



COLLINS hf-vhf ground  
systems

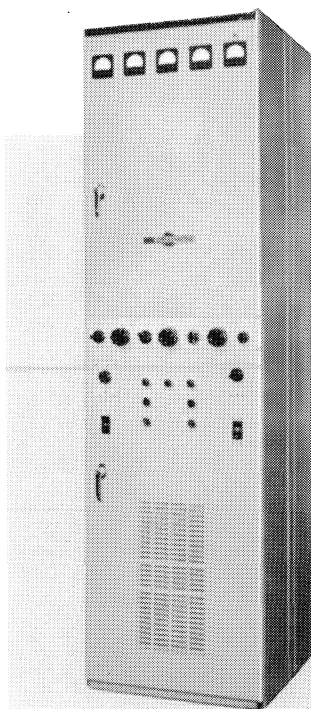
# HF SSB POWER AMPLIFIERS



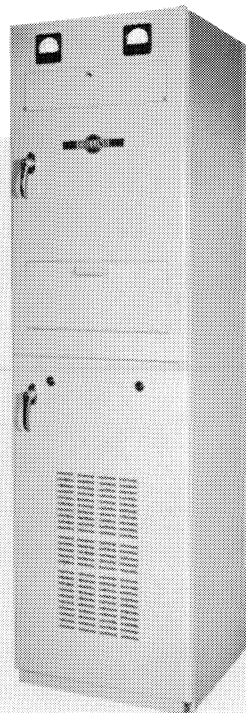
205J-1

**205J-1 45 KW POWER AMPLIFIER** — An automatically tuned linear power amplifier capable of 45 kw PEP output over the 2 to 30 mc frequency range. Low distortion amplifiers allow transmission of multiplex signals without mutual interference between subchannels. Local or remote control for either attended or unattended operation may be employed. RF and pre-positioning information for the tuned circuits is supplied by an external exciter, such as the Collins 310F-1. Servo devices within the equipment automatically complete the tuning and loading of the three amplifier stages. A pi-L network is used for antenna coupling. Over-all negative feedback provides extremely linear operation. A distortion canceling circuit also contributes to the high degree of linearity. Mercury vapor rectifier tubes are in a temperature-controlled chamber for operation at low temperatures. Power output may be reduced to 12 kw. *RF Bandwidth:* Not less than 16 kc between -1 db points. *Distortion:* 3rd and higher odd order distortion products are at least 35 db below either of two equal tones required to drive the power amplifier to 45 kw PEP output when used with a Collins 310F-1 Exciter. *Harmonic Output:* 2nd harmonic at least 50 db down. All harmonics above 50 mc at least 60 db down. Added filtering can be used at the output transmission line if required. *Noise:* Noise output is at least 50 db below either of two equal tones required to drive the power amplifier to 45 kw PEP output. *Ambient:* -29 to +50°C.

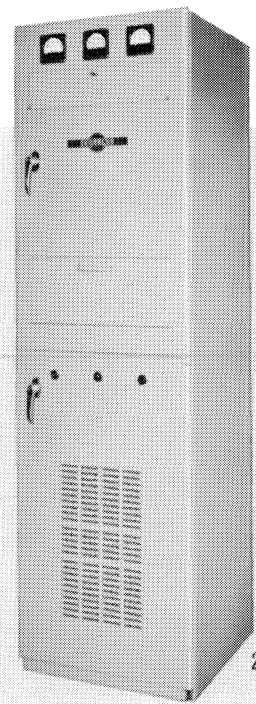
**204C-1 10 KW POWER AMPLIFIER** — A manually tuned linear power amplifier capable of 10 kw output over the 4



204C-1



204F-1



204H-1



to 25 mc frequency range. A nominal 0.1 watt drive signal at the desired output frequency is supplied by an external source. May be used in continuous duty applications with either attended or unattended operation. Local or remote control may be employed. Phase detectors which provide an accurate resonance indication facilitate tuning. A 4CX5000A ceramic-seal tetrode is used as the output amplifier. Accurate neutralization is maintained over the entire frequency range by a broadband capacitance bridge circuit. A pi-L output network provides very high harmonic attenuation in the final amplifier. Power amplifier tuning and loading controls have very low inter-action. *Drive Power:* 0.1 watt nominal. *RF Bandwidth:* Not less than 16 kc between -1 db points. *Distortion:* 3rd and higher odd order distortion products are at least 38 db below either of two equal tones required to drive the power amplifier to 10 kw output.

**204F-1 2.5 KW POWER AMPLIFIER** — The 204F-1 has an output of 2.5 kw PEP or CW on either of two preset channels in the 2 to 30 mc frequency range. Either channel may be tuned to any frequency in the range. RF circuits consist of a three stage linear amplifier with over-all feedback. The use of pretuned circuits permits instantaneous channel switching. A broadband capacitance bridge maintains neutralization over the entire frequency range without adjustment. Single 52 ohm input and output connectors with relay switching for each RF channel is normally supplied, however, individual connectors and separate ALC voltage terminations for each channel may be provided on special order. Connections for power and external control facilities may be made either through top or base of cabinet. Complete front accessibility to all

components and wiring permits installation against the wall. *Drive Power:* 0.1 watt nominal. *RF Bandwidth:* Not less than 16 kc between -1 db points. *Distortion:* 3rd and higher odd order distortion products average 35 db below either of two equal tones required to drive the power amplifier to 2.5 kw PEP.

**204H-1 2.5 KW POWER AMPLIFIER** — An automatically-tuned linear power amplifier with 2.5 kw PEP or continuous average power output in the 2 to 30 mc range, when driven by a suitable exciter, such as the Collins 310F-1. Automatic tuning operation is controlled by prepositioning information and the input frequency. Frequency and phase discriminators, in conjunction with closed-loop servo systems, operate the bandswitch and tuning elements. All controls are located on the front panel and provide manual override of servo functions. The primary power and tuning sequence can be locally or remotely controlled. RF circuits consist of a three stage linear amplifier with over-all feedback, the final stage utilizing a pair of 4CX1000A ceramic-seal tetrodes. The operating point is carefully controlled to provide high efficiency and low intermodulation distortion. A broadband capacitance bridge circuit maintains accurate neutralization over the entire frequency range. Service connections can be made either from the top or through the cabinet base. Mounting feet, which fit within the cabinet base, are available for applications requiring shock isolation. The isolators do not appreciably increase cabinet height. *Drive Power:* 0.1 watt nominal. *RF Bandwidth:* Not less than 16 kc between -1 db points. *Distortion:* 3rd and higher odd order distortion products average 35 db below either of two equal tones required to drive the power amplifier to 2.5 kw PEP.

Power Amplifier Type	Power Output PEP (kw)	Primary Power	Input Impedance (ohms)	Output Impedance (ohms)	Dimensions (inches)			Weight (lbs.)
					W	D	H	
205J-1	45	195-225 v or 350-410 v 50-60 cps, 3Ø, 67 kva	52	52	83¾	35½	78	2950
Plate Transformer					18¾	33¾	32¾	975
Circuit Breaker					16¾	17¾	26¾	153
Step-start Control					17	9¾	27¾	73
Optional Flushing Blower								
204C-1	10	200-250 v (230 v nom) 50-60 cps, 3Ø, 20 kva	52	52	24	26	86	1000
204F-1	2.5	200-250 v (230 v nom) 50 or 60 cps, 1Ø, 6 kva	52	52	20	20	70*	575
204H-1	2.5	200-250 v (230 v nom) 50 or 60 cps, 1Ø, 6 kva	52	52	20	20¾	70*	650

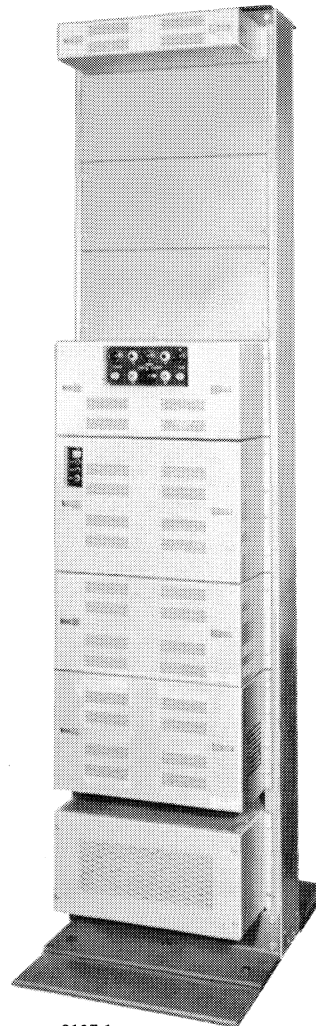
\*With shockmounts 71%".

