Admiral

SERVICE MANUAL SUPPLEMENT
for models using
20A1, 20B1, 21A1, 4J1, and 4K1 CHASSIS

IMPORTANT
When servicing any model using the 20A1, 20B1, 21A1, 4J1, and 4K1 chassis, use this supplement with the Television Service Manual for 20A1, 20B1, 21A1, 4J1, and 4K1 Chassis (Form No. S267).

This supplement contains necessary service data for late production 20A1, 20B1, 21A1, 4J1, and 4K1 chassis. It also includes corrections and additions for the Television Service Manual (Form S267).

The most important production change is the use of a new TV Tuner (part number 94C18-2). Page 64 explains how to identify the type of tuner used. When servicing, or ordering parts for a 94C18-2 Tuner (late production), BE SURE to use this Service Manual Supplement. When servicing, or ordering for a 94C18-1 Tuner (early production), BE SURE to use the Television Service Manual for 20A1, 20B1, 21A1, 4J1, and 4K1 Chassis (Form S267).

WRITING TO DISTRIBUTOR OR FACTORY

When reporting about any Admiral product, be sure to include the following information:
1. Model number and anything stamped on model label.
2. Fill out and send the Inspection Tag, if a tag is attached to chassis.
3. If Inspection Tag is not sent in, give all letters and numbers stamped on back of chassis.
4. Detailed explanation to speed investigation.
5. If reporting parts failure, give symbol number, part number and any brand name on part.
6. For record changers, give model and anything stamped on model label on bottom of changer pan.

ADDITIONS AND CHANGES IN TELEVISION SERVICE MANUAL

Important: To prevent possibility of error when using the Television Service Manual (Form No. S267), portions of it should be revised or crossed out in accordance with the information given below.

Models 4H18C, 4H19C, 4H145C, 4H146C, 4H156C, 4H166C, and 4H167C should be added to the list of models given on the first page of the service manual. (Note that any of these model numbers may have a suffix letter “N”. ) All these models use a 4K1 radio tuner and a 6PA3 power supply. (See “Model Identification Chart” on page 58.)

The “Deflection Yoke Adjustment” procedure given on page 8 should be changed to read as follows: “If picture appears tilted (Figure 17), loosen the wing nut on top of deflection yoke and rotate the deflection yoke coil for correct picture orientation while pushing the yoke coil forward as far as it will go.”

Page 13, under the heading “Test Equipment”, states that the Signal Generator should have an output “AM modulated at 4.5 MC”. This is not a requirement of the signal generator and the sentence can be crossed out.

Page 14, in step 9 of the “IF Amplifier and Trap Alignment” chart, states that the Signal Generator Frequency (MC) should be “4.5 AM modulated”. This should be changed to read “4.5 unmodulated or 400 cycle AM modulated”.

In Figure 30 “Overall Video IF Response Curve” on page 15, the first line inside the curve should read “21.25 MC AUDIO MARKER NOT VISIBLE DUE TO TRAP”.

Under heading “Sharp Tuning Control” on page 36, in the third line of the second paragraph, the word “circulator” should be “circular”.

On page 39, the correct part number for C102 should be 98A45-67.
On page 41, L606 was erroneously listed as an “FM” peaking coil instead of an “AM” peaking coil.

On page 41, the part number of coil L104 should be corrected to read 98A45-14.

On page 44, the correct dimensions for “Door Bumper, Sponge Rubber”, part number 12A5-6 are \( \frac{3}{4} \times \frac{3}{8} \times \frac{2}{16} \). This item appears in the left-hand column, 5 lines from the bottom of the page.

Note that in the cabinet parts list, the descriptions given for channel escutcheons are not always correct. Channel escutcheons are supplied less mounting spring and any other parts if used. The following information should be noted: Channel escutcheons part #23B43, 23B43-1, and 23B43-2 require a hairpin wire mounting spring (part #21A48). Channel escutcheon part #23B44 requires a c.675 bronze mounting spring (part #18A27), two speed nuts (part #21B05-5-68), and a fibre cushion plate (part #32A73).

On page 49, the part number for cabinet doors on models 30F15, 30F16, 30F17 are incorrect. See parts list on page 67.

In the “Voltage Chart” on page 50, at the top of the right column, we indicate “• Channel selector set on channel 2”. This should be changed to read “• Channel selector set on an unused low channel (preferably channel 2).

Production Change “Y” (in this Supplement) states that condenser C214 has been added to the circuit. C214 should be added to the schematics given in Figures 81 and 82. C214 is connected in series between the junction of R207, C204 and the volume control R212A.

In all four schematics, the coil terminal numbers on the physical illustration of the width control T405 (at the extreme right end of the schematics), should be changed as follows:

Terminal number 1 should be 2.
Terminal number 2 should be 1.
Terminal number 3 should be 4.
Terminal number 4 should be 3.

All wire colors remain as originally shown; only the numbers change.

In the schematics for combination models, on pages 54 and 56, the band switch section (SW601) connected between the oscillator (V601B) and the IF Transformer (T601) is shown in the FM position. This should have been shown in the AM position since all other sections of this switch are shown in the AM position.

**ION TRAP ADJUSTMENT FOR 16” (21A1) SETS**

Care must be exercised in adjustment of the ion trap for 16” sets since there are two locations on the neck of the tube where a raster can be produced.

Locate the ion trap magnet approximately over the metal flags of the electron gun structure located near the tube base. Starting from this point, very carefully move the ion trap forward or backward and at the same time rotate it slightly in either direction; adjust for the brightest raster possible with the lowest setting of the brightness control on which good line focus can be maintained. The second ion trap location, which is further forward on the tube neck, should not be used.

**MODEL IDENTIFICATION CHART**

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Television Chassis</th>
<th>FM-AM Radio Tuner</th>
<th>Power Supply Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>24A12, 24A125</td>
<td>20A1</td>
<td>—</td>
<td>4PA1</td>
</tr>
<tr>
<td>4H15A or B, 4H16A or B, 4H17A or B</td>
<td>20B1</td>
<td>—</td>
<td>4PA1</td>
</tr>
<tr>
<td>24C15, 24C16</td>
<td>20B1</td>
<td>—</td>
<td>4PA1</td>
</tr>
<tr>
<td>4H145A or B, 4H146A or B, 4H147A or B, 4H155A or B, 4H156A or B, 4H157A or B, 4H165A or B, 4H166A or B, 4H167A or B, 30F15, 30F16, 30F17</td>
<td>20B1</td>
<td>—</td>
<td>4PA1</td>
</tr>
<tr>
<td>4H10C or CN, 4H19C or CN, 4H145C or CN, 4H146C, 4H156C or CN, 4H166C or CN, 4H176C or CN, 30F15A, 30F16A, 30F17A</td>
<td>20B1</td>
<td>—</td>
<td>4PA2</td>
</tr>
<tr>
<td>4H137A or B, 4H126A or B</td>
<td>21A1</td>
<td>—</td>
<td>4PA2</td>
</tr>
<tr>
<td>4H126C or CN</td>
<td>21A1</td>
<td>4J1</td>
<td>6PA3</td>
</tr>
</tbody>
</table>

*6PA3 can also be used. **6PA4 can also be used.

**IMPORTANT**

To identify a 4J1 or 4K1 Radio tuner, note that there are two leads for each pilot light in the 4K1 since the pilot lights and heaters are not returned to ground in the 4K1 chassis. In the 4J1 tuner, the pilot lights have one lead and are grounded by the pilot light mounting brackets; one side of the heater circuit is grounded to the 4J1 chassis. The Tuner type is also indicated on the serial number decal.

