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SERVICE NEWS

Service News

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DIRECTOR'S CORNER

BY

Harold J. Schulman

Every service organization, whether it be a one-man shop or a large-scale operation, needs paperwork to keep the wheels turning. Yet there are still many shops operating in the dark when it comes to the past service records of receivers they have worked on.

Of course paperwork can hinder as well as help you in your daily routine. Whether it hinders or helps depends upon how well it is designed for the job you want it to do.

A master service record for each customer fulfills a great many of the paperwork requirements of a service shop. Such a record provides;

A day-to-day control of parts inventory.

A record of the work performed by each man in the shop.

A dispatching card.

The information required to discuss a customer's problems over the telephone.

A service history of each customer's receiver.

A source of names for your mailing list.

The master service records should be kept on cards, filed close to the telephone so that they can be pulled out while speaking to a customer on the phone. The customer's complaint is entered immediately.

Then the master record card is used for dispatching. A duplicate card having pertinent information—name, address etc., can be left in the file.

The technician takes the master record with him on the call. In this

(CONTINUED ON PAGE 21)

SERVICING
TURRET TUNERS

This issue of the Service News is devoted to the troubleshooting and repair of the switch turret r-f tuners used in Du Mont RA-160 to RA-171 chassis. All of these tuners are ruggedly constructed and require a minimum of service. You will occasionally encounter a tuner which is in need of repair. On the following pages you will find the information necessary to place a faulty tuner in proper working order.

Because tuners operate at very high frequencies, considerable care must be taken when working on them. If the following simple precautions are observed no difficulty should be encountered:

1. Don't assume the tuner is at fault until the other circuits of the receiver have been carefully checked.
2. Always use exact replacement parts.
3. When troubleshooting a tuner do not disturb the parts or lead positioning.
4. When making a replacement, duplicate the positioning and lead dress of the original part.
5. Do not disturb any of the tuner adjustments unless you are familiar with the proper adjustment procedure.

REPLACING TUNER COIL STRIPS. — TU-1, TU-2, TU-3, TU-4, TU-6, TU-8, TU-10

1. Remove the tuner bottom cover by pulling its front end away from the tuner and unhooking its rear edge.
2. Using a screwdriver pry the spring finger, holding the strip, away from the turret end plate and lift out the strip.
3. To install the new strip, insert the two projections into the holes in the detent ring.
4. Pry the spring finger away from the end plate, push the strip in place, and let the spring finger snap over the end of the strip.

TU-5, TU-7, TU-9

1. Remove the four screws holding the tuner bottom cover and remove the cover.
2. Using a screwdriver, push the spring finger holding the strip toward rear of tuner and lift out strip.
3. To install new strip, insert end having smaller projection into the hole in the detent plate.
4. Pry the spring finger away from rear of drum and push the strip into place. Let spring finger snap back into place making sure that projection on end of strip seats correctly in hole in spring finger.

CLEANING THE TUNER CONTACTS. — Remove the tuner bottom cover and several of the coil strips as described in the previous paragraph. Rotate the turret so that the wiping contacts are accessible through the opening made by removing the strips. Clean the coil strip and wiping contacts with a soft cloth moistened with "No Noise".

ADJUSTING THE TENSION OF THE WIPING CONTACTS.—Remove the tuner bottom cover and several of the coil strips. Rotate the turret to permit access to the contacts through the opening thus provided. Using a small screwdriver bend each contact spring until it extends approximately 1/8 inch inward from the surface of the plastic contact-mounting plate.

To check the tension of the spring

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contacts, place the turret in a position between channels and note the clearance between the contact spring and the surface of the coil strip. The clearance should be approximately 1/64 inch.

REMOVING THE TUNER TURRET DRUM.—

1. Remove the tuner bottom cover.
2. Remove the fine tuning bracket from front of tuner.
3. Remove the front and rear retainer springs by pushing the straight end of each spring toward the top of tuner.
4. Slip the turret drum out of the tuner.

OSCILLATOR TUBE REPLACEMENT.—Due to differences in interelectrode capacitance, replacement of the oscillator tube may result in considerable oscillator frequency shift. This condition can be avoided by trying several tubes and selecting the one which causes the least frequency shift. If it is necessary to use a tube which causes excessive frequency shift the oscillator frequency must be adjusted.

