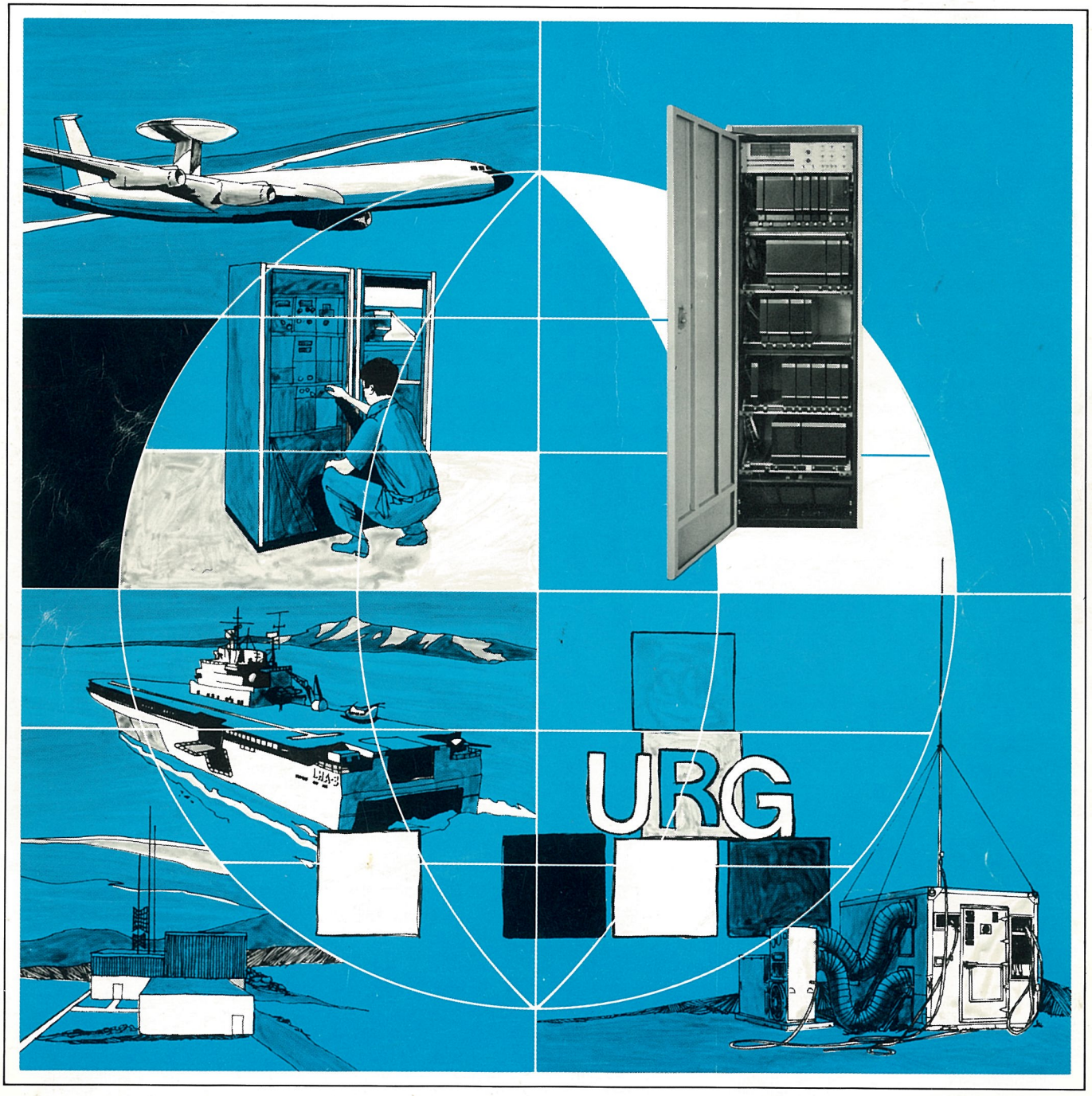
COLLINS

URG-II
HF Communications Equipment



URG-II HF Communications Equipment

Introduction

Universal Radio Group II (URG-II) is a result of over two decades of combined experience in high-frequency SSB voice and data transmission technology. Prior to URG-II, Collins Radio Company pioneered the development and manufacture of automatically tuned, remote-controllable, highly stable hf SSB equipment. User acceptance of the URG-I building-block concept and unique solutions to complex hf tactical data systems with the Collins SRC-16 and SRC-23 products provided a strong experience base for URG-II.

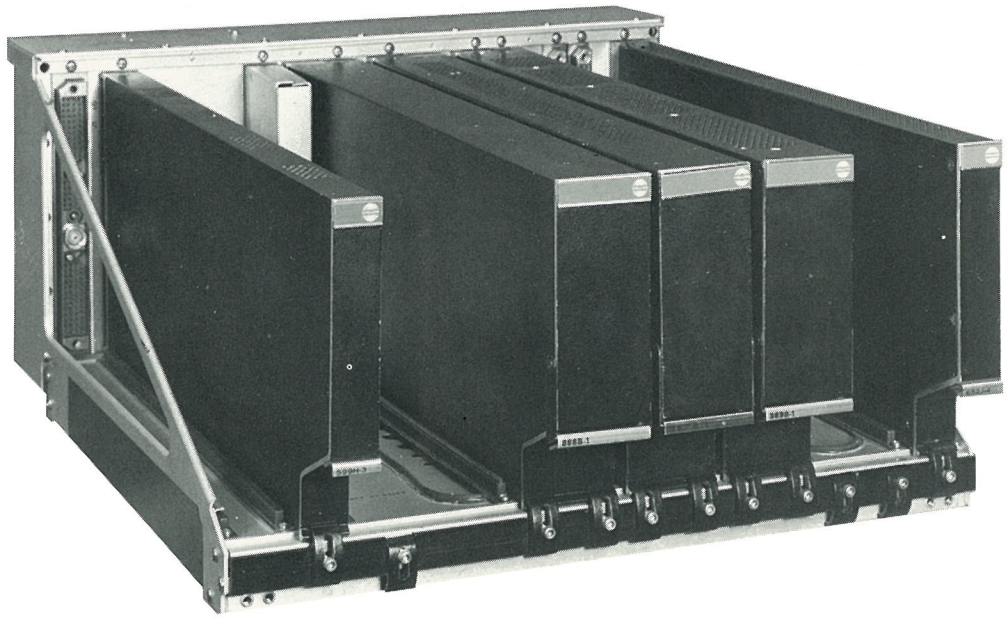
URG-II is a product line of standardized functional units that can be combined to fulfill a multiplicity of high-performance high-frequency system requirements. Each functional plug-in unit is constructed using planar circuit board techniques to simplify maintenance. Solid-state integrated-circuit design is used throughout except for high-power rf amplifier stages. Particular attention has been given to circuit parameters critical to high-speed data transmission---differential phase delay, stability, tr transfer time, receive front-end protection, and SIMOP. URG-II is designed to comply with various US Government performance and environmental specifications required for modern day communications.

Control and performance monitoring of URG-II equipment is accomplished by serial-digital techniques. Compact control units for single installations as well as small serial-digital control processors for large systems are available.

Flexible functional unit building-block design lends itself to integration into shipboard, airborne, transportable, and fixed station terminals.

Although URG-II is a relative newcomer to the Collins Telecommunications Equipment product line, current applications experiences, qualification testing, and field data provide a confident performance base. URG-II is utilized in the AN/TSC-60 transportable systems tested in accordance with MIL-E-5400 applicable government data transmission specifications. The AN/URC-81 is a URG-II configuration used in the exterior communications system aboard the US Navy's Light Helicopter Assault (LHA) ships. Cabinet subsystems for LHA have been tested in accordance with MIL-E-16400. The AN/USC-27 system in use by the German Navy includes URG-II. US Coast Guard Fixed Shore Stations including URG-II are operational. URG-II has also been selected for the US Navy's Junior Participating Tactical Data System (JPTDS), Australian Navy, USS Enterprise, and the USAF AWACS program. This combination of equipment acceptance, operational use, established technical data and support make URG-II well-suited for all future high-performance hf requirements.

