1957

COLLINS RADIO COMPANY

General Catalog

GENERAL CATALOG

Collins IN 1957

Our catalog this year concentrates on our capabilities of supplying integrated commercial systems as well as individual equipments. Separate brochures are available on nearly every system or equipment listed.

For your convenience in locating specific products, the catalog is indexed by general areas, page 3, and by Collins type numbers, pages 4 and 5.

We hope the catalog will give you a complete picture of all our commercial product lines at this time, and we invite you to inquire by telephone or correspondence to your nearest Collins Office as listed below.

James G. Shumaker

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1957

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Collins AIRBORNE ELECTRONIC SYSTEM

Engineered for those customers who require the finest equipment obtainable — Collins new Airborne Electronic System is as advanced as the Jet Age. A complete package installation in communication, navigation and control is *Lightweight* — savings up to 65%, *Compact* — volume reductions of up to 60%, *Efficient* — input power reductions of 50% or more, and *Modularized* — for complete flexibility on any multi-engined aircraft — piston or jet.

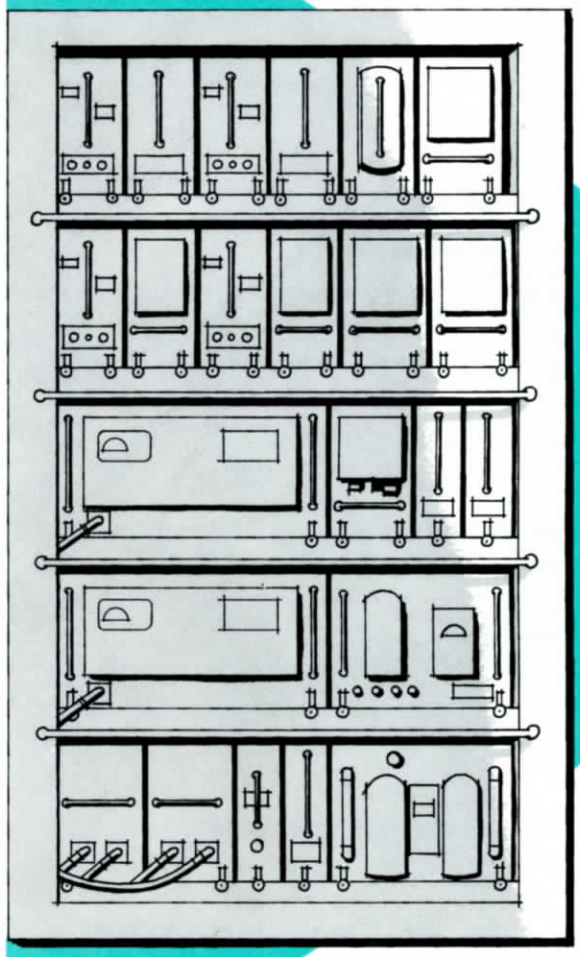
MORE RELIABLE

LESS WEIGHT

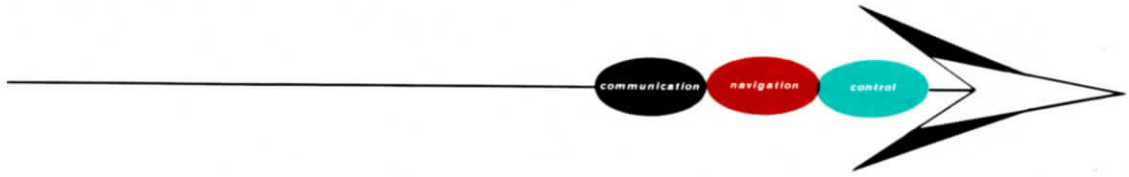
MORE COMPACT

LESS POWER

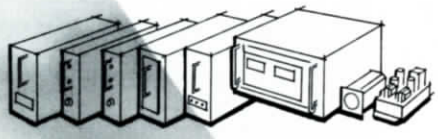
MORE FLEXIBLE

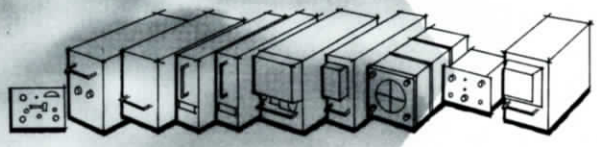


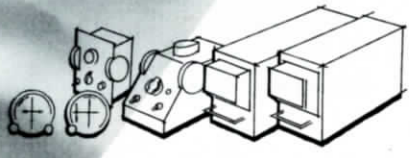
The equipment shown: TOP SHELF: 51X-2 VHF Communication Receiver, 17L-7 VHF Transmitter, 51X-2, 17L-7, 456C-1 Selcal, 328A-1 Compass Amplifier (MC-101); 2ND SHELF 51X-2, 344B-1 VOR Instrumentation, 51X-2, 344B-1, 562A Steering Computer (FD-104), 562C-1 Computer Amplifier (AP-101); 3RD SHELF: 618S HF Transceiver, 621A-1 ATC Transponder, 51V-3 Glideslope Receiver, 51V-3; 4TH SHELF: 618S, 374A-1 (Synchronizer of WP-101); BOTTOM SHELF: 51Y-1 ADF Receiver, 51Y-1 346D-1 Passenger Address Amplifier, 51Z-2 Marker Receiver, 776C-1 (R/T of WP-101).



FOR AIRLINE OPERATION







COMMUNICATION

Only Collins offers such a complete line of communication equipment — VHF, HF, Passenger address, Interphone and Selcal. Modularized, transistorized, each with an integral, removable power supply. Units such as the 17L-7 and 17L-8 VHF Transmitters and 51X-2 VHF Receiver will set the standard for new, lightweight electronics equipment.

NAVIGATION

Collins, as always, the leader in navigation equipment, brings this new package which includes ADF, VOR receiver and instrumentation, ATC Transponder, Marker and Glideslope Receivers, Compass and Weather Radar. Representative of the new lightweight navigation equipment is the 18 pound ADF Receiver built to ARINC Characteristic 530A.

CONTROL

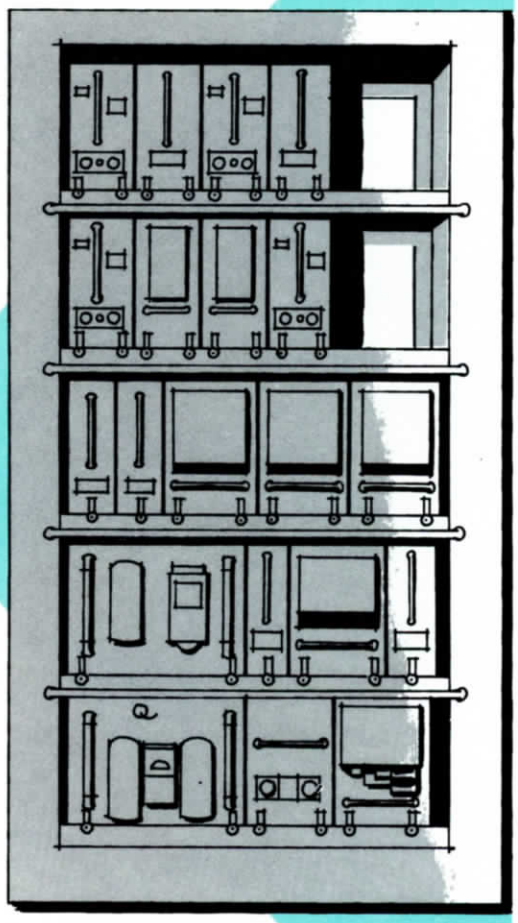
Using Collins control package, smooth, precise, flight control is achieved with Collins tubeless, modularized Automatic Pilot. Outstanding instrumentation is provided by Collins Integrated Flight System — the original — which presents easy to fly and interpret basic altitudes and flight director information.

Collins AIRBORNE ELECTRONIC SYSTEM

LOCAL SERVICE AIRLINE AND HEAVY BUSINESS AIRCRAFT OPERATION

Only with Collins can the operator of these aircraft get the most reliable, complete electronic system and add passengers on each flight, too. More electronic equipment — communication, navigation, instrumentation control — assures greater versatility and ease of operations. With Collins new electronic system, local service airlines and the larger business aircraft — who use substantially the same equipment — can still have the finest — but in less space and with less weight. Only five 2 ATR wide shelves contain a more complete system than previously considered possible in twice the space.

With Collins system, increased flexibility is possible because modifications and additions are easily made. Modular construction, in which each electrical function is physically compartmented, lends itself to later improvements. Advanced engineering techniques assure *long design life* — modern today and tomorrow.



The equipment shown: TOP SHELF: 51X-2 VHF Communication Receiver, 17L-7 VHF Transmitter, 51X-2, 17L-7; 2ND SHELF: 51X-2, 344B-1 VOR Instrumentation, 344B-1, 51X-2; 3RD SHELF: 51V-3 Glideslope Receiver, 51V-3, 562A Steering Computer (FD-104), 562A, 562C Computer Amplifier (AP-101): 4TH SHELF: 374A-1 (Synch. of WP-101), 51Z-2 Marker Receiver, 328A-1 Compass Amplifier (MC-101), 346A-1 Interphone Amplifier; BOTTOM SHELF: 776C-1 (R/T of WP-101), 51Y-1 ADF Receiver, 621A-1 ATC Transponder.

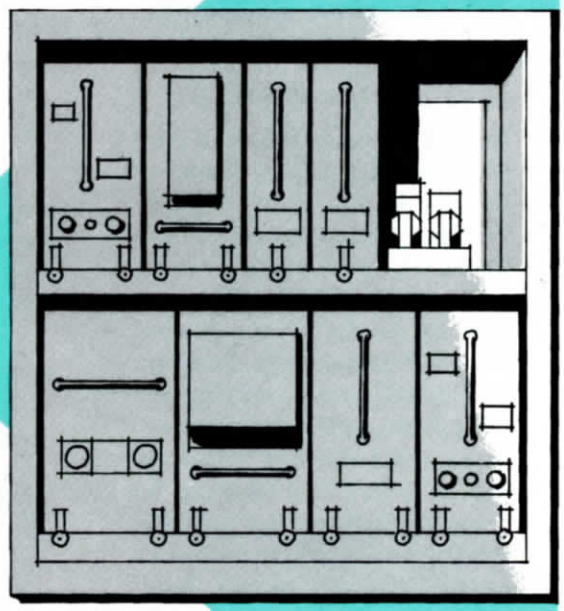
FOR TWIN ENGINE AIRCRAFT

MEDIUM BUSINESS AIRCRAFT OPERATION

Here in a space only 18″ wide by 15.25″ high and 19.6″ deep, is a complete system for the business aircraft. Owners of lighter aircraft will no longer have to 'make-do' with inferior equipment. Collins reliable 'Airline Standard' system can be used in any twin engine aircraft.

Shown on this page is a configuration of the Collins Electronic System for a medium sized twin engine aircraft. Safe cross country traveling is yours with Collins reliable, CAA type certificated equipment.

Installation of this system is simpler — each unit, for example, has its own power supply, the equipment may be shelf mounted or mounted in single or dual shockmounts throughout the plane. Collins engineers will design a Collins Electronics System for any multi-engine aircraft.



The equipment shown: TOP SHELF: 51X-2 VHF Communication Receiver, 344B-1 VOR Instrumentation, 51V-3 Glideslope Receiver, 51Z-2 Marker Receiver, 427A-1 Power Supply-Modulator for 17L-8; BOTTOM SHELF: 51Y-1 (ADF) Receiver, 562A-4 Steering Computer (FD-104), 17L-7 VHF Transmitter, 51X-2 VHF Communication Receiver.

communication navigation control

Collins INTEGRATED

331A-2 COURSE INDICATOR
329B-2 APPROACH HORIZON

The 331A-2 presents a plan view of the aircraft position. The deviation bar shows relative VOR or localizer course; servo driven compass dial the aircraft heading against a fixed lubber line; station direction by To-From pointer. Weight 4 pounds. 400 cps input. The 329B-2 has standard pitch and roll reference with glideslope and steering pointer added. Glideslope pointer at left. Flag warnings for Glideslope and Localizer receivers. Steering needle indicates direction to turn. Weighs 2.1 pounds. Standard 3″ instrument case.

327B-1 GYRO MONITOR

This unit provides an instrument panel indication of the Vertical Gyro speed and erection current. Circuitry for the operation of the monitor is included in the Steering Computer. Weighs .5 pounds.

The FD-104 IFS presents basic attitude, navigation situation and steering information to the pilot. Two instruments provide a "forward view" presentation, on the Approach Horizon, and a "plan view" on the Course Indicator. Both displays are of the pictorial type, combining the available data in an unambiguous manner.

The IFS receives information from the 51V and 51R sources which also feed other systems. Particular emphasis in the FD-104 is given to compatibility. Installations may be arranged to allow equipment savings, but with sufficient independence and equipment backup to give desirable logical redundant failure protection.

New circuit designs employ reliable magnetic amplifiers and transistors — no vacuum tubes are required. Power consumption and equipment temperature rise are reduced. Modularized throughout. 50 va power required after start.

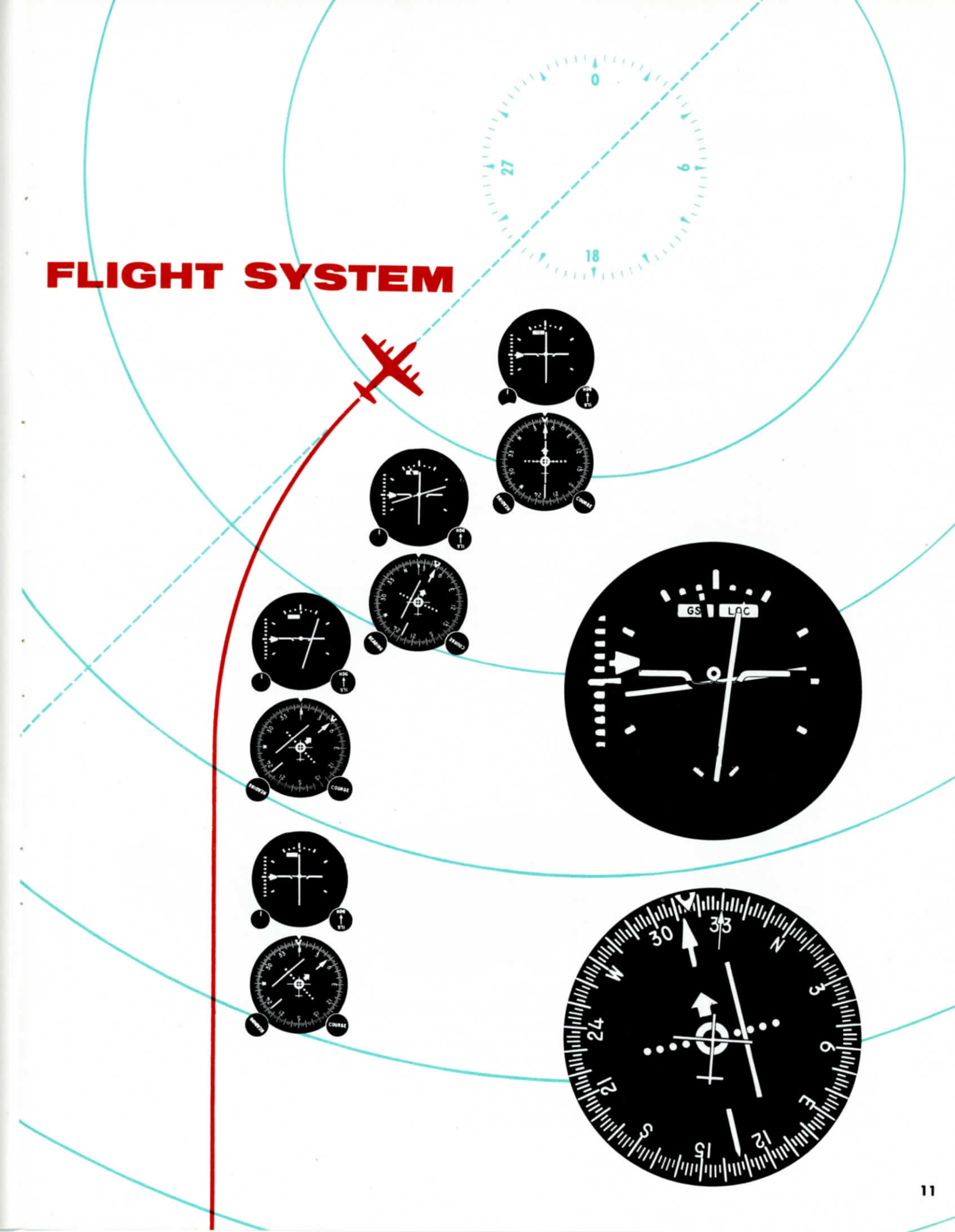
562A-4 STEERING COMPUTER

The 562A provides lateral guidance signals to the steering pointer of the 329B-2 Approach Horizon and contains the pitch and bank circuitry for the 329B-2 and the servo amplifier to drive the servo motor in the 331A-2 Course Indicator. The 562A mounts in the 350M-2 shockmount. Standard ½ ATR, weighs 17 pounds. Modular construction. No tubes. Numerous test points provided.

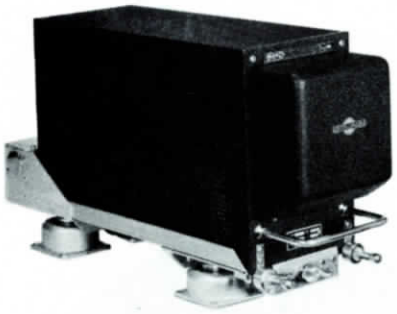
332D-5, D-6 VERTICAL GYRO
345A-2 SENSING UNIT

The 332D-6 is a non-tumbling cageable gyro for full freedom installation requirements. The 332D-5 is a gyro for installations not requiring the full freedom gyro. Gyro caging is controlled by Steering Computer. 332D-5 weighs 5 pounds and 332D-6 weighs 6.5 pounds. The 345A-2 provides roll erection cutout during turns. Weighs 3.2 pounds.

FLIGHT SYSTEM



Collins AUTOMATIC



562A-6 STEERING COMPUTER

Contains same basic circuitry, functions, and is otherwise like the 562A-4 (previous page) except that new circuitry has been added for automatic cross wind correction and switchover to heading control when over the cone of confusion.

The AP-101 Automatic Pilot, which includes the FD-104 Flight Director, controls the aircraft in all modes of flight. Complete monitor information is displayed on the two instruments. Operational features include the ability to fly a selected altitude, heading, rate of turn or pitch attitude. No separate approach coupler is needed because the automatic approach is integral. Completely modularized, tubeless — flexibility for future changes has been included.

614E-1, E-2, E-3 PEDESTAL CONTROLLERS (E-2 shown above right, E-3 not shown)

Controls are included for maneuvering, altitude hold function, mode of operation selection, and autopilot engagement. A flashing light warns of disengagement. The 614E-3 is the switching unit for the E-2. Weights are: E-1 — 5.3 pounds, E-2 — 2 pounds, E-3 — 3 pounds.

562C-1 COMPUTER AMPLIFIER

The 562C-1 provides servo amplification, vertical guidance computation, trim coordination circuitry, transducer excitation and relay service for the AP-101 autopilot. No tubes. Shockmount 350V-1. Weighs 30 pounds. ½ ATR case. Power: Average total ac and dc-400 va.

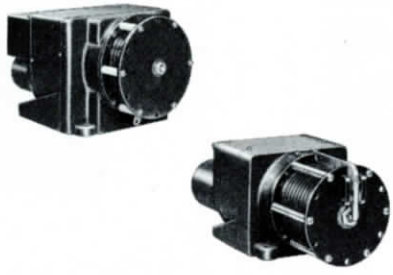
345A-3 SENSING UNIT

The gyro in this unit provides the autopilot with the rate information for proper control of the aircraft. In the 345A-3 are yaw, pitch, and roll gyros. Relays are included which utilize yaw rate signals from the gyros for roll erection cutout of the vertical gyro. The A-3 weighs 7 pounds.

PILOT SYSTEM

590A-1, A-2 ALTITUDE CONTROLS

The 590A-1 and A-2 provide altitude hold information for the AP-101. Basically, they incorporate partially evacuated diaphragms, which position error pickup devices to transmit altitude change to the autopilot. Weight: A-1 — 3.25 pounds, A-2 — 3.0 pounds.



334C-1, 334D-1 SERVOS

Three type 334C and one type 334D servos are required for the AP-101. The 334C is the primary for aileron, rudder and elevator control and the 334D for the trim tab. Two capstan sizes and lever arm type controls available. Weights (including capstans): 334C-1—17.3 pounds; 334D-1—5.7 pounds.

121A-1 MECHANICAL DISCONNECT

The 121A-1 acts as an emergency device, provides independent electrical and manual disengagement for the aircraft control surfaces from the Primary and Trim Tab servos. An electrical interlock makes it necessary the handle be in engaged position before autopilot can be electrically engaged. Weight 1.3 pounds.

communication navigation control

Collins AUTOMATIC DIRECTION

Collins DF-201 ADF System provides continuous electrical tuning from 90 KC to 1800 KC. New design employs transistors and only 11 tubes for improved reliability and much lower power requirements. Services provided: 1) Automatic or Manual Direction Finder 2) AM or CW reception 3) Range reception 4) Consol reception. Signals are detectable using either Loop or Sense Antenna.

Counter type dial and unique frequency control system provide positive indication of operating frequency. Simplified controls and edgelighted plastic panel assure ease of operation.

Modular construction, plug-in assemblies to facilitate easy maintenance and increase versatility. Test points conveniently provided on all subunits. Sense and Loop cable assemblies available in standard lengths.

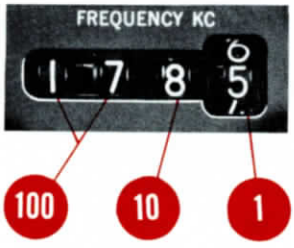
51Y-1/51Y-2 ADF RECEIVERS (Y-2 not shown)

Provide outstanding sensitivity and accuracy. 51Y-1 in standard ½ ATR; 51Y-2 in ¾ short ATR. Weight 18 pounds. Collins Mechanical Filter gives outstanding selectivity. Selectable broad or sharp bandpass. Transistorized power supply. Eleven tubes, 8 transistors, 15 diodes. Power requirements are: 13w at 27.5v ac, 26w at 115v ac, 20w at 115v ac 400 cps. Two power supply types. 51Y-1 uses 349D-1 shockmount; 51Y-2 the 349D-2.

614L-1, 614L-2 CONTROLS

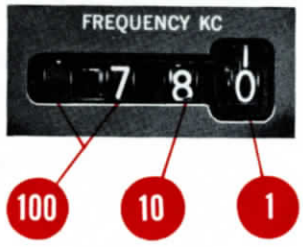
Two control types to fit either console or instrument panel type mounting. High precision, self-balancing bridge type network provides a digital frequency presentation. No mechanical connection to receiver. Easy-to-read dial ends searching for station problems. Printed wiring switch sections reduces normal maintenance problems with deck type switches. Weight: 2 pounds.

FINDER SYSTEM



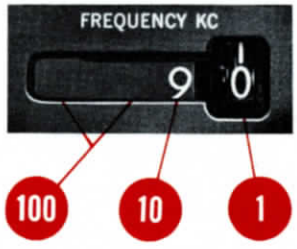
RANGE 1000-1800 KC

Rotate 100's knob until first two digits appear in 1000 and 100 kc dials. Next rotate 10's knob for third digit and units knob for fourth digit.



RANGE 100-999 KC

Rotate 100's knob until 1000 kc dial is blank and first digit desired appears on 100 kc dial. Next rotate 10's knob for second digit and units knob for third digit.

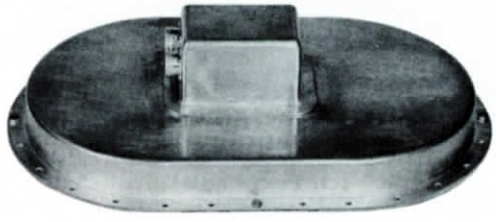


RANGE 90-99 KC

Rotate 100's knob counter clockwise to mask 100 kc and 10 kc dials. The latter mask is marked with the "9." Next rotate units knob until frequency appears on units dial. When units dial is rotated above nine, a plus sign appears in window, when rotated below zero, a minus sign.

331E-1, 331E-1W, 331E-2, 331E-2W INDICATORS

Dual and single pointer indicators for the ADF system. Either type available with matte white or pale yellow numerals and pointer. Manually set card. Standard 3" instrument case. Weight: 2 pounds.



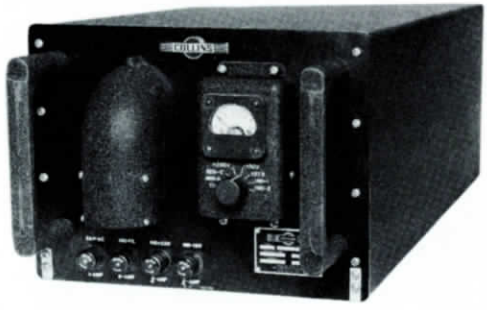
137A-1/137A-2 ANTENNAS (137A-2 not shown)

The 137A-1 mounts flush and is not sealed. The 137A-2 is hermetically sealed semi-flush mounted and directly interchangeable with other S-F M Loops. Loop mechanisms remove separately. Quandrantal error compensation is provided electrically by crescent shaped ferrite correctors. Better than ±2° accuracy obtained. Weight 6 pounds.

communication navigation control

Collins AIRBORNE WEATHER RADAR SYSTEM

The WP-101 Radar identifies the turbulent areas of a storm so that they may be avoided by altering course of the aircraft. Clouds with a high moisture content are detected and presented on the cockpit indicator. The indicator presents a weather map of frontal and local weather conditions in the air space within a 150-mile radius and approximately 240° around the aircraft's nose. Ranges are 20, 50, and 150 miles. Turbulent areas are sharply defined by an Iso Echo circuit.



776C-1, -2 SYNCHRONIZER

Contains frequency control and basic timing circuitry. Test voltage meter on the front panel. Blower cooled. Modular construction. Shockmount is 349B-2. Circuitry for dual indicator installation is provided by the 776C-2. Weight 38 pounds.

561G-1, -2 COCKPIT CONTROL/493A-1 INDICATOR

The 561 provides all necessary controls for pilots control of the WP-101. The rear connector of a G-1 is an ARINC type; G-2 is a miniature K. Weighs 1½ pounds. The 493A-1 mounts on the instrument panel; load isolators not necessary if instrument panel shockmounted. Individually controllable dual installations. Range marks 5, 10 and 25 miles. Weighs 11 pounds.

374A-1 RECEIVER/TRANSMITTER

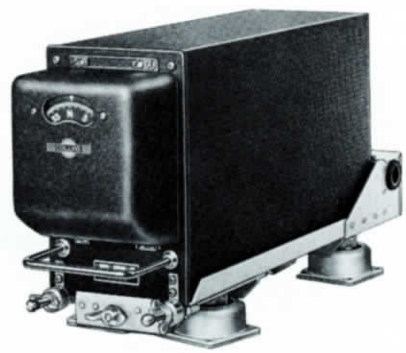
Contains all RF and IF circuitry. Load isolator used to protect magnatron from a large VSWR condition. Insertion loss .5 db. Front panel meter allows monitoring of necessary test voltages. Blower cooled. Waveguide connection on front panel. Shockmount used is 349A-4. Operates on 5400 mc ±40 mc. 1 ATR case. Weighs 51.3 pounds.

537F-1, -3 ANTENNA

A stabilized, rotating antenna for nose installation. 537F-1 is a 21″ dish with a 7° beam. The 537F-3 is a 30″ dish with a 4.5° beam. Rotation is full 360° at 15 RPM. Tilt +10° minus 15° controlled in cockpit. Antenna stabilized ±35°. Weighs 21 pounds.

Collins COMPASS SYSTEM

The MC-101 compass is a gyro-stabilized magnetic compass providing the performance and reliability requirements of airborne applications, all heading source requirements for modern aircraft and will operate independently or as a central data source for the Collins Integrated Flight System and the AP-101 Autopilot.
A unique servo system gives excellent isolation and more than adequate output to drive required instruments. Modular construction. The MC-101 meets the requirements of TSO C6b as set forth in SAE AS-399, where applicable. Input power: 115v ac, 400 cps — start 85 va, run 65 va; 27.5v dc, 34 w start, 8.5 w run.



328A-1 COMPASS AMPLIFIER

Completely modularized. Test points located in all necessary points. Only one tube. The basic indicator dial is on front cover. Synchro motors are under front cover for easy adjustment. Weighs 13 pounds. Shockmount used is 350V-1. Short ½ ATR case size. Units completely interchangeable, no line matching required. Accurate to $\pm 1°$ as indicated on dial.

323A-1 FLUX DETECTOR

The 323A-1 couples the MC-101 to the magnetic field of the earth to keep the compass magnetically stabilized. Hydraulically damped. All elements cast in resin for durability. Weighs 1.75 pounds. 400 cps excitation, 800 cps output. Compensator available. Usually wing mounted. Flux Detector Cable available for connection between Flux Detector and Compass Amplifier.

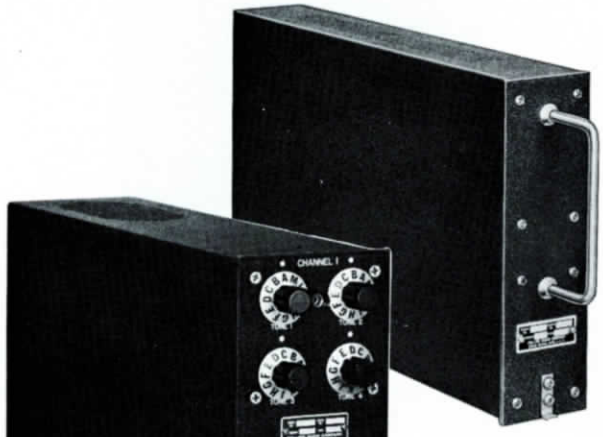
332E-1 DIRECTIONAL GYRO

The 332E-1 is completely self-contained. All components are mounted on the main base plate. The 350X-1 shockmount is used to mount the gyro in the aircraft. Mercury switch controlled torque motor, erects to gravity. Weighs 5 pounds. Non-tumbling. 115v 400 cps single phase.

Collins SELCAL SYSTEM
456A-1, C-1 AIRBORNE UNITS

The-456 SELCAL provides instantaneous calling of a single flight on two separate frequencies or single flight and group calling on a single frequency. The 456A-1 contains four reed relays in each channel. Reeds must be changed to change codes. A complete 456C-1 contains twelve resonant reed relay assemblies in each channel. The tones are designated by letters from A to M (I being omitted) and an aircraft or flight may be assigned any combination of four letters. In the 456C-1 four switches on each channel allow selection on each channel of any four of twelve reed relays. An easily removable cover prevents accidental change of switch positions, but allows change of codes without removing the unit from the aircraft.

The 456 SELCAL has a plug-in power supply module for operation from a 115v ac source. Filaments require approximately 18w of 27.5v dc. 456A-1 weighs 7.5 pounds with dual decoder. 456C-1 weighs 10.25 pounds. Shockmount 390D-1 for 456A-1. Shockmount 349H-2 for 456C-1. 456A-1 short ¼ ATR. 456C-1 short ⅜ ATR.



456A-1

456C-1

288A-1 TONE GENERATOR

The 288A-1 contains twelve tone oscillators that may be used in any of the sequences listed in ARINC Characteristic 531. An internal amplifier modulates the associated transmitter. The tone generator has a total of eight tubes and fourteen relays. Power input: 115/230v ac, 50 to 60 cps, 35 w. Output: 20 mw into 600 ohms. Standard rack mounted vertical chassis 19″ long, 8¼″ high, 7¼″ deep.

614J-1 CONTROL UNIT

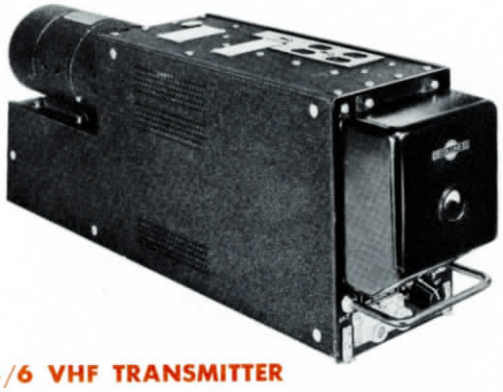
The 614J-1 is a rack mounted, push button control consisting of two rows of twelve buttons each plus a release button.

614K-1 CONSOLE UNIT

The 614K-1 is electrically identical to the 614J-1 except that it is a console unit.

278H-1 PRESET CONTROL PANEL

The 278H-1 is a rack mounted control unit with provisions for up to 20 preset tone-coded sequences or calls. It contains a memory drum which is accessible from the front panel for setting any desired code.



17L-4/6 VHF TRANSMITTER

The 17L-4 provides transmitting facilities on 360 crystal controlled channels with 50 kc spacing between 118.00 and 135.95 mc. CAA certificated. The 17L-6 is identical to the 17L-4 with the addition of an audio clipper which allows a higher average percentage of modulation to be transmitted. The companion receiver for use with this transmitter is the 51X-1A or 51R-3. Antenna is 37R-1. Control units are: 314Y-2, 614X-1, 614F-1 (50 kc spacing) or the 614F-2 (100 kc spacing). Shockmount 350E-3C.

OUTPUT: 25 watts; CASE SIZE: ½ ATR

POWER REQUIREMENTS: 27.5 vdc at 2.1 amps standby; 12.22a transmit; WEIGHT: 29 pounds

17L-7 VHF COMMUNICATION TRANSMITTER

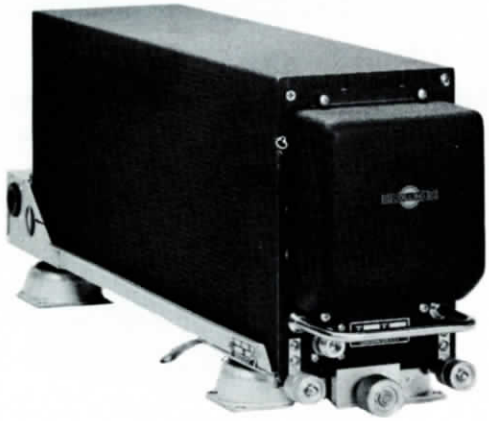
Companion unit to the 51X-2. The 17L-7 provides 880 crystal controlled channels with 50 kc spacing. Frequency range 118.0 to 151.95 mc. Employs only 38 crystals. Maximum frequency change time, four seconds. Fourteen wire Autopositioner® control. Conforms to ARINC Characteristic 520A. Shockmount 349H-3. Controls are 614U-1, 614F-1, and 614X-1. Antenna 37R-1.

WEIGHT: 14 pounds; CASE SIZE: Short ⅜ ATR

POWER OUTPUT: 25 watts

POWER REQUIREMENTS: 180w of 27.5v dc; AC supply also available

AIRBORNE COMMUNICATION

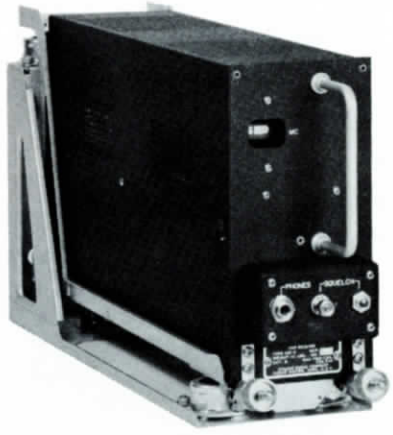


51X-1A COMMUNICATION RECEIVER

The 51X-1A provides 360 crystal controlled channels with 50 kc spacing between 118.0 and 135.95 mc. Maximum sensitivity and selectivity. Designed and built to ARINC Characteristic 520A. ATCSS circuitry provided. CAA certificated. Control unit 614G-1 for receiver only, or 614F-1 for single channel simplex control of receiver and 614X-1 for scs or dcd. Power supplies under 416X-1. Type 350E-3B Shockmount. The 37R Antenna is recommended.

POWER REQUIREMENTS: 27.5 volts dc, 3.5 amps; AC 115 v at ½A 380-1000 cps and 26.5 v at 2a, these figures exclude outopositioning.

CASE SIZE: ½ ATR; WEIGHT: 26 pounds

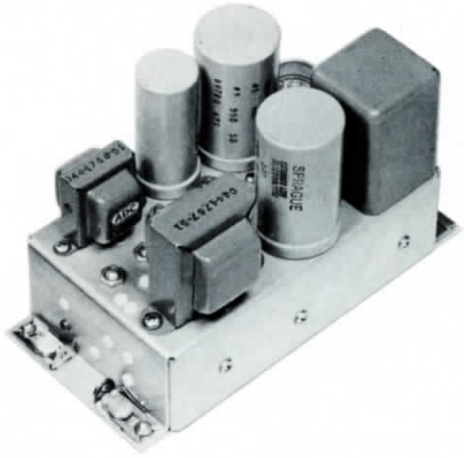


51X-2 VHF COMMUNICATION RECEIVER

The 51X-2 provides 880 crystal controlled channels with 50 kc spacing between 108.0 and 151.95 mc. Fulfills basic electrical requirements of ARINC Characteristic 520A including ATCSS; modularized construction. Also provides complete VOR and Localizer operation when used with the 344B-1 instrumentation box. Self-contained power supply. Shockmount 349H-4. Controls 614U-1, 614X-1, 614F-1 and 614G. Antenna 37R-1.

CASE SIZE: ⅜ ATR; WEIGHT: ten pounds

POWER REQUIREMENTS: 2 watts at 27.5 vdc, and 25 watts at 115 vac 400 cps or 27.5 vdc



17L-8 VHF COMMUNICATION TRANSMITTER

The 17L-8 is a 3 watt VHF Transmitter in a 3" diameter case 8 5/8" long for mounting on instrument panel. 90 channels, 118.0 to 126.9 mc — 100 kc spacing, crystal controlled. Modulator-power supply is separate unit — two will fit in short 3/8 ATR space or may be mounted anywhere — no shockmount necessary. Transistorized modulator for 90% modulation with carbon mike. Antenna is 37R.

CASE SIZE: Modulator 429A-1, 6 55/64" x 3 9/16" x 4 7/16"
Transmitter 17L-8, 3" Instrument case 5/8" long

POWER OUTPUT: 3 watts into 52 ohms WEIGHT: Both units 5 pounds

POWER REQUIREMENTS: 27.5 vdc at .55 a standby, 1.95 a transmit

TRANSMITTERS AND RECEIVERS

18S-4A HF TRANSMITTER/RECEIVER

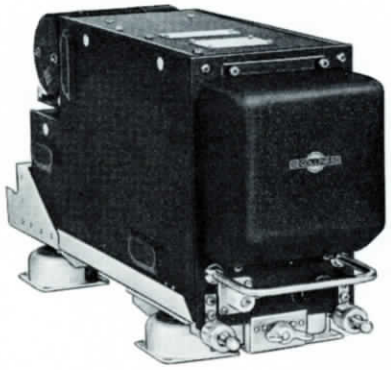
The 18S-4A employs the Collins Mechanical Filter, providing maximum rejection of unwanted signals. Provides 20 crystal controlled frequencies in the range of 2.0 to 18.5 mc with a nominal output power of 100 watts, cw or voice emission. Transmitter, receiver, and power supply are all contained in one case. Full remote control is possible from cockpit or radio operator's position. CAA certificated. Required accessories are the 180K-3 or 180L-2 Antenna Tuning Units, 314S-4 Remote Control Unit, and the 350C-5 Shockmount.

POWER OUTPUT: 100 watts; POWER REQUIREMENTS: 38a at 27.5 vdc
CASE SIZE: 1½ ATR; WEIGHT: 53 pounds

618S HF TRANSCEIVER

The 618S-1 provides the necessary number of frequencies required for global communications in the 2.0 to 25.0 mc range. Crystal controlled, 100 watt, 144 channel Transceiver employs the most modern design techniques including modular construction, Collins Mechanical Filters, and automatic tuning. 100 watts nominal to 14.25 mc; 90 watts, 14.25 to 25.0 mc. CAA certificated. Accessories required are the 614D-1, D-2 or D-3 Control Units, 180L-2 or -3 Automatic Tuning Unit, 416W-1 Power Supply. 350S-1 is required shockmount.

POWER OUTPUT: 90-100 watts
POWER REQUIREMENT: 28a at 27.5 vdc; 180w at 115 vac, 400 cps
CASE SIZE: 1 ATR; WEIGHT: 51 pounds

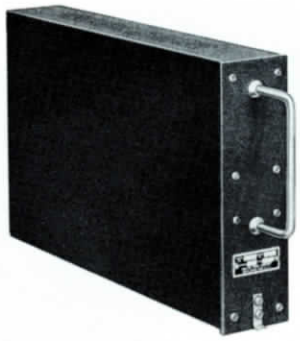


51V-2 GLIDESLOPE RECEIVER

The 51V-2 provides 20 crystal controlled channels between 329.3 and 335.0 mc. When used with 51R Navigation Receiver, fulfills all ILS glideslope and localizer requirements. Designed and built to ARINC characteristic. CAA certified. Shockmount is 350L-2. Antenna 37P-4. A 27.5v dc dynamotor is normally used with this receiver. The 416V-2 ac power supply is also available.

POWER REQUIREMENT: 27.5v dc at 2.25a

CASE SIZE: Short ¼ ATR; WEIGHT: 15 pounds



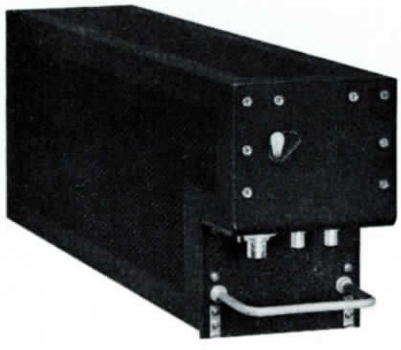
51V-3 GLIDESLOPE RECEIVER

The 51V-3 provides 20 crystal controlled channels between 329.3 and 335.0 mc (incorporates motor driven crystal switches for increased reliability). When used with Collins 51R Navigation Receiver fulfills all ILS glideslope and localizer requirements. Includes power supply. Shockmount is 390D-3; antenna 37P-4.

POWER REQUIREMENTS: DC: .5a at 27.5v dc plus 1a at 27.5v dc for channel switching
AC: 200ma at 115v ac 300-1000 cps plus 1a at 27.5v dc for channel switching

CASE SIZE: Short ¼ ATR; WEIGHT: 6.4 pounds

NAVIGATION RECEIVERS

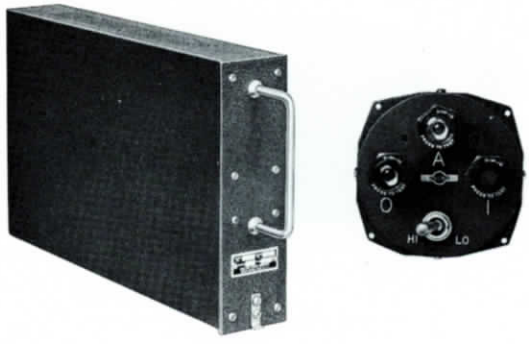


621A-1 ATC TRANSPONDER

The 621A-1 provides reinforcement of radar replies permitting aircraft to be tracked through heavy ground clutter and precipitation. Extremely accurate timing circuitry. Triple tuned RF section assures stable receiver. Modular construction. Designed and built to ARINC Characteristic 532. Antenna available through Collins. Shockmount is 350E-3D.

POWER REQUIREMENTS: 0.3 a at 27.5v dc and 130 va at 115v ac 300-1000 cps

WEIGHT: 25 pounds; CASE SIZE: ½ ATR

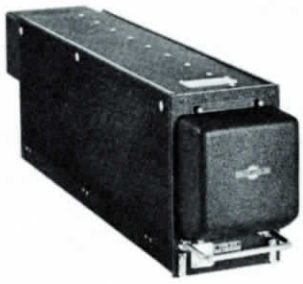


51Z-2 MARKER BEACON RECEIVER/327A-2 MARKER INDICATOR

The 51Z-2 weighs only 4.5 pounds, provides aural and visual indication of passage over a 75 mc marker beacon. Crystal controlled. Available in either single or three lamp configuration. HI-LO sensitivity controlled remotely. Modularized, contains only five tubes. AC or DC power supplies. In accordance with RTCA paper 87-54/DO57. 327A-2 is Marker Indicator. Shockmounts — 390D-2 single, 390F-2 for 51V-3 and 51Z-2; 390F-4 for 346A and 51Z-2. Antenna is 37X-2.

WEIGHT: 3 lamp unit — 4.5 pounds; 1 lamp unit — 3.8 pounds

POWER REQUIREMENTS: (excluding lamp drain) — 15w 115v ac or 27.5v dc (three lamp unit); CASE SIZE: ¼ ATR



51R-3 VHF NAV-COMM RECEIVER

The 51R-3 provides 280 crystal controlled channels with 100 kc spacing between 108.0 and 135.90 mc. Designed and built to ARINC requirements. CAA certificated. Accessories are the 614F-2, 314U-8, or 314U-10 Control Units, and 416N-1 dc and 416N-5 ac Power Supplies. Shockmount is the 350E-3A. 37R-1 is comm. antenna and 37J-3 nav. antenna.

WEIGHT: 29.5 pounds

CASE SIZE: ½ ATR

POWER REQUIREMENTS: DC: 3.5 a 27.5v dc
AC: 1 a at 115v ac, 300-1000 cps
These figures exclude autopositioning.

51R-4 VHF NAV-COMM RECEIVER/344B-1/51X-2 NAV-COMM RECEIVER

The 51R-4 provides 880 crystal controlled channels with 50 kc spacing between 108.0 and 151.95 which includes communication, localizer and VOR bands. Same modules as 51X-2 and 344B-1. Self-contained power supply, RMI servo amplifier, and OBI as well as separate 400 cps data synchro transmitter for future requirements of Rho Theta computors. The 344B-1 is used with the 51X-2 Communication Receiver and provides VOR/LOC minimum or full instrumentation, including RMI servo amplifier, OBI and integral power supply. The 51R-4 uses same controls as 51R-3. Antennas are 37R-1 and 37J-3. 344B-1 shockmounts are: 51X-2 and 344B — 390E-1; 344B alone — 349H-5.

51R-4 WEIGHT: 23 pounds; CASE SIZE: ½ ATR
POWER REQUIREMENTS: 18 va of 27v ac 400 cps and 60 w of 115v ac or 27.5v dc.

344B-1 WEIGHT: 12 pounds; CASE SIZE: Short ⅜ ATR
POWER REQUIREMENTS: 35 w at 115v ac 400 cps or 27.5v dc and 18 va at 26v ac.

ACCESSORIES

336A-2 OMNI-BEARING SELECTOR

The 336A-2 is for use when the airplane is not equipped with the Collins Course Indicator. Any desired track selected and indicates TO or FROM the station. Accessory to 51R-3 VOR Receiver; is normally used in conjunction with the ID-48. 3″ diameter, 6″ long. Weighs 2 pounds.

ID-48 DEVIATION INDICATOR

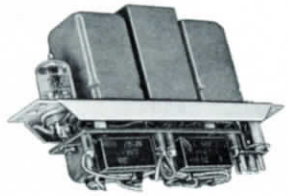
ID-48 provides VOR, VAR and ILS displacement data obtained from the 51R and 51V Receivers. Minimum ILS approach information is provided. A companion unit to the 336A-2. 3″ diameter, 4¼″ long. Weighs 1 pound 14 ounces.

332C-1 RADIO MAGNETIC INDICATOR

332C-1 provides continuous presentation of heading and course. Compass card "servoed" with Gyro Magnetic Compass, may be driven by one VOR Receiver and one ADF, or by two VOR or by two ADF's. 3″ diameter, 5″ long. Weighs 2 pounds.

337A-2 OMNI-BEARING INDICATOR

337A-2 (OBI) presents magnetic bearing to the omni station. For instrument panel mounting, may be used to provide bearing only. Usually mounted in 351A accessory unit when RMI used. 3″ diameter, 6″ long. Weighs 2.5 pounds.



351A-1 ACCESSORY FRAME/333B-1, -3 SERVO AMPLIFIER

The 351A Accessory Frame provides a mounting arrangement for 51R-3 receiver accessories. Two type 337A Omni-Bearing Indicators, three type 333B Servo Amplifiers, and two type 416N-1 or 5 Power Units may be mounted on the frame. Receptacles are provided for matching with the plugs on the various accessories and these receptacles are wired to a rear plug similar to the rear connector on the 51R Receiver. Standard ½ ATR. Mounts on same type shockmount as receiver. Weighs 7 pounds, 5 ounces. Shockmount 350E-3A.

A servo amplifier is required to drive each Radio Magnetic Indicator from a Gyro-Stabilized compass. The 333B-1 Amplifier was designed for accessory frame mounting; the 333B-3 is a 333B-1 with a base for separate mounting. Filament and plate power is obtained from a self-contained 400 cycle transformer requiring 26.5 or 115 volt ac input.

DIMENSIONS: 6¼″ high, 5½″ wide, 7 11/32″ deep

WEIGHT: 333B-1: 2 pounds; 333B-3: 2 pounds, 4 ounces

AUDIO AMPLIFIERS

346A-1 INTERPHONE AND ISOLATION AMPLIFIER

The 346A-1 audio modules and mounting frame, which will hold up to six modules plus power supply, provide a flexible aircraft installation. Six modules will provide two crew interphone circuits and two amplifiers for cockpit speakers. Shockmount is 390D-1.

WEIGHT: 9 pounds (with six modules)
CASE SIZE: Short ¼ ATR
POWER REQUIREMENTS: 13w of 27.5v dc

346D-1 PASSENGER ADDRESS AMPLIFIER

The 346D meets all the requirements for passenger address and also provides for taped music entertainment for airline and business aircraft. Completely transistorized. Two microphone and tape reproducer inputs. Shockmount is 390D-5. 60 cps to 10kc with 4 db variation. 5% distortion at maximum output of 50 watts.

WEIGHT: 6½ pounds
CASE SIZE: Short ¼ ATR
POWER REQUIREMENTS: Max at 27.5v dc — 95w

REMOTE CONTROL UNITS

Representative pictures are shown for units similar in appearance. With the exception of the 314S-4, which is 5½″H, 5″W, 2″D, and the 614U-1, which is 2¼″H, 5¾″W, 4″D, all units are 3 9/16″H, 2¼″W and up to 6 7/16″D. Internal lighting lamps are 28v type. All units CAA type certificated. VOR receiver audio and audio/squelch control kits available for receiver units. Weight 2.5 pounds.

314S-4

614D-1, D-2, D-3

314Y-2

314U-8

For combined control of a 51V, 51R, and a DME. Tunes 108.00 to 135.95 with 100 kc spacing; 329.3 to 335.0 in 100 kc steps.

314U-10

For use with 51V/51R combination. Tunes 108.0 through 135.9 for all VOR, ILS, and communication frequencies. Glideslope also selected with ILS.

314Y-2

For use with 17L VHF Transmitters. Tunes 118.0 through 135.9 in 100 kc steps.

614D-1, D-2, D-3

In the 614D-1 frequencies are selected on the basis of channel assignment: A1, A2, . . ., A24 through F1, F2, . . ., F24 with letters on the inner knob and numerals on the outer knob. Channel assignments correlate with the crystals in the crystal oscillator unit. For use with the 618S. A Volume Control and an On-Off switch are available as accessory kits. Weight is 1.5 pounds. The 614D-2 is a more flexible version of 614D-1. Band information is controlled in the control unit, rather than in the 618S, thus allowing any of the 144 crystals to be used in any of the four frequency bands. The desired frequency is obtained by selecting one of 24 letters and one of 24 numbers. Weight 1.5 pounds. The 614D-3, in addition to the 614D-2 functions, contains switching contacts to prevent RF radiation during 618S tune-up when desired on specific channels. Switching is also provided to connect 180L shunt capacitance for predetermined channels, minimizing 180L tuning time. Weight: 1 pound.

614F-1

Tunes 51X receivers and 17L transmitters simultaneously. 50 kc spacing between 118.0 and 135.9.

614X-1

For use with 51X receivers and 17L Transmitters. Tunes 118.0 to 135.9 in 50 kc steps. Provides control for duplex operation utilizing 6 mc frequency shift.

614F-2

For use with 51R Communication-Navigation Receiver and 17L Transmitter combination. Tunes 112.0 to 135.9 in 100 kc steps.

614F-3

For simplex control of 17L/51X/51V combinations. Tunes 108.0 through 135.9 in 100 kc steps.

614G-1

For use with 51X Receiver. Tunes 118.0 to 135.9 in 50 kc steps.

314S-4

For use with the 18S-4A equipment. Provides complete remote control. Weight: 1.4 pounds.

614G-1, 314U-8, 314U-10

614F-1, 614F-2, 614F-3

614X-1

37J-3 VOR NAVIGATION ANTENNA

Collins 37J-3 is a horizontally-polarized navigation antenna for receiving VOR and localizer signals. Frequency range is 108-122 mc with a standing wave ratio of 5:1 or less. Impdeance is 52 ohms into unbalanced line. Constructed of cast aluminum, formed and welded sheet aluminum, the 37J-3 weighs four pounds and has a drag of approximately 2.63 pounds at 250 mph. It will withstand more than 150 pounds sideward pressure. Mounting does not require cutting of airframe structure. Lightning strike damage is minimized by internally grounding dipole center with heavy braid. The antenna is for use with Collins 51R and other navigation receivers. CAA certificated. Dimensions: 12″ high, 17″ wide, 27″ long. Base plate, 7¼″ long, 3¾″ wide.

AIRBORNE ANTENNAS

37R-1 VHF COMMUNICATION ANTENNA

Collins 37R-1 is a vertically-polarized communication antenna for both transmitting and receiving. Frequency range is 118.0 — 136.0 mc with a standing wave ratio of 2:1 or less. Impedance is 52 ohms into unbalanced line. Despite its horizontal shape, loss of vertically-polarized power is only .6 db. All aluminum, the 37R-1 weighs less than 3.5 pounds and has a drag of approximately one pound at 250 mph. Mounting does not require cutting of airframe structure. Lightning strike damage is minimized by having antenna at same d.c. potential as a/c skin. As a receiving antenna, it is used with Collins 51R or 51X receivers. As a transmitting antenna, it is used with Collins 17L transmitters. CAA certificated. Dimensions: 10¼″ high, 3¾″ wide, 21⅞″ long.

37P-4 GLIDE SLOPE ANTENNA

Collins 37P-4 is a horizontally-polarized antenna for receiving glideslope signals. It has a standing wave ratio of 2:1 or less from 329 to 366 mc at room temperature. Impedance is 52 ohms into unbalanced line. Constructed of aluminum, the 37P-4 weighs .7 pounds and has negligible drag. Mounting does not require cutting of airframe structure. It is designed for use with Collins 51V-3 and other glideslope receivers. CAA certificated. Passes water submersion tests at an altitude of 70,000 ft. and salt spray. Dimensions: 6⅛″ high. Base plate, 4¼″ long, 2″ wide.

37X-2 MARKER BEACON ANTENNA

Collins 37X-2 is a horizontally-polarized antenna for receiving the 75 mc marker beacon signal. The standing wave ratio is 3:1 or less through operating temperature range: —40°C to ±60°C. Impedance is 52 ohms into unbalanced line. Plastic filled and sealed; the effects of precipitation static will be small. Weight is less than one pound and has a drag of less than 3.5 ounces at 400 mph. Mounting does not require cutting of airframe structure. For use with Collins 51Z and other marker beacon receivers. Impervious to Skydrol. CAA certificated. Dimensions: 2$\frac{7}{32}$″ high, 1$\frac{7}{16}$″ wide, 11½″ long.

180K-3

The 180K-3 Antenna Tuning Unit matches the 52 ohm output impedance of the 18S-4 HF Transmitter/Receiver to standard aircraft antennas, assuring maximum receiver sensitivity. The Collins Autotune® System is employed to reposition the tuning elements remotely after initial adjustments have been made. CAA type certificated. Utilizes voltages from transmitter.

OVERALL DIMENSIONS: 7¾" high, 10¼" wide, 9⅞" long
WEIGHT: 12 pounds
REQUIRED SHOCKMOUNT: 350D-3

ANTENNA TUNERS

180L-2

The 180L-2 Automatic Antenna Tuning Unit is for use with the 18S-4A and the 618S. Requires no manual adjustment for initial installation, change in frequency or change in antenna. Flexibility of unit facilitates mounting in relatively inaccessible locations, utilizes the high voltage, either 250 v (618S) or 400 v (18S) dc, of the transmitter. Other voltages are obtained from the aircraft's mains. Antenna impedance matching limitations available on request. CAA type certificated.

OVERALL DIMENSIONS: 7 11/16" H, 10⅜" W, 11⅜" L
WEIGHT: 19 pounds
REQUIRED SHOCKMOUNT: 350D-3

180L-3

The 180L-3 Automatic Antenna Tuning Unit, in addition to providing the same functions as the 180L-2, also contains an antenna transfer relay and is for use when separate receiving facilities are desired with a common antenna, or when the 618S is used as a receiver only on a certain frequency, e.g. weather frequencies, etc. The 180L-3A provides an internal relay for grounding an adjacent HF antenna. CAA type certificated.

OVERALL DIMENSIONS: 7 11/16" high, 10⅜" wide, 13⅞" long
WEIGHT: 20 pounds
REQUIRED SHOCKMOUNT: 350D-3

416N-1, -5

The 416N-1 is a dynamotor type supplying 250 volts dc from the dc source of 28 volts. The 416N-5 is a transformer-rectifier type and supplies 250 volts dc from the 115 volt 380-1000 cps source. These units are power supplies for the 51R VOR Receiver. Will plug into 351A Accessory Unit or separate mounting base.

DIMENSIONS: 7¼" high, 5⅛" wide, 7$^{17}/_{32}$" long

WEIGHT: 416N-1: 9.4 pounds; 416N-5: 8.2 pounds

POWER SUPPLIES

416V-2

The 416V-2 is mechanically interchangeable with the DM-53A Dynamotor used with the 51V Glideslope Receiver for B+ voltage which requires no rotating machinery. 27.5 volts dc at 1.0 amp and 115 volts, 300-1000 cps single phase at 0.3 amperes required.

DIMENSIONS: 3$^{13}/_{32}$" high, 2$^{21}/_{32}$" wide, 4$^{15}/_{16}$" long

WEIGHT: 1 pound 7 ounces

416W-1

The 416W-1 provides voltages necessary for operation of the 618S Transceiver and the 180L Automatic Tuning Unit. Inputs are 27.5 volts dc and the 115 v ac. Conforms to Specification RTCA50-53/DO44. The dynamotor provides high voltage for the modulator and power amplifier. Operates only on key-down phone and cw position. Utilizes two selenium rectifiers.

WEIGHT: 28 pounds

SHOCKMOUNT: 350T-1

416X-1

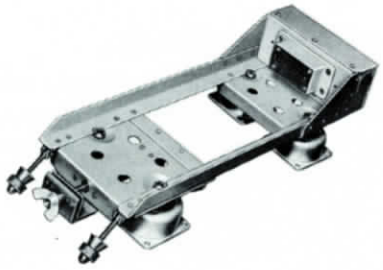
Type 416X-1 power supply is a transformer-rectifier type supply for use where both 27.5 vdc and 115 vac 300-1000 cycle sources are available. For 51X-1A.

WEIGHT: 2.4 pounds

416Y-1

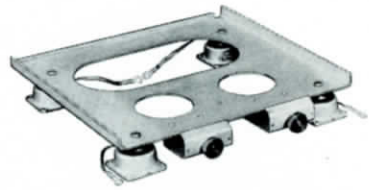
Type 416Y-1 power supply is a conventional DC power supply employing a dynamotor for use in installations where only 27.5 vdc power is available. For 51X-1A.

WEIGHT: 3.2 pounds



350T-1 for 416W-1. Weight 3.5 pounds

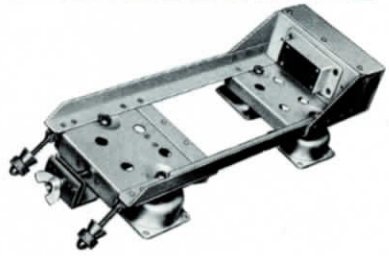
350C-5 for 18S-4A. Weight 7.5 pounds



350D-3 for 180K, 180L. Weight 1.25 pounds

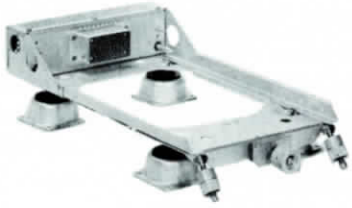
SHOCKMOUNTS

Each Collins equipment has a specifically designed shockmount. The load range of load isolators is selected for that required by the unit. Shockmounts requiring extractors have the new Collins designed slip-type that cannot be over tightened. Aluminum anodized. 1/4 and 3/8 ATR shockmounts designed to accommodate higher CG of those boxes.



350L-2 for 51V-2
350M-2 for 562A-4, -6
350U-1 for 328A-1
Weight 3.7 pounds

350S-3 for 618S. Weight 9 pounds

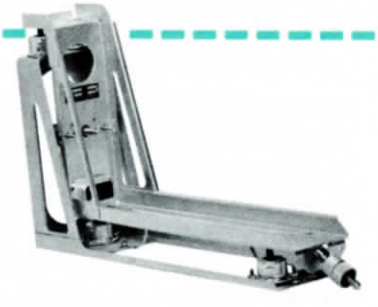


349D-2 for 51Y-2 ADF Receiver. Weight 2 pounds.

390F-1 for dual 51V-3
390F-2 for 51V-3 and 51Z-2
390F-3 for 346A and 51V-3
390F-4 for 346A and 51Z-2
Weight 2.25 pounds

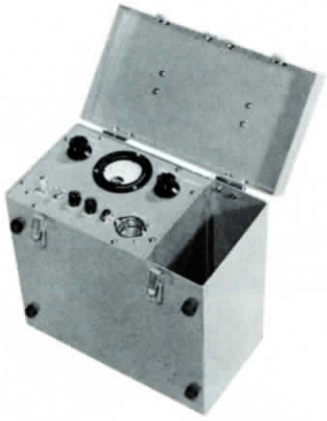
349H-2 for 456C-1
349H-3 for 17L-7
349H-4 for 51X-2
349H-5 for 344B-1
Weight 1.5 pounds

390E-1 for 51X-2 and 344B-1
390E-2 for 51X-2 and 17L-7
Weight 2.4 pounds



390D-1 for 346A-1 or 346D-1
390D-2 for 51Z-2
390D-3 for 51V-3
Weight 1.3 pounds

350E-3A for 51R-3 or 351A-1
350E-3C for 17L-4/6
350E-3B for 51X-1A
350E-3D for 621A-1
350V-1 for 562C-1
349D-1 for 51Y-1
Weight 2 pounds



478A-1 ZIFOR (ZERO INDICATOR FOR OMNI-RANGE)

The 478A-1 Test Set is used for precisely ascertaining the proper zero, or North setting on audio signal generators used in VOR testing, to set the zero on the Collins 479S series of test equipments, their military equivalents or equipment made by other manufacturers. It may also be used to check for phase shift through the RF signal generator which is used with the 479S-3. It is supplied in a hinged cover portable carrying case.

ACCURACY: ±0.1°; SENSITIVITY: ±1.0° signal gives full scale deflection of the null indicator; CASE DIMENSIONS: 13½" high, 13½" wide, 7½" deep; WEIGHT: 22 pounds; POWER REQUIREMENTS: 115 volts, ±10%, 56-60 cps.

TEST EQUIPMENT

478C-2 IFS TEST SET

The 478C-2 Test Set provides accurate simulated aircraft heading signal, lateral and vertical displacement signals, attitude signals, and rate of change of these signals as necessary for bench testing and calibrating the Collins 526A Steering Computers and components of the Collins IFS. The 478C-2 also performs auxiliary functions, providing 0.001 to 10 cps signals for testing meter responses and servo mechanisms. Motor driven synchros provide excellent stability and reliability. No vacuum tubes are used.

POWER SOURCE: 115 volts ac, 400 cps; 115 volts ac, 60 cps (also 28 volts dc when testing 562A-2); POWER REQUIREMENTS: 230 watts maximum; WEIGHT: 40 pounds; DIMENSIONS: 10½" high, 19" wide, 12" deep.

478H-1 618S TEST SET

The 478H-1 and associated 413F-1 Power Supply are for use with the Collins 618S Transceiver, providing complete self-contained facilities for testing the modular subassemblies of this equipment. Also provides a convenient test station for detailed circuit checks. The lower portion of the test set panel carries all operating controls required to simulate functions of the complete 618S Transceiver. The 413F-1 Power Supply provides all necessary operating voltages for the 478H-1.

POWER SOURCE: 413F-1 Power Supply; DIMENSIONS: 19⅞" high, 17½" wide, 8" deep; WEIGHT: 35 pounds.

413F-1: POWER REQUIREMENTS: 115 volts ac, 50/60 cps, single phase 6 amps; WEIGHT: 30 pounds; DIMENSIONS: 9" high, 17½" wide, 7" deep.

479S-3 VOR AUDIO SIGNAL GENERATOR

The 479S-3 Generator is used for precision testing and calibration of all types of VOR receivers. It provides singly or in combination all output signals required for VOR, tone localizer, and glide slope audio circuit investigations, and signals required for modulating a suitable radio frequency signal generator. The unit derives all signals from electro-mechanical generators operated from shafts driven by synchronous motors. Output level of all generators is sufficiently high so that no further amplification is needed.

POWER REQUIREMENTS: 115 volts, 60 cps, single phase; DIMENSIONS: 10½" high, 19" wide, 14" deep; WEIGHT: 58 pounds.

479T-2 ALL CHANNEL VOR-ILS SIGNAL GENERATOR

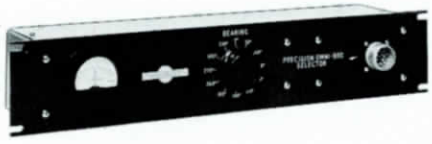
The 479T-2 is a portable test set for ramp testing of aircraft navigation and ILS receivers. The generator may be used inside or outside the plane for an over-all check on the installation from receiving antenna to indicating instruments. Crystal controlled RF signals are provided at 100 kc intervals to give complete coverage of all channels from 108.0 through 135.9 mc and 329.3 to 335.0 mc. RF level can be varied from 4 to 200,000 microvolts. Signals include: VOR, LOC, Glide Slope 1000 cps audio tone. Test antenna and cords included.

POWER REQUIREMENTS: Operates on 21 to 29 volts dc, 5.4 amps; DIMENSIONS: 19" wide, 18" high, 10½" deep; WEIGHT: 45 pounds.

479U-1 THREE CHANNEL VOR-ILS SIGNAL GENERATOR

The 479U-1 is a portable test set for ramp checking of navigation and ILS receivers and associated components installed in the aircraft from antenna to instruments. One channel each is provided for VOR, Localizer, and Glide Slope. It is not intended that this equipment should be used in calibrating receivers, but as a "go-no-go" gauge for quickly checking their operation. Test antenna and cords included.

POWER REQUIREMENTS: 26v dc at 1.8 a or 13.3v dc at 4 amps; DIMENSIONS: 13⅜" long, 7⅝" wide, 13" deep, including cover; WEIGHT: 17.5 pounds.



479V-2 PRECISION OMNI-BEARING SELECTOR

The 479V-2 Precision Omni Bearing Selector is for use in a test panel for checking the 51R navigation receivers; 30° steps selected by a tap switch with a maximum runout error of ±0.05°. This enables the technician to test the receiver without introducing omni-bearing selector errors. Costs less than a standard aircraft OBS.

DIMENSIONS: 3½" high, 19" wide, 4" deep; WEIGHT: 5 pounds, 3 ounces (479V-1, large dial type with ±0.2° accuracy, also available).

479X-2 INSTRUMENT ZEROING PANEL

The 479X-2 provides precision facilities for indexing VOR resolver type instruments. By means of a precision network, OBS & OBI instruments can be indexed within ±0.1° and will give uniform results in Collins 51R Navigation Receivers. Designed to permit Omni-Resolver Zeroing (ORZ) procedures to be carried out in accordance with RTCA standards and with a minimum of complicated apparatus; does not require a phase standard. Only two operational adjustments are necessary — amplitude control and input level control. Zero'd to standards recognized by RTCA SC-61.

DIMENSIONS: 3½" high, 19" wide, 4" deep; WEIGHT: 3½ lbs.

180M-1 ANTENNA TUNING UNIT TEST SET

The 180M-1 is a manually adjustable network. It is used to minimize the time required to determine the circuit elements which must be wired into the 180K-3. Circuits and values of capacitance and inductance can be selected by front panel controls. The unit permits matching aircraft antennas to 52 ohm transmitter output in the frequency range of 2.7 to 18.5 mc.

DIMENSIONS: 7¾" high, 10¼" wide, 9⅞" long; WEIGHT: 12 pounds.