sound recording studios it may be used to control level differences between various voice or music signals, or as a compressor to be used prior to the recording amplifier.

In industrial or public address systems, the Uni-Level Amplifier may be used to eliminate "blasting" due to varying intensities of sound sources with consequent overloading of line or power amplifiers, as a compressor-expander to control and amplify weak or compress excessively strong input signals, or as a micro-wave audio input control.

Due to the unique design of the BA-9-B, this amplifier may be used as either an average level control device or as a peak level control amplifier.

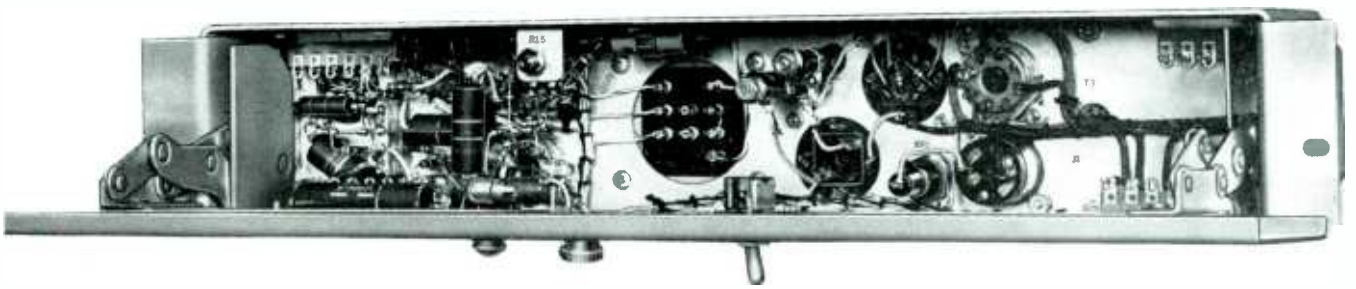
Maximums of up to 30 db in program variations may be successfully controlled by this amplifier. It may be used in any audio system where −34 dbm is available to its input.

(See Typical Application section for detailed suggested use.)

FEATURES:

1. **AC Powered.** Requires only 110-125 volt AC power for operation.
2. **Conserves Rack Space.** Will mount in any standard rack, utilizing only 3½ in. (2 RU) of vertical height.
3. **Extremely versatile.**
   a. **Permits unattended remote audio operation.** This amplifier used on an incoming remote line automatically controls level variations from an unattended remote amplifier. (See Fig. 3—Typical Applications.)
   b. **Controls level differences between two or more program sources.** Level differences automatically controlled between:
      Turntables and/or projector outputs.
      Network incoming signal (when properly padded) and projectors, turntables, or announce mike pre-amps.
   c. **May be used as a program line compressor.**
   d. **May be used as an automatic master gain control for program line.** (See Fig. 1—Typical Applications.)
   e. **May be used as a microwave input audio control.** (See Fig. 4—Typical Applications.)
   f. **May be used as an Expander-Compressor Amplifier.** With average program material set for 15 db of gain reduction, output will be compressed for incoming signals exceeding 15 db and expanded for signals below 15 db.
   g. **May be used as an automatic fader control.** (See Fig. 2—Typical Applications.)
   h. **May be used as a straight program amplifier,** with or without level control. Removal of one tube disables automatic level control and permits use as a normal program amplifier.

4 **Functionally interchangeable with G-E BA-12-C Plug-In Program/Monitor Amplifier** when used for program purposes.
5. **Used as a peak level control,** amplifier will operate over a 30 db range with only a 10 db change in output.
6. **Used as an average level control device,** amplifier will operate over a 30 db range of input level with only a 10 db change in output level.
7. **Variable threshold level.** Amplifier will operate with the threshold level set at any output between +10 dbm and +30 dbm.
8. **Average Program/Dual Recovery connection** permits use of amplifier as an average level control or as a peak level control.
9. **Dual time constant eliminates program "pumping."** Recovery time is an automatic function of program material.
10. **Easily Serviced.** All components exposed for easy service when hinged front panel is opened.



BA-9-B Uni-Level Amplifier (Front View, Panel Open)

DESCRIPTION:

Essentially, the BA-9-B Uni-Level Amplifier is the AC powered, rack-mounted version of its plug-in counterpart, the BA-9-A Uni-Level Amplifier. Other than its mounting and power supply, it is identical in performance and specification with the BA-9-A Uni-Level Amplifier.

The BA-9-B Uni-Level Amplifier is an automatic level control device designed to functionally replace or supplement the BA-12-C Program/Monitor Amplifier, when used as a program amplifier, or when features of automatic level control are desired.

The Type BA-9-B Amplifier, when operated at an output level of +20 dbm, supplies gain control characteristics over a range of 30 db with a rise in output level of only 10 db. This is a 3:1 compression ratio. At +30 dbm output, the BA-9-B has a compression ratio over a 30 db range of 5:1.

The threshold control may be set for a range varying from 0 dbm at a compression ratio of 1.6:1, to +30 dbm at a compression ratio of 5:1. Recommended threshold level is +20 dbm with a resultant compression ratio of 3:1.

A connection may be made in the amplifier which permits changes in attack and recovery time.

The unit as shipped is connected for dual recovery time—wherein the recovery time is an automatic function of the nature of the program material. For short, single peaks, approximately 0.9 second is required for 63 per cent recovery of gain after the signal has dropped below the gain reducing level. For sustained or rapidly recurring peaks, approximately 0.9 second is required for 40 per cent of gain recovery, increasing automatically up to about 34 seconds for 90 per cent of gain recovery. The typical attack time is approximately 11 milliseconds.

By strapping an adjacent terminal connection, the amplifier may be changed to an average level control device which will work on average levels of program material changes. In essence, single short peaks will not cause gain reduction, but sustained increases in over-all program level or rapidly recurring short peaks will cause automatic gain reduction depending upon the over-all amplitude of the incoming signals. The typical attack time is approximately 62 milliseconds. The average recovery time is 13 seconds for 90 per cent recovery.

These effects are accomplished by the use of a bias generator which in turn is composed of a full wave rectifier circuit charging simple RC networks. The output of the bias generator supplies a variable DC bias to the control grids of a G-E Type GL-6386 tube (a dual remote cutoff triode).

Gain reduction may be read on any standard VU meter. A third scale, in the form of a decal supplied with the amplifier, may be applied to the VU meter's face. By the use of a suitable switch connected between the VU meter multiplier and meter movement, gain reduction will be indicated over a 30 db range.

Space is provided behind the hinged front panel for mounting an input and an output attenuator. These attenuators may be mounted on the hinged panel by the broadcaster to handle input or output levels of higher or lower values than those specified for Uni-Level operation.

A pilot light and an "OFF-ON" switch is located on the front panel for convenience. Total dimensions of the chassis (over-all) are height 3½ in., width 19 in., and depth 7½ in. Weight is approximately 12 lbs.

MECHANICAL SPECIFICATIONS:

Units:

One BA-9-B Uni-Level Amplifier.
One miniature motor base plug for AC power.

Dimensions: (Over-all).
Height: 3½ in. (2 R.U.)
Width: 19 in.
Depth: 7½ in.
Weight: 12 lbs.

Mounting:

Standard RETMA 19 in. Cabinet rack mounting.

Operating Conditions:

Maximum ambient temperature: 113° F (45° C).
Maximum relative humidity: 95 per cent.

Electrical Connections:

AC power: Recessed miniature motor base receptacle and plug.

Signal: Solder lug terminal strips.

Gain Reduction: Solder lug terminal strips.

Average Program/Dual Recovery: Strap on adjacent terminal.

Safety Provisions:

No exposed voltages when hinged front panel is closed. AC switch provided on panel for independent operation of unit. Pilot, light on front panel indicated amplifier operation. AC power-fused.

Output noise: Less than −50 dbm. (With 6V6GT)
−55 dbm. (With 5881)

Attack time:

Dual	Average
11 milliseconds	62 milliseconds

Recovery time: (Dual)

Single short peaks: 0.9 second for 63 per cent of recovery.

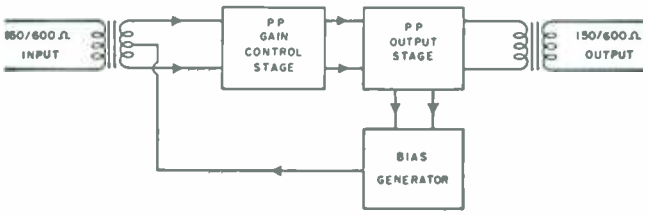
Sustained peaks: 0.9 second for 40 per cent recovery.
34 seconds for 90 per cent recovery.
(Average)
13 seconds for 90 per cent recovery.

BA-9-B Uni-Level Amplifier (Rear View)

ELECTRICAL SPECIFICATIONS:

Circuit Operation:

Consists of a G-E Type GL-6386 push-pull triode variable gain input stage supplying signal to a push-pull output stage utilizing two Type 6V6GT power tubes. The signal for the bias generator rectifier is supplied from the plates of the output stage. The bias generator uses a full wave rectifier Type 6AL5 whose output supplies a bias voltage to the control grids of the GL-6386 tube. A strap to an adjacent terminal will select the correct time constants to obtain the average control of program material. As shipped, the amplifier is connected for peak compression of program material.



Simplified Block Diagram, BA-9-B Uni-Level Amplifier

Performance:

Frequency response: + or −1 db, 50-15,000 cycles under any condition of gain reduction up to 30 db.

Gain: 54 db.

Harmonic distortion: (Threshold control set for +20 dbm output.) At any level up to 30 db of gain reduction, the total harmonic distortion between 100 and 15,000 cycles is 1½ per cent or less; from 50 to 100 cycles the distortion rating is 2 per cent or less.

Inputs:

Power: 117 volts AC 50/60 cycle, 65 watts. (Note: B+ voltage is adjustable to 300 volts DC for AC inputs varying between 110–125 volts.)

Signals:

Threshold control @ 0 dbm output: −54 dbm to −24 dbm input.

Threshold control @ 20 dbm output: −34 dbm to −4 dbm input.

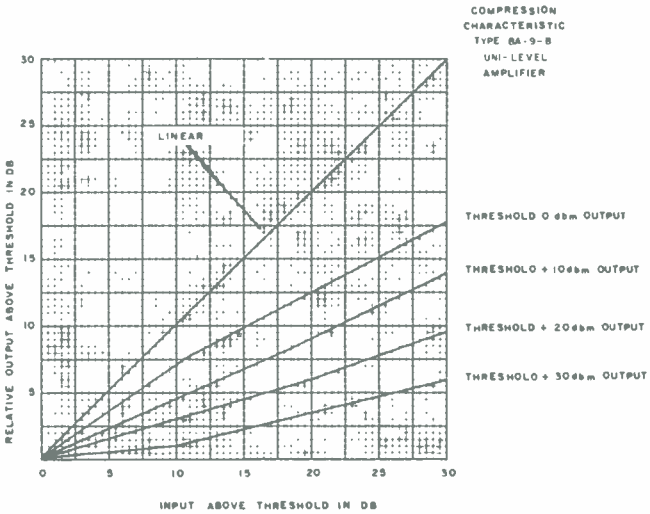
Threshold control @ 30 dbm output: −24 dbm to +6 dbm input.

Input impedance: Unloaded transformer.

Source impedance: 150/600 ohms, shipped wired for 600 ohms. Balanced input.

Outputs:

Signal: 150/600 ohms impedance, shipped wired for 600 ohms. Balanced output.



Threshold control @ 0 dbm: 0 dbm to +18 dbm output.
Threshold control @ 20 dbm: +20 dbm to +30 dbm output.
Threshold control @ 30 dbm: +30 dbm to +36 dbm output.
(All signals below and up to threshold level, linearly amplified.)
External VU Meter:
Solder lugs on terminal strip.
Controls: Threshold setting.

TUBE COMPLEMENT:

1—GL-6386
1—6AL5
2—6V6GT
1—5Y3GT

ORDERING INFORMATION:

When ordering, please specify:
.....General Electric Type BA-9-B Uni-Level Amplifier (for rack mounting). (The Type Number includes the amplifier, one set of operating tubes, one gain reduction scale (decal) for applying to standard 4-in. VU meter, one miniature motor base plug, and Installation and Operating Instructions.)

ACCESSORIES:

1—7774619P1 VU Meter (for steel panels).
1—7774619P2 VU Meter (for aluminum or non-magnetic panels).

Typical Applications, BA-9-B Uni-Level Amplifier

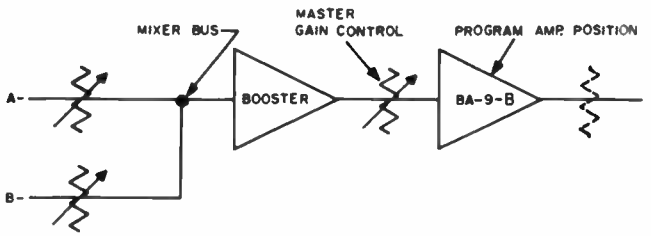


Fig. 1. The BA-9-B Uni-Level Amplifier as an Automatic Level Control Amplifier

The application of automatic level control to a studio system is outlined in Figure 1.

The Uni-Level Amplifier can be used to control level differences between two or more program sources, as a program line compressor, automatic master gain control, expander-compressor operation, or as a straight program amplifier.

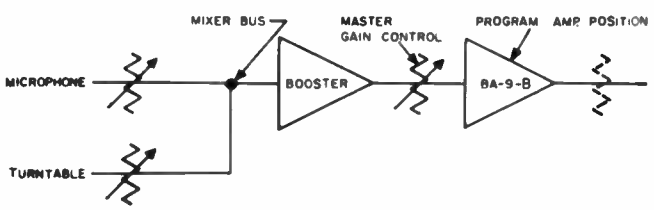


Fig. 2. Using the BA-9-B Uni-Level Amplifier as an Automatic Fader Control

The use of the "Uni-Level" Amplifier as an automatic fader control is outlined in Figure 2. In this application, the turntable signal level should be set so that it results in a GR scale reading of about 2 to 3 db of gain reduction. The microphone level at the mixer bus is set about 20 db higher than the turntable signal at the same point.

The microphone and turntable inputs can now be used together with no manual fading required. Whenever it is desired to use the microphone channel to make an announcement, it is only necessary to talk into the microphone. The turntable will fade into the background and will be separated from the microphone announcement by 20 db.

The resultant increase in output signal level will be less than 7 db, which can be easily handled by the transmitter limiting amplifier. The speed with which the turntable will return to normal is determined by the operation of the Uni-Level recovery circuits. It may be used either in the Dual or Average conditions for attack and recovery. The speed with which the turntable level will return to normal is determined by the average or peak condition of attack and recovery of the amplifier.

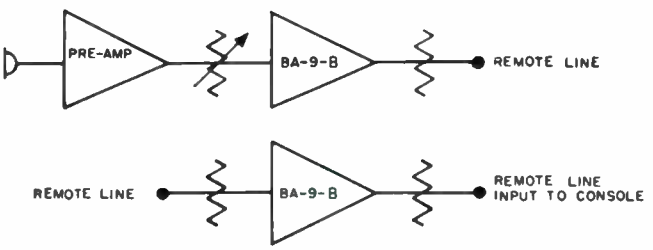


Fig. 3. Unattended Remote Operation

When it is desirable to operate the Uni-Level Amplifier on unattended remote operations, either of the above single-line diagrams can be used. A typical setup would be to set levels so that what is considered a normal signal level causes about 15 db gain reduction. For a signal increase of ±15 db line variations will be only 5 db.

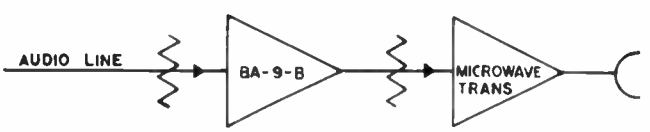
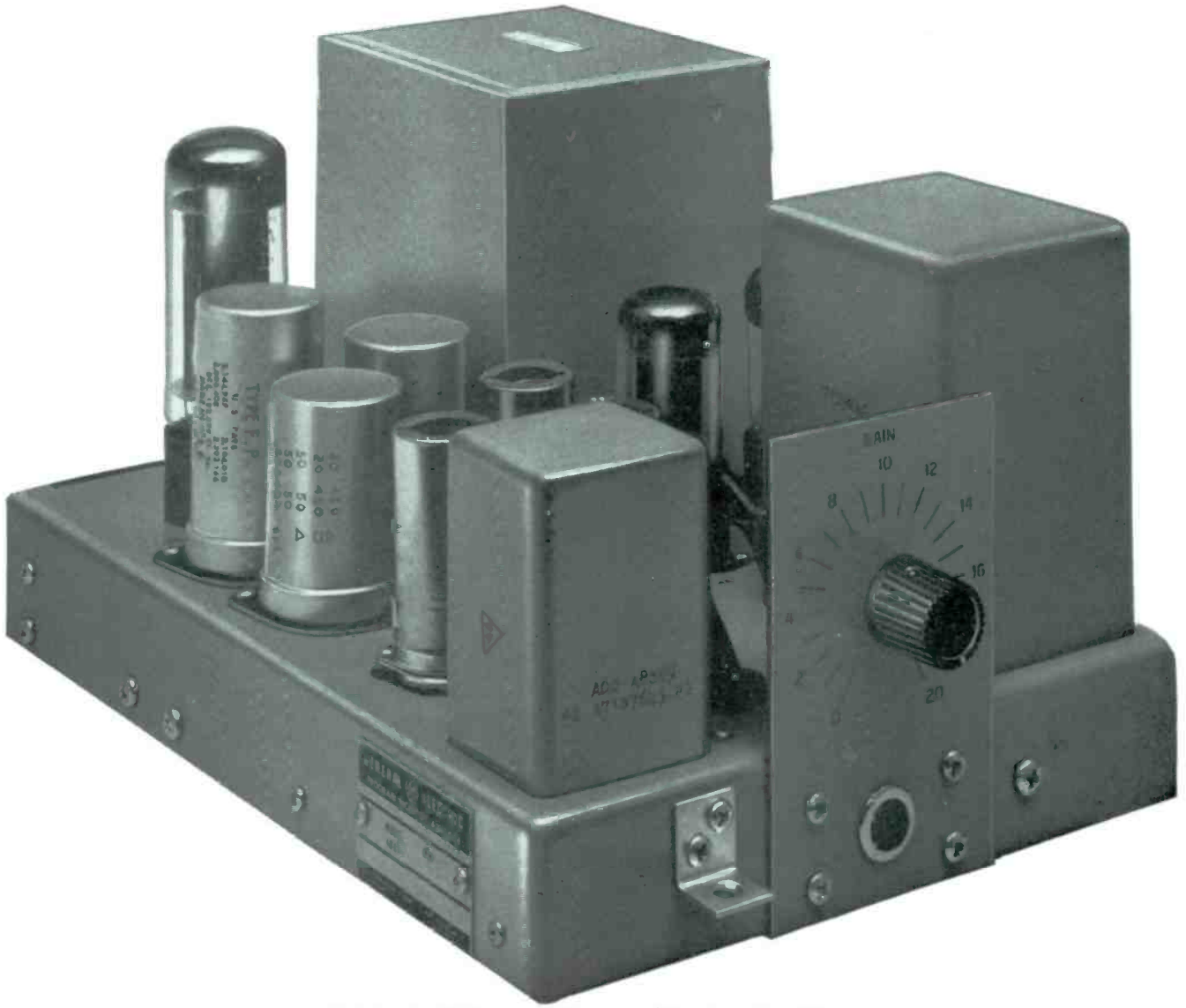


Fig. 4. Microwave Relay Application of the Uni-Level

The Uni-Level Amplifier can be used to prevent excessive audio variations in an audio line feeding the audio input of a microwave system. Such an application is shown in Figure 4.

AC Powered Program/Monitor Amplifier Type BA-14-A



BA-14-A AC Powered Program/Monitor Amplifier.

APPLICATION:

The General Electric Type BA-14-A Program/Monitoring Amplifier is a versatile, dual-purpose audio amplifier designed to serve as a program or line amplifier, or as a genaral purpose monitoring amplifier in Radio and Television Stations, in Recording Studios, and in Motion Picture Studios.

When connected as a program amplifier it may be used as a program or main amplifier, an isolation or bridging amplifier, a line amplifier, for medium power monitoring or as a cueing or audition amplifier.

When connected for monitoring service, it may be used as a monitor amplifier, bridging program or other lines to furnish power for studio speakers; a control-to-studio talkback amplifier, where the talkback microphone is fed into the BA-14-A without preamplification; a transcription cueing or audition amplifier (again without preamplification); or an emergency program amplifier in the program channel of speech input systems.

This unit contains its own built-in power supply and is intended for shelf mounting in an audio rack. Simple, easily made internal connections and interchangeable tubes permit this amplifier to be quickly converted from program to monitor service, or vice-versa.

FEATURES:

1—Extremely versatile.

a) May be connected for matching or bridging input.
b) Provides both line and voice-coil outputs.
c) Can be connected for either program or monitor service.
d) Has multi-impedance inputs and outputs.
e) Will operate direct from a microphone or a line.

2—High Gain Program or Monitor amplifier.

a) 60 db of program matching gain; 36 db of program bridging gain.

b) 105 db of monitor gain (unloaded input); 75 db of monitor bridging gain.

3—**Compact.** 6⅜" height and 7" width permit two amplifiers to be mounted side by side on one shelf in 7" of vertical rack space.

4—**Plug-in construction and small height permit easy removal for maintenance or service type change.** All external connections are made on two 10-pin Jones plugs and sockets. Input connections (including fixed bridging pad) are made on one "2400" series plug, while AC power and output connections are made on second "2400" series Jones plug. Mating sockets are mounted on accessory shelf.

5—**Contains built-in power supply.** Only 105 to 125 volts, 60 cycle, AC needed to power this amplifier.

6—**Uses readily available low cost, low noise tubes.** Amplifier uses three 5879s, either two 6V6s or two 5881s, and a 5U4GA. 6V6s are used in program service, 5881s may be used for increased power in monitor service.

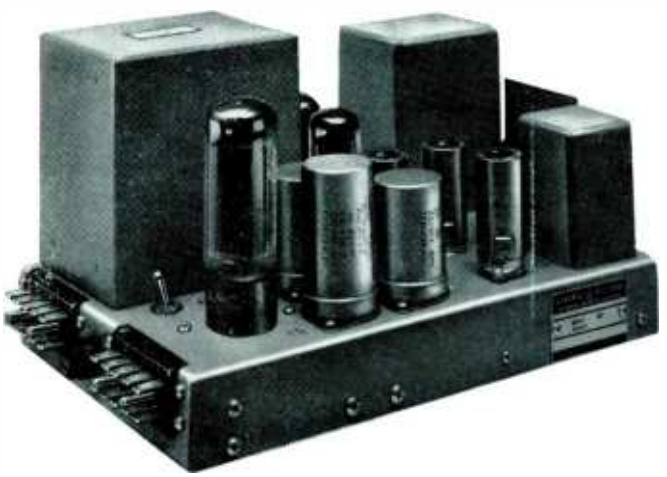
7—**Rated at 10-watt output in monitor use; 4-watt output in program use.**

8—**Magnetically and electrostatically shielded transformers** effectively prevent hum pickup in this and adjacent medium or high level equipment.

9—**Stability improved through use of negative feedback.** Tertiary winding of output transformer supplies negative feedback to cathode of second stage.

10—**Excellent frequency response with low distortion.**
Program amplifier: ±1 db 30-15,000 cps. +30 dbm output less than 0.5% harmonic distortion (50-15,000 cps).
Monitor amplifier: ±1 db 30-15,000 cps. +40 dbm output 1½% harmonic distortion.

11—**Continuous log taper volume control with db markings furnished** and mounted on amplifier. Precision step attenuator may be substituted by broadcaster, if desired. (See Electrical Specifications —Gain Control.)



Rear view of BA-14-A Amplifier, showing plug-in construction.

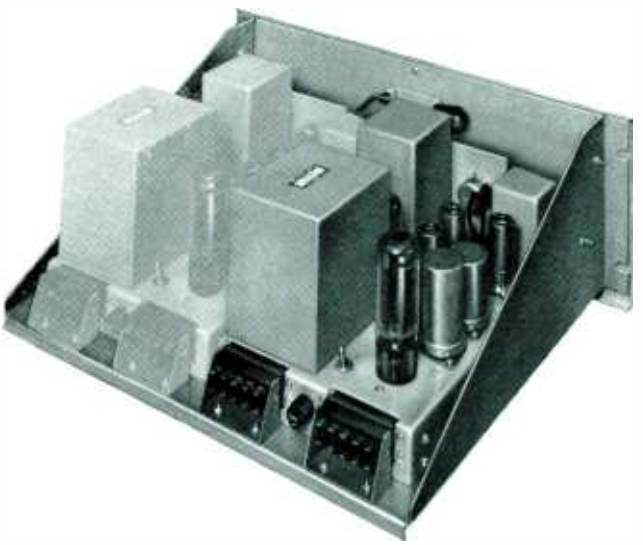
12—**Variable frequency response** made by internal adjustment, if desired.

