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RADIO SERVICE NEWS

VOLUME XV, No. 2 | RCA TUBE DEPARTMENT, HARRISON, NEW JERSEY | July-August, 1950

SUMMER SERVICING PROMOTED BY RCA VACATION PROGRAM

Summer time is vacation time. RCA's new Vacation Service Promotion ties in with your customers' vacation mood and makes it pay in increased business.

The RCA Vacation Service Promotion has been developed around two well-known facts: First, your customers will want to have their automobile radio and portable radio serviced *before they leave on their vacations*. Secondly, they will find it convenient to have their radios, television sets, and phonographs serviced *while they're away*.

To help promote this large service market and help you profit through increased tube and parts sales, RCA has prepared several colorful point-of-sale and direct mail promotions.

Heading the list is a sparkling 6-color "bathing beauty scene" display which is certain to stop customers with the thought that they really need their portable radio for a pleasurable vacation.

Companion piece to this display is a colorful 27"x10" Vacation Service streamer which reminds customers to have their radios and TV sets serviced while they are away.

Both the display and streamer are available without charge from RCA distributors.

Two direct-mail postcards provide the additional punch you need to get the Summer Vacation business. One contains a reply card on which your customer tells you the date he wants his radio picked up and checked. Printed in bright red and blue colors, the cards are available at $1.75 per 100, imprinted with your name and address.

Ask your RCA distributor for your Vacation Service flier. It contains all the information you need to capture your share of Summer Servicing.

NEW SPEAKER FLIER

A 4-page, 2-color Speaker Folder describing RCA's complete line of speakers for replacement needs, is now available. A copy of the folder —Form 3F629—is waiting for you at your RCA distributor.

This sparkling, 6-color beach scene display is a sure stopper for customers who depend on their radios for a pleasureable vacation—your service prospects! *See your RCA distributor for yours. Complete details of RCA's Summer Servicing Program appear on Column 1, this page.*

RCA PICT-O-GUIDE AVAILABLE AGAIN TO MEET TRADE DEMAND

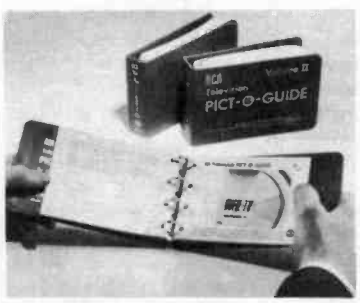
In response to overwhelming demand by the service-dealer trade, RCA has announced the re-opening of the unique RCA Television Pict-O-Guide promotion. Effective immediately, you will automatically receive from your RCA distributor your choice of Pict-O-Guide Volume I or II—no charge—with your purchases of RCA kinescopes or receiving tubes. For a limited period, you will earn an RCA Pict-O-Guide with your order of three RCA kinescopes or every 100 RCA receiving tubes which you purchase from an RCA distributor.

You can have your choice of Volume I or II by specifying, on your tube orders, which volume you want. Each volume is complete in itself and covers different phases of TV trouble-shooting by picture analysis.

Volume I contains 100 pages and more than 40 photos of receiver troubles taken directly from the face of an operating kinescope. Volume II of the Pict-O-Guide contains 224 pages and 25,000 words of TV servicing data, together with 84 photos.

Get your copies today!

ENCORE!



Servicemen and dealers now have another big opportunity to get Volumes I and II of the famous, original *RCA Pict-O-Guide shown above.*

CIRCUS PROMOTION ANNOUNCED FOR RCA PORTABLE BATTERIES

Ingenious containers, which can be converted into colorful circus wagons for the kiddies, are now being used to enclose RCA popular portable-radio "A-B" battery packs, as part of a spectacular battery "circus" promotion launched by the RCA Tube Department.

Timed with the portable-radio battery selling season, the new RCA battery "circus" promotion is a natural follow-up on last season's best-selling RCA "toy truck" container for farm radio battery packs. Four fast-moving portable radio "A-B" batteries, RCA-VS019, VS047, VS050, and VS057, are now packed in new circus wagon containers—each featuring a different group of animals—lions, monkeys, bears, and pandas.

To give the promotion maximum impact, a circus promotional kit has been made available to dealers through distributors. The kit contains eleven highly useful display items, including a colorful floor-stand battery merchandiser, a counter display, a window streamer, and eight sample battery circus wagons.

The floor-stand merchandiser is an attractive "self-seller" nearly four feet high which can be quickly assembled. Colorfully illustrated in the circus motif, the floor-stand merchandiser makes an ideal "island-type" display for an attractive arrangement of RCA batteries and a portable-radio. The counter display in the kit is a cut-out of an eye-catching circus clown, useful either on the counter or as a center piece in the window. The window streamer also features a circus clown and is intended for use directly on the store window, or as an over-the-counter valance.

A heavy advertising and publicity campaign has been launched on the new RCA battery circus promotion. A strong consumer advertising and publicity push for the circus battery promotion and the RCA battery line generally, is spearheaded by a series of commercials on television's top puppet show "Kukla, Fran and Ollie" and on radio's high-Hooper-rated "Screen Directors' Playhouse".

Get aboard the band-wagon and promote the RCA circus. It's new and powerful. And it will be profitable for you. See your RCA Battery distributor today.

Photolithographed in U. S. A.

THE HETERODYNE FREQUENCY METER FOR TV SERVICING

As television broadcasting spreads over the nation, new service opportunities are being created for the electronic technician. With these opportunities also comes the need for new techniques and specialized test equipment. Progressive technicians who plan to cash in on these new service opportunities are, understandably, acquainting themselves with the new tools of their trade.