Note that the power supplies are stamped with their number; usually on the top of the chassis near the power transformer. The power supplies can also be identified by the following differences:

- R505 is 270 ohms in the 4PA1 Power Supply.
- R505 is 150 ohms in the 4PA2 Power Supply.
- R516 is used in the 6PA1 and 6PA3 Supplies.
- R516 is NOT used in the 6PA2 and 6PA4 Supplies.
FM RF ALIGNMENT PROCEDURE

The FM RF alignment procedure for 4J1 and 4K1 Radio Tuners has been changed as indicated below to prevent possible spurious oscillation at the high frequency end of the FM band.

It is important to use the FM RF Alignment Procedure Chart given below and disregard the chart on page 21 of the "Television Service Manual for 20A1, 20B1, 21A1, 4J1, and 4K1 Chassis" (Form No. S267).

<table>
<thead>
<tr>
<th>Step</th>
<th>Connect Generator</th>
<th>Generator Frequency</th>
<th>Receiver Gang or Dial Setting</th>
<th>Output Connections</th>
<th>Adjust as follows (very carefully)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>109 MC</td>
<td>Gang fully open</td>
<td>Connect VTVM</td>
<td>*M (oscillator) for maximum</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(DC probe) from point &quot;p&quot; to chassis</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>109 MC</td>
<td>&quot;</td>
<td>&quot;</td>
<td>Adjust N (antenna) for maximum VTVM reading, while rocking signal generator. If trimmer does not peak, it will be necessary to squeeze or spread turns of FM antenna coil.</td>
</tr>
<tr>
<td></td>
<td>To ends of FM antenna twin lead thru 120 ohm carbon resistors in series with each generator lead.</td>
<td></td>
<td></td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>87 MC</td>
<td>Tune in Signal. (Gang should be closed or almost closed).</td>
<td>&quot;</td>
<td>If signals in steps 1 and 3 will not tune in at gang tuning extreme (within 0.5 MC), it will be necessary to spread or squeeze oscillator coil turns and then repeat steps 1 and 3 until correct results are obtained.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>106 MC</td>
<td>At 106 MC See Figs. 85 and 86</td>
<td>&quot;</td>
<td>Readjust M (oscillator) for maximum.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>109 MC</td>
<td>Gang fully open</td>
<td>&quot;</td>
<td>Readjust N (antenna) for maximum VTVM reading, while rocking signal generator. Check tracking and calibration at 100 and 92 MC. See Figures 85 and 86. Calibration error should not exceed ±0.5 MC. If necessary, repeat alignment until correct results are obtained.</td>
</tr>
</tbody>
</table>

* It is advisable to adjust generator output so VTVM readings do not exceed approx. —1.5 V. DC while peaking. Signal may be unmodulated or 400 cycle AM modulated. If your signal generator does not reach this frequency, use harmonies as described in "FM Alignment Equipment" on page 19 of the Service Manual.

IMPORTANT

After completing alignment, assemble chassis cover and dial scale to chassis. Set dial pointer as shown in Figure 85. Recheck dial calibration for AM and FM tuning. The AM and FM oscillator or antenna trimmer adjustments may be touched up for more accurate calibration and tracking.

AM antenna trimmer adjustment "F" in step 3 of "AM Alignment Procedure" should be repeated after receiver and antenna have been installed in cabinet. Note: AM antenna trimmer may not peak properly if antenna leads are not routed properly or separated as originally made.

Locating 109, 106 and 92 MC Settings

With Gang Drum

Fully open the gang condenser. This is the 109 MC setting. Make a pencil line on the edge of the gang drum as shown by the arrow marked "109 MC" in Figure 86. Then to locate the 106 MC or 92 MC settings, merely rotate the gang drum until the pencil line corresponds to the dotted line positions (marked 106 MC and 92 MC) shown in Figure 86.

Figure 85. Pointer Setting.

Figure 86. Locating Alignment Settings.
ADDITIONAL PRODUCTION CHANGES AND TROUBLE SHOOTING

(For earlier Production Changes and complete Trouble Shooting data, see pages 25 through 32 of Television Service Manual for 20A1, 20B1, 21A1, 4J1 and 4K1 Chassis, Form No. S267.)

S. BREAKDOWN OF C437

To prevent breakdown, the working voltage rating of coupling condenser C437 (.05 mfd.) was changed from 400 volts (DC) to 600 volts (DC). The new part number is 64B5-7. Chassis with this change are stamped run 17A or higher.

If C437 shorts in sets using a 12AU7 Sync Separator and Clipper, the Sync Separator section of the 12AU7 will draw grid current. This will bias the AGC tube (V305) to cut-off. Since no AGC voltage is developed, the 1st and 2nd video IF's are not controlled by AGC, and their gain will be maximum. With a strong signal, enough negative voltage will be developed across video detector load resistor R319 to drive the video amplifier V306 to cut-off.

This trouble can be identified by either a weak picture with loss of horizontal and vertical sync, or no picture at all. In most cases, the picture may be observed faintly by turning up the brightness and contrast controls. In any case, vertical and horizontal synchronization will be impossible.

If this condition appears, remove the 12AU7 (V403) tube. If the picture appears with brightness and contrast restored, but still not sync either vertically or horizontally, replace C437 with a .05 mfd. 600 volt condenser, part number 64B5-7.

T. R436 DECREASED IN VALUE TO IMPROVE HORIZONTAL OSCILLATOR STABILITY

Chassis with this change stamped run "16" or higher.

Load resistor R436 was changed from a 270,000 ohm, ½ watt resistor to a 240,000 ohm, ½ watt, 5% resistor (part number 60B7-244). R436 was changed to compensate for any increase in its resistance value that may occur during use of the receiver. If R436 does increase in value, horizontal sync will be affected, and a split-framed picture may result.

A check can easily be made with an ohmmeter. When replacing R436, use part number 60B7-244.

U. AM PEAKING COIL L606 CHANGED TO PREVENT EXCESSIVE REGENERATION IN 4K1, 4J1 RADIO TUNER

L606 was changed in value from 475 microhryns to 120 microhryns. The new part number is 73A5-10.

L606 is used to obtain positive feedback and eliminate the grid loading which is inherent in a triode mixer. This results in an increase in conversion gain. This change was made to prevent excessive feedback which resulted from an increase in value of loading resistor R605 beyond its specified tolerance. This difficulty can be identified by “motor boating” or “whistling” at the center of the band, when the AM-FM switch is on AM, and the loop antenna is connected. If the converter is oscillating at the center of the band, place your hand across the loop antenna. If the oscillations stop, replace L606 and damping resistor with the new part.

V. CHANGE IN LENGTH OF 300 OHM LINE FROM ANTENNA TO TUNER WHEN BUILT-IN “ROTO-SCOPE” ANTENNA IS USED

FOR 20A1, 20B1 CHASSIS: In these chassis, the length of antenna twin lead (300 ohm) connected from the antenna terminals to the TV Tuner (94C18-1), has been shortened from 18 inches (in early sets) to 13 inches (in later sets).

FOR 21A1 CHASSIS: In these chassis, the length of the antenna lead has been shortened as much as possible (between 4 and 5 inches).

This change was made to increase the signal pickup on the high channels in sets using the built-in Roto-Scope antenna. When necessary to make this change in a set having the built-in Roto-Scope antenna, unsolder the antenna lead from the antenna terminals and shorten as described above. Then resolder the lead to the antenna terminals.

W. BREAKDOWN OF C311

Condenser C311 was changed from .05 mfd., 400 volt condenser to .05 mfd., 600 volt condenser (part number 64B5-7).

A voltage divider network consisting of R323 and R324, supplies the proper bias voltage for the picture tube (V307). If C311 shorts, the total voltage is applied to the picture tube cathode, and the picture tube will be cut off. The symptom of this trouble would be: no raster, sound OK.