DESCRIPTION:

The BA-14-A Program/Monitor Amplifier is a four-stage, AC powered unit designed to operate from either microphone or line level signals and to furnish power to drive either program lines or one or more speakers.

Either matching inputs of 600/250/150/30 ohms or a 10,000-ohm bridging input are available for matching or bridging any standard broadcast source impedance.

The output of the amplifier may be used to drive a 600/150 line and/or an 8/2 ohm voice-coil loudspeaker. Separate windings are used for the program and voice-coil sections of the output transformer, thus it is possible to use both speaker and line feed simultaneously (for low or medium level monitoring) if required. Negative feedback is supplied from a tertiary winding of the output transformer back to the cathode of the second stage.



BA-14-A Amplifiers mounted in FA-23-C Shelf.

The complete amplifier includes only four stages.* The first and second stages are conventionally connected 5879 pentode tubes. The third stage, also using a 5879 type tube, serves as a phase-splitter driving the push-pull output stage. When connected for program service, two 6V6 tubes are used in the output stage. However, when connected for monitoring service, additional power may be gained if 5881 type tubes are substituted for the two 6V6 tubes. A 5U4GA is used as a rectifier.

Changes from program to monitor service or vice-versa are easily made by changing five jumper straps located on easily accessible terminal boards under the chassis. These connections cut in or by-pass the first stage and change the voltages supplied to the tubes.

Impedance changes are made in the customary manner on the transformer terminals. As shipped, the amplifier

* In program service, the first stage is by-passed and the tube omitted from the socket.

is connected for program service with a 600-ohm input, an output of 600 ohms and 8 ohms, and minus the first-stage tube which is by-passed. For monitor purposes a tube kit (7145567), consisting of the first-stage 5879 and two 5881 output tubes, is available as an accessory item.

Frequency response and noise and distortion measurements for program and monitor services may be found under Electrical Specifications.

MECHANICAL SPECIFICATIONS:

Units: One BA-14-A Program/Monitor Amplifier, equipped with an Allen-Bradley potentiometer.

Dimensions: Height: 6⅜"
Depth: 13"
Width: 7½"
Weight: 20 lbs.

Mounting: Each amplifier mounts in an FA-23-C shelf (Accessory). Two amplifiers may be mounted in this shelf which, in turn, may be mounted in a PR-1-A or other standard RETMA Cabinet Rack. When so mounted, the rear of the amplifier plugs into two Jones "2400" series mating sockets on the FA-23-C shelf. These two plugs handle all input, output and power connections to this unit. The FA-23-C shelf includes four Jones sockets, spacer bar, and two knobs and shaft extensions.

Operating Conditions:

Maximum room ambient temperature—continuous operation . . . . . 113°F (45°C).
Maximum room ambient temperature—5% of annual operating hours . . . 122°F(50° C).
Maximum cabinet ambient temperature—continuous operation . . . . . 122°F (50°C).
Maximum cabinet ambient temperature—5% of annual operating hours, 140°F (60°C).
Maximum relative humidity . . . . . 95%.

Electrical Connections:

Power and Signal:

Two 10-pin, "2400" series Jones plugs (furnished on amplifier) mating to two 10-pin, "2400" series Jones sockets mounted on FA-23-C shelf (Accessory).

Safety Provisions:

No voltage applied until amplifier is plugged into mating source. Amplifier is equipped with ON-OFF switch and red jewel indicator light. Power transformer primary is fused. No exposed voltages.

ELECTRICAL SPECIFICATIONS:

Type of Circuit:

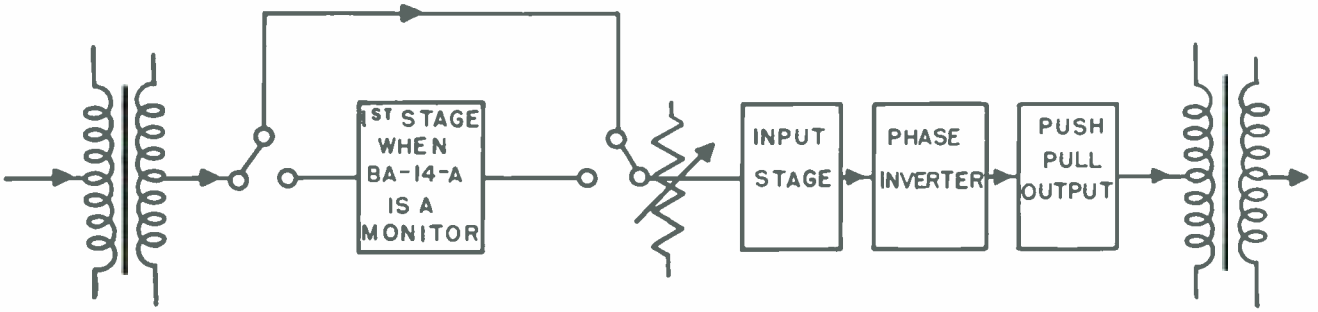
Program Service:

Amplifier consists of a four-stage amplifier with the first stage by-passed. The input transformer is connected to the grid volume control of the second stage; said stage using a type 5879 tube, pentode connected. The third stage, also a type 5879, serves as a phase-splitter which, in turn, drives the two 6V6 tubes in the push-pull output stage. 15 db of negative feedback is supplied from the tertiary winding of the output transformer back to the second-stage cathode. A 5U4GA is used as a rectifier.

Monitor Service:

In monitor service, the four stages of the amplifier are used to develop additional gain. Power output is increased by the change in plate voltage and substitution of higher power output tubes. The first two stages are conventionally connected pentode tubes of the 5879 type. The third stage, utilizing a 5879, serves as a phase-splitter which, in turn, drives two type 5881 tubes in the push-pull output stage. Type 6V6 tubes may be used in place of the type 5881 tubes with a slight reduction in power output. A type 5U4GA tube serves as the rectifier. 10 db of negative feedback from the output transformer tertiary winding is supplied to the cathode of the second stage.

Performance:	*Program Service*	*Monitor Service*
Frequency Response:	+30 dbm out, ±1 db 30 to 15,000 cycles per second.	+40 dbm out (10 watts), 1 db 30 to 15,000 cycles per second.



Block diagram of BA-14-A Program/Monitor Amplifier, shown connected as a program amplifier.

Performance: (cont'd)	*Program Service*	*Monitor Service*
Gain:	Matching: 60 db Bridging: 36 db (for 600-ohm terminated source).	Unloaded transformer input: 105 db. Bridging input: 75 db (supplied with fixed bridging resistor on Jones Plug). Input stage bypassed: +40 dbm out Unloaded input: 66 db Loaded input: 60 db Bridging input: 36 db
Output:	4 watts	10 watts
Harmonic Distortion:	+30 dbm out 50-15,000 cps less than 0.5%. 30 cycles—0.75%. +36 dbm out 30-15,000 cps less than 1%.	+36 dbm out 30-15,000 cps—1% +40 dbm out 30-15,000 cps—1½%.
Noise:	+30 dbm out, signal to noise ratio is 83 db. −53 dbm or less, unweighted. Noise remains constant regardless of position of gain control.	−18 dbm at maximum gain. Volume control set for 20 db loss, noise level will be −30 dbm. Low gain monitor −30 dbm.
Maximum input level:		
Matching input:	0 dbm.	−35 dbm as high gain monitor. 0 dbm as low gain monitor.
Bridging input:	+24 dbm.	−5 dbm as high gain monitor. +30 dbm as low gain monitor with fixed resistors. +40 dbm as low gain monitor with FA-35-G Bridging Volume control.
Input Impedances:		
Source impedances:		
Matching:	600/250/150/30 ohms, balanced or unbalanced.	600/250/150/30 ohms, balanced or unbalanced.
Bridging:	0 to 1000 ohms, terminated resistive circuits, balanced or unbalanced.	0 to 1000 ohms, terminated resistive circuits, balanced or unbalanced.
Input impedances:		
Matching:	600/250/150/30 ohms, balanced or unbalanced.	600/250/150/30 ohms or unloaded transformer, balanced or unbalanced.
Bridging:	10,000 ohms, balanced or unbalanced.	10,000 ohms, balanced or unbalanced.
Output Impedances:		
Line:	600/150 ohms.	600/150 ohms.
Speaker:	8/2 ohms.	8/2 ohms.
Gain Control:*	Log taper potentiometer continuously variable attenuation from 0 to infinity.	Log taper potentiometer continuously variable attenuation from 0 to infinity.

* *The broadcaster may substitute 500,000-ohm Daven attenuator CP-130-Y, 2 db/step–30 step, for the gain control furnished, if desired.*

Input Power: 105/115/125 volts, AC, 50/60 cycles, single phase, 85 watts.

Tube Complement: Amplifier is shipped connected for program service and is equipped with tubes for this type service. For monitor service, see Accessory listing for monitor service tube kit.

Program service: 2—5879
2—6V6
1—5U4GA

Monitor service: 3—5879
2—5881
1—5U4GA

ORDERING INFORMATION:

When ordering please specify:

———General Electric Type BA-14-A PROGRAM/MONITOR AMPLIFIER. (The type number includes the amplifier connected for program service, a set of operating tubes for program service, and an Installation and Instruction book.)

ACCESSORIES:

7145567 —Monitor tube kit (consisting of 1—5879 tube and 2—5881 tubes).

FA-23-C —Shelf with four mating Jones sockets, two knobs, and two extension shafts. Shelf will mount two BA-14-A amplifiers.

Audiomatic Limiting Amplifier, Type BA-7-A

Type BA-7-A Audiomatic Limiting Amplifier

APPLICATION

The General Electric BA-7-A Audiomatic Limiting Amplifier is a peak-limiting device designed to permit a substantial increase in the average program level without danger of any audio peaks exceeding a predetermined level.

The output of the BA-7-A Audiomatic Limiting Amplifier is sufficient to drive any RETMA AM, FM, or TV audio transmitter to 100% modulation. It is readily adaptable for use in recording systems in the tape, disc, and motion picture sound recording industries. As such, it may be used either before or after pre-emphasis.

FEATURES

1. **"Thumping" virtually eliminated.** New design uses a new method for eliminating the "thump" component common to limiter actions.
2. **Greater limiting range.** The new Audiomatic Limiter incorporates a limiting range of 20 db, an increase of 8 db in limiting range over the popular G-E BA-5-A Limiter.
3. **Higher output level.** The new Audiomatic Limiter has an output level of +27 dbm, an increase of 15 dbm in output level as compared to the G-E BA-5-A Limiter.
4. **New program controlled recovery circuit utilized.** This circuit permits large amounts of gain reduction with a negligible pumping effect.
5. **Two different types of recovery circuits offered.** The conventional dual RC type may be used, or the new program controlled recovery circuit may be used.
6. **Attack time effectively zero.** 70 microsecond attack time is obtained by means of a high speed bias generator.
7. **Extremely low transient waveform distortion.**
8. **Very high compression above threshold of gain reduction action.**
9. **"Motor-boating" can not occur** since automatic control voltage is not a function of the output voltage of the controlled amplifier.
10. **Very low steady state distortion and noise level** due to inverse feedback circuits.

11. **Instant accessibility.** Vertical rack mounting chassis utilizes single hinged front-cover panel.
12. **Compact.** Entire unit measures only 10½" high by 9" deep, by 19" wide.
13. **Single unit.** All amplifiers and power supply are mounted on the one small chassis.
14. **One VU meter supplies all required readings.** Single VU meter is used to read input level to control amplifiers, gain reduction, output level of limiter, and for balancing of modulator.
15. **No matched tubes required.** The BA-7-A Audiomatic Limiting Amplifier uses only 18 tubes--none of which require matching.
16. **Plug-in connections.** All external connections are made on plugs. It is not necessary to solder or unsolder connections when installing or removing amplifier.
17. **Thoroughly shielded.** All transformers, oscillator, and R.F. power amplifier sections, plus tubes in R.F. section, are thoroughly shielded to prevent radiation and interaction.
18. **Excellent frequency response with low distortion** up to practical limit of gain reduction. (See Electrical Specifications.)

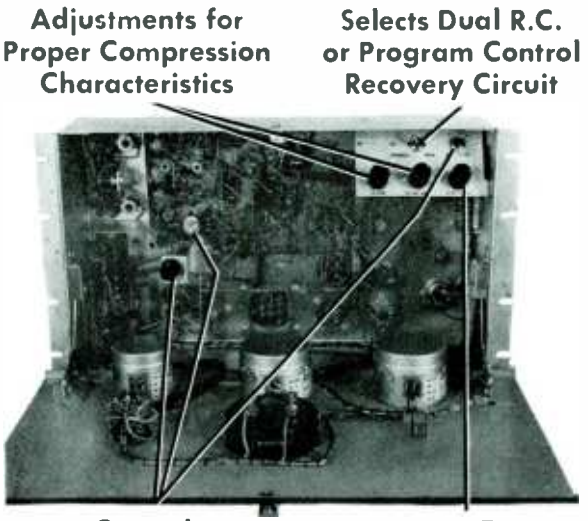
Front panel of BA-7-A Amplifier

DESCRIPTION

The General Electric Type BA-7-A Audiomatic Limiting Amplifier is designed as a fast-acting, thumpless, peak-limiting audio amplifier. As such it incorporates, among others, two new outstanding features, the first being a new and effective method of eliminating the "thump" component common to all limiter actions. The second outstanding feature is the incorporation of the new program controlled recovery circuit which permits the use of larger amounts of gain reduction with negligible pumping effect. These features are made possible by the use of a new method of limiting, namely the audio modulation of an RF carrier, the imposition of limiting action on this signal, and the demodulation of the RF to render a virtually thumpfree, peak-limited audio signal.

The use of this new design permits an 8 db increase in limiting range, a 15 db increase in output level, and a reduction in physical size as compared to the popular General Electric BA-5-A Limiting Amplifier. Attack time is effectively zero—being limited to approximately 70 microseconds by means of a high speed generator. A switch is provided which will allow the amplifier to operate either on the new program controlled recovery circuit where large amounts of gain reduction are expected, or on the conventional dual RC recovery circuit. Should conditions require it, this amplifier may be used in a backward acting mode of operation.

Mechanically, the Audiomatic Limiting Amplifier is complete with power supply on one chassis. As such it requires only 10½" of vertical rack space, and 9" of rack depth. This vertical rack-mounted unit is equipped with a hinged front panel allowing instant accessibility to the internal controls and components. Only 110 watts of 110-125 volts AC power are required for its operation.

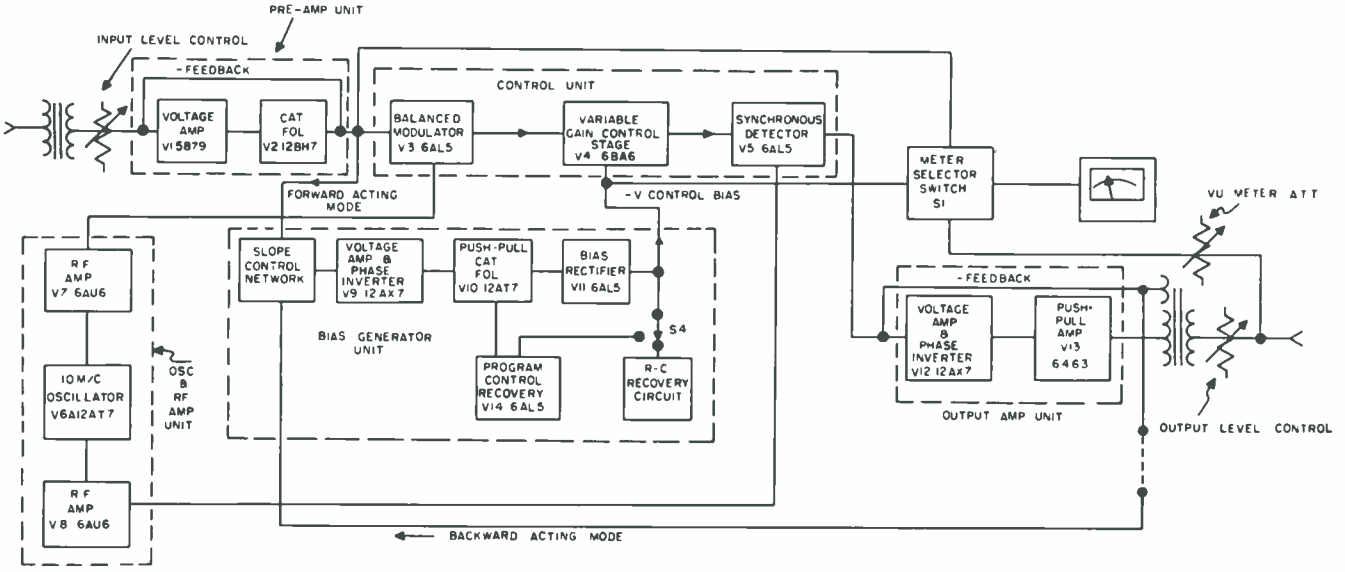


Front view of BA-7-A Amplifier with front panel open to show interior controls

All connections are made by means of a single 10-pin Cinch-Jones plug and a standard AC plug and receptacles, located on the rear of the amplifier chassis. A VU meter is used to measure signal levels and gain reduction.

Electrically, the Audiomatic Limiting Amplifier consists of an amplifier and power supply mounted on one chassis. The amplifier incorporates five sections: a preamplifier, an oscillator and RF section, a bias generator, a control section and an output stage.

The operation of the limiting amplifier on the audio signal is as follows: The incoming audio signal is fed into the loaded input of the preamp stage. From here the signal is split in two paths, the first going to the balanced modulator in the control section, and the second to the bias generator. The balanced modulator receives, in addition to the audio signal, a constant amplitude 10-megacycle carrier from the oscillator and RF amplifier section. This carrier is then amplitude modulated by the audio signal, the main carrier is suppressed, and the resulting output signal, consisting of modulated sidebands only, is fed to the variable gain RF stage in the control section. Simultaneously the audio fed to the bias generator section is first passed through a voltage correction network, through a slope control, then to a



Simplified block diagram of BA-7-A Amplifier

voltage amplifier, a phase splitter and then a push-pull cathode follower. The output of the cathode follower is split in two parts, the first being fed to the program control recovery circuit, the second being fed to a full wave rectifier diode. The variable DC voltage resulting from this latter diode's action is then applied to the grid of the variable gain RF stage in the control section. This variable DC voltage has the effect of controlling the amplitude of the audio modulated sidebands. Since there is no carrier present at the grid of this control stage, the low frequency or thump component, created by varying the control voltage, is not passed through the RF circuit and thus is not detected later. These controlled sidebands are then passed to a synchronous detector which also receives a 10-megacycle constant amplitude carrier from the oscillator and RF section. The carrier and controlled sidebands are recombined and the resultant audio is detected. The audio signal is then fed to a voltage amplifier, a phase splitter and then the push-pull output stage of the limiting amplifier. From a tertiary winding on the output transformer, voltage is fed back around the output unit. The secondary of the output transformer feeds the line through an output attenuator which is bridged by a VU multiplier attenuator. The VU meter is switched to read the output level, the amount of gain reduction, the input level to the balanced modulator, and can be used to check modulator balance.

Recovery of the amplifier is controlled by two different types of circuits, both located in the bias generator section. The first circuit is the conventional dual RC circuit. The second circuit is the new program controlled recovery circuit. This latter recovery control is obtained by placing a diode in the discharge path of a capacitor in the recovery circuit. The diode is biased to an equivalent voltage of 15 db of gain reduction. The amplitude of the audio trigger voltage from the cathode-follower (bias generator) output is adjusted to produce an artificial verge of 3 db. Thus, below 3 db of gain reduction the diode will not conduct, resulting in a very slow discharge rate and consequent slow recovery time of the amplifier. Between 3 db and 20 db of gain reduction the audio trigger voltage will cause the diode to conduct. This results in a voltage discharge of the capacitor which produces a normal amplifier recovery rate. However, during the absence of program material the diode will cease to conduct and recovery of the amplifier will be appreciably slowed down. Hence, the audio gain recovery is controlled by the variances in peak audio amplitudes, with the resulting advantage that large amounts of gain reduction may be used with negligible pumping effect. Where only small amounts of gain reduction from threshold to 6 db are required, the dual RC circuit should be used.

The recommended compression ratio for this amplifier operation is 20:1 when used in either the dual RC or program controlled recovery operational mode. If used as a backward acting amplifier, the recommended compression ratio is 2:1.

Balanced tubes are not required in this unit. Only a simple adjustment of the modulator balance controls is necessary to balance the modulator. A push-button balance check switch provides an easy, rapid and convenient means of checking the modulator balance.

Performance, distortion ratings, etc., may be found in the *Electrical Specifications* section.

MECHANICAL SPECIFICATIONS

Units: 1—BA-7-A Audiomatic Limiting Amplifier.

Dimensions: Height: 10½" (6 Rack Units)
Width: 19"
Depth: 9"
Weight: 42 lbs.

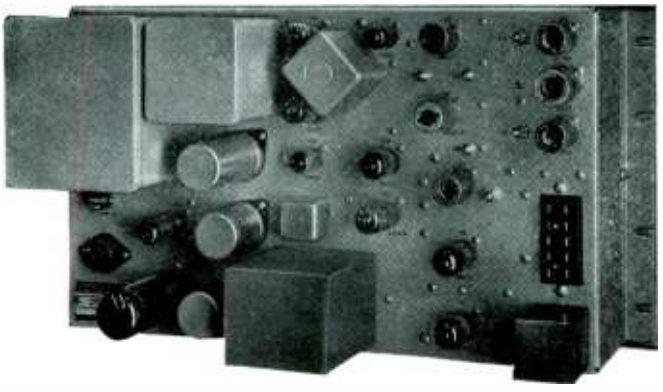
Mounting: Standard RETMA 19" rack mounting with hinged front panel.

Operating Conditions: Maximum ambient temperature: 113° F (45 °C).
Maximum relative humidity: 95%

Electrical Connections: Input and output audio signals made through a 10-pin Cinch-Jones plug and receptacle. AC power made through standard AC plug and receptacle.

Safety Provisions: Power supply primary fused. All exposed wiring normally covered by hinged front panel.

Ventilation: Normal rack ventilation. No blowers required.



Rear view of BA-7-A Amplifier

ELECTRICAL SPECIFICATIONS

Type of Circuit: (See block diagram of circuitry.) Audio signal is fed into preamplifier through an input transformer with terminated secondary into a 5879 voltage amplifier and 12BH7 cathode-follower output. The preamplifier incorporates inverse voltage feedback. The audio signal is then split into two paths, one into the balanced modulator using a 6AL5, the other into the bias generator circuit. A 10 M C constant amplitude carrier is generated by an oscillator consisting of one-half of a 12AT7 and amplified by a 6AU6 power amplifier. This carrier signal is fed to the balanced modulator and is modulated by the audio signal. The output of the modulator consists of sidebands only with the carrier suppressed. The sidebands are then fed to a variable gain RF stage using a 6BA6. The audio signal which is fed to the bias generator is passed through a voltage correction network; it is then fed into a 12AX7 voltage amplifier and phase splitter, which drives a 12AT7 push-pull cathode-follower. Full wave rectification is then achieved by using a 6AL5 dual diode. This variable DC voltage is then applied to the grid of the variable gain RF stage (6BA6) to control the amplitude of the sidebands. The controlled sidebands are passed to a synchronous demodulator using a 6AL5. The demodulator receives a 10 M/C constant amplitude carrier from the same source as the balanced modulator for the detection process. The audio signal is then fed into a 12AX7 voltage amplifier and phase splitter which drives the push-pull 6463 amplifier output stage. Two different types of recovery circuits can be used, the conventional dual RC type or the new program recovery circuit.

Performance:

Output Level: Variation of ±0.5 db from verge to 20 db of limiting

Frequency Response: ±1 db from 50 to 15,000 cycles (from verge to 20 db of limiting)

Distortion: From verge to 12 db of gain reduction:
1% or less, 50 to 15,000 cycles
From 12 db to 20 db of gain reduction:
1.5% or less, 100 to 15,000 cycles
2.5% or less, 50 to 100 cycles

Attack Time: Approximately 70 microseconds

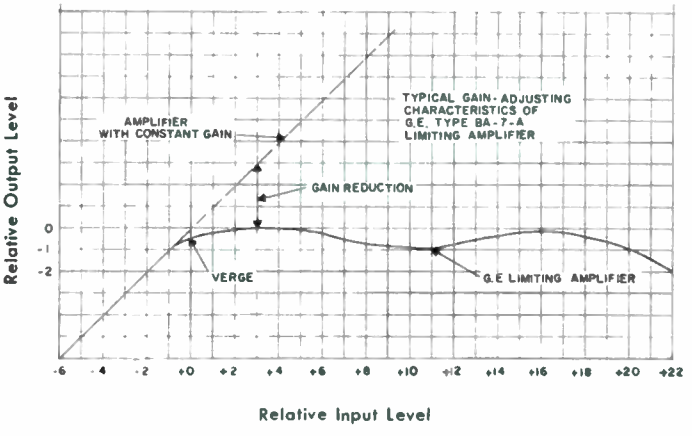
Compression Ratio: Forward acting: 20:1
Backward acting: 2:1

Recovery Time:
Dual RC:
Approximately 0.5 seconds for short peaks for 63% gain recovery. For sustained or rapidly recurring peaks, the recovery time is approximately the same for 50% recovery and increases to 10 seconds for 90% gain recovery.
Program controlled recovery:
Determined by type of program material

Signal to Noise ratio: 65 dbm below ±27 dbm output at threshold or below

Signal to Thump Ratio: −45 db or better

Total Gain (amplifier set at verge of limiting: 57 dbm, ±2 db.