Among the new instruments on the TV technician's "must" list, the RCA WR-39B Television Calibrator stands high. One of the important functions of this versatile instrument is to serve as a heterodyne frequency meter.

As a heterodyne frequency meter, the WR-39B permits the technician to make frequency measurements rapidly and with the requisite accuracy for TV service work. Such measurements are required in setting local oscillator frequencies, aligning intermediate-frequency amplifiers, adjusting discriminators, adjusting traps, and aligning head ends. The heterodyne frequency meter also has other specialized uses.

Fig. 1. One of the important functions of the RCA WR-39B Television Calibrator is to serve as a heterodyne frequency meter.

In television service, a heterodyne frequency meter with crystal standards is most conveniently combined with a variable-frequency oscillator in the same case, as illustrated in Fig. 1. The combination instrument is then termed a television calibrator.

From a general point of view, the heterodyne frequency meter consists of a suitable variable-frequency oscillator plus facilities for comparing unknown frequencies with calibrated frequencies. The heterodyne frequency meter which is built into the calibrator can be used to check the frequency of the variable-frequency oscillator (also built into the calibrator), or to check the frequency of another rf source. A block diagram illustrating the operation of a heterodyne frequency meter is given in Fig. 2. The rf output from a crystal-controlled oscillator is mixed with the rf output from a generator or other device to be calibrated. The two rf waves beat together in the detector and there develop the beat note. This beat note is amplified and delivered to a speaker to give an audible indication. It is apparent that when the generator frequency is adjusted to exact zero beat with the calibrated frequency, the vfo output is then known to the accuracy of the calibration.

In the case of the WR-39B shown in Fig. 1, the calibration depends on two quartz crystals, one of which has an accuracy better than ±0.01%, and the other of which can be adjusted to zero beat with the first. These two crystals provide an extensive array of frequency check points, against which the vfo output can be zero beat. For higher accuracy, either crystal can be adjusted to zero beat with standard frequency signals from the National Bureau of Standards Station WWV.

The manner in which this dual crystal calibration operates can be seen from Fig. 3. A 2.5-Mc crystal oscillator is provided, which produces harmonics useful up to 250 Mc. The output of a 0.25-Mc crystal oscillator is fed to a clipper stage which develops strong harmonics of the 0.25-Mc fundamental frequency. These harmonics are applied to the screen grid of the detector which modulates the output of the 2.5-Mc crystal oscillator. Since the 2.5-Mc signal and its harmonics are modulated by the 0.25-Mc signal and its harmonics, the 2.5-Mc harmonics are accompanied by side frequencies of 0.25 Mc, 0.5 Mc, 0.75 Mc, 1 Mc, 1.25 Mc, and so on up to 250 Mc.

The variable-frequency-oscillator position of the calibrator is then turned on, and its output beat at any desired 0.25-Mc point against the crystal frequencies. The reader will recall that the crystal accuracy is ±0.01%; the oscillator accuracy is in the order of ±0.2% (a very good figure for a variable-frequency oscillator). When the variable-frequency oscillator output is zero-beat against the crystals, the oscillator accuracy can be adjusted to ±0.01% at the check point. The accuracy will be approximately ±0.01% in the vicinity of the check point but, if the scale setting of the vfo is changed considerably, another calibration should be made.

Such a television calibrator is useful to generate accurate marker frequencies for visual alignment of television receivers, to adjust local oscillators, and to calibrate other test equipment. It can be used either modulated or unmodulated, for aligning TV and FM receivers by adjusting traps and by peak-aligning stagger-tuned if systems. The 4.5-Mc output may be used to align TV receivers employing intercarrier sound. When externally modulated, this calibrator can be used to locate rapidly TV receiver faults by the technique of signal injection. It can also be used with an external audio or rf signal source to provide a bar pattern for linearity adjustments on all TV channels, whether or not a TV station is on the air.

Because of the accuracy provided by the heterodyne frequency meter, the television calibrator permits the properly equipped technician to service television receivers with the accuracy requisite for optimum performance.

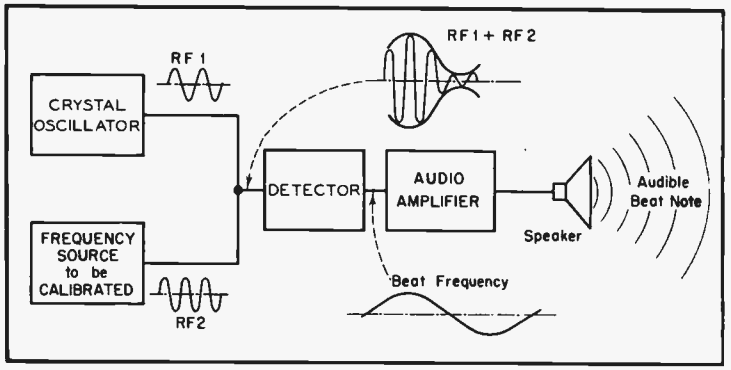


Fig. 2. A block diagram illustrating the operation of a heterodyne frequency meter.