# HF SSB EXCITERS

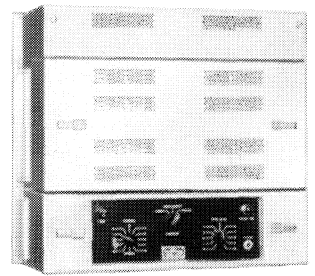
**310F-1 EXCITER** — Servo tuned, this exciter provides a 0.2 watt RF output signal in the 2 to 29.999 mc frequency range to drive a linear power amplifier in single sideband transmission. It may be used for voice operation on upper sideband, lower sideband, twin sideband (independent upper and lower sidebands with suppressed carrier), or one sideband and reinserted carrier for AM compatibility. CW and TTY operation may be accommodated with accessory equipment. A total of 28,000 frequencies in 1 kc steps throughout the range can be selected on a direct reading, counter type dial. The exciter employs a stabilized master oscillator slaved to a highly stable frequency standard. A plug-in, transistorized standard yields a stability of one part in  $10^6$  per month; or an optional external 40N-1 Standard (consisting of 40K-1, 8U-1 and 426A-1, see page 49) provides a stability of one part in  $10^8$  per day. *SSB Distortion:* Third order and higher intermodulation distortion more than 35 db below either tone of standard two-tone signal at rated output. *Primary Power:* 115 v, 1 phase, 60 cps, 625 watts.

**310F-6 RECEIVER-EXCITER** — The 310F-6, manually tuned with 1 kc steps in four bands over the 2 to 30 mc range, provides 0.2 watt excitation as well as reception on a simplex basis. Transceiver techniques are employed in the double conversion circuits used to translate the sideband signal generated at 300 kc to the desired radio frequency or, conversely, to convert the received signal to a 300 kc IF for detection. The 310F-6E Exciter has identical performance characteristics except that receiver functions are not included. The 0.2 watt RF output of the exciter may be used to drive manually tuned linear power amplifiers. Voice controlled (VOX) or push-to-talk exciter actuation is provided. Operation is possible on upper or lower sideband; twin, independent sideband; AM, or, with accessory equipment, CW and TTY. Frequency is selected on a direct reading, digital dial. Stability of one part in  $10^6$  per month is imparted by a plug-in, transistorized standard; stability of one part in  $10^8$  per day, by an external 40N-1 Standard (40K-1, 8U-1 and 426A-1, page 49.). *Receiver Selectivity:* Determined by Mechanical Filters. Normally 3 kc bandwidth; 0.8 kc or 6 kc available on special order. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 280 watts.

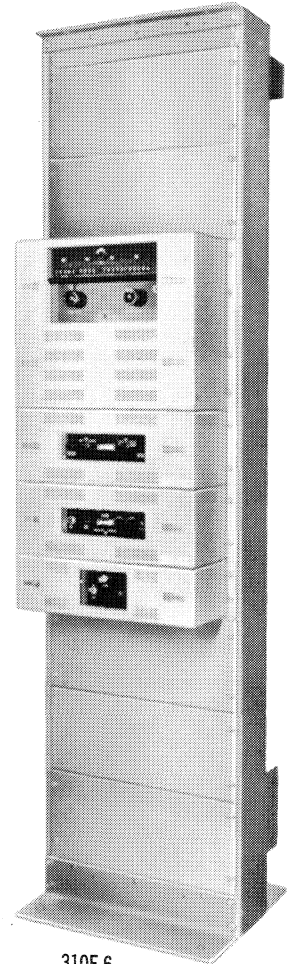
**310U SERIES EXCITERS** — The 310U is a fixed-tuned, crystal-controlled exciter with a 0.4 watt RF output in the 2-30 mc range for driving a linear power amplifier. The 310U provides from one to ten selectable channels using a common power supply and multiple exciter modules. The exciter is normally equipped for upper sideband, but accessory modules are available for lower sideband, independent sideband, AM, CW and TTY. Conversion circuits include a crystal filter to provide desired spurious rejection with a minimum of tubes and coils. A netting oscillator supplies a test signal for tuning the exciter, setting amplifier levels and checking frequency of an associated receiver. Conventional tubes are used in RF circuits and transistors are employed in audio applications. Plug-in modules permit a wide variation of equipment configurations to meet individual needs and enable easy modification for future requirements. *Frequency Stability:* 1 part in  $10^6$  ( $20^{\circ}$  to  $35^{\circ}$ C), 2 parts in  $10^6$  ( $0^{\circ}$  to  $55^{\circ}$ C). *Primary Power:* 115/230 v, 1 phase 50/60 cps.



310F-1



310U



310F-6

	Type	RF Output (ohms)	Audio Termination (ohms)	Dimensions (inches)			Wt. (lbs.)
				W	D	H	
Exciter	310F-1	52	150	19	7*	63	255**
Receiver-Exciter	310F-6	52	600 or speaker	20	20	84	205**
Exciter	310F-6E	52	600	20	20	84	205**
Exciter	310U-1	52	600	19	7*	17½	60

\* Forward projection.  
\*\* Mounted in 84" rack.



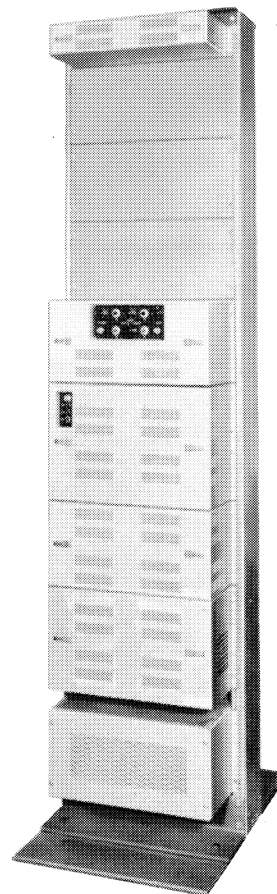
# HF SSB RECEIVERS

**50E-1 RECEIVER** — This servo tuned SSB equipment may be employed for reception on any frequency in 1 kc steps in the 2 to 29.999 mc range. Operation is possible on either sideband, both sidebands independently, AM, or, with accessory equipment, CW or TTY. A plug-in, transistorized frequency standard results in stability of one part in  $10^6$  per month; an external 40N-1 Standard (40K-1, 8U-1 and 426A-1, page 49), one part in  $10^8$  per day. A diversity configuration, 50E-1D, is available with common utilization of the stabilized master oscillator. *Selectivity:* Determined by Mechanical Filters. Normally 3 kc bandwidth per sideband for SSB; others on special order. *Primary Power:* 115 v, 1 phase, 60 cps, 625 watts.

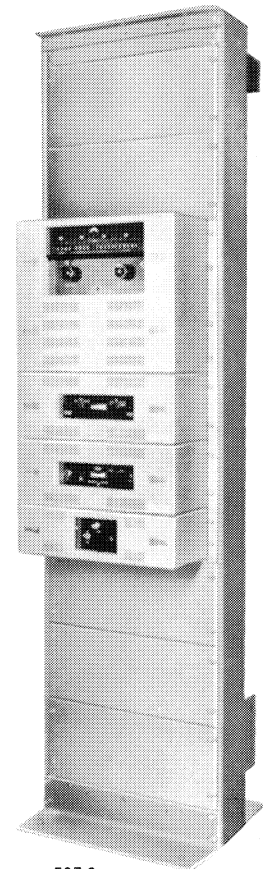
**50E-6 RECEIVER** — The 50E-6 is manually tuned in 1 kc increments over the 2 to 30 mc range in four bands. Reception may be had on upper or lower sideband, twin sideband, AM, or, with accessories, CW and TTY. A fast attack, slow release AGC is used for SSB reception. The received signal level is indicated on a meter. A manually tuned stabilized master oscillator is slaved to a plug-in frequency standard, providing stability of one part in  $10^6$  per month, or to an external 40N-1 Standard (40K-1, 8U-1, 426A-1, page 49), for one part in  $10^8$  per day. A 50E-6D configuration is also available for applications requiring diversity reception. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 250 watts.