Inputs:

Power: 110 watts, 110-117-125 volts AC, 50/60 cycles, single phase.

Audio: 600/150 ohms, balanced or unbalanced. Center tap or either side may be grounded as desired.

Minimum input level at verge: −30 dbm.
Maximum input level at verge: 0 dbm.
Input level adjustable by 30 step, 1 db per step control.

Outputs: 600 ohm unbalanced "T" (can be used to feed a balanced line). One side may be grounded if desired.

Output Level: +27 dbm. Output variable down to 12 dbm by use of "T" attenuator, 30 steps, 0.5 db per step.

Controls:

Front Panel:
- Input Level Control (potentiometer)
- VU Multiplier ("T" attenuator)
- VU Meter Switch (selects preamp output, gain reduction or amplifier)
- Output Level Control ("T" attenuator, 0.5 db per step, 30 steps)
- Power Switch

Internal Chassis:
- Slope Control (for adjusting gain reduction characteristics)
- Delay Bias Control (for adjusting gain reduction characteristics)
- Zero Meter Adjust Control (zero setting of meter for gain reduction use)
- Push-Button Balance Check Switch
- Recovery Selector Switch (switches between Dual RC and program controlled recovery)

TUBE COMPLEMENT

1—5879
1—12BH7
4—6AL5
1—6BA6
2—12AT7
2—6AU6
2—12AX7
1—6463
1—5U4GA
1—0B2

ORDERING INFORMATION

When Ordering Please Specify:

.. ..General Electric Type BA-7-A Audiomatic Limiting Amplifier. (The type number includes the amplifier, one set of operating tubes, one 10-pin Cinch-Jones plug, one AC plug, and Installation and Operating Instructions.)

Plug-In Pre-Amplifier, Type BA-1-H

Type BA-1-H Plug-In Pre-Amplifier, Type FA-22-D Tray

APPLICATION

Type BA-1-H Plug-In Pre-Amplifier is designed for use as a microphone pre-amplifier or as a booster amplifier between mixer bus and the program amplifier of a studio audio system. It can also be used as an isolation amplifier when provided with a suitable bridging resistance, such as Type FA-35-G Bridging Volume Control.

This pre-amplifier, when used in conjunction with Type BA-12-C Plug-in Program/Monitor Amplifier, makes it possible to assemble a complete studio audio system employing only two basic amplifier types.

FEATURES

1—Plug-in construction permits easy removal for servicing.
2—Small, compact design. Six of these amplifiers can be mounted in 7″ of rack space.
3—Simple two-stage circuit using printed-wire board makes parts easy to locate for maintenance.
4—Excellent plug-in contact efficiency. Unit uses Cinch-Jones "2400" series plugs.
5—Tubes are shielded by easily removed tube shields.
6—Transformers are of hum-bucking coil construction with magnetically shielded cases.

7—Chassis provides mounting hole to accommodate Type FA-35-G Bridging Volume Control.
8—Uniformity of performance assured by use of printed wireboard.

INTERCHANGEABILITY

Electrically and mechanically interchangeable with previous Type BA-1-F Plug-In Pre-Amplifier.

COMPLIANCE

Complies with all applicable FCC and RETMA specifications.

DESCRIPTION

Type BA-1-H Plug-in Pre-Amplifier consists of a single plug-in unit that utilizes a printed-wire board on which are assembled all the amplifier components. This assembly is mounted in a wrap-around frame incorporating a ten-pin Cinch-Jones "2400" series plug.

Electrically, the BA-1-H consists of two resistance coupled stages using Type 5879 tubes. A feedback loop is used around the two stages. Specially designed input and output transformers with hum-bucking coil construction and alloy shields are used.

An unloaded transformer input is employed to give maximum gain and optimum signal-to-noise ratio from high-quality broadcast microphones.

A Type FA-35-G Bridging Volume Control is available as an accessory. This control may be mounted in a hole which is available for this purpose on the BA-1-H. When so mounted, this control provides a 10,000 ohm input impedance for use as a bridging or continuously variable-input volume control.

MECHANICAL SPECIFICATIONS

Units: Type number covers single plug-in assembly.

Dimensions:	Height	Length	Width	Weight
BA-1-H	4⅝″	10¼″	2 7/16″	2½ lbs

Mounting: Plug-in mounting. A single pre-amplifier chassis can be mounted on a Type FA-22-D Tray (accessory) whereas six of these pre-amplifiers or three pre-amplifiers and one Type BP-10-B Plug-in Power Supply can be mounted on a Type FA-23-B Shelf (accessory) for rack mounting. Up to seven pre-amplifiers can be mounted in a Type BC-11-A Audio Console.

Operating Conditions:

Maximum cabinet ambient temperature: 130°F (55°C)
Maximum relative humidity: 95%

Electrical Connections: All connections are made via a 10 pin "2400" series Cinch-Jones plug, which is the standard plug used on all our plug-in units.

Safety Provisions: No B+ power is applied to the unit unless it is plugged into its mating connector. The exposed soldered eyelet points on the top side of the board are protected with an insulating coating of resin varnish.

ELECTRICAL SPECIFICATIONS

Performance:

Frequency Response:	±1 db 50-15,000 cps.
Gain:	40 db
Harmonic Distortion:	.5% or less at +18 dbm, 50-15,000 cps.
Noise	−80 dbm or less.

Power Requirements:

0.3 ma at 6.3 volts AC (Filament Power)
Filaments biased at +20 to +50 volts DC (supplied by BP-10-B Power Supply).

Signal Inputs:

Input Impedance:	Unloaded transformer.
Source Impedance:	30/150/250/600 ohms connections (150 ohms as shipped.)

Signal Outputs: Rated output, +18 dbm; output impedance, 600/150 ohms; 600 ohms as shipped.

TUBE COMPLEMENT

2 Type 5879

ORDERING INFORMATION

When ordering, please specify: Type BA-1-H Plug-In Pre-Amplifier (requires an external power supply).

ACCESSORIES

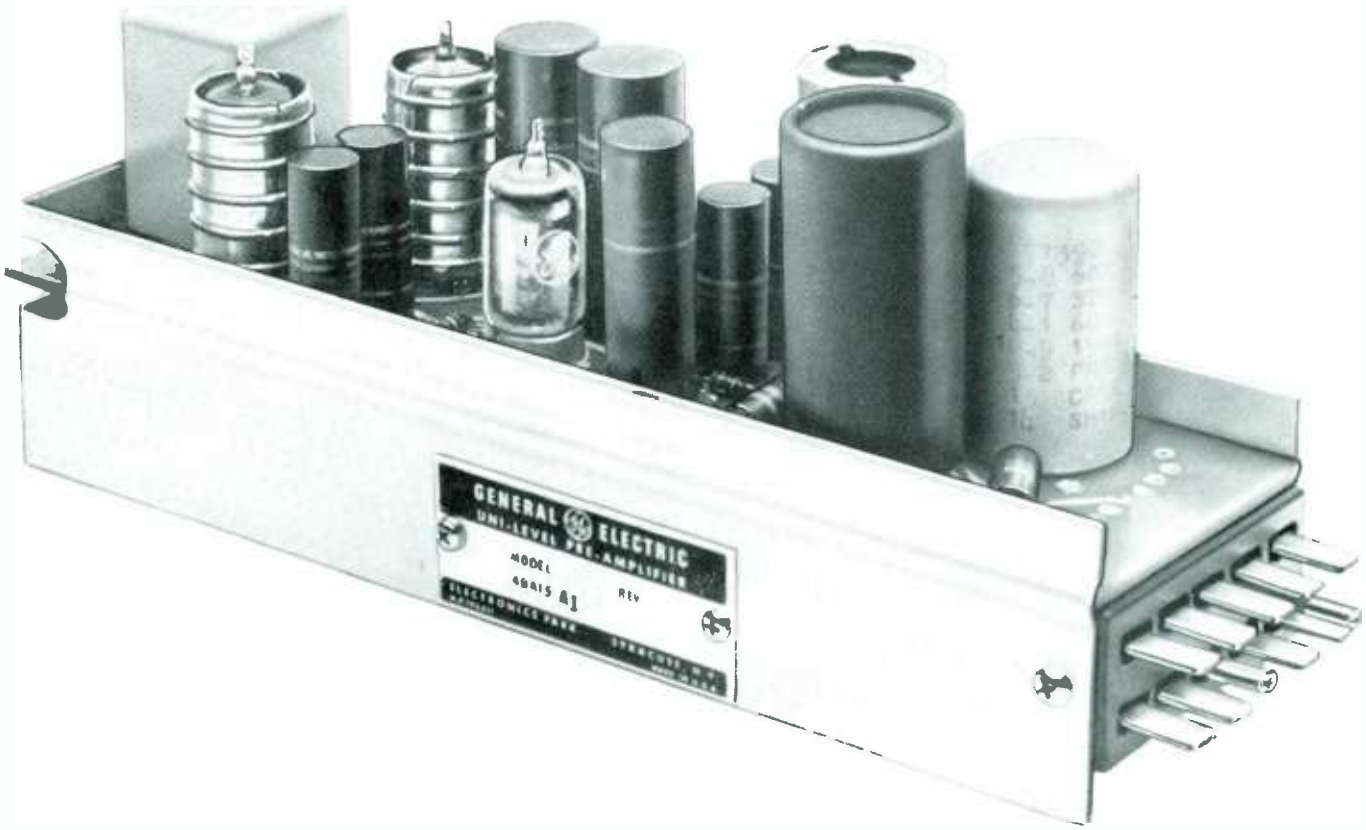
Type FA-22-D Tray, for mounting BA-1-H. (Required *only* for older FA-22-A Shelves or external mounting.)

Type BP-10-B Plug-in Power Supply, for BA-1-H's and/or BA-12-C's. (Type BP-10-B uses 200 watts at 110 volts AC and will supply power for 25 Type BA-1-H Pre-Amplifiers or 3 Type BA-12-C Program/Monitoring Amplifiers.)

Type FA-23-B Shelf, for mounting various plug-in amplifiers. The FA-23-B Shelf requires 7″ of vertical rack space, and will accommodate 6 BA-1-H Pre-Amplifiers, or 4 BA-12-C Program/Monitoring Amplifiers, or BA-9-A Uni-Level Amplifiers; or 2 BP-10-B power supplies or combinations of these plug-in units.

Type FA-35-G Bridging Volume Control, for use with BA-1-H and BA-12-C Amplifiers. It is designed to convert a 600 ohm amplifier input to a 10,000 ohm balanced-bridging service and may be used on line levels up to +40 dbm. When used with the BA-1-F it is connected ahead of the input transformer.

Plug-In Uni-Level Pre-Amplifier, Type BA-15-A



APPLICATION

The General Electric Type BA-15-A Plug-In Uni-Level Pre-Amplifier is a high gain microphone pre-amplifier incorporating automatic level control. This device is designed to automatically control variation in microphone signal levels. This compact plug-in unit may be used in place of the BA-1-F or BA-1-H Pre-Amplifiers.

Input level variations of up to 30 db may be successfully controlled by this pre-amplifier with only a 10 db change in the output signal level. Such variations are often encountered in boom microphone operation or in other cases where the relationship between the talent and the microphone is continuously changing. In addition, the Uni-Level Pre-Amplifier is a high gain unit having 60 db of gain as compared to a conventional pre-amplifier having 40 db of gain.

FEATURES

1. **Extremely versatile.**
   - *a. Relieves operators* by permitting automatic level control in any microphone channel.
   - *b. May be used in variety of applications* in AM-FM-TV-Recording studios, such as announce booths, boom mikes and public address systems.
   - *c. Controls level difference* between two or more microphone signals.
   - *d. Automatic Gain Control is applied when the microphone signal to the amplifier is −70 dbm or higher.* Signals below −70 dbm are linearly amplified.
2. **High gain**—60 db vs. 40 db gain for standard pre-amplifiers.
3. **Plug-in construction** allows easy removal of pre-amplifiers for servicing.
4. **Small compact design.** Six of these units can be mounted in 7" of rack space.
5. **Tubes** are shielded by easily removed tube shields.
6. **Transformers** are of hum-bucking coil construction with magnetically shielded cases.
7. **Prevents blasting** when two or more people are using same microphone.
8. **Automatically adjusts** audio level from close-in to 6 or 8 feet from microphone.

DESCRIPTION

Type BA-15-A Plug-In Uni-Level Pre-Amplifier is a single plug-in chassis which consists of a push-pull input stage (12AX7) supplying signal to a variable gain output stage (GL6386). Signal for the bias generator is supplied from the plates of the output stage (GL6386) to a voltage amplifier stage (GL5670) connected in push-pull. The voltage amplifier supplies a signal to a full wave bias

rectifier stage (6AL5) whose output applies a bias voltage to the control grids of the variable gain stage.

MECHANICAL SPECIFICATIONS

Units: The type number covers the amplifier, one set of operating tubes, and installation and operating instructions.

Dimensions: Height 4¾"
Width 2½"
Length 10½"
Weight 1½ lbs.

Mechanical: The size of this unit permits it to be used with our present line of plug-in amplifiers. The chassis size is that of the BA-1-H. It may be used to replace a BA-1-F or H, or any similar amplifier used as a microphone pre-amplifier of any studio audio system.

Mounting: 6 Uni-Level Pre-Amplifiers can be mounted in 7" of rack space using a Type FA-23-B shelf. Plug-in construction using a Jones 2400 series plug allows easy removal for servicing.

Operating Conditions:
Up to an external ambient of 45°C.
Up to 95% relative humidity.
Will withstand normal shipping.

Open-type construction allows natural ventilation.

Electrical Connections: All connections are made to one 2400 series Jones connector mounted at end of chassis. The electrical connections to the BA-15-A Jones connector except for one connection are the same as our present line of plug-in amplifiers.

ELECTRICAL SPECIFICATIONS

Performance:

Frequency Response: ±1 db 50-12,000 and +1−1.5@ 15,000 cycles under any gain condition up to 30 db gain reduction.

Gain: 60 db unloaded transformer input.

Harmonic Distortion: Below and up to threshold of gain reduction .5%−50 to 15,000 cps. With 30 db gain reduction 50 to 15,000 cps 1%.

Output Noise: −60 dbm.

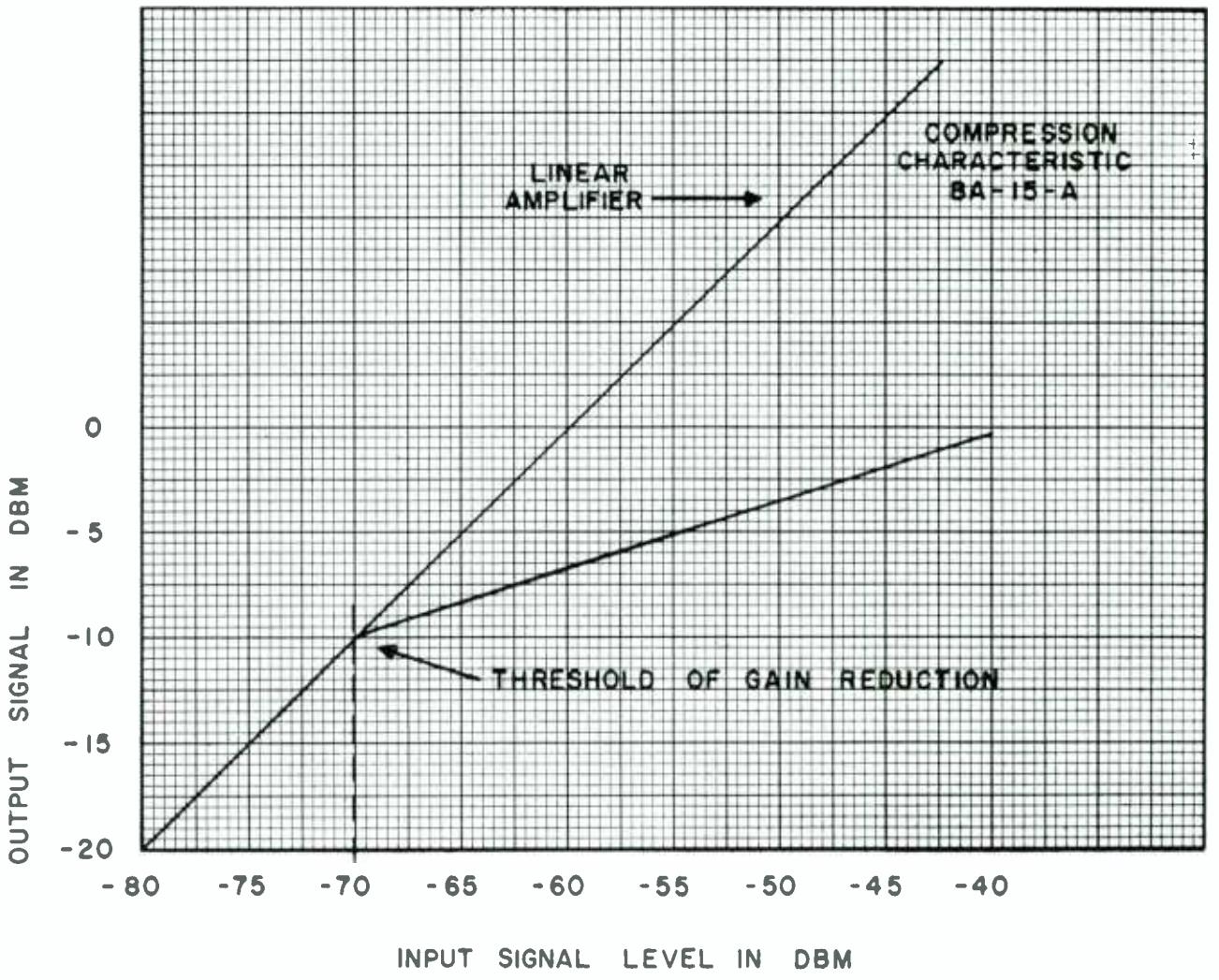
Attack Time: 1 millisecond

Recovery Time: .9 seconds for 63% recovery.

Power Requirements:

300 V DC 25 ma approximately.

6.3 V AC@ 1.30 amps+20 to +50 V DC bias on filaments. 15.7 watts. (The BA-15-A uses an external power supply—suggested Type BP-10-B Power Supply.)



Signal Inputs: Microphone level and up to −40 dbm with 30 db gain reduction.

Source Impedance: 30/150/250/600 ohms.

Impedance: 150 ohms as shipped. Balanced or unbalanced.

Input Impedance: Unloaded transformer.

Signal Outputs: Threshold—10 dbm output 0 dbm at 30 db gain reduction. 150/600 ohms out. 600 ohms as shipped. Balanced or unbalanced.

TUBE COMPLEMENT

1—12AX7

1—GL6386

1 –6AL5

1—GL5670

ORDERING INFORMATION

When ordering specify:

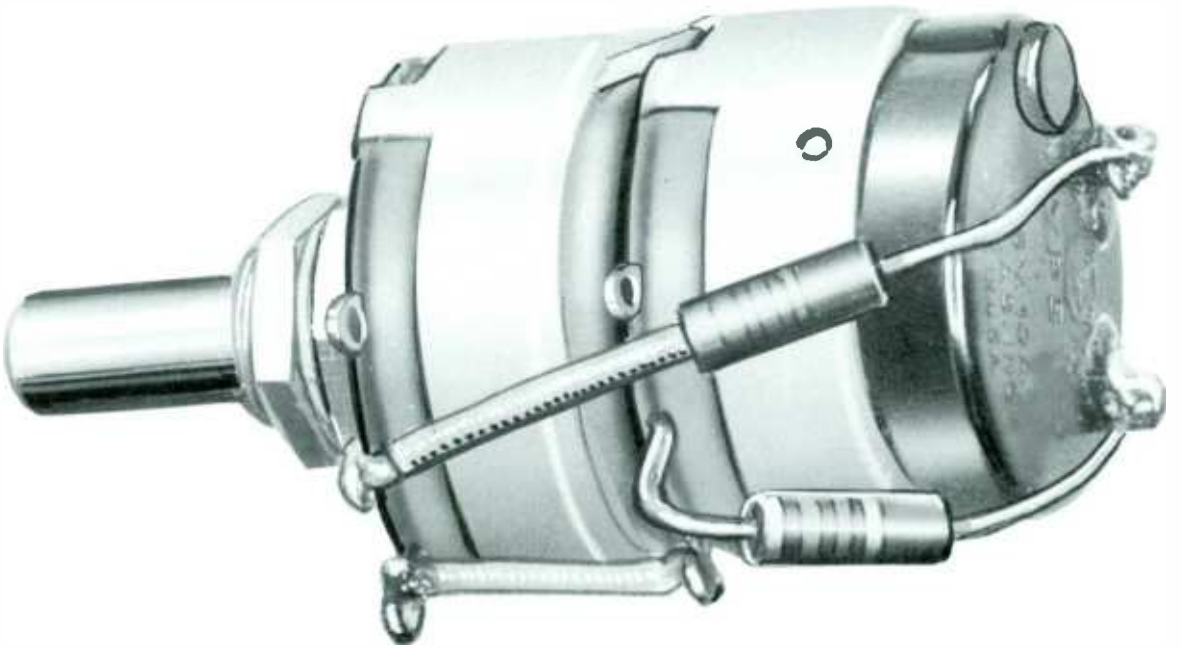
Type BA-15-A Plug-In Uni-Level Pre-Amplifier to consist of one amplifier; one set of operating tubes and installation and operating instructions.

ACCESSORIES

1—FA-23-B Shelf (Mounts 6 BA-15-A Amplifiers)

1—BP-10-B Power Supply will supply 5 BA-15-A amplifiers.

Bridging Volume Control, Type FA-35-G



G-E Bridging Volume Control, Type FA-35-G

APPLICATION

The FA-35-G Bridging Volume Control is designed to convert a 600-ohm input of an amplifier to 10,000 ohms balanced bridging service. It may be used on line levels up to +40 dbm.

DESCRIPTION

The FA-35-G consists essentially of a continuously variable dual potentiometer, a screwdriver control (a knob may be used) and a dummy switch section tandem-mounted to provide terminals for mounting two resistors and input connections to the control.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	2½"
Diameter	1 1/16"

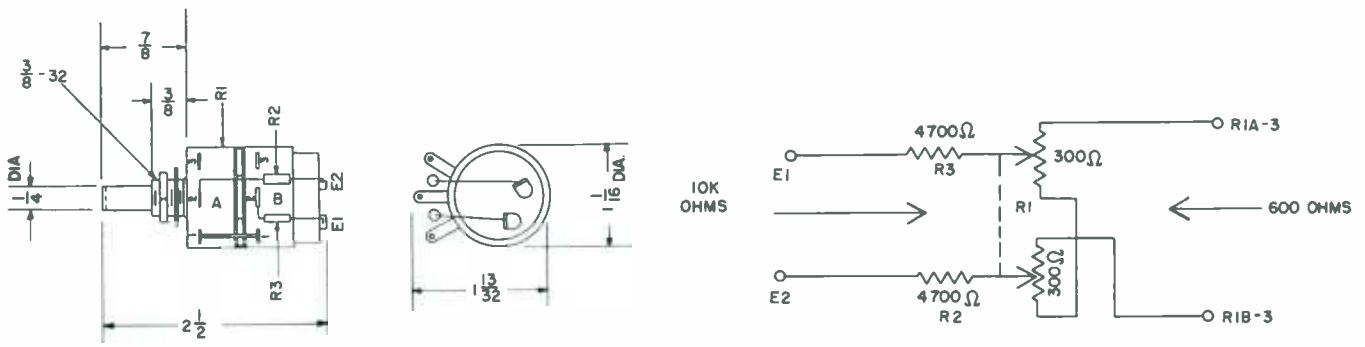
Weight: 2 ounces

Mounting:

The FA-35-G is designed to fit holes provided in the ends of the BA-1-F Pre-Amplifier and the BA-12-C Program/Monitor Amplifier chassis. It may also be mounted on the BA-4-E Monitoring Amplifier or used in similar applications where a bridging gain control is required. A ⅜" hole is required for mounting in applications other than outlined above. (See outline diagram for internal chassis clearance dimensions.)

