AIRCRAFT COMMUNICATION RECEIVER

AVR-20

AVR-20	Receiver Unit (6- to 12-Volt) - -	CAATC-235
AVA-51B	Power Supply Unit (12-Volt) - - - -	CAATC-441
AVA-51C	Power Supply Unit (6-Volt) - - - -	CAATC-442

INSTRUCTIONS

Manufactured by

RCA Manufacturing Company, Inc.

Camden, N. J., U. S. A.

Printed in U. S. A.

IB-34014

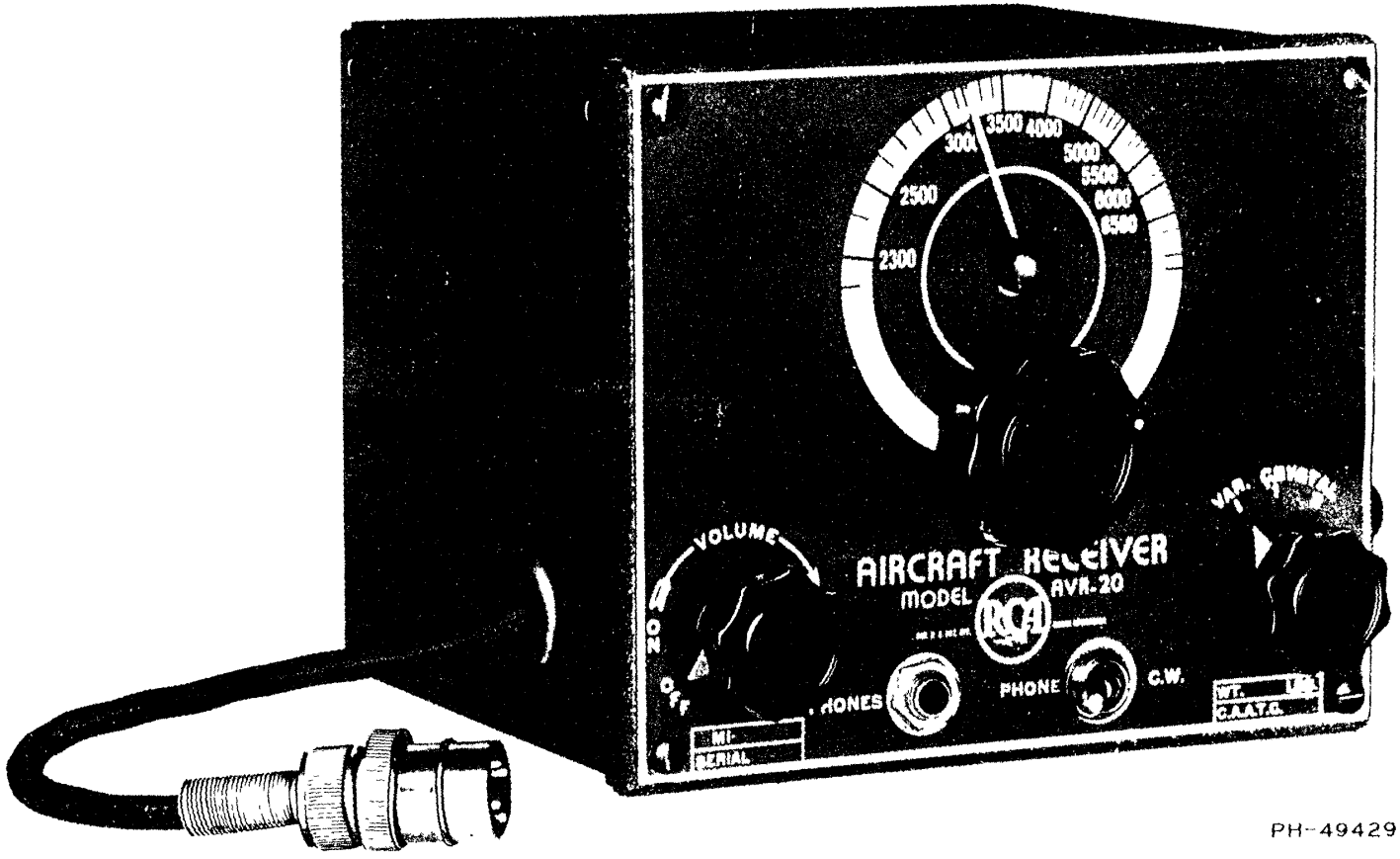

FIGURE 1 - MODEL AVR-20 AIRCRAFT RECEIVER

MODEL AVR-20

AIRCRAFT COMMUNICATION RECEIVER

TECHNICAL SUMMARY

Electrical Specifications

Frequency Range ..... 2,300-6,700 kc
Crystal lock-in—Any two frequencies in the frequency range by use of proper crystal.
Intermediate Frequency ..... 455 kc
Average selectivity 23 kc off resonance ..... 60 db
Power Output greater than 600 milliwatts.