**50T SERIES RECEIVERS** — The 50T provides reception on fixed-tuned, crystal-controlled frequencies in the 2-30 mc range. Up to ten selectable channels can be provided, with a common power supply and multiple receiver modules. The receiver is equipped for upper sideband reception, but modules are available for lower sideband, independent sideband, AM, TTY or CW. The 50T employs an RF bandpass crystal filter allowing single conversion to a 500 kc IF with a minimum number of inductors and other components. A Collins Mechanical Filter is used for sideband selection. Exact correlation of receiver and transmitter frequencies is provided by a netting filter. *Frequency Stability:* 1 part in  $10^6$  (20°C to 35°C), 2 parts in  $10^6$  (0°C to 55°C). *Power Output:* 0 dbm with 5 uv signal, line amplifier; 2 watts, 3 ohm speaker. *Primary Power:* 115/230 v, 50/60 cps.

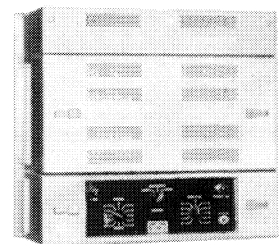
**51S-1 RECEIVER** — Offers continuous coverage of the 0.2 to 30 mc range with excellent dial accuracy, stability and operational simplicity. Facilitates reception of upper or lower sideband, AM, CW or FSK signals. A product detector has been incorporated for separate SSB detection. Multiple conversion, superheterodyne circuits are used with crystal injection oscillators for the first conversion and a permeability tuned oscillator for the second. Receiver includes fast acting, dual time constant AVC circuits and Q-multiplier. Optional external stabilized master oscillator unit which will correct minor frequency errors of injection oscillators and VFO at 1 kc points throughout the range of the receiver is available for applications requiring extreme frequency stability. *Frequency Stability:* Without SMO after 20 minutes warm-up and calibration, the RF will not vary more than  $\pm 50$  parts per  $10^6$  from 0° to 50°C. *Visual Dial Accuracy:* 200 cps all bands. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 100 watts.



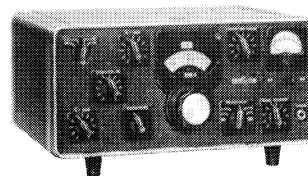
50E-1



50E-6



50T



51S-1

Receiver Type	RF Input Impedance (ohms)	Audio Output Impedance (ohms)	Dimensions (inches)			Weight (lbs.)
			W	D	H	
50E-1	52	150	19	7*	63	225**
50E-6	52	dual 600	20	20	84**	205**
50T	52	600 or speaker	19	7*	24½	65
51S-1	125	4, 500 or 600 low level	19	11½	7	30

\*Forward protection.  
\*\*Mounted in 84" rack.

# HF SSB TRANSCEIVERS

**KWT-6 500 WATT TRANSCEIVER (TYPE 5)** — Offers simplex transmission and reception in the 2 to 30 mc range with 500 watts PEP. Continuous coverage of the frequency range in 1 kc steps is provided, with manual tuning. Operational modes include upper sideband; lower sideband; independent sideband; AM, or with accessory equipment, TTY or CW. An integral transistorized frequency standard provides stability of one part in  $10^6$  per month; an external 40N-1 Frequency Standard (40K-1, 8U-1, 426A-1, page 49) may be used for stability of one part in  $10^8$  per day. Receiver and exciter circuits employ double conversion. Balanced modulators and Mechanical Filters for sideband separation provide excellent carrier suppression and negligible interchannel crosstalk. The power amplifier is a two stage, four band unit with excellent linearity. Several configurations are available. Standard telephone levels and impedances are provided. *Audio Output:* +14 dbm into two 600-ohm lines. 1 watt into speaker. Standard headphone output. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 1400 watts with 500 watts continuous output.

**32RS-1 100 WATT TRANSCEIVER** — This self-contained SSB station has an output of 100 watts PEP on any of four pretuned channels in the 1.6 to 15 mc range. Simplified panel controls and good frequency stability facilitate operation by non-technical personnel. Channels are instantly changed by a selector switch. Operation is on the upper sideband. Either VOX or push-to-talk actuation of the transmitter may be employed. Transmitter automatic load control circuitry maintains a high level of transmitted "talking power." The transceiver requires a CR-27/U crystal for each channel frequency. Coil kits may be obtained for the frequency ranges required. The 32RS-1C is cabinet-mounted; 32RS-1H (hinged) and 32RS-1F (flush) are rack-mounted. *Frequency Stability:*  $\pm 1$  part in  $10^6$  or  $\pm 5$  parts in  $10^6$  depending on oven. *RF Output and RF Input Impedance:* 52 ohms. Capable of tuning VSWR of 2.5:1. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 350 watts (transmit).

**DIPOLE BALUN ANTENNA KIT** — For use with the 32RS-1 in installations employing a single frequency or separate antennas for multi-channel operation. Complete installation instructions and all materials for antenna construction with the exception of the towers, support wires and coaxial feedline are included.

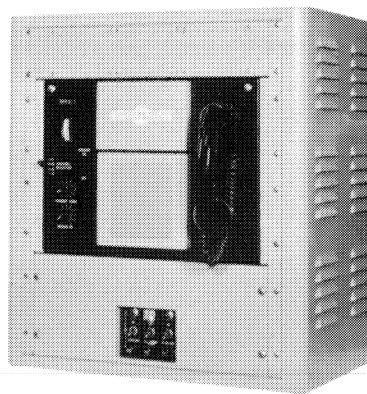
**152J-1 PHONE PATCH** — Makes use of a resistance hybrid circuit to match the 600 ohm telephone line to the unbalanced transmit and receive audio inputs. The station operator has complete supervisory control and may select either transmit, receive or VOX operation. Mounts in 32RS-1C accessory panel. *Size:* 5" W, 6 $\frac{7}{8}$ " D, 5" H. *Weight:* 3 lbs.

**180V-1 ANTENNA COUPLER** — Will properly load a 30 foot whip or longer antenna. It is weatherproof, permitting installation at the antenna base. *Size:* 12" W, 12" D, 7 $\frac{1}{2}$ " H. *Weight:* 15 lbs.

**302E-2 DIRECTIONAL WATTMETER** — Measures forward or reverse power. Full scale indication is 200 watts. Mounts in 32RS-1C accessory panel. *Size:* 5" W, 5 $\frac{1}{4}$ " D, 3" H. *Weight:* 3 lbs.



KWT-6

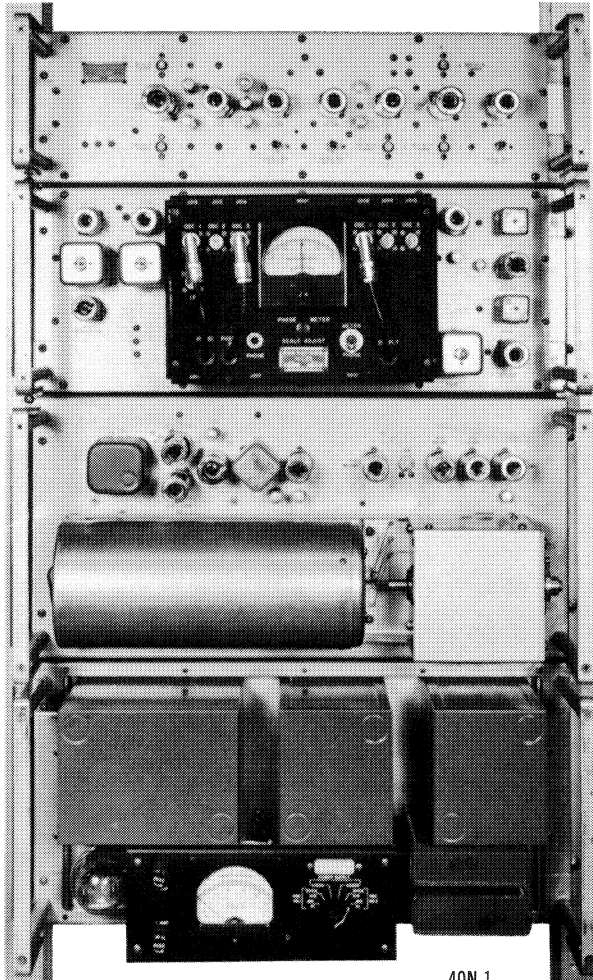


32RS-1C

Transceiver Type	Power Output PEP (kw)	Dimensions (inches)			Weight (lbs.)
		W	D	H	
KWT-6	500	20	20	84*	320*
32RS-1C	100	22	14 $\frac{3}{4}$	24 $\frac{1}{2}$	97
32RS-1H	100	19	7	19 $\frac{1}{4}$	55
32RS-1F	100	19	7	19 $\frac{1}{4}$	55

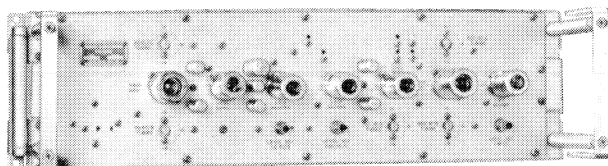
\*Includes rack.