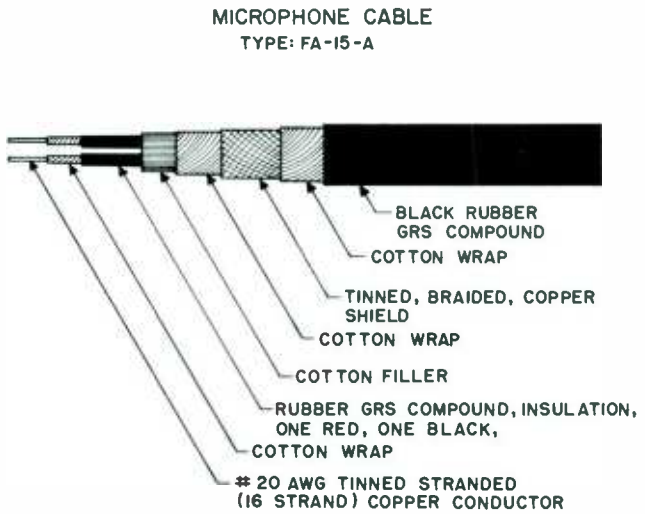
ORDERING INFORMATION

When ordering, please specify:
Type FA-35-G Bridging Volume Control.



Outline and Elementary Diagrams, FA-35-G Bridging Volume Control

Microphone Cable, Plugs and Receptacle
Type FA-15-A Microphone Cable
Type FA-16-A Male Microphone Plug
Type FA-16-B Female Microphone Plug
Type FA-16-C Microphone Wall Receptacle



Type FA-15-A Microphone Cable

APPLICATION

General Electric FA-15-A Microphone Cable is a two-conductor, shielded, rubber-covered, flexible, waterproof cable designed primarily for use with low impedance microphones in television and broadcast studios. It may be used also for the make-up of extension cables and as replacement for old cables.

FEATURES

1. **Lies straight in use,** but high flexibility permits easy coiling for storage purposes.
2. **Ruggedly constructed** for long, efficient service.
3. **Tough outer GRS compound jacket resists abrasion and abuse,** giving thorough protection to shielding and conductors within.

MECHANICAL AND ELECTRICAL SPECIFICATIONS

Lot Length: 250′ per spool
Voltage Rating: 600 volts AC
Outside Diameter: 0.320″
This cable consists of two #20 AWG (16 strands per conductor), stranded, tinned copper conductors with a cotton wrap over each conductor. Rubber GRS compound insulation is placed over the cotton wrap; insulation colored white on one conductor, black on the other. The two conductors are then twisted with cotton fillers and a cotton wrap is placed over them. A tinned copper braided shield is placed over this assembly. This, in turn, is covered with another cotton wrap. The entire assembly is enclosed within a black rubber GRS compound jacket.

ORDERING INFORMATION

When ordering, please specify:
.....spools (250′ each) of Type FA-15-A Microphone Cable.

Type FA-16-A Male Microphone Plug, Type FA-16-B Female Microphone Plug, and Type FA-16-C Microphone Wall Receptacle

APPLICATION

General Electric microphone plugs and wall receptacle are ruggedly designed units patterned after a trouble-free type of self-locking, quick disconnect plug and receptacle. They are furnished with three standard contacts and have either a satin chrome or zinc plate finish.

FEATURES

1. **Easily installed.** Large solder pots on pin ends permit easy installation with excellent electrical and mechanical connection of wires.

2. **Positive locking device.** A push of the male plug into the wall receptacle or mating plug automatically locks the two together.

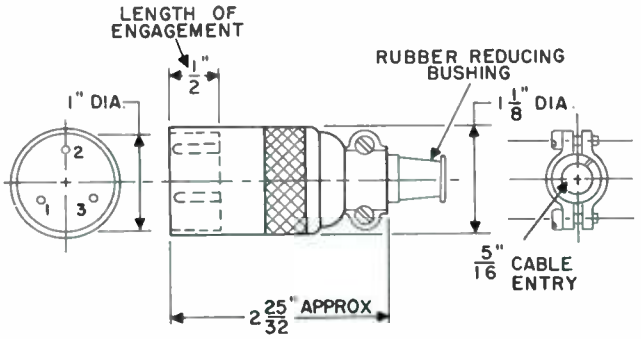
3. **Quick, easy disconnect.** Thumb latch allows immediate disconnect of lock and easy withdrawal of plug.

4. **Rugged construction.** Steel shell with phenolic mounted contacts assures long, dependable life.

5. **Rubber bushed cable clamp** takes strain from connections and aids in prolonging cable life. Clamp is integral part of plug shell.

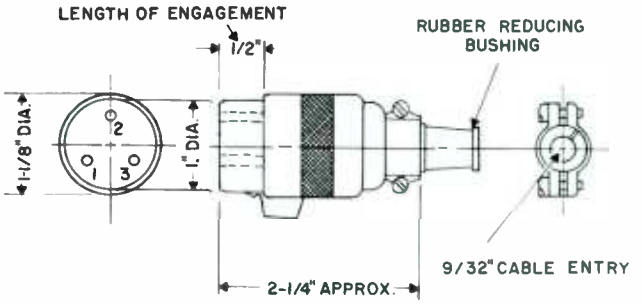
6. **Large pin-type male contacts** assure good connections with mating plug or receptacle.

MECHANICAL AND ELECTRICAL SPECIFICATIONS:



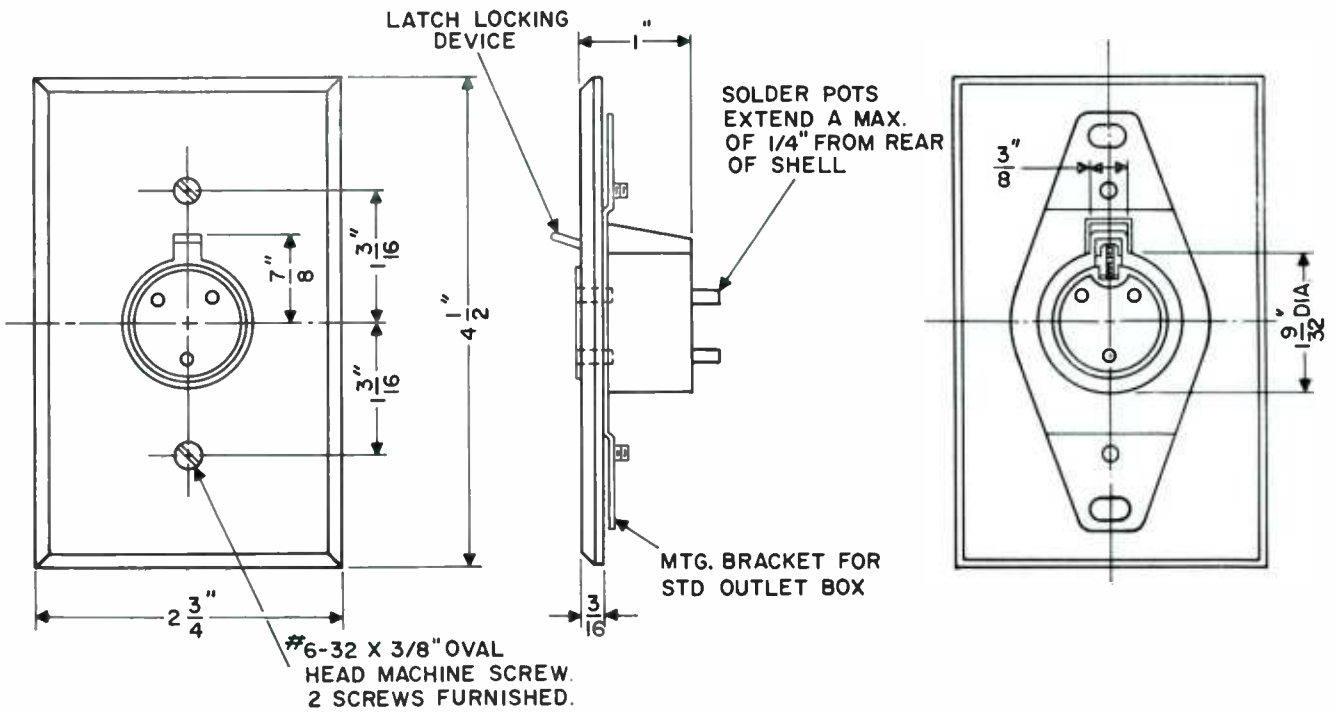
FA-16-A Male Microphone Plug

The steel shell and zinc cable clamp are finished in satin chrome. Phenolic insulation is used to mount the contact pins. Cable entry is $\frac{5}{16}$", through rubber reducing bushing. Shell has circular groove in interior to accept latch of female connector or wall receptacle. The three male contacts are so spaced that they cannot be inserted in a receptacle in the wrong position. The contacts terminate in tinned solder pots for wire connections. Dimensions shown on above drawing.



FA-16-B Female Microphone Plug

The die-cast zinc shell is finished in satin chrome. Insulation is black phenolic compound with contacts anchored within. Cable entry is $\frac{9}{32}$", through a rubber reducing bushing. A thumb-operated locking latch locks on inside rim of mating male plug shell when the units are pushed together. Encasements of the three female contacts are so located that the male plug cannot be wrongly positioned on insertion. The contact encasements terminate in solder pots for wire connections. See above drawing for dimensions.



FA-16-C Microphone Wall Receptacle

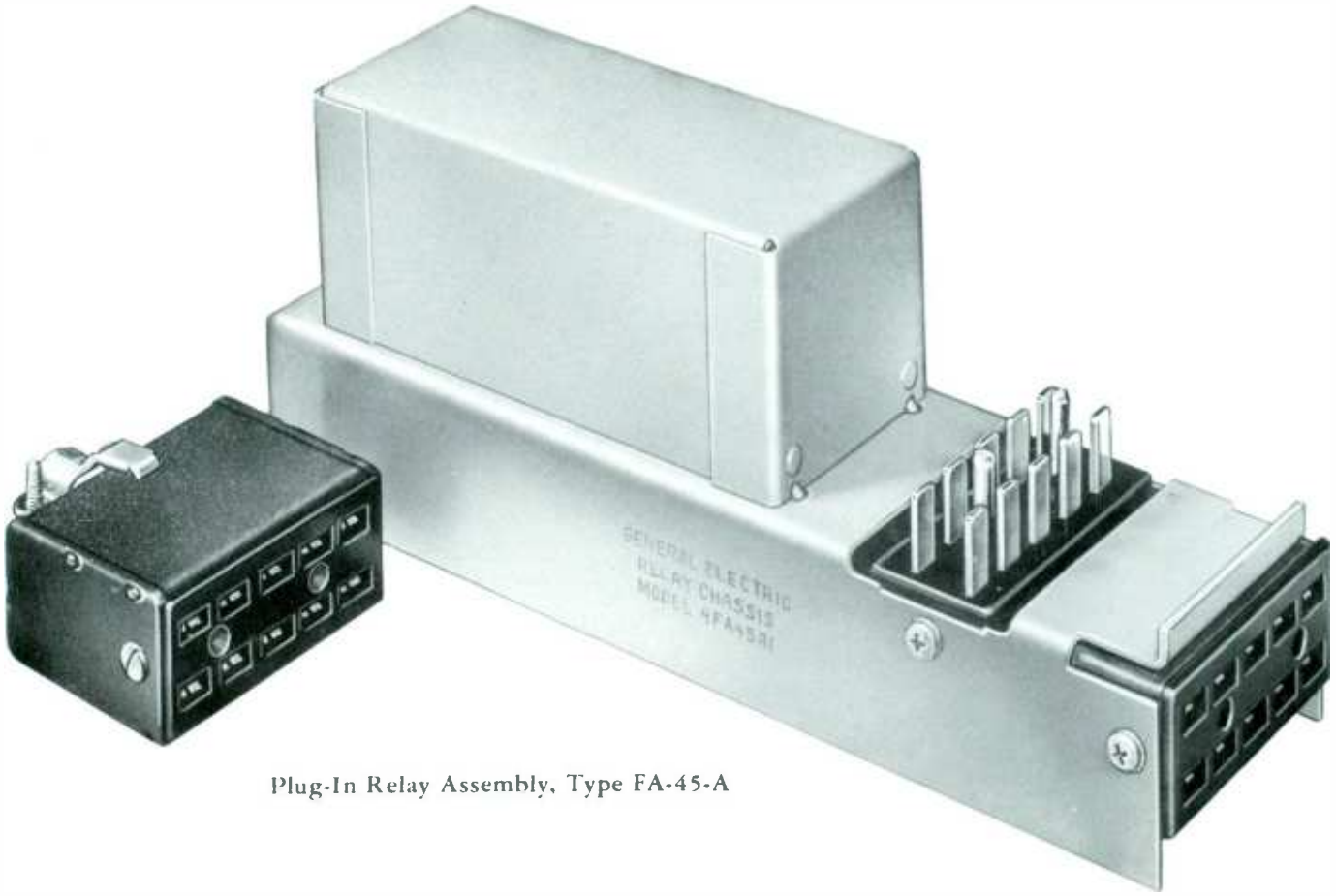
This unit is a single-gang, flush-mounting, wall receptacle with female latch-locking unit. It has a die-cast zinc shell and is finished in zinc plate. Insulation is black phenolic compound. Encasements of the three female contacts terminate in solder pots. A male plug is automatically locked into this receptacle by the locking latch engaging in a groove on the inside rim of the plug shell when the plug is inserted. The thumb-operated latch releases the lock. This receptacle fits all standard wall outlet boxes similar to G-E Outlet Box SP-5800. See drawing above for dimensions.

ORDERING INFORMATION

When ordering, please specify:

Microphone Plug, Male, Type FA-16-A.
Microphone Plug, Female, Type FA-16-B.
Microphone Wall Receptacle, Female, Type FA-16-C.

Plug-In Relay Assembly, Type FA-45-A



Plug-In Relay Assembly, Type FA-45-A

APPLICATION

The General Electric Type FA-45-A Plug-In Relay Assembly is designed to control speaker and air warning lights in an announce booth and one studio. While primarily designed to plug into a BC-11-A Console, this unit may be mounted and power supplied externally for other applications.

The relay assembly may be operated from either 117 volts AC or 24 volts DC without a wiring change. In external applications, by easily made wiring changes on the plugs, this relay assembly may be used for relay operation of TV motion picture audio change-over and other applications where two relays with two form C contacts each can be used.

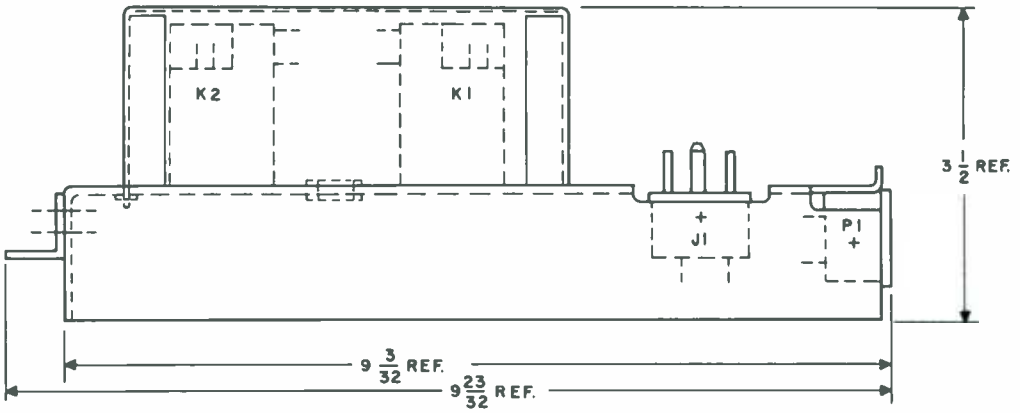
FEATURES

1. **Plug-in, pre-wired construction.** Assembly is pre-wired to plug in and operate in BC-11-A Console.
2. **Operates on either 24 volt DC or 117 volt AC without wiring change.** Unique coil construction permits operation on either voltage.
3. **Relays are case protected.** Relays are protected from dust or damage due to accidental impact by aluminum case. Case may be readily removed during routine maintenance.
4. **Impossible to make wrong connection in console.** Relay chassis employs female plug while other chassis in console employ male plugs, in same position.
5. **May be used in other applications.** Relay chassis wiring may be changed easily for use in other applications. Two 10-terminal Jones plugs permit wide variety of control and use. Unit may be externally mounted and operated. Relay contacts rated at 5 amperes at 115 v AC.

DESCRIPTION

The General Electric Type FA-45-A Plug-In Relay Assembly consists of two relays mounted and wired with associated components on a plug-in chassis. Each relay has two form C contacts.

When plugged into the BC-11-A Audio Console, connections are made through P-1 (see outline diagram) to the existing wiring of the BC-11-A mixer switches. In this application, K-1 (see circuit diagram) is controlled by any one of the first four microphone mixer switches, while K-2 is controlled by the announce-booth mixer switch. Another plug, mating with J-1 (see outline diagram) on top of the assembly should be wired with the relay voltage and external circuits associated with



Outline Drawing, Plug-In Relay Assembly, Type FA-45-A

the announce-booth and studio loudspeakers and air warning lights.

Each relay is provided with two sets of contacts, one of which is used to break the loudspeaker circuit and the other for the air warning light control. Both relays are protected by a cover which may be easily removed during routine maintenance.

The Relay Assembly requires 24 volts DC at 110 ma, or 117 volts AC at 110 ma. Low voltage operation down to 19 volts DC or 95 volts AC is possible. It is recommended that 24 volts DC be used for the relay operation to eliminate the possibility of hum pickup in the audio circuits.

The bases of the plugs on the chassis are readily available for rewiring if other control circuits or other applications are contemplated.

MECHANICAL SPECIFICATIONS

Units:	1—FA-45-A Plug-In Relay Assembly with J-1 mating plug.
Dimensions:	Over-all height—3½" Over-all length—9 23/32" Over-all width—2 7/16"
Weight:	1 lb., 9 oz.
Connectors (on Chassis):	J-1—10-pin, male, Jones # P-2410 P-1—10-pin, female, Jones # S-2410 A 10-pin, female plug, Jones # S-2410-CCT is supplied to mate with J-1.
Finish:	Grey.

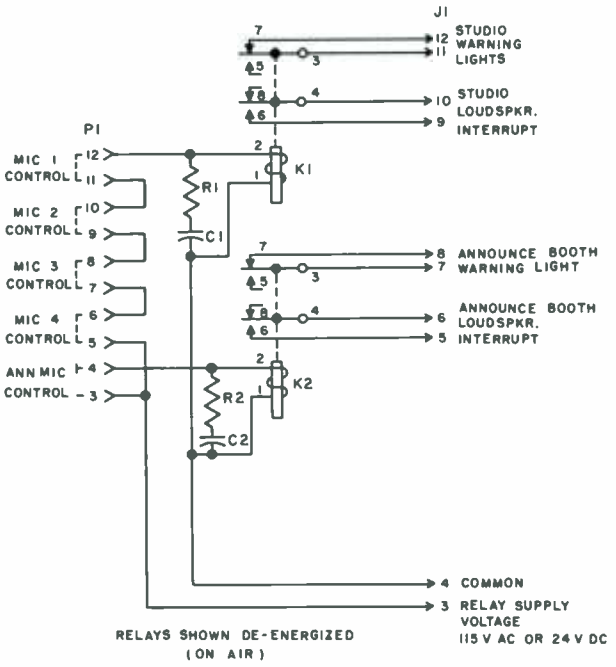
ELECTRICAL SPECIFICATIONS

Relay Coil Requirements:	24 volts DC @ 110 ma, or 117 volts AC @ 110 ma.
Relay Contact Capacity:	5 amperes @ 117 volts AC, each contact.
Relay Contact Type:	Two form C contact assemblies on each relay.
Number of Relays:	Two.

ORDERING INFORMATION

When ordering, please specify:

FA-45-A Plug-In Relay Assembly. (Type number includes one Relay chassis, one Jones # S-2410-CCT plug, and Installation and Operating Instructions.)



Elementary Diagram, Plug-In Relay Assembly, Type FA-45-A

Monitoring Speaker, Type FS-1-B
Studio Wall Speaker, Type FS-2-B
Housing for FS-1-B Speaker, Type FS-4-A
Cabinet for FS-2-B Speaker, Type FS-3-A

FS-1-B Monitoring Speaker (FS-4-A Cabinet)

APPLICATION

The FS-1-B Monitoring Speaker is designed for critical high-quality monitoring of broadcast program material in AM-FM and TV broadcast studios. It is ideally suited for every application requiring a pleasing, wide range response coupled with an attractive appearance. The FS-1-B Monitoring Speaker will provide unexcelled reproduction of music and speech in clients' rooms, control rooms, and studios. Its range extends from 50 to 13,000 cps.

The FS-2-A Studio Wall Speaker is a low cost speaker and housing combination for general purpose use in studios, offices, and recording rooms of broadcast studios.

FEATURES

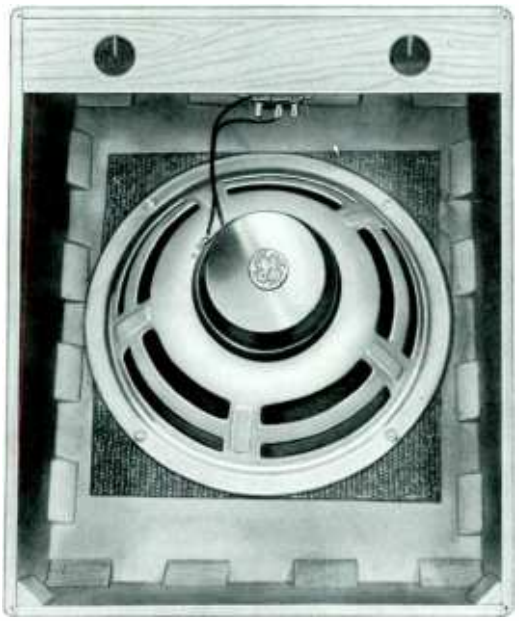
FS-1-B MONITORING SPEAKER

1. **Rich full bass.** Assured by use of ample cabinet volume and bass-reflex design.
2. **Wide range response.** Use of famous G-E speaker Type 1201A provides a uniform response, free from objectionable peaks, over the useful range of 50 to 13,000 cycles per second.
3. **High wattage capacity.** Non-warping aluminum foil base voice coil is unaffected by changes in moisture or temperature.
4. **Low driving power required.** Speaker is highly efficient.
5. **Contemporary styling of cabinet.** Carefully selected woods and contemporary cabinet styling complement the appearance of any studio.
6. **Line-to-voice-coil transformer included.**

FS-2-B STUDIO WALL SPEAKER

1. **Good sound distribution.** Cabinet front sloped for best sound distribution.
2. **Good frequency reproduction.** Uses General Electric 1201A speaker.

FS-2-B Studio Wall Speaker (FS-3-A Housing)



FS-2-B Studio Wall Speaker, rear, Showing Voice Coil Transformer

3. **Attractively styled cabinet.** Attractive walnut-finish wood used in cabinet construction.
4. **Line-to-voice-coil transformer included.**
5. **Economical.** Speaker and cabinet combination low in price.

DESCRIPTION

The FS-1-B Monitoring Speaker is composed of the FS-4-A Monitoring Speaker Cabinet, a 1201A Loudspeaker, and an FA-42-A Line-to-Voice-Coil Transformer.

The speaker used in the cabinet employs a curvalinear molded cone for efficient dispersion of its wide range reproduction. The heavy Alnico V permanent magnet provides a high sensitivity with reliable, quiet operation.

The interior surfaces of the cabinet are treated with special sound-absorptive material.

While the cabinet is designed for floor mounting, it may be readily wall mounted, if required.

The FS-2-B Studio Wall Speaker consists of an FS-3-A Wall Speaker Housing, a 1201A Speaker and an FA-42-A Line-to-Voice-Coil Transformer.

The cabinet is especially constructed and braced for wall mounting. Its sloping front panel assures good distribution of sound when the speaker is located out of the way at or near ceiling level. Its external walnut finish harmonizes pleasingly with other studio fixtures.

A line-to-voice-coil transformer, included with this model, will provide correct matching to several line impedances or parallel speaker operation.

MECHANICAL SPECIFICATIONS

Units: FS-1-B Monitoring Speaker including floor cabinet, speaker, and line-to-voice-coil transformer.
FS-2-B Studio Wall Speaker, including wall mounting cabinet, speaker, and line-to-voice-coil transformer.
FS-3-A Wall Speaker Housing only.
FS-4-A Monitoring Speaker Cabinet only.

Dimensions:	**FS-1-B**	**FS-2-B**
Speaker:	12″	12″
Cabinet: Width:	25″	14 5/8″
Depth:	14 1/2″	9 3/4″
Height:	26″	18″
Weight:	70 lbs approx.	10 lbs approx.

Mounting: FS-1-B. Floor mounting.
FS-2-B. Wall mounting with drilled holes to facilitate easy mounting or take-down.

Finish: Walnut.

Connections: FS-1-B and FS-2-B—solder terminals on transformer taps.