INDIVIDUAL CHANNEL OSCILLATOR ADJUSTMENT.—When the oscillator frequency is correct for some channels but not for others, the individual-channel slugs should be used to correct the oscillator frequency on channels requiring adjustment. Adjust the slugs as follows:

1. Tune the set to the channel requiring adjustment.
2. Remove the Fine-Tuning and Station Selector knobs. If set has a UHF dial, remove the dial.
3. Set the Fine-Tuning control in the center of its mechanical range. If the Fine-Tuning control does not have a stop, turn the control so that the flat on the shaft faces down.
4. Using an insulated alignment tool adjust the slug for best picture and sound. The slug is accessible through the hole just to the right of the tuning shaft.

OVERALL OSCILLATOR ADJUSTMENT.—TU-5, TU-7 and TU-9 are provided with an overall oscillator adjustment. When replacement of the oscillator tube, or components other than a channel strip, causes a change in oscillator frequency, this adjustment may be used to correct the oscillator frequency. The adjustment should be made as follows:

1. Tune the set to the highest channel station available.
2. Set the Fine-Tuning at the center of its mechanical range. If the Fine-Tuning control does not have a stop, turn the control so that the flat on the shaft faces down.
3. Adjust G (figure 2) for best picture and sound.
4. Check the tuning on all available channels and adjust the individual channel slugs if necessary.

TUNER IDENTIFICATION

Chassis	Tuner		Input Impedance	Tubes		Turret Positions	Shaft Lengths, Inches	Output I. F.	Channel Strips	
	Symbol	Part Number		RF Amp.	Mixer-Osc.				Coding	Type
RA-160-162-162B	TU-1	21 009 121	Bal. 300 ohm	6BK7/6BQ7	6J6	12	2 1/8—3 5/8	41 mc	Black M	2 section
	TU-2	21 009 122	Bal. 300 ohm	6BQ7	6J6	12	2 1/8—3 5/8	41 mc	Red R	2 section
RA-164-165	TU-3	21 010 781	Bal. 300 ohm	6BQ7	6J6	12	4 1/8—5 9/16	21 mc	Red Q	2 section
	TU-4	21 010 782	Bal. 300 ohm	6BQ7/6BQ7A/6BZ7	6J6	12	4 1/8—5 9/16	21 mc	Red Q	2 section
	TU-5	89 012 601	Bal. 300 ohm	6BQ7	6J6	12	4 1/8—5 9/16	21 mc	Green Channel No.	1 section
	TU-6	21 010 783	Bal. 300 ohm	6BQ7/6BQ7A/6BZ7	6J6	12	4 1/8—5 9/16	21 mc	Red Q	2 section
RA-166-167-170	TU-7	89 012 901	Bal. 300 ohm	6BK7	6J6	13	8 —8 1/2	41 mc	Green Channel No. Z to X	1 section
	TU-8	89 012 971	Bal. 300 ohm	6BQ7	6J6	13	8 —8 1/2	41 mc	Green QR	2 section
RA-168-169-171	TU-9	89 012 911	Bal. 300 ohm	6BK7	6J6	13	8 —8 1/2	41 mc	Green Channel No. Z to X	1 section
	TU-10	89 013 021	Bal. 300 ohm	6BQ7	6J6	13	8 —8 1/2	41 mc	Green QR	2 section

TUNER INTERCHANGEABILITY

All tuners that are used on the same chassis are interchangeable. In a few cases special instructions are required. For the technician's convenience an interchangeability chart is shown below which contains these instructions. When a tuner is interchanged the mixer output coil (E in figure 2) of the new tuner should be readjusted. The alignment procedure for the mixer output coil will be found on the service data sheet for the chassis involved.