# FREQUENCY STANDARD



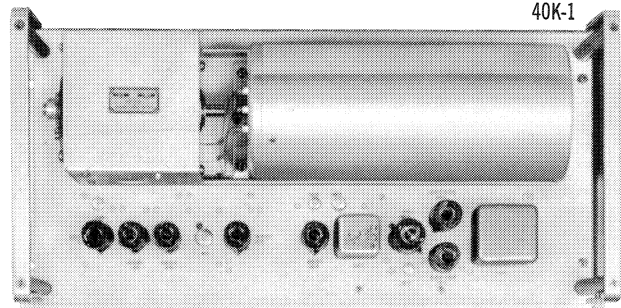
40N-1

**40N-1 FREQUENCY STANDARD** — May be used in applications requiring extreme stability of mixing injection frequencies in both transmitting and receiving equipment. It consists of the 40K-1 High Stability Oscillator and associated 426A-1 Power Supply, 8U-1 Frequency Divider and 54M-1 Frequency Comparator. The 40N-1 may also be utilized as a secondary frequency standard.

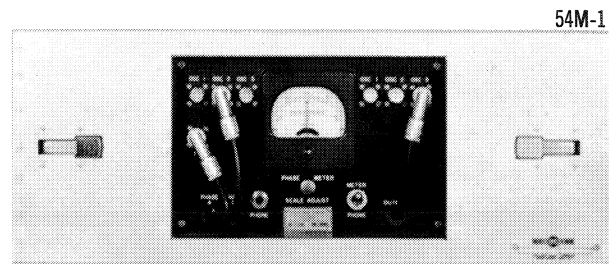


**40K-1 HIGH STABILITY OSCILLATOR** — Ideally suited as a secondary frequency standard or a base frequency generator in frequency synthesizers or stabilized master oscillators. Output frequency is stable to within one part in  $10^8$  per day

or better under normal operating conditions. The frequency control element is a 1 mc resonator, with a Q of over one million, sealed in an evacuated glass envelope. *Output Frequency:* 1 mc. *Output Voltage:* 2 v rms in 5000 ohms. *Frequency Stability:* Within one part in  $10^8$  for a 24 hour period. *Short Term Stability:* Less than one part in  $10^{10}$ . *Power:* Furnished by associated Collins 426A-1 Power Supply.



**8U-1 FREQUENCY DIVIDER** — Outputs of 1 mc, 100 kc and 10 kc may be obtained from a 1 mc signal source by the use of this unit. Regenerative dividing circuits are employed to provide the optimum in frequency and phase stability. All three output voltage levels may be adjusted individually. The outputs may be used with low impedance loads. *Output Voltages:* 0.2 v rms at 1 mc; 0.5 v rms at 100 kc and 0.5 v rms at 10 kc. *Output Impedances:* Approximately 500 ohms. *Input Signal Requirement:* 1 to 10 v rms at 1 mc. *Power Source:* 300 v dc, 60 ma; 6.3 v ac or dc, 2.1 amps; may be supplied from Collins 426A-1 Power Supply.



**54M-1 FREQUENCY COMPARATOR** — The 54M-1 samples frequencies of any two of three 1 mc signals or compares the tenth harmonic of the 100 kc signal with any one of three 1 mc signals. It may be used to compare the output of three Collins 40K-1 High Stability Oscillators. The frequency difference between two compared channels is indicated on a front panel meter. Aural monitoring is also provided. *RF Input Voltage:* 1 mc input; between 1.3 and 10 v rms into a 40 ufd capacitive load; 100 kc input, 0 to 5 v rms. *Power Requirements:* 250 to 300 v dc, 20 ma; 150 v dc, regulated; 6.3 v, 50-60 cps, 1.5 amp. May be supplied from Collins 426A-1 Power Supply.

	Type	Dimensions (inches)			Weight (lbs.)
		W	D	H	
High Stability Oscillator	40K-1	19	7	8¾	15
Power Supply	426A-1	19	7	8¾	45
Frequency Divider	8U-1	19	7	5 <sup>7</sup> / <sub>32</sub>	6
Frequency Comparator	54M-1	19	7	7	3



## HF-VHF GROUND

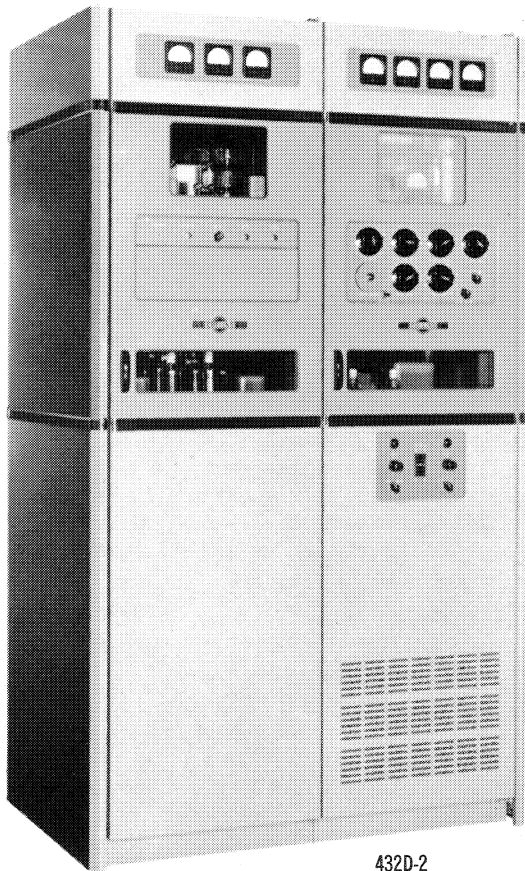
# HF TRANSMITTERS, RECEIVERS

**432D-2 2.5/2 KW TRANSMITTER** — Covers the 2 to 30 mc frequency range with 10 crystal-controlled channels rapidly and automatically tuned by Autotune® system. The 432D-2 has a power output of 2 kw AM and 2.5 kw CW and FSK. FSK may be employed on up to three of the channels by installation of 709E-1 Frequency Shift Oscillator accessory units in the transmitters. One of the 10 channels may likewise be derived from an external signal source, such as a stabilized master oscillator. Remote control of all transmitter functions is available with the 177M-1 (page 56). Channels are easily preset by Autotune® tuning controls on the front panel of the transmitter. Improved performance is achieved by modern components, such as vacuum variable tank capacitor and beam power tetrode. *Power Output:* 2-20 mc, 2500 watts CW-FSK, 2000 watts AM; 20-24 mc, 2250 watts CW-FSK, 1750 watts AM; 24-30 mc, 2000 watts CW-FSK, 1500 watts AM. *Frequency Stability:* AM and CW — Better than 0.002% (depending on crystal). FSK — 0.0005%. *Output Impedance:* 50-70 ohms with maximum SWR of 2 to 1. Connector provided for RG-17/U coaxial cable.

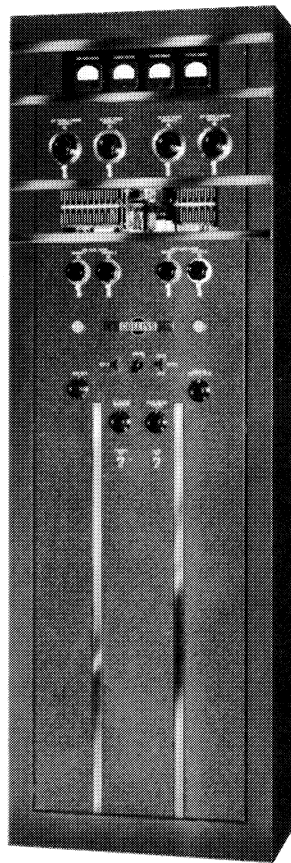
*Primary Power:* 230 v to 208 v, 3 phase, 60 cps with 50 cps modification available.