651H-( ) series hf receivers



Features

- *Meets DCA Specifications*
- *Processor Controlled*
- *High-Speed Data Capability*
- *Burnout Protection*
- *Solid-State Design*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*
- *Mobile*

In compliance with the specifications of DCA CIR 330-175-1, the 651H-( ) series of receivers provide optimum reception on any of 280,000 channels in the 2.0- to 29.9999-MHz frequency range. Modes of operation include USB, LSB, ISB, AM, and 4-channel multiplex. Each basic receiver consists of five units: an rf translator, an if translator, a digital unit (frequency synthesizer), a power supply, and an adapter unit. The 651H-( ) series consists of three receiver configurations: 651H-1A (military designation AN/URR-68); 651H-2A (military designation AN/GRR-18(V)1); and 651H-2B. Contained in the 651H-1A is the 888B-1 rf translator that permits receiver operation in the presence of rf signals up to 200 volts at the antenna. The 651H-2A/2B utilizes the 888B-2 rf translator that contains additional filter circuits to withstand 1000 volts rf without degrading receiver performance.

Included in the 651H-2B is a multicoupling feature that allows a number of receivers to operate from a single antenna.

Serial-digital control for the receivers can be from either a line processor or a radio set control, such as the 916H-( ). Control and monitoring information is transmitted between the processor or 916H and the receiver by a serial bit stream over a single 3-twisted-pair cable. All audio terminations are compatible with telephone industry standards.

Specifications

FREQUENCY RANGE:
2 to 29.9999 MHz.

FREQUENCY CHANNEL:
280,000 to 100-Hz intervals.

OPERATIONAL MODES:
USB, LSB, UUSB, LLSB, ISB, AM, CW, and 4-channel multiplex (3-kHz channels).

CONTROL INPUT:
Remotely supplied serial-digital information.

FREQUENCY DRIFT RATE:
Two parts in 10^9 per day.

TUNING TIME:
0.6 second nominal, 2.0 seconds maximum.

INPUT IMPEDANCE:
50 ohms nominal unbalanced.

OVERALL BANDPASS AMPLITUDE RESPONSE (SELECTIVITY):
±1-dB maximum variation from 255 to 3035 Hz. ±2-dB maximum variation under environmental conditions. 60-dB attenuation points are 0 to 3260 Hz.

OVERALL DIFFERENTIAL TIME DELAY:
500-μs maximum variation from 370 to 2920 Hz. 600-μs maximum variation under environmental conditions.

INTERNAL SPURIOUS RESPONSE:
Below 2-μV equivalent signal (99.9 percent of channels), below output noise level on 99 percent of channels.*

SENSITIVITY (10 dB (s+n)/n):
651H-1A SSB: less than 1.2 μV.
651H-1A AM: less than 6.0 μV.
651H-2A/2B SSB: less than 1.8 μV.
651H-2A/2B AM: less than 9.0 μV. 6-dB maximum variation under environmental conditions.

IMAGE REJECTION:
Greater than 100 dB.

IF REJECTION:
Greater than 100 dB.

OVERALL (IN-BAND) INTERMODULATION:
50 dB down for 2-tone levels up to 0.4 volt per tone.*

CROSS MODULATION:
651H-1A: 30 dB down for 200 V pev, 2-tone signal.
651H-2A/2B: 30 dB down for 1000 V pev, 2-tone signal.

OSCILLATOR LEAKAGE:
Less than 5 μV into a 50-ohm antenna.

AGC CHARACTERISTICS:
3-dB maximum audio rise for input signals from 5 μV to 3 volts.*

AGC ATTACK TIME:
Less than 13 ms for 10-μV to 1.0-volt input signals.*

AGC DECAY TIME:
0.7 to 1.3 seconds for 10-μV to 1.0-volt input voice signals.* Fast decay is 10 ms.

AGC NOISE QUIETING:
Noise output decreases linearly within 2 dB with a linear increase in input signal level until the (s+n)/n ratio is 50 dB. The 50-dB (s+n)/n ratio may be 90 percent of the decibel increase input signal level.

AUDIO OUTPUT:
-30 to +10 dBm, adjustable, into 600-ohm balanced line.

AUDIO OUTPUT IMPEDANCE:
600 ohms balanced with a return loss of not less than 26 dB from 255 to 3035 Hz. Longitudinal balance shall be at least 46 dB.

HARMONIC DISTORTION:
SSB: Not more than 0.5 percent at rated power output. AM: Not more than 2.0 percent at rated power output.

ALTITUDE:
Operating: 0 to 30,000 ft. Nonoperating: 0 to 50,000 ft.

TEMPERATURE:
Operating: -54 to +55 °C (-65.2 to +131 °F) with 0.5 hour at +71 °C (+159 °F). Nonoperating: -62 to +85 °C (-79.6 to +185 °F).

HUMIDITY:
Nonoperating: 95 percent humidity, +38 to +50 °C (100 to 122 °F) for 10 days.

VIBRATION (ON ISOLATORS):
0.01-inch double amplitude from 10 to 45 Hz. 1.0 g from 45 to 500 Hz.

SHOCK:
Three 15-g 11-millisecond impacts in opposite directions along each of three mutually perpendicular axis.

CRASH SAFETY:
Two 30-g, 11-millisecond inputs in opposite directions along each of three mutually perpendicular axis.

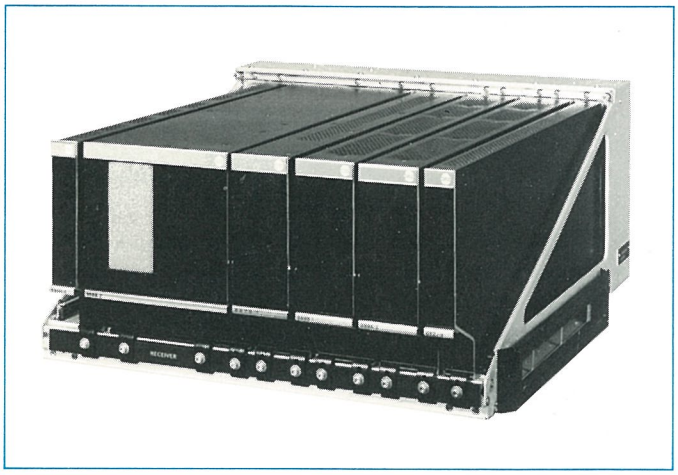
COOLING:
2 channel - 125 lb/h at 30 °C (+86 °F). 4 channel - 170 lb/h at 30 °C (+86 °F). Negative or positive air at 0.4 inch of water.

Power Requirements

The 651H-( ) requires 115 Vac ±10 percent, single-phase, 47 to 450 Hz, at 300 watts maximum.

*Input signal levels expressed in open-circuit hard μV from a 50-ohm source.

671T-3A/4A hf receiver-exciters



Features

- *Meets DCA Specifications*
- *Increased Selectivity*
- *Processor Controlled*
- *High Speed Data Capability*
- *Solid-State Design*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*
- *Mobile*

Operating in the 2.0- to 29.9999-MHz frequency range in 100-Hz increments, the 671T-3A/4A Receiver-Exciters provide optimum reception and 0.4-watt rf power output on any of 280,000 possible channels. Modes of operation include USB, LSB, ISB, CW, and AME. Automatic tuning is accomplished in 0.6 second nominal, 2.0 seconds maximum for any channel in the operating range.

The 671T-3A (military designation OR-81/URC-75), and the 671T-4A (military designation RT-1036/URC) each consist of five units: an rf translator, an if translator, a digital unit (frequency synthesizer), a power supply, and an adapter unit. Contained in the 671T-3A is the 888B-1 RF Translator that permits receiver-exciter operation in the presence of rf signals up to 200 volts at the antenna; while the 671T-4A utilizes the 888B-2 RF Translator to withstand 1000 volts without degrading performance. Both rf translators provide 0.4-watt rf drive for use by the associated transmitting system.