Chassis	Symbol	Tuner Part Number	Remarks
RA-160-162-162B	TU-1 TU-2	21 009 121 21 009 122	TU-1 and TU-2 are directly interchangeable.
RA-164-165	TU-3 TU-4 TU-5	21 010 781 21 010 782 89 012 601	TU-3, TU-4 and TU-5 are directly interchangeable.
	TU-6	21 010 783	TU-6 may be interchanged with TU-3, TU4 or TU-5 by adding L220 (see production change 6552074 in this issue). TU-3, TU-4 and TU-5 may be interchanged with TU-6 by removing L220.
RA-166-167-170	TU-7 TU-8	89 012 901 89 012 971	TU-7 and TU-8 are directly interchangeable.
RA-168-169-171	TU-9 TU-10	89 012 911 89 013 021	TU-9 and TU-10 are directly interchangeable.

TUNER ALIGNMENT

TEST EQUIPMENT. — To properly align a Du Mont switch turret tuner the following test equipment is required:

Oscillograph

Vertical amplifier must have good 60 cycle response and a vertical deflection sensitivity of at least 0.1 rms volts per inch.

Sweep Signal Generator

Frequency range—54 to 216 mc.
Sweep—At least 10 mc.

Marker Signal Generator

Frequency range—54 to 216 mc.
Should have built-in calibrator crystal.

BENCH SET-UP. — The following precautions should be observed when setting up equipment for tuner alignment purposes:

1. Connect all equipment to a common ground. A metal topped bench is preferred, however heavy bonding straps may be used.

2. The sweep generator output *must* be properly matched to the tuner input. A suitable matching device is shown in figure 1. It consists of a connector plug, which fits the generator output and three half-watt resistors.

3. Before attempting to perform an actual alignment check the bench set-up by connecting the test equipment to a chassis which is operating properly and observe the tuner curves. If the curves are correct it can be assumed that the bench set-up is functioning properly.

FREQUENCY TABLE

Channel Number	Channel Freq., MC	Video Carrier, MC	Sound Carrier, MC	21.25 MC HF Osc., MC	41.25 MC HF Osc., MC
2	54-60	55.25	59.75	81	101
3	60-66	61.25	65.75	87	107
4	66-72	67.25	71.75	93	113
5	76-82	77.25	81.75	103	123
6	82-88	83.25	87.75	109	129
7	174-180	175.25	179.75	201	221
8	180-186	181.25	185.75	207	227
9	186-192	187.25	191.75	213	233
10	192-198	193.25	197.75	219	239
11	198-204	199.25	203.75	225	245
12	204-210	205.25	209.75	231	251
13	210-216	211.25	215.75	237	257

The oscillator frequencies shown in the above table are for reference only. Final oscillator frequency adjustments should always be made with the available TV station signals.

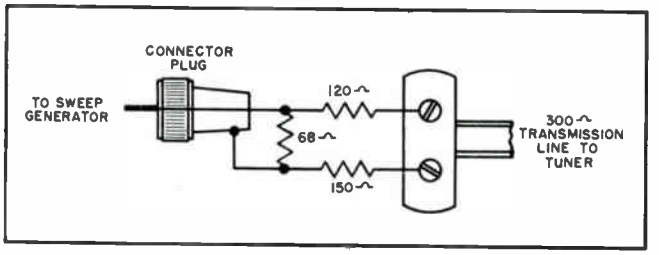

Figure 1. Matching device suitable for tuner alignment work. Keep the lead lengths between the connector plug and the resistor network as short as possible.