Power Supply—

- Model AVA-51B ..... 12-volt aircraft storage battery
- Model AVA-51C ..... 6-volt aircraft storage battery

Current Consumption—

- Heater Current ..... 0.6 amp. at 12 V or 1.05 amperes at 6 V
- "B" Supply Current ..... 57 ma at 250 V

Headphones ..... 600 ohms impedance

Tube Completement

- RCA-6S7 ..... R-F Amplifier
- RCA-6K8 ..... 1st Detector-oscillator
- RCA-6F7 ..... I-F Amplifier-CW oscillator
- RCA-6B8 ..... 2nd Detector-AVC-Power Amplifier

Mechanical Specifications

Dimensions—	Receiver	Power Unit AVA-51B	Power Unit AVA-51C
Height			
Width	(See Drawing Figure 5)		
Depth			

Weights—

- Receiver ..... 6.2 lbs.
- Power Unit AVA-51B ..... 6 lbs. 7 oz.
- Power Unit AVA-51C ..... 6 lbs. 7 oz.
- Headphones ..... 11 oz.
- Cable to Transmitter ..... 2 lbs. 3 oz.

EQUIPMENT (OPTIONAL)

MI-5998—

- AVR-20 Receiver Unit, 12-Volt MI-5978
- AVA-51B Power Unit, 12-Volt MI-5984-A
- Crystal Unit, AVA-53A MI-5977-1
- Headphone Set MI-5803-4
- Cable (Power Unit to Receiver) MI-5988-A

MI-5988-A—

AVR-20 Receiver Unit, 12-Volt	MI-5978
Crystal Unit, AVA-53A	MI-5977-1
Headphone Set	MI-5803-4
Cable to AVT-15 Transmitter	MI-5884-A or -B

MI-5999—

AVR-20 Receiver Unit, 6-Volt	MI-5979
AVA-51C Power Unit, 6-Volt	MI-5985-A
Crystal Unit, AVA-53A	MI-5977-1
Headphone Set	MI-5803-4
Cable (Power Unit to Receiver)	MI-5988

MI-5999-A—

AVR-20 Receiver Unit, 6-Volt	MI-5979
Crystal Unit, AVA-53A	MI-5977-1
Headphone Set	MI-5803-4
Cable to AVT-15A Transmitter	MI-5884-A or -B

Additional Equipment Required but not furnished—

Aircraft Storage Battery.
Antenna System.
Ignition shield harness (if not already installed by motor manufacturer).
Miscellaneous screws, nuts, lockwashers—for mounting.
Battery Fuse.

DESCRIPTION

Model AVR-20 is an aircraft communications type receiver having a frequency range of 2,300 to 6,700 kc. It may be used in combination with type AVA-51B power unit or type AVT-15 transmitter power supply, to operate from a 12-volt storage battery; or with type AVA-51C power unit or AVT-15A transmitter power supply, to operate from a 6-volt battery. These power units are of the synchronous vibrator type. The receiver is a four-tube superheterodyne designed for reception of either phone or CW signals. A three-position switch provides either standard variable condenser tuning, or crystal "lock-in" on either of two frequencies. These two frequencies are determined by the crystals used.

INSTALLATION

CAUTION.—Make sure that the power supply unit is of the proper type (input voltage) to operate from the storage battery of the aircraft.

RECEIVER.—The receiver should be located within convenient operating reach of the pilot. Figure 5 shows the dimensions of the equipment and details for mounting. Mounting holes are provided in the four corners of each end of the receiver. By selecting the right set of holes for attaching the mounting brackets, any desired mounting arrangement can be effected. The rubber shock mounts should be used.

