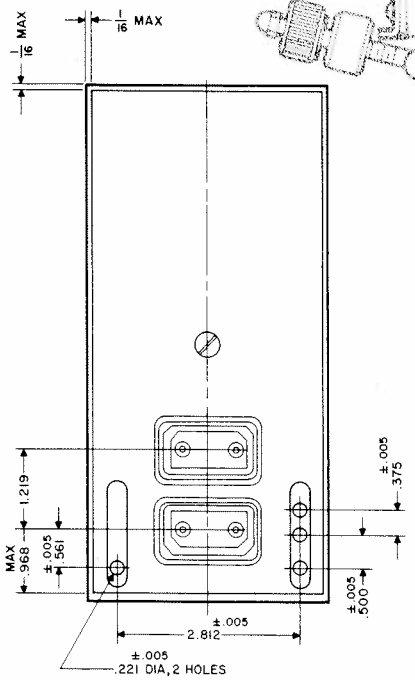
COLLINS CREATIVE LEADER IN AVIATION ELECTRONICS


# COLLINS
# 17L-7
# AIRBORNE VHF TRANSMITTER

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# 25 WATT AIRBORNE VHF TRANSMITTER

*'Airline standard' transmitter provides 25 watts, 680 channels in small package*

Collins 17L-7 VHF Transmitter, which has become the 'airline standard' that its 17L predecessors were, combines extended reliability and frequency coverage with greatly reduced size and weight. In addition to international, domestic and local service airlines, the 17L-7 is applicable to business aircraft fleets and military use.

## DESIGN FEATURES

An integral part of Collins' Airborne Electronic System, the 17L-7 provides 25 watts output in the 118.0-151.95 mc range with 680 50 kc crystal-controlled channels available. Remote control may be utilized for either single-channel simplex, double-channel simplex or double-channel duplex operation with a 6 mc shift in transmitter frequency from that of the receiver on those frequencies specified by CAA for duplex operation.

Housed in a short ⅜ ATR case, the 17L-7 weighs only 14 pounds, half the weight of previous transmitters of like performance. Only six tubes and five transistors are utilized, with two additional transistors in the dc power supply. A blower on the front panel provides cooling for conventional installations by forcing air between the chassis decks and distributing it through modules as needed. The unit is also adaptable to ARINC cooling. Metering of all pertinent circuits is provided on the front panel. The rear panel contains two DPA connectors through which all connections are made.

The modular concept employed in all Collins lightweight airborne equipment has been utilized in the 17L-7. Modular

## ASSOCIATED EQUIPMENT

### 51X-2 VHF COMMUNICATION RECEIVER

Companion unit to the 17L-7, the 51X-2 also features extended reliability and coverage with compact design. Providing 880 channels with 50 kc spacing, the receiver employs only 42 crystals and a 14-wire Autopositioner® control. Contained in a short ⅜ ATR case, it weighs only 10.5 pounds including power supply. *Power Requirements:* DC Power Supply — 27.5 v at 1.2 amps. AC Power Supply — 115 v, 300-1000 cps at .21 amp; 27.5 v at 0.1 amp. *Shockmount:* 349H-4; 390E-2 for dual mtg. with 17L-7. *Controls:* 614U-1. *A complete brochure on the 51X-2 is available.*

### 137X-1 VHF COMMUNICATION/ NAVIGATION ANTENNA

This antenna provides a combined unit with essentially the same electrical characteristics as the 37J-3 VOR navigation and 37R-1 VHF communication antennas. The standing wave ratio at the communication terminal is less than 2:1 from 118 to 136 mc, and at the navigation terminal is less than 5:1 from 108 to 122 mc. Both navigation and communication portions have omnidirectional azimuthal patterns, the communication terminal being vertically-polarized and the navigation terminal horizontally-polarized. The antenna is designed to withstand forces encountered at Mach .9 (sea level) in an attitude of 5° pitch and 5° yaw. It has a drag of approximately 2.66 pounds at 250 mph (sea level) with 0° angle of pitch and yaw and drag of 15.3 pounds at 600 mph. The 137X-1, which mounts in the same holes as the 37J-3 and 37R-1 and 37R-2 with appropriate base plate, is plastic-filled with a Fiberglas covering and weighs 4.7 pounds. It passes salt spray tests and water submersion tests at an altitude of 70,000 feet. The 137X-1 is also used with Collins 51R Navigation Receivers, 51X Communication Receivers and Collins 17L-4 or 17L-7 Transmitters. It is CAA certificated, and passes military specifications.

design, in which components are grouped and packaged according to their functions, results in compactness, reduced manufacturing costs, easier trouble shooting, reduced spare stocks and possible use of less experienced line maintenance personnel. All routine adjustments can be made while a module is in place and without removing covers. Provisions are made for removing energized modules through the use of extension cables.