X. UNGROUNDDED STATOR PLATE FOR SHARP TUNING CONDENSER C111 CHANGED TO MINIMIZE FREQUENCY DRIFT

A ceramic ungrounded stator plate was added to late production 94C18-1 Tuners. This new type stator plate is also used in the 94C18-2 Tuner and is shown in figure 86 as M118. Use of this stator minimizes frequency drift.

To install this new type stator plate on a tuner, see instructions on page 64.

Y. COUPLING CONDENSER (C214) ADDED TO ELIMINATE NOISE IN VOLUME CONTROL

A coupling condenser (C214, .05 mfd., 400 volts, part #64B5-22) was connected in series between junction of de-emphasis network (R207 and C204) and terminal of volume control R212A. Addition of this condenser
blocks direct current into the volume control, thereby
avoiding noise with rotation of volume control.

Z. VERTICAL OUTPUT TRANSFORMER T402 LEAD LENGTH CHANGED
The length of vertical output transformer T402 has
been increased to make this new part (part number
79R24-1) a universal replacement for the 20A1, 20B1
and 20X1 television chassis.

CHANGE IN AMPERAGE OF LINE FUSE M313
A 3-ampere fuse F313 was added in late production
sets (see production change "M" on page 26 of the
manual). The amperage of line fuse M313 has since
been increased from 3 amperes, 250 volts (part number
84A1-14) to 4 amperes, 250 volts (part #84A1-15) to
avoid burning out of fuse due to possible momentary
increase in current drain.

SERVICE HINTS
These service hints have been compiled as an addition to the "Trouble
Shooting" information and chart on pages 27 to 32 in the "Television
Service Manual for the 20A1, 20B1, 21A1, 4J1, 4K1 Chassis" (Form No.
S267). In general, the regular trouble shooting procedures apply, but
these hints should assist you in making a quick diagnosis of some service
troubles. Note, however, that these service hints are not intended to cover
all possibilities that may cause a particular trouble, but should be used
together with the material in the service manual.

HINTS ON AUTOMATIC GAIN CONTROL
(AGC) CIRCUIT

Note: Although reference numbers used in the following
discussion apply to the schematic (Figure 81)
showing the 12AU7 sync separator and clipper, these
service hints apply to all 20A1, 20B1, 21A1 chassis.

The AGC system employed in the 20A1, 20B1, 21A1
chassis can be serviced more readily if its function is
properly understood.

A sharp cut-off pentode amplifier (V305, 6AU6) is
used as a "triggered" AGC tube to supply a negative
control bias to the RF amplifier and the first two video
IF amplifiers. A positive sync pulse is applied to the
control grid of the AGC tube through the isolating
resistor R315. A pulsed plate voltage, supplied through
the width control and developed during retrace time, is
applied to the AGC tube plate through condenser C430.
The AGC tube is biased to cut-off until the pulsed plate
voltage is applied to condenser C430, and the positive
sync pulse is applied to the control grid, simultaneously.

The current through the AGC tube V305 will charge
the condenser C430 to a negative value in respect to
chassis ground. AGC voltage is developed by the
discharge of C430 through the filter network (R430, R447,
C417 and C305) and the bias resistors (R303 and R305)
to ground. Note: Under normal conditions, the AGC
voltage measured at the control grid (pin 1) of the 1st
video amplifier (V301) will be approximately —4.5
volts. This voltage will vary slightly with signal input
and contrast control setting.

Since the AGC tube is dependent upon other circuits
for its operation, it will be affected by defective com-
ponents in the video amplifier V306, damper V403, and
sync separator V403 circuits. The following hints are
associated with these circuits:

No Sound; No Picture. AGC measured at pin 1 of
V301 (6AU6) will read approximately —10 volts.

The voltage present at the junction of the video am-
plifier plate load resistors R340 and R341 is applied to
the control grid of the AGC tube. If the video amplifier
or circuit becomes defective, the voltage drop across
R341 is decreased, an increased positive voltage is
applied to the grid of the AGC tube. The AGC tube
is no longer at cut-off between sync pulse intervals, and
increased plate current results.

The AGC voltage developed will be of sufficient ampli-
tude to cut-off the RF amplifier and 1st two video IF
tubes. This will result in no sound or video.

Low or Varying 2nd Anode Voltage; Distortion
in Sound. Plate voltage is applied to the AGC tube
through the width control (T435), which is connected to
the horizontal output transformer. If damper tube
V405 becomes gassy, the pulsed voltage applied to
condenser C430 may vary enough to cause distortion in
the RF amplifier and 1st and 2nd video IF amplifier.
This will affect both the sound and picture.

Weak Picture, No Sync; Or No Picture. This
trouble can be identified by either a weak picture with
loss of horizontal and vertical sync, or no picture at all.
In most cases, the picture may be observed faintly by
turning up the brightness and contrast controls. In any
case, vertical and horizontal synchronization will be im-
possible. The AGC voltage measured at pin 1 of V301
(6AU6) will read approximately ___3 volts.

If C437 shorts in sets using a 12AU7 Sync Separator
and Clipper, the Sync Separator section of the 12AU7
will draw grid current. This will bias the AGC tube
(V305) to cut-off. Since no AGC voltage is developed,
the 1st and 2nd video IF's are not controlled by AGC
and their gain will be maximum. With a strong signal,
enough negative voltage will be developed across video
detector load resistor R319 to drive the video amplifier
V306 to cut-off.

If this condition occurs, remove the 12AU7 (V403)
tube. If the picture appears with brightness and contrast
restored, but will still not sync either vertically or hori-
zontally, replace C437 with a .05 mfd., 600 volt con-
derenser, part number 64B3-7.
ARCMG OR CORONA IN 21A1 (16") SETs

Arcing or corona in the 2nd anode supply circuit of the picture tube will generally produce a sharp crackling noise in the sound of the receiver, a faint hissing sound, or an odor of ozone. It can also cause the raster to vary in brightness. Arcing or corona is generally aggravated by conditions of high humidity.

If the noise in sound, hissing sound, or odor of ozone stops when the 2nd anode connector is disconnected from the chassis, the difficulty is in or at the picture tube mounting assembly. If these symptoms persist after disconnecting the 2nd anode connector, the difficulty will be found in the 2nd anode supply in the chassis.

In general, the exact spot of arcing or corona can be located by close observation under subdued light. However, if location or arcing or corona is not visible, it may be located by listening through length of fibre or bakelite tubing (approx. 1" diameter, at least 18" long). The tubing is held close to the ear with the other end directed to suspected point of arcing or corona.

Caution: 2nd anode voltage is approximately 12,000 volts; extreme precaution should be exercised when making this test. Before handling picture tube, see "Picture Tube Replacement" on page 53 of the Service Manual.

If the arcing or corona is located in or at the picture tube assembly (steps when 2nd anode lead is disconnected), the remedy may be found in the following:

Arcing or corona from the front of the picture tube (cone or screen) to the picture tube window. Clean picture window and picture tube screen; see "Cleaning Plastic Picture Tube Window" on page 32 of the Service Manual.

Except for very early sets, a polyethylene insulating sheet is mounted in back of the picture window. Install a polyethylene insulating sheet if set does not have one or if original one is deteriorated, torn, or has deep scratches or holes in it. Plastic sheet part #32D122 is used in sets having a rectangular picture window and part #32D126 is used in sets having a rounded-end picture window. Important: To avoid arcing or corona to cabinet, mount the insulating sheet with short tacks or staples applied as far to the top or sides of the cabinet as possible.

Arcing or corona from the front of the picture tube (cone or screen) to the polyethylene insulating sheet. This may be due to presence of moisture or dust on the screen of the picture tube and on the polyethylene insulating sheet. It may also be due to locating the insulating sheet mounting staple too close to the edges of the picture window.

Clean picture tube screen. Remove the polyethylene sheet and clean it with carbon tetrachloride. If insulating sheet is deteriorated, torn, or has deep scratches or holes in it, replace it.