A location which will prove satisfactory for most cases, and particularly in planes having a side-by-side seating arrangement, is to mount the receiver unit midway and under the instrument board. A small stand may be made of sheet aluminum, angles or tubing, located in available space on the floor of the cabin, and the receiver mounted on this stand.

POWER UNIT.—The power supply unit should be located near the aircraft's storage battery and within five feet of the receiver. It is important to locate this unit as far as possible away from the plane's magnetic compass. Unless this precaution is taken, deviation of the magnetic compass may occur when the receiver is turned on.

POWER UNIT.—**Note.**—The power unit should be mounted with the axis of the vibrator approximately vertical. The power unit is mounted by bolting its case to the plane's structure, through holes supplied in the back of the case. The power supply cable should be attached to the storage battery terminals, as indicated in Figure 5, through a suitable fuse (to be supplied by the customer). If the negative side of the battery is grounded to the plane's structure, the wire marked "HOT" in Figure 5 should be attached to the positive battery terminal and the shield extension to the negative terminal. If the positive side of the system is grounded, the wire marked "HOT" should be attached to the negative battery terminal, and the shield extension to the positive terminal. In case the positive side of the battery

system is grounded, it will also be necessary to transpose the two primary wires of the power transformer in the power supply unit, which can be done by any authorized RCA Aviation Radio Equipment dealer.

If the receiver is to be operated from the power supply of an AVT-15 or AVT-15A transmitter, connections should be made as indicated in Figure 5, using the MI-5884 cable. Certain modifications in the transmitter power supply are also required. Data on these modifications is available on request.

ANTENNA.—Any conventional communication type of antenna may be used, or the aircraft's transmitting antenna (if transmitter is provided with antenna change-over relay) may be used for greater pickup. Connect the antenna lead-in to the terminal on the side of the receiver marked "ANT." The heavy terminal with wing nut, adjacent to the "ANT." terminal, should be securely bonded to the metal frame of the aircraft, using heavy conductor. The power supply unit case should also be thoroughly grounded to the metal structure of the aircraft. To do this, scrape the finish from a small portion of a structural member of the plane, and connect to the clean surface with an effective ground clamp. (Holes should not be drilled in the metal structure of the plane.)

SHIELDING.—Maximum performance cannot be obtained from any aircraft radio equipment unless the motor ignition system is properly shielded. Ignition shielding kits are manufactured for most types of aircraft motors, and are available through aircraft accesories supply houses. A bulletin entitled "Location and Elimination of Engine Ignition Interferences to Aircraft Radio Receivers" may be obtained free of charge by addressing the Aviation Sales Department, RCA Manufacturing Co., Inc., Camden, N. J.

OPERATION

Four controls are provided on the front panel of the receiver, as follows:

Tuning Control (dial calibrated in kc).

Volume Control, combined with "on-off" power switch.

Condenser tuning-crystal switch.

Phone-CW switch.

Proceed as follows:

Plug headphones into jack. Rotate volume control knob to nearly its maximum clockwise position. Then revolve tuning control until desired signal is heard. Adjust carefully for maximum signal and set volume control to desired volume.

CW RECEPTION.—Throw toggle switch to the "CW" position. Tune for desired station in the usual way, then adjust tuning control carefully for desired pitch or note.

CRYSTAL TUNING.—Turn the variable condenser-crystal switch to the desired "crystal" position. There are two crystal positions, the frequency at each position being determined by the crystal used. Turn the tuning control until the pointer is approximately at the frequency desired. When the signal is heard, adjust tuning control for maximum signal strength. The receiver will then remain tuned accurately to that frequency, as long as the controls are not disturbed.

To discontinue operation of the receiver, turn the Volume Control knob counterclockwise until a "click" occurs, indicating that the power is turned "off."