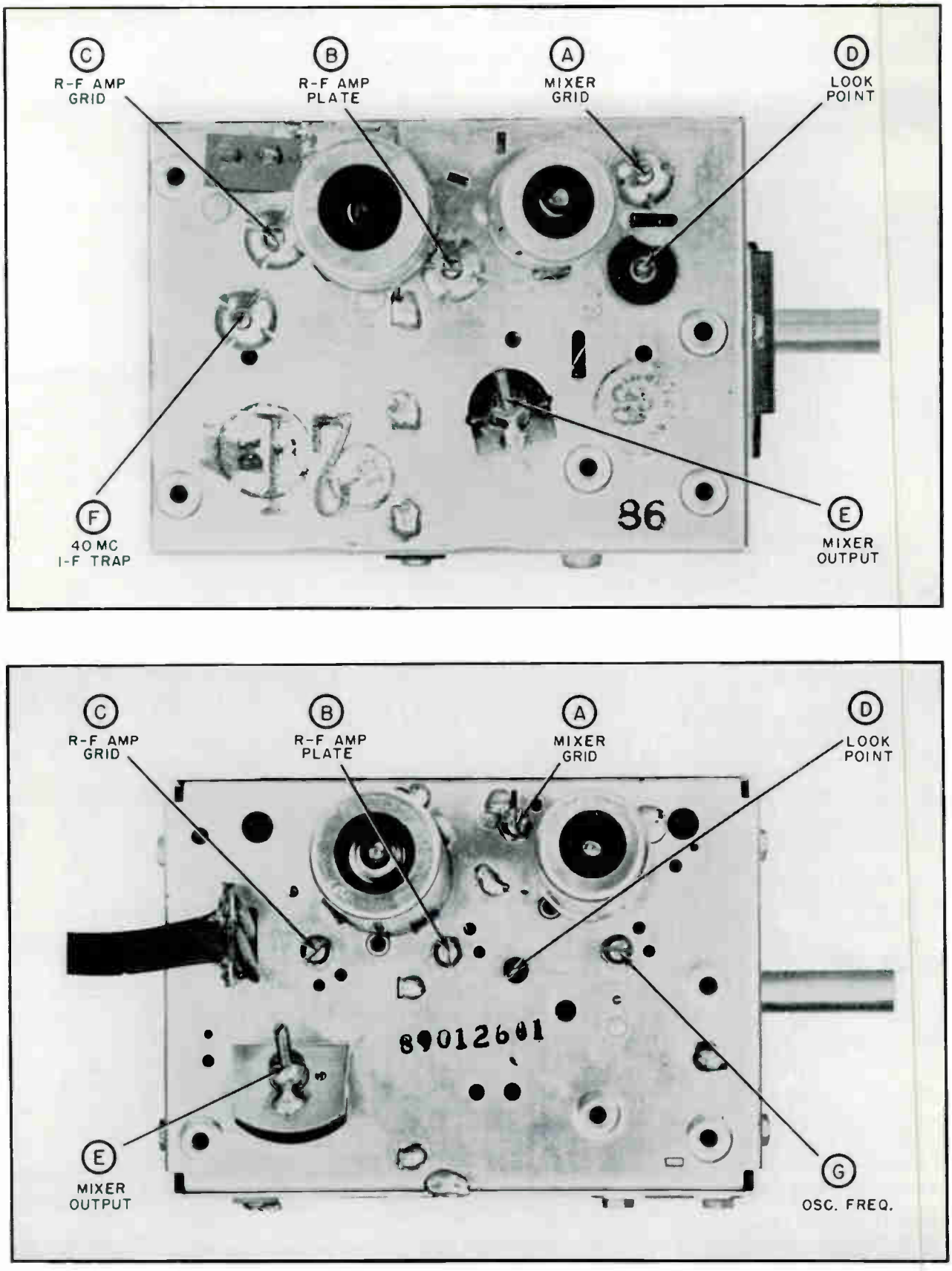

Figure 2. The two basic turret tuners and their adjustment slugs. The upper illustrations is for TU-1, 2, 3, 4, 6, 8 and 10 and the lower is for TU-5, 7 and 9. An explanation of the tuner slug functions will be found on the next page.

Turret Tuner
ALIGNMENT PROCEDURE

a. Apply −3 volts to the tuner green a-g-c lead by connecting two small flashlight batteries in series between the tuner a-g-c lead and ground.

b. Connect the tuner antenna transmission line terminal board to the generator matching network.

c. Connect the vertical amplifier terminals of the oscillograph to the tuner look point (D in figure 2) using a short length of coax. Connect a 10K resistor between the look point and the center lead of the coax. Ground the coax outer conductor to the tuner chassis.

d. Disable the horizontal sweep circuits by removing the horizontal oscillator and deflection amplifier tubes.

