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

Mechanical Specifications
Dimensions— Receiver Power Unit AVA-51B Power Unit AVA-51C
Heights ........................................... (See Drawing Figure 5)
Widths .........................................................
Depths ...........................................................

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

EQUIPMENT
(OPTIONAL)

MI-5988—
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-A
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-13A 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-13A 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 trans- 
pose 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-13 or AVT-13A transmitter, con- 
nections 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 trans- 
mitt ing antenna (if transmitter is provided with an- 
tenna 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 air-
craft motors, and are available through aircraft ac-
cessories 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 RECEIPTION.—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 con- 
denser-crystal switch to the desired “crystal” posi-
tion. There are two crystal positions, the frequency 
at each position being determined by the crystal used. 
Turn the tuning control until the pointer is approxi-
mately at the frequency desired. When the signal is 
heard, adjust tuning control for maximum signal 
strength. The receiver will then remain tuned ac-
curately 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

<table>
<thead>
<tr>
<th>Stock No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>12714</td>
<td>Capacitor—Adjustable capacitor (C-23, C-24, C-25)</td>
</tr>
<tr>
<td>35515</td>
<td>Capacitor—5 mfd. (C-9, C-26)</td>
</tr>
<tr>
<td>35508</td>
<td>Capacitor—12 mfd. (C-32)</td>
</tr>
<tr>
<td>35516</td>
<td>Capacitor—56 mfd. (C-31)</td>
</tr>
<tr>
<td>35492</td>
<td>Capacitor—70 mfd. (C-5, C-13, C-33)</td>
</tr>
<tr>
<td>35492</td>
<td>Capacitor—120 mfd. (C-6, C-7, C-14, C-15)</td>
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<tr>
<td>35494</td>
<td>Capacitor—220 mfd. (C-4)</td>
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<tr>
<td>12952</td>
<td>Capacitor—330 mfd. (C-12)</td>
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<tr>
<td>35520</td>
<td>Capacitor—400 mfd. (C-11)</td>
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<tr>
<td>33806</td>
<td>Capacitor—0.015 mfd. (C-16)</td>
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<tr>
<td>14933</td>
<td>Capacitor—0.01 mfd. (C-30)</td>
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<tr>
<td>4858</td>
<td>Capacitor—0.1 mfd. (C-1)</td>
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<tr>
<td>32786</td>
<td>Capacitor—0.1 mfd. (C-27, C-28, C-29)</td>
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<tr>
<td>35499</td>
<td>Capacitor Pack—Comprising 3 sections of 0.25 mfd., 2 sections of 0.1 mfd., 1 section of 0.01 mfd., and 1 section of 20 mfd.</td>
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<tr>
<td>35514</td>
<td>Coil—Antenna coil, less shield (T-5, C-25, C-31, R-13, R-17)</td>
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<tr>
<td>35507</td>
<td>Coil—Detector coil, less shield (T-4, C-32, R-14, R-16)</td>
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<tr>
<td>35511</td>
<td>Coil—Oscillator coil, less shield (T-6, C-33, R-11)</td>
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<tr>
<td>35518</td>
<td>Coil—CW Oscillator coil (L-1, C-9, C-11, C-12, C-13, R-7)</td>
</tr>
<tr>
<td>35485</td>
<td>Condenser—3-gang variable, complete with gears and knob shaft (C-20, C-21, C-22)</td>
</tr>
<tr>
<td>35501</td>
<td>Contact—Contact assembly for RCA-991 tube</td>
</tr>
<tr>
<td>MI-5977</td>
<td>Crystal—Crystal and holder (specify frequency when ordering)</td>
</tr>
<tr>
<td>35487</td>
<td>Gear—Intermediate drive gear and short pinion gear</td>
</tr>
<tr>
<td>35692</td>
<td>Gear—Intermediate drive gear and long pinion gear</td>
</tr>
<tr>
<td>35488</td>
<td>Gear—Variable condenser shaft drive gear</td>
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<tr>
<td>35502</td>
<td>Jack—Phone jack (J-1)</td>
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<tr>
<td>16888</td>
<td>Jack—Tip jack for crystal mounting (4 required)</td>
</tr>
<tr>
<td>18348</td>
<td>Jack—Tip jack for transmitter &quot;side tones&quot; or additional phones</td>
</tr>
<tr>
<td>33154</td>
<td>Knob—Tuning condenser knob</td>
</tr>
<tr>
<td>33148</td>
<td>Knob—Volume control or crystal switch knob</td>
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<thead>
<tr>
<th>Stock No.</th>
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<tbody>
<tr>
<td>35506</td>
<td>Panel—Front panel and dial scale</td>
</tr>
<tr>
<td>35505</td>
<td>Pointer—Dial pointer and set screw</td>
</tr>
<tr>
<td>16584</td>
<td>Post—Antenna binding post</td>
</tr>
<tr>
<td>14028</td>
<td>Nut—Clamping nut for air trimmers</td>
</tr>
<tr>
<td>33523</td>
<td>Resistor—42 ohms, 2 watts (R-18) (12-volt models only)</td>
</tr>
<tr>
<td>33509</td>
<td>Resistor—100 ohms, ½ watt (R-16)</td>
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<tr>
<td>33496</td>
<td>Resistor—680 ohms, ½ watt (R-2)</td>
</tr>
<tr>
<td>33513</td>
<td>Resistor—820 ohms, ½ watt (R-11)</td>
</tr>
<tr>
<td>33522</td>
<td>Resistor—15,000 ohms, 2 watts (R-6)</td>
</tr>
<tr>
<td>33497</td>
<td>Resistor—56,000 ohms, ½ watt (R-4)</td>
</tr>
<tr>
<td>33519</td>
<td>Resistor—56,000 ohms, ½ watt (R-7, R-12)</td>
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<tr>
<td>14138</td>
<td>Resistor—68,000 ohms, ½ watt (R-10)</td>
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<tr>
<td>33510</td>
<td>Resistor—220,000 ohms, ½ watt (R-14)</td>
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<tr>
<td>33524</td>
<td>Resistor—470,000 ohms, ½ watt (R-8)</td>
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<tr>
<td>33495</td>
<td>Resistor—560,000 ohms, ½ watt (R-9, R-13, R-17)</td>
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<tr>
<td>33498</td>
<td>Resistor—1 megohm, ½ watt (R-19)</td>
</tr>
<tr>
<td>33521</td>
<td>Resistor—1 megohm, ½ watt (R-1, R-5)</td>
</tr>
<tr>
<td>33585</td>
<td>Screw—No. 8-32, cup point, set screw for pointer</td>
</tr>
<tr>
<td>33486</td>
<td>Shaft—Tuning condenser knob shaft and pinion gear</td>
</tr>
<tr>
<td>33344</td>
<td>Socket—Tube socket for RCA-6F7</td>
</tr>
<tr>
<td>33500</td>
<td>Socket—Tube socket for RCA-6JS, RCA-6K8 or RCA-6B8</td>
</tr>
<tr>
<td>33503</td>
<td>Switch—Crystal selector switch (S-3)</td>
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<tr>
<td>33142</td>
<td>Switch—&quot;On-Off&quot; toggle switch (S-1)</td>
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<tr>
<td>33490</td>
<td>Transformer—First I-F transformer (T-3, C-14, C-15, R-9)</td>
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<tr>
<td>33491</td>
<td>Transformer—Second I-F transformer (T-2, C-4, C-5, C-6, C-7, R-2, R-4, R-19)</td>
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<tr>
<td>33489</td>
<td>Transformer—Output transformer (T-1)</td>
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<tr>
<td>33504</td>
<td>Volume Control</td>
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## MISCELLANEOUS ASSEMBLIES