ELECTRICAL SPECIFICATIONS

Performance:

FS-1-B and FS-2-B: Frequency response: 50–13,000 cps.
Power Handling capacity: 25 watts, music and speech.
Field: Alnico V permanent magnet, 14.5 ounces.

Transformer Input Impedance: 600/1200/1800/2400 ohms.

ORDERING INFORMATION

When ordering, please specify:

FS-1-B Monitoring Speaker. (The type number includes one FS-4-A Cabinet, one 1201A speaker, one FA-42-A Line-to-Voice-Coil Transformer, and Installation and Operating Instructions.)

FS-2-B Studio Wall Speaker. (The Type number includes one FS-3-A Wall Housing, one 1201A speaker, one FA-42-A Line-to-Voice-Coil Transformer, and Installation and Operating Instructions.)

FS-3-A Wall Speaker Housing.

FS-4-A Monitoring Speaker Cabinet.

ACCESSORIES

FA-19-J Interconnecting Cable.

Speakers, Types 850, 1201A, and 1203A

Cut-Away View, 1201A Speaker

G-E 1201A Speaker

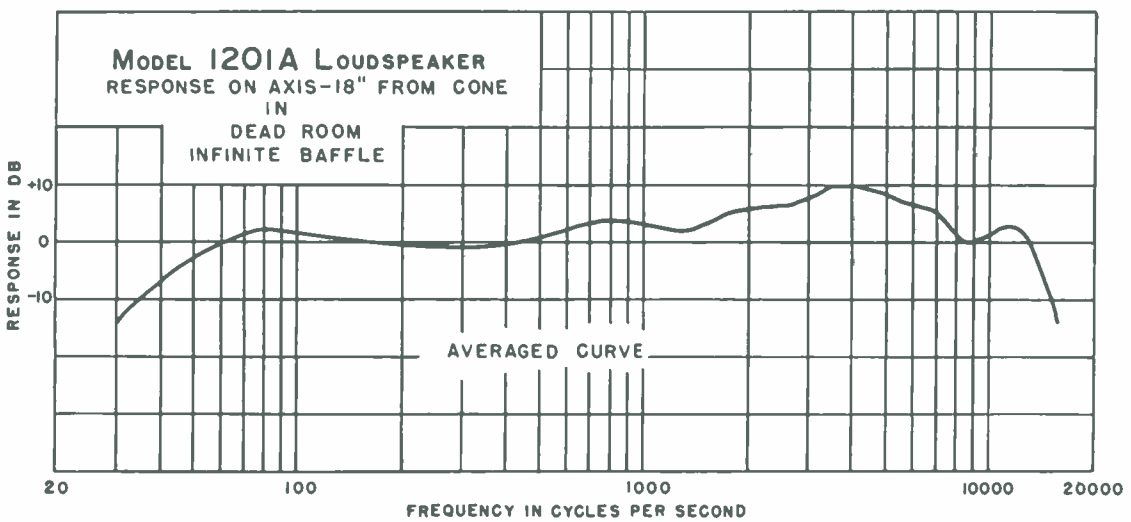
APPLICATION

General Electric Loudspeakers are designed for critical high quality monitoring of broadcast program material in AM-FM and TV broadcast studios. They may be depended upon to provide excellent reproduction of music and speech in recording, control, and studio monitoring applications.

The Types 850, 1201A and 1203A Speakers are wide range speakers for use in broadcast control and studio monitoring.

FEATURES

1. **High wattage handling capacity** made possible by use of non-warping aluminum foil base voice coils.
2. **Faithful reproduction** assured by molded, scientifically designed General Electric cones.
3. **High efficiency** due to liberal use of Alnico V magnet material.
4. **Rigidly constructed.** All-welded construction insures rigidity and provides optimum controlled flux density.
5. **Attractive appearance.** Lustrous finish is specially protected to preserve beauty and effectiveness.
6. **Wide range.** The 1201A and 1203A Speakers uniformly cover the frequency range from 50 to 13,000 cycles per second.



DESCRIPTION

General Electric Loudspeakers are designed by audio engineers and produced under exacting conditions of quality control.

The Type 850 Speaker is a wide range unit, 8-in. in diameter with a 15-watt handling capacity.

The Type 1201A and 1203A Speakers are wide range units, 12" in diameter and with 25-watt handling capacities. They differ only in their Alnico V magnet weight; the 1201A having a 14.5-ounce magnet compared to a 9-ounce magnet in the 1203A, with a consequent increase in efficiency in the 1201A.

All speakers employ non-warping aluminum foil base voice coils with molded, scientifically designed circular cones. All-welded frame construction is employed to insure rigidity and controlled flux density. Alnico V magnet material is used for increased efficiency.

Due to careful design and quality control in manufacture, these speakers offer a uniform response, with freedom from objectionable peaks over their useful response ranges.

G-E 850 Speaker

MECHANICAL AND ELECTRICAL SPECIFICATIONS

Units: Wide Range Speakers: 850, 1201A, 1203A.

Mounting: All speakers are equipped with four mounting holes on the circumference of the frame designed to accept No. 8 machine screws.

Dimensions and Weights:

	Diameter Over-all Size	Mtg. Hole Centers	Depth Gasket to Yoke or Cover	Shipping Weight
850	$7\frac{19}{32}$"	$7\frac{5}{8}$"	$3\frac{3}{4}$"	2 lbs 10 oz
1201A	$12\frac{7}{32}$"	$11\frac{9}{16}$"	$5\frac{7}{8}$"	6 lbs 8 oz
1203A	$12\frac{7}{32}$"	$11\frac{9}{16}$"	$5\frac{7}{8}$"	5 lbs 2 oz

Type*	Size*	Shape* Cone	Alnico V Mag. Wt.	Power Rating	V.C. Diam.	V.C. Imp. Ohms	Baffle Open.
** 850	8"	Round	6.8 oz.	15w	1"	8.0	$6\frac{7}{8}$"
**1201A	12"	Round	14.5 oz.	25w	$1\frac{1}{4}$"	8.0	$10\frac{3}{4}$"
**1203A	12"	Round	9.0 oz.	25w	$1\frac{1}{4}$"	8.0	$10\frac{3}{4}$"

* The General Electric Company manufactures a complete line of original and replacement speakers in a variety of shapes, sizes, and ratings not shown here. For information concerning these latter speakers, please consult your local General Electric distributor.

**Wide range speakers recommended for broadcast studio and monitoring applications.

Connections: 1201A, 850 and 1203A—Screw terminals.

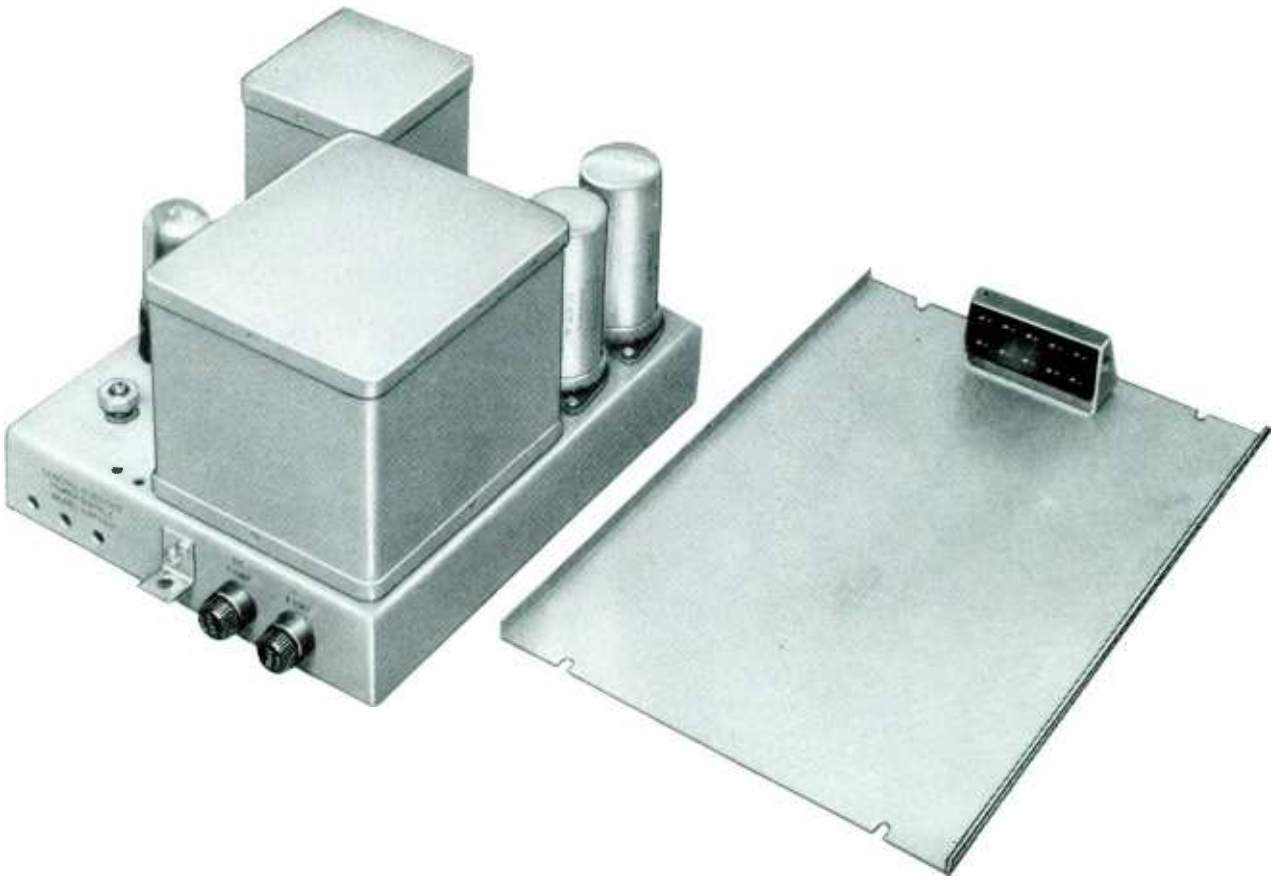
ORDERING INFORMATION

When ordering, please specify:
Type....., Wide Range Speaker

ACCESSORIES

FS-4-A Monitoring Speaker Cabinet (for 12" speaker).
FS-3-A Wall Speaker Cabinet (for 12" speaker).
FA-42-A Line-to-Voice-Coil Transformer.
FA-19-J Interconnecting Cable.

Plug-In Power Supply, Type BP-10-B



Plug-In Power Supply, Type BP-10-B, and Tray, Type FA-22-F

APPLICATION

The Plug-In Power Supply, Type BP-10-B, is specifically designed to power plug-in audio amplifiers Types BA-1-F, BA-9-A and BA-12-C. It will also supply TV or other equipment which will operate from an unregulated supply of BP-10-B ratings.

FEATURES

1. Compact, plug-in construction.
2. Easy to remove, maintain and service.
3. Conservatively rated components.
4. Screwdriver control to adjust B+ voltage to current value.

DESCRTIPION

The BP-10-B is a plug-in unregulated power supply, constructed on a narrow recessed chassis with all controls and components marked. Fuses and operating controls are accessible from the front. A Jones plug that mates with a corresponding receptacle on the FA-22-F Tray makes all necessary electrical contacts.

A voltage divider across the DC output serves as a bleeder and as a source of low voltage DC for biasing the filament supply 30 volts positive to minimize hum output from amplifiers.

One BP-10-B can supply power for up to 25 BA-1-F Pre-Amplifiers, or 3 BA-9-A Uni-Level Amplifiers, or three BA-12-C Program/Monitor Amplifiers at 300 volts B+.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	$5\frac{15}{16}$"
Width	$7\frac{3}{8}$"
Depth	$9\frac{5}{32}$"
Weight:	25 lbs. (approximately)

Mounting: The BP-10-B plugs into a Type FA-22-F Tray, two of which mount in a Type FA-23-A Shelf.

Operating Conditions: May be operated in an external ambient of up to 113°F (45°C) and a relative humidity up to 95%.

Safety Provisions: Wiring and terminals are enclosed in a grounded chassis. No exposed voltages because of plug-in construction.

ELECTRICAL SPECIFICATIONS

Type of Circuit: Full-wave, single-phase rectifier using two 5Y3 tubes in parallel. Use of parallel rectifiers increases power supply reliability under average load

conditions. The filter is a pi-filter with a rheostat located in the B+circuit just ahead of the output capacitor. Filament supply is maintained at +30 v bias.

Performance: Potentiometer adjustment to +300 v for all loads from 40 ma to 230 ma. Maximum ripple, full load: 25 mv (120 cycles).

Inputs: 110/117/125 v, 50/60 cycles, 200 w single phase.

Outputs: 40 to 230 ma adjustable to 300 v DC at nominal input transformer tap voltages; 4.5 amps at 6.4 v AC at 50 cycle, 7.5 amps at 6.4 v AC at 60 cycle; at 50 cycles this unit will supply 3 BA-12-C Amplifiers or 15 BA-1-F Amplifiers; at 60 cycles this unit will supply 3 BA-12-C Amplifiers or 25 BA-1-F Amplifiers.

Internal Power Supplies: The BP-10-B also derives and establishes the filament winding at a positive bias of 30 volts.

Controls and Adjustments: Voltage output can be adjusted to 300 v DC, by a screwdriver adjustment located above the chassis, under all load conditions from 40 to 230 ma. Fuses are removable from the front of the chassis.

Tube Complement:
2 Type 5Y3GT/G

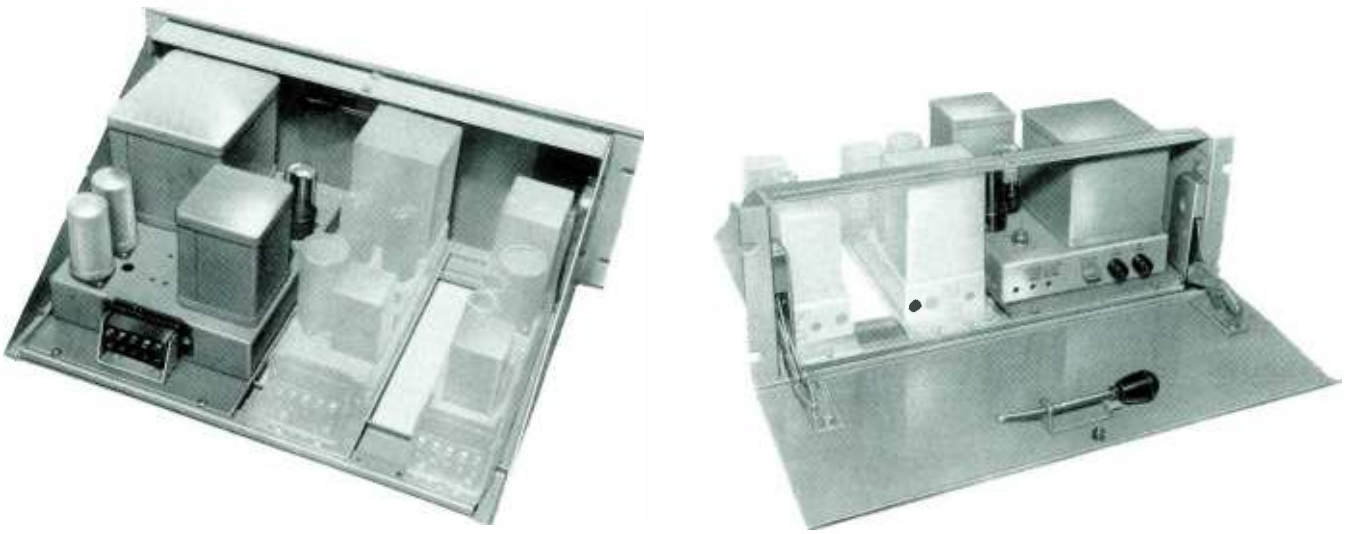
ORDERING INFORMATION

When ordering, please specify:
Type BP-10-B Plug-In Power Supply.

ACCESSORIES

Type FA-22-F Tray for mounting BP-10-B.

Type FA-23A Shelf, for mounting plug-in units with trays. (Type FA-23-A occupies 7 inches—4 units of rack height—in a type PR-1-A Cabinet Rack and will accommodate 6 Pre-Amps, Type BA-1-F, with trays; 4 Type BA-12-C Program/Monitoring Amplifiers, with trays; or 2 Type PB-10-B Power Supplies with trays.)



Plug-In Power Supply, Type BP-10-B, and Tray, Type FA-22-F; plus Plug-In Program/Monitoring Amplifier, Type BA-12-C; and Plug-In Pre-Amplifier, Type BA-1-F, mounted in Broadcast Shelf, Type FA-23-A. (Front view, right, with shelf panel open.)

Transcription Equalizer, Type FA-12-B

Transcription Equalizer, Type FA-12-B

APPLICATION

The General Electric Transcription Equalizer, Type FA-12-B, is an adjustable network for use with professional-type G-E cartridges, 4GS-01D, 4GS-02D and 4GD-01D-02D, for broadcast reproduction of lateral transcriptions and records.

FEATURES

1. **Pleasing record reproduction**—full low-frequency response and adjustable high-frequency response.
2. **Easy to install**—single unit construction.
3. **Low hum pickup** because of adequate magnetic shielding.
4. **Connections simplified**—outputs may be run balanced or unbalanced.
5. **Convenient to use**—connects to any microphone pre-amplifier.

DESCRIPTION

The FA-12-B Transcription Equalizer is a single unit housed in a rectangular steel case. It has a low-impedance output which will work into the unloaded input of any microphone pre-amplifier. It includes a four-position switch which provides control of high-frequency response.

The "FLAT" position provides essentially flat high-frequency response from material recorded at constant velocity above 700 cps. The "NARTB" position provides an essentially flat reproduction of material recorded in accordance with the "NARTB" lateral curve. This position may also be used for reproduction of 78 rpm vinylite base and "hi-fi" records. The "GOOD RECORDS" position provides a high-frequency response somewhat more attenuated than that given by the "NARTB" position. The fourth position, marked "POOR RECORDS", provides a high-frequency response considerably more attenuated than that given by the "NARTB" position. (See Average Performance Characteristic Curves, Fig. 1.)

All switch positions provide low-frequency response essentially the complement of the "NARTB" curve.

Experience has shown that the "NARTB" position is ideal for high-quality transcriptions and both wide-groove (.003 in.) and micro-groove (.001 in.) types of records. For worn transcriptions and average good records, the "GOOD RECORDS" position provides the most pleasing response. Noisy and distorted records require the "POOR RECORDS" position. The "FLAT" position is useful for the reproduction of instantaneous recordings and other special records cut with a "FLAT" recording characteristic.

MECHANICAL SPECIFICATIONS

Dimensions:	Can	Dial Plate
Depth	4 1/16 in.	———
Length	3 3/8 in.	3 5/8 in.
Width	3 1/4 in.	3 in.
Weight:	2 lbs.	———

Mounting: Tapped mounting holes are provided at the top (switch end) of the case to enable mounting the FA-12-B to the under side of the top panel of a transcription turntable with its switch shaft passing vertically through a clearance hole drilled in the top panel. The switch shaft is made extra long so as to accommodate various thicknesses of transcription turntable top panels. A knob and escutcheon plate are supplied for mounting above the Transcription Equalizer on the control surface of the transcription turntable. External connections to the pickup and to the amplifier are made on a terminal board located at the bottom of the Equalizer case. Although the Equalizer components are completely enclosed in a protective metal case containing inner mu-metal shields, the removal of two case screws enables rapid access to the components should servicing be necessary.

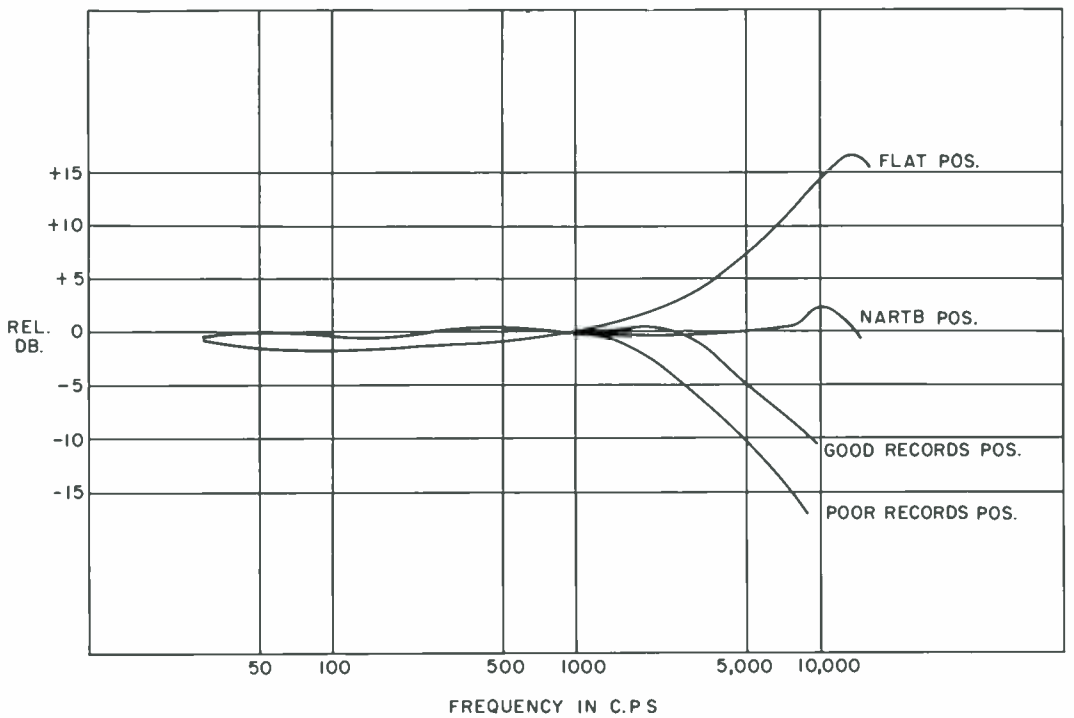


Fig. 1. Average Performance Characteristics of the Transcription Equalizer with the "New Orthophonic" Test Record and G-E 4GS-01D or 4GD-01D-02D Cartridge using the 1-Mil Diamond Stylus

ELECTRICAL SPECIFICATIONS

Output Circuits:

Load Impedance:	Designed to work into either a 150/250- or 30/50-ohm unloaded input.
Output Connections:	Balanced, or either side may be grounded.
Output Level:	An output level of approximately −55 VU maximum is obtained when reproducing 78 rpm shellac records; −60 VU maximum from micro-groove records.

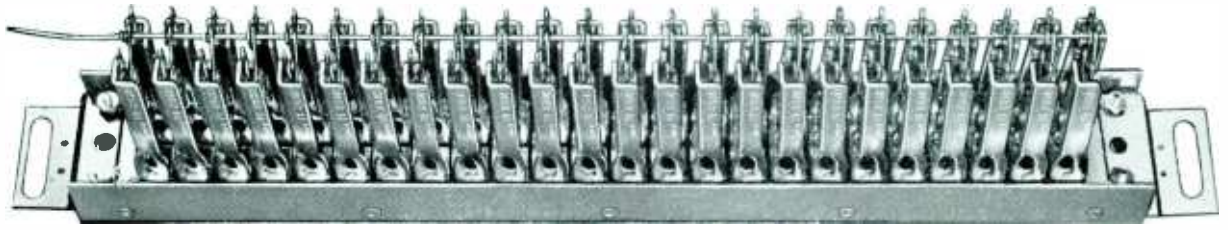
Typical Reproduction Response: See Fig. 1

ORDERING INFORMATION

When ordering, please specify:

Type FA-12-B Transcription Equalizer

Jack Strip, Type FA-2-A



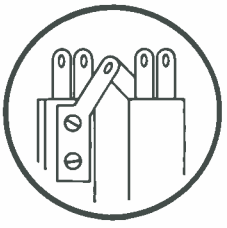
Type FA-2-A Jack Strip showing common ground

APPLICATION

G-E Type FA-2-A Jack Strips are used in amplifier racks to permit rapid isolation, selection, and monitoring of individual amplifiers by means of patch cords. They are also used in studio and master control room consoles and racks to permit "patching" of the various remote, local, and audition programs into the desired transmitter, remote, and monitoring channels.

FEATURES

1. **Easily wired ground terminals.** The jacks used on these Jack Strip assemblies are provided with *special off-set sleeve (or grounding) terminals*, so designed that the sleeve terminals fall in a line down the center of the assembly when two rows of jacks are mounted on the strip. This makes it possible to ground all sleeves by simply passing a single straight length of bus wire through all sleeve terminals, thus effecting a saving in labor, time and wiring space.



2. **Increased strength.** The two-sided construction of this jack adds rigidity, lessening the possibility of wire breakage, and makes a smoother operating Jack-Strip assembly.
3. **Easily mounted.** The vertically slotted end mounting brackets permit some vertical movement of the jack strip. This facilitates the mounting of the strip when used in conjunction with odd sized rack mounted equipment.
4. **The PV-14-A Card Holder Kit** is available for labeling of the Jack Strips where the strips are to be mounted within the rack instead of front flush mount.