STEP	SWEEP GEN.	MARKER FREQ.	ADJUST
1	Adjusted to sweep channel 13.	215.75 mc sound 211.25 mc video	Check for curve shown below. If necessary, adjust A and B in figure 2 for proper bandpass, and C in figure 2 for maximum amplitude with equal peaks.
2	Adjust to sweep each channel in turn.	Correct markers for each channel (see frequency table on page 19).	Above adjustment sufficient for all channels. Individual channels may be favored if desired.
3	Tune to each channel on which a TV signal is available.		Set fine tuning control in the center of its mechanical range. If fine tuning control does not have a stop turn control shaft so that flat on shaft faces downward and adjust oscillator slugs. Adjust each oscillator slug for best picture and sound using non-metallic alignment tool.

NOTES

Slug A adjusts low frequency side of curve, slug B the high frequency side and slug C adjusts the r-f stage bandpass.

Some tuners have slug F which adjusts a 40 mc i-f trap. This slug may be reset if additional i-f rejection is required. Its adjustment affects the low channel curves slightly.

Some tuners have slug G which adjusts the oscillator frequency. It should be reset only if a channel strip oscillator slug cannot be properly set for its channel.

Failure to obtain the proper curves can be caused by a misadjusted oscilator slug or mixer output coil E. The adjustment of the mixer output coil is included in the i-f alignment procedure.

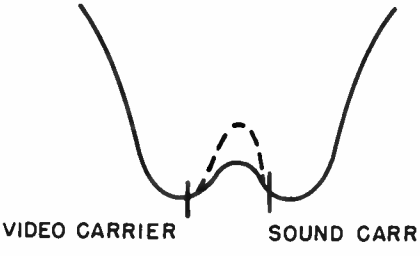

Figure 3—Set video carrier just inside peak. Sound carrier position may vary somewhat. On channel 13 the two peaks may be equal, varying slightly in amplitude on other channels.

DIRECTOR'S CORNER (Con't.)

way he is provided with information on all previous service of the set. He knows what has been changed before, and whether a difficulty is occuring again and again. He'll be able to answer questions regarding previous work—right on the spot.

When he finishes the call the technician completes the entry on the card —time, parts used, changes etc. At the end of the day you have a complete record of work performed and inventory used.

There are so many advantages to a master service record that it's hard to understand why this practice is not followed by 100% of the service industry.

For better service to your customers, for more efficient and economical operation, and more profit to you — have a continuous record of service performed on each receiver— and make it available to the technician who is doing the work.

PRODUCTION CHANGES

RA-164-165

6545600

Reason:

To improve the vertical linearity adjustment range, the value of R272 has been decreased.

Procedure:

Replace R272 with a 15K resistor.

Parts Required:

SYMBOL	PART NUMBER	DESCRIPTION
R272	02 030 760	Res F C 15K 5% ½W

The first chassis so modified is: Serial Number 6545600.

6549482

Reason:

To improve picture quality and definition.

Procedure:

1. Replace R201 and R208 with 5.1K resistors.
2. Disconnect pin 2 of V204, the video amplifier, from the junction of L202-C230-R212-R228, and connect L205 between these two points. Connect a 27K resistor (R302) in parallel with L205. (See figure C-1.)
3. Remove L209 and connect it between pin 7 of V204 and the junction of C217-L206-L207. (Sets below serial number 656400 have L209 located in this position.) Connect L210 between the junction of C217-L207 and the junction of C216-R217.
4. The following new IF alignment frequencies are used. The alignment procedure and the sound IF frequencies remain unchanged.

COIL	NEW ALIGNMENT FREQUENCIES
L110 (Mixer Plate)	23.05 mc
Z201	25.25 mc
Z202	23.93 mc
Z203	25.25 mc
L201	27.25 mc
L207	4.5 mc

Parts Required:

SYMBOL	PART NUMBER	DESCRIPTION
L205	21 006 628	Video Peaking Coil
L210	21 006 628	Video Peaking Coil
R201	02 030 650	Res F C 5.1K 5% ½W
R208	02 030 650	Res F C 5.1K 5% ½W
R302	02 031 940	Res F C 27K 10% ½W

The first chassis so modified is: Serial Number 6549482.