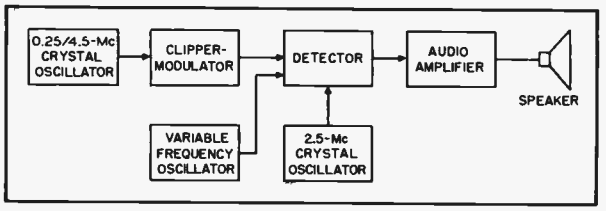


Fig. 3. The manner in which dual crystal calibration operates in a heterodyne frequency meter.

ARE YOU AN EXPERT?

Examine Yourself on TV Service

Here are twelve miscellaneous troubles in TV receivers. Can you identify and explain them? In some cases, a photo shows two or more troubles in the same section of a receiver. Examine the photographs carefully. Take your time, The test is to determine how accurately you can localize the trouble, not how quickly.

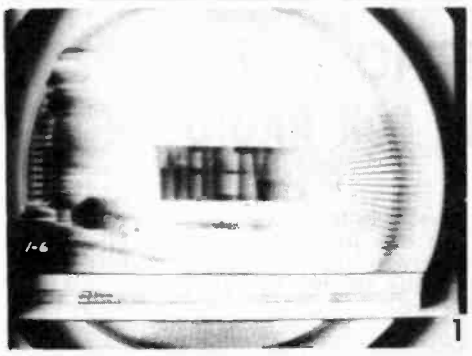
Place ONE check mark for each trouble in the table on this page. For example, if you think that trouble No. 6 is in the vertical oscillator section, place a check mark in trouble column No. 6 on the line marked "vertical oscillator section."

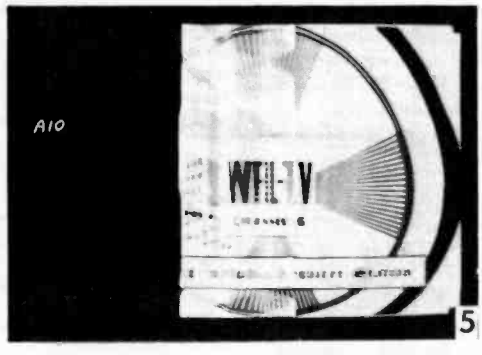
The correct answers are given on page 5. If you get all twelve correct, you are an expert. If you miss one or two you're almost an expert. If you miss more than two, you had better burn some midnight oil studying the RCA Pict-O-Guide volumes I and II.

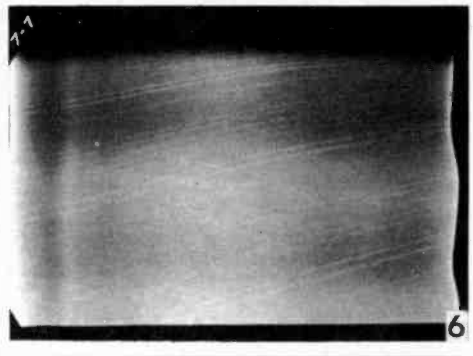
These and scores of other troubles are being covered in RCA RADIO SERVICE NEWS by John R. Meagher, who has made hundreds of photographs of actual troubles to help you become expert on TV service. Video troubles were shown in the last issue. These will be followed by photographs of troubles in horizontal deflection, vertical deflection, sync, etc. You cannot afford to miss a single issue containing this exclusive information.

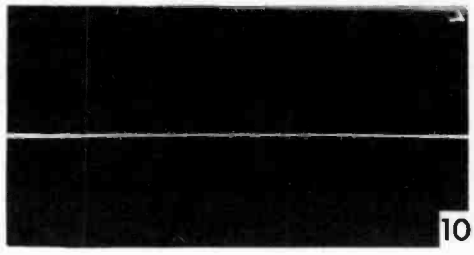
SECTION	PICTURE NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
RF-IF Amplifiers												
Video Amplifier												
Horizontal Oscillator												
Horizontal Deflection												
Vertical Oscillator												
Vertical Deflection												
B+ Power Supply												

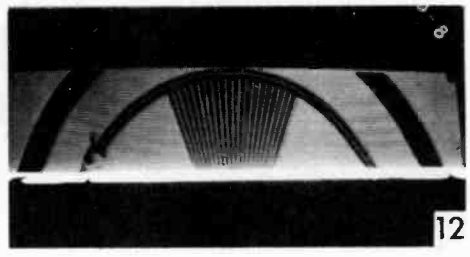
(See page 5 for correct answers.)











PRINTED CIRCUIT TV TUNER SEEN AS MAJOR DESIGN ADVANCE

The television industry's first "printed-circuit" television tuner, a major development in television receiver design which provides superior reception in fringe areas as well as in receivers operated with built-in antennas, has been announced by the RCA Tube Department.

A radical departure from conventional wound-coil units, RCA's new "printed-circuit" tuner utilizes a unique photo-etch process to reproduce the critical tuned circuits. The process eliminates the complication of mechanically winding separate coils, and at the same time produces precision circuits of superior performance.