**30K-5 300/250 WATT TRANSMITTER** — Instantaneous frequency change to either of two pretuned, crystal-controlled frequencies in the 2 to 30 mc range is featured in the 30K-5, which may be controlled remotely by the 177L-2 (page 56). *Power Output:* 2-15 mc — 300 watts, CW; 250 watts, AM. 15-24 mc — 250 watts, CW; 200 watts, AM. 24-30 mc — 200 watts, CW; 125 watts, AM. *Output Impedance:* Matches wide range of antenna impedances. *Primary Power:* 115/230 v, 1 phase 50/60 cps, 1350 watts maximum.

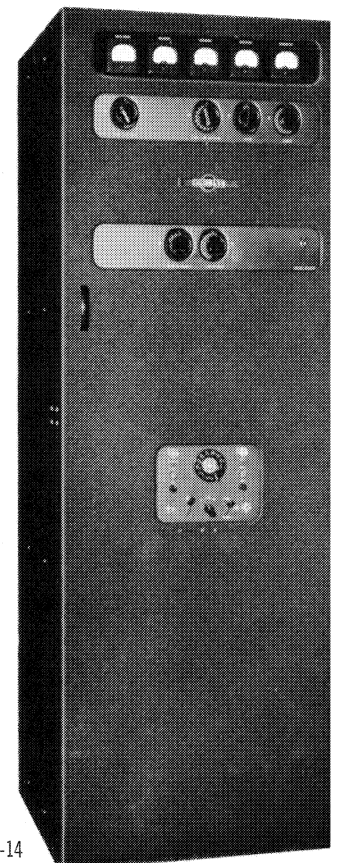
**16F-14 400/250 WATT TRANSMITTER** — Employs Autotune® for selection of any of 10 frequencies, 2 to 20 mc. Power Output is 400 watts CW, 250 watts AM or MCW; remote control, with 177G-10 (page 56). *Output Impedance:* Unbalanced antennas or concentric transmission lines 50-1200 ohms pure resistance, 70-850 ohms at 45° phase angle, or 100-600 ohms at 60°, and balanced trans-



432D-2



30K-5



16F-14

mission lines at 300-1200 ohms within 4-20 mc. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 1600 watts maximum, at 85% PF.

**32RA-10 75/50 WATT TRANSMITTER** — This compact, self-contained transmitter has a nominal power output of 50 watts in AM radiotelephone service and 75 watts in radiotelegraph service. Four preset, crystal-controlled frequencies in the 1.5 to 15 mc range are available for instant selection. Simplified panel controls facilitate operation by non-technical personnel. A single frequency control selects the crystal, pre-tuned tank circuits for the intermediate amplifier and the output circuit. Plug-in crystals, intermediate tank circuits and output circuit coils are employed in the transmitter. In radiotelephone service, a carbon microphone is used to obtain plate modulation. *Output Impedance:* Collins pi network matches a wide range of antenna impedances. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 435 va maximum.

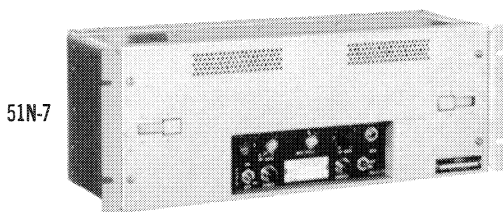
**51J-4 RECEIVER** — The 51J-4 is a multiple conversion superheterodyne with continuous coverage of the 0.54 to 30.5 mc range. A linear dial scale is accurately calibrated in 1 kc increments. The Collins Mechanical Filter provides nearly ideal selectivity with filters available for 1.4, 3.1

and 6 kc bandwidths. Receives AM, SSB, CW, MCW and FSK. The use of a high frequency first IF together with three tuned circuits in the RF portion of the receiver gives excellent image rejection. Images are attenuated more than 40 db throughout the entire tuning range. Care has been taken to apportion gain throughout, resulting in extremely good cross modulation and strong signal performance. *Frequency Stability:* Dial calibration at room temperature within 300 cps, if nearest 100 kc point is used to adjust fiducial. *Sensitivity:* 2 uv average on all bands for 10 db S/N and 1 watt output into 600 ohms, except band 1 (.54-1.5) which is 7.5 uv. *Primary Power:* 115/230 v, 1 phase, 45/70 cps, 85 watts.

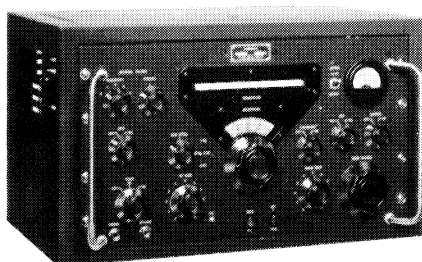
**51N-7 RECEIVER** — The 51N-7 is a crystal-controlled superheterodyne receiver advantageous for continuous, unattended operation on a fixed frequency in the 2 to 24 mc range. It may be used for AM, CW or MCW reception. Excellent image and spurious response rejection is accomplished by the use of five tuned circuits preceding the mixer. Fixed tuned IF stages eliminate the need for alignment of the IF amplifiers. Relatively constant output level is assured by the use of AVC on the RF amplifier as well as the IF amplifiers. The audio output circuit has an impedance of 600 ohms with a 4 ohm tap for a speaker. The secondary winding is split to permit an RF gain control to be superimposed on a telephone line for remote operation. Features include the Mechanical Filter, automatic noise limiter and carrier-operated squelch circuit. S/N is enhanced by a crystal oscillator allowing reception of either upper or lower sideband by proper selection of crystal. Flush, recessed or hinged mounting styles are available. *Frequency Stability:* 0.001%. *Sensitivity:* With RF gain maximum, a 3 uv signal at 30%, 1000 cps modulation will produce not less than 10 db S/N. *Selectivity:* 4 kc  $\pm$  10% at 6 db. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 45 watts.



32RA-10



51N-7



51J-4

	Type	Power Output (watts)	RF Impedance (ohms)	Dimensions (inches)			Weight (lbs.)
				W	D	H	
Transmitter	432D-2	2500/2000	50 or 70	48	33	84	1450
Transmitter	30K-5	300/250	70-2000	22	16½	66½	385
Transmitter	16F-14	400/250	wide range	28	30	80%	1170
Transmitter	32RA-10	75/50	wide range	22	18	12½	129
Receiver	51J-4*	-----	52	19	13	10½	35
Receiver	51N-7	-----	100 bal. or unbal.	19	7	7	18

\*Cabinet optional.

# VHF TRANSMITTERS, RECEIVERS

**242F-5CL 50 WATT TRANSMITTER** — Offers continuous duty AM communication or VOR service in the 108 to 152 mc frequency range, ideally suited for climax type operation, with output power conservatively rated at 50 watts. Although the 242F-5CL is basically a single-channel transmitter, an option is available providing up to four channels within a 500 kc spectrum. Spurious output is reduced in this transmitter, and linear power amplification minimizes intermodulation interference between transmitters. Envelope feedback contributes to a low audio distortion level and maintains excellent modulation stability for VOR operations. Compressor type modulation limiter has extremely fast attack time and holds modulation rise to less than 3 db for a 20 db increase in audio input level. Use of low level modulation reduces the number of tubes, simplifies circuitry and lowers transmitter power requirements. Resistance coupling is used throughout the modulator. Excellent high frequency response suits the transmitter for VOR and other special applications. Complete metering and commonly used controls are located on the open panels. A reflectometer included with the harmonic filter, provides an accurate measurement of the power output and VSWR. The transmitter employs a minimum number of different tube types, utilizing ARINC types where applicable. Type 4X150A tubes are employed as power amplifiers and type 811 as modulators. The power supply circuits use 866A rectifiers. The transmitter may be controlled remotely. Any of the three mounting styles may be obtained; flush, extended or hinged-extended. *Power Output:* Conservatively rated at 50 watts. Adjustable to any level from 10-50 watts by potentiometer. *Frequency Stability:*  $\pm 0.005\%$  or  $\pm 0.002\%$ , depending on crystal. An external frequency standard for climax operation has a stability of approximately one part in  $10^6$  over a period of 6 months. *Harmonic Output:* All spurious except second harmonic over 100 db below carrier level; second harmonic at least 80 db below carrier level. *Modulation:* At least 90%, 300 to 3750 or 300 to 10,000 cps depending upon application. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 530 watts maximum with 90% lagging PF.