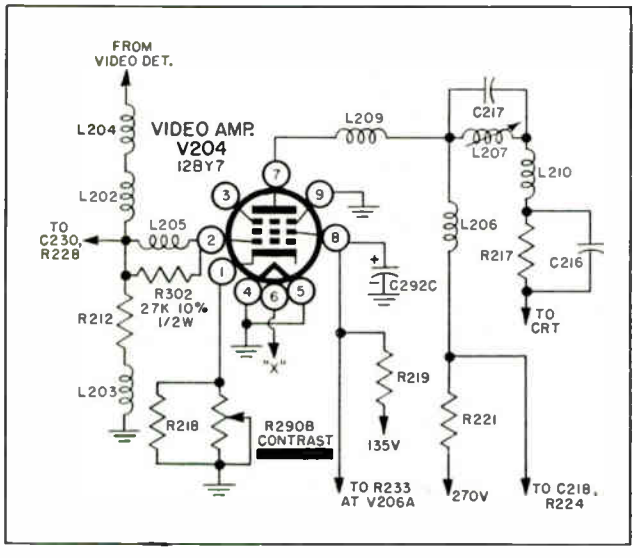

Figure C-1

6555201

Reason:

To improve the adjustment range of the a-g-c control the value of R303 has been increased.

Procedure:

Replace R303, the a-g-c control, with a 100K potentiometer.

Parts Required:

SYMBOL	PART NUMBER	DESCRIPTION
R303	01 053 800	Res V C 100K 30% ½W

The first chassis so modified is: Serial Number 6555201.

6552074

Reason:

To reduce tuner oscillator radiation the inductance of L110, the mixer-plate coil, has been reduced. This permits the use of a suppressor coil, L220, between the tuner output tab and L201-C202, the adjacent-channel trap. Tuners having the new mixer-plate coil are stamped 21010783.

Procedure:

Connect L220, covered with an adequate insulation sleeve, between the tuner (21010783) output tab and L201-C202, the adjacent-channel trap.

NOTE: Tuner 21010783 must be used with L220 or mixer plate coil L110 will not align properly. To facilitate tuner replacement, return defective 21010783 tuners with the suppressor coil, L220, *attached* to the tuner. Tuners 21010781, 21010782 and 89012601 may be used as direct replacements if L220 is removed from the circuit.

Parts Required:

SYMBOL	PART NUMBER	DESCRIPTION
L110	21 011 561	Mixer Plate Coil
L220	21 011 751	Suppressor Coil
	21 010 783	R F Tuner

The first chassis so modified is: Serial Number 6552074.

6574505

Reason:

To eliminate audio buzz, minimize residual hum and improve the sound quality.

Procedure:

1. Remove the shielded leads running between the junction of C241-R252 to C242 (adjacent to the Volume Control, R290A) and from R290A to C244 in the grid circuit of the first audio amplifier, V210. Reroute the leads as shown in figure C-2. Run the lead from C241-R252 through holes A, B and C. Run lead from C244 through hole D, place a 12 inch length of spaghetti over the lead and run through hole B. Fasten leads to chassis at points indicated by E. Connect leads to Volume Control as shown in figure C-3.

2. Run leads around edge of shield. Remove volume control ground wire connected between points A and B (do not disturb the contrast control ground). Connect shield of lead from C244 at point B and center wire to point C. Ground shield of lead from C241-R252 at point D and connect center wire to C242 at terminal board. Disconnect blue lead from ungrounded end of the contrast control (R290B), run through hole E, reconnect and dress lead along front of chassis as shown in figure C-3.

3. Dress C244 close to rear of chassis as shown at A in figure C-4. Dress lead from volume control (R290A) as shown at B. Pull all excess CRT base connector leads through hole C. Dress excess CRT connector leads away from the audio amplifier stages. Disconnect blue CRT base connector lead from terminal board TB11-2 and connect to pin 6 of V218. Disconnect jumper wire between pin 6 of V218 and TB11-2. Disconnect R254 and R256 from pin 4 of V211 and connect them to TB11-2. Connect R304, a 100K resistor between pin 4 of V211 and TB11-2. Connect C245, a .1 mf, 600V condenser from TB11-2 to ground near pin 1 of V211. Replace R255, connected between pin 5 of V211 and ground, with a 680K resistor.