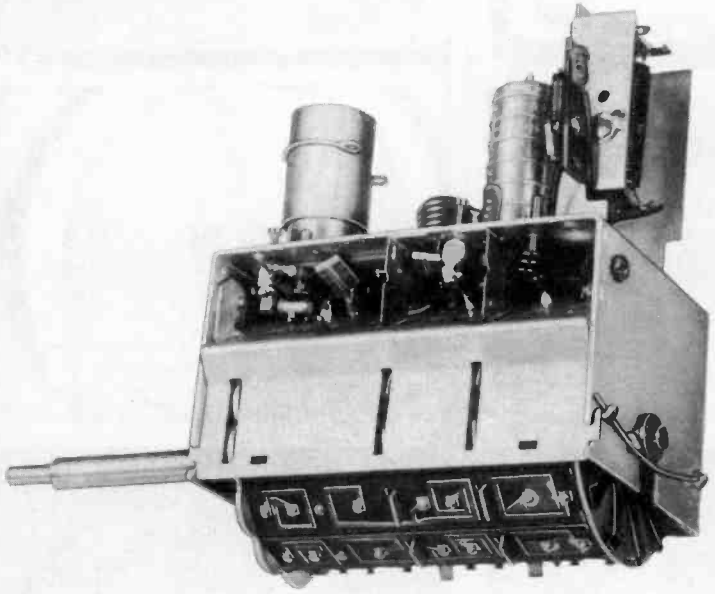
In design, the new RCA unit is a turret-type tuner. The turret assembly employs individual coil strips or segments, each containing the printed circuit for a separate television channel. The strips are easily removed for service or replacement.

Tuning is accomplished by rotating the turret by means of a conventional channel-selector switch which connects in the proper coils for each channel. The unit is capable of withstanding well over 40,000 complete revolutions of the turret. Initial designs of the new tuner are intended for use with a stagger-tuned picture system having a carrier of 25.75 megacycles per second and a sound system having a carrier of 21.25 megacycles per second as employed in the 630TS type of television receiver. This type of receiver now using the RCA 201E1 (KRK-2) or similar tuner may be changed over to the new tuner with only two minor electrical changes and minor mechanical modifications.

The new printed circuit tuner provides high and substantially uniform gain of between 28 and 35 decibels on all channels under typical operating conditions. Other features include excellent noise factor, high rejection of spurious responses, very low oscillator radiation, temperature-compensated Colpitts circuit for oscillator stability, and low-reflection coefficient in the transmission line. These characteristics make the new RCA printed-circuit tuner especially suited to receivers using indoor antennas. The new RCA tuner is also the first to use a type 6CB6 tube as the amplifier. Characteristics of this tube include high gain, low noise, and low grid-plate capacitance.

In addition to the removable coil strips and turret, ease of servicing is provided for in the new tuner by an oscilloscope terminal to facilitate alignment.

The new tuner will be available for replacement purposes through RCA Parts Distributors. A bulletin containing full technical details covering electrical and mechanical features, as well as a circuit diagram of the new tuner Type 206E3, is now available from Commercial Engineering, RCA Tube Department, Harrison, N. J.



The new RCA Printed Circuit Tuner makes possible superior television reception.

The RCA WO-57A provides engineering features in a portable scope formerly found only in higher-priced laboratory instruments.

NEW RCA SERVICE-TYPE 'SCOPE VERSATILE FOR RADIO AND TV

Servicemen will be interested in RCA's new portable oscilloscope —the WO-57A—which for the first time provides engineering features formerly found only in higher-priced laboratory instruments, and which is versatile enough to handle every phase of radio and television servicing.

Especially suited to television servicing, the new WO-57A Oscilloscope is an instrument of high sensitivity and wide frequency range which is equally useful in shop, laboratory, and factory, for viewing and measuring square waves, pulses, and TV sync signals.

Deflection sensitivity of the oscilloscope is better than 30 millivolts per inch. The frequency response of the vertical amplifier is flat within 3.0 db from zero to 500 kc, and down less than 9.0 db at 1 Mc.

Outstanding design feature of the new oscilloscope is the direct-coupled vertical amplifier which is used to provide low-frequency response flat down to dc. Excellent low-frequency square-wave reproduction, essential for correct sweep alignment, is thus assured.

High-frequency square-wave response up to 100 kc enables the WO-57A to reproduce blanking and sync-pulse wave shapes with fidelity heretofore unobtainable in moderately priced service oscilloscopes.

"Tilt," caused by low-frequency phase distortion, and "overshoot", caused by high-frequency amplitude and phase distortion, is minimized in the new oscilloscope. Less than two per cent tilt and overshoot assures more accurate viewing of square waves, pulses, and TV deflection-circuit waveshapes. Increased utility is provided in the new oscilloscope by the frequency-compensated and calibrated step attenuator. The instrument also has a vernier control and a calibrating voltage source.

An accessory kit which greatly facilitates signal-tracing measurements in television sets is available for the new RCA Oscilloscope. This kit comprises a set of matched probes and cables which allows waveshape observation without undue loading of the receiver circuits. Consisting of a direct probe and cable, a low-capacitance probe, a ground lead, and slip-on alligator clip, the accessory kit is available separately.

Advanced sweep features have been incorporated in the new oscilloscope. These include a linear sweep range from 15 to 30,000 cps with preset fixed sweep positions for viewing vertical and horizontal deflection-circuit waveforms, a provision for positive or negative synchronizing for easy lock-in of upright or inverted pulse waveforms, and an exclusive sweep direction-reversing switch for left-to-right or right-to-left traces. In addition, the instrument has a phase-controlled sinusoidal sweep of power-line frequency. Traces may be expanded twice the screen diameter for sweep-alignment applications.

Additional features include push-pull amplifiers for sharper trace and reduced astigmatism as well as separate jacks for dc and ac signal inputs.

The new RCA WO-57A Oscilloscope is available from RCA Test Equipment distributors. Its suggested list price is $137.50.

RADIO·PHONO·TV Tips

ADDITION OF CAPACITOR IN 9TW390 RADIO CHASSIS

A .05 mfd capacitor designated C389 has been added between terminal 8 of S304 (front) and tuning capacitor C303/C304 in Radio Chassis RC617A.