The transmitter meets applicable ARINC, RTCA and FCC specifications.

The 17L-7 is interchangeable with the 17L-4 with the addition of a 49T-1 Adapter Case, which converts the new transmitter to a long ½ ATR.

## 614U-1 CONTROL

This control provides remote frequency selection of both the 17L-7 and 51X-2 in single-channel simplex, double-channel simplex and double-channel duplex systems. The unit tunes 118.0-151.95 mc in 50 kc steps.

## CIRCUIT DESCRIPTION

Frequency generation is accomplished in the 17L-7 by mixing the outputs from two oscillators, resulting in output frequencies in the 118.00-151.95 mc range. The VHF oscillator employs a Butler oscillator with 18 remotely selected crystals to furnish the high injection frequency. Mixed with this is the output from the HF oscillator which has 20 remotely selected crystals in 50 kc steps. A Collins Autopositioner® of the new miniature design is used to select the proper crystal. The frequency generating system uses all the crystals twice by utilizing sum and difference mixing to cover the full frequency range with only 38 crystals. Very low level mixing is employed to suppress spurious mixer products. The crystal frequencies have been chosen to eliminate direct beats.

Following the mixer are two stages of RF amplification and filtering. Double-tuned circuits are employed between stages to eliminate or suppress undesired frequencies and provide adequate drive to the driver stage. Single-ended driver and PA stages amplify the power level to 25 watts. A CERAMIC tetrode output tube is used as the final class C power amplifier stage. This stage is high level plate modulated to provide low distortion, noncritical modulation to the output signal. The power amplifier is link coupled to the transmission line through a low pass filter and an antenna change relay. The final power amplifier stage is fully protected against loss of RF drive.

A five transistor modulator module is used in the 17L-7. The input from a carbon microphone is coupled directly to the preamplifier. The signal is amplified in the driver and class B push-pull stages to the level necessary to modulate the final stage. Large savings in weight, size and power requirements have been achieved in the modulator circuitry. The use of transistors materially lowers the internally dissipated heat which allows the equipment volume to be reduced without overheating even when it is used for continuous transmission. The remaining transistor is used to amplify the detected sidetone to 100 mw minimum into 500 ohms.

Two interchangeable power supplies are available. The 516C-1 operates from a 300-1000 cps, 115 v ac source and employs conventional transformer-silicon rectifier circuits to supply the plate supply voltages. The 516D-1 transistorized dc supply is used in place of a dynamotor when 27.5 v dc primary power is employed.

*Size:* 24 3/16" W, 25 7/8" L, 10 31/32" H.