4. Disconnect R226 at terminal board, cover with spaghetti and connect to pin 8 of V204.

Parts Required:

SYMBOL	PART NUMBER	DESCRIPTION
C245	03 019 250	Cap F Pa .1 mf, 20%, 600V
R255	02 031 160	Res F C 680K, 5%, ½W
R304	02 032 010	Res F C 100K, 10%, ½W

The first chassis so modified is: Serial Number 6574505.

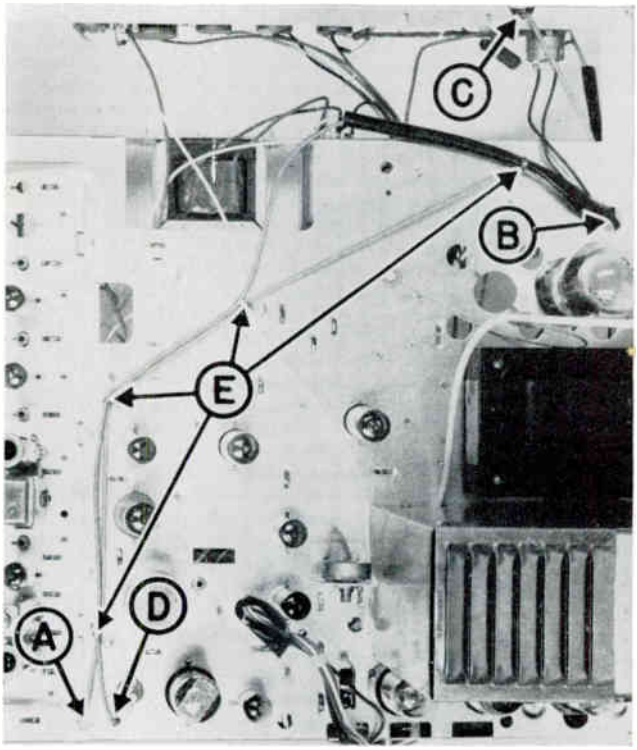

Figure C-2

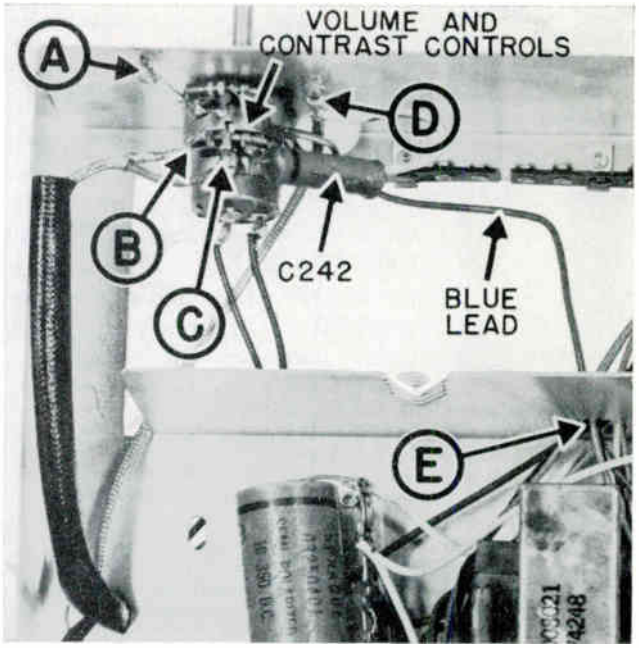

Figure C-3

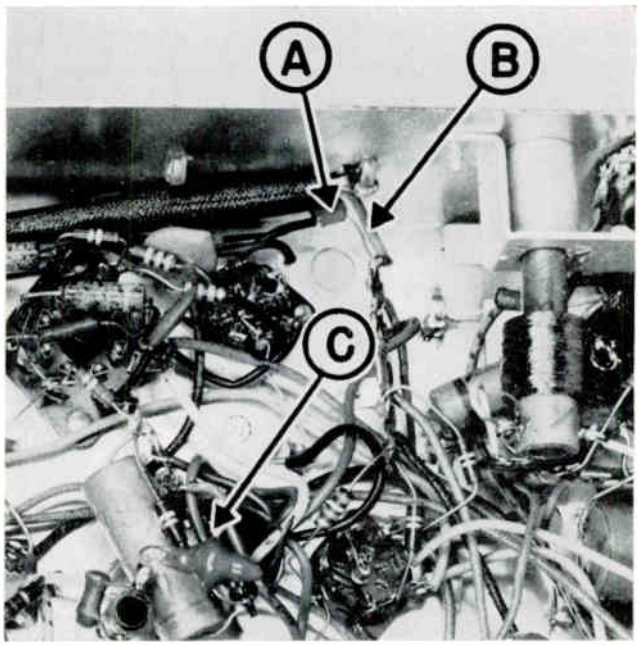

Figure C-4

STATION CHANGES CREATE SERVICE PROBLEMS

This year many VHF TV stations in the east and middle west will be changing to different channels and/or increasing their effective radiated power. A number of problems are likely to arise when these changes take place and you will do well to familiarize yourself with plans in your area so that you can prepare in advance.

Frequency changes will have their greatest effect in fringe areas where high-gain, narrow-band antennas are used. A recent check made with 5-element yagi antennas showed that a channel 2 yagi produces approximately 5 times as much signal as a channel 3 yagi when receiving channel 2. With a channel 2 signal a simple dipole proved twice as effective as a channel 3 yagi.

Under the above conditions a set owner receiving a good channel 3 picture with a 500 microvolt signal would find himself with a 100 microvolt signal and a somewhat noisy picture, if his station changed frequency to channel 2. In this example the station has moved to an adjacent channel. In many cases the situation will be aggravated by the fact that the station will move two or more channels.

Another effect which may be encountered as a result of frequency changes will be new ghosts. In some locations, probably not in many, ghosts will appear, or become stronger than they were before the change.

Most of the frequency changes will be accompanied or followed by increases in effective radiated power and/or antenna height.

If the increase in power or antenna height does not accompany the frequency change a decrease in signal may be noted in a few locations during the intervening period. In almost all cases the eventual transmitter improvements will result in better reception than in the past.

In receivers with turret type tuners the oscillator slug adjustments for channels not in use are usually ignored. In many cases the slugs will require adjustment after a frequency change.