PARTS LIST

Stock No.	DESCRIPTION
	RECEIVER ASSEMBLIES
12714	Capacitor—Adjustable capacitor (C-23, C-24, C-25)
35515	Capacitor—5 mmfd. (C-9, C-26)
35508	Capacitor—12 mmfd. (C-32)
35516	Capacitor—56 mmfd. (C-31)
35493	Capacitor—70 mmfd. (C-5, C-13, C-33)
35492	Capacitor—120 mmfd. (C-6, C-7, C-14, C-15)
35494	Capacitor—220 mmfd. (C-4)
12952	Capacitor—330 mmfd. (C-12)
35520	Capacitor—400 mmfd. (C-11)
33806	Capacitor—.0015 mfd. (C-16)
14393	Capacitor—.01 mfd. (C-30)
4858	Capacitor—.01 mfd. (C-1)
32786	Capacitor—0.1 mfd. (C-27, C-28, C-29)
35499	Capacitor Pack—Comprising 3 sections of 0.25 mfd., 2 sections of 0.1 mfd., 1 section of .01 mfd., and 1 section of 20 mfd.
35514	Coil—Antenna coil, less shield (T-5, C-25, C-31, R-13, R-17)
35507	Coil—Detector coil, less shield (T-4, C-32, R-14, R-16)
35511	Coil—Oscillator coil, less shield (T-6, C-33, R-11)
35518	Coil—CW Oscillator coil (L-1, C-9, C-11, C-12, C-13, R-7)
35485	Condenser—3-gang variable, complete with gears and knob shaft (C-20, C-21, C-22)
35501	Contact—Contact assembly for RCA-991 tube
MI-5977	Crystal—Crystal and holder (specify frequency when ordering)
35487	Gear—Intermediate drive gear and short pinion gear
35692	Gear—Intermediate drive gear and long pinion gear
35488	Gear—Variable condenser shaft drive gear
35502	Jack—Phone jack (J-1)
16888	Jack—Tip jack for crystal mounting (4 required)
18348	Jack—Tip jack for transmitter "side tones" or additional phones
33154	Knob—Tuning condenser knob
33148	Knob—Volume control or crystal switch knob
35506	Panel—Front panel and dial scale
35505	Pointer—Dial pointer and set screw
16584	Post—Antenna binding post
14028	Nut—Clamping nut for air trimmers
35525	Resistor—42 ohms, 2 watts (R-18) (12-volt models only)
35509	Resistor—100 ohms, ½ watt (R-16)
35496	Resistor—680 ohms, ½ watt (R-2)
35513	Resistor—820 ohms, ½ watt (R-11)
35523	Resistor—15,000 ohms, 2 watts (R-6)
35497	Resistor—56,000 ohms, ½ watt (R-4)
35519	Resistor—56,000 ohms, ½ watt (R-7, R-12)
14138	Resistor—68,000 ohms, ½ watt (R-10)
35510	Resistor—220,000 ohms, ½ watt (R-14)
35524	Resistor—470,000 ohms, ½ watt (R-8)
35495	Resistor—560,000 ohms, ½ watt (R-9, R-13, R-17)
35498	Resistor—1 megohm, ½ watt (R-19)
35521	Resistor—1 megohm, ½ watt (R-1, R-5)
31085	Screw—No. 8-32, cup point, set screw for pointer
35486	Shaft—Tuning condenser knob shaft and pinion gear
33144	Socket—Tube socket for RCA-6F7
35500	Socket—Tube socket for RCA-6S7, RCA-6K8 or RCA-6B8
35503	Switch—Crystal selector switch (S-3)
33142	Switch—"On-Off" toggle switch (S-1)
35490	Transformer—First I-F transformer (T-3, C-14, C-15, R-9)
35491	Transformer—Second I-F transformer (T-2, C-4, C-5, C-6, C-7, R-2, R-4, R-19)
35489	Transformer—Output transformer (T-1)
35504	Volume Control
	MISCELLANEOUS ASSEMBLIES
35526	Bracket—Mounting bracket for receiver (4 required)
35527	Cushion—Rubber cushion, spacer, nut, screw and washer for mounting receiver (4 required)
14991	Wrench—No. 8 Allen set screw wrench