Serial-digital control for the receiver-exciters can be from either a line processor or a radio set control, such as the 916H-( ). Control and monitoring information is transmitted between the processor, or 916H, and the receiver-exciter by a serial bit stream over a single 3-twisted-pair cable. All audio terminations are compatible with telephone industry standards.

Specifications

FREQUENCY RANGE:
2 to 29.9999 MHz.

FREQUENCY CHANNELS:
280,000 at 100-Hz intervals.

OPERATIONAL MODES:
USB, LSB, ISB, CW, and AME.

CONTROL INPUT:
Remote supplied serial-digital information.

FREQUENCY DRIFT RATE:
Two parts in 10^9 per day.

TUNING TIME:
0.6 second nominal, 2 seconds maximum.

TRANSFER TIME:
10 ms maximum, receive to transmit or transmit to receive.

INPUT IMPEDANCE:
50 ohms nominal unbalanced.

OVERALL BANDPASS AMPLITUDE RESPONSE (SELECTIVITY):
±1-dB maximum variation from 255 to 3035 Hz. ±2-dB maximum variation under environmental conditions. 60-dB attenuation points are 0 and 3260 Hz.

SENSITIVITY (10 dB (s+n)/n):
671T-3A SSB: less than 1.2 μV.*
671T-3A AM: less than 6 μV.*
671T-4A SSB: less than 1.8 μV.*
671T-4A AM: less than 9.0 μV.* 6-dB maximum variation under environmental conditions.

IMAGE REJECTION:
Greater than 100 dB.

IF REJECTION:
Greater than 100 dB.

OVERALL (IN-BAND) INTERMODULATION:
50 dB down for 2-tone levels up to 0.4 volt per tone.*

CROSS MODULATION:
671T-3A: 30 dB down for 200 volts pev, 2-tone signal.

671T-4A: 30 dB down for 1000 volts pev, 2-tone signal.

OSCILLATOR LEAKAGE:
Less than 5 μV into a 50-ohm antenna.

AGC CHARACTERISTICS:
3-dB maximum audio rise for input signals from 5 μV to 3 volts.*

AGC ATTACK TIME:
Less than 13 milliseconds for 10 μV to 1.0-volt input signals.*

AGC DECAY TIME:
0.7 to 1.3 seconds for 10 μV to 1.0 volt-input voice signals. Fast decay is 10 milliseconds.

AGC NOISE QUIETING:
Noise output decreases linearly within 2 dB with a linear increase in input signal level until (s+n)/n ratio is 50 dB. The 50-dB (s+n)/n ratio may be 90 percent of the decibel increase in input signal level.

AUDIO OUTPUT:
-30 to +10 dBm, adjustable into 600 ohms; balanced line.

AUDIO OUTPUT IMPEDANCE:
600 ohms balanced with a return loss of not less than 26 dB from 255 to 3035 Hz. Longitudinal balance shall be at least 46 dB.

HARMONIC DISTORTION:
SSB: not more than 0.5 percent at rated power output. AM: not more than 2.0 percent at rated power output.

RF POWER OUTPUT:
0.4-watt pep or average.

RF OUTPUT LOAD IMPEDANCE:
50 ohms, 1.3 to 1 vswr maximum.

SPURIOUS OUTPUTS:
70 dB below 0.4-watt rf output.

DISTORTION:
SSB: 50 dB below 0.1-watt rf output and 46 dB below 0.2-watt output for third-order products. AME: less than 20 percent at 85 percent modulation.

HARMONIC SUPPRESSION:
-35 dB below 0.1-watt pep output for second harmonic, 45 dB below rated pep for all other harmonics.

HUM AND NOISE:
50 dB below rated pep output.

CARRIER SUPPRESSION:
60 dB below 0.4-watt rf output.

CROSS-CHANNEL INTERFERENCE:
60 dB down.

PILOT CARRIER:
0 to 33 dB below rated output (3-dB steps).

AUDIO INPUT:
-30 to +10 dBm, adjustable.

ALTITUDE:
Operating: 0 to 30,000 ft. Nonoperating: 0 to 50,000 ft.

TEMPERATURE:
Operating: -54 to +55 °C (-65.2 to +131 °F) with 0.5 hour at +71 °C (+159 °F). Nonoperating: -62 to +85 °C (-79.6 to +185 °F).

HUMIDITY:
Nonoperating: 95 percent humidity, +38 to +50 °C (100 to 122 °F) for 10 days.

VIBRATION (ON ISOLATORS):
0.01-inch double amplitude from 10 to 45 Hz. 1.0 g from 45 to 500 Hz.

SHOCK:
Three 15 g, 11-millisecond impacts in opposite directions along each of three mutually perpendicular axis.

CRASH SAFETY:
Two 30-g, 11-millisecond impacts in opposite directions along each of three mutually perpendicular axis.

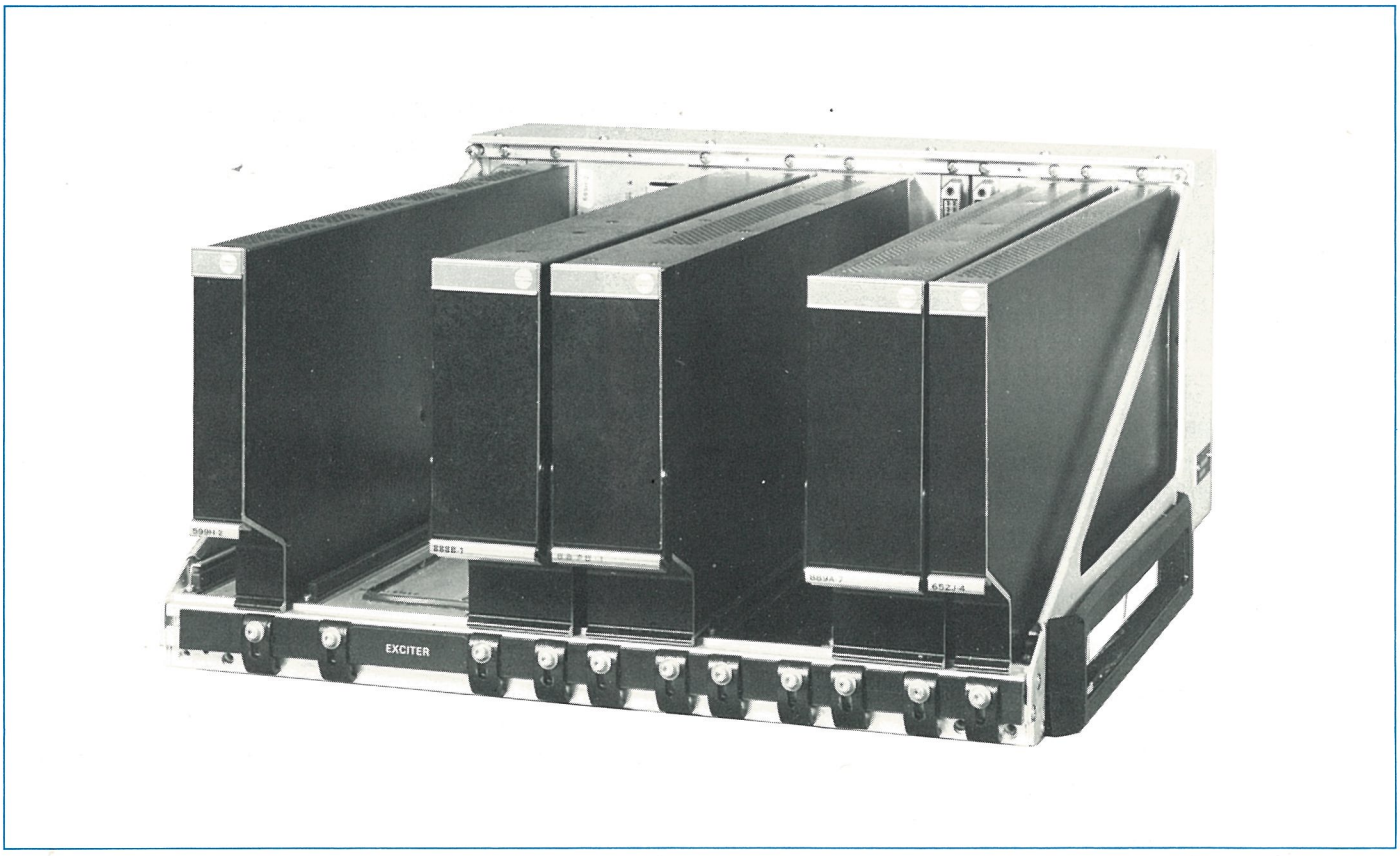
COOLING:
671T-3A: 180 lb/h at 30 °C (+86 °F) negative or positive air at 0.4 inch of water.
671T-4A: -225 lb/h at +30 °C (+86 °F) negative or positive air at 0.4 inch of water.