In some installations new interference problems will occur. Readjustment of the receiver and re-orientation or replacement of the antenna may be required to remedy such problems. You will find some helpful information on interference in the September 1951 and the January and July 1952 issues of the Service News.

Power increases will also result in the need for receiver adjustments. In locations very close to transmitters overloading will be encountered in a few cases. In strong and medium signal areas a-g-c controls will require readjustment.

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LITERATURE AIDS

The Du Mont *Picture Tube Data Chart*, now in its fifth printing, lists all RTMA registered picture tubes of every type and manufacture. It tabulates complete specifications and is suitable for hanging to provide ready reference in the workshop.

The *Picture Tube Selector* is also available as a handy index to the interchangeability of tube types. Tool box or pocket sized, its circular slide rule format lets you dial the type to be replaced and shows possible replacement types.

For a free copy of the DATA CHART and SELECTOR send your request to Replacement Sales, Dept. 201, 750 Bloomfield Avenue, Clifton, N. J.

16KP4/RP4 Picture Tube Added to Teletron Line

The addition of the type 16KP4/-RP4 by replacement sales, completes a full line of Du Mont Teletron picture tubes in the most popular replacement sizes from 12″ to 30″. The 16KP4/-RP4 is an all-glass rectangular type employing electromagnetic focus and deflection and utilizes a single ion-trap magnet.

Since the 16KP4 and 16RP4 types essentially are identical both electrically and physically, the type 16KP4/-RP4 serves as a common replacement.

SERVICE NOTES

If horizontal pull is observed on an RA-166, 167, 170 or 171 chassis while it is being serviced on the bench, check the position of the CRT leads. If the leads are too close to the high voltage compartment video enters the sync circuits causing a misleading horizontal pull condition.

Don't be too quick to blame receiver faults on UHF strips. Reports have been received from UHF areas of technicians encountering poor horizontal sync and similar troubles, and incorrectly assuming that the difficulty was in a newly added UHF strip. In most cases the fault proved to be in another part of the receiver.