Arcing or corona inside the connector on the 2nd anode connector lead. Push the connector together for good contact. If the connector does not fit together securely, trim excess material off with a file or sharp knife.

If the arcing or corona is located in the 2nd anode supply in the chassis (does not stop when 2nd anode lead is disconnected) the remedy may be found in the following:

Arcing or corona between or across components mounted on the IB3 (8016) rectifier tube mounting strip. Make proper clearances, tighten mounting screws, check soldered connections. Clearance between the corona ring (below the IB3/8016 tube socket) and the chassis should be approximately 3/4 of an inch. Check for leakage across 500 mfd. condensors (C440, C441 or C427). Clean surface of condensors, tube sockets, phenolic mounting strip, etc. with carbon tetrachloride. If arc-over or corona persists, replace the part.

Arcing or corona between terminals, leads or windings of horizontal output transformer. If arcing occurs across terminals, check for protruding edges of solder or strands of wire.

If arcing occurs between wire leads, separate leads. If insulation on leads is not burned badly, the surface of wire and terminal may be cleaned with carbon tetrachloride and the part may still be usable.

GENERAL SERVICE HINTS

Focus Control Requires Full Rotation, Or Some Tubes Have No Heater Voltage, Due To Use Of Wrong Power Supply. It is important to use the correct power supply with the various television and radio tuner chassis. To determine the correct power supply, refer to the "Model Identification Chart" given on page 58.

If the power supplies for 10-inch, 12-inch television sets are used in 16-inch television sets, or vice-versa, incorrect focus will result. The picture may focus at an extreme setting of the focus control.

If a 6PA1 or 6PA2 power supply (used in combination models having 4J1 tuners) is used in sets which require a 6PA3 or 6PA4 (used in combination models having 4K1 tuner), the heaters of the 6X5 rectifier (V316), the video amplifier (V306), and the horizontal output tube (V406) will not be connected to the heater string, and therefore will not operate.

The AM-FM radio tuners can be identified either by the serial number decal on the tuner chassis or by noting that the pilot lights in the 4K1 have two leads, while the 4J1 pilot lights have only one lead.

Split-frame Picture. See Production Change "T" in this supplement.

Horizontal Jitter, or Loss of Horizontal Sync. If filter condenser C413 (0.1 mfd., 400 V, part number 6IB5-25 opens up, it may be difficult to detect. The Horizontal Hold adjustment will be very critical, or will not hold sync at all. In some cases, adjustment of the Horizontal Lock L401 in rear of chassis, will not bring the picture into sync. If the picture will sync, horizontal "jitter" in the picture will result.
Shadows Or Rounded Corners In Picture When Ion Trap Is Adjusted For Maximum Brightness. Always adjust the Ion trap for maximum brightness. If shadows appear on the picture raster, adjust the deflection yoke until it is as far forward as possible. Then center the picture by carefully moving the focus coil forward or backward on the neck of the picture tube. If it is impossible to remove the shadows, try reversing the leads of the focus coil.

No Raster, Sound OK. See production change "W".

Vertical Line At Left Of Picture. If a white vertical line appears at the left side of the picture, it is probably due to misadjustment of the horizontal drive C121. Adjust the horizontal drive until the line disappears.

Interference From Electric Range Switches. If the Admiral Flex-O-Heat electric range switch or other electric range switches create an electrical disturbance in the television set, connect a .25 mfd. 1000 volt DC condenser across the line input terminals to the switch. If necessary, a smaller condenser should be used from each terminal to the range body or neutral.

Interference From Cash Registers. Television interference which is caused by operation of a cash register can be eliminated by installing an inductive-capacitive line filter (such as Tobe Filtertite #1194). The line filter should be installed inside the cash register as close to the motor as possible, and should be mounted on clean surface of the metal frame. The connecting leads should be as short as possible (see instructions supplied with filter).

Tunable Audio Hum. If audio hum is present which is tunable, but may be "tuned out" at a particular setting of the Sharp Tuning control, try connecting a 2.200 ohm, 1/2 watt resistor and a .1 mfd. 400 volt condenser in series from the AGC tube plate (pin 5 of V305) to ground.

Sound Has Excessive Bass Response. If the bass response of the set seems over-emphasized, check the condenser which shorts the primary of the output transformer. If this condenser is 0.04 mfd, replace it with a 0.002 mfd. 600 volt (part number 6450-14). Over-emphasized bass response can often be determined by mechanical vibrations such as rattles of the cabinet grille.

Weak Sound In High Signal Strength Areas. If the sound is weak in a high signal strength area, and all other possibilities of a defective sound system have been checked, disconnect the green AGC lead going to the tuner from the junction of R447 and R303. Then, reconnect this lead to the junction of R302 and R303. The decreased AGC will increase the gain of the RF amplifier (V101); and thus increase the gain of the sound as well as the video signal.

Tweets Heard On A.M. In 4J1, 4K1 Radio Tuners. If interference is present on the broadcast band in the 4J1 or 4K1 AM-FM radio tuner, first tune in the interference. Then, remove the horizontal oscillator tube (V405) in the television set. If the interference stops, disconnect the ground connection from pin 8 of the horizontal oscillator. Then connect a lead from pin 8 of V405 to pin 2 of V406. This will stop the horizontal oscillator from oscillating when the AM-FM tuner is used.

Audio Hum. Connect 25 inches of 1/2 inch bonding braid under the bracket holding the webbing for the picture tube, on the side nearest the audio lead; connect the other end of the braid under the power supply chassis, at the mounting screw nearest the audio lead.

Weak Sound In Normal Or Fringe Area. While watching picture, carefully turn slug A9 (see Figure 27, page 15 of the manual) approximately two turns inward for an increase in audio gain without loss of picture contrast. If further audio gain is necessary see Production Change F, on page 25 of Television Service Manual for 20A1, 20B1, 21A1, 4J1 and 4K1 chassis.

Whistle On AM Band of 4J1, 4K1 Tuner. See production change "U".

Noisy Volume Control. See Production Change "Y" in this supplement.

Horizontal Output Transformer Protection Fuse M405 Blows When Set Is Apparently OK. If the .25 amper fuse M405 (located inside the high voltage housing) blows repeatedly, even though the television set appears to be operating properly, try replacing damper tube V408 (6W4GT).

3 Ampere Line Fuse M313 Blowing. See Production Change on page 61 in this supplement.

Cabinet Grille Rattle. See "Sound Has Excessive Bass Response" on this page.

Operating The 4J1, 4K1 Radio Tuner Without Television Chassis Connected To Power Supply. If the special adapter socket, illustrated on page 19 in the manual is used to operate the radio tuner without the television set, be sure that the band switch is in the "Radio" position. This adapter will not suffice to check the phonograph, since plate voltage is not supplied to the audio amplifier and output tubes when the band switch is in the "Phono" position.

BUILT-IN "ROTO-SCOPE" ANTENNA

Some late production models were equipped with the new Admiral Built-In "Roto-Scope" Antenna which may eliminate the need for either an indoor or outdoor antenna if the installation is in a "normal signal strength" area.

Operating the "Roto-Scope" Antenna: The Roto-Scope antenna is operated by the antenna control lever which extends from the back of the cabinet near the top (see figure 87). The antenna control lever can be set to any of three different positions, which, in effect, allow the Roto-Scope to be oriented (rotated) for best possible reception on all channels operating in your area.

To determine the best position of the antenna control lever, first tune in a television station. Then, after tuning the set for best sound, move the antenna control lever to each of its three positions (extreme left, center and extreme right). As the lever is moved to the different positions, carefully watch for the position giving the clearest picture.

A good picture should have good contrast, sharp detail, and freedom from "ghosts", "snow" effect, and the various types of interference.