Power Requirements

The 671T-3A/4A require 115 volts ac ±10 percent, single-phase, 47 to 450 Hz, and 300 watts maximum.

*Input signal levels expressed in open-circuit hard μV from a 50-ohm source.

310Y-1A hf exciter



Features

- *Automatic Tuning*
- *Transmitter Gain Control*
- *High Speed Data Capability*
- *Processor Controlled*
- *Meets DCA Specifications*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*
- *Mobile*

Providing 0.4-watt pep and average rf output for use by the associated transmitting system, the 310Y-1A operates in the 2.0- to 29.9999-MHz frequency range in automatically tuned 100-Hz increments. Modes of operation include USB, LSB, ISB, AME, CW, and 4-channel multiplex. Tuning is accomplished in 0.6 second typical and 2.0 seconds maximum for any of the 280,000 possible channels.

The 310Y-1A (military designation T-1231/URT and AN/GRT-17(V)1) conforms to the design concepts of DCA CIR 330-175-1. The exciter consists of five units: an rf translator, an if translator, a digital unit (frequency synthesizer), a power supply, and an adapter unit. All units are mounted on an electrical equipment shelf that provides electrical interface and cooling interconnections.

Serial-digital control for the exciter can be from either a line processor or a radio set control, such as the 916H-( ). Control and monitoring information is transmitted between the processor, or 916H, and the exciter by a serial bit stream over a single 3-twisted-pair cable. All audio terminations are compatible with telephone industry standards.

Specifications

FREQUENCY RANGE:
2 to 29.9999 MHz.

FREQUENCY CHANNELS:
280,000 at 100-Hz intervals.

OPERATIONAL MODES:
USB, LSB, UUSB, LLSB, ISB, AME, CW, and 4-channel multiplex (3-kHz channels).

CONTROL INPUT:
Remotely supplied serial-digital information.

FREQUENCY DRIFT RATE:
Two parts in 10^9 per day.

TUNING TIME:
0.6 second nominal, 2.0 seconds maximum.

RF POWER OUTPUT:
0.4-watt pep or average.

RF OUTPUT LOAD IMPEDANCE:
50 ohms, 1.3-to-1 vswr maximum.

SPURIOUS OUTPUTS:
70 dB below 0.4-watt rf output.

DISTORTION:
SSB: 50 dB below 0.1-watt rf output and 46 dB below 0.2-watt output for third-order products. AME: less than 20 percent at 85 percent modulation.

HARMONIC SUPPRESSION:
35 dB below 0.1-watt pep output for second harmonic, 45 dB below rated pep for all other harmonics.

HUM AND NOISE:
50 dB below rated output.

CARRIER SUPPRESSION:
60 dB below 0.4-watt rf output.

CROSS-CHANNEL INTERFERENCE:
60 dB down.

PILOT CARRIER:
0 to 33 dB below rated output (3-dB steps).

OVERALL BANDPASS AMPLITUDE RESPONSE (SELECTIVITY):
±1-dB maximum variation from 255 to 3035 Hz. ±2-dB maximum variation under environmental conditions. 60-dB attenuation points are 0 and 3260 Hz.

OVERALL DIFFERENTIAL TIME DELAY:
500-μs maximum variation from 370 to 2920 Hz. 600-μs maximum variation under environmental conditions.

AUDIO INPUT:
-30 to +10 dBm, adjustable, from a 600-ohm balanced line.

AUDIO INPUT IMPEDANCE:
600 ohms balanced with a return loss of not less than 26 dB from 255 to 3035 Hz. Longitudinal balance shall be at least 46 dB.

ALTITUDE:
Operating: 0 to 30,000 ft. Nonoperating: 0 to 50,000 ft.

TEMPERATURE:
Operating: -54 to +55 °C (-65.2 to 131 °F) with 0.5 h at +71 °C (+159 °F). Nonoperating: -62 to +85 °C (-79.6 to +185 °F).

HUMIDITY:
Nonoperating: 95 percent humidity, +38 to +50 °C (100 to 122 °F) for 10 days.

VIBRATION (ON ISOLATORS):
0.01-inch double amplitude from 10 to 45 Hz. 1.0 g from 45 to 500 Hz.

SHOCK:
Three 15-g, 11-millisecond impacts in opposite directions along each of three mutually, perpendicular axis.

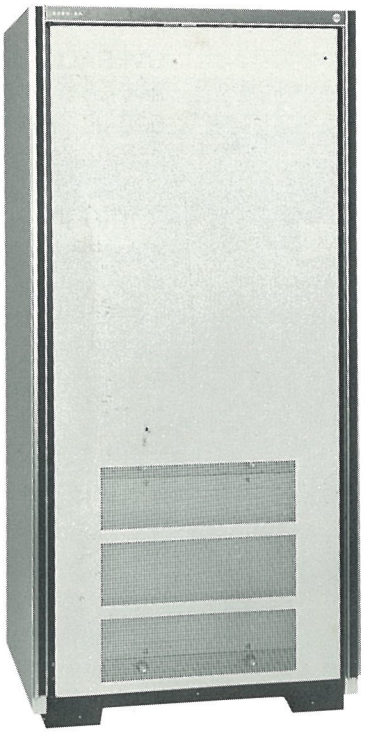
CRASH SAFETY:
Two 30-g, 11-millisecond impacts in opposite directions along each of three mutually, perpendicular axis.

COOLING:
140 lb/h at +30 °C (+86 °F) negative or positive air at 0.4 inch of water.

Power Requirements

The 310Y-1A requires 115 volts ac ±10 percent single-phase, 47 to 450 Hz, at 300 watts maximum.

208U-3A linear power amplifier



Features

- *Adjustable Power Output*
- *Automatic Tuning*
- *DCA and FCC Compatible*
- *Remote Control and Monitoring*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Commercial*
- *Military*

Operating in the 2.0- to 29.9999-MHz frequency range, the 208U-3A (military designation OG-90) provides an rf output of 3000 watts pep and average for any type of modulation not exceeding the bandwidth capability. Tuning is fully automatic and is complete in 10 seconds maximum for any frequency within the operating range.

Requiring only 0.1-watt drive for full rated output, an adjustable power level control permits lower power operation at any preset level between 1- and 3-kW. Remote control is possible over extended distances using serial-digital control techniques and either a line processor or a manual radio set control. All control and monitoring information is transmitted between the processor or radio set control and the linear power amplifier by a serial bit stream over a single 3-twisted-pair cable.

The 208U-3A is constructed using functional plug-in units to facilitate maintenance. Extensive use of solid-state components reduces power consumption, weight, and size and provides maximum operational reliability. A single equipment cabinet houses all units of the 208U-3A.

Specifications

FREQUENCY RANGE:
2.0000 to 29.9999 MHz.

POWER OUTPUT:
3-kW pep or average, 0.6-kW DCA noise rated power.

RF POWER INPUT:
Not more than 100 mW pep or average required for rated output.

INPUT IMPEDANCE:
50 ohms nominal, 1.3:1 vswr maximum (unbalanced).

RF LOAD IMPEDANCE:
50 ohms nominal, 3:1 vswr maximum (unbalanced).