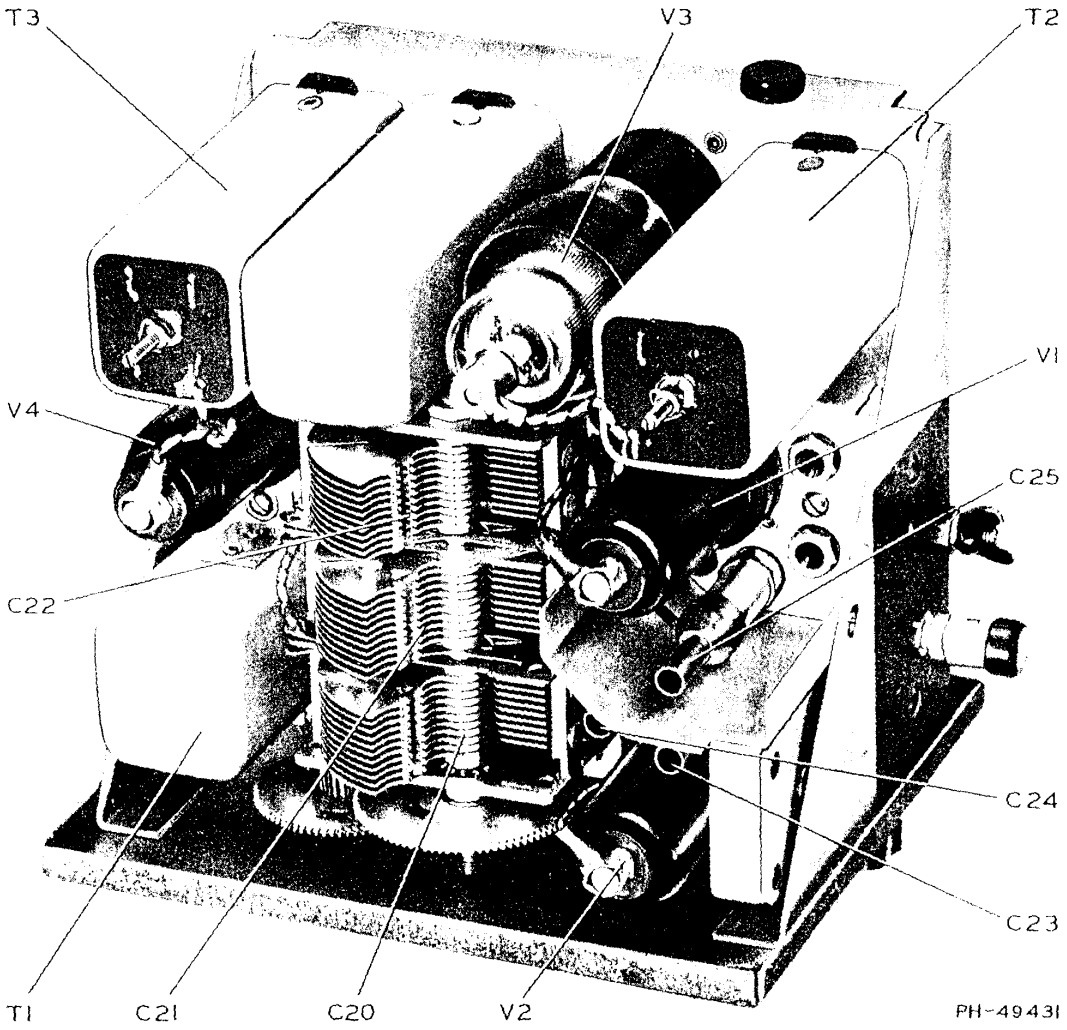

FIGURE 2 - RECEIVER CHASSIS
(Top View)