The antenna control lever should be left in the position which gives the most satisfactory picture on all channels.
Note: Sometimes, rotating the set slightly will improve the picture. Sometimes moving the set to another location in the room, even as little as two or three feet away, will make an appreciable difference in the picture.

However, if it is not possible to find a setting which gives satisfactory reception on ALL channels, it may be desirable for the owner to reposition the antenna control lever for each particular station being tuned in.

Weak Signal Areas: Some signal areas are so weak, or some particular locations are so unfavorable, that it is not possible to get satisfactory pictures with a built-in antenna. Important: Before connecting an indoor or outdoor antenna, be sure to disconnect the Built-In Roto-Scope antenna from the antenna terminals. Do not reconnect the Roto-Scope leads. When disconnected the matching stub (see figure 87) may be taped to the side of the cabinet.

If an indoor or outdoor antenna is to be used, select the proper Admiral antenna for the location and type of installation. Admiral antennas and transmission line are made of the highest quality material and workmanship. They are designed for ease of installation, good appearance, sturdiness, long use and top performance.

20A1, 20B1, 21A1, 4J1, 4K1

94C18-1 and 94C18-2 TELEVISION TUNERS

Important: It is very important to correctly identify a tuner to be serviced so that the proper service instructions and parts lists are used.

TELEVISION TUNER IDENTIFICATION

Early production sets used the 94C18-1 Tuner. Late production sets use the 94C18-2 Tuner. These tuners are similar in physical appearance and electrical operation but are only interchangeable as a complete unit. Many of the parts are neither electrically or mechanically interchangeable. Some of the parts appear to be identical physically but are not interchangeable. For example: The detent rollers in these tuners both have a 3/32” diameter but the diameters of the bearings are different. The bearing diameter for the 94C18-1 Tuner is 1/16”; the bearing diameter for the 94C18-2 Tuner is 5/64”. Consequently it is important that the tuner being serviced is identified properly and the correct parts list used.

The most noticeable identifying feature of the 94C18-2 Tuner is the individual channel coils. The coils on the 94C18-2 Tuner are stamped 2F, 3F, 4F, etc. and the coil contacts are mounted on a “raised” portion on the surface of the coil. See Figure 89.

The coils on the 94C18-1 Tuner are stamped 2, 3, 4, etc. (without letter “F”) and the coil contacts are mounted on the flat surface of the coil. (For 94C18-1 Tuner illustration see Figure 73 on page 37 of Television Service Manual, Form No. S267.)

Another distinguishing feature is the difference in detent plates. See the adjoining illustration for detent plate detail.

94C18-2 TELEVISION TUNER SERVICE

Service procedure for the 94C18-2 Tuner is practically identical with service procedure for the 94C18-1 Tuner. Refer to pages 36 and 37 of the Television Service Manual (Form No. S267) for all service data for 94C18-1 tuners. The only difference in servicing the 94C18-2 Tuner is that the contact plate assembly M123 can not be repositioned and the detent spring M122 can not be reset. Therefore, the paragraphs under heading “Repositioning Contact Plate Assembly M103” and “Resetting Detent Spring M102” apply only to the 94C18-1 Tuner.

Replacement of the Ungrounded Stator Plate of Sharp Tuning Control. The new type (ceramic disc) ungrounded stator plate M118 will be supplied as a replacement for the metal stator plate with a phenolic wafer used in the 94C18-1 Tuner and early production 94C18-2 Tuners. The part number for the new type stator plate is 98A45-86. Note that this part is supplied with wiring lead and trimmer condenser C110 attached, because it is difficult to solder the wire lead to the silver plated surface on the ceramic stator plate disc.

To replace an early production stator plate (in 94C18-1 or very early 94C18-2 Tuner) remove turret assembly as described under “Removing Tuner Turret Assembly” on page 36 of the Television Service Manual (Form No. S267). Remove mounting rivets from stator plate by drilling out or clipping them out with diagonal wire cutters. Remove trimmer screw M115 and locking nut M114 from trimmer condenser C110. Unsolder wiring lead connecting trimmer to terminal on contact plate.

Assemble the replacement stator plate (M118) by placing the ceramic button over the 5/8" hole in the chassis with the wiring lead extending into the chassis. Place the mounting bracket over the ceramic button and mount securely using #4x1/8" round head machine screws with #4-40x1/8" hex nuts and #4 shank proof lock washers. Mount trimmer condenser C110 in chassis and solder wire lead to its original terminal on the contact plate making this lead as short as possible. Dress wiring lead from ceramic stator plate to trimmer condenser C110 so it does not come in contact with the turret drum. After replacement of the stator plate, it will be necessary to make “Overall Oscillator Adjustment (A15)”. See page 17 in Television Service Manual (Form No. S267).
PARTS LIST FOR 94C18-2 TELEVISION TUNER

IMPORTANT

Use this parts list for 94C18-2 Tuner only. Some parts for early tuner (94C18-1) and late tuner (94C18-2) are not interchangeable. Be sure to use the parts list in the Television Service Manual (Form S287) for all 94C18-1 parts.

CONDENSERS

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No</th>
</tr>
</thead>
<tbody>
<tr>
<td>C102</td>
<td>.5 to 3 mfd, Ceramic, Trimmer</td>
<td>98A 45-87</td>
</tr>
</tbody>
</table>

COILS FOR 94C18-2 TUNER

NOTE: Channel coils in this tuner are stamped 2F, 3F, 4F, etc.

L101 Antenna Coil
- for Channel #2: 98A 62-2
- for Channel #3: 98A 62-3
- for Channel #4: 98A 62-4
- for Channel #5: 98A 62-5
- for Channel #6: 98A 62-6
- for Channel #7: 98A 62-7
- for Channel #8: 98A 62-8
- for Channel #9: 98A 62-9
- for Channel #10: 98A 62-10
- for Channel #11: 98A 62-11
- for Channel #12: 98A 62-12
- for Channel #13: 98A 62-13

L102 Mixer-Oscillator Coil
- for Channel #2: 98A 63-2
- for Channel #3: 98A 63-3
- for Channel #4: 98A 63-4
- for Channel #5: 98A 63-5
- for Channel #6: 98A 63-6
- for Channel #7: 98A 63-7
- for Channel #8: 98A 63-8
- for Channel #9: 98A 63-9
- for Channel #10: 98A 63-10
- for Channel #11: 98A 63-11
- for Channel #12: 98A 63-12
- for Channel #13: 98A 63-13

Before inserting replacement coil L101 or L102, see that teeth at tuner end of coils fit together when fitted in detent plate at center of turret. If necessary file teeth slightly.

MISCELLANEOUS PARTS FOR TV TUNER 94C18-2

To identify a 94C18-1 or 94C18-2 Tuner see illustrations. For illustration of 94C18-1 Tuner, see Figure 73 on page 37 of the Television Service Manual. For illustration of 94C18-2 Tuner, see Figure 80 in this Supplement.