**51M-8 RECEIVER** — This single-channel, preset, crystal-controlled receiver is ideal for continuous, unattended reception of AM signals in the 108 to 152 mc range. A double conversion superheterodyne circuit is utilized with an advanced automatic noise limiter, which provides maximum suppression of the effects of impulse noise of the type associated with ignition systems. A carrier-operated relay-type squelch circuit silences the receiver when no signal is being received. The ratio of signal levels required to open and close the squelch system is less than 1.2 to 1, permitting the squelch to be set open on very weak signals and still close at the end of transmission. The input circuit may be easily modified to provide operation

of two or more receivers from a single antenna. The audio output transformer has a split secondary allowing the RF gain control to be superimposed on telephone lines for remote operation. Printed wire boards and miniaturized components are employed in certain portions of the receiver to provide maximum compactness with improved mechanical and electrical characteristics. Available in flush, recessed and hinged mounting. *Frequency Stability:* 0.002% with premium crystals. *Sensitivity:* Not less than 6 db S/N for 2 uv input modulated 30%. *Selectivity:* Bandwidth at 6 db attenuation not less than 40 kc; bandwidth at 80 db not more than 80 kc. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 60 watts.

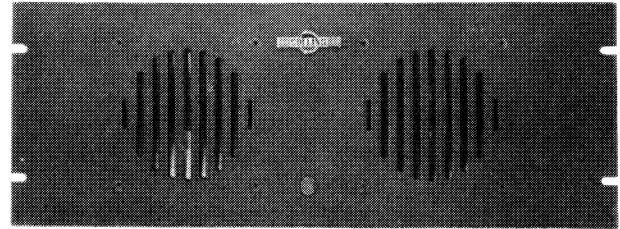
**242F-2 200 WATT TRANSMITTER** — A continuous duty transmitter for ground-to-air or point-to-point communication service in the 108 to 152 mc frequency range. Basically, it is a single channel crystal controlled transmitter, however, a crystal selector switch allows operation on a second channel within 0.3% of the frequency without retuning the transmitter. Spurious outputs are more than 80 db below the carrier level assuring freedom from interference with other services in terminal areas where channel frequencies are closely spaced. Vertical chassis construction allows complete access to all components and greatly simplifies maintenance. Tubes, transformers and controls are accessible from the front. Wiring is accessible from the rear by removal of the protective cover. The equipment may be mounted in either recessed-midrail cabinet or open frame rack. The mechanical design greatly assists in heat dissipation, where multiple installation requires economy of space. All essential circuits are metered to facilitate tuning and maintenance. Remote control functions may be performed up to 50 miles over telephone lines using the 177L-2 or RC-101 (page 56). Additional remote control facilities are available for more complex requirements. *Frequency Stability:*  $\pm .005\%$  or  $\pm .002\%$  depending on crystal. *Harmonic Output:* At least 80 db below carrier level. *Noise Level:* More than 40 db below 100% modulation without clipping. *Audio Input:* 100 ohm carbon or high impedance microphone, with PTT switch, or 600 ohm telephone line. *Audio Frequency Response:*  $\pm 3$  db, 1000 cps reference, 300 to 3750 cps;  $\pm 4$  db, up to 10 kc. *Primary Power:* 115/230 v, 1 phase, 50/60 cps, 1200 watts, 90% PF.

	Type	Power Output (watts)	Dimensions (inches)			Weight (lbs.)
			W	D	H	
Transmitter	242F-5CL	50	19	8	21	60
Receiver	51M-8	.....	19	7	7	15
Transmitter	242F-2	200	19	12	52½	121



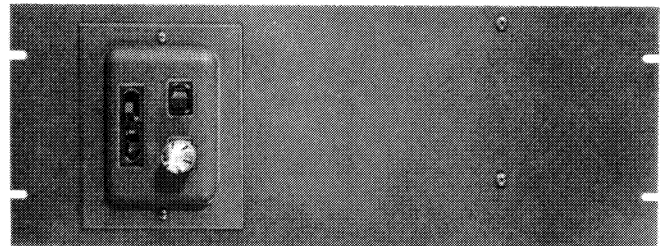
# ACCESSORY EQUIPMENT

271B-3 SPEAKER



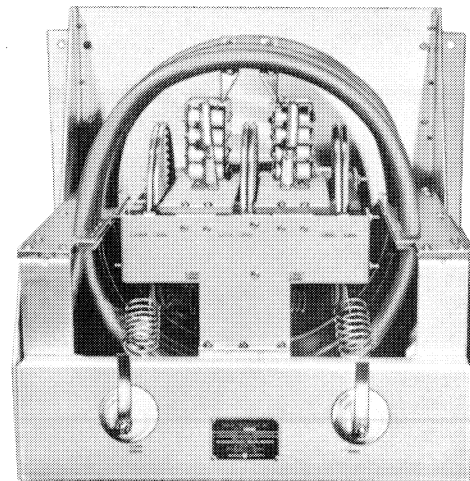
**271B SPEAKERS** — The 271B-3 is a dual speaker panel; the 271B-4, a single speaker panel. Each speaker has a 600-ohm-to-voice-coil-impedance matching transformer and a terminal board. *Size:* 19" W, 4" D and 7" H. 271B-3—6.3 lbs. 271B-4—4 lbs.

RACK TERMINAL PANEL



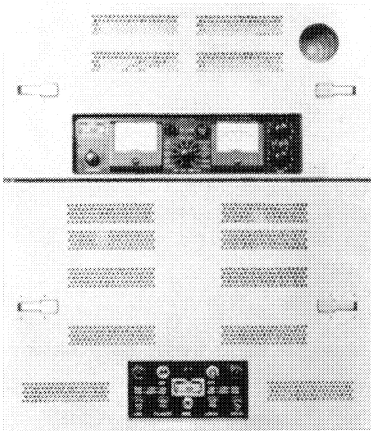
**RACK TERMINAL PANEL**—Contains 15-amp circuit breaker and rack wiring terminal block. 19" W, 3" D, 7" H. 3½ lbs.

512B-2

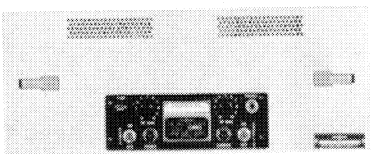


**512B-2 HF IMPEDANCE CONVERSION UNIT** — For coupling a transmitter 52 ohm unbalanced RF output with a 300-600 ohm balanced transmission line. 512B-2 may be used with transmitters with powers up to 3 kw AM or 10 kw PEP single sideband and with frequencies between 2 and 30 mc. No tuning or adjusting is necessary because the 512B-2 is broadband. When terminated by a 600 ohm balanced resistive load, coupler will contribute no more than 2:1 SWR from 2-30 mc. *Size:* 23" W, 22⅞" D and 20¾" H. *Weight:* 75 lbs.