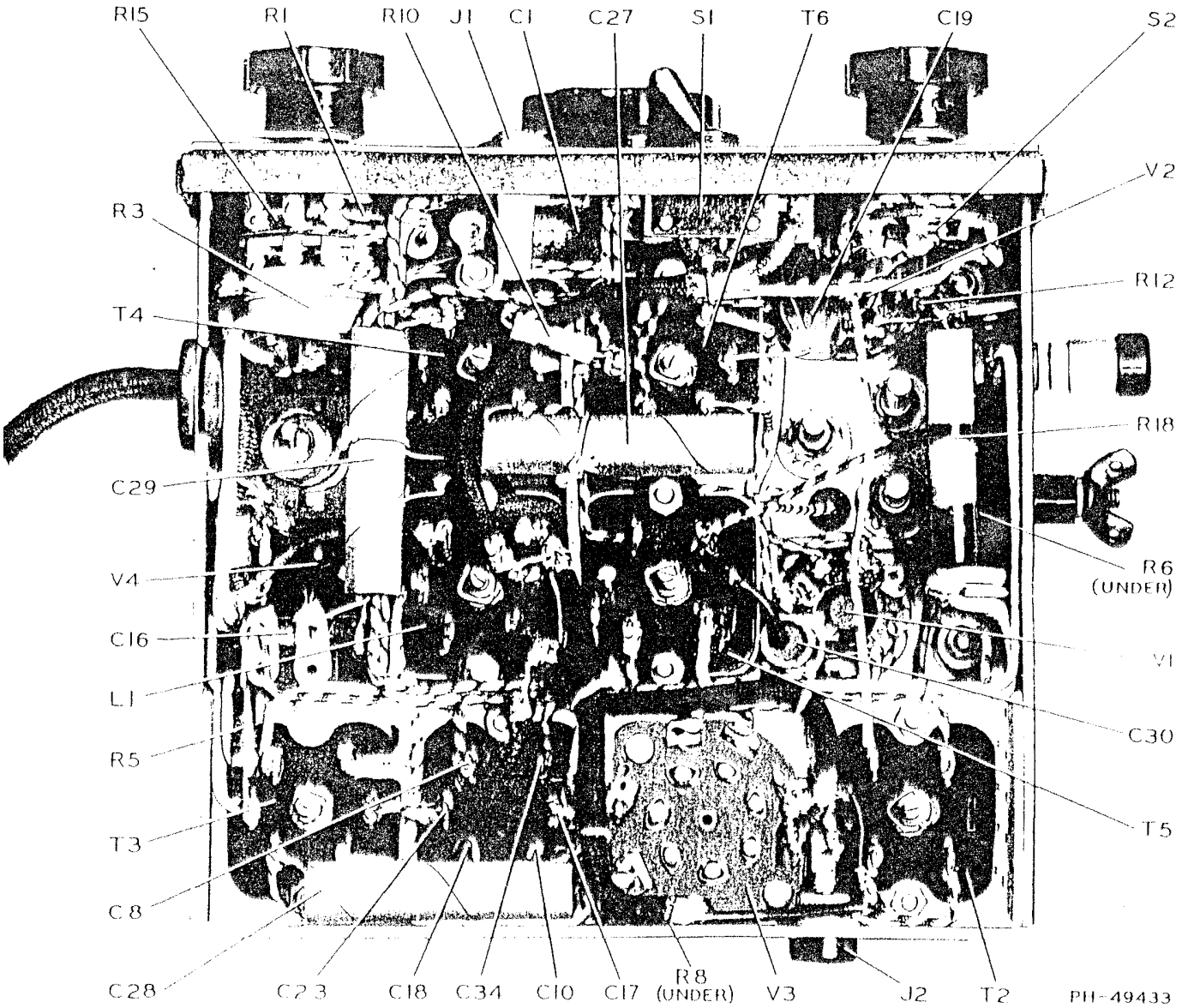

FIGURE 3 – RECEIVER CHASSIS
(Bottom View)