BANDWIDTH:
12 kHz, 0.1-dB variation over 3-kHz segment.

INTERMODULATION DISTORTION:
Two-tone source, 40 dB below either one of two equal tones at rated pep output. Noise loading, 43 dB at DCA noise rated power with 310Y-1 Exciter.

RF NOISE:
At least 50 dB below either one of two equal tones at DCA noise rated power.

NOISE (KEY OFF):
0.1 μV in a 3-kHz bandwidth centered on the tuned transmitter frequency.

HARMONIC ATTENUATION:
80 dB below fundamental frequency.

TUNING TIME:
10 seconds maximum after receipt of rf power, 7 seconds typically.

ALTITUDE:
Operating, 0 to 10,000 feet; nonoperating, 0 to 50,000 feet (15,240 m).

TEMPERATURE:
Operating, -40 to +55 °C (-40 to +131 °F); nonoperating, -62 to +70 °C (-78 to +158 °F).

HUMIDITY:
0 to 95 percent relative humidity.

VIBRATION:
5 to 15 Hz; 0.03-inch (0.0762 cm) double amplitude or 1 g whichever is less. 16 to 55 Hz; 0.02-inch (0.0508 cm) double amplitude or 1 g whichever is less.

SHOCK (WITHOUT DOORS OR TRIM PANELS):
3 impacts in each direction in each of 3 planes, except vertical from the top, for a total of 15 impacts; each impact at 15 g for 11 ms.

COOLING AIR:
A variable speed blower provides sufficient cooling to the entire linear power amplifier. Adequate air margin existing under all specified environmental conditions.

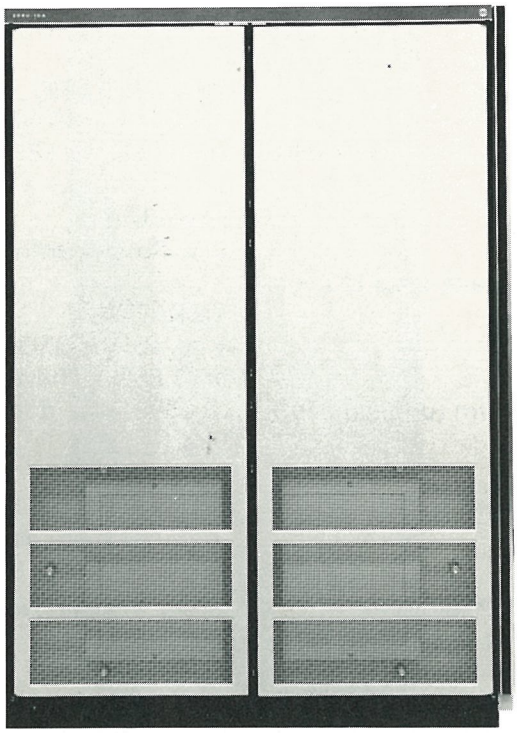
Power Requirements

200 to 250 volts, 3-phase, 47 to 63 Hz or 380 to 420 Hz. An optional external transformer for a 3-phase 380- to 440-volt power source is available.

SIZE:
69 inches (175.3 cm) high; 29.7 inches (75.4 cm) wide; 27.8 inches (70.5 cm) deep.

WEIGHT:
975 lb (442.3 kg) approximately.

208U-10A linear power amplifier



Features

- *Automatic Tuning*
- *Adjustable Power Output*
- *Remote Control and Monitoring*
- *DCA and FCC Compatible*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Commercial*
- *Military*

Operating in the 2.0- to 29.9999-MHz frequency range, the 208U-10A (military designation OG-89) provides an rf output of 10-kW pep and average for any type of modulation not exceeding the bandwidth capability. Tuning is fully automatic and is complete in 10 seconds maximum for any frequency within the operating range.

Requiring only 0.1-watt drive for full rated output, an adjustable power level control permits reduced power operation at any preset level between 5 and 10 kW. Remote control over extended distances is possible through the use of serial-digital control techniques with either a line processor or a manual radio set control. All control and monitoring information is transmitted between the processor or radio set control and the linear power amplifier by a serial bit stream over a single 3-twisted-pair cable.

The 208U-10A is constructed using functional plug-in units to facilitate maintenance. Extensive use of solid-state components reduces power consumption, weight, and size while providing increased operational reliability. The 208U-10A is housed in a single 2-door enclosure.

Specifications

FREQUENCY RANGE:
2.0 to 29.9999 MHz.

POWER OUTPUT:
3-kW pep or average, 0.6-kW DCA noise rated power.

RF POWER INPUT:
Not more than 100-mW pep or average required for rated output.

INPUT IMPEDANCE:
50 ohms nominal, 1.3:1 vswr maximum (unbalanced).

RF LOAD IMPEDANCE:
50 ohms nominal, 3:1 vswr maximum (unbalanced).

BANDWIDTH:
12 kHz, 0.1-dB variation over 3-kHz segment.

INTERMODULATION DISTORTION:
Two-tone source, 40 dB below either one of two equal tones at rated pep output. Noise loading, 43 dB at DCA noise rated power with 310Y-1 Exciter.

RF NOISE:
At least 50 dB below either one of two equal tones at DCA noise rated power.

NOISE (KEY OFF):
0.1 μV in a 3-kHz bandwidth centered on the tuned transmitter frequency.

HARMONIC ATTENUATION:
80 dB below fundamental frequency.

TUNING TIME:
10 seconds maximum after receipt of rf power (7 seconds typically).

ALTITUDE:
Operating, 0 to 10,000 feet; nonoperating, 0 to 50,000 feet (15,240 m).

TEMPERATURE:
Operating, -40 to +55 °C (-40 to +131 °F); nonoperating, -62 to +70 °C (-78 to +158 °F).

HUMIDITY:
0 to 95 percent relative humidity.

VIBRATION:
5 to 15 Hz, 0.03-inch (0.0762 cm) double amplitude or 1 g whichever is less. 16 to 55 Hz, 0.02-inch (0.0508 cm) double amplitude or 1 g whichever is less.

SHOCK (WITHOUT DOORS OR TRIM PANELS):
3 impacts in each direction in each of 3 planes, except vertical from the top, for a total of 15 impacts. Each impact at 15 g for 11 ms.

COOLING AIR:
A variable speed blower provides sufficient cooling to the entire linear power amplifier. Adequate air margin existing under all specified environmental conditions.

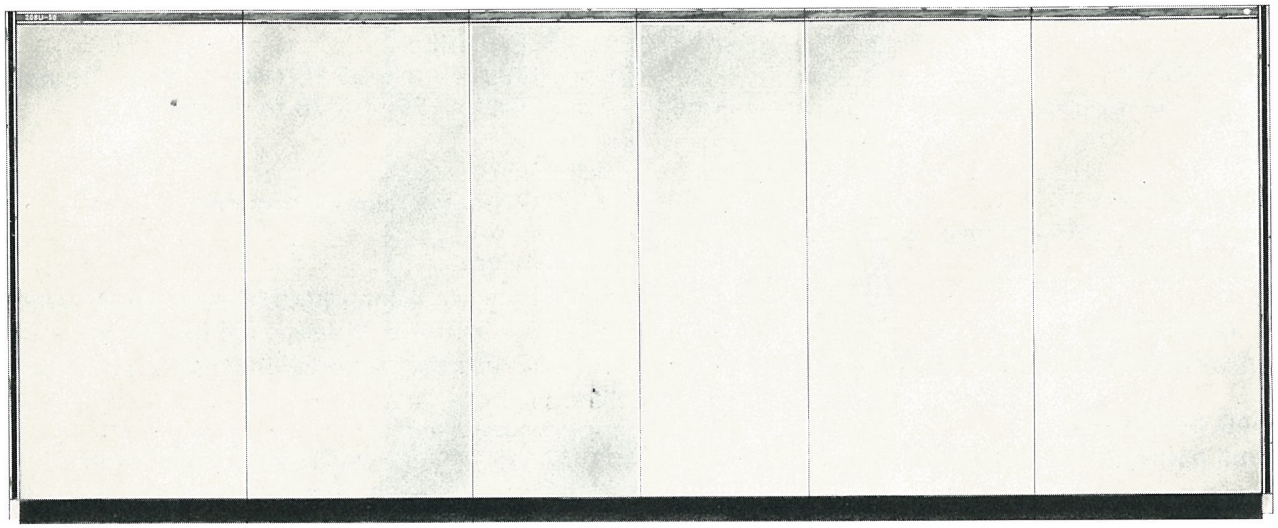
Power Requirements

200 to 250 volts, 3-phase, 47 to 63 Hz or 380 to 420 Hz. An optional external transformer for a 3-phase 380- to 440-volt power source is available.