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M104</td>
<td>Shaft Shell &amp; Rotor Assy. (Sharp Tuning) (with 4½&quot; long brass shaft)</td>
<td>98A 45-51</td>
</tr>
<tr>
<td>M107</td>
<td>Bracket, Sharp Tuning Rotor Retaining</td>
<td>98A 45-61</td>
</tr>
<tr>
<td>M109</td>
<td>Spring, Detent Plate Grounding</td>
<td>98A 45-74</td>
</tr>
<tr>
<td>M109</td>
<td>Shield, Tube (Slotted; for 6J6)</td>
<td>98A 45-75</td>
</tr>
<tr>
<td>M110</td>
<td>Shield, Tube (Plain; for 6A6)</td>
<td>98A 45-35</td>
</tr>
<tr>
<td>M114</td>
<td>Nut, Locking Spring (for trimmers)</td>
<td>98A 45-31</td>
</tr>
<tr>
<td>M115</td>
<td>Screw, Trimmer (6-36x½&quot;)</td>
<td>98A 45-33</td>
</tr>
<tr>
<td>M116</td>
<td>Screw, Bracket Mounting (6-32x½&quot;)</td>
<td>98A 45-62</td>
</tr>
<tr>
<td>M117</td>
<td>Slug, Brass Tuning</td>
<td>98A 45-68</td>
</tr>
<tr>
<td>M118</td>
<td>Stator Plate (ungrounded); Silver with Ceramic Insulation, for Sharp Tuning</td>
<td>98A 45-86</td>
</tr>
<tr>
<td>C111</td>
<td>(includes mfg. bracket)</td>
<td>98A 45-86</td>
</tr>
<tr>
<td>M120</td>
<td>Tuner, Television (complete)</td>
<td>94C 18-2</td>
</tr>
<tr>
<td>M121</td>
<td>Roller, Detent (½&quot; dia., 3/8&quot; dia. bearing)</td>
<td>98A 45-82</td>
</tr>
<tr>
<td>M122</td>
<td>Spring, Detent (2½&quot; long)</td>
<td>98A 45-81</td>
</tr>
<tr>
<td>M123</td>
<td>Contact Plate and Bracket Assembly</td>
<td>98A 45-84</td>
</tr>
<tr>
<td>M124</td>
<td>Spring, Sharp Tuning Rotor Contact (Flat bronze 1½&quot;x½&quot;)</td>
<td>98A 45-83</td>
</tr>
<tr>
<td>M125</td>
<td>Spring, Front and Rear Turret Shaft</td>
<td>98A 45-85</td>
</tr>
<tr>
<td>M126</td>
<td>Turret and Shaft Assembly (less coils) (5½&quot; shaft and ½&quot; detent depression)</td>
<td>98A 45-80</td>
</tr>
</tbody>
</table>
HORIZONTAL OUTPUT CIRCUIT FOR 16" SETS
(21A1 CHASSIS) WITH ROUNDED-END
PICTURE WINDOW

Chassis with this change stamped run “19” or higher.
Greater sweep width is required for 16” sets using a
rounded-end picture tube window. The schematic and
parts list given below are for the horizontal output and
2nd anode supply circuits used in these sets.
For sets with rectangular picture window, see the
Television Service Manual (Form No. 5267).

![Schematic Diagram]

Figure 90. Horizontal Output Circuit For 16” Sets With
 Rounded End Picture Window.

PARTS FOR 16" SETS WITH ROUNDED-END PICTURE WINDOW

For 16” sets with rounded-end picture window, use this list FIRST, then use the list in the
manual for any parts not given below.

**RESISTORS**

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R460</td>
<td>6800 ohms, ½ watt.</td>
<td>60B 8-682</td>
</tr>
<tr>
<td>R461</td>
<td>390 ohms, ½ watt.</td>
<td>60B 8-391</td>
</tr>
</tbody>
</table>

**CONDENSERS**

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C434</td>
<td>4 mfd., 25 volts Electrolytic........</td>
<td>67A 4-3</td>
</tr>
<tr>
<td>C444</td>
<td>.01 mfd., 200 volts..................</td>
<td>64A 2-7</td>
</tr>
<tr>
<td>C446</td>
<td>.05 mfd., 200 volts..................</td>
<td>64A 2-8</td>
</tr>
<tr>
<td>C445</td>
<td>.25 mfd., 600 volts..................</td>
<td>64B 6-3</td>
</tr>
<tr>
<td>C443</td>
<td>.01 mfd., 400 volts..................</td>
<td>64B 5-25</td>
</tr>
</tbody>
</table>

**COILS AND TRANSFORMERS**

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>L402</td>
<td>Coils, Horizontal Linearity for sets with rounded-end picture window (2.5 to 9 millihenrys).</td>
<td>94A 26</td>
</tr>
<tr>
<td></td>
<td>for sets with rectangular picture window (5.5 to 20 millihenrys).</td>
<td>94A 3</td>
</tr>
<tr>
<td>T405</td>
<td>Transformer, Width Control for sets with rounded-end picture window</td>
<td>94A 19-1</td>
</tr>
<tr>
<td></td>
<td>for sets with rectangular picture window</td>
<td>94A 19</td>
</tr>
</tbody>
</table>

**TRANSFORMERS**

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>T406</td>
<td>Transformer, Horizontal Output</td>
<td>79C 17-3</td>
</tr>
<tr>
<td></td>
<td>for sets with rounded-end picture window</td>
<td></td>
</tr>
<tr>
<td></td>
<td>for sets with rectangular picture window</td>
<td>79C 17-2</td>
</tr>
</tbody>
</table>

**CABINET PARTS FOR 25A15, 25A16, 25A17**

(For all other parts see page 40 of “Television Service Manual for 20A1, 20B1, 21A1, 4J1, 4K1 Chassis”)

Escutcheon, Television
- for sets with rectangular picture window . 23D 42
- for sets with rounded-end picture window . 23D 55-1

Sheet, Insulating (for back of picture window)
- for use with 23D42 escutcheon . 32D 122
- for use with 23D55-1 escutcheon . 32D 126

Gasket, Sponge Rubber
- for 23D42 escutcheon . 12A 5-13
- for 23D55-1 escutcheon . 12A 32-6
(rubber channel 12A35-1 was used in early sets)
**SUPPLEMENTARY PARTS LIST**

This parts list contains corrections and additions to the parts list in the Television Service Manual for 20A1, 20B1, 21A1, 4J1, and 4K1 Chassis (Form No. S267). Use this parts list FIRST, then use the list in the manual.

<table>
<thead>
<tr>
<th>Sym.</th>
<th>Description</th>
<th>Part No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>R436</td>
<td>240,000 ohms, 1/5 W, ±5%</td>
<td>60B 7-244</td>
<td>See Production Change T.</td>
</tr>
<tr>
<td>C102</td>
<td>.5 to 3 mfd, Ceramic Trimmer</td>
<td>98A 4S-87</td>
<td>Part number corrected.</td>
</tr>
<tr>
<td>C214</td>
<td>.05 mfd, 400 V</td>
<td>64B 5-22</td>
<td>See Production Change Y.</td>
</tr>
<tr>
<td>C311</td>
<td>.05 mfd, 600 V</td>
<td>64B 5-7</td>
<td>See Production Change W.</td>
</tr>
<tr>
<td>C347</td>
<td>.05 mfd, 600 V</td>
<td>64B 5-7</td>
<td>See Production Change S.</td>
</tr>
<tr>
<td>L104</td>
<td>Cheke, Fil. Ose.</td>
<td>98A 4S-14</td>
<td>Part number corrected.</td>
</tr>
<tr>
<td>L606</td>
<td>Coil, AM Peaking</td>
<td>73A S-10</td>
<td>See Production Change U.</td>
</tr>
<tr>
<td>M302</td>
<td>Plug, AC Input (Interlock)</td>
<td>89A 22-2</td>
<td>Part added.</td>
</tr>
<tr>
<td>M313</td>
<td>Fuse, Line (4 amp, 250 volts)</td>
<td>84A 1-18</td>
<td>See &quot;Production Changes&quot;</td>
</tr>
<tr>
<td>Clamp, Webbing Strap Tension</td>
<td>19A 61</td>
<td>Omitted from parts list.</td>
<td></td>
</tr>
<tr>
<td>Slug, Brass Tuning (for L102)</td>
<td>98A 4S-88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stator Plate (ungrounded); Silver with ceramic insulator, for Sharp Tuning</td>
<td>Omitted from parts list.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C111</td>
<td>(includes mfg. bracket)</td>
<td>98A 4S-86</td>
<td>See Production Change X.</td>
</tr>
</tbody>
</table>