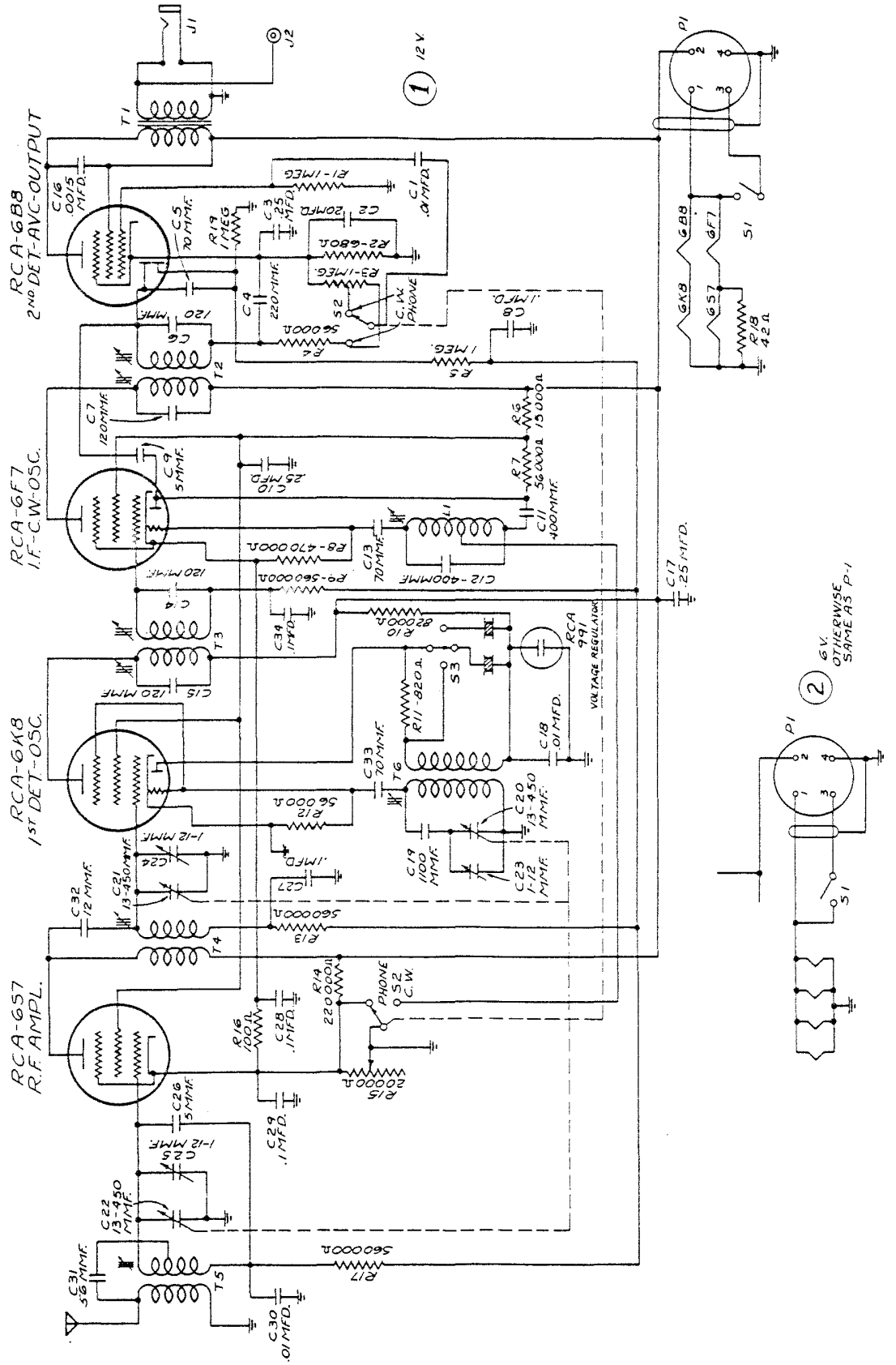

FIGURE 4 - RECEIVER
(Schematic P-714435)