SIZE:
69 inches (175.3 cm) high; 48.8 inches (124 cm) wide; 27.8 inches (70.5 cm) deep.

WEIGHT:
1760 lb (798.3 kg) approximately.

208U-50 linear power amplifier



Features

- *DCA and FCC Compatible*
- *Automatic Tuning*
- *Remote Control and Monitoring*
- *Built-in Antenna Matching Network*

Applications

- *Fixed Station*
- *Transportable*
- *Commercial*
- *Military*

The 208U-50 provides an rf power output of 50-kW pep and average for any type of modulation not exceeding the bandwidth capability throughout the entire 2.0- to 29.9999-MHz frequency range. Tuning is automatic and complete within 9 seconds after receipt of rf power.

Only 0.1-watt of rf drive is required from the associated exciter to produce the full rated output. The 4-stage power amplifier output is inductively coupled to the matching network where matching and loading of the associated broadband unbalanced antenna is accomplished without the need for an external antenna coupler.

Remote control over extended distances is possible through the use of serial-digital control techniques with either a line processor or manual radio set control. All control and monitoring information is transmitted between the processor or radio set control and the linear power amplifier by a serial bit stream over a single 3-twisted-pair cable.

Specifications

FREQUENCY RANGE:
2.0 to 29.9999 MHz.

POWER OUTPUT:
50-kW pep or average, 10-kW DCA noise rated power.

RF POWER INPUT:
Not more than 100-mW pep or average required for rated output.

INPUT IMPEDANCE:
50 ohms nominal, 1.3:1 vswr maximum (unbalanced).

RF LOAD IMPEDANCE:
50 ohms nominal, 3:1 vswr maximum (unbalanced).

BANDWIDTH:
12 kHz, 0.1 dB variation over 3 kHz segment.

INTERMODULATION DISTORTION:
Two-tone source, 46 dB below either one of two equal tones at rated pep output. Noise loading, 43 dB at DCA noise rated power with 310Y-1 Exciter.

RF NOISE:
At least 50 dB below either one of two equal tones at DCA noise rated power.

NOISE (KEY OFF):
0.1 μV in a 3-kHz bandwidth centered on the tuned transmitter frequency.

HARMONIC ATTENUATION:
80 dB below fundamental frequency.

TUNING TIME:
9 seconds maximum after receipt of rf power.

ALTITUDE:
Operating, 0 to 10,000 feet; nonoperating, 0 to 50,000 feet (15,240 m).

TEMPERATURE:
Operating, -40 to +55 °C (-40 to +131 °F); nonoperating, -62 to +70 °C (-78 to +158 °F).

HUMIDITY:
0 to 95 percent relative humidity.

VIBRATION:
5 to 15 Hz, 0.03-inch (0.0762 cm) double amplitude or 1 g whichever is less. 16 to 55 Hz, 0.02 inch (0.0508 cm) double amplitude or 1 g whichever is less.

SHOCK (WITHOUT DOORS OR TRIM PANELS):
3 impacts in each direction in each of 3 planes, except vertical from the top, for a total of 15 impacts. Each impact at 10 g for 11 ms.

COOLING AIR:
Vapor phase cooling plus 50/60 Hz squirrel-cage blowers provide cooling for linear power amplifier. Power supply and rf units are cooled separately allowing greater freedom in positioning since air ducts are not required between them. Each 208U-50 requires a minimum of 15 gpm of water at a temperature not exceeding 135 °F. Cooling water may be supplied by optional water-to-air heat exchanger.

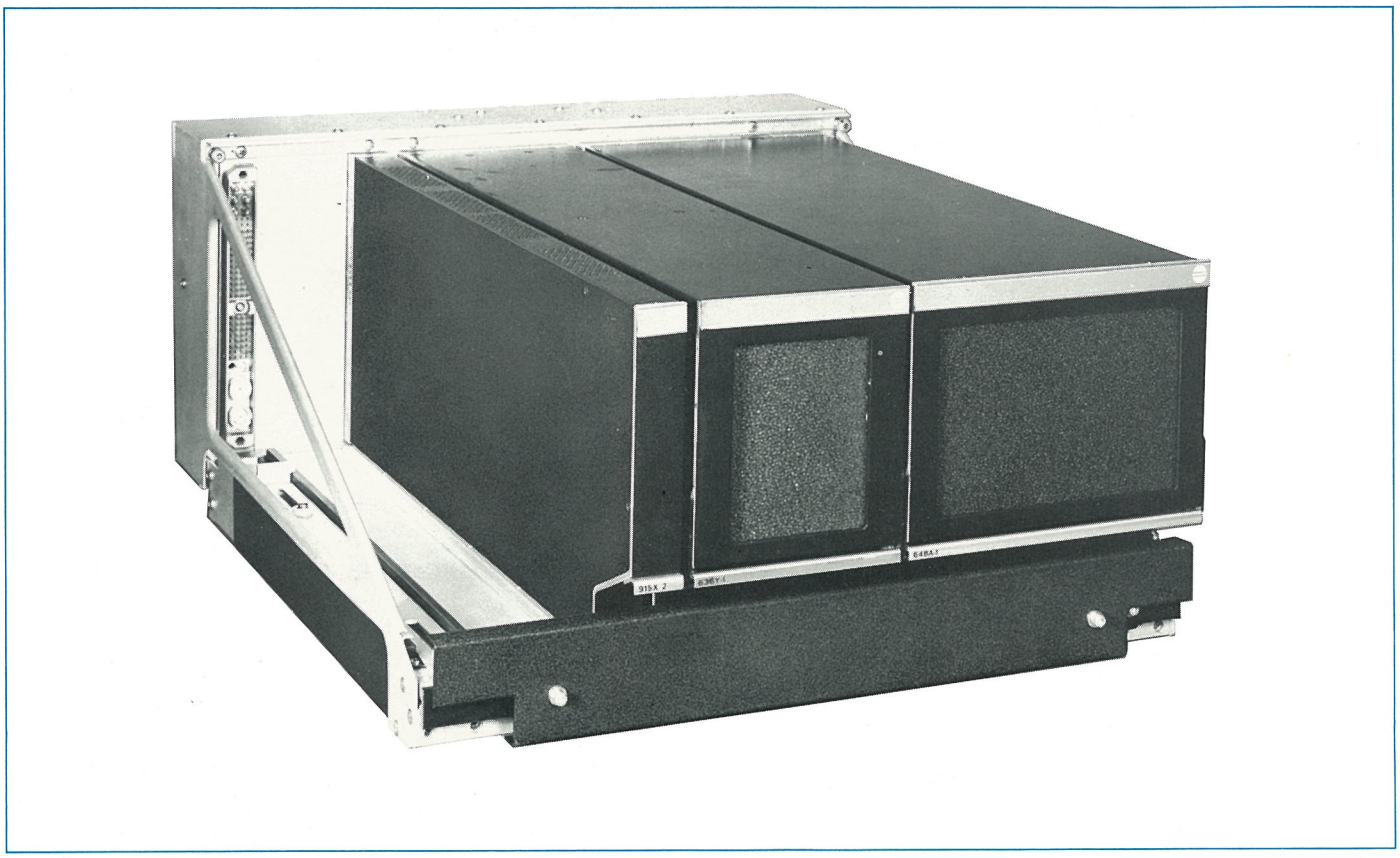
Power Requirements

200 to 250 volts, 3-phase, 47 to 63 Hz or 380 to 420 Hz. Optional modes are available for a 380- to 440-volt, 3-phase power source.