**CABINET PARTS FOR 30F15, 30F16, 30F17**

When ordering parts for these models, use this parts list FIRST. Then see page 49 of the Television Service Manual (Form No. S267) for any parts not listed here.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door, Television and Radio Phonos</td>
<td>98A 4S-57</td>
<td>Part number corrected.</td>
</tr>
<tr>
<td>pair for Walnut (30F15)</td>
<td>98A 4S-57</td>
<td>Part number corrected.</td>
</tr>
<tr>
<td>pair for Mahogany (30F16)</td>
<td>98A 4S-57</td>
<td>Part number corrected.</td>
</tr>
<tr>
<td>Gasket, Sponge Rubber</td>
<td>98A 4S-69</td>
<td>Omitted from parts list.</td>
</tr>
<tr>
<td>(includes chipboard backing for back of picture window escutcheon)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for sets with 23KD9 Picture Window</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escutcheon</td>
<td>98A 6S-2</td>
<td></td>
</tr>
<tr>
<td>Knob, Television Tuning</td>
<td>33C 28-21</td>
<td>These knobs for sets with all plastic television panel.</td>
</tr>
<tr>
<td>for Walnut (30F15) and Mahogany (30F16)</td>
<td></td>
<td>For sets with wood television panel, see Television Service Manual (Form No. S267).</td>
</tr>
<tr>
<td>&quot;Sharp Tuning&quot; (Maroon outer knob)</td>
<td>33C 28-22</td>
<td></td>
</tr>
<tr>
<td>&quot;Vertical, Brightness and Focus&quot; (Maroon outer knob)</td>
<td>33C 28-17</td>
<td></td>
</tr>
<tr>
<td>&quot;Channel Selector&quot; (Gold inner knob)</td>
<td>33C 28-18</td>
<td></td>
</tr>
<tr>
<td>&quot;Horizontal, Contrast and Off-Volume&quot; (Gold inner knob)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUILT-IN ROTO-SCOPE ANTENNA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antenna, Built-In Roto-Scope</td>
<td>33C 28-21</td>
<td>Built-In Roto-Scope Antenna used only in late production sets.</td>
</tr>
<tr>
<td>for 4H126A, B, C, or CN</td>
<td>A3023</td>
<td></td>
</tr>
<tr>
<td>for 4H146C or CN, 4H146C or CN</td>
<td>A3026</td>
<td></td>
</tr>
<tr>
<td>for 4H156A, B, C, or CN</td>
<td>A3046</td>
<td></td>
</tr>
<tr>
<td>for 4H18C or CN, 4H19C or CN, 4H166A, B, C, or CN</td>
<td>A3029</td>
<td></td>
</tr>
<tr>
<td>for 24A12, 24A325</td>
<td>A3029</td>
<td></td>
</tr>
<tr>
<td>for 24C18, 24C16</td>
<td>A3029</td>
<td></td>
</tr>
<tr>
<td>for 25A15, 25A16, 25A17</td>
<td>A3023</td>
<td></td>
</tr>
<tr>
<td>for 30F15, 30F16, 30F17</td>
<td>A3060</td>
<td></td>
</tr>
</tbody>
</table>

**Universal Replacement Parts for All Roto-Scope Antennas**

| Antenna Lead (includes matching stub and spade lugs) | A3030 | |
| Control Lever Arm (includes switch blades) | A3024 | |
| Contact, Bronze Spring | 18A 40 | |
ADMIRAL

Schematic for 20A1, 20B1, 21A1 Television Chassis with 6AU6 Sync Separator.

RF SECTION
TV TUNER 94C8-1

Sweep Section

NOTE: Tube numbers and parts are given in the tables of the chassis, see page 10.

G-113
2nd ANODE SUPPLY, DEFLECTION YOKE, and AC INTERLOCK CIRCUIT USED in 16'(21AI) SETS

COURTESY OF ADMIRAL CORPORATION.
ALIGNMENT

DIVIDUAL CHANNEL ADJUSTMENTS USING SIGNAL GENERATOR & VTVM

Allot about 15 minutes for receiver and test equipment to warm up. Disconnect antenna from receiver.

Connect signal generator high side to one antenna terminal, ground to chassis.

See Figure 29. Connect VTVM high side to "Z" common to "V" in ratio detector V303 circuit. Use VTVM 3 volt zero center scale if available.

Set Sharp Tuning control at half rotation by rotating it approximately 150° as shown in figure 33.

Use a NON-METALLIC alignment screwdriver with a 1/4 inch blade.

For more accurate oscillator alignment, it is advisable to first check sound IF amplifier alignment (A2, A3, A4, and A5) before aligning HF oscillator. IF's and ratio detector must be accurately aligned to correct IF frequency. Retouch IF and ratio detector adjustments if necessary.

Adjust as follows:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Frequency (kHz)</th>
<th>Adjust</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>215.75</td>
<td>A14 (Fig. 33) for zero VTVM reading between a positive and a negative peak with Sharp Tuning control at electrical center.</td>
</tr>
<tr>
<td>12</td>
<td>209.75</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>203.75</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>197.75</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>191.75</td>
<td>Do this carefully as only a slight rotation of slug may be required.</td>
</tr>
<tr>
<td>8</td>
<td>185.75</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>179.75</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>173.75</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>167.75</td>
<td>Note that if mis-alignment is evident on a major number of channels, an over-all HF oscillator adjustment (A15) can be made.</td>
</tr>
<tr>
<td>4</td>
<td>161.75</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>155.75</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>149.75</td>
<td></td>
</tr>
</tbody>
</table>

Figure 30. Overall Video IF Response Curve.

Figure 31. Ratio Detector Response Curve.

OVER-ALL OSCILLATOR ADJUSTMENT (A15)

Over-all oscillator adjustment should only be necessary when tubes or other components in the oscillator circuit have been replaced. (When replacing the oscillator-mixer tube (646), it is recommended that several tubes be tried to select one which causes least frequency shift.)

This over-all adjustment can be made using a VTVM and signal generator, or using a television signal.

a. Remove chassis from cabinet.

b. Set selector to channel 13 or other high channel.

c. When using a signal generator, follow steps (a), (b), (c), and (d) under "Individual Channel Adjustments Using Signal Generator and VTVM", then adjust A15 (figure 33) for zero VTVM reading between a positive and a negative peak.

OR

c. When using a television signal, set the Channel Selector knob for a station and adjust controls for normal picture and sound. Set Sharp Tuning control at electrical center by rotating approximately 150° or half rotation as shown in figure 33. Note position of dielectric rotor. Then adjust A15 (figure 33) for best sound and clearly defined picture.

d. Recheck adjustment of individual channels and touch-up (A14) if necessary.
RF AND MIXER ALIGNMENT

- Disconnect 4½ volt battery, if used earlier.
- Connect a wire jumper from AGC base (junction of R203, R467 and C355) to chassis. Leave connected for all steps in this alignment.
- For unjointed combination models, see page 14.
- Disconnect antenna from receiver.
- Before starting alignment, allow about 15 minutes for receiver and test equipment to warm up.
- Connect sweep generator to antenna terminals.
- Loosely couple marker generator to antenna terminal (to obtain marker pips of video and sound RF carriers). To avoid distortion of the response curve, keep marker generator output at a minimum, marker pips just barely visible.
- Connect oscilloscope through 10,000 ohm resistor to point “W” (figure 21). Keep oscilloscope lead away from chassis.
- Set Comp-4 center control at center of its rotation.