Early production models of this receiver will not have this capacitor in the radio chassis.

When the radio function switch is in the TV position, the filament voltage is present on the high side of the tuning capacitor (C303/C304) due to the function switch design. Any shorting of the tuning capacitors to ground causes choke coil L314 to burn out. The insertion of the capacitor removes filament voltage from the tuning capacitor without affecting its operation.

EXCESSIVE HUM IN THE 8X541 SERIES

When servicing these models for high hum level, be sure to check the value of R15, which should be 1200 ohms. Some instruments were shipped to the field with R15 as 220 ohms, which is insufficient to provide correct filtering action.

HORIZONTAL WHITE LINE ACROSS TOP OF RASTER

This condition may often be corrected by the addition of a one megohm resistor across the primary of the vertical oscillator transformer (green and yellow leads.)

The addition of this resistor will reduce the "Q" of the transformer, providing more stable operation.

TOUCHING UP RCA METAL TV CABINETS

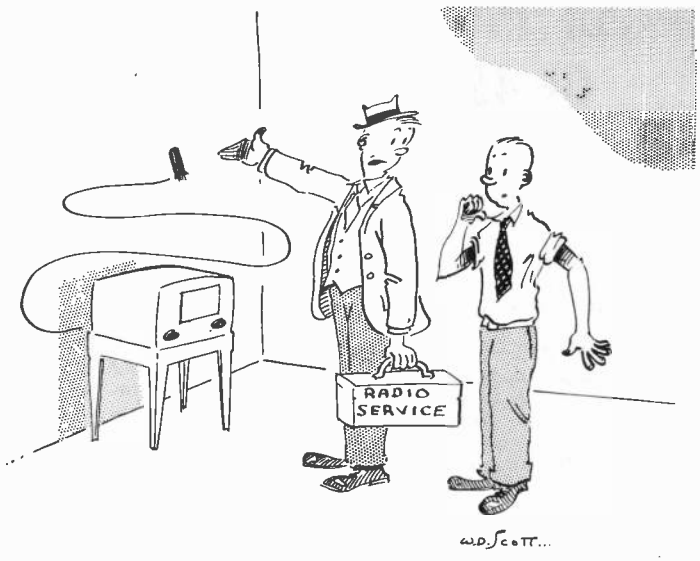
Dupli-color No. 1020 (Regal maroon—1941 Dodge), obtainable from Dodge dealers or auto supply stores, appears to be a satisfactory color match for touch up of the maroon portions of RCA Victor metal television cabinets. This will prove useful in touching-up spots where the finish has been chipped off.

REMOVAL OF SHIPPING SCREWS IN 9EY3 AND 45EY

Many dealers are still failing to remove the red-headed shipping screws provided in these instruments to assure safe arrival. According to unpacking instructions included with each instrument, these shipping screws must be removed in order for the instrument to operate normally. Failure to remove these screws often results in complaints from dealers or consumers that the instrument is not operating properly, resulting in an unnecessary service call.

TELEVISION RECEIVING TUBE SUBSTITUTION

It has been found that many tubes are discarded as being inoperative in certain critical circuits which would operate satisfactorily in other circuits in the set using the same type of tube. For example, a microphonic 6J6 oscillator tube may be entirely satisfactory for use in the rf or converter stages of the same rf unit. A 6K6GT tube which may not be entirely satisfactory for use as a video amplifier may be perfectly usable in the sound output stage. Also, "swapping" of such types as 6SN7GT, 6AG5, etc., may provide a simple solution to a complaint.



"must be a gassy tube" . . .

CHANGE IN VIDEO AMPLIFIER MODELS T164, T165-6-7-8-9

The 12K resistor (R220) across the 4.5-Mc trap (L110) was placed in this circuit to reduce regeneration or "ringing" in the video amplifier. However, it has been found that this condition may still exist at a minimum setting of the contrast control. Therefore, R220 has been changed in value to 10K to reduce this tendency.

Are YOU an Expert?

Correct Answers

SECTION	PICTURE NUMBER											
	1	2	3	4	5	6	7	8	9	10	11	12
RF-IF Amplifiers							✓					
Video Amplifier	✓		✓									
Horizontal Oscillator				✓					✓			
Horizontal Deflection		✓			✓							
Vertical Oscillator								✓		✓	✓	
Vertical Deflection										✓		✓
B+ Power Supply						✓						

Trouble #10 can be vertical oscillator or vertical deflection, so count the answer as correct if you have marked either one.

STAR-SPANGLED BATTERY DISPLAY

Build your sales volume on RCA batteries with this miniature circus. The items shown in this store window are featured in the spectacular battery circus promotion launched by the RCA Tube Department. Read the story on page 1 of Radio Service News.

SIMPLIFYING THE SERVICING OF 45 RPM RECORD PLAYERS

The 45-rpm changer is the simplest and most dependable instrument of its kind, but its servicing is not for amateurs. It requires an experienced serviceman who is equipped with the proper tools and all the technical service data issued on the particular changer he is to service. The sequence of making adjustments on any changer is also important, and the following adjustments for the 45 rpm changer are indicated in the sequence in which they should be made.