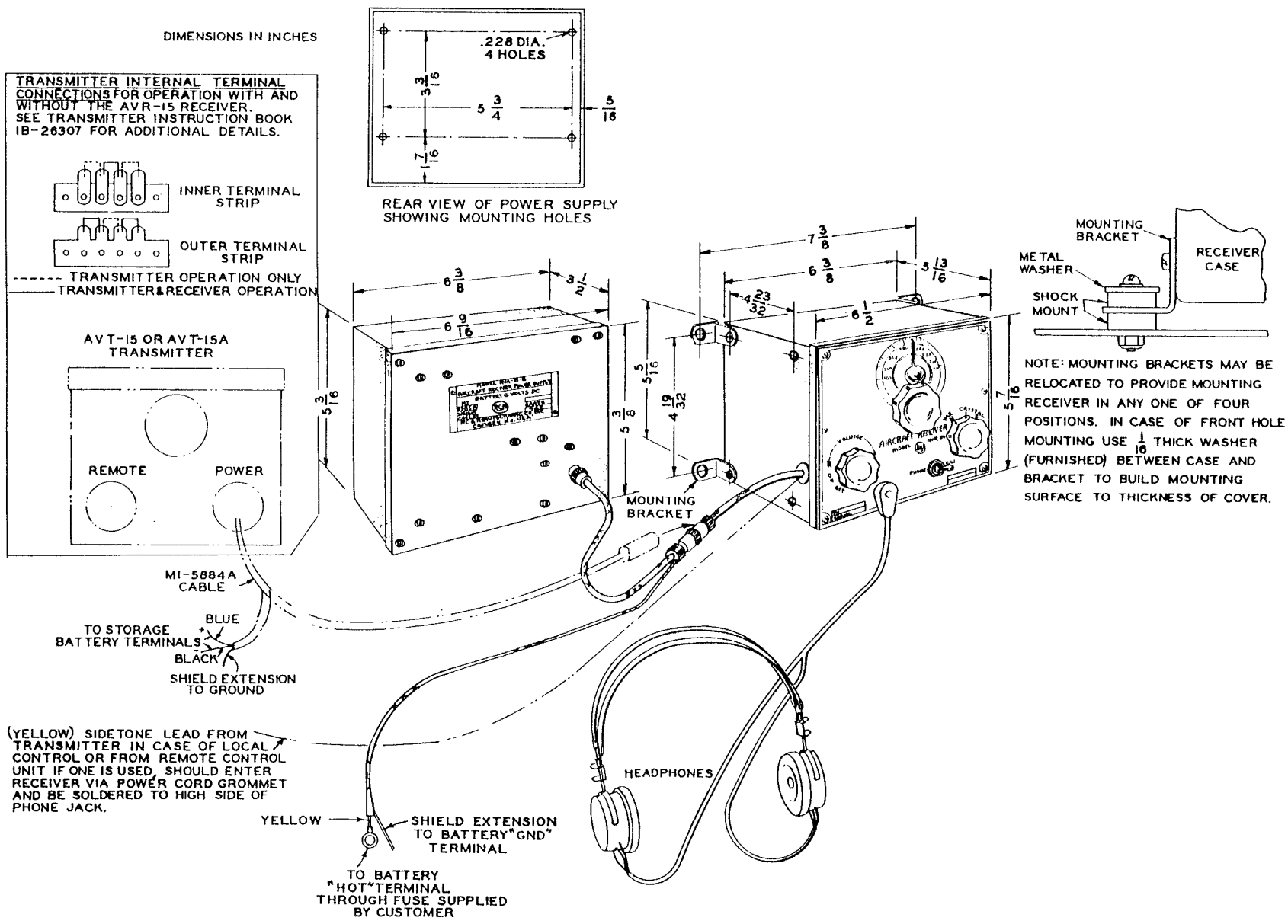

FIGURE 5 - EQUIPMENT INTERCONNECTION DIAGRAM (P-714301)

LIST OF CONTENTS OF MASTER ITEM No. 5978

TITLE: MI-5978 AVR-20 AIRCRAFT RECEIVER (12 V., 2500-6700 KC)

ITEM	QUAN.	DESCRIPTION	REFERENCE	PART OR GROUP
1	1	RECEIVER UNIT (C.A.A.T.C. 235), INCLUDING TUBES PACKED IN PLACE WITH CORRUGATED CARDBOARD COLLARS, OR OTHER SUITABLE MEANS, TO INSURE SAFE SHIPMENT.	T-601707	501
2	1	BAG OR ENVELOPE, CONTAINING:-		
		(A) 1 WRENCH, #8 ALLEN SET SCREW (STK.14991)	K-823505	12
		(B) 4 BRACKETS FIN.587	K-844161	1
		(C) 4 GROMMETS (SHOCK MOUNT)	K-65415	10
		(D) 4 SPACERS .170 I.D.x.265 O.D.x.297, BRASS, FIN.072	K-59067	16
		(E) 4 SCREWS #8-32x3/8 RH, BRASS, FIN.072	K-57458	59
		(F) 4 WASHERS .170 I.D.x3/8x1/16, STEEL, FIN.072	K-59213	26
		(G) 4 WASHERS .170 I.D.x9/16x1/32, BRASS, FIN.072	K-32237	20
		(H) 4 LOCKWASHERS #8, STEEL	K-59048	4
		(I) 4 NUTS #8-32, BRASS, FIN.100	K-57435	55
3	1	INSTRUCTION BOOK (PACKED BY SHIPPING DEPARTMENT)	IB-34014	
4	1	PACKING LIST	THIS SHEET	

NOTE #1 TUBE COMPLEMENT COMPRISES 1-EACH OF RCA-6B8, -6F7,-6K8,-6S7 & 991.

O

H. G. Eckardt Mar 22, '39

FACTORY INSPECTOR

SHIPPING INSPECTOR

REQUISITIONS	S	REQUISITIONS	S
SO-4190	0		
SO-4017	0		

PROPOSITIONS
18835-B
13016-B

RCA Mfg. Co., Inc. Camden, N. J.	COMPILED BY	FIRST MADE FOR	WF DIST.
	TWK 11-21-39	MI-5998	

FORM 18228