Adjust

Step | Marker Gen. Freq. (kHz) | Sweep Gen. Frequency | Channel 12
--- | --- | --- | ---
1 | 205.25, 209.75 | Sweeping | Check for curve resembling RF response curve shown in figure 32. If necessary, adjust A11, A12, and A13 (figure 27) as required. Consistent with proper band width and correct marker location, response curve should have maximum amplitude and flat top appearance.
2 | 211.25 | 13 | Check each channel for curve resembling RF response curve shown in figure 32. In general, the adjustment performed in step 1 is sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on a particular channel, (a) check to see that coils have not been intermixed, or (b) try replacing the pair of coils for that particular channel, or (c) repeat step 1 for the weak channel as a compromise adjustment to favor this channel. If a compromise adjustment is made, other channels should be checked to make certain that they have not been appreciably affected.
3 | 199.25, 203.75 | 11 |
4 | 193.75, 197.75 | 10 |
5 | 187.75, 191.75 | 9 |
6 | 181.75, 185.75 | 8 |
7 | 175.75, 179.75 | 7 |
8 | 169.75, 173.75 | 6 |
9 | 163.75, 167.75 | 5 |
10 | 157.75, 161.75 | 4 |
11 | 151.75, 155.75 | 3 |
12 | 145.75, 149.75 | 2 |

FP SHOULD NOT EXCEED 30% OF TOTAL HEIGHT

Full skirt of curve will not be visible unless generator sweep width extends beyond 10 MHz.

FIGURE 32. RESPONSE CURVE.
ALIGNMENT ADJUSTMENT IDENTIFICATION

<table>
<thead>
<tr>
<th>Adj.</th>
<th>Symbol</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>L201</td>
<td>21.25 MHz, Sound Trap</td>
</tr>
<tr>
<td>2A</td>
<td>T201</td>
<td>1st IF Transformer (Sound)</td>
</tr>
<tr>
<td>3</td>
<td>T201</td>
<td>1st IF Transformer (Sound)</td>
</tr>
<tr>
<td>4</td>
<td>T201</td>
<td>1st IF Transformer (Audio)</td>
</tr>
<tr>
<td>5</td>
<td>T202</td>
<td>1st IF Transformer (Sound)</td>
</tr>
<tr>
<td>6</td>
<td>T202</td>
<td>1st IF Transformer (Audio)</td>
</tr>
<tr>
<td>7</td>
<td>T303</td>
<td>1st IF Transformer (Sound)</td>
</tr>
<tr>
<td>8</td>
<td>T303</td>
<td>1st IF Transformer (Audio)</td>
</tr>
<tr>
<td>9</td>
<td>L100</td>
<td>1st IF Coil</td>
</tr>
<tr>
<td>10</td>
<td>L203</td>
<td>4.5 MHz, Trap Coil</td>
</tr>
<tr>
<td>11</td>
<td>C102</td>
<td>Trimmer Condenser (RF Amp.)</td>
</tr>
<tr>
<td>12</td>
<td>C104</td>
<td>Trimmer Condenser (RF Amp.)</td>
</tr>
<tr>
<td>13</td>
<td>C107</td>
<td>Trimmer Condenser (Mixe)</td>
</tr>
<tr>
<td>14</td>
<td>L102</td>
<td>HF Qeh. Coil (All Channels)</td>
</tr>
<tr>
<td>15</td>
<td>C110</td>
<td>Trimmer Condenser (Oscillator)</td>
</tr>
</tbody>
</table>

LOCATIONS OF A1, A6, AND A8 WERE DIFFERENT IN EARLY PRODUCTION SETS. SEE FIGURES 27, 28.

CONNECTIONS FOR TELEVISION-RADIO-PHONO COMBINATION MODELS

Set "Televisions-Radio" switch on radio tuner for television operation. The radio tuner must be connected to power supply for alignment unless a jumper isomitted in the power supply makes 6R14 to complete the heater circuit. See adjoining illustration. A special adapter plug is available from Admiral Accessories under part #38A3.

MODELS WITH 14" PICTURE TUBE

For all models with 14" picture tube (21A1 television chassis), remove the complete picture tube and mounting board assembly. The picture tube including all connecting radio parts mustbe connected to the television chassis during alignment.

IF AMPLIFIER AND TRAP ALIGNMENT

- Connect a 4½ volt battery; negative to AGC bus (junction of R339, R447 and C505), positive to chassis. Leave connected for all steps in this alignment.
- Allow about 15 minutes for receiver and test equipment to warm up.
- Disconnect antenna from receiver.
- Set Channel Selector to channel 13 or other unsaid channel to prevent signal interference during IF alignment.
- Connect RC filter of 10,000 ohm resistor and 330 mfd condenser in series from point "X" to chassis. See figure 29. Leave connected for all steps in this alignment.

**FOR STEPS 1-8, CONNECT SIGNAL GENERATOR HIGH SIDE TO TUBE SHIELD OF 4½ INH. VFO AMPLIFIER TUBE.**
- **For steps 1 to 8, connect signal generator high side to tube shield of 4½ in. oscillator tube.** Be sure to insulate tube shield from chassis. Connect generator low side to chassis close to 0½ tube base.
- Set Contrast control at center of its rotation. Adjusting controls set to the center of rotation.**
- Use VTVM on lowest scale. (3 volts DC for steps 1 to 8 and 3 volts AC for steps 9 to 13.) The AC range of VTVM must have a range of 0.5 to 1 volt DC.
- Refer to figures 27, 28 and 29 for alignment adjustment and test point locations.

<table>
<thead>
<tr>
<th>Step</th>
<th>Signal Generator Frequency (AC)</th>
<th>Connect VTVM To</th>
<th>Test Connections and Instructions</th>
<th>Adjust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;21.25&quot; High side to junction of resistor and condenser of RC filter connected to &quot;X,&quot; (video amplifier V306 circuits); common to chassis. See figure 29.</td>
<td>1. Use lowest signal generator output for adequate meter indication, then gradually increase generator output as VTVM reading decreases. Use VTVM DC range.</td>
<td><strong>A1 for minimum.</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>&quot;21.25&quot; High side to &quot;V&quot;, common to chassis. See figure 29.</td>
<td>While peaking, keep reducing signal generator output so VTVM reading is approx. 0.5 volts DC.</td>
<td><strong>A2, A3 and A4 for maximum.</strong></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>&quot;21.25&quot; High side to &quot;V&quot;, common to &quot;V&quot; in ratio detector V203 circuit.</td>
<td>Use 3 volt zero center DC scale if available.</td>
<td><strong>A5 for zero between pos. and neg. peak. If far off readjust A4.</strong></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>23.3</td>
<td>Same as step 1.</td>
<td>While peaking, keep reducing signal generator output as VTVM reading is approx. 0.1 volt DC.</td>
<td><strong>A6 for maximum.</strong></td>
</tr>
<tr>
<td>5</td>
<td>23.5</td>
<td><strong>&quot;</strong></td>
<td><strong>&quot;</strong></td>
<td>A7 for maximum.</td>
</tr>
<tr>
<td>6</td>
<td>22.0</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
<td><strong>A8 for maximum.</strong></td>
</tr>
<tr>
<td>7</td>
<td>22.3</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
<td>A9 for maximum.</td>
</tr>
<tr>
<td>8</td>
<td>&quot;21.25&quot;</td>
<td>Same as step 1.</td>
<td>Check A1; if off, readjust. Repeat step 6.</td>
<td><strong>A10 for minimum.</strong></td>
</tr>
<tr>
<td>9</td>
<td>&quot;4.5 MHz modulated&quot; VTVM probe (3 volts range) to pin 3 of V306 video amplifier (6AE7); common to chassis. The frequency range of VTVM must have response to 4.5 MHz.</td>
<td>Connect signal generator high side through a .005 mfd. condenser to pin 3 of V306 video detector (6A113) with tube removed; low side to chassis close to tube base.</td>
<td><strong>A12 for minimum.</strong></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
<td>&quot;&quot;</td>
<td><strong>A13 for minimum.</strong></td>
</tr>
</tbody>
</table>

- **Before proceeding, be sure to check the signal generator used in alignment against a crystal calibrator or other frequency standard for absolute frequency calibration required for this operation.**

- **See figures 27 and 28 for alternate locations.**

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