<table>
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<tr>
<th>Stock No.</th>
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<tbody>
<tr>
<td>33526</td>
<td>Bracket—Mounting bracket for receiver (4 required)</td>
</tr>
<tr>
<td>33527</td>
<td>Cushion—Rubber cushion, spacer, nut, screw and washer for mounting receiver (4 required)</td>
</tr>
<tr>
<td>14991</td>
<td>Wrench—No. 8 Allen set screw wrench</td>
</tr>
</tbody>
</table>
# LIST OF CONTENTS OF MASTER ITEM No. 5978

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

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QUAN.</th>
<th>DESCRIPTION</th>
<th>REFERENCE</th>
<th>PART OR GROUP</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>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.</td>
<td>T-601707</td>
<td>501</td>
</tr>
</tbody>
</table>
| 2    | 1     | BAG OR ENVELOPE, CONTAINING:  
(A) 1 WRENCH, #8 ALLEN SET SCREW (STK.14991)  
(B) 4 BRACKETS FIN.587  
(C) 4 GROMMETS (SHOCK MOUNT) FIN.072  
(D) 4 SPACERS .170 I.D.x.265 O.D.x.297, BRASS, FIN.072  
(E) 4 SCREWS #3-32x3/8 RH, BRASS, FIN.072  
(F) 4 WASHERS .170 I.D.x3/8x1/16, STEEL, FIN.072  
(G) 4 WASHERS .170 I.D.x9/16x1/32, BRASS, FIN.072  
(H) 4 LOCKWASHERS #3, STEEL  
(I) 4 NUTS #3-32, BRASS, FIN.100 | K-323505  
K-3441b1  
K-65415  
K-59067  
K-57458  
K-59213  
K-32237  
K-59043  
K-57435 | 12  
1  
10  
16  
59  
26  
20  
4  
55 |

3 | 1 | INSTRUCTION BOOK (PACKED BY SHIPPING DEPARTMENT) | IB-34014 |

4 | 1 | PACKING LIST | THIS SHEET |

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

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**Requisitions**

<table>
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<tr>
<th>REQUISITIONS</th>
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<td>30-4017</td>
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**Propositions**

| 18335-B |
| 13016-B |