### 37R-2 VHF COMMUNICATION ANTENNA

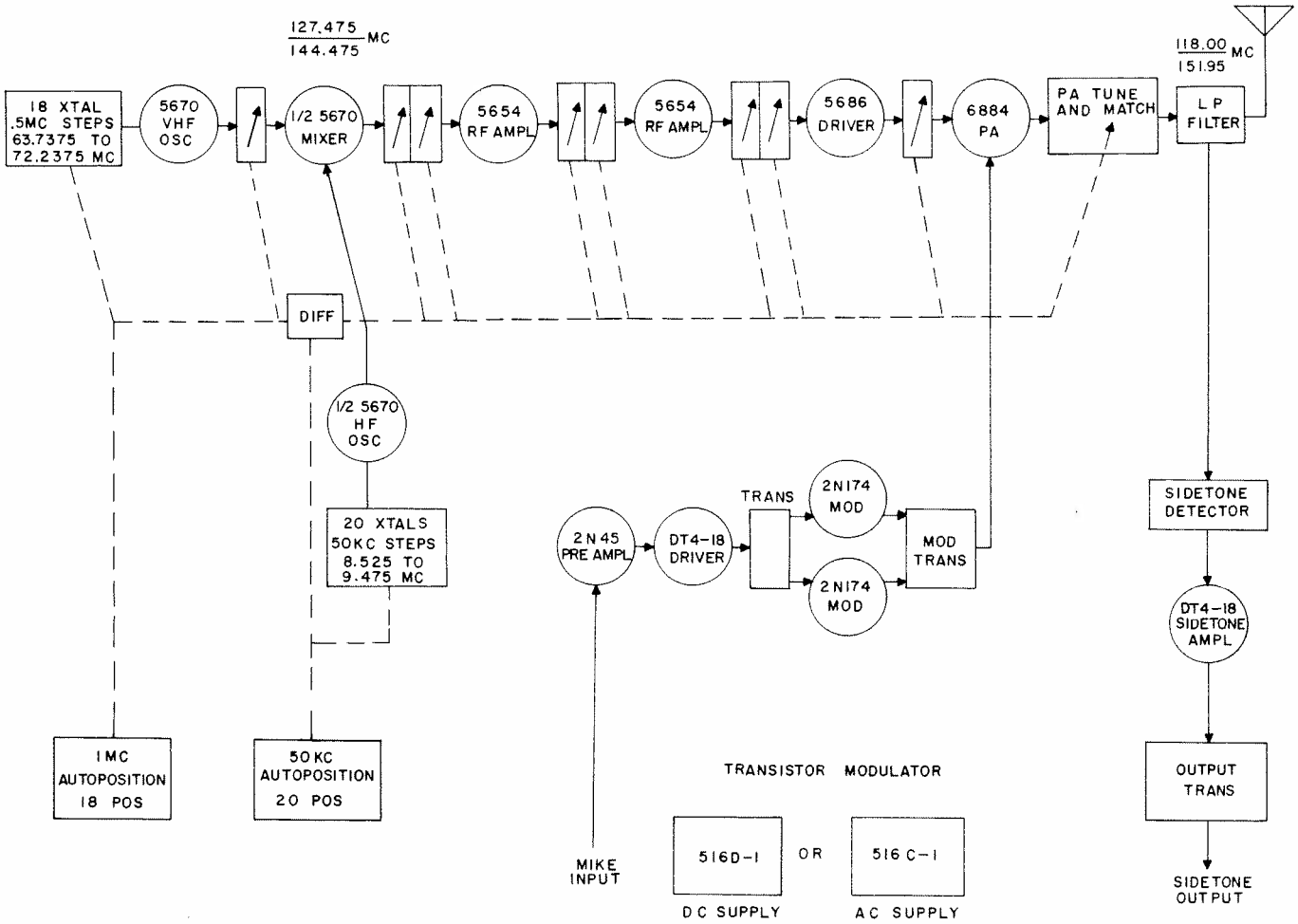
The 37R-2 is a vertically-polarized communication antenna for use on aircraft cruising up to 600 mph. An SWR of 2:1 or less is obtained over the 116-152 mc range. The nominal input impedance is 52 ohms. The input connector is a pressurized BNC which mates with BNC plugs UG 88/U, UG 260/U or equivalents. The antenna is used for both receiving and transmitting with a maximum input capability of 125 watts for intermittent service. Printed circuit techniques and foamed-in-place-plastic have kept weight at a minimum (2 pounds) while maintaining the aerodynamic properties necessary for modern high speed aircraft. The 37R-2 has a drag of approximately .518 pounds at 250 mph (sea level) with 0° angle of attack, and a drag of 1.32 pounds at 400 mph (sea level). On new installations, a mounting hole pattern longer than the present 5 5/8" pattern is recommended. However, for direct replacement of the 37R-1, an adapter plate is available. CAA certificated. *Size:* 12 5/16" H, 3 33/32" W, 11½" L.

### 390E SHOCKMOUNT

The 390E-2 provides dual mounting for the 17L-7 and 51X-2. The 390E-1 provides mounting for the 51X-2 and 344B-1 Instrumentation Unit. A unique extractor mechanism prevents damage during insertion or removal of the units. Load isolators were selected for proper smoothing of G forces. *Weight:* 2.4 lbs.

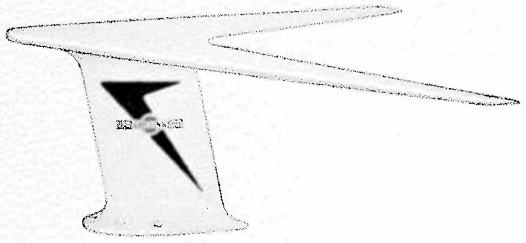
### 349H-3 SHOCKMOUNT

Designed to accommodate a single installation of ⅜ ATR boxes, this unit prevents 'bottoming' under high G forces. A floating-type rear connector and coded guide pins guard against damaged connectors during removal or replacement of unit. *Weight:* 1.4 lbs.