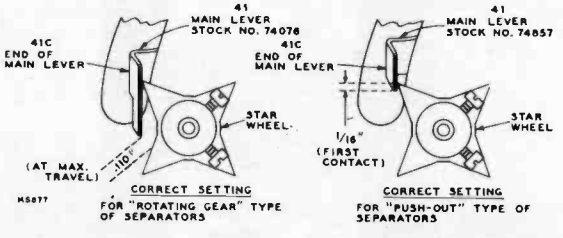
Star Wheel Timing

The star wheel must be fastened to the drive gear shaft so that it is properly related to the separator blades. To insure this, rotate the drive gear shaft with one hand until the blades recede into the spindle, and press the fingers of the other hand against the slots in which the blades are recessed. Then turn the shaft one way until the blades touch the fingers, and in the opposite direction until they again touch the fingers. Determine the shaft position halfway between these two positions, and place the star wheel on the shaft so that one tooth points either toward one of the cam screws or toward the center of the record shelf on that side of the spindle. Tighten the star wheel screws and recheck the setting.

Setting Tail of Main Lever

The tail of the main lever stops the star wheel. If this is set too close to the star wheel, it will jam; if too far away, it will cause erratic record dropping. There are 2 types of main levers: a long end type for players with "rotating gear" separators, and a short end type for players with "push-out" type separators. To correct the setting of long end levers, adjust the lever until its inside surface is 0.110" from the hub of the star wheel when the mechanism is halfway through the change cycle. The diameter of a No. 4-40 machine screw (0.112") makes a convenient gauge for measuring this distance.

For levers with a short end, the star wheel should first contact the end approximately 1/16-inch from the front or leading edge of the lever.



Adjusting Tone Arm Pivot

The tone arm is held on the vertical pivot shaft by means of two pointed pivots. One is permanently fastened to the inside of the tone arm; the other is a cone-pointed adjustable screw, locked in position by means of a separate screw. Correct adjustment requires a small amount of play at the pivot point. If this adjustment is too loose, failure to trip, intermittent tripping, or erratic landing may result. However, if the pivot screw is too tight, the tone arm will bind. It is advisable to recheck the adjustment after tightening the locking screw, to make certain that this has not changed the pivot screw adjustment.

To test, hold the trip lever and gently move the pickup end of the tone arm back and forth. The movement at the pickup, due to play in the pivots, should not exceed about 1/32".

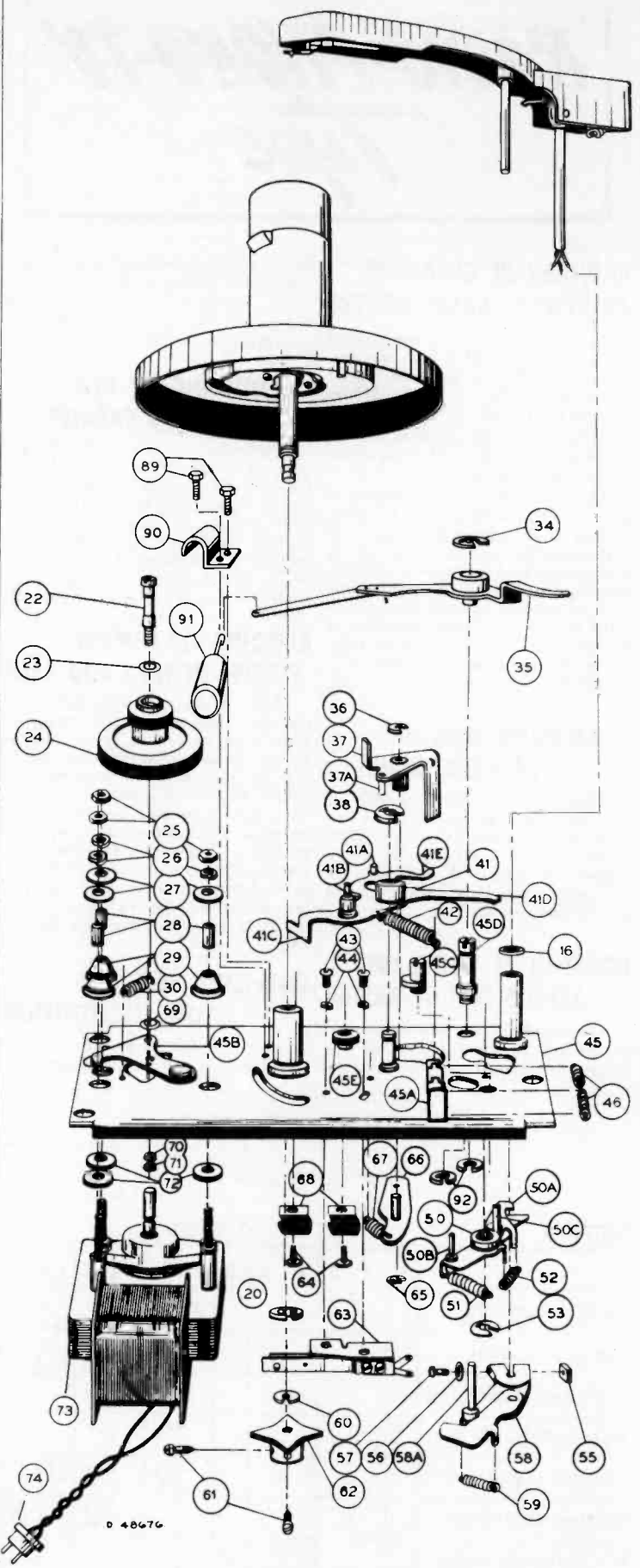
Sapphire Height Above Motorboard

Adjustment of the tone arm height above the motorboard when the changer is in the *out-of-cycle* or playing position should be made with no records on the turntable. The sapphire must not touch the motorboard, yet it must be low enough to properly play the first record. The clearance between the sapphire and the motorboard when the arm is positioned between its rest and the turntable's edge should be 1/16". If the distance is incorrect, bend the adjusting lug—located under the arm just forward of the tone arm shaft—up or down, as the case requires.