DESCRIPTION

The FA-2-A Jack Strip consists of 48 jacks, mounted in two rows on heavy black Textolite board. All jacks

Type FA-2-A Jack Strip

are of the tip and sleeve type with an additional normally closed contact making the jack suitable for use on "normalled through" circuits.

Jacks are mounted on $\frac{5}{8}$-inch horizontal centers so as to mate properly with G-E Patch Cords (Types FA-7-A, B & C) and other manufacturers' standard, double-plug patch cords.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	$2\frac{1}{8}$ in.
Width	$18\frac{13}{16}$ in.
Depth	$3\frac{5}{8}$ in. approx.

Weight: $5\frac{1}{2}$ lbs.

Mounting: Mounting brackets at the end of the strip are vertically slotted to fit a standard 19-inch RETMA cabinet or relay rack. Two No. 12–24 screws are supplied to mount each Jack Strip. Jack Panels, Type FA-3-A, -B, and -C, may be used with the FA-2-A to provide designation cards above and below each jack pair.

ELECTRICAL SPECIFICATIONS

Number of Jack Pairs:	24
Type of Jack:	Tip and sleeve with normalled-through contact

ORDERING INFORMATION

When ordering, please specify:
Type FA-2-A Jack Strip.

ACCESSORIES

PV-14-A Card Holder Kit
FA-7-A/B/C 2, 4 or 6 foot Patch Cords
FA-3-A, B, C Single, Double or Triple Jack Panels

Equalizer Panel, Type FA-14-A

Equalizer Panel, Type FA-14-A

APPLICATION

The Type FA-14-A Equalizer Panel is designed to equalize the non-linear characteristics of one or two non-loaded telephone lines for substantially flat frequency response to 10,000 or 15,000 cycles per second, depending on line characteristics and termination. The FA-14-A would normally be used on lines which are not continuously operating and thus do not require the permanent installation of a fixed equalizer.

FEATURES

1. Provides equalization for two lines.
2. Front-panel adjustment in steps of 3 db.
3. Equalizes short lines up to 15,000 cycles—longer lines up to 10,000 cycles.
4. Simple clamp-type mount permits flexibility of mounting on any standard rack.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	$3\frac{15}{32}$"
Width	19"
Depth	$4\frac{15}{16}$"
Weight:	5 lbs.

Mounting: The Equalizer Panel is designed for vertical mounting on a standard 19-inch RETMA relay or cabinet rack. A clamp-type mounting, not visible from the front, is provided to mount the panel in any desired location on a rack.

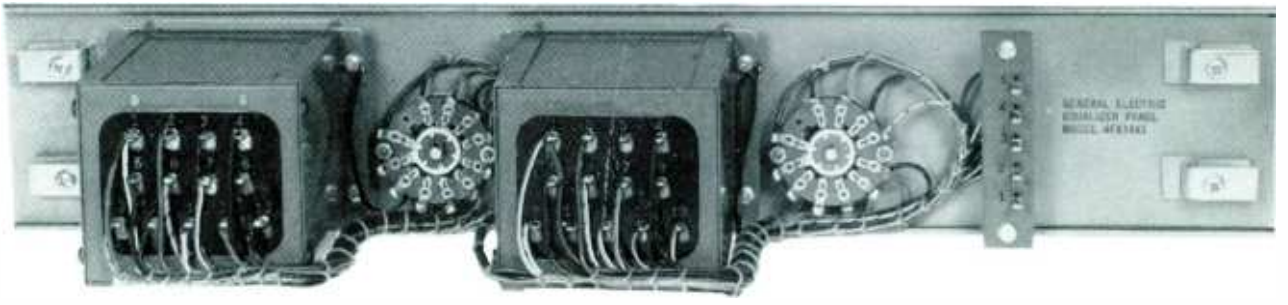
ELECTRICAL SPECIFICATIONS

Type of Circuit: The FA-14-A consists of two separate and complete FA-14-B Equalizers mounted on a single panel. Parallel-resonant circuits consisting of a capacitor, a reactor, and logarithmically tapered resistances are used in each equalizer unit. These resistances are selected by a rotary switch located on the front panel. Input and output connections of the FA-14-A are available on terminal boards.

The electrical specifications for each of the sections of the Equalizer Panel are the same as the specifications for the Equalizer Unit, Type FA-14-B.

ORDERING INFORMATION

When ordering, please specify:
Type FA-14-A Equalizer Panel.



Equalizer Panel, Type FA-14-A, rear view

Equalizer Unit, Type FA-14-B

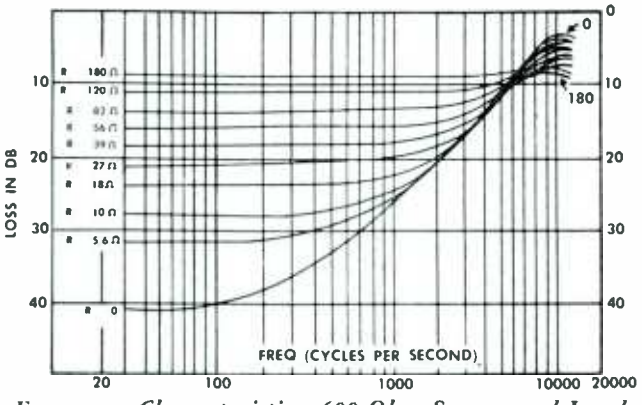
APPLICATION

The Type FA-14-B Equalizer Unit is a semi-fixed unit recommended for use on lines which are permanently installed and continuously used, such as studio-to-transmitter lines and remote or "nemo" lines. It is designed to equalize non-linear characteristics of non-loaded telephone lines for substantially flat frequency response up to 10,000 or 15,000 cycles per second, depending on line characteristics and terminations.

Equalizer Unit, Type FA-14-B

FEATURES

1. Equalizes up to 10,000 or 15,000 cycles depending on line length and termination.
2. Easily connected for equalization in steps of 3 db or less.
3. Small size allows flexibility of mounting.



Frequency Characteristics, 600 Ohm Source and Load

MECHANICAL SPECIFICATIONS

Dimensions:

Height	3⅜" (2 Rack Units)
Width (including mounting)	3⅞"
Depth	3"
Weight:	1½ lbs.

Mounting: Mounting flanges on the bottom of the case make it adaptable for mounting on any flat surface.

ELECTRICAL SPECIFICATIONS

Type of Circuit: The FA-14-B consists of a reactor, a capacitor, and associated resistors mounted in a rectangular metal case. A solder-lug terminal board is provided on one end of this case for adjusting the resistance and for connecting the unit to the line.

Line Impedance: 600 or 150 ohms

Equalization Ability (dependent on line length):

Line Termination 150 ohms: 30 to 15,000 cps.
Line Termination 600 ohms: 30 to 10,000 cps.

Insertion Loss (600-ohm source and load):
(See Frequency Characteristics curve.)

R = 0 ohms:	41-db max at 30 cycles, 2.5-db min at 11,000 cycles
R = 180 ohms:	8-db max at 30 cycles, 7-db min at 11,000 cycles

Equalization Range: Refer to Frequency Characteristics curve.

ORDERING INFORMATION

When ordering, please specify:
Type FA-14-B Equalizer Unit.

Sound Effects Filter Panel, Type FA-18-A

APPLICATION

The Type FA-18-A Sound Effects Filter Panel provides control of program bandwidth, thus enabling the user to obtain unusual dramatic sound effects. Speech and music may be made "bassy" or "tinny" and "telephone-quality" effects may be simulated.

FEATURES

1. **Simple control of desired bandwidth.**
2. **Gives variety of "bassy" or "tinny" effects.**
3. **Telephone conversation effect may be created.**
4. **Helps to eliminate static from overseas or short-wave pickups and rebroadcasts. Clarifies speech intelligence.**
5. **Easy installation and operation.**
6. **Telephone-type key permits instant switching in or out of audio circuit.**

DESCRIPTION

The FA-18-A consists of adjustable high- and low-pass filter sections mounted on a panel. Each of the filters are connected to a variable cutoff frequency-selector switch controlled by a front-panel knob. Each switch has eight cutoff positions (100, 250, 1000, 2000, 3000, 4000 and 5000 cycles) and an OFF position. A key switch is provided to connect or disconnect the filter circuit so that the filter may be preset at any time for desired characteristics and inserted in the circuit when required.

MECHANICAL SPECIFICATIONS

Dimensions:

Height	$5\frac{7}{32}$" (3 Rack Units)
Width	19"
Depth (including front panel control)	$8\frac{5}{32}$"
Weight:	9 lbs.

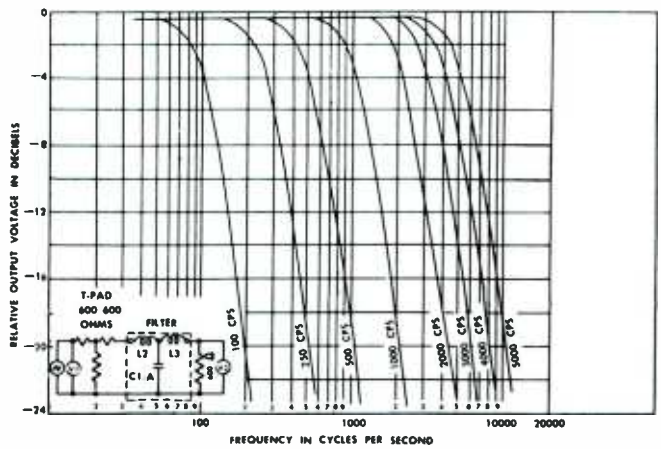
Mounting: The Sound Effects Filter Panel is designed for vertical mounting on a standard 19-inch relay or cabinet rack. A clamp-type mounting, not visible from the front, is provided to mount the panel in any desired location on a rack.

ELECTRICAL SPECIFICATIONS

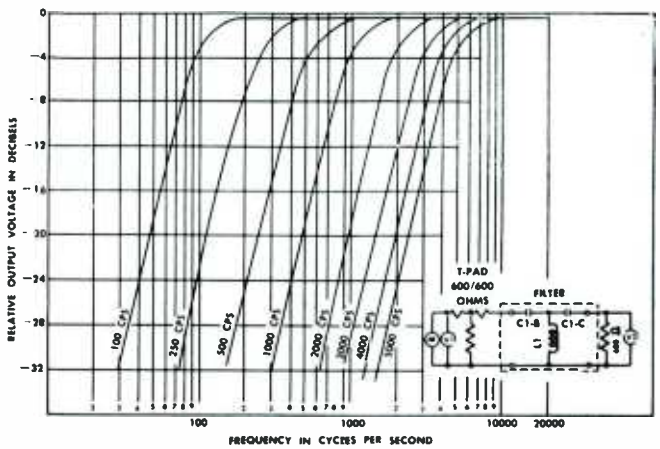
Source Impedance:	600 ohms (unbalanced)
Operating Level:	−40 to +20 dbm
Load Impedance:	600 ohms (unbalanced)
Insertion Loss:	1 db or less at passed frequencies.

ORDERING INFORMATION

When ordering, please specify:
Type FA-18-A Sound Effects Filter Panel.

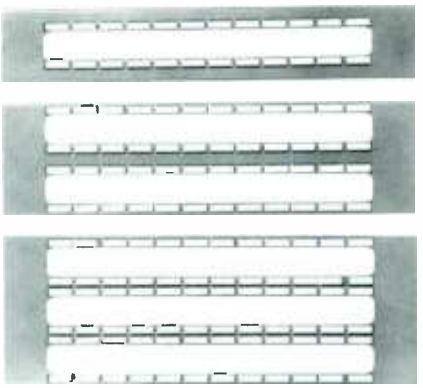


Typical Attenuation Characteristics of High-frequency Cut-off Section of FA-18-A



Typical Attenuation Characteristics of Low-frequency Cut-off Section of FA-18-A

Jack Panels, Types FA-3-A (Single), FA-3-B (Double), FA-3-C (Triple)
Patch Cords, Types FA-7-A (2′), FA-7-B (4′), FA-7-C (6′)



From top, FA-3-A, FA-3-B and FA-3-C Jack Panels

Patch Cords, Types FA-7-A, B and C

DESCRIPTION

Jack Panels are available for covering one, two or three G-E Type FA-2-A Jack Strips.

Designation cards inserted behind clear plastic strips are mounted in card holders on each panel above and below each pair of jack openings.

SPECIFICATIONS

Type No.	Description	Height	Weight
FA-3-A	Single Jack Panel	$3\frac{15}{32}$″	1¼ lbs.
FA-3-B	Double Jack Panel	$5\frac{7}{32}$″	1¾ lbs.
FA-3-C	Triple Jack Panel	$6\frac{31}{32}$″	2 lbs.

Mounting: A mounting is furnished with each panel to secure it to the Jack Strip so that no mounting screws will be exposed.

ORDERING INFORMATION

When ordering, please specify:
Type FA-3-.. Jack Panel.

DESCRIPTION

General Electric Patch Cords consist of two insulated copper conductors shielded with tinned copper braid and covered with heavy black cotton braid. A six-inch length at either end is reinforced so that the two-conductor double plug may be securely mounted. The plug at either end is interchangeable with the W. E. Type 241-A double plug. The shield of the cord is connected to the sleeves of both plugs.

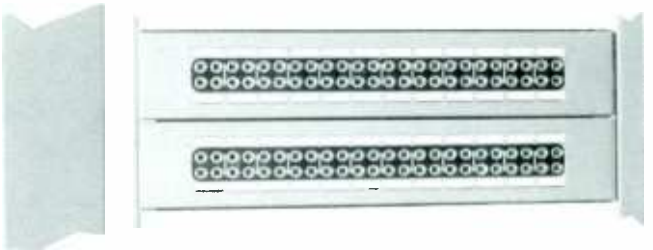
SPECIFICATIONS

General Electric Patch Cords are available in three sizes:

Type No.	Cord Length
FA-7-A	2 feet
FA-7-B	4 feet
FA-7-C	6 feet

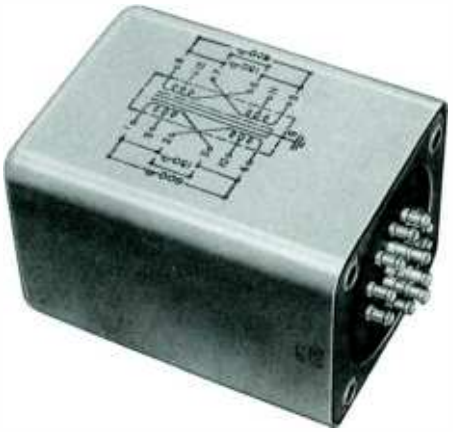
ORDERING INFORMATION

When ordering, please specify:
Type FA-7-.. Patch Cord.



Use of Jack Panel Provides a Neat Flush Mounting of Jack Strips in a Rack

Line-To-Line Transformer, Type FA-40-B
Bridging-To-Line Transformer, Type FA-41-C
Line-To-Voice Coil Transformer, Type FA-42-A



G-E Line-To-Line Transformer, Type FA-40-B

MECHANICAL SPECIFICATIONS

Dimensions: (Over-all):

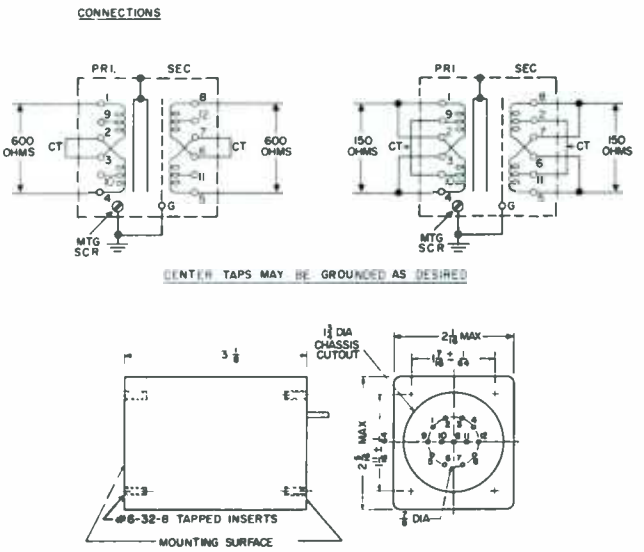
Height	$3\frac{1}{8}$" maximum
Width	$2\frac{1}{16}$" maximum
Depth	$2\frac{5}{8}$" maximum
Weight:	Approx. $1\frac{3}{4}$ lbs.
Mounting:	#6-32-8 tapped inserts.

APPLICATION

The FA-40-B Line-To-Line Transformer is designed for use as a high quality repeat coil in telephone lines, or for isolation and impedance-matching in output circuits of low- and medium-level amplifiers.

ORDERING INFORMATION

When ordering, please specify:
Type FA-40-B Line-To-Line Transformer.



Installation Drawing for FA-40-B Transformer

APPLICATION

The FA-41-C Bridging-To-Line Transformer is designed for use in connecting a 600- or 150-ohm device across a low-impedance program circuit without appreciably affecting the performance of that circuit.

MECHANICAL SPECIFICATIONS

Dimensions: (Over-all):

Height	$3\frac{1}{4}$"
Width	$2\frac{1}{16}$"
Depth	$2\frac{5}{16}$"
Weight:	Approx. $\frac{3}{4}$ lb.
Mounting:	$\frac{1}{4}$"—#6-32 tapped inserts.

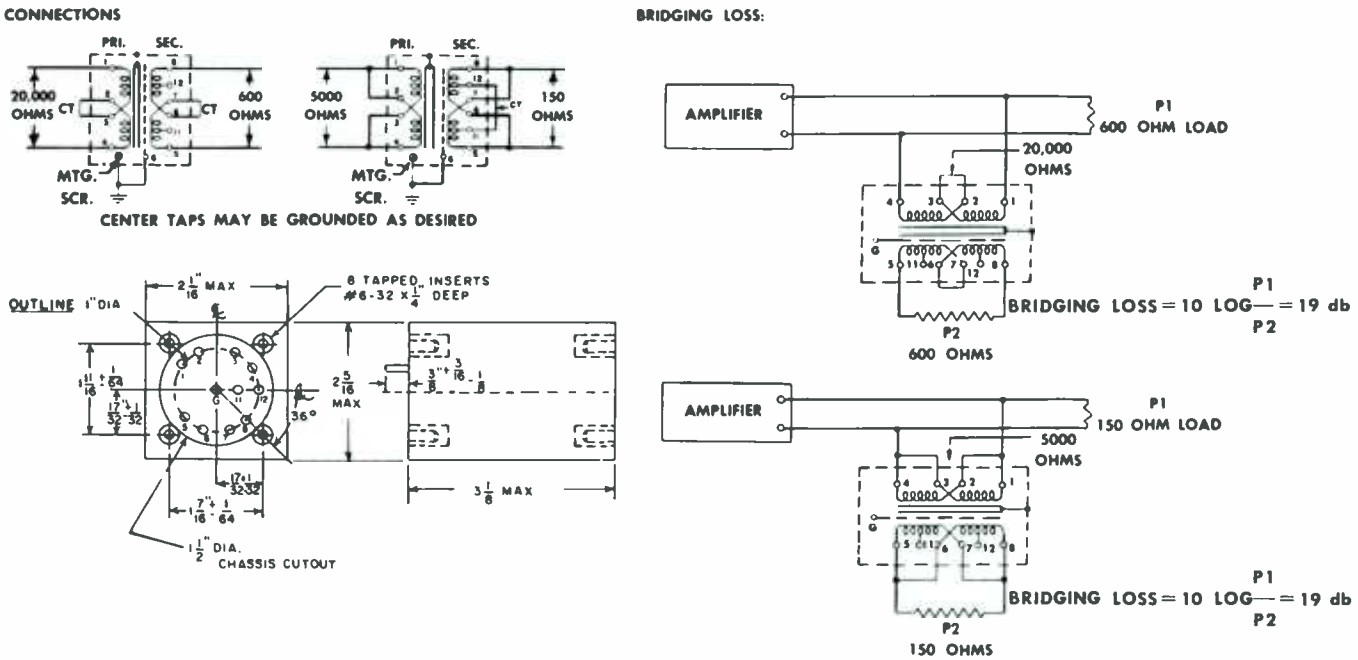
ELECTRICAL SPECIFICATIONS

Frequency Range:	In excess of 50 to 15,000 cycles, $\pm\frac{1}{2}$ db.
Impedances:	20,000 ohms to 600 ohms. 5,000 ohms to 150 ohms.
Maximum Operating Level:	+15 dbm at 50 cycles on secondary (corresponds to approx. 38 volts on 20,000-ohm primary).
Bridging Loss:	19 db. (See drawing below.)
Connections:	See drawing below.

G-E Bridging-To-Line Transformer, Type FA-41-C

ORDERING INFORMATION

When ordering, please specify:
Type FA-41-C Bridging-To-Line Transformer.



Installation Drawing for FA-41-C Transformer

APPLICATION

The General Electric Type FA-42-A Line-to-Voice Coil Transformer is designed to match a 600 ohm amplifier output to single or multiple speaker voice coils. It is provided, for this purpose, with multiple primary and secondary taps.

FEATURES

1. **Multiple primary taps.** Permits paralleling of speakers across a single output.
2. **Multiple secondary taps.** Permits use of transformer with all common voice coil impedances.
3. **Terminal impedances clearly marked.** All terminal impedances are clearly marked on the coil adjacent to the terminal.
4. **Frame bright plated to resist corrosion.**

DESCRIPTION

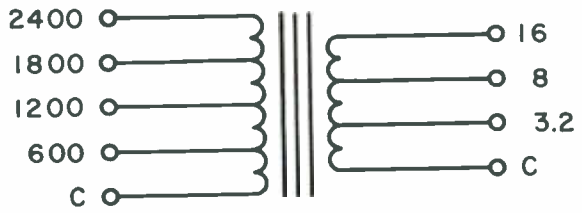
The General Electric Type FA-42-A Line-to-Voice Coil Transformer utilizes core and coil construction with solder lug type terminals.

Multiple primary terminals permit the use of from one to four speakers across the output of any 600 ohm amplifier.

Multiple secondary terminals permit the proper matching of any speaker with a voice coil impedance range of from 3.2 ohms to 16 ohms. Three taps are provided for this purpose.

All terminals are situated on the coils and are clearly marked for ready identification of their impedances.

TRANSFORMER CIRCUIT



Line-To-Voice Coil Transformer, Type FA-42-A

MECHANICAL SPECIFICATIONS

Units: 1—FA-42-A Line-to-Voice Coil Transformer.
Dimensions:
- Over-all Height 2″
- Over-all Width $2\frac{3}{8}$″
- Over-all Length $3\frac{1}{4}$″

Weight: 14 oz.
Mounting Holes: Two—$\frac{3}{16}$″ diameter on $2\frac{13}{16}$″ centers.
Connections: Solder type terminals, protruding from coil.
Markings: Terminal impedances marked adjacent to them on coil surface.
Construction: Open frame, core and coil construction.

ELECTRICAL SPECIFICATIONS

Performance:
- Frequency Response: ±2 db, 60-8000 cps.
- Power Handling Capacity: 5 watts with less than 3% distortion.

Primary Impedances: 600/1200/1800/2400 ohms.
Secondary Impedances: 3.2/8/16 ohms.

ORDERING INFORMATION

When ordering, please specify:
FA-42-A Line-to-Voice Coil Transformer.

Broadcast Shelves, Types FA-23-B, FA-23-C and FA-46-A

Front view of FA-23-B Shelf.

APPLICATION:

FA-23-B and FA-46-A

The General Electric Type FA-23-B Broadcast Shelf is designed to mount in a standard EIA 19" cabinet or relay rack. This shel;, occupying only seven inches of vertical rack space, provides mounting space for General Electric plug-in audio amplifiers in any of the following combinations:

Six BA-1-F Pre-Amplifiers, or
Four BA-9-A Uni-Level Amplifiers, or
Four BA-12-C Program/Monitor Amplifiers, or
Two BA-3-A Equalized Transcription Pre-Amplifiers, or
Two BP-10-B Power Supplies.

Combinations of the various units are possible such as mounting three BA-1-F Pre-Amplifiers and two BA-12-C Program/Monitor Amplifiers or two BA-9-A Uni-Level Amplifiers on a single FA-23-B Shelf.

The plug-in audio equipment may be easily inserted in or withdrawn from the mating receptacles mounted on the shelf. An extractor tool, clipped to the shelf door, aids in quick removal of amplifiers through the front of the rack.

The General Electric Type FA-46-A Broadcast Shelf is identical to the unit just described less the front panel and hinges.

FA-23-C

The General Electric Type FA-23-C Broadcast Shelf is designed to permit rack mounting of the General Electric Type BA-14-A Program/Monitor Amplifiers. This shelf, similar in appearance, size, and function to the FA-23-B Broadcast Shelf, differs in that the front panel of the FA-23-C Shelf contains four holes with plug buttons, control decals for the operating controls, and the indicating light jewels of the BA-14-A Program/Monitor Amplifier. If a front panel volume control is not required, the BA-14-A can be mounted in a FA-23-B Shelf. Both shelves are furnished with the same number of mating Jones receptacles and spacer bars.