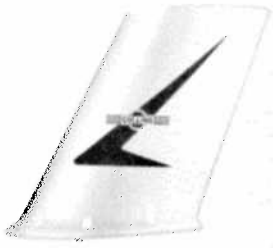



## CIRCUIT DIAGRAM

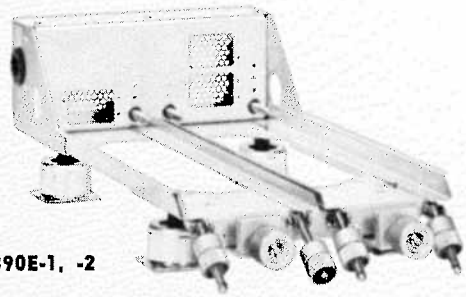
51X-2



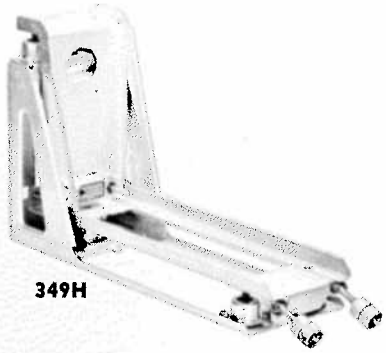
137X-1



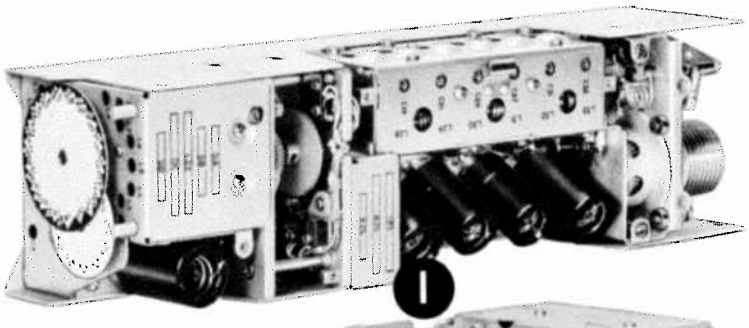
37R-2



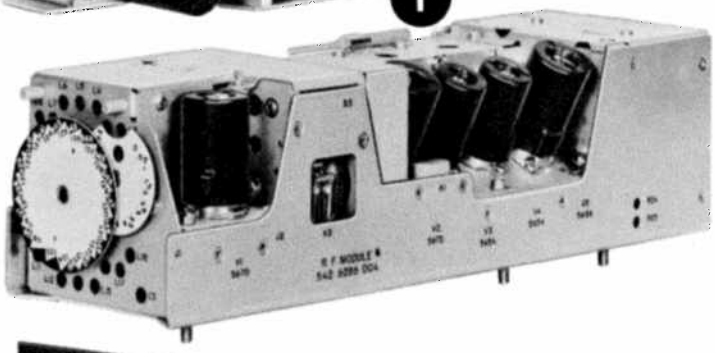
390E-1, -2



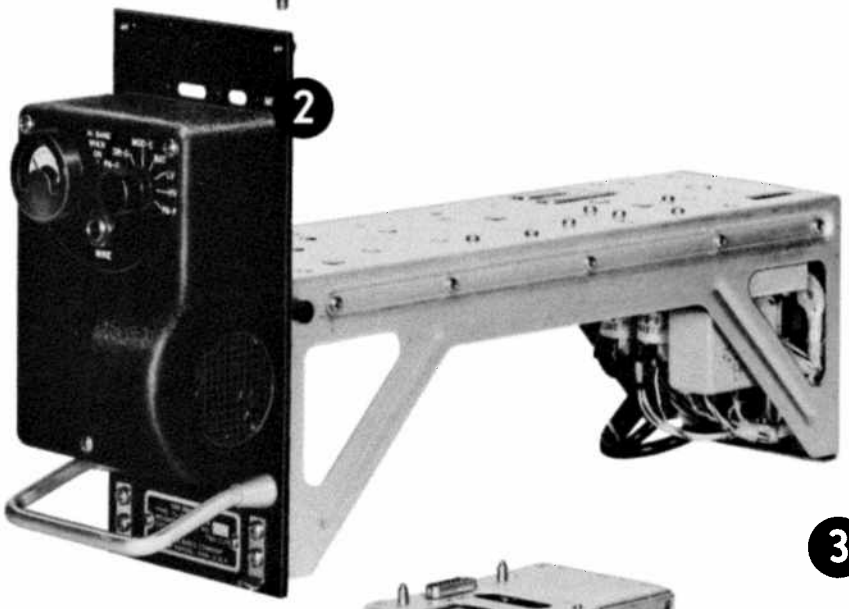
349H



The rack type 17L-7, in a perforated case, is double-deck chassis construction with modular subassemblies connected to the top and bottom of the middle shelf through mating connectors.