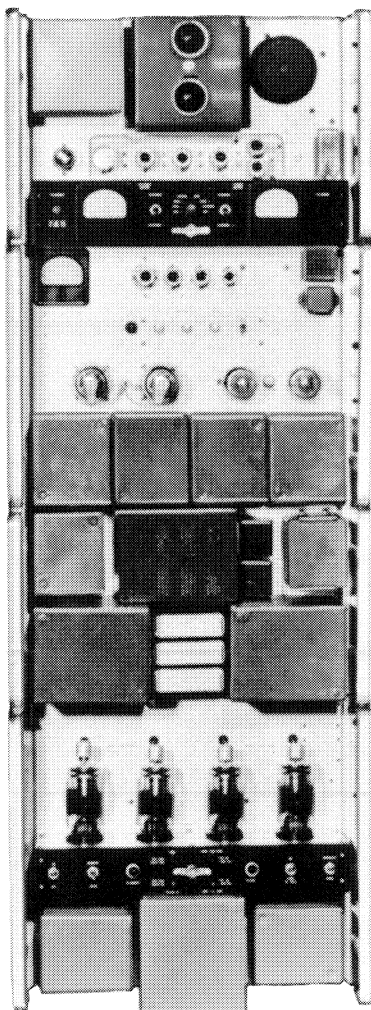
242F-5CL



51M-8

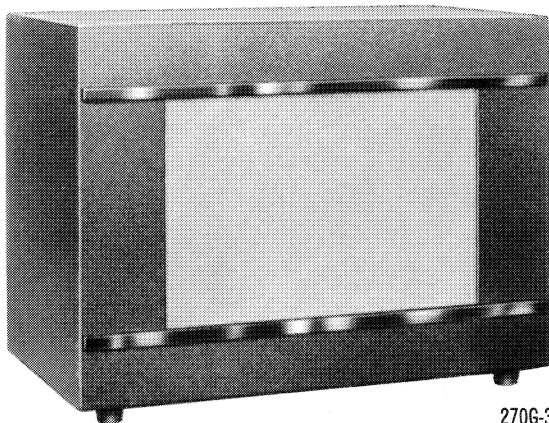


242F-2



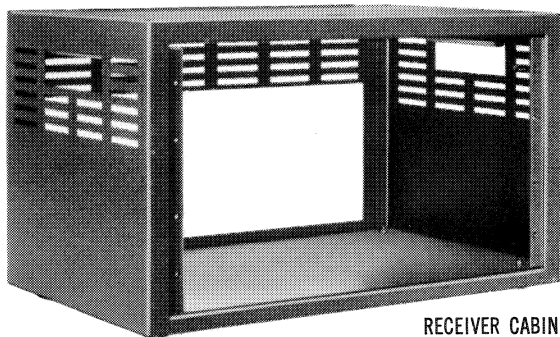
## ACCESSORY EQUIPMENT

(continued from page 53)



270G-3

**270G-3 CABINET-SPEAKER** — This unit consists of cabinet and 10" PM speaker, 6-8 ohm impedance voice coil, 8 watts. It is attractively finished to match 51J-4 and 75A-4 Receivers. *Size:* 15" W, 9 $\frac{1}{8}$ " D and 10 $\frac{5}{8}$ " H. *Weight:* 12 $\frac{1}{2}$  lbs.



RECEIVER CABINET

**RECEIVER CABINET** — Houses 19" x 10 $\frac{1}{2}$ " panels, such as 51J-4 and 75A-4 Receivers. St. James gray wrinkle finish, Part No. 505 5959 003. *Size:* 21 $\frac{1}{8}$ " W, 13 $\frac{1}{8}$ " D and 12 $\frac{1}{4}$ " H. *Weight:* 20 lbs.

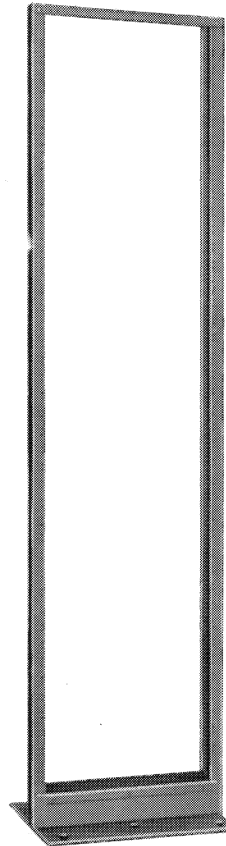
**619F CABINETS** — Flexible mounting enclosures with choice of door types. Mounting channel may be positioned for flush or recessed mounting or both. *619F-2:* 22" W, 19 $\frac{1}{2}$ " D, 76 $\frac{1}{8}$ " H. *Mounting Space:* 19" W, 18" D, 70 $\frac{1}{8}$ " H. *Weight:* Approximately 150 lbs. *619F-6:* 22" W, 19 $\frac{1}{2}$ " D, 48 $\frac{1}{8}$ " H. *Mounting Space:* 19" W, 18" D, 42 $\frac{1}{8}$ " H. *Weight:* Approximately 100 lbs.

**619J-4 EQUIPMENT RACKS** — Utilize 6" wide aluminum channels. Tapped for standard 19" rack mounting equipments. *Size:* 18" D, 20 $\frac{1}{2}$ " W, 86 $\frac{1}{8}$ " H. *Weight:* 80 lbs.

**512D-1 HF IMPEDANCE CONVERSION UNIT** — This bilateral device converts transmitter output from either 50 to 600 ohms or 600 to 50 ohms, rated up to 50 kw. Unit is broadband over 4 to 30 mc range. *Size:* 37" W, 16" D and 74" H. *Weight:* 200 lbs. Also available in 2-package form (See 512F-1 Coaxitran and 512G-1 Exponential Line Kit descriptions).

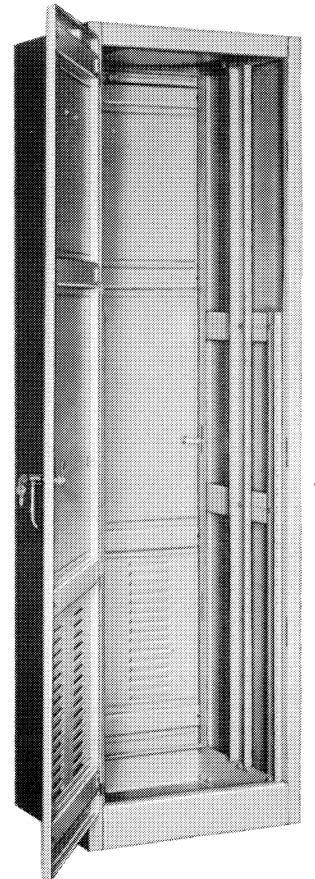
**512F-1 COAXITRAN** — An impedance changing transformer with a 50 ohm unbalanced input and 200 balanced output. Power rating up to 50 kw with SWR of less than 1.5:1 at most frequencies. *Frequency Range:* 4-30 mc. *Size:* 24" W, 16" D, 37" H. *Weight:* 90 lbs.

**512G-1 EXPONENTIAL LINE KIT** — Includes the precut conductors, insulators, spacers and mounting hardware for constructing an 80 foot exponential line with a 200 ohm balanced input and 600 ohm balanced output. *Frequency Range:* 4 to 30 mc.

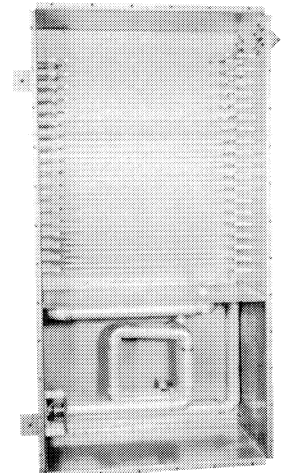


619J-4

619F-2



512D-1

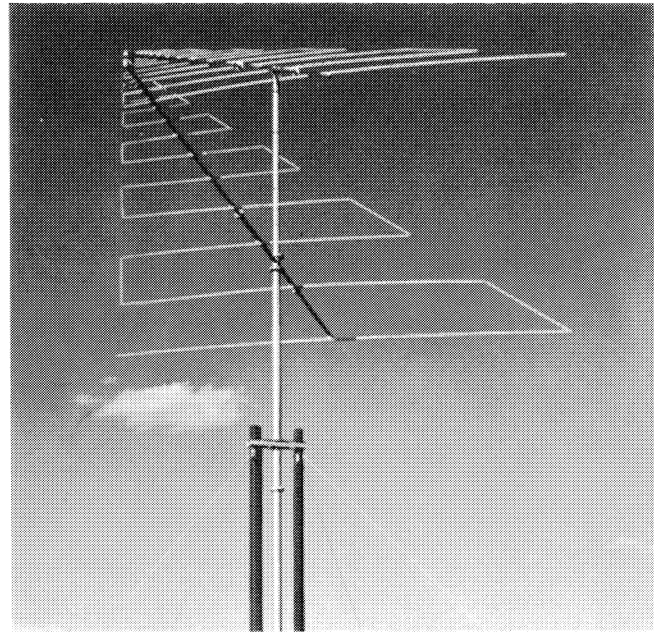


# LOG PERIODIC ANTENNAS

The 237A Unidirectional HF Antennas are extremely broad-band structures for use in high-frequency communication systems. They belong to the Logarithmically Periodic class of antennas for which the radiation patterns and impedance characteristics are essentially independent of frequency.

The 237A-1 covers a frequency range of 6.5 to 60 mc; the 237A-2, 11.1 to 60 mc; and the 237A-3, 19.0 to 60 mc. They provide a horizontally polarized unidirectional beam with a gain of 8 db over an isotropic antenna, with side lobes more than 16 db down.