Tripping Adjustment

The tripping adjustment is made by proper angular positioning of the trip lever in relation to the position of the tone arm. Before attempting this adjustment, make certain that the vertical pivot shaft on which the trip lever is mounted has just enough play to prevent binding. To establish proper clearance, use a feeler gauge about 0.010" thick.

One of the easiest ways of making the tripping adjustment is to place on the turntable a scale or a cardboard disc on which is marked a line 1 9/32" from the spindle. With the turntable revolving at its normal speed, hold the cardboard disc so that it does not turn. Move the tone arm inward very slowly until it trips, releasing it at that instant to permit normal cycling. If tripping occurs before the 1 9/32" line is reached, move the trip lever counter clockwise, looking down from the top, until tripping is obtained exactly at



Replacement parts for the RCA RP-168 Series—45 RPM record changer should be ordered only by stock number. Refer to the illustration and parts listing for identification. Items listed but without stock numbers are not stock items. Order replacement parts from your RCA distributor.

STOCK No.	ILL. No.	DESCRIPTION
		SUB-BASE ASSEMBLIES
74256	16	Washer—Vellutex washer (pivot arm shaft bearing washer)
74080	17-19	Washer—Washer for turntable bearing
72349	18	Bearing—Turntable thrust bearing
72688	20	Washer—"C" washer—turntable assembly retainer
74079	22	Stud—Idler wheel mounting stud—for Sub-base Types I, II, III, IV, early VI, and early VII
74078	23	Washer—Dampening washer for idler wheel—top
74077	24	Wheel—Idler wheel for all except Model CP-5203
74470	24	Wheel—Idler wheel for Model CP-5203
74132		Hardware—Motor mounting hardware consisting of:
	25	Three hex nuts }
	26	Three lockwashers }
	27-72	Six flat washers }
	28	Three spacers }
74087	29	Grommet—Rubber grommet to mount motor (3 required)
74089	30	Spring—Idler wheel tension spring (.195" O.D. x .593"—14 turns)
35969	34	Washer—"C" washer to retain pickup arm lift lever
74073	35	Lever—Pickup arm lift lever for mechanisms without dashpot
74757	35	Lever—Pickup arm lift lever for mechanisms with dashpot
———	35	Lever—Two piece pickup arm lift lever (use No. 74073 or No. 74757 for replacement)
74805	–	Spring—Tension spring for two piece pickup arm lift lever (.170" O.D. x ¾")
33726	36	Washer—"C" washer to retain trip pawl
74072	37	Pawl—Trip pawl
74453	–	Washer—Bearing washer between trip pawl (Ill. No. 37) and trip pawl lever (Ill. No. 66)
35969	38	Washer—"C" Washer to retain main lever
74076	41	Lever—Main lever (director lever) for use with turntables having rotating gear record separators
74857	41	Lever—Main lever (director lever) for use with turntables having push-out record separators
74084	42	Spring—Main lever spring (.195" O.D. x .800"—27¼ turns)
———	43	Screw—Screw to mount muting switch (No. 6-32 or No. 6 self tapping)
———	44	Washer—No. 6 lockwasher used with Item 43 (No. 6-32 screw)
74070	45	Base—Sub-base assembly complete with all staked and riveted parts, including idler lever and reject lever—Type I without pickup rest
74743	45	Base—Sub-base assembly complete with all staked and riveted parts, including idler lever and reject lever—Type III with pickup rest
74468	45	Base—Sub-base assembly complete with all staked and riveted parts, including idler lever and reject lever—less No. 74473 bracket—Type IV—for RP-168-2—used only on Model CP-5203
74473	–	Bracket—Metal bracket with power input connector and audio output jack—RP168-2 only
74856	45	Base—Sub-base assembly complete with all staked and riveted parts—less idler lever and reject lever—Type V—with pickup rest
74803	45	Base—Sub-base assembly complete with all staked and riveted parts, including idler lever—less reject lever—Type VI—with pickup rest
74860	45A-1	Lever—Reject lever — bottom section — for sub-base Types V, VI, and VII
74861	45A-2	Lever—Reject lever—top section—for sub-base Types V, VI, and VII
74814	45B	Plate—Idler wheel mounting plate and stud—for sub-base Type V
74870	45B-1	Retainer—Idler wheel retainer (spring sleeve) for use with No. 74814 plate (45B)
75081	45B-1	Retainer—Idler wheel retainer (horseshoe washer) for use with sub-base Types VI and VII (late production)
74804	45B-2	Washer—Idler wheel bearing washer (½" O.D. x .185" I.D. x .032" thick) for sub-base Types VI and VII (late production)
74430	45C	Stud—Eccentric stud for landing adjustment
74429	45D	Stud—Eccentric stud for height adjustment
74082	45E	Washer—Felt washer (½" O.D. x ¼" I.D. x 3/16" thick)
74086	46	Spring—Reject lever spring (.203" O.D. x 13/16"—34¾ turns) for sub-base having one piece reject lever—1 required
74427	46	Spring—Reject lever spring (.203" O.D. x .531"—13 turns) for sub-bases having two piece reject lever—2 required
74074	50	Lever—Return lever (includes spring Ill. No. 51)
74085	51	Spring—Return lever actuating spring (.195" O.D. x 29/32"—37½ turns)
74075	52	Spring—Return lever latch spring (.180" O.D. x .535"—21½ turns)
———	54	Washer } To clamp trip lever
———	55	Nut } (Ill. No. 58) to pivot
———	56	Washer } arm shaft (Ill. No. 40)
———	57	Screw }
74099	58	Lever—Trip lever (includes Items 54, 55, 56, 57 and 59)
74426	59	Spring—Trip lever spring (.171" O.D. x .595"—30 turns)
33726	60	Washer—"C" washer for star wheel shaft
74083	61	Screw—No. 6-32 x .281" cone point set screw for star wheel (2 required)
74081	62	Wheel—Star wheel
74088	63	Switch—Muting switch
———	64	Screw—No. 8 x ¼" self tapping screw
33726	65	Washer—"C" washer to retain trip pawl lever
74245	66	Lever—Trip pawl lever
74100	67	Spring—Trip pawl take up spring (.195" O.D. x 5/8"—20½ turns)
———	68	Clamp—Cable clamp
74078	69	Washer—Dampening washer for idler wheel (bottom)
———	70	Washer—No. 4 lockwasher for idler mounting stud (Ill. No. 22)
———	71	Nut—No. 4-40 hex nut for idler wheel mounting stud (Ill. No. 22)
———	72	Washer—Part of No. 74132—see Ill. No. 27
74071	73	Motor—115 volt, 60 cycle motor complete with connector—shaded pole type. Not suitable for 50 cycle conversion
74624	73	Motor—115 volt, 60 cycle motor complete with connector and No. 73158 spring sleeve (for 50 cycle conversion), shaded pole type
74469	73	Motor—115 volt, 60 cycle motor complete with connector and 5 mf. capacitor—for RP 168-2 only
74621	–	Capacitor—Motor capacitor (5 mf.) for No. 74469 motor
30870	74	Connector—Two prong male plug (connector) for motor cable
73158	–	Spring—Spring sleeve to convert motors No. 74624 to 50 cycle operation
———	89	Screw—No. 8 x ¼" self tapping screw
74859	90	Clamp—To mount dash-pot
74428	91	Dash-pot—Pneumatic dash-pot complete with plunger
74431	92	Washer—"C" washer for mounting adjustment studs No. 74429 (Ill. No. 45D) and No. 74430 (Ill. No. 45C)