SIZE:
69 inches (175.3 cm) high; 186.6 inches (474 cm) wide; 27.8 inches (70.5 cm) deep.

WEIGHT:
4400 lb (1995.8 kg) approximately.

548U-( ) series linear power amplifiers



Features

- *Meets DCA Specifications*
- *Processor Controlled*
- *Automatic Tuning*
- *Improved Harmonic Rejection*
- *Power Supply Options*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*
- *Mobile*

The 548U series consists of the 548U-1 (military designation OG-98/URC-75); the 548U-1A; the 548U-1F; the 548U-2B; and the 548U-2C (military designation OG-88). Each unit produces 1-kW pep and average throughout the entire 2.0- to 29.9999-MHz frequency range. An adjustable power level control permits reduced power output operation between 100 and 700 watts.

Included in the 548U-1A and 548U-2C is the 915X-2 Digital Performance Monitor that monitors up to 16 selected analog voltages. All 514U-( ) amplifiers can be used in system complexes that contain various combinations of exciters and power amplifiers and can be centrally controlled, monitored, and selected by a line processor unit. This processor control, using serial-digital data link techniques, provides maximum flexibility and operational simplicity.

Two power supply options are available and may be selected according to the primary power sources available. Both supplies provide all voltages necessary to operate the 548U-( ).

Time delay circuits in all amplifiers prohibit rf output until properly heated to prevent damaging the amplifier tubes. However, a feature of the 548U-1F will allow the time delay to be overridden by a switch when emergency conditions dictate.

The table lists individual units of each 548U-( ) Linear Power Amplifier.

NOMENCLATURE	DIMENSIONS			WEIGHT POUNDS (kg)
	WIDTH INCHES (cm)	HEIGHT INCHES (cm)	DEPTH INCHES (cm)	
490T-3	7-5/8 (19.37)	7-5/8 (19.37)	21-49/64 (54.29)	27 (68.58)
490T-8	9-1/8 (23.18)	9-1/4 (23.50)	32 (81.28)	53-1/4 (135.36)
890F-1	8-7/16 (21.43)	11-1/16 (28.10)	21-7/8 (55.56)	9.5 (24.13)

Specifications

OUTPUT FREQUENCY RANGE:
2.0 to 29.999 MHz.

RF OUTPUT POWER:
1-kW pep or average; 200 watts DCA noise rated.

REDUCED OUTPUT POWER:
Two levels adjustable from 100 W to 700 W pep or average.

RF INPUT POWER:
0.1 watt maximum.

INPUT IMPEDANCE:
50 ohms unbalanced, 1.3 vswr.

LOAD IMPEDANCE:
50 ohms unbalanced, 3:1 vswr maximum.

RF BANDWIDTH:
12 kHz, 0.1-dB variation.

INTERMODULATION DISTORTION:
40 dB below either one of two equal tones at 10-kW pep output. 40 dB below 200 watts average with DCA noise loading.

HARMONIC SUPPRESSION:
80 dB below desired output level.

TUNING TIME:
5 seconds after receipt of rf power.

DUTY CYCLE:
Continuous.

AMBIENT TEMPERATURE:
-54 to +55 °C with 30 minutes operation to +71 °C.

ALTITUDE:
0 to 30,000 feet maximum.

Power Requirements

636Y-1 POWER SUPPLY:
115/200 volts, 3 phase 4 wire, 400 Hz, 3 kVA.

639D-1P/2P POWER SUPPLY:
115/200 volts, 3 phase, 4 wire, 50/400 Hz, 3 kVA.

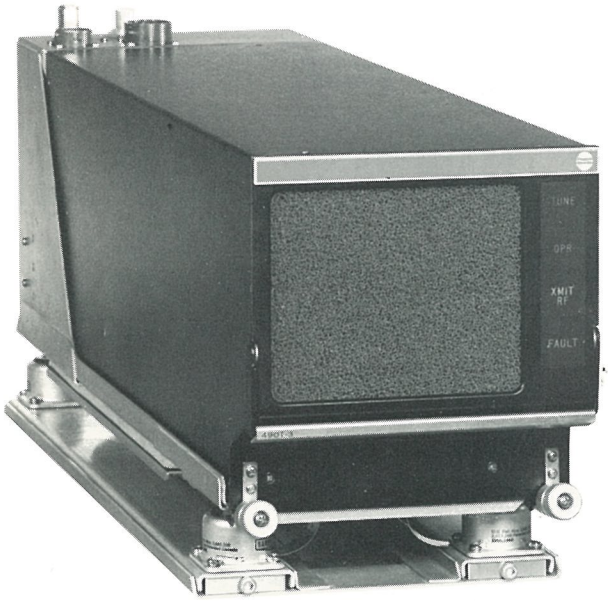
SIZE:
548U-1/1A, 9.8 inches (24.9 cm) high; 18.8 inches (47.7 cm) wide; 22.6 inches (57.4 cm) deep.
548U-2B/2C, two shelves of the above size.

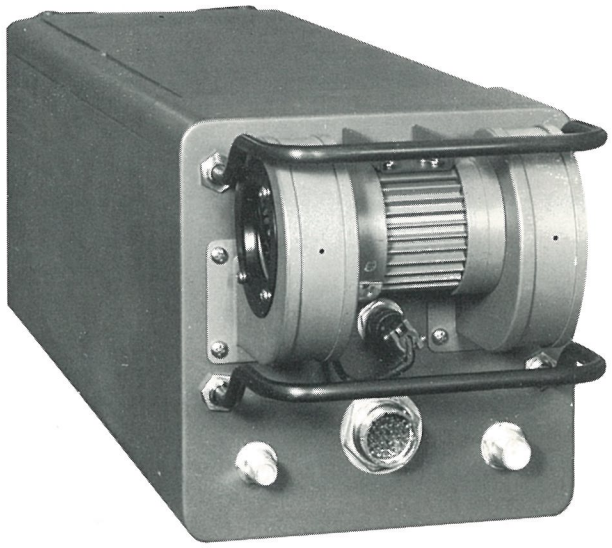
WEIGHT (APPROX):
548U-1, 83 lb (37.7 kg); 548-1A, 93 lb (42.3 kg); 548U-2B, 154 lb (70 kg); 548U-2C, 164 lb (74.5 kg).

NOMENCLATURE	*DIMENSIONS			*WEIGHT POUNDS (kg)
	WIDTH INCHES (cm)	HEIGHT INCHES (cm)	DEPTH INCHES (cm)	
548U-1( ) on 499R-7 Shelf (no 915X-2)	18.8 (47.7)	9.8 (24.9)	22.6 (57.4)	85 (38.6)
548U-1( ) on 499R-7 Shelf (includes 915X-2)	18.8 (47.7)	9.8 (24.9)	22.6 (57.4)	90 (40.9)
548U-2( ) on 499R-5 Shelf 499R-6 Shelf (no 915X-2) **Total	18.8 (47.7) 18.8 (47.7) 37.6 (95.4)	9.8 (24.9) 9.8 (24.9)	22.6 (57.4) 32.6 (57.4)	73 (31.1) 77 (35.0) 150 (68.1)
548U-2( ) on 499R-5 Shelf 499R-6 Shelf (includes 915X-2) **Total	18.8 (47.7) 18.8 (47.7) 37.6 (95.4)	9.8 (24.9) 9.8 (24.9)	22.6 (57.4) 22.6 (57.4)	78 (35.4) 77 (35.0) 155 (70.4)

*Includes mounting shelf
**Requires two shelves

490T-3/8 antenna couplers





Features

- *Automatic Tuning*
- *Matches Variety of Antennas*
- *Auto Failure Shutdown*
- *Continuously Monitors Power*
- *Simultaneous Operation (SIME-OP)*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*
- *Mobile*

The 490T-3 (military designation CU-1849/U) and 490T-8 (military designation CU-1896/BC-60) antenna couplers will match most antennas over the entire 2- to 30-MHz range. With a typical tuning time of two seconds, the couplers can match whips or typical wire antennas used for airborne, shipboard, or ground installations. Both antenna couplers have the same electrical characteristics, with the 490T-8 version designed for application as a pressurized unit at extreme altitude or a weatherized unit to protect it in an environment of dust, dirt, or moisture. A SIME-OP version is available in order to allow operation by two or more transmitting systems in close proximity when real estate is at a premium. Optional interchangeable circuit boards allow serial-digital or parallel-wire control, thus allowing maximum equipment interface including 548L-4A and 548U Power Amplifiers.