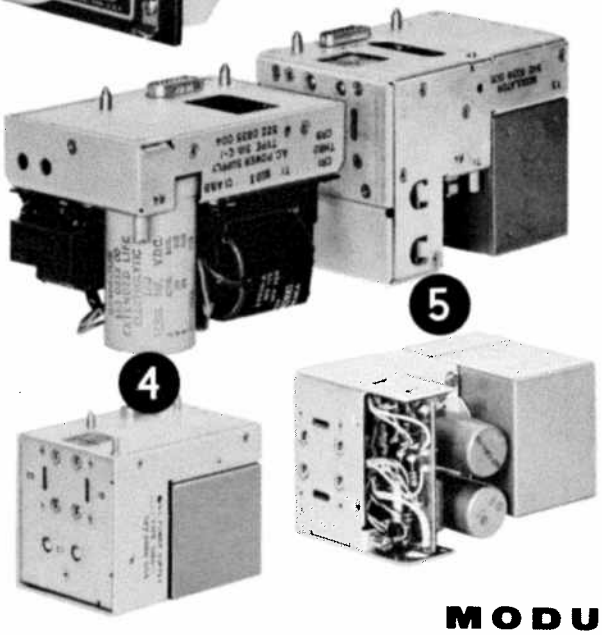


1. On top of the chassis shelf is the RF module, which contains the entire RF channel, Autopositioner® drive, gear train and seeking switches.



2. The chassis includes the squirrel-cage blower housing and meters and switches on the front panel, and the relay control subassembly at the rear.


3. The 614U-1 Control provides frequency selection for single-channel simplex, double-channel simplex and double-channel duplex operation, tuning 118-151.95 mc in 50 kc steps.

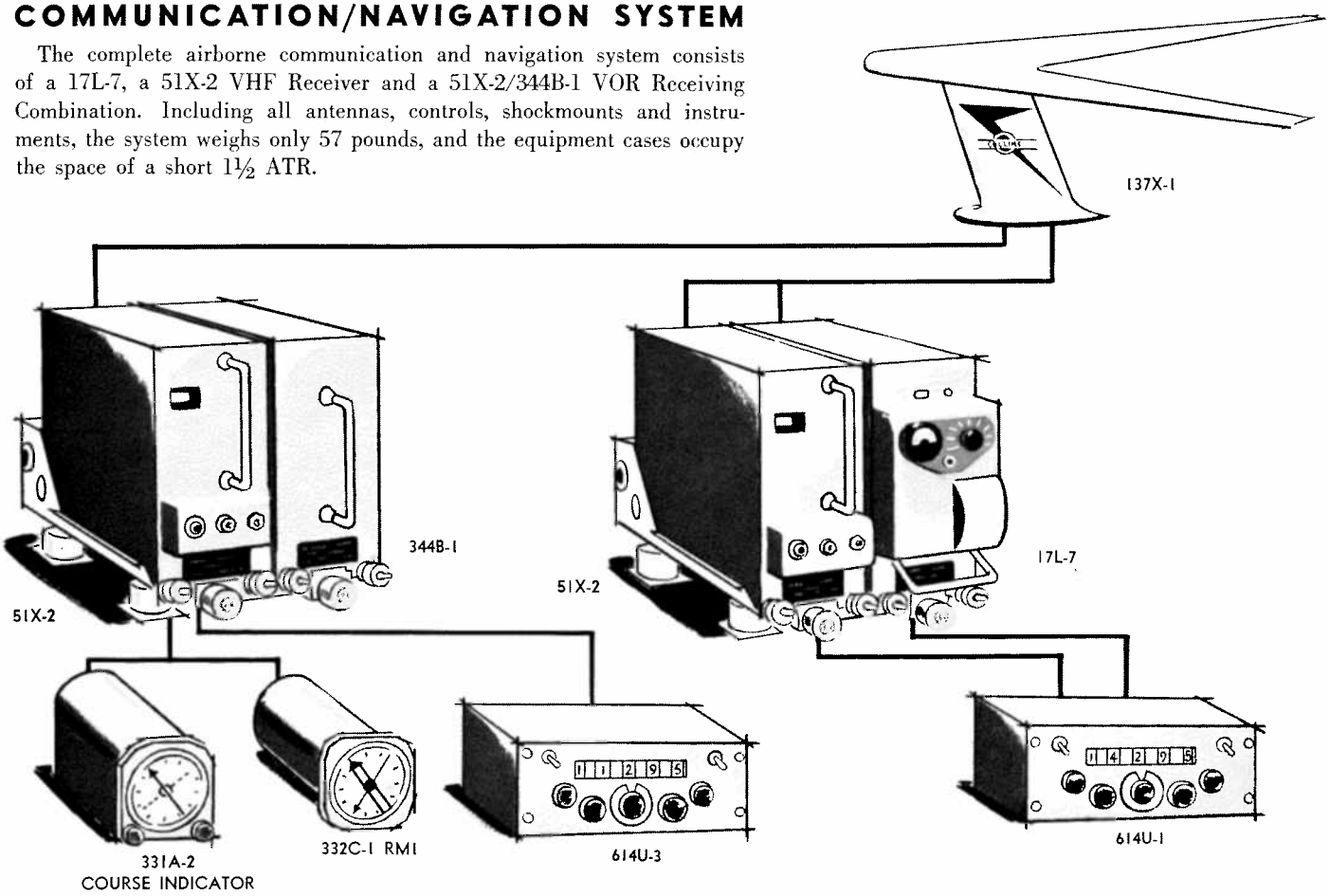


4-5. The bottom of the shelf mounts the 516D-1 dc power or 516C-1 ac supply module in front and the modulator module in the middle. The lower deck modules have mating connectors to those in the bottom of the chassis shelf.

## MODULAR CONSTRUCTION

## COMMUNICATION/NAVIGATION SYSTEM

The complete airborne communication and navigation system consists of a 17L-7, a 51X-2 VHF Receiver and a 51X-2/344B-1 VOR Receiving Combination. Including all antennas, controls, shockmounts and instruments, the system weighs only 57 pounds, and the equipment cases occupy the space of a short 1½ ATR.




## SPECIFICATIONS

CAA CERTIFICATION: TSO approved under C37a Category B.

FREQUENCY RANGE: 118.00 to 151.95 mc in 50 kc steps.

POWER OUTPUT: 25 w minimum, 118-135.95 mc; 20 w minimum, 136-151.95 mc.

DUTY CYCLE: Designed for continuous transmission, 90% modulated.

OUTPUT IMPEDANCE: Unbalanced output into a 52 ohm load.

FREQUENCY STABILITY: Not more than ±0.004% deviation from assigned channel frequency per ARINC 520A.

HARMONIC AND OTHER SPURIOUS RADIATION: With 52 ohm load, harmonics down at least 45 dbw, and spurious emissions down at least 75 dbw.

MODULATION CHARACTERISTICS: 90% over entire RF range with not more than 0.25 v rms 1000 cps input signal.

AUDIO FREQUENCY RESPONSE: Within 6 db from 300 to 10,000 cps with respect to 1000 cps.

AUDIO FREQUENCY DISTORTION: With 1000 cps input does not exceed 10% at 90% modulation.

TRANSIENT PROTECTION: Fully protected against +80 v and −40 v line transients.

NOISE LEVEL: Over-all noise level at least 35 db down at 90% modulation.

ARINC TUBE TYPES: RF Amplifier, 2-5654; Oscillator and Mixer, 2-5670; Driver, 1-5686; PA, 1-6884.

AMBIENT TEMPERATURE RANGE: −40°C to +70°C.

AMBIENT HUMIDITY RANGE: 95 to 100% for 48 hours at 50°C ±3°C.

ALTITUDE: Sea level to 30,000 ft.

SHOCK AND VIBRATION CONDITIONS: Conform to RTCA Paper 100-54/DO-60.

POWER REQUIREMENTS: 516C-1 AC Power Supply — 115 v ac at 1 amp, 27.5 v dc at 3.1 amps. (90% modulated.)
516D-1 DC Power Supply — 27.5 v dc at 7.3 amps. (90% modulated.)

STANDBY: 23.5 w at 27.5 v (either supply).

SIZE: Short ⅜ ATR case, $15\frac{3}{16}$" D, $3\frac{9}{16}$" W, $7\frac{5}{8}$" H, including front handle extension.

WEIGHT: 14 lbs.