Front view of FA-46-A Shelf.

FEATURES:

1. **Easy to service and maintain.** Hinged front panels permit easy, quick replacement of amplifiers, or power supplies.

2. **Space saving.** Construction of shelf, occupying only seven inches of vertical rack space, permits many ampli-

Front view of FA-23-B Shelf, with front panel open.

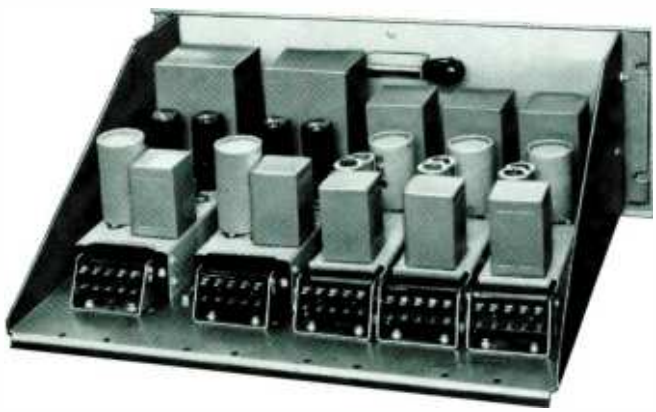
fier combinations to be compactly mounted in a small area.

3. Improved rack appearance. Door, when closed, covers all shelf mounting hardware. Shelf panel matches other General Electric rack mounted audio panels.

4. Easy amplifier replacement. Extractor tool, clipped to inside of front panel, permits rapid and easy withdrawal of amplifiers for maintenance or service.

5. FA-23-C panel adapted for mounting of controls and indicating light jewels. FA-23-C Shelf is equipped with shaft extensions for BA-14-A controls. Front panel is equipped with two control scales and plug buttons for both the controls and indicator light jewels.

6. Mounts many amplifier combinations. Spacer bars and mating receptacles may be mounted in any desired manner to permit use of different types of General Electric audio amplifiers. Shelf base is drilled to mount spacer bars and receptacles.



Rear view of FA-23-B Shelf, showing mounted BA-1-F and BA-12-C Amplifiers.

DESCRIPTION:

The General Electric Type FA-23-B, FA-23-C and FA-46-A Broadcast Shelves are designed to mount the General Electric line of plug-in audio amplifiers and power supplies in standard 19" EIA cabinet or relay racks. Through the use of these shelves, from two to six amplifiers or power supplies (depending upon the type) may be mounted in only seven inches of rack space.

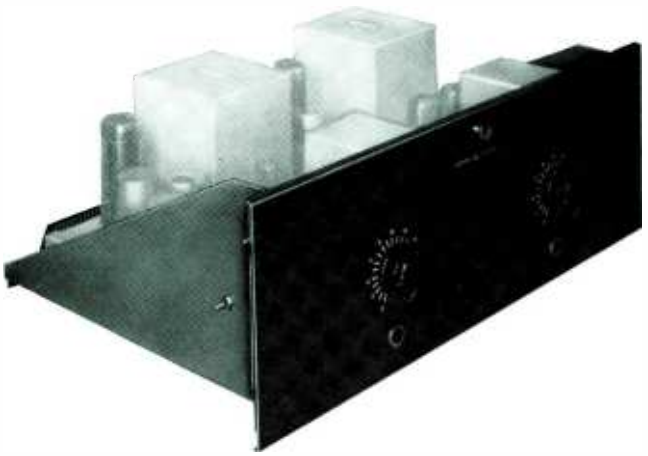
These shelves are identical in construction, size and appearance except for the addition of four holes (with plug buttons furnished) and two scales on the front panel of the FA-23-C Shelf and the lack of front panel and hinges on the FA-46-A.

All models are equipped with five spacer bars, six 10-pin Cinch-Jones 2400 series receptacles, and special brackets. The bases of the shelves are drilled to permit mounting the spacer bars and receptacles in different configurations. Both the spacer bars and receptacle brackets are drilled and tapped for this purpose.

Essentially the shelves consist of a drilled, horizontal plate, two mounting flanges, and a spring loaded, hinged front panel. The mounting flanges, an integral part of the horizontal base, are folded up vertically and are notched with standard EIA slots for rack mounting in a 19" cabinet or rack. A clip mounted on the inside of the front panel of the FA-23-B and FA-23-C holds the extractor tool for ready use whenever it becomes necessary to remove or insert an amplifier or power supply.

All steel parts are given a rust-proof plating of cadmium.

The front panel of the FA-23-B Shelf is painted a Dark Metalustre Blue and is devoid of holes or control designations.



Front view of FA-23-C Shelf, showing front panel control of mounted BA-14-A Amplifiers.

The front panel of the FA-23-C Shelf is painted a Dark Metalustre Blue, and in addition, is provided with four holes and two calibrated scales. These holes and scales are used for mounting the two indicator light jewels and for passage of the extension shafts of volume controls in the BA-14-A Program/Monitor Amplifiers. The knobs furnished are the push-on type permitting ready insertion or removal of the knobs whenever it becomes necessary to open the front panel.

A shelf utilizes fourteen inches of space between the rear of the front mounting surface and the rear of the shelf. When these shelves are mounted in a General Electric Type PR-1-A cabinet rack, the #12-24 mounting screws (furnished) are hidden from sight by the exclusive General Electric rolled front panel and cabinet design, an important contribution to the neat appearance of your control or equipment room.

MECHANICAL SPECIFICATIONS:

Units:

FA-23-B

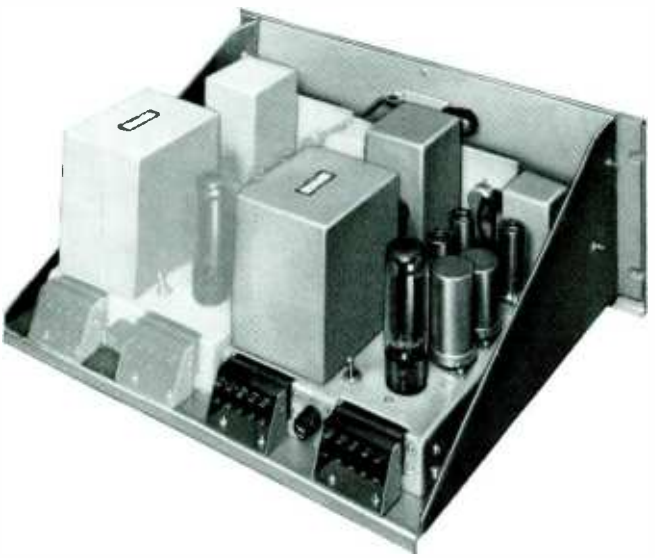
1—FA-23-B Shelf.
5—Drilled and tapped spacer bars, with screws.
6—Cinch-Jones S-2410 10-pin female connectors with special shelf mounting brackets.
1—Extractor tool.
Mounting screws.

FA-46-A2

As above less extractor tool, front panel and hinges.

FA-23-C

1—Shelf with panel plug buttons and two calibrated scales.
2—Extension shafts.
2—Control knobs and springs.
5—Drilled and tapped spacer bars, with screws.
6—Cinch-Jones S-2410 10-pin female connectors with special shelf mounting brackets.
1—Extractor tool.
Mounting screws.



Rear view of FA-23-C Shelf, showing mounted BA-14-A Amplifiers.

Dimensions:

Height: $6\frac{15}{16}$" (4 Rack units)
Width: 19"
Depth: $13\frac{9}{16}$"
Weight: 9 lbs.

Mounting:

FA-23-B, FA-23-C and FA-46-A Shelves bolt to the front of the cabinet or relay rack with #12–14 round head screws (furnished). They may be mounted in any standard 19" width cabinet or relay rack with at least 14" clearance between the front panel and the rear door.

Finish:

Front panel—G-E Dark Metalustre Blue.
Shelf base and hardware—cadmium plated for rust prevention.

ORDERING INFORMATION:

When ordering please specify:

_____General Electric Type FA-23-B Broadcast Shelf. (Type number includes shelf, panel, spacers, connectors and brackets, extractor tool, mounting screws and Installation Instructions.)

OR

_____General Electric Type FA-23-C Broadcast Shelf. (Type number includes shelf, panel with scale and plug buttons, spacers, connectors and brackets, extractor tool, extension shafts, push-on knobs, and Installation Instructions.)

OR

_____General Electric Type FA-46-A Broadcast Shelf. (Type number includes shelf, spacers, connectors and brackets, mounting screws and Installation Instructions.)

INTERCONNECTING CABLES
Twin #16 Stranded, Type FA-19-J
Twin #22 Solid, Type FA-19-M
Twin #22 Stranded, Type FA-19-R

FA-19-J

FA-19-M

FA-19-R

APPLICATION

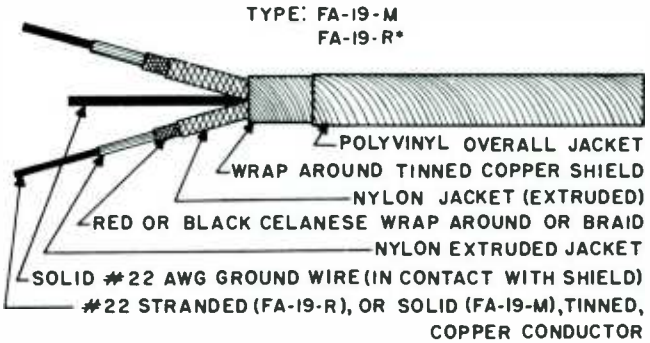
Interconnecting Cables, Types FA-19-J, FA-19-M, and FA-19-R are used for power, audio, or circuit control connections. Each of the three types has special characteristics and recommended uses. All of the three cables are designed and manufactured to give long, efficient, trouble-free service. The FA-19-M and FA-19-R Cables have been made with very small outside diameters to permit their use in large numbers in small conduits or other small-diameter wiring channels.

FEATURES

1. **Small outside diameter** of FA-19-M and FA-19-R enables use of greater number of cables in a small conduit. Outside diameter only 0.152 inches.
2. **Easily stripped** and prepared for soldering.
3. **Third bare conductor in full length contact with shield** provides excellent grounding in audio cables (FA-19-M and FA-19-R). No need to solder ground to shield.
4. **Wrap-around shield in audio cables easily removed** during making of connection. No need to fray out shield as with braided type.
5. **Audio cables insulated from each other** by over-all polyvinyl jackets on each cable. Permits common grounding at one point.
6. **Sold in 500-foot, non-returnable spool lots.**

DESCRIPTION

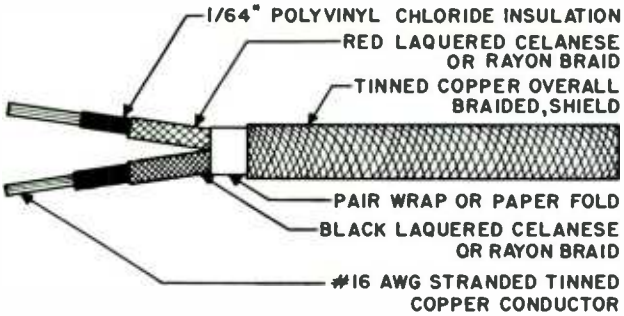
Types FA-19-M and FA-19-R Interconnecting Cables are small-diameter, two-conductor, shielded cables designed for use in low or intermediate level audio circuits. Both cables are No. 22 AWG two-conductor, shielded with over-all nylon jackets. The FA-19-M employs solid conductors, while the FA-19-R uses stranded conductors. A unique feature of these two cables is the third, bare ground wire included under the shielding and in contact with it for the entire length of the cable.



*Utilizes stranded bare ground wire.

The FA-19-M is recommended for general-purpose audio wiring within ducts, conduits, and cabinets, where vibration is at a minimum. The FA-19-R is recommended for use inside cabinet racks where some vibration or occasional wire movement can be expected. Both cables afford ground control by permitting the shield to be grounded only at those points desired. Both are capable of carrying 1.8 amperes at 400 volts DC.

FA-19-J



The FA-19-J Interconnecting Cable is a medium-diameter, two-conductor shielded cable designed for use in power and high-level audio circuits. Primarily intended for handling power, this cable is composed of two No. 16 AWG stranded conductors with heavy insulation and an over-all braided, tinned copper shield. This cable is recommended for power use up to 8.0 amperes at 600 volts and for use in high-level audio circuits where shielding is desired, as in ducts, conduit, and cabinets.

SPECIFICATIONS—MECHANICAL AND ELECTRICAL

FA-19-J: 2 No. 16 AWG, stranded, tinned copper conductors with $\frac{1}{64}$-inch, black polyvinyl chloride insulation on each conductor. One conductor covered with black lacquered celanese or rayon braid; second conductor covered with red lacquered celanese or rayon braid. The two conductors are twisted and given a pair wrap or paper fold, with a tinned copper, braided over-all shield. Length per spool, 500 feet. Rated voltage: 600 volts DC at 8 amperes. Outside diameter: 0.245 inches.

FA-19-M: 2 No. 22 AWG, solid, tinned copper conductors with nylon extruded insulation. One conductor has a black celanese wrap; second conductor has red celanese wrap. A nylon jacket is extruded over the celanese wrap of each conductor. One No. 22 solid, tinned copper ground wire is twisted with the two identified conductors and the whole included in a wrapped, tinned copper shield. A polyvinyl jacket covers over-all. Cable is furnished on 500-foot spools. Rated voltage: 400 volts DC at 1.8 amperes. Outside diameter: 0.152 inches.

FA-19-R: 2 No. 22 AWG, stranded, tinned copper conductors with nylon extruded insulation. One conductor covered with black celanese wrap; second conductor covered with red celanese wrap. Over the celanese wraps on each conductor is extruded a nylon jacket. One No. 22, stranded, tinned copper ground wire is twisted with the two identified conductors and the whole included in a wrapped, tinned copper shield. A polyvinyl jacket covers over-all. Cable is furnished on 500-foot spools. Rated voltage: 400 volts DC at 1.8 amperes. Outside diameter: 0.52 inches.

ORDERING INFORMATION

When ordering, please specify:

Type No. FA-19..... Interconnecting Cable;
.....feet; .....spools.

RECOMMENDED NUMBER OF CABLES IN ONE CONDUIT

Conduit Size (Nominal)

Cable Type	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	3½"	4"	4¼"
FA-19-J	2	4	7	13	17	28	40	62	83	107	135
FA-19-M	6	10	17	28	38	63	88	138	185	238	300
FA-19-R	6	10	17	28	38	63	88	138	185	238	300

Program Level Indicator Panel, Type FA-1-A
Switch and Fuse Panel, Type FA-4-A

1. Program Level Indicator Panel, Type FA-1-A

PROGRAM LEVEL INDICATOR PANEL, TYPE FA-1-A

APPLICATION

The Type FA-1-A Program Level Indicator Panel provides a means of measuring accurately the program level of up to ten 600-ohm audio lines. The level of lines having other impedances may be measured by applying suitable correction factors. Program-level readings obtained with this unit are in "volume units" (VU). When used to make steady-state, single-frequency measurements, the readings obtained are in dbm.

FEATURES

1. **Measures levels from +4 to +42 VU.**
2. **May be switched to any of ten program lines.**
3. **Uses large size, illuminated standard VU meter.**
4. **Clamp-type mounting for easy installation.**

DESCRIPTION

The unit includes a two-circuit, ten-point selector switch (plus an OFF position), a variable step-type attenuator which provides readings of from +4 to +42 VU (or dbm) in 2-db steps, a VU meter, and a calibrating potentiometer for making a fine adjustment of the level reading over a range of ±½ dbm. The illuminated VU meter has two scales: the upper scale is calibrated in percent, ranging from 0 to 100; the lower scale is calibrated in VU, ranging from −20 to +3. A source of 6.3 volts at 0.3 amp is required for illumination.

MECHANICAL SPECIFICATIONS

Dimensions

Height	$5\frac{7}{32}$ in. (3 RU)
Width	19 in.
Depth	$3\frac{3}{8}$ in.
Weight	$4\frac{1}{2}$ lbs.

Mounting: The unit mounts on a standard 19-inch RETMA relay or cabinet rack. A clamp-type mounting, which is not visible from the front, is provided to mount the panel in any desired location on the rack.

VU Scale: "B" Scale

ELECTRICAL SPECIFICATIONS

Input Impedance	7500 ohms
Measurement Range (600-ohm lines)	+4 to +42 VU (or dbm) in 2-db steps
Number of Lines That May Be Measured	1 to 10, inclusive

ORDERING INFORMATION

When ordering, please specify:
Type FA-1-A Program Level Indicator Panel.

2. Switch and Fuse Panel, Type FA-4-A

SWITCH AND FUSE PANEL, TYPE FA-4-A (FRONT PANEL OPEN)

APPLICATION

The Type FA-4-A Switch and Fuse Panel provides a master power switch, indicator lamp and fuse protection for an entire cabinet or relay rack.

FEATURES

1. **Easy access to fuse block through hinged-front panel.**
2. **Unused surface on removable back plate readily fitted with additional equipment.**
3. **Attractively styled for any cabinet mounting.**

DESCRIPTION

Power circuits running through the FA-4-A are activated by the switch. Dual fuses protect equipment from surges and shorts in the power line. The panel light indicates that the line is in use, or, with switch on and light out, indicates circuit trouble. The hinged-front panel allows easy access to the fuse block on the inside back plate for inspection or replacement of fuses. Two fuses of the screw-plug type are required, but are not furnished since their rating depends upon the load to be protected. On the removable back plate are approximately 100 square inches of unused surface which may be used to mount additional terminal distribution blocks, filament or line transformers, line pads, equalizers, relays, and so forth. A ⅞-inch diameter hole is provided at each end of the chassis for connecting external wires.

MECHANICAL SPECIFICATIONS

Dimensions

Height	$6\frac{31}{32}$ in. (4 RU)
Width	19 in.
Depth (behind panel)	$3\frac{1}{4}$ in.
(over-all)	$4\frac{5}{16}$ in.
Weight:	$5\frac{1}{2}$ lbs.

ELECTRICAL SPECIFICATIONS

Switch	DPST, 20 amps, 125 v
Fuses (not furnished)	Plug type; rating dependent on equipment to be protected; 20 amps maximum
Lamp	Mazda #6S6, 120 v, 6 watts

ORDERING INFORMATION

When ordering, please specify:
Type FA-4-A Switch and Fuse Panel.

Automatic Program Control System, Type BC-16-A

APPLICATION

The Type BC-16-A Automatic Program Control System provides television stations with a means to automatically time and control the switching of film, slide, audio tape and network sources.

In the AM or FM radio station application, it may be used to automatically control the playback of audio tape, operate automatic turntables, and switch to either network or local programs.

FEATURES

1—Operating costs reduced by:

a. Preventing human errors in switching during station breaks.

b. Preparation of programs in advance, by stenographic personnel and using low cost paper tape. (About 6″ of tape per hour continuous programming.)

c. Relieving technicians of manual switching, so they can devote full time to checking quality of output signals.

2—Operation—Simple, flexible, reliable.

a. Controls up to seven different operations.

b. Designed for continuous or intermittent program operation.

c. Provides manual over-ride controls and adjustable time delay projection control circuits.

d. Visual indicators of program source and timing.

e. Built-in power supply in control unit.

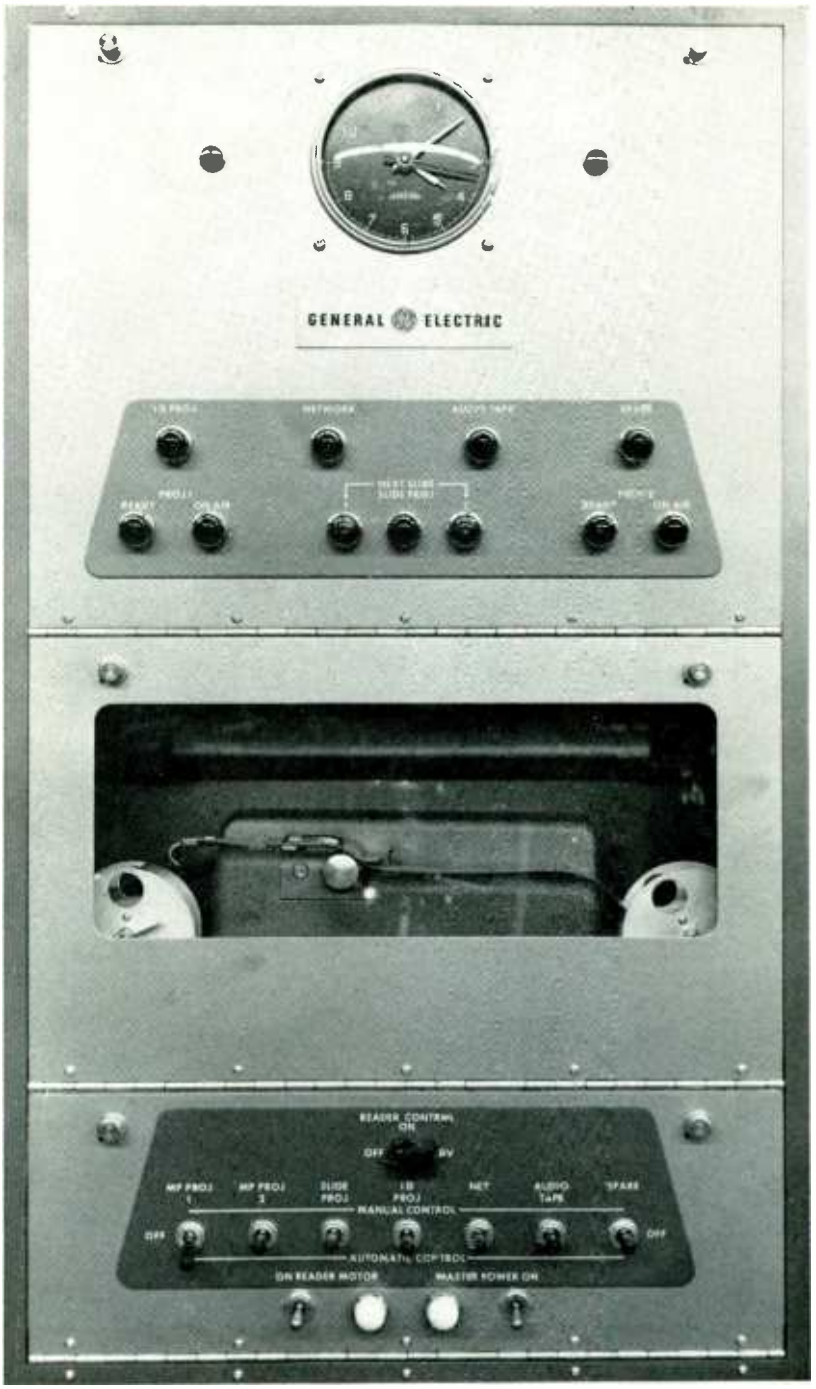
DESCRIPTION

Type BC-16-A Automatic Program Control System consists of a Type BC-17-A Tape Editor and a Type BC-18-A Reader-Control Unit.

Basically the circuit is composed of an eight channel paper tape controlled relay switching system. The paper tape reader stepping rate is controlled by either one second or one minute pulses which are supplied by a synchronous timer unit. The one minute or one second rate is determined by the eight channel of the control tape.

The use of a dual time base reading system, either one second per step or one minute per step, makes it possible to control a half hour of continuous program material with only 3″ of tape (18 hours of material with approximately 60′ of tape). It should be understood that complexity of programming can effect this over-all length of control tape.

Type BC-17-A Tape Editor is composed of a motor-driven eight channel punch mechanism, tape feed spool and take up assembly, two lever keys and one seven-position push-button switch for the control of the editing unit and an impulse-type clock unit which will provide a tabulation of time as it is edited into the tape. This unit also contains a power supply for the operation of the punch mechanism and indicator light.



Type BC-18-A Reader-Control Unit

Type BC-18-A Reader-Control Unit is composed of a punched paper tape reader and the associated relays required for the operation of projectors, slide mechanisms, tape recorders, turntables, network circuits, etc. in TV, AM and FM operations.

The operation of this control unit is governed by an eight channel punched paper tape. The spacing and location of the punched holes in this paper tape controls the time and sequence of operations to be performed.

The relays provide start and stop switching for seven separate functions. Two of these functions include time delay relays for use with motion picture projectors. These delay relays are variable so that the unit can be adjusted to operate with any type or combination of projectors. In addition, the projection control channels provide either operating pulses or holding voltages for the operation of all types of projection equipments.

Lever keys are provided for manual over-ride. Tally lights are provided to indicate the status of the control circuits.

A small chassis containing relays required for the flip-flop operation of dual slide projectors and a third projector for I.D. or emergency slide use is also provided. This unit will be located in the vicinity of the slide projection equipment, remote from the reader-control unit. This reduces the installation wiring required between the control unit and the projection equipment.

Type BC-17-A Tape Editor

MECHANICAL SPECIFICATIONS

Units: Type number covers editor unit and reader-control unit.