Specifications

FREQUENCY:
2 to 30 MHz.

RATED INPUT RF POWER:
1600 watts pep, and 1250 watts average continuous.

INPUT IMPEDANCE:
50 ohms.

NUMBER OF CHANNELS:
Continuous tuning.

TUNING ACCURACY:
1.3:1 vswr maximum (with no interfering signal).

TUNING TIME:
2 seconds typical, 5 seconds maximum.

POWER AMPLIFIER COMPATIBILITY:
548L-4A, 548U-( ).

ENVIRONMENTAL

AMBIENT TEMPERATURE RANGE:
-54 to +55 °C (-65.2 to +131 °F) continuous; to +71 °C for 1/2 hour; -62 to +85 °C (-79.6 to +185 °F) nonoperating.

HUMIDITY:
MIL-T-5422E. 95 percent humidity from +50 to +38 °C (+122 to 100.4 °F) for 10 days.

ALTITUDE:
Sea level to 30,000 feet (operating); 50,000 feet (nonoperating).

SHOCK:
6 impacts of 15 g for 11 +1 milliseconds in each of 3 planes.

CRASH SAFETY:
6 impacts of 30 g for 11 +1 milliseconds in each of 3 planes.

VIBRATION:
490T-3 mounted on 890F-1. 0.1 double amplitude: 5 to 20 Hz. 2 g: 20 to 33 Hz. 0.36 double amplitude: 33 to 73 Hz. 10 g: 73 to 500 Hz.
490T-8: 4 g da, 5 to 9 Hz, 2.5 g, 7 to 500 Hz.

COOLING AIR:
890F-1 Mount supplies all required cooling air for the 490T-3. The 490T-8 contains its own provisions for cooling air.

Physical Characteristics

TYPE	POWER AMPLIFIER	POWER SUPPLY	PERFORMANCE MONITOR	SHELF
548U-1	648A-1	636Y-1		499R-7
548U-1A	648A-1	636Y-1	915X-2	499R-7
548U-1F	648A-1	636Y-2		499R-7
548U-1G	648A-1	636Y-2	915X-2	499R-7
548U-2	648A-1	639D-1		499R-5
		639D-2		499R-6
548U-2A	648A-1	639D-1	915X-2	499R-5
		639D-2		499R-6
548U-2B	648A-1P	639D-1P		499R-5
		639D-2P		499R-6
548U-2C	648A-1P	639D-1P	915X-2	499R-5
		639D-2P		499R-6

Power Requirements

POWER SOURCE (MODULE OPTIONS):
490T-8: 115 V, 50 to 400 Hz, single-phase; 230 V, 50 to 400 Hz, single-phase; 28 Vdc; or 115 V 400 Hz single-phase.
490T-3: 28 Vdc; or 115 V 400 Hz, single-phase.

TUNING:
490T-3/8: 160 watt peaks maximum (short duration).

OPERATE:
490T-3: 50 watts average maximum (30 watts blower power must be added).
490T-8: 150 watts average maximum.

514A-1A radio set control

Features

- *Digital Frequency Display*
- *System Status Indicator*
- *Lightweight Compact Unit*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*

The 514A-1A (military designation C-9058/UR) permits manual control of hf communications systems that use serial-digital techniques, such as the 671T-3A/4A Receiver-Exciters, the 671U-4 Receiver-Exciter, the 548U-( ) Power Amplifier, and the 490T-3/8 Antenna Couplers. All controls and displays are located on the front panel and consist of mode select, squelch, and frequency select. A digital readout displays selected operating frequency and an indicator alerts the operator when the system is ready, in the tuning cycle, or faulty.

Control words, in the form of serial data bits, are generated within the 514A-1A and transmitted via a 3-twisted-pair cable to the appropriate system component. This control technique enables the 514A-1A to control up to eight system units simultaneously.

All internal voltages are synthesized from the single 28 Vdc input. Cooling air is not required in standard installations.

Specifications

FREQUENCY RANGE:
2.0 to 29.9999 MHz.

FREQUENCY CHANNELS:
280,000 in 100-Hz increments.

OPERATIONAL MODES:
USB, LSB, or AM.

ALTITUDE:
0 to 50,000 ft (15,240 m).

TEMPERATURE:
-55 to +71 °C (-67 to +159.8 °F).

HUMIDITY:
Up to 100 percent relative humidity at 50 °C (122 °F) for 48 hours.

VIBRATION:
Solid mount: 0.020 inch (0.0508 cm) double amplitude, 10 to 55 Hz; 1.5 g, 55 to 500 Hz.

SHOCK:
Solid mount: 12 impacts of 15 g for 11 ±1 ms in opposite directions along each of 3 perpendicular axes.

CRASH SAFETY:
Solid mount: 4 impacts of 30 g at 11 ±1 ms in opposite directions along each of 3 perpendicular axes.

Physical Characteristics

WIDTH:
5-3/4 inches (14.605 cm).

HEIGHT:
2-5/8 inches (6.542 cm).

DEPTH:
5-1/4 inches (13.335 cm).

WEIGHT:
2.5 pounds (1.13 kg).

Power Requirements

The 514A-1A Radio Set Control requires an input voltage of 28 volts dc. Power consumption of the unit is 20 watts.

514A-2 radio set control

Features

- *Digital Frequency Display*
- *System Status Indicator*
- *High/Low Power Switch*
- *Lightweight Compact Unit*
- *Military Nomenclatured*

Applications

- *Fixed Station*
- *Transportable*
- *Airborne*
- *Shipboard*

The 514A-2 (military designation C-9138/UR) permits manual control of hf communications systems that use serial-digital techniques. It controls the same family of equipments as does the 514A-1A, but has the additional capability of a high/low power switch to control the associated linear power amplifier. The 514A-2 also has facilities to control upper and lower sidebands independently for ISB operation.

Control words, in the form of serial data bits, are generated within the 514A-2 and transmitted via a three-twisted-pair cable to the appropriate system component. This control technique enables the control of up to eight system units from a single 514A-2.

All internal voltages are synthesized from the 28-Vdc input. Cooling air is not required in standard installations.

Specifications

FREQUENCY RANGE:
2.0 to 29.9999 MHz.

FREQUENCY CHANNELS:
280,000 in 100-Hz increments.

OPERATIONAL MODES:
AM, CW, or SB (USB, LSB, or ISB).

SB SUBMODES:
Voice or data.

ALTITUDE:
0 to 30,000 ft (1,525 m).

TEMPERATURE:
-55 to +71 °C (-67 to +159.8 °F).

HUMIDITY:
Up to 100-percent relative humidity at 50 °C (122 °F) for 48 hours.

VIBRATION:
Solid mount, 0.020-inch (0.0508 cm) double amplitude, 10 to 55 Hz; 1.5 g, 55 to 500 Hz.

SHOCK:
Solid mount, 12 impacts of 15 g for 11 ±1 ms in opposite directions along each of three perpendicular axes.

CRASH SAFETY:
Solid mount, four impacts of 30 g at 11 ±1 ms in opposite directions along each of three perpendicular axes.

Physical Characteristics

WIDTH:
5-3/4 inches (14.605 cm).

HEIGHT:
3-3/8 inches (8.6 cm).

DEPTH:
5-1/4 inches (13.335 cm).

WEIGHT:
2.5 pounds (1.13 kg).

Power Requirements

28 Vdc, 20 W.

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