the center marking. If tripping occurs past the center line, adjust the trip lever clockwise. Tighten the trip lever and repeat the test to make certain the adjustment has not been changed by this action.

Landing Adjustment

After the tripping adjustment is correctly made, it is necessary to make the landing adjustment. Place a normal record on the turntable and run the changer through its cycle until the arm is just ready to land.

In the correct adjustment, the sapphire lands halfway between the edge of the record and the first music groove, or 2⅝" from the spindle. If it does not land at this point, run the changer to an "out-of-cycle" position and place the tone arm on its rest. Turn the landing adjustment screw slightly in whichever direction is required and test the changer again, continuing until the landing is properly adjusted. The landing adjustment screw is shown as item "A" in the customer's operation instructions.

Tone Arm Height in Cycle

The next adjustment is for tone arm height during the change cycle. The arm must rise high enough during the cycle to clear and land on the top record of the stack on the turntable (up to 10 records), but not high enough to strike any records stacked on the upper part of the spindle. The correct distance from the sapphire to the turntable before landing is ¾". To make the adjustment, run the changer through its cycle until the arm has reached its highest point. Turn screw "B", located near the tone arm vertical pivot shaft, until this distance measures exactly ¾". Screw "B" is shown in the customer's operating instructions as the height adjustment.

Muting Switch Adjustment

The muting switch is held open by the main lever while the record is playing, and short-circuits the pick-up leads when the main lever moves toward the star wheel during the change cycle.

The muting switch contacts should be open by 1/32" during the playing time. When closed, they should make firm contact. The tension is adjusted by moving the switch frame, after loosening the screws which hold it to the sub base.

Turntable and Spindle Separator Mechanism

The turntable assembly of players with "rotating gear" type separators is detached by removing the star wheel and the two "C" washers from the turntable shaft. The turntable assembly can then be lifted from the changer. Caution is required to avoid losing the ball bearing assembly and the flat steel washers located on each side of it. To reach the separator assemblies after removing the turntable, detach the turntable cam plate by removing its two holding screws. Then remove the two screws inside the turntable spindle which hold the plastic cap in place. Note: In late production models the cam track is an integral part of the turntable.

The two separator assemblies may then be withdrawn by lifting them straight up. Reassemble these units in reverse order, making certain that the compression spring is installed in the holes provided in each separator shelf. Accurate timing of the separator assemblies is necessary to assure correct dropping of the records. To adjust, first rotate the shaft which drives the separator assemblies until the front edge or nose of one assembly is about to protrude from the edge of the spindle. If this does not bring the second separator blade to the same position, lift it gently until its gear is free to rotate, place it in the proper position, and press it down on its shaft into proper mesh with the drive gear. When the cap is replaced, the screws must not be overtightened or the cap may become distorted and prevent records from dropping properly.

In record players having "push-out" type of separators, the knives are self synchronizing.

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RADIO SERVICE NEWS

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