The antennas may be mounted on a rotatable pipe mast for multidirectional applications. The rotator at the base of the mast consists of a power unit and a rotating coaxial joint. The unit is mounted between two poles or towers which aid in erecting the structure without crane or derrick as well as provide a solid permanent support for the structure. *Power Handling Characteristics:* 25 kw, average; 50 kw, peak. *VSWR:* Less than 2:1 at input over the full frequency range. *Free Space Half-Power Beamwidths:* Average value, azimuthal plane — 65°, vertical plane — 90°. *Input:* 52 ohm, 3 1/8" coaxial line. *Wind and Ice Loading:* 80 mph wind with 1/4" radial ice. *Rotation:* 1 rpm motor, reversible, with directional indicator system.

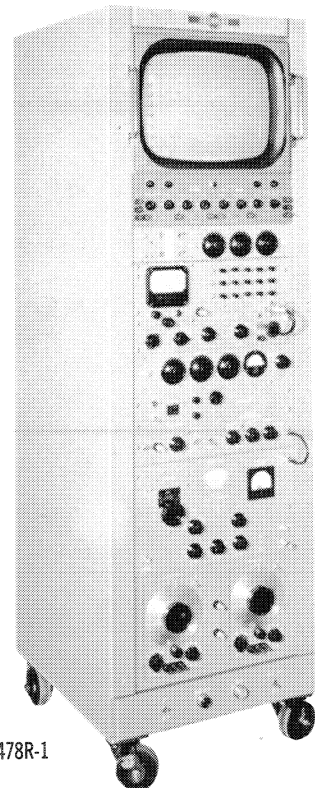


237A

Antenna	Frequency	Longest Element	Boom Length
237A-1	6.5 - 60 mc	70.0'	52.5'
237A-2	11.1 - 60 mc	46.8'	41.0'
237A-3	19.0 - 60 mc	28.1'	24.5'

# SPECTRUM ANALYZER

**478R-1 SPECTRUM ANALYZER** — The 478R-1 provides rapid and direct visual spectrum plots of amplitude versus frequency, with high resolution and low intermodulation distortion. Applicable to all emission modes. Dynamic range is 70 db or greater, displayed on one scale to an accuracy of ±1 db. Signal levels of 20 millivolts rms are used as zero db reference. It may be used to make simultaneous measurements of hum, distortion, noise and other spurious products in a direct plot of db level versus frequency. Permanent data for engineering reports may be provided by using an accessory two-axis recorder. *Input Frequency Range:* 2 to 64 mc and 250 to 300 kc. Other ranges with external injection. *RF Input Voltage Range:* .02 to 3 v rms for 0 db reference level. 70 db dynamic range. RF signals below 6 uv may be detected. *Scanning Bandwidths:* 4, 8 or 16 kc. *Scanning Time:* 2 to 60 sec. Manual scanning may be employed. *Resolution:* 60 cps sidebands can be separated from the carrier frequency throughout the full range. A 4 kc bandwidth and long-persistence tube provide extremely sharp resolution at slow sweep speed. *Calibration Accuracy:* Vertical — Within ±1 db from 0 to -70 db, 10 inches of usable height. *Two-Tone Test Signal:* Continuously variable audio oscillators provide input signals. Output is 3 v rms for each tone with up to 111 db of attenuation in 0.1 db steps into a 600 ohm external load. *Primary Power:* 115 v, 60 cps, 1200 va. *Size:* 22" W, 26" D, 69" H. *Weight:* 600 lbs.



478R-1



# REMOTE CONTROL EQUIPMENT

**RC-101 REMOTE CONTROL SYSTEM** — This system controls all functions of two VHF transmitters and two VHF receivers at each of up to twelve remote sites. Sites are connected to each other and to a central operating position by a four-wire, two-way standard long distance telephone circuit. One pair handles outgoing transmitter modulation and control information, while the other pair returns the receiver audio. Push-to-talk control is available.

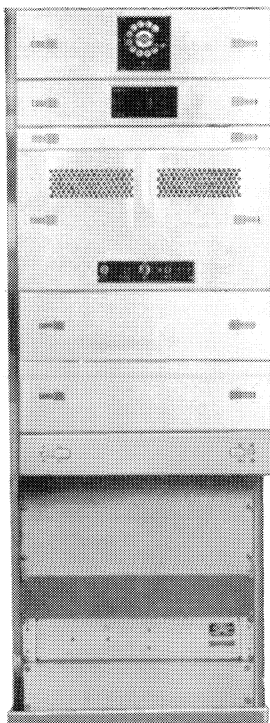
Audio signaling is used, employing a 2500 cps carrier which is frequency modulated by either a 90 or 150 cps subtone. At the remote site, the detected pulses operate a stepping switch to accomplish the desired switching of power, audio and antenna circuitry. A pulse of the 90 cps subtone is used to lock the transmitter in keyed status, a pulse of 150 cps to unlock it. The control carrier thus can time-share the out-going telephone circuit with the transmitter audio. *Control Circuits:* Telephone Line Level Variation —  $\pm 20$  db if nominal level does not go below  $-15$  dbm. S/N —  $+10$  db minimum except noise in 2000-3000 cps range must not exceed 30 dbm below control carrier level. *Transmitter Modulation:* Distortion — Not more than 5% (not including telephone line). Input —  $-15$  dbm minimum as normally installed. Output — With  $-15$  dbm input,  $+6$  dbm output at 1000 cps. *Overall Size:* Approximately 19" W, 12" D, 37½" H (remote

station), 10½" H (control site). *Primary Power:* 115/230 v, 1 phase. 50/60 cps, 200 watts (remote station), 90 watts (control site). *Weight:* 87 lbs. (remote station), 35 lbs. (control site).

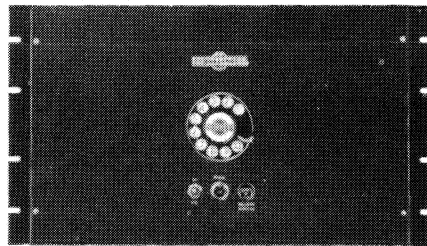
**177G-10 REMOTE CONTROL UNIT** — Complete remote control for the 16F-14 Transmitter. Uses two cable pairs and ground with control loop resistance not exceeding 1000 ohms or line loss not exceeding 25 db. *Size:* 19" W, 9½" D and 10½" H. *Primary Power:* 115 v, 50/60 cps, 25 watts. *Weight:* 30 lbs.

**177L-2 REMOTE CONTROL UNIT** — Used for remote control of 30K-5 and 242F-2 Transmitters. Interconnection requires two telephone line pairs and a ground with single loop resistance which does not exceed 125 ohms and line loss which does not exceed 25 db. *Size:* 17¼" W, 7⅞" D and 7" H. *Weight:* 12 lbs.

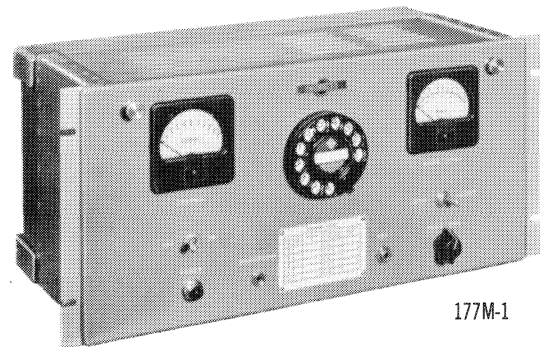
**177M-1 REMOTE CONTROL UNIT** — For remote operation of 432D-2. Requires four telephone lines and ground with audio line loss not more than 25 db, keyline loop resistance not more than 1000 ohms. *Size:* 21⅛" W, 11" D and 10⅞" H. *Primary Power:* 115 v, 50/60 cps, 35 watts. *Weight:* 31 lbs.



RC-101



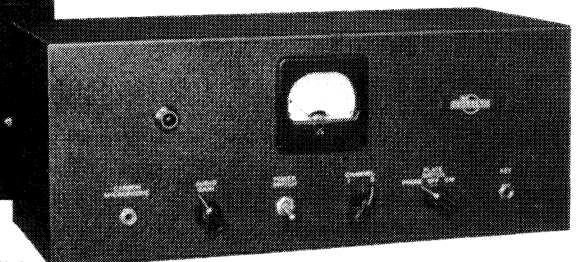
278G-1 (Used at RC-101 Control Site)



177M-1



177G-10



177L-2