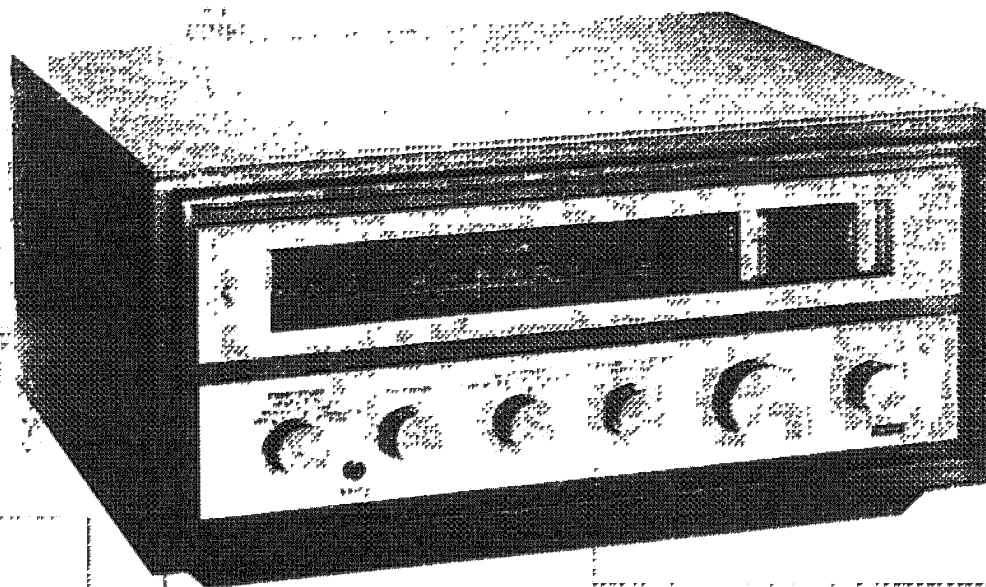


**ASSEMBLY
AND
OPERATION
MANUAL**



CITATION III-X



**PROFESSIONAL FM
STEREOPHONIC
BROADCAST TUNER**

harman **kardon**

CITATION III-X

ASSEMBLY & OPERATION MANUAL

INTRODUCTION

This new Citation III-X Professional FM Stereophonic Tuner Kit represents the culmination of extensive research and experimentation in the technique of kit design. It is meant to satisfy the aspirations of those who insist on nothing short of perfection itself. The keynote is unparalleled performance and no compromise has been made in the design of this magnificent instrument.

This instruction manual has been written in simple, nontechnical language and if you will take the time to read it thoroughly before starting the actual construction of this kit, your work will be easier and far more accurate. Additional information may be obtained by carefully studying the large fold-out diagrams supplied with this manual. These may be attached to the wall opposite your workbench for easy reference.

After studying the manual, work slowly and carefully. After every ten or fifteen steps, go back over your work to check for possible errors. This will insure proper construction and will afford you the feeling of satisfaction upon completing a tuner that performs perfectly the first time it is connected.

KEEP THIS INSTRUCTION MANUAL AVAILABLE AT ALL TIMES. IT CONTAINS INDISPENSABLE TECHNICAL AND SERVICE INFORMATION.

CITATION III-X FEATURES

Defeatable AFC with regulated voltage supply to maintain absolute oscillator stability regardless of line voltage variation.

Front panel volume control.

Front panel interchannel muting switch.

Two 6BN6 gated-beam limiters assure exceptionally high capture ratio, greater quieting, lower distortion and a completely uniform audio output of all signals.

Local/Distant range switch.

Military-type terminal board construction for rigidity, strength, proper lead dress and professional appearance.

Audio range 3 octaves above and below range of normal human hearing.

Front panel light to indicate when stereophonic broadcasting is being transmitted.

Magnificently styled in gold and charcoal brown to match all of the Citation instruments.

Double-tuned antenna circuit transitionally coupled to first RF stage.

First RF comprised of Nuvisor for lowest noise figure obtainable.

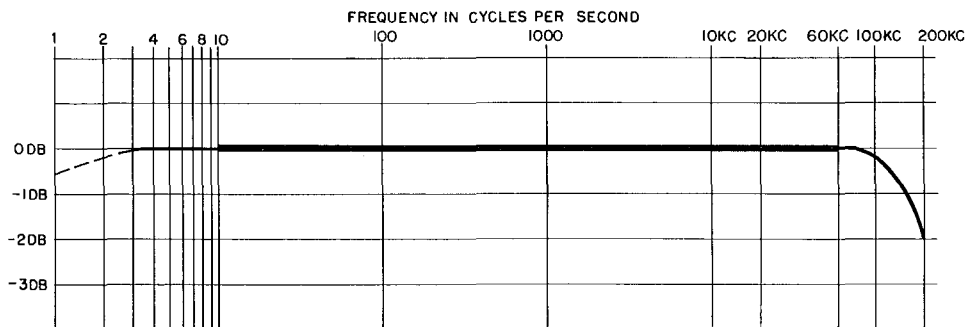
Tuning gangs specially designed for outstanding selectivity and elimination of stray capacitance and inductance loading and eliminate distortion.

Cathode follower inserted between discriminator and de-emphasis network to provide constant high impedance loading and eliminate distortion.

Two separate D'Arsonval movement tuning meters for signal strength and center of channel tuning.

Wide band IF, limiters and discriminator assure excellent capture ratio with virtually non-existent distortion.

FREQUENCY RESPONSE



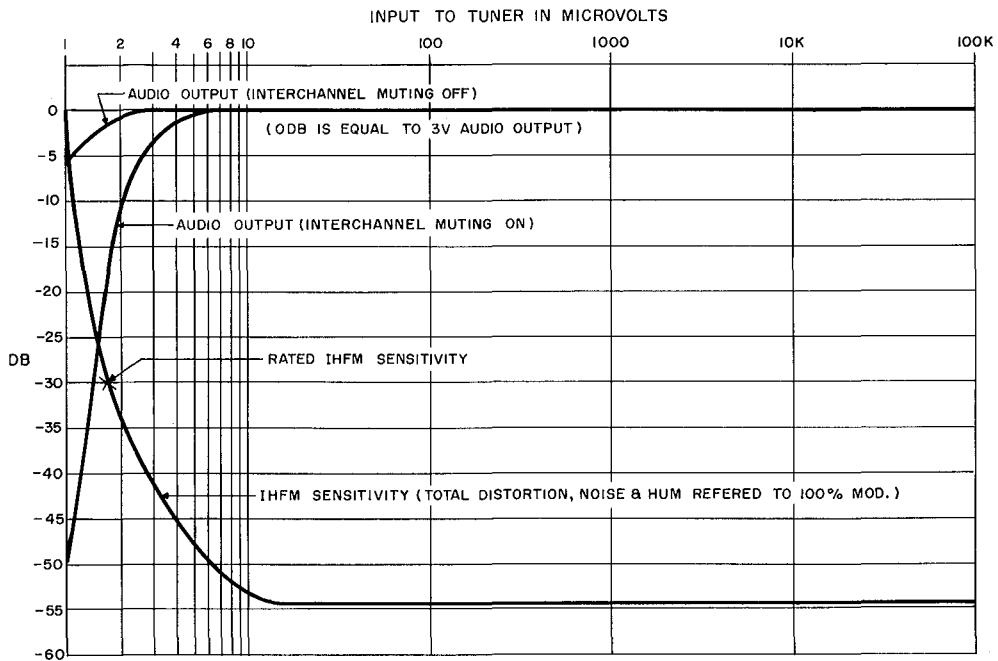
FREQUENCY RESPONSE

- - - - - CALCULATED
 ——— MEASURED AUDIO STAGE RESPONSE
 ——— MEASURED OVERALL RESPONSE (LIMITS IN OVERALL RESPONSE CURVE ARE
 LIMITS IN MODULATION EQUIPMENT)

NOTES:

- 1- DEEMPHASIS NETWORK DISABLED.
- 2- MEASURED OVERALL RESPONSE WAS MADE USING BOONTON MODEL 202E SIGNAL GENERATOR
 EXTERNALLY MODULATED USING HEWLETT PACKARD MODEL 200CD AUDIO GENERATOR

SENSITIVITY



WARRANTY OF HARMAN-KARDON CITATION KITS

For a period of 90 days following the original date of purchase, all parts supplied with Harman-Kardon Citation Kits are guaranteed by the manufacturer to be free from defects in material and workmanship when put to normal use and service. This guaranty is specifically limited to the following conditions:

- (1) To validate the warranty, the warranty card accompanying each kit must be filled out completely and returned to the factory immediately following the date of purchase.
- (2) Harman-Kardon reserves the right to substitute replacement parts for any which may be found defective.
- (3) The warranty is effective only as to parts which are defective at the time of sale or become defective as the result of normal operation during the 90 day period following the date of sale.
- (4) This warranty is limited to those parts which are returned to the factory transportation prepaid, and in the judgment of Harman-Kardon are found defective under the terms of this warranty.
- (5) This warranty is specifically void as to any parts in which acid core solder or paste fluxes have been used.

This warranty is in lieu of all other warranties, express or implied, and all other obligations on the part of Harman-Kardon. Harman-Kardon neither assumes nor authorizes any one else to assume for it any other liability in connection with the sale of this instrument.

Harman-Kardon does not assume liability for damages or injuries incurred during the construction or operation of this kit.

SERVICE POLICY

Harman-Kardon has established a special consumer service division to answer all questions pertinent to the assembly, testing, or installation of this kit. Our superbly equipped factory service department is at your disposal in the event you require assistance to obtain the specified performance from your tuner. For information relating to your Harman-Kardon tuner, please address all correspondence to:

**HARMAN-KARDON INC.
CITATION DIVISION
PLAINVIEW, L. I., N. Y.
ATT: SERVICE MANAGER**

If your problem cannot be resolved through your own efforts and after you have received factory authorization (refer to warranty contract) pack the unit carefully and return via Railway Express, PREPAID, to the address listed above. Pack the tuner in a large, rugged container, preferably of wood, using a substantial quantity of padding such as excelsior, shredded paper, or crumpled newspaper. Attach a tag to the unit indicating your name and address and specific problem. Mentioning the other components in your installation may be of value.

Harman-Kardon will inspect and service your tuner at a minimum service charge of \$15 plus the cost of parts and tubes, provided the tuner has been constructed and completed in accordance with the instructions in this manual.

PLEASE NOTE THIS SERVICE APPLIES ONLY TO FULLY COMPLETED INSTRUMENTS. WE WILL NOT ACCEPT INCOMPLETE KITS OR THOSE THAT HAVE BEEN MODIFIED IN DESIGN. TUNERS SHOWING EVIDENCE OF ACID CORE SOLDER OR PASTE FLUX WILL SIMILARLY BE REFUSED.

UNPACKING

Set aside ample room on your workbench to unpack the contents of this kit. Handle all parts with care, for they may become damaged through carelessness. Check the contents of the carton and folds of the packing material. Do not discard the carton. Check against the master parts list to make certain all parts are present and are correct as to type and value. Whenever possible, the values are stamped on the outside of all the parts to facilitate identification.

PLEASE NOTIFY YOUR DEALER IMMEDIATELY IF A SHORTAGE OR ERRONEOUS PART IS DISCOVERED.

In the event of visible shipping damage, notify your dealer at once. If the kit was shipped to you, notify the transportation company without delay. Harman-Kardon will cooperate with you in such instances, but please note that only you can recover from the carrier for damages incurred during shipping.

To help us expedite delivery to you, it may occasionally be necessary for us to make minor part substitutions. Before these substitutions are made, they are thoroughly checked to be certain that the replacement is equal to or superior to the original component in every respect. For example, a 50 volt capacitor may be substituted for a 25 volt unit. In some instances, a 5% tolerance component may be substituted for a 10% unit. This would provide a component with closer tolerances than required. In every case, these substitutions will not affect the performance of the unit. Turn to the replacement parts list in the rear of this manual for the unpacking procedure.

CONSTRUCTION INFORMATION

TOOLS REQUIRED

Only standard tools are required for the proper assembly of this kit. The most important and frequently used tool will be the soldering iron. It should be a good one. A pencil type iron between 50 and 80 watts or a solder gun up to 100 watts is recommended. You will also require a long-nose pliers, diagonal cutters, screwdriver, sharp knife, solder (rosin core only), an adjustable wrench and some "Lubriplate" (small amount needed for pointer lubrication in final assembly). An ohmmeter could be of value but is not essential.

SOLDERING TECHNIQUE

Good solder connections are essential for the proper operation of this instrument. An improperly soldered connection or a "cold" solder joint can cause considerable difficulty and is extremely hard to locate. If you have little or no experience with soldering, it is suggested you read the following section carefully before proceeding with the construction of the kit. Practice your soldering on an old terminal strip or tube socket until you are certain you can attain a workable degree of skill. Soldering is not difficult. Merely observe the following rules and precautions:

1. USE ONLY ROSIN CORE (NON-CORROSIVE) SOLDER! The solder you purchase should be clearly labeled for radio and television use. The usual composition is 60% tin and 40% lead indicated on the package label as 60/40. Do not use so-called non-corrosive paste. This compound is highly corrosive when heated and will destroy the insulation value of non-conductors and will quickly lead to erratic or degraded performance. It has been our experience that the following solder offer the best results.

Alpha, Cen-tri-core energized rosin 60/40 alloy .062 dia.

Bow, AE 16 rosin core 60/40 alloy .062 dia.

Kester, "44" rosin core 60/40 alloy.

Kester, "Rosin Five" core 60/40 alloy.

Multi-core, Solder #13 SWG (5 core) Flux 364 (rosin) 60/40 alloy.

2. Use a high quality soldering iron in the 50-80 watt range. You may choose either the standard diamond or chisel tip. Always keep the tip clean and properly tinned in accordance with the manufacturer's instructions.
3. All terminals and leads must be free from dirt, wax, and corrosion, for solder will not adhere to dirty surfaces. Carefully scrape all terminals and leads which are not clean before applying solder.
4. Solder alone cannot be relied upon for strength. A good mechanical connection must always be made before applying solder. Tinning the leads on resistors and condensers is not always necessary, but is advisable for it helps the solder adhere more readily to the connection.
5. To solder properly, apply the soldering iron to the joint until the joint heats sufficiently to melt the solder. Apply the solder and hold the iron on the connection until the solder flows freely around and into the connection. Merely melting drops of solder onto the connection is not satisfactory and will result in faulty connections.
6. The general appearance of a connection can indicate if it is properly made. A "cold" solder joint presents a dull and pitted or grainy appearance. A good solder connection should have a bright and smooth appearance. When in doubt as to the condition of a connection, it may be tested by moving the leads slightly to determine if they are loose. Always apply fresh solder when correcting a loose or "cold" solder connection. As a rule, reheating the defective joint will not properly do the job.
7. When using your soldering iron, avoid applying excessive heat, as this can result in damage to certain components. When soldering a joint having a small component connected to it, the part may be protected from excessive heat produced by the iron by grasping the lead between the joint and the component with a long-nose pliers. The pliers will then conduct most of the heat away from the component, preventing overheating and damage.
8. Do not use excessive solder when making a connection. Use only enough solder to cover all leads and to insure a tight connection. Excessive solder may result in the formation of shorts between adjacent terminals, particularly on tube sockets and switch terminals.

ASSEMBLY PROCEDURE

These instructions are presented in a simple step-by-step sequence to make assembly and wiring of your Citation Kit as easy as possible. Please take time to read each step carefully before actually performing the work. A space (1) is provided to check off each step as it is completed. A second space (2) is provided to check off each step as it is inspected.

Note that in the pictorials each component is identified by a code designation. For example, V1-2 means tube socket V1, pin #2 etc.

Abbreviations (NS), (S-1), (S-2), etc. after these coding designations indicate whether or not that particular point should be soldered at this time. (NS) means "no solder" and indicates that more than one wire or component is connected to that terminal and it should not be soldered in that operation. (S-1) indicates that there is only one connection to that terminal and it should be soldered in that operation. (S-2) indicates that there are two connections to that terminal and both should be soldered, etc.

When wire lengths are specified, measure the length accurately with a ruler so that the finished wiring will be neat and dressed as shown in the pictorial. Straighten the wire out before measuring and cutting.

The Citation Tuner is wire in seven stages:

1. Main chassis
2. Terminal board
3. Pre-selector
4. Limiter-Discriminator
5. FM Cartridge
6. Front Panel
7. Multiplex

As each stage is wired it should be inspected before proceeding to the next stage. In this way any errors can be corrected before the construction of the kit has progressed to the final assembly.

Small components are packaged in plastic bags and positioned in the component boxes in a sequence which closely follows the step-by-step construction procedure.

Most resistors and capacitors are mounted on cards which will serve as convenient holders during construction. Bend the card at the scored lines until it forms a right angle. Use a piece of tape to hold it in shape.

The card now serves as a pyramid base with the leads pointing upward. This will simplify the selection and identification of the components as the work progresses.

There are photographs of various sections of the tuner. Use the photographs in conjunction with the pictorials as a guide for the correct location and wiring of the components.

CHASSIS ASSEMBLY

Now that you have checked your parts list and have become familiar with the components, put all pictorials in numerical order and clear your work area of everything except --

PICTORIAL 1, FIGURE A AND THE FOLLOWING ITEMS:

Component Box #1
A. C. Line Cord (Component Box #3)
Main Chassis

You will notice in the pictorial that some components are shown in exploded views, away from the chassis. These are to be used as a guide in the mounting of the components which are shown already mounted in place. Pay careful attention to the orientation shown, as each component has two possible mounting positions.

REFER TO FIGURE A.

In steps 1-10, use #6-32 x 3/8" binding head machine screws, with #6 lockwashers under #6-32 nuts to mount the following:

- | STEP # | (1) | (2) | |
|--------|-----|-----|---|
| 1 | () | () | 3 Position output socket (observe double lug for orientation), socket insulating strip, lug strip and internal tooth solder lug (no lockwasher required with solder lug). |
| 2 | () | () | Multiplex control receptacle. Observe Pin #1 for orientation. |
| 3 | () | () | A. C. convenience socket, one-terminal lug strip, and internal tooth solder lug (no lockwasher required). |
| 4 | () | () | Antenna terminal strip. Mount from top of chassis, as shown. |
| 5 | () | () | C63 electrolytic capacitor mounting wafer, one-terminal lug strip, two internal tooth solder lugs (no lockwasher required). |
| 6 | () | () | C62 electrolytic capacitor mounting wafer (mount from top of chassis), two-terminal lug strip, and harness lug. |
| 7 | () | () | C61 electrolytic capacitor mounting wafer (mount from top of chassis), one-terminal lug strip, and harness lug. |
| 8 | () | () | Cartridge input terminal strip. Mount from top of chassis. |
| 9 | () | () | Two solder lugs on left side panel. |
| 10 | () | () | Two harness lugs on right side panel. |
| 11 | () | () | Mount the interchannel muting control. Insert the solder shield between the control and the chassis. The shield should be positioned to extend under the lugs of the control. Hold the control firmly against the chassis and twist the mounting tabs 1/4 turn. |
| 12 | () | () | Mount the fuseholder with rubber washer (from top of chassis), with lockwasher and hex nut supplied. Insert the fuse into the fuse cap and then into the fuseholder. Lock in place with a clockwise twisting motion. |
| 13 | () | () | Mount the four terminal board spacers (standoffs). Use #6-32 x 1/4" binding head machine screws, #6 lockwashers under the heads of the screws. |
| 14 | () | () | Insert the A. C. line cord from the top of the chassis. Pull from bottom side until it snaps into place. |

REFER TO PICTORIAL 1, FIGURE B. and the following items:

Component Box #1
Component Box #3
Power Transformer

Mount the following lug strips using #6-32 x 3/8" binding head screws, #6 lockwashers between the chassis and the mounting lugs, as shown at center mounting lug of LS1, and #6 lockwashers under #6-32 nuts.

- | STEP # | (1) | (2) |
|--------|-----|---|
| 1 | () | () LS1, two internal tooth solder lugs (no lockwashers under mounting lugs with these solder lugs), and two lug strips. Insert the three screws into the holes in the chassis. Hold the screws in place and mount the components in the sequence shown. |
| 2 | () | () LS4, LS5, LS12, and LS13. |

Mount the following tube sockets. Use #4-40 x 1/4" binding head machine screws, #4 lockwashers under all #4-40 nuts. Observe Pin #1 orientation.

- | | | |
|----|-----|---|
| 3 | () | () V7-7 pin (bottom mount) and solder lug. |
| 4 | () | () V6-7 pin (bottom mount) and solder lug. |
| 5 | () | () V8-9 pin (top mount) with shield base. |
| 6 | () | () V9-9 pin (top mount) with shield base and two-terminal lug strip. |
| 7 | () | () V10-9 pin (bottom mount), and two-terminal lug strip as shown. |
| 8 | () | () Mount the power transformer using #8 external tooth lockwashers under #8-32 nuts. Make certain that all wires are pulled through the hole before tightening the nuts. |
| 9 | () | () Mount the discriminator transformer (5 lugs) from the top. Hold the transformer firmly against the chassis and insert the transformer mounting clip from the bottom. Observe orientation. Push one side of the mounting clip down until you hear it snap in place. Push the other side down until it snaps in place. Make certain that the clip is properly seated in the slots in the side of the transformer can. |
| 10 | () | () Mount the limiter transformer (2 lugs), following the same procedure outlined in step #9. |
| 11 | () | () Mount the pre-selector assembly from the top side of the chassis. Use # 6 x 1/4" sheet metal screws, #6 lockwashers under the heads of the screws. |
| 12 | () | () Mount the V1 Nuvistor socket. Observe orientation. Hold the socket firmly against the chassis and bend the two <u>outer</u> tabs flat and tight to the chassis. |
| 13 | () | () Mount the <u>electrolytic</u> capacitors by holding them firmly against the wafers and twisting the mounting tabs 1/4 turn. Note the position of the solid tab for proper orientation.
(a) 500 mfd/25 volt at C63.
(b) 50-50 mfd/300 volt - 50 mfd/250 volt at C62.
(c) 50 mfd/400 volt, 50 mfd/350 volt at C61. |

This completes the assembly of the chassis. Check against the pictorial for proper orientation of all components.

CHASSIS WIRING

REFER TO PICTORIAL 2 AND COMPONENT BOX #1 COMPONENT BOX #3

Cut the following wires, strip 1/4" of insulation from each end. Dress as shown in the pictorial. Use the assorted color hookup wire supplied in the plastic bag.

STEP #	(1)	(2)	COLOR	LENGTH	FROM	TO
1	()	()	Black	3 1/2"	C61-C(NS)	C63-C (S-1)
2	()	()	Black	6"	V10-4 (NS)	SL-6 (NS)
3	()	()	Black	11 1/2"	G1 (NS)	SL-5 (NS)
4	()	()	Black	4 1/4"	C63-A (NS)	R2-2 (NS)
5	()	()	Black	7 1/4"	SL-6 (NS)	LS7-1 (NS)
6	()	()	Black	9"	SL-6 (S-3)	V11-11 (NS)
7	()	()	Black	10 1/2"	V8-3 (NS)	Leave free, dress along side panel, through harness lugs.
8	()	()	Red	2"	C61-A (NS)	V10-3 (S-1)
9	()	()	Red	8 1/4"	C61-A (NS)	V11-3 (S-1)
10	()	()	Red	7 1/2"	LS4-3 (NS)	C62-D (NS)
11	()	()	Red	3"	C62-D (NS)	LS10 (NS)
12	()	()	Red	7 1/2"	LS10 (NS)	LS12-4 (NS)
13	()	()	Red	9 1/4"	C62-D (NS)	V8-6 (S-1)
14	()	()	Brown	5"	V8-9 (NS)	V9-9 (NS) Dress behind LS6
15	()	()	Brown	8"	V8-9 (S-2)	V11-1 (S-1)
16	()	()	Brown	1 3/4"	V8-4 (NS)	V9-4 (NS)
17	()	()	Brown	8 3/4"	V8-4 (NS)	V11-2 (S-1)
18	()	()	Brown	5 3/4"	V10-5 (NS)	LS4-5 (NS)
19	()	()	Brown	10 1/2"	V10-5 (NS)	LS12-3 (NS)
20	()	()	Black (with connector attached)		LS10 (NS)	Dress toward side panel, through harness lug, then leave free
21	()	()	Heavy yellow wire	15"	V11-6 (S-1)	Dress along side panel, through harness lug, leave free
22	()	()	Yellow (with connector attached)		V11-4 (NS)	Dress along side panel, through harness lug, leave free

Use solid bare wire to make the following connections. Make all leads as short as possible. Use the small sleeving over the wire at the points indicated.

STEP #	(1)	(2)	FROM	TO
23	()	()	C63-B (NS)	use sleeving C62-E (S-1)
24	()	()	C63-B (NS)	SL-5 (NS)
25	()	()	LS9-1 (NS)	use sleeving C62-C (S-1)
26	()	()	LS8 (NS)	use sleeving C61-B (S-1)
27	()	()	V8-4 (S-3)	V8-5 (NS)
28	()	()	V9-4 (S-2)	V9-5 (NS)
29	()	()	LS4-1 (NS)	through LS4-2 (NS) LS4-3 (NS)
30	()	()	R2-2 (S-2)	R2-3 (NS)

31 () () G1 (S-2) (output socket) (Dress away from J2) G2 (NS)
 32 () () G2 (S-2) LS14-2 (NS)

The following instructions refer to the power transformer leads. Cut the wires to the lengths indicated in the table, measuring from the chassis. Strip 3/8" of insulation from the end of each wire. Use caution when stripping these wires to avoid cutting the individual strands of the wire. Tin only the tip of the wires to hold the strands together. ("Tinning" is the process of applying a thin film of solder to the part to be soldered before the part is actually connected.)

Dress as shown in the pictorial to form a neat cable. Connect to the points indicated and cut off the excess wire.

Carefully bend the pins on the socket away from each other to avoid any possible contact between them.

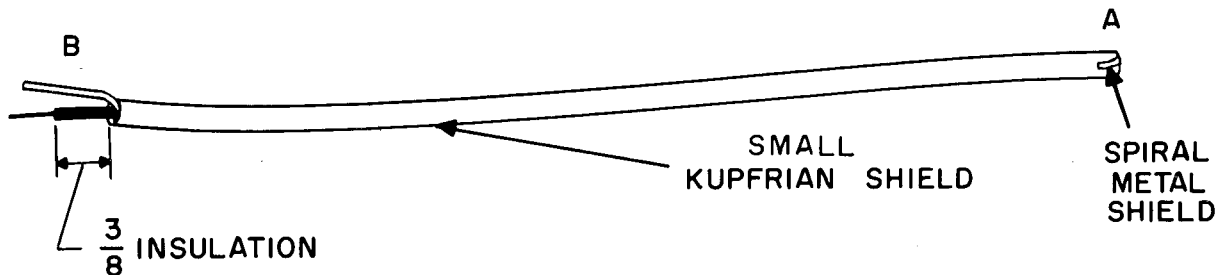
STEP #	(1)	(2)	COLOR	LENGTH		CONNECT TO
33	()	()	Red/yellow	3"		C63-A (S-2)
34	()	()	Black	4 3/8") Twist together as shown	AC-B (NS)
35	()	()	Black/white	7"		Fuse-A (S-1) Bend lug away from fuseholder.
36	()	()	Green/white	6"		V10-4 (S-2)
37	()	()	Green	6"		V10-5 (S-3)
38	()	()	Brown/white	7 3/4") Twist together	V9-9 (NS)
39	()	()	Brown	9"		V8-5 (S-2)
40	()	()	Red	7"		Leave Free

REFER TO FIGURE 1.

- 41 () () Notice that at one end (A) the spiral metal shield is bent over the insulation. Unwind approximately three turns of the spiral metal shield from the opposite end (B) of the 6" Kupfrian shield. Insert the red wire from the transformer into end (A). Slip the shield over the wire until 3/8" of the insulation of the red wire is exposed. Connect the shield wire to LS7-2 (NS). Connect the red wire to V10-1 (S-1).
- 42 () () Red/blue 6" Leave free
- 43 () () Follow the procedure outlined in step 38. Unwind approximately six turns from end (B) of the 5 1/4" Kupfrian shield. Slip over the red/blue wire. Straighten out the shield wire. Slip a piece of small sleeving over this wire and connect to LS7-2 (NS). Connect the red/blue wire to V10-7 (S-1).

Slip a piece of the large sleeving over each of the harness lugs and wrap the lugs around all of the wires to hold the cable in place.

FIGURE 1



STEP # (1) (2)
 44 () () Connect one lead of the A.C. line cord to AC-B (S-2). Connect the other lead to LS11 (NS).
NOTE: Insert the wire into the lug and using your soldering iron, heat the wire and form it around the lug. Cut off the excess wire. Do not solder LS11 at this time.

Position the following components as shown in the pictorial. Make all leads as short as possible.

			COMPONENT	VALUE	MARKING	FROM	TO
45	()	()	Resistor, 3 watt	12K ohm	on body	LS9-2 (NS)	LS10 (NS)
46	()	()	Resistor, 5 watt	330 ohm	on body	LS10 (NS)	LS9-1 (NS)
47	()	()	Resistor, 5 watt	330 ohm	on body	LS9-1 (S-3)	LS8 (NS)
48	()	()	Resistor, 5 watt	330 ohm	on body	LS8 (S-3)	C61-A (S-3)
49	()	()	Resistor, 1/2 watt	22K ohm, 10%	(red, red, orange, silver)	C62-D (S-4)	C62-F (NS)
50	()	()	Capacitor, small disc	.01 mfd, +80/-20%	on body	C63-B (NS)	C63-D (S-1)
51	()	()	Resistor, 5 watt	220 ohm	on body (use sleeving to C63-B)	C63-B (S-4)	C61-C (S-2)
NOTE: Make sure the body of the resistor does not touch any other lugs.							
52	()	()	Resistor, 1/2 watt	47K ohm	(yellow, violet, orange, silver)	R2-3 (S-2)	LS12-2 (NS)
53	()	()	Connect the center lead of the 2 x 10K/1400 volt disc capacitor to LS11 (NS). Connect one end of the capacitor to SL-7 (S-1) and connect the other end to AC-A (NS).				

Check previous steps for correct wiring and make certain that all (S) connections are soldered.

TERMINAL BOARD WIRING

REFER TO PICTORIAL 3, FIGURE A, and the following:

Component Box #3

Cut the following wires. Strip 3/4" of insulation from each end. Insert the bared section of the wire into the small holes from the bottom of the board. Wrap one complete turn around the bottom of the lug on the top of the board.

			COLOR	LENGTH	FROM LUG	TO LUG
1	()	()	Black	3 1/4"	#19 (NS)	#6 (NS)
2	()	()	Black	3 1/2"	#6 (NS)	#24 (NS)
3	()	()	Black	3 1/4"	#24 (S-2)	#21 (NS)
4	()	()	Red	4 3/4"	#17 (NS)	#22 (S-1)

Use bare wire and the small sleeving to make the following connections.

STEP #	(1)	(2)	FROM LUG	TO LUG
5	()	()	#16 (NS)	#25 (S-1)
6	()	()	#13 (NS)	#23 (S-1)
7	()	()	#12 (NS)	#21 (NS)

Cut the following wires. Strip 3/4" of insulation from one end. Insert this end through the small hole and connect to the bottom section of the lug. Strip 1/4" of insulation from the other end. Leave this end free. Dress as shown.

	COLOR	LENGTH	TO LUG
8	() () Red	6"	#18 (NS)
9	() () Black	5 3/4"	#19 (NS)
10	() () Blue	4 1/2"	#13 (S-2)
11	() () Gray	14 1/4"	#11 (NS)
12	() () Blue	5 1/4"	#20 (NS)

REFER TO PICTORIAL 3, FIGURE B.

Use bare wire to make the following connections. Wrap one complete turn around the bottom section of the lug.

	FROM LUG	TO LUG
13	() () #7 (NS)	#8 (S-1)
14	() () #9 (NS)	#10 (S-1)
15	() () #14 (S-1)	#15 (S-1)
16	() () #17 (S-2)	#18 (S-2)
17	() () #26 (NS)	#27 (S-1)
18	() () #28 (NS)	#29 (S-1)

Cut the following wires. Strip 1/2" of insulation from one end. Connect this end to the bottom section of the lug. Strip 1/4" of insulation from the other end. Leave this end free.

	COLOR	LENGTH	TO LUG
19	() () Green	2 1/2"	#1 (S-1)
20	() () Yellow	2 1/4"	#2 (NS)
21	() () Green	2"	#3 (S-1)
22	() () Green	2 1/2"	#4 (S-1)
23	() () Yellow	2 1/4"	#5 (S-1)
24	() () Black	5 1/4"	#6 (S-3)
25	() () Blue	3"	#7 (S-2)
26	() () Blue	6"	#9 (S-2)

27 () () Connect a 3.3 uh choke (orange, orange dot on body) to the Lug #26 (NS). Leave other end free.

NOTE: Use one of the brown shielded wires to practice the stripping procedure outlined in steps 28 and 29. When you are able to strip the outer insulation without cutting into the shield, then proceed with the following steps.

- STEP # (1) (2)
- 28 () () Prepare the blue shielded wire by stripping 3/4" of outer insulation from one end. Fan the shield away from the inner conductor and cut the strands of the shield as close to the outer insulation as possible. Make sure that there are no strands of the shield extending from the outer insulation. Strip 1/4" of insulation from the inner conductor. Tin the end.
- 29 () () Prepare the other end by stripping 3/4" of outer insulation. Fan the shield away from the inner conductor. Twist the shield and tin the end. Strip 1/2" of insulation from the inner conductor and tin the end. Connect this end (inner conductor) to the bottom of Lug #20 (S-2). Connect the shield to the bottom of Lug #19 (S-3). Leave the other end of the shielded wire free.
- 30 () () Prepare the long orange shielded wire by stripping 3/4" of outer insulation from one end. Fan the shield away from the inner conductor and cut the strands of the shield as close to the outer insulation as possible. Make sure that there are no strands of the shield extending from the outer insulation. Strip 1/2" of insulation from the inner conductor and tin the end. Connect this end (inner conductor), to the bottom of Lug #28 (S-2).
- 31 () () Prepare the other end by stripping 1" of outer insulation. Fan the shield away from the inner conductor. Twist the shield and tin the end. Strip 1/4" of insulation from the inner conductor and tin the end. Leave this end free.

WIRING COMPONENTS TO BOARD

REFER TO FIGURE C.

Center the components between the lugs. Wrap the leads one complete turn around the bottom section of the lugs, then cut off the excess wire.

	COMPONENT	VALUE	MARKING	FROM LUG	TO LUG
32	() () Capacitor, disc	.05/50 volt	on body	#11 (S-2)	#21 (S-3)
		(Dress body in upright position)			
33	() () Resistor, 1/2 watt	1.2K ohm, 10%	(brown, red, red, silver)	#2 (NS)	#12 (NS)
34	() () Capacitor, disc	.05/50 volt	on body	#2 (S-3)	#12 (S-3)
		(Dress body in upright position)			
35	() () Resistor, 1/2 watt	33K ohm, 10%	(orange, orange, orange, silver)	#16 (S-2)	#26 (S-3)

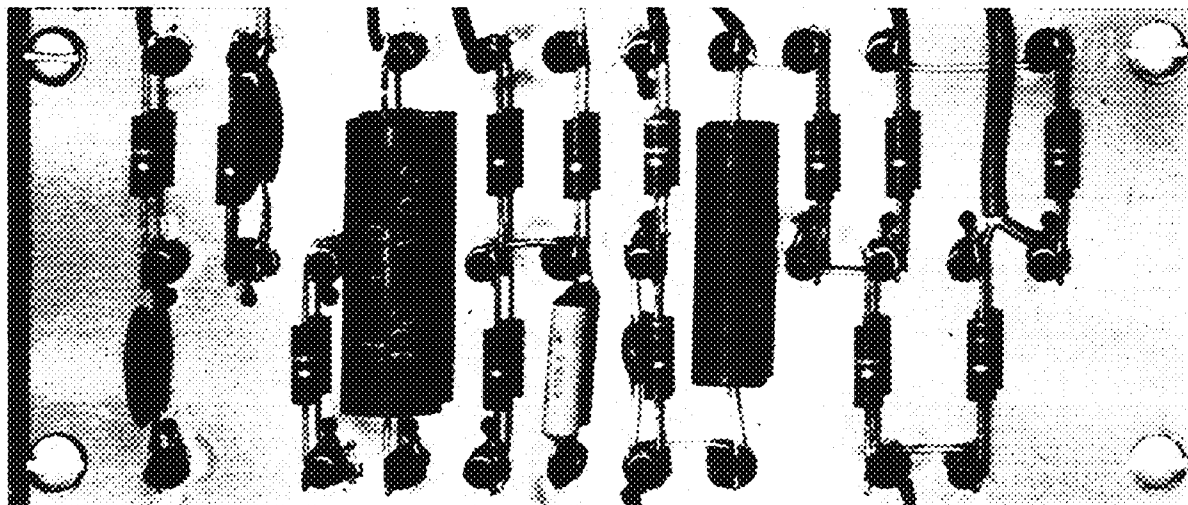
Connect the following components to the top section of the lugs.

36	() () Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	#1 (S-1)	#11 (S-1)
37	() () Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	#13 (S-1)	#22 (S-1)
38	() () Resistor, 1/2 watt	1 Meg ohm, 10%	(brown, black, green, silver)	#4 (S-1)	#14 (NS)

STEP #	(1)	(2)	COMPONENT	VALUE	MARKING	FROM LUG	TO LUG
39	()	()	Resistor, 1/2 watt	10K ohm, 10%	(brown, black, orange, silver)	#14 (S-2)	#24 (S-1)
40	()	()	Capacitor, tubular	.1 mfd/400 volt	on body	#3 (S-1)	#23 (S-1)
41	()	()	Resistor, 1/2 watt	680 ohm, 10%	(blue, gray, brown, silver)	#5 (S-1)	#15 (NS)
42	()	()	Capacitor, tubular	2 mfd/25 volt	on body	#15 (S-2)	#25 (S-1)
(Observe polarity; + end to #15)							
43	()	()	Resistor, 1/2 watt	470K ohm, 10%	(yellow, violet, yellow, silver)	#6 (S-1)	#16 (NS)
44	()	()	Capacitor, disc	10 mmf, 10%	on body	#16 (S-2)	#26 (S-1)
45	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	#8 (S-1)	#17 (S-1)
46	()	()	Capacitor, tubular	.047 mfd/400 volt	on body	#7 (S-1)	#27 (S-1)
47	()	()	Resistor, 1/2 watt	1.5 Meg ohm, 10%	(brown, green, green, silver)	#9 (S-1)	#18 (NS)
48	()	()	Resistor, 1/2 watt	150K ohm, 10%	(brown, green, yellow, silver)	#18 (S-2)	#28 (S-1)
49	()	()	Resistor, 1/2 watt	3.3K ohm, 10%	(orange, orange, red, silver)	#19 (S-1)	#29 (S-1)
50	()	()	Resistor, 1/2 watt	680K ohm, 10%	(blue, gray, yellow, silver)	#10 (S-1)	#20 (S-1)

Inspect the completed board for correct wiring and proper location of components. All lugs should be soldered.

TERMINAL BOARD



MOUNTING AND WIRING OF TERMINAL BOARD TO CHASSIS

REFER TO PICTORIAL 4, AND THE FOLLOWING: Component Box #1 and Component Box #3.

- | STEP # | (1) | (2) | |
|--------|-----|-----|---|
| 1 | () | () | Mount the terminal board to the spacers in the chassis. Observe orientation. Use #6-32 x 1/4" screws, #6 lockwashers under the heads of the screws. |
| 2 | () | () | Dress the gray wire (from under the board), the orange wire from Lug #28 and the blue wire from Lug #20 along the side panel toward the front of the chassis. Bend the harness lugs over the wires to hold them in place temporarily. |
| 3 | () | () | Break out the orange wire to LS3. Connect the inner conductor to LS3 (NS). Connect the shield to LS1-1 (NS). |

Connect the following wires from under the board.

STEP #	(1)	(2)	
4	()	()	Dress the red wire (from Lug #18) under the cable harness and connect to C62-F (S-2).
5	()	()	Dress the black wire (from Lug #19) under the cable harness and connect to SL-5 (S-3).
6	()	()	Dress the blue wire (from Lug #20) under the black and black/white twisted transformer wires and connect to R2-1 (S-1).
7	()	()	Dress the blue wire (from lug #13) down to the chassis and connect to V9-6 (S-1).

Connect the following wires from the top side of the board to the points indicated.

		COLOR	FROM LUG	TO
8	()	()	Black #6	LS6-2 (NS) (Dress down to the chassis)
9	()	()	Blue #9	V8-1 (S-1) (Dress down to the chassis)
10	()	()	Blue #7	V9-1 (S-1) (Dress down to the chassis)
11	()	()	Green #1	V8-2 (NS) (Dress over the tube socket)
12	()	()	Yellow #2	V9-3 (S-1)
13	()	()	Green #3	V9-2 (NS)
14	()	()	Green #4	V9-7 (NS) (Dress over the tube socket)
15	()	()	Yellow #5	V9-8 (S-1)
16	()	()	Connect the free end of the 3.3 uh choke to LS14-1 (NS).	

Inspect the previous steps for correct connections and proper dressing of wires. Make certain that all (S) points are soldered.

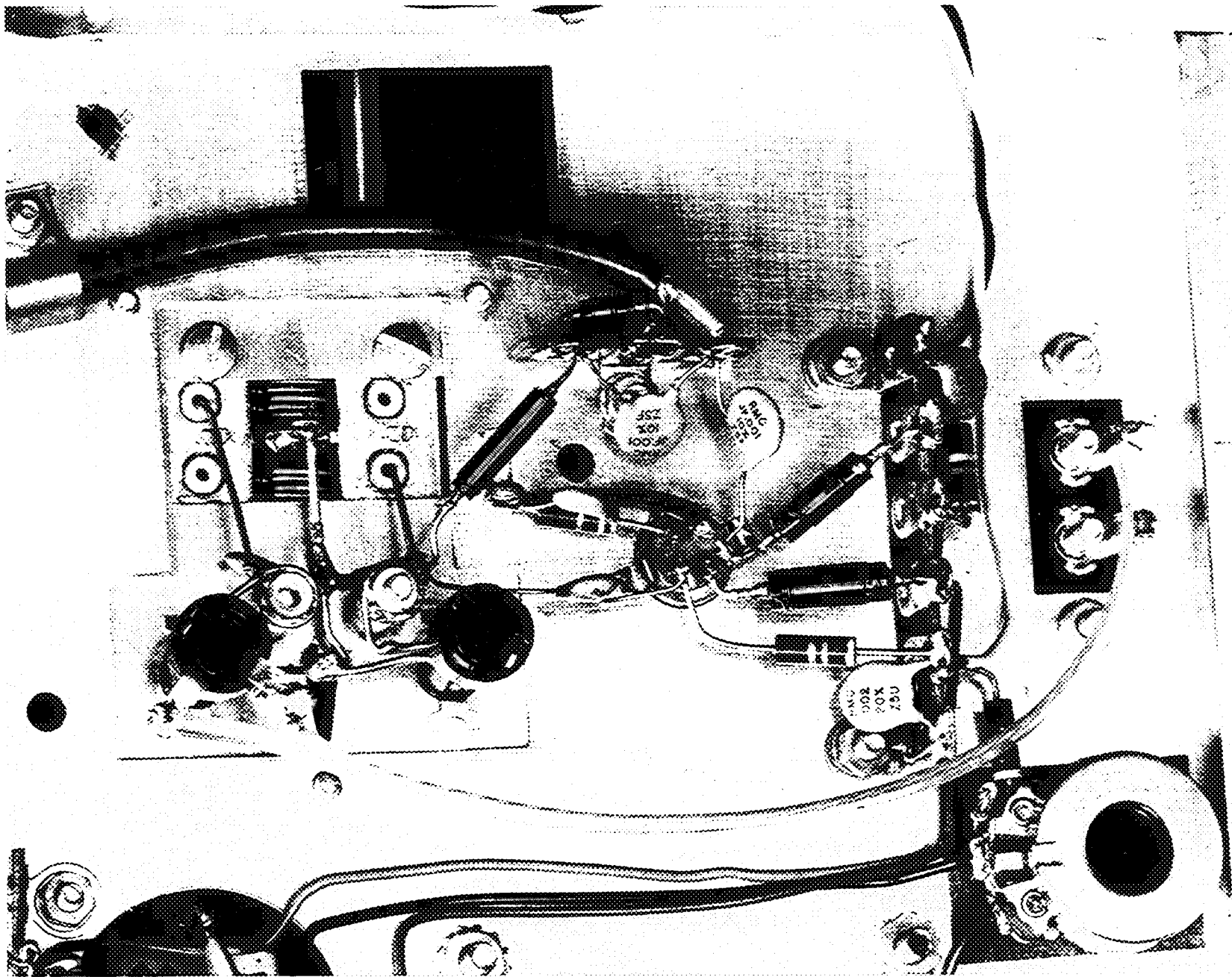
Position the following components as shown in the pictorial. IMPORTANT: Make all leads as short as possible.

STEP #	(1)	(2)	COMPONENT	VALUE	MARKING	FROM	TO
17	()	()	Resistor, 1/2 watt	39 ohm, 10%	(orange, white, black, silver)	V9-5 (S-2)	LS7-1 (NS)
18	()	()	Resistor, 1/2 watt	39 ohm, 10%	(orange, white, black, silver)	V9-9 (S-3)	LS7-1 (S-3)
					(Dress under the yellow wire.)		
19	()	()	Resistor, 1/2 watt	1 Meg ohm, 10%	(brown, black, green, silver)	V9-2 (S-2)	LS6-2 (NS)
					(Dress under the yellow wire.)		
20	()	()	Bare wire			V8-3 (S-2)	LS6-2 (NS)
21	()	()	Capacitor, disc	.02 mfd, 20%	on body	V8-2 (S-2)	LS6-2 (NS)
22	()	()	Resistor, 1/2 watt	680 ohm, 10%	(blue, gray, brown, silver)	V8-8 (S-1)	LS6-1 (NS)
23	()	()	Resistor, 1/2 watt	1 Meg ohm, 10%	(brown, black, green, silver)	V8-7 (NS)	LS6-1 (NS)
					(Dress over the tube socket.)		
24	()	()	Resistor, 1/2 watt	10K ohm, 10%	(brown, black, orange, silver)	LS6-1 (NS)	LS6-2 (NS)
25	()	()	Cut a green wire 7" long. Strip 1/4" of insulation from each end. Connect one end to LS6-1 (S-4). Dress along the side panel through the harness lugs toward the front panel. Leave the other end free.				
26	()	()	Prepare the white shielded wire by stripping 3/4" of outer insulation from one end. Fan the shield away from the inner conductor. Twist and tin the end of the shield. Strip 1/4" of insulation from the inner conductor and tin the end.				

- STEP # (1) (2)
- 27 () () Prepare the other end by stripping 1/2" of outer insulation. Fan the shield away from the inner conductor. Twist and tin the end of the shield. Strip 1/4" of insulation from the inner conductor. Tin the end. Connect this inner conductor to J1 on the output socket (S-1). Connect the shield to SL8 (S-1). Dress the other end through the harness lugs along the side panel toward the front of the chassis. Leave this end free.
- 28 () () Prepare one end of the black/white shielded cable by stripping 3/4" of outer insulation. Fan the shield away from the inner conductors. Twist the shield and tin the end. Strip 1/2" of insulation from the inner conductor and tin the end.
- 29 () () Prepare the other end of the black/white shielded cable by stripping 1 1/4" of outer insulation. Fan the shield away from the inner conductor. Twist the shield and tin the end. Strip 1/2" of insulation from the inner conductor and tin the end. Connect the inner conductor to V11-8 (S-1) and the shield to V11-11 (NS)
- 30 () () Prepare the white/green, green/white, white/orange, blue/green and red/green shielded cables as described below.
- 31 () () Strip 3/4" of outer insulation from one end. Fan the shield away from the inner conductor and cut the strands of the shield as close to the outer insulation as possible. Make sure there are no strands of the shield extending from the outer insulation. Strip 1/4" of insulation from the inner conductor. Tin the end.
- 32 () () Prepare the other end of all 5 cables by stripping 3/4" of outer insulation. Fan the shield away from the inner conductor. Twist the shield and tin the end. Strip 1/2" of insulation from the inner conductor and tin the end. Connect this end of all these cables to the points indicated.
- 33 () () Red/Green Inner conductor to V11-9 (S-1)
Shield to V11-11 (NS)
- 34 () () Blue/Green Inner conductor to V11-10 (S-1)
Shield to V11-11 (S-4)
- 35 () () White/Orange Inner conductor to LS14-1 (S-2)
Shield to LS14-2 (NS)
- 36 () () Green/White Inner conductor to J3 (S-1)
Shield to LS14-2 (NS)
- 37 () () White/Green Inner conductor to J2 (S-1)
Shield to LS14-2 (S-4)
- 38 () () Dress all six cable along the side panel through the harness lugs toward the front panel. Leave these ends free.
- 39 () () Cut a heavy green wire 12" long. Strip 1/4" of insulation from each end. Connect one end to V9-7 (S-2). Dress under the 39 ohm resistor.
- 39A () () Connect a 47K ohm 1/2 watt 10% resistor (yellow, violet, orange, silver) between V11-4 (S-2) and V11-7 (S-1).

REFER TO FIGURE 1 - PAGE 11.

- 40 () () Unwind 4 turns from end "B" of the 10 3/4" Kuprian shield. Straighten and slip 1 1/4" of small sleeving over the wire. Slip end "B" over the heavy green wire. Connect the shield wire to LS7-2 (S-3). Dress the other end through the harness lugs into the side panel harness.



PRE-SELECTOR WIRING

REFER TO PICTORIAL 5 AND PHOTO #1.

- | STEP # | (1) | (2) |
|--------|-----|---|
| 1 | () | () Connect one end of the cartridge interconnecting lead (no plug) to the cartridge input terminal strip. Inner conductor to Lug #2 (S-1). Shield to Lug #1 (S-1). |
| 2 | () | () Connect the other end to lug strip LS13. Inner conductor to LS13-3 (NS). Shield to LS13-2 (NS). |
| 3 | () | () Cut a black wire 13 1/2" long. Strip 1/4" of insulation from each end. Connect one end to LS12-6 (NS). Leave the other end free. |
| 4 | () | () Cut a yellow wire 14 1/2" long. Strip 1/4" of insulation from each end. Connect one end to LS12-2 (NS). Twist together with the black wire connected to LS12-6 and dress along the side panel toward the front of the chassis. Bend the two solder lugs over the wires to hold them in place. |

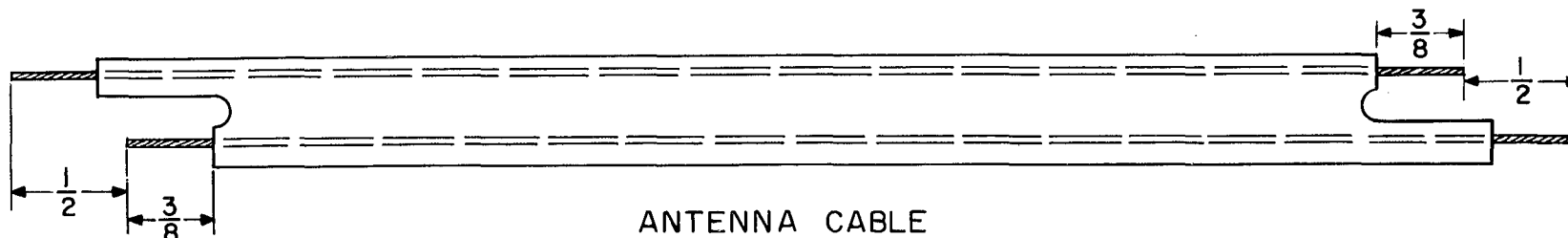
NUVISTOR SOCKET WIRING

NOTE: The pins on the nuvistor socket are very fragile. Do not try to wrap the wires around the pins. Insert the leads of the components into the hole in the pins, solder, then cut off the excess wire. Carefully bend the pins away from each other to avoid any possible contact between them. Make all leads as short as possible.

- | | | | |
|----|-----|-----|--|
| 5 | () | () | Connect a bare wire from V1-12 (NS) to V1 socket base (S-1). |
| 6 | () | () | Connect a bare wire (use sleeving) from V1-12 (S-2) to the ground lance (NS). |
| | | | COMPONENT VALUE MARKING FROM TO |
| 7 | () | () | Resistor, 1/2 watt 39 ohm, 10% (orange, white, black, silver) V1-8 (NS) ground lance (NS) |
| 8 | () | () | Capacitor, disc 470 mmf, 10% on body V1-8 (S-2) ground lance (S-3) |
| 9 | () | () | Capacitor, disc .001 mfd, 10% on body LS13-1 (NS) LS13-3 (NS) |
| 10 | () | () | Capacitor, disc .001 mfd, 10% on body V1-2 (NS) LS13-3 (S-3) |
| 11 | () | () | Capacitor, disc .002 mfd, 20% on body LS12-5 (NS) LS12-6 (S-2) |
| 12 | () | () | Resistor, 1 watt 27K ohm, 10% (red, violet, orange, silver) LS12-4 (NS) LS12-5 (NS) |
| 13 | () | () | Resistor, 1 watt 27K ohm, 10% (red, violet, orange, silver) LS12-4 (S-3) LS12-5 (NS) |
| 14 | () | () | Choke 1.0 uh Black dot on body V1-2 (S-2) LS12-5 (S-4) |
| 15 | () | () | Choke 3.3 uh Orange, orange dots on body V1-10 (S-1) LS12-3 (S-2) |
| 16 | () | () | Resistor, 1/2 watt 100K ohm, 10% (brown, black, yellow, silver) LS12-1 (NS) LS12-2 (NS) |
| 17 | () | () | Capacitor, disc .002 mfd, 20% on body LS12-1 (S-2) LS12-2 (NS) |
| 18 | () | () | Resistor, 1/2 watt 47K ohm, 10% (yellow, violet, orange, silver) V1-4 (NS) LS12-2 (S-5) |
| 19 | () | () | Choke .24 uh small body, red, yellow dot on body LS13-1 (NS) LS13-2 (S-2) |
| 20 | () | () | Connect the free end of the 470 mmf disc capacitor (from the pre-selector assembly) to V1-4 (S-2). |
| 21 | () | () | Connect the free end of the 1.7 uh choke (from the pre-selector assembly) to LS13-1 (S-3). |

- STEP # (1) (2)
- 22 () () Prepare the antenna cable as shown in Figure 2. Cut off 1/2" from one of the wires at each end as shown. Strip back 3/8" of insulation and tin the ends.
- 23 () () Connect the two leads of one end to lugs #1 and #2 on the coil of the pre-selector assembly. (Solder both lugs).
- 24 () () Connect the two leads of the other end to lugs #1 and #2 on the antenna terminal strip (solder both lugs).
 () Carefully check the previous steps before proceeding.

FIGURE 2



WIRING OF LIMITER AND DISCRIMINATOR SECTION

REFER TO PICTORIAL 6, FIGURE A

- 1 () () Bend V6-4 and V7-4 against the center pins of their sockets. Rotate the center pin of each socket so that one of the small holes is in line with the hole of pin #4. Insert a piece of bare wire through V6-4 and the hole in the center pin, and bend it over to make a mechanically secure connection (S-1).
- 2 () () Connect a bare wire through V7-4 and the hole in the center pin (S-1) to SL3 (NS).
- 3 () () Connect a 100 mmf, 20% disc capacitor (value marked on body) from pin #2 on the discriminator transformer (NS) to LS5-1 (NS).

Cut the following wires. Strip 1/4" of insulation from each end.

	COLOR	LENGTH	FROM	TO
4	() () Black	1 3/4"	V6 center pin (S-1)	SL2(NS)
5	() () Brown	4 1/2"	V6-3 (NS)	V7-3 (S-1)
6	() () Brown	11 1/2"	LS4-5 (NS)	leave free

Dress to the rear of LS5 and with the group of wires in the harness lugs along the side panel toward the front of the chassis.

- 7 () () Prepare the orange shielded wire by stripping 1" of outer insulation from one end. Fan the shield, twist and tin the end. Strip the inner conductor 1/4" of insulation, tin the end. Connect the inner conductor at this end to LS3 (NS), shield to LS1-1(NS). Make the shield as short as possible and cut off any excess.

- STEP #** (1) (2)
- 8 () () Prepare the other end by stripping 1/2" of outer insulation. Cut off the shield. Strip 1/4" of insulation from the inner conductor, tin the end. Dress as shown. Leave this end free.
- 9 () () Prepare the green shielded wire as outlined in step #7. Connect the inner conductor to LS2-4(NS), the shield to LS1-5 (NS).
- 10 () () Prepare the other end as outlined in step #8. Dress along the rear of LS1 as shown. Leave this end free.

Prepare the following shielded wires by stripping 3/4" of outer insulation from each end. Fan the shield, twist and tin the ends. Strip 1/4" of insulation from the inner conductors and tin the ends. Connect one end, dress as indicated, leave the other end free.

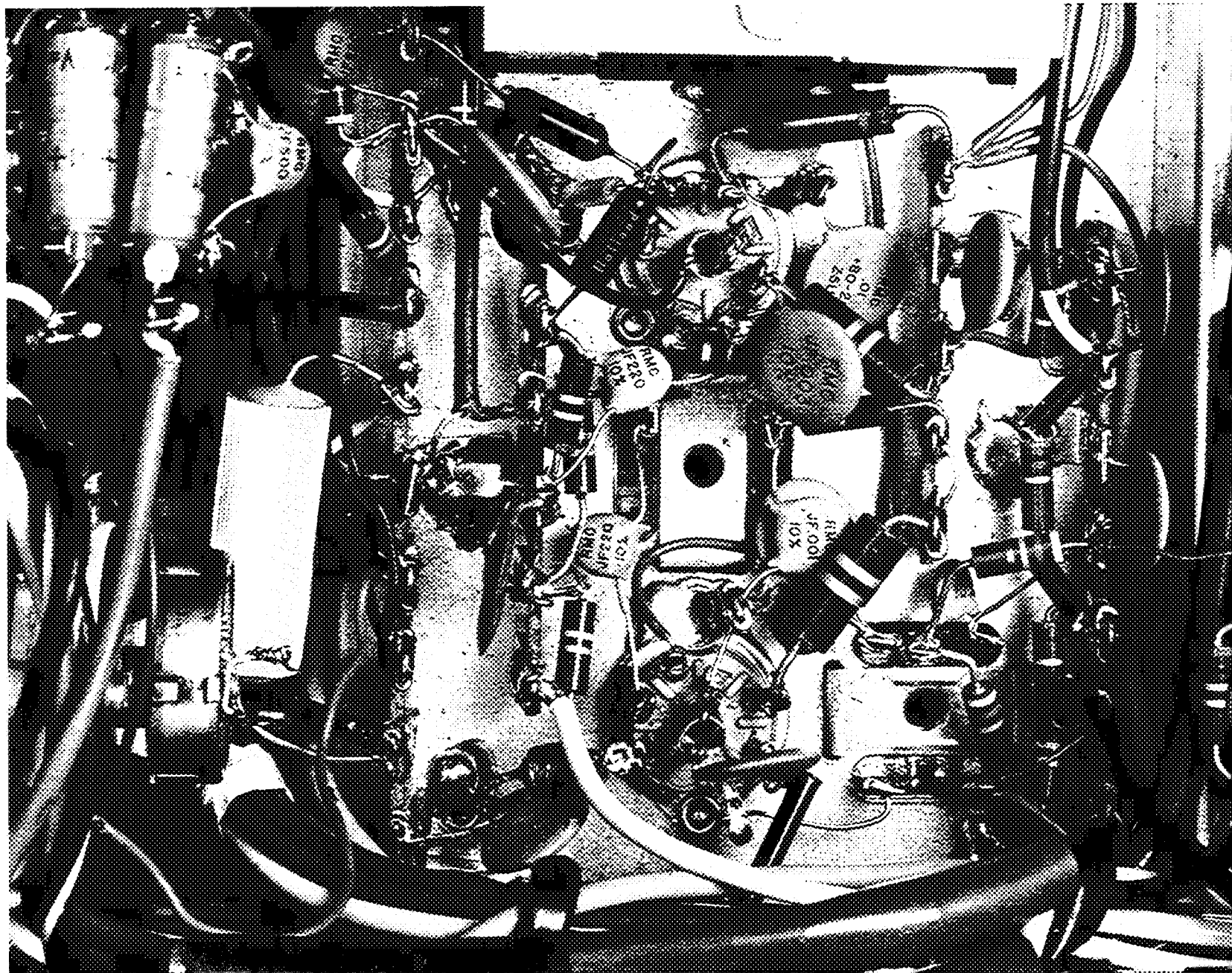
- | | COLOR | CONNECT INNER CONDUCTOR TO | CONNECT SHIELD TO |
|----|---|---|--------------------------|
| 11 | () () Red | LS5-2 (NS) | LS5-1 (S-2) |
| 12 | () () Yellow | LS5-7 (NS) | LS5-8 (NS) |
| | Dress both wires behind LS5 down against the chassis and then up into side panel harness through the harness lugs toward the front panel. | | |
| 13 | () () Brown | LS1-8 (NS) | LS1-9 (NS) |
| | Dress along the front of the chassis | | |
| 14 | () () | Slip a piece of the large sleeving over each of the harness lugs on the side panel. Wrap the lugs around the wires and push them over so that they rest between the wires and the screws. | |

REFER TO PICTORIAL 6, FIGURE B.

Break out the white/green, green/white, white/orange, blue/green, red/green and black/white shielded cables as shown. Dress the remaining wires of the harness down to the chassis and to the front side of LS1. Connect as follows.

- | | COLOR | CONNECT TO |
|----|---|---|
| 15 | () () Brown | LS1-4 (NS) |
| 16 | () () Gray | LS1-11 (NS) |
| 17 | () () Green | LS1-2 (NS) |
| 18 | () () Black | LS1-3 (NS) |
| 19 | () () White, inner conductor | LS1-6 (NS) |
| | Shield | LS1-5 (S-2) |
| 20 | () () Green (inside of Kupfrian shield) | LS1-12 (NS) |
| 21 | () () | Wrap two turns of a piece of cable wrap around the group of wires at the three points opposite each of the mounting lugs of LS1. |
| 22 | () () | Mount the large plastic cable clamp over all remaining wires. Insert a #6-32 x 3/8" screw from the rear side of the chassis flange. Slip the clamp over the wires, flat side against the chassis. Follow with a #6 flatwasher, #6 lockwasher and a #6-32 nut. |
| 23 | () () | Break out the yellow, blue, green, and orange shielded wires at this point. |
| 24 | () () | Mount the small plastic cable clamp over the red and brown shielded wires. Follow the same procedure as outlined for the large cable clamp in step 22. |
| 25 | () () | Cut a black wire 3 1/2" long. Strip 1/4" of insulation from each end. Connect one end to LS1-3 (S-2). Leave other end free. |
| 26 | () () | Cut a brown wire 3 1/2" long. Strip 1/4" of insulation from each end. Connect one end to LS1-4 (NS). Leave other end free. |

Check the previous steps for correct wiring before proceeding.



IMPORTANT NOTE: THE PHYSICAL LOCATION OF COMPONENTS IN THIS PART OF THE CIRCUIT IS VERY CRITICAL. ANY DEVIATION FROM THE POSITIONS INDICATED IN THE PHOTO COULD AFFECT THE PERFORMANCE OF THE INSTRUMENT. MAKE ALL LEADS AS SHORT AS POSSIBLE.

STEP #	(1)	(2)	COMPONENT	VALUE	MARKING	FROM	TO
26	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	LS5-2 (S-2)	LS5-3 (NS)
27	()	()	Bare wire			Discr. -2 (NS)	LS5-3 (NS)
28	()	()	Resistor, 1/2 watt	1 Meg ohm, 10%	(brown, black, green, silver)	LS5-3 (NS)	LS5-4 (NS)
29	()	()	Capacitor, tubular	.1 mfd, 200 volt	on body	LS5-3 (S-4)	V8-7 (S-2)
				(Dress body close to V8, use sleeving on lead to LS5-3.)			
30	()	()	Capacitor, disc	10 mmf	on body	Discr. -1 (NS)	Discr. -5 (NS)
				(Dress body close to chassis.)			
31	()	()	Bare wire			Discr. -1 (S-2)	LS5-5 (NS)
32	()	()	Resistor, 1/2 watt	1 Meg ohm, 10%	(brown, black, green, silver)	LS5-4 (NS)	LS5-7 (NS)
				(Use sleeving on both leads.)			
33	()	()	Resistor, 1/2 watt	47K ohm, 5%	(yellow, violet, orange, gold)	Discr. -5 (NS)	LS5-5 (NS)
34	()	()	Capacitor, disc	.02 mfd, 20%	on body	LS5-4 (S-3)	LS5-5 (NS)
35	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	LS5-5 (NS)	LS5-6 (S-1)
36	()	()	Bare wire			LS5-5 (S-5)	LS6-2 (S-6)
37	()	()	Capacitor, disc	.02 mfd, 20%	on body	LS5-7 (NS)	LS5-8 (NS)
38	()	()	Resistor, 1/2 watt	2.2 Meg ohm, 10%	(red, red, green, silver)	LS5-7 (NS)	LS5-8 (NS)
39	()	()	Resistor, 1/2 watt	47K ohm, 5%	(yellow, violet, orange, gold)	Discr. -2 (S-3)	Discr. -5 (S-3)
				(Dress toward LS5. Keep the alignment hole in the transformer can clear.)			
40	()	()	Bare wire			Discr. -3 (S-1)	V7-7 (S-1)
41	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	V7-6 (NS)	LS3 (S-3)
				(Use sleeving on lead to V7)			
42	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	V7-6 (S-2)	V7 Center Pin (S-1)
43	()	()	Capacitor, disc	.002 mfd, 20%	on body	V7-5 (NS)	SL3 (NS)
				(Dress body of capacitor down to chassis.)			
44	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	Discr. -4 (NS)	SL3 (NS)
				(Dress body of capacitor down to chassis.)			
45	()	()	Resistor, 1/2 watt	1K ohm, 10%	(brown, black, red, silver)	Discr. -4 (S-2)	LS4-1 (NS)
46	()	()	Resistor, 1 watt	22K ohm, 10%	(red, red, orange, silver)	V7-5 (S-2)	LS4-1 (S-3)
47	()	()	Choke	80 uh	no marking	V7-2 (NS)	SL1 (S-1)
				(Use sleeving on lead to V7. Dress body of choke tight to chassis.)			
48	()	()	Resistor, 1/2 watt	220 ohm, 10%	(red, red, brown, silver)	V7-1 (NS)	LS1-1 (NS)
49	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	V7-1 (S-2)	LS1-1 (S-4)
				(Dress above 220 ohm resistor.)			

STEP #	(1)	(2)	COMPONENT	VALUE	MARKING	FROM	TO
50	()	()	Resistor, 1/2 watt	8.2K ohm, 10%	(gray, red, red, silver)	Lim. -1 (NS)	Lim. -2 (NS)
51	()	()	Bare wire			Lim. -1 (NS)	V6-7 (S-1)
52	()	()	Capacitor, disc	220 mmf, 10%	on body	V7-2 (S-2)	Lim. -1 (S-3)
(Center the body of the capacitor between the two connection points and dress down to the chassis.)							
53	()	()	Capacitor, disc	.001 mfd, 10%	on body	Lim. -2 (NS)	SL3 (S-4)
54	()	()	Resistor, 1/2 watt	1K ohm, 10%	(brown, black, red, silver)	Lim. -2 (NS)	LS4-2 (S-2)
55	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	V6-6 (NS)	SL4 (NS)
(Dress body of capacitor down to chassis.)							
56	()	()	Resistor, 1/2 watt	220K ohm, 10%	(red, red, yellow, silver)	LS2-1 (NS)	LS2-2 (NS)
57	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	LS2-3 (NS)	LS2-5 (NS)
58	()	()	Capacitor, disc on body	220 mmfd, 10%		LS2-3 (NS)	LS2-5 (NS)
59	()	()	Capacitor, disc on body	.05 mfd, 50 volt		LS2-2 (NS)	LS2-3 (S-3)
60	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	LS2-2 (S-3)	LS2-5 (NS)
60A	()	()	Resistor 1/2 watt, 220K ohm, 10%		(red, red, yellow, silver)	LS2-1 (NS)	LS2-2 (NS)
61	()	()	Diode	1N87	On body	LS2-5 (S-4)	V6-2 (NS)
(Observe polarity, striped end to LS2-5)							
62	()	()	Connect yellow wire from chassis side rail to LS2-1			(S-2)	
63	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	V6-6 (S-2)	LS2-4 (S-2)
64	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	V6-3 (NS)	SL4 (S-2)
(Dress body of capacitor down to chassis.)							
65	()	()	Resistor, 1 watt	22K ohm, 10%	(red, red, orange, silver)	V6-5 (NS)	LS4-3 (NS)
66	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	LS4-3 (S-4)	LS4-4 (S-1)
(Dress down to chassis.)							
67	()	()	Capacitor, disc	.003 mfd, 10%	on body	Lim. -2 (S-4)	V6-5 (S-2)
68	()	()	Choke	3.3 uh	orange, orange dots on body	V6-3 (S-3)	LS4-5 (NS)
69	()	()	Resistor, 1/2 watt	22K ohm, 10%	(red, red, orange, silver)	LS1-9 (NS)	LS1-11 (NS)
70	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	LS1-8 (S-2)	LS1-10 (NS)
71	()	()	Resistor, 1/2 watt	100K ohm, 10%	(brown, black, yellow, silver)	LS1-10 (NS)	LS1-11 (S-3)
72	()	()	Resistor, 1/2 watt	470K ohm, 10%	(yellow, violet, yellow, silver)	LS1-9 (NS)	LS1-10 (NS)
73	()	()	Connect the inter connecting lead with the plug attached to one end. Insert the stripped end through the hole in the chassis near V6 socket. Connect the inner conductor to V6-2 (NS). Connect the shield to SL2 (S-2). Make the shield as short as possible. Cut off the excess.				
74	()	()	Resistor, 1/2 watt	220 ohm, 10%	(red, red, brown, silver)	V6-1 (NS)	LS1-9 (NS)
75	()	()	Capacitor, disc	.01 mfd, +80/-20%	on body	V6-1 (S-2)	LS1-9 (NS)
76	()	()	Diode	1N87	on body	V6-2 (S-3)	LS1-10 (NS)
(Observe polarity, striped end to V6-2.)							
77	()	()	Capacitor, disc	220 mmf, 10%	on body	LS1-10 (S-5)	LS1-9 (S-6)
78	()	()	Capacitor, tubular	.47 mfd/200 volt	on body	LS1-2 (NS)	LS1-7 (NS)
(Use 1 1/2" sleeving on both leads. Dress down against chassis flange.)							
79	()	()	Capacitor, electrolytic	4 mfd/350 volt	on body	LS1-2 (S-3)	LS1-6 (S-2)
(plus terminal to lug #2)							

FLYWHEEL ASSEMBLY

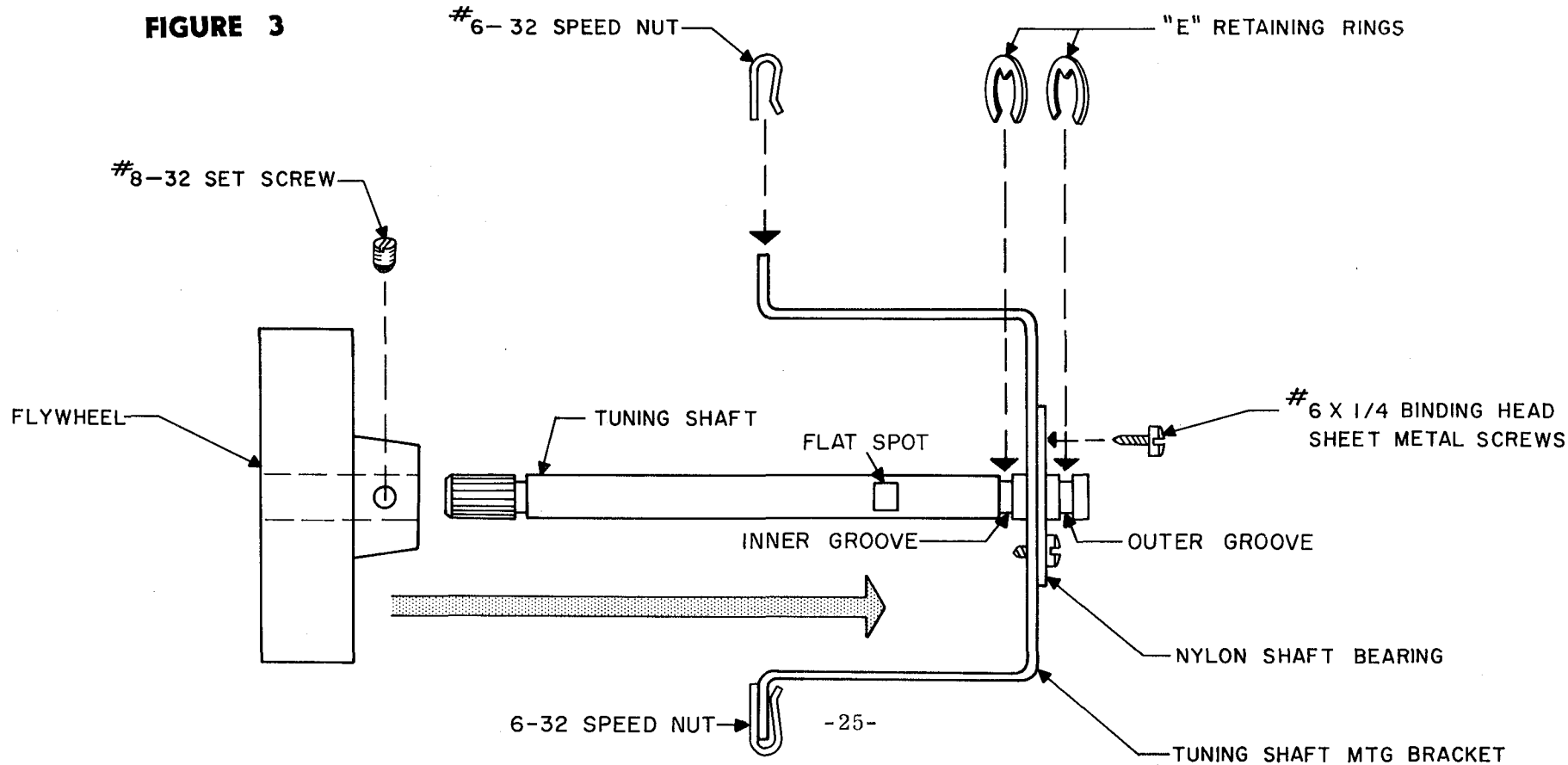
REFER TO FIGURE 3 and the following items:

Component Box #1

Component Box #3

- | STEP # | (1) | (2) | |
|--------|-----|-----|--|
| 1 | () | () | Mount a nylon shaft bearing to the tuning shaft bracket. Use #6 x 1/4" sheet metal screws. |
| 2 | () | () | Insert an "E" retaining ring into the inner groove of the tuning shaft. |
| 3 | () | () | Insert the shaft into the nylon shaft bearing and slip the other "E" retaining ring into the outer groove of the tuning shaft. |
| 4 | () | () | Insert the #8-32 set screw into the threaded hole in the hub of the flywheel. (Turn only enough to hold the set screw in place.) |
| 5 | () | () | Slip the flywheel over the tuning shaft. (Note position of hub.) Tighten the set screw onto the flat spot of the shaft. |
| 6 | () | () | Slip a #6-32 speed nut over each of the mounting holes on the bracket. (Flat side of speed nut towards tuning end of shaft.) |

FIGURE 3



CHASSIS FRONT PANEL ASSEMBLY

REFER TO PICTORIAL 7, FIGURE A and the following items:

Chassis Front Panel
Meters

Component Box #1
Component Box #2
Component Box #3

Assemble the idler pulleys in the following sequence. Tighten the nuts just enough to allow the pulleys to spin freely.

- | STEP # | (1) | (2) | |
|--------|-----|-----|---|
| 7 | () | () | Pulleys A, B, and C. Use a #2-56 x 1/2 screw, nylon washer, idler pulley and the nylon bushing. Mount to the front panel with a #2 lockwasher under a #2-56 nut. (Notice the orientation of the nylon bushing.) |
| 8 | () | () | Pulley D. Insert a #2-56 x 1/2" screw into the hole in the bracket. Slip the nylon bushing over the screw (observe orientation). Follow with the idler pulley, nylon washer, #2 lockwasher and #2-56 nut. |
| 9 | () | () | Mount the nylon shaft bearing. Use #6 x 1/4" sheet metal screws. |
| 10 | () | () | Mount the flywheel assembly to the front panel. Use #6-32 x 3/8" screws. |
| 11 | () | () | Mount the automatic frequency and interchannel muting switches. Rotate switches so that locking tabs fall into the small holes in the panel. Use #3/8 lockwashers under #3/8-32 nuts. |
| 12 | () | () | Mount the range switch, the function switch, and the volume control. Follow the same procedure outlined in step #11. |

REFER TO PICTORIAL 7, FIGURE B.

There are two types of pilot light sockets, 2 with short and 1 with long mounting brackets.

- | | | | |
|----|-----|-----|--|
| 13 | () | () | Mount the #1 socket (short bracket). Use #6-32 x 3/8" screw, #6 lockwasher under #6-32 nut. |
| 14 | () | () | Mount the #2 socket (long bracket). Use same type of hardware as step #13. Dress the wires of both the #1 and #2 sockets through hole "A". |
| 15 | () | () | Mount lug strip LS15. Use #6-32 x 3/8" screw, #6 lockwasher under #6-32 nut. |
| 16 | () | () | Using the small screwdriver supplied, mount the two meters and meter pad (do not tighten screws). |

NOTE: There is a very fine wire (shipping shunt) connected between the lugs on the meters. Loosen the lug screws and remove the shunt wires. Tighten the screws.

- | | | | |
|----|-----|-----|---|
| 17 | () | () | Install #6-32 speed nuts at all 8 points shown. Observe orientation. |
| 18 | () | () | Mount the front panel assembly, with the remaining #3 pilot light socket to the chassis. Use #6-32 x 3/8" screws. |
| 19 | () | () | Dress the wire from the #3 pilot light socket through hole "B". |
| 20 | () | () | Insert the clear pilot lamps into the three pilot light sockets. |
| 21 | () | () | Slip the lamp shields over the #2 and #3 lamps as shown. Note the orientation of the slot in each shield. It should be 45° angle away from the front panel. |

FRONT PANEL WIRING

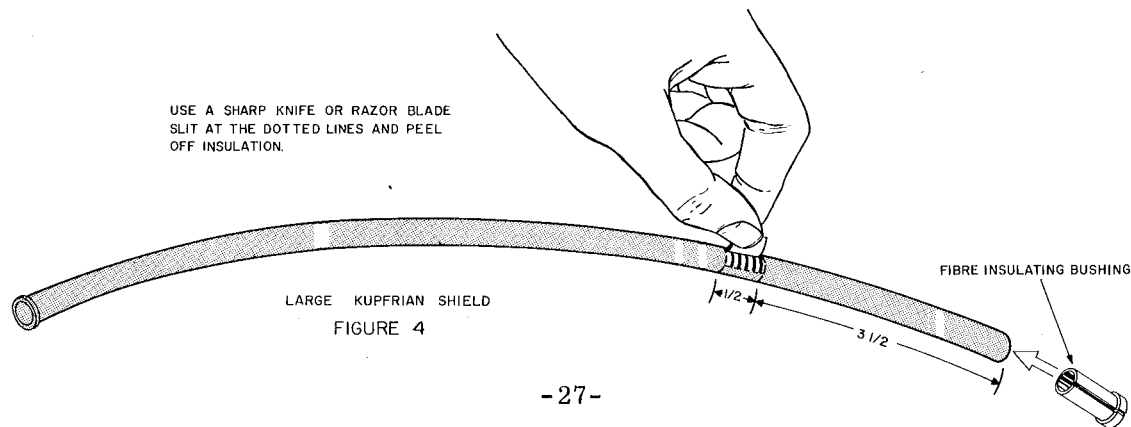
REFER TO PICTORIAL 8.

- | STEP # | (1) | (2) |
|--------|-----|-----|
| 1 | () | () |
| 2 | () | () |
| 3 | () | () |
| 4 | () | () |
| 5 | () | () |
| 6 | () | () |
| 7 | () | () |
| 8 | () | () |
| 9 | () | () |
| 10 | () | () |
- Twist together the two black pilot light wires from hole "A". Cut and strip the longer wire to the same length as the shorter wire. Connect both wires to LS1-4 (NS). Dress as shown.
- Cut off 5 1/4" from the black pilot light wire from hole "B". Strip 1/4" of insulation and connect to LS1-4 (S-5).
- Connect the black wire from LS1-3 to volume control lug #1 (NS).
- Connect a 270K ohm, 1/2 watt, 10% resistor (red, violet, yellow, silver) from LS1-7 (S-2) to volume control lug #3 (NS). Use sleeving on the lead to volume control lug #3.
- Connect a .47 mfd/200 volt tubular capacitor (value marked on body) from LS1-12 (S-2) to volume control lug #2 (S-1). Make leads as short as possible.
- Connect a 500 mmfd disc capacitor (value marked on body) to volume control from lug #1 (NS) to lug #3 (S-2). Make the leads as short as possible, but be sure that the leads do not touch lug #2.
- Connect a bare wire between volume control lugs #1 (S-3), Lug #4 (S-1), and lug #7 (S-1).
- Connect the yellow shielded wire to the automatic frequency control switch,
Shield to lug #3 (S-1). (Make as short as possible and cut off excess.)
Inner conductor to lug #2 (S-1).
There is no connection to lug #1.
- Connect the following three shielded wires to the interchannel muting switch.
Blue to lug #3 (S-1)
Green to lug #2 (S-1)
Orange to lug #1 (S-1).
- Connect the black and yellow twisted wires from the pre-selector assembly section to the range switch.
Yellow to lug #2 (S-1)
Black to lug #1 (S-1).

REFER TO FIGURE 4.

- 11 () () Prepare the large Kupfrian shield by cutting out the area of insulation at the point shown. Insert one of the fibre insulating bushings at the end shown.

FIGURE 4



REFER TO PICTORIAL #8.

- | STEP # | (1) | (2) |
|--------|-----|-----|
| 12 | () | () |
| 13 | () | () |
| 14 | () | () |
| 15 | () | () |
| 16 | () | () |
| 17 | () | () |
| 18 | () | () |
| 19 | () | () |
| 20 | () | () |
| 21 | () | () |
| 22 | () | () |
| 23 | () | () |
| 24 | () | () |
| 25 | () | () |
| 26 | () | () |
| 27 | () | () |
| 28 | () | () |
| 29 | () | () |
| 30 | () | () |
| 31 | () | () |
| 32 | () | () |
| 33 | () | () |
- Turn the chassis over so that the meter wires can be connected. Tin the small lugs and hold the wire against the lug to solder them. Cut off the excess wire.
- 32 () () Connect the brown shielded wire to the level meter. (Observe Polarity.)
 Shield to the + lug (S-1).
 Inner conductor to the - lug (S-1).
- 33 () () Connect the red shielded wire to the balance meter. (Observe Polarity.)
 Shield to the - lug (S-1).
 Inner conductor to the + lug (S-1).
- Check the front panel wiring. Make sure all connections are soldered.

FM CARTRIDGE WIRING

REFER TO PICTORIAL 9, FIGURE A and the following items:

	FM Cartridge	Component Box #2
	Component Box #1	Component Box #3

- STEP # (1) (2)
- 1 () () Prepare both ends of the black shielded wire by stripping 3/4" of insulation from the outer conductor. Fan the shield, twist and tin the ends. Strip 1/4" of insulation from the inner conductor and tin the ends. Connect one end, inner conductor to lug #2 (S-1). Wrap shield around lug #5 (S-1).

Cut the following wires. Strip each end 1/4" of insulation.

			COLOR	LENGTH	CONNECT TO LUG
2	()	()	Orange	5 3/4"	#1 (S-1)
3	()	()	Brown	8 1/2"	#3 (S-1)
4	()	()	Red	6 1/2"	#4 (S-1)

- 5 () () Insert the group of wires into the hole in the fishpaper shield and then into the hole of the lug strip cover. Bend fishpaper shield and insert into cover.

REFER TO FIGURE B.

- 6 () () Tilt the cover at an angle and insert the hook into the slot in the chassis. Push the cover down so that the slot in the cover is in line with the small flange in the chassis. Snap in place.

REFER TO FIGURE C.

- 7 () () Insert the cartridge into its position in the main chassis. Note orientation. Use #6 x 1/4" sheet metal screws, #6 lockwashers under the heads of the screws. Note the position of the solder lug. Connect the plug from the interconnecting lead to the single phono socket on the FM cartridge chassis as shown.

REFER TO FIGURE D.

- 8 () () Connect a piece of bare wire between the solder lug (S-1) and lug #2 (S-1) of the cartridge input terminal strip. Make these two points as close to each other as possible.
- 9 () () Using your long-nose pliers, flatten one end of the heavy bare wire. Slip the other end through the wire loop which extends out of the ceramic feed-through capacitor. Insert the flattened end into lug #1 of the cartridge input terminal strip (S-1). Solder the end which passes through the loop and cut off the excess wire. CAUTION: When attaching this wire, be careful not to crack the ceramic capacitor. This wire should be dressed straight to the capacitor as shown. If the loop is turned in the wrong direction, grasp it lightly and turn it to receive the wire. Apply only enough heat to make a good connection. Do not overheat.

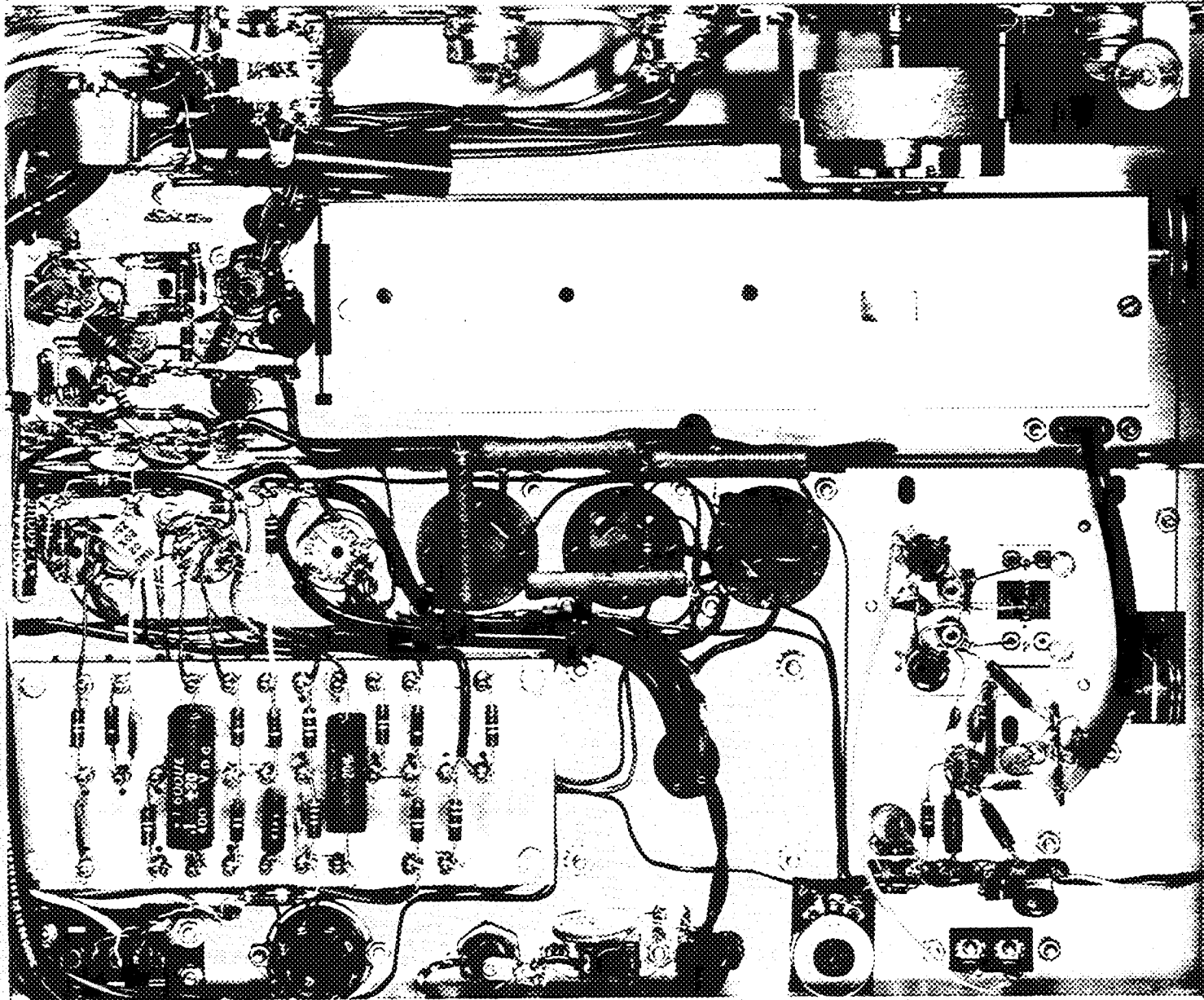
REFER TO PICTORIAL 10.

- 1 () () Insert the wires from the lug strip cover down through the hole (near the cover) in the main chassis.

			COLOR	CONNECT TO LUG
2	()	()	Red (dress under the resistor)	LS10 (S-6)
3	()	()	Orange (dress under the resistor)	LS9-2 (S-2)
4	()	()	Brown	LS4-5 (S-4)
5	()	()	Black: Inner conductor	LS5-7 (S-5)
6	()	()	Black, Shield	LS5-8 (S-4)

Dress all leads down to chassis.

This completes the wiring of the unit. Check your wiring and soldering of this last portion. Remove all stray wire clip-pings from the chassis.



PULLEY MOUNTING BRACKET AND DRIVE PULLEY ASSEMBLY

REFER TO PICTORIAL 11, FIGURE A

- | STEP # | (1) | (2) |
|--------|-----|-----|
| 1 | () | () |
- Insert the two #6-32 set screws into the two holes in the hub of the drive pulley. Turn the screws just enough to hold them in place.
- | | | |
|---|-----|-----|
| 2 | () | () |
| 3 | () | () |
| 4 | () | () |
| 5 | () | () |
| 6 | () | () |
- Open the rotor plates of the tuning capacitor by rotating the shaft to its full clockwise position.
- Measure 1 1/8" from the slotted end of the shaft. Put a pencil mark at this point on the shaft.
- Slip the drive pulley onto the shaft until the rear of the hub reaches the pencil mark. (Notice the position of the rim opening and the set screws.) Tighten the set screws securely.
- Assemble the idler pulleys as shown. Use #2-56 x 1/2" screw, nylon washer, idler pulley and nylon bushing (observe orientation). Mount to the pulley mounting bracket with #2 lockwasher under #2-56 nut. Tighten the nuts just enough to allow the pulleys to spin freely.
- Mount this assembly to the chassis. Observe orientation. Use #6-32 x 3/8" screws, #6 lockwashers under #6-32 nuts.

REFER TO PICTORIAL 11, FIGURE B.

The stringing procedure is very simple if you carefully follow the steps outlined below. Stand the chassis on its side with the wired portion facing you and the front panel at your left.

- | | | |
|---|-----|-----|
| 1 | () | () |
|---|-----|-----|
- Insert the loop end of the dial cord through the slot in the chassis (from wired side) directly below the drive pulley. Hook the loop to the lug on the drive pulley at the START point.

Following the direction of the arrows on the pictorial, string in the sequence outlined. Keep the cord taut at all times and in the groove of the idler pulleys.

- | | | |
|----|-----|-----|
| 2 | () | () |
| 3 | () | () |
| 4 | () | () |
| 5 | () | () |
| 6 | () | () |
| 7 | () | () |
| 8 | () | () |
| 9 | () | () |
| 10 | () | () |
- Dress around idler pulley "A" and over to the bottom of the cartridge pulley.
- Wrap one complete turn around cartridge pulley and over to idler pulley "B".
- Dress around idler pulley "B" and over to the bottom of the tuning shaft.
- Wrap 3 1/2 turns around the tuning shaft (wrap the turns toward the front panel) and over to idler pulley "C". Put the chassis in the position shown in the pictorial.
- Dress around idler pulley "C" and over to the bottom of idler pulley "D".
- Dress around idler pulley "D" and over to idler pulley "E", then around idler pulley "E" and back to idler pulley "F". Dress around idler pulley "F" to the bottom of the drive pulley.
- Wrap 1 1/2 turns around the drive pulley. Attach the free end of the spring through the rim opening to the lug at the FINISH point. It should be necessary to stretch the spring to make it reach the lug. If there is slack in the cord, check the previous steps.
- Rotate the tuning shaft several times and watch the rotor plates on the tuning capacitor to make certain that they open and close fully.
- Check the idler pulleys to see that they all turn freely.

DIAL PLATE AND ESCUTCHEON ASSEMBLY

REFER TO PICTORIAL 12 AND THE FOLLOWING ITEMS:

Escutcheon Assembly
Component Box #1
Component Box #2
Component Box #3

- STEP # (1) (2)
- 1 () () Remove the masking paper from the dial scale as shown in Figure A. If any adhesive remains on this surface, remove with rubbing alcohol using a soft lint free cloth. If it is necessary to clean the front side use a "DRY" lint free cloth.
- 2 () () Lay the escutcheon back plate down (on a clean area of your work table) with the studs facing upward. Assemble in the following sequence:
- 3 () () 1/4" spacer over each stud.
- 4 () () Rubber Dial pad over each spacer.
- 5 () () Dial scale (note orientation).
- 6 () () Rubber Dial pad over each stud.
- 7 () () Dial plate. (Open end toward you).
- 8 () () #6 lockwashers under #6-32 nuts.

Make certain that the dial pads are even with the edge of the dial scale before tightening the nuts.

- 9 () () Mount the neon light assembly to the escutcheon front plate (bottom), use mounting clip as shown.
- 10 () () Mount the Escutcheon front plate (bottom), thread a 5/8" spacer onto each of the outer studs. Use a #6 flatwasher, #6 lockwasher under a #6-32 nut on the center stud.

ESCUTCHEON ASSEMBLY TO CHASSIS

REFER TO PICTORIAL 13 AND THE FOLLOWING ITEMS.

Escutcheon Front Plate (top)
Knobs (5 small, 1 large)
Pointer

- 1 () () Slip the pointer onto the chassis front panel. Slide along the panel and observe the area covered by the pointer carriage. Remove the pointer and carefully apply a very thin film of "Lubriplate" to the area covered. Avoid getting any "Lubriplate" on the dial cord. Do not attach the pointer to the dial cord at this time.
- 2 () () Slip two #4 speed nuts over the small angles on the chassis front panel as shown.

- STEP #** (1) (2)
- 3 () () NOTE: Make sure the slots on the pilot light shield have not shifted. They should be at a 45° angle away from the front panel.
Mount the dial plate and escutcheon assembly to the front panel with two #6 flatwashers and two thumb screws (thread into the 5/8" spacers from rear side of panel). Do not tighten.
- 4 () () Adjust each meter until the rectangular portion (meter scale) is centered in the rectangular openings in the escutcheon back plate. Tighten the four meter mounting screws and the two thumb screws.
- 5 () () Remove the masking paper from the escutcheon front plate (top).
- 6 () () Mount to the escutcheon back plate with two #4-40 x 1/2" oval head screws. (Use small screwdriver supplied).
- 7 () () Mount the 5 small knobs to the control and switch shafts, the large knob to the tuning shaft. If knobs are loose on the shaft, insert a screwdriver into the slot in the shaft and spread apart slightly until knobs fit properly.
- 8 () () Slip sleeving over each male lead of black and yellow wire with connector attached. Snap connector from neon light to mating connector under chassis (match colors). Slide sleeving back to cover connectors.



REFER TO PICTORIAL 13 AND THE FOLLOWING ITEMS.

6CW4 Nuvistor 6CA4/EZ81 Tube 6BN6 Tube (2) 12AX7/ECC83 Tube (2)

- 1 () () Insert the tubes and the nuvistor into their respective sockets. Use extreme care when inserting the nuvistor to avoid damaging the small pins of the nuvistor.
- 2 () () Mount the tube shields over the two 12AX7/ECC83 tubes.

ALIGNMENT PROCEDURE