Dimensions:

Reader and Relay Assembly: 29½" high x 17" wide x 14" deep. Cabinet for rack or wall mounting.

Editing Unit: Portable, may be set on any desk or table, 14" high x 18" deep x 12½" wide.

Slide-Relay Sub-Assembly: 12" long x 6" wide x 3" high.

Operating Conditions: External ambient temperature of 35° C, and a relative humidity of 95%.

Electrical Connections: Inter-connections between units and control connections from relay assembly are made via use of terminal boards. Editing unit provided with a cord and connector for use on any standard 117 V AC outlet.

Reader head assembly plugs into main assembly of the reader-control unit for ease of maintenance.

Safety Provisions: All voltage points are contained within unit case.

ELECTRICAL SPECIFICATIONS

Power Requirements:

110/117/125 volts AC 60 cycle single phase, 140 watts.

Inputs:

Control Voltages: 117 V AC and 24 V DC
Signal: Audio

Outputs:

Control Voltages: 24 V DC and 117 V AC
Signal: Audio

Controls and Adjustments: Manual over-ride control switches. Adjustable time delay relays on projector positions to cover starting speeds of various types of projectors. Stop, operate and rapid advance control of the reader unit.

Indicators: Status light on relay switching assembly to give indication of operation, accumulated time counter. Tally light and counter tape clock to show edited time in the editor unit.

ORDERING INFORMATION

When ordering specify: Type BC-16-A Automatic Program Control System to consist of:

1—Type BC-17-A Tape Editor
1—Type BC-18-A Reader-Control Unit.

BROADCAST AND TV STUDIO EQUIPMENT PRICE LIST
BROADCAST EQUIPMENT DATA BOOK

FEBRUARY 15, 1959

Section E 231

PAGE	TYPE NUMBER	EQUIPMENT	PRICE
31	BT-50-A	50 KW A.M. Transmitter	$ 95,000.00
		AM TRANSMITTER ACCESSORIES	
	400R	Schaefer Basic Remote Control System, less accessories	1,695.00
		Schaefer Remote Control Accessories	On Request
		(Remote control facilities vary with installation)	
	GR1181A	General Radio Monitor (AM)	940.00/
		Antenna Phasing Equipment	On Request
		(Varies with installation)	
		Dummy load (air cooled)	2,150.00
		Transmitter Control Console	On Request

Prices are net f.o.b. point of shipment and do not include sales, use, excise or similar taxes.
Prices are subject to change without notice.
Where tubes are required, price includes one set.
/Indicates correction or addition to former price list.

50 KW AM Transmitter, Type BT-50-A

APPLICATION

Type BT-50-A 50 KW AM Transmitter supplies 53.0 kilowatts of amplitude modulated RF carrier in the frequency range from 535 to 1620 kilocycles.

INTERCHANGEABILITY

Can be used with studio broadcast equipment whose output signal complies with RETMA standard.

COMPLIANCE

Complies with all applicable FCC and RETMA specifications.

FEATURES

1—Low installation cost.

- *a. Small size*—13½ ft. x 4½ ft.—can be housed in small building.
- *b. Lightweight tubes do not require dollies or hoists*—access aisles can be limited to 42".
- *c. No under-floor ducts*—intercubicle wiring ducts built into cabinetry.
- *d. External blower*—can be located remotely for accessibility and layout flexibility.
- *e. Can be operated in unheated building*—ambient temperature range is 0° to 120° F.
- *f. Multiple radiator antenna and single radiator omnidirectional antenna* installations facilitated by multiple RF output impedance (50 to 230 ohms).

2—Low operating cost.

- *a. Small tube complement*—only 16 in complete transmitter. Since there are only six types, spare tube inventory can be small.
- *b. Low-cost, long-life tubes.*
- *c. Standard power input*—2400 or 480 volts, three phase. (Equipment for operation at other voltages and frequencies available if required.)
- *d. Low power consumption*—108 KW at 0.91 power factor for average (30% modulation).

3—Dependable operation and low maintenance expense.

- *a. Germanium rectifiers supply all direct current.*
- *b. Long rectifier life assured*—operating characteristics of germanium do not change with age.
- *c. Germanium rectifiers eliminate destructive voltage surges* caused by arc starvation in mercury vapor tubes.
- *d. Can be used at low temperatures* simplifying remote operation when approved.
- *e. Extreme simplicity in RF circuits*—conventional proven circuits familiar to all operators are used throughout the transmitter.
- *f. Class B audio modulation with Class C RF stage.*
- *g. Only 3 Class C amplifier stages* produce 53 KW output at terminals.
- *h. Easily-tuned.* Front-of-cubicle meters easily read; no tuning procedures that require oscilloscopes or special equipment.

i. The 6427 final RF and audio tubes weigh only 20 pounds each and can easily be lifted into or out of their sockets without tube hoists or other auxiliary equipment.

j. Quick, complete access—full length cubicle doors front and back.

k. Low distortion—feed-back circuits make it easy to maintain low distortion; (measured less than 2%, 50-7500 cycles).

l. Protection against momentary surges—recloser with automatic reset re-applies power in case of momentary outages (sometimes caused by lightning).

m. Power is automatically re-applied following short duration (2 second) power outages.

n. Extra care has been given to the selection and placement of components so that long uninterrupted operation will be obtained with a minimum of care.

4—The plate modulated Class C amplifier used will operate satisfactorily into directional antennas where the load impedance often varies 2 to 1 at sideband frequencies.

5—To restrict harmonic radiation, harmonic filters are built in and RF circuits are completely shielded.

6—Complete safety protection to operating personnel and equipment has been provided.

7—Can be supplied with Pyranol filled transformers and reactors.

DESCRIPTION

Type BT-50-A 50 KW AM Transmitter consists of three cubicles each 7 ft. high, 4½ ft. wide and 4½ ft. deep.

The Modulator is driven by four 304TL triodes operated as cathode followers. By using two 304TL's in parallel on each side of the push-pull circuit an extremely low impedance driver is obtained for the modulator tubes and these tubes are operated with very low dissipation.

A Class A audio amplifier employing a pair of 6156 tetrodes provides ample voltage for the cathode follower stage.

Feedback around the audio stages makes it easy to maintain low distortion. Adjustments are not critical nor subject to small variations in tubes or other operating parameters. Ten DB of rectified RF feedback at low audio frequencies keeps hum well below 60 db and reduces distortion.

Plate power for the final RF and audio stages is applied with high-speed contactors which have demonstrated their ability to operate many years without service. These contactors are backed up by current limiting protectors which prevent damage to transformers and contactors should a fault develop in primary power circuits. A step-down distribution transformer provides 208 and 120 volt power for low level circuits.

Final radio frequency is generated by a crystal controlled oscillator and amplified by only 3 Class C amplifier stages to produce a carrier signal of 53 kilowatts. This power, and more if needed to provide for unusual losses in directional antenna phasing networks, and transmission lines, is available at the transmitter output terminals. The RF output circuit is a conventional pi-network type of circuit with the load capacitively coupled to the tank circuit to minimize harmonics.

A built-in completely shielded low-pass harmonic filter further reduces harmonic output to levels far below present specifications and adequate to meet anticipated revised FCC specifications.

Germanium rectifiers, which do not deteriorate with age, are used for all DC voltage supplies. As mentioned previously, use of germanium rectifiers will completely eliminate destructive voltage surges which may develop in plate transformers with arc starvation in gas rectifier tubes. Not only will the Broadcaster save money on tubes, but he can operate this transmitter in an unheated building and save the expense of installing a heating system.

MECHANICAL SPECIFICATIONS

Units: Type number consists of three cubicles and associated external equipment.

Dimensions and Mounting:

	Height	Width	Depth	Weight
Rectifier and Control Cubicle	84″	54″	54″	2200 lbs. (approx)
Exciter & Modulator Cubicle	84″	54″	54″	2200 lbs. (approx)
RF Amplifier Cubicle	84″	54″	54″	2200 lbs. (approx)

Mounting: See diagram of Typical Station Layout for dimensions of external equipment and for mounting requirements.

Operating Conditions:

Ambient Temperature 0-120° F.
Maximum altitude 5000 ft. for standard equipment, easily modified for higher altitudes.
Maximum Relative Humidity—95%.

Safety Provisions: All doors are provided with electrical interlocks and safety grounding switcher to protect personnel from high voltage. Control circuits provide overload protection and proper sequencing to prevent damage to the equipment.

ELECTRICAL SPECIFICATIONS

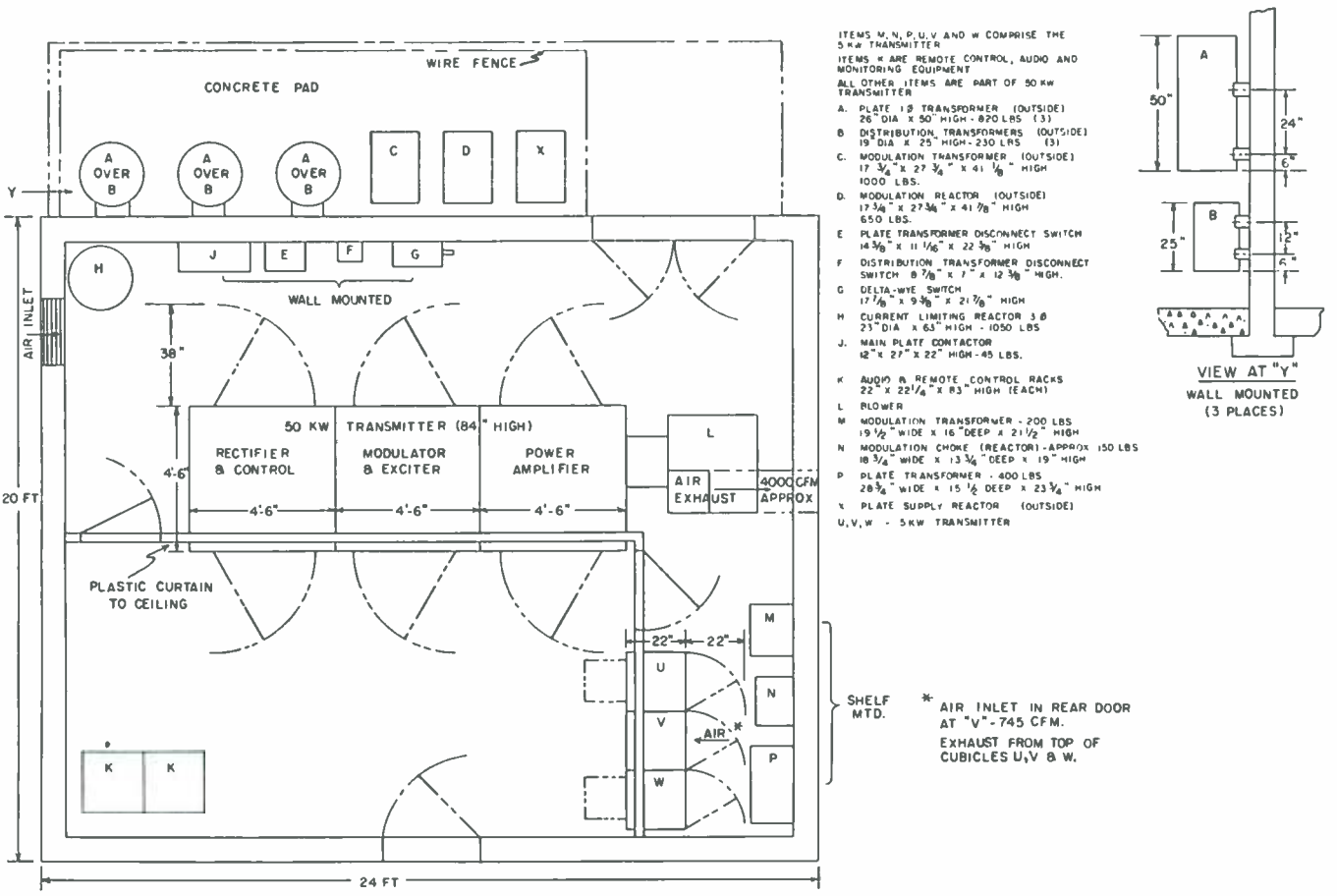
Performance:

Frequency: As specified between 535 and 1620 kc.
Frequency Stability: ±5 cycles.
Power Output (at Transmitter Output Terminal): 53 KW.
Type of Emission: A3.
Type of Modulation: High Level.

Power Requirements:

Percentage Modulation	50 KW RF Carrier Power	53 KW RF Carrier Power
0%	94 KW @ 0.9 P.F.	98 KW @ 0.9 P.F.
30%	108 KW @ 0.91 P.F.	113 KW @ 0.91 P.F.
100%	145 KW @ 0.93 P.F.	153 KW @ 0.93 P.F.

2400 or 480, 60 cycles 3 phase (If required, equipment can be furnished for operation at other power line voltages and frequencies.)



Typical Station Layout
50 KW AM Broadcast Transmitter with 5 KW Standby and Conelrad Transmitter

Audio Input: +10 dbm, ±2 dbm for 100% modulation.

Audio Input Impedance: 600/150 ohms.

Audio Response: ±1.5 db 30–10,000 cycles.

Audio Distortion: Less than 3% 50–7500 cycles.

Noise Level: More than 60 db below 100% modulation.

Carrier Shift: Less than 2½% –0 to 100% modulation with 0 regulation of supply voltage.

Output: Unbalanced.

Output Impedance: 50 to 230 ohms.

TUBE COMPLEMENT

1—6146 Crystal Oscillator
1—6146 Buffer Amplifier
1—6156 1st Intermed. Power Amplifier
1—6623 2nd Intermed. Power Amplifier
2—ML-6427 Power Amplifier
2—6136 First Audio
2—6156 Second Audio
4—304TL Third Audio
2—ML-6427 Modulator

ORDERING INFORMATION

When ordering please specify: Type BT-50-A 50 KW AM Transmitter. This standard transmitter consists of:

1—Rectifier & Control Cubicle
1—Exciter & Modulator Cubicle
1—RF Amplifier Cubicle
1—Blower
3—Plate Transformers
1 -Current Limiting Reactor, 3 phase
1—Plate Contactor Assembly
1—Delta Wye Switch
1—Fused Disconnect Switch (200 amps)
1—Filter Reactor
1—Modulation Transformer
1—Modulation Reactor
3—Distribution Transformers
1—Fused Disconnect Switch (60 amp)

CAPACITOR AND RESISTOR COLOR CODE CHART

RESISTORS
FIXED COMPOSITION
RETMA STANDARD REC-116
MILITARY STANDARD MIL-R-11A

Color	Digits of Resistance (ohms)	Multiplier	Tolerance (%)
Black	0	1	—
Brown	1	10	—
Red	2	100	—
Orange	3	1000	—
Yellow	4	10,000	—
Green	5	100,000	—
Blue	6	1,000,000	—
Violet	7	10,000,000	—
Gray	8	100,000,000	—
White	9	—	—
Gold	—	0.1	±5
Silver	—	0.01	±10
No color	—	—	±20

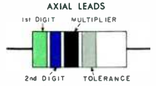
INSULATION CODING

RETMA: Insulated fixed composition resistors with axial leads are designated by a background of any color except black. The usual color is natural tan. Noninsulated fixed composition resistors with axial leads are designated by a black background color.

MILITARY (MIL): Insulated resistors are designated by a background of any color except black. The usual color is natural tan. Noninsulated resistors with axial leads are designated by a black background color. Noninsulated resistors with radial leads are designated by a black background color or by a background the same color as the first significant figure of the resistance value.

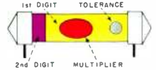
EXAMPLES

AXIAL LEADS



56 ohms ± 10%

RADIAL LEADS (OBSOLETE)



4700 ohms ± 10%

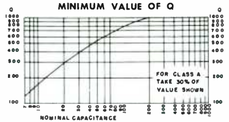
CAPACITORS
MICA DIELECTRIC
RETMA STANDARD REC-115A
(See example under MIL-C-5A)

Color	Digits of Capacitance (μμf)	Class	Multiplier	Tolerance (%)
Black	0	A	1	±20
Brown	1	B	10	—
Red	2	C	100	±2
Orange	3	D	1000	±3
Yellow	4	E	10,000	—
Green	5	F	—	±5
Blue	6	G	—	—
Violet	7	—	—	—
Gray	8	I	—	—
White	9	J	—	—
Gold	—	—	0.1	±5
Silver	—	—	0.01	±10

DESCRIPTION OF CLASS

Class	Temperature Coefficient (parts per million per °C)	Maximum Capacitance Drift	Minimum Insulation Resistance (megohms)
A	±1000	±(5% +1 μμf)	3000
B	±500	±(3% +1 μμf)	6000
C	±200	±(0.5% +0.5 μμf)	6000
D	±100	±(0.3% +0.1 μμf)	6000
E	+100 −20	±(0.1% +0.1 μμf)	6000
F	+150 −50	±(0.3% +0.2 μμf)	6000
I	+100 −50	±(0.2% +0.2 μμf)	6000

MINIMUM VALUE OF Q

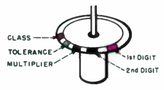


VOLTAGE RATING
(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches) Length	Width	Thickness	Style	Capacitance (μμf)	Voltage Rating (v d-c)
51/64	15/32	7/32	20	5–510 560–1000	500 300
1 7/64	15/32	7/32	25	5–1000 1100–1500	500 300
53/64	53/64	9/32	30	470–6200 Over 6200	500 300
53/64	53/64	3/8	35	3300–6200 Over 6200	500 300
1 1/32	41/64	11/32	40	100–2400 2700–7500 Over 7500	1000 500 300

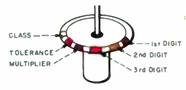
EXAMPLES

SILVER MICA BUTTON CAPACITORS (5-DOT)



700 μμf ± 5%, Class C

SILVER MICA BUTTON CAPACITORS (6-DOT)



1320 μμf ± 2%, Class E

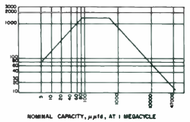
CAPACITORS
MICA DIELECTRIC
MILITARY STANDARD MIL-C-5A

Color	Digits of Capacitance (μμf)	Characteristic	Multiplier	Tolerance (%)
Black	0	A	1	±20
Brown	1	B	10	—
Red	2	C	100	±2
Orange	3	D	1000	—
Yellow	4	E	—	—
Green	5	F	—	—
Blue	6	G	—	—
Violet	7	—	—	—
Gray	8	—	—	—
White	9	—	—	—
Gold	—	—	0.1	±5
Silver	—	—	0.01	±10

DESCRIPTION OF CHARACTERISTIC

Characteristic	Temperature Coefficient (parts per million per °C)	Maximum Capacitance Drift	Minimum Insulation Resistance (megohms)
B	Not specified	Not specified	7500
C	±200	±0.5%	7500
D	±100	±0.3%	7500
E	+100 −20	±(0.1% +0.1 μμf)	7500
F	+70	±(0.05% +0.1 μμf)	7500

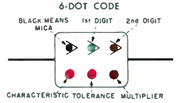
Q MINIMUM VALUE OF Q



VOLTAGE RATING
(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches) Length	Width	Thickness	Style CM	Capacitance (μμf)	Voltage Rating (v d-c)
33/64	7/16	7/32	15	5–510	300
51/64	15/32	7/32	20	5–510 560–1000	500 300
1 7/64	15/32	7/32	25	51–1000	500
53/64	53/64	9/32	30	560–3300	500
53/64	53/64	11/32	35	3600–6200 6800–10,000	500 300
1 1/32	41/64	11/32	40	3300–9200 9100–10,000	500 300

EXAMPLE
6-DOT CODE



510 μμf ± 2%, Characteristic C, 500 v (Style 20)

The arrangement of dots under RETMA Standard REC-115A is the same as in the example above. The only difference is that the *first* dot is *white* instead of *black*.

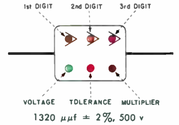
CAPACITORS
MICA DIELECTRIC
OBSOLETE STYLES

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

*Old 3-dot only.

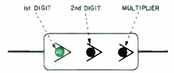
EXAMPLES

6-DOT CODE



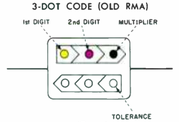
1320 μμf ± 2%, 500 v

3-DOT CODE



50 μμf
(Voltage rating is always 500 v; tolerance is always 20%.)

3-DOT CODE (OLD RMA)



47 μμf
(Voltage rating is always 500 v; tolerance is always 20%.)

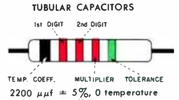
CAPACITORS
CERAMIC DIELECTRIC
RETMA STANDARD REC-107A
MILITARY STANDARD MIL-C-20A

Color	Digits of Capacitance (μμf)	Multiplier	Tolerance: 10 μμf or Less (μμf)	Tolerance: Over 10 μμf (%)	Temperature Coefficient (parts per million per °C): RETMA	Temperature Coefficient (parts per million per °C): MIL
Black	0	1	±2.0	±20	0	0
Brown	1	10	±0.1†	±1	−33	−30
Red	2	100	—	±2	−75	−80
Orange	3	1000	—	±2.5†	−150	−150
Yellow	4	10,000†	—	—	−220	−220
Green	5	—	±0.5	±5	−330	−330
Blue	6	—	—	—	−470	−470
Violet	7	—	—	—	−750	−750
Gray	8	0.01	±0.25	—	+150 to −1500	+30
White	9	0.1	±1.0	±10	+100 to −750	−330
Gold	—	—	—	—	—	+100

†RETMA only.

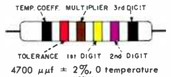
EXAMPLES

TUBULAR CAPACITORS



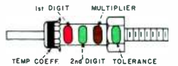
2200 μμf ± 5%, 0 temperature coefficient
(Voltage rating is always 500 v.)

TUBULAR CAPACITORS (OLD RMA)



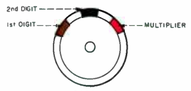
4700 μμf ± 2%, 0 temperature coefficient

STAND-OFF CAPACITORS (RETMA ONLY)



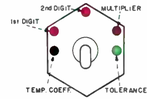
250 μμf ± 5%, 0 temperature coefficient

3-DOT BUTTON CAPACITORS (RETMA ONLY)



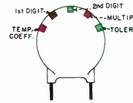
1000 μμf

FEED-THROUGH CAPACITORS (RETMA ONLY)



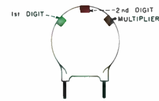
220 μμf ± 5%, 0 temperature coefficient

5-DOT DISC CAPACITORS (RETMA ONLY)



1500 μμf ± 5%, −75 temperature coefficient
(Voltage rating is always 500 v.)

3-DOT DISC CAPACITORS (RETMA ONLY)



510 μμf
(Voltage rating is always 500 v; tolerance is always −0.)

CAPACITORS
PAPER DIELECTRIC
MILITARY STANDARD MIL-C-91A
(Commercial codes are same except as noted)

Color	Digits of Capacitance (μμf)	Multiplier	Tolerance (%)	Voltage Rating* (v d-c)	Characteristic	Temperature Rating (°C)
Black	0	1	±20	—	A	85
Brown	1	10	—	100	E	85
Red	2	100	—	200	—	—
Orange	3	1000	±30	300	—	—
Yellow	4	10,000	—	400	—	—
Green	5	—	—	500	—	—
Blue	6	—	—	600	—	—
Violet	7	—	—	700	—	—
Gray	8	—	—	800	—	—
White	9	—	—	900	—	—
Gold	—	—	—	1000	—	—
Silver	—	—	±10	—	—	—

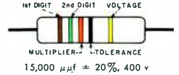
*Tubular capacitors only; for rectangular capacitors see table below.

VOLTAGE RATING FOR RECTANGULAR CAPACITORS
(Indicated by dimensions rather than color coding)

Maximum Dimensions (inches) Length	Width	Thickness	Style CM	Capacitance (μμf)	Voltage Rating (v d-c)
51/64	15/32	7/32	20	1000 2000–6000 10,000	400 200 120
57/64	57/64	17/64	22	2000–3000 6000–10,000 20,000	400 300 120
53/64	53/64	9/32	30	1000–2000 3000 6000–10,000 20,000	800 600 400 120
53/64	53/64	11/32	35	3000 6000–10,000 20,000	800 600 300
1 1/4	41/64	9/32	41	3000–6000 10,000 20,000 30,000	600 400 300 120
1 15/32	49/64	11/32	42	1000–6000 10,000–20,000 30,000 50,000 100,000	1000 600 400 300 120
1 15/32	49/64	13/32	43	10,000 20,000–30,000 50,000–100,000 200,000	1000 600 400 120

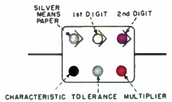
EXAMPLES

TUBULAR CAPACITORS (COMMERCIAL ONLY)



15,000 μμf ± 20%, 400 v
(No characteristic or temperature rating)

RECTANGULAR CAPACITORS



4700 μμf ± 10%, Characteristic A

GENERAL ELECTRIC
SCHENECTADY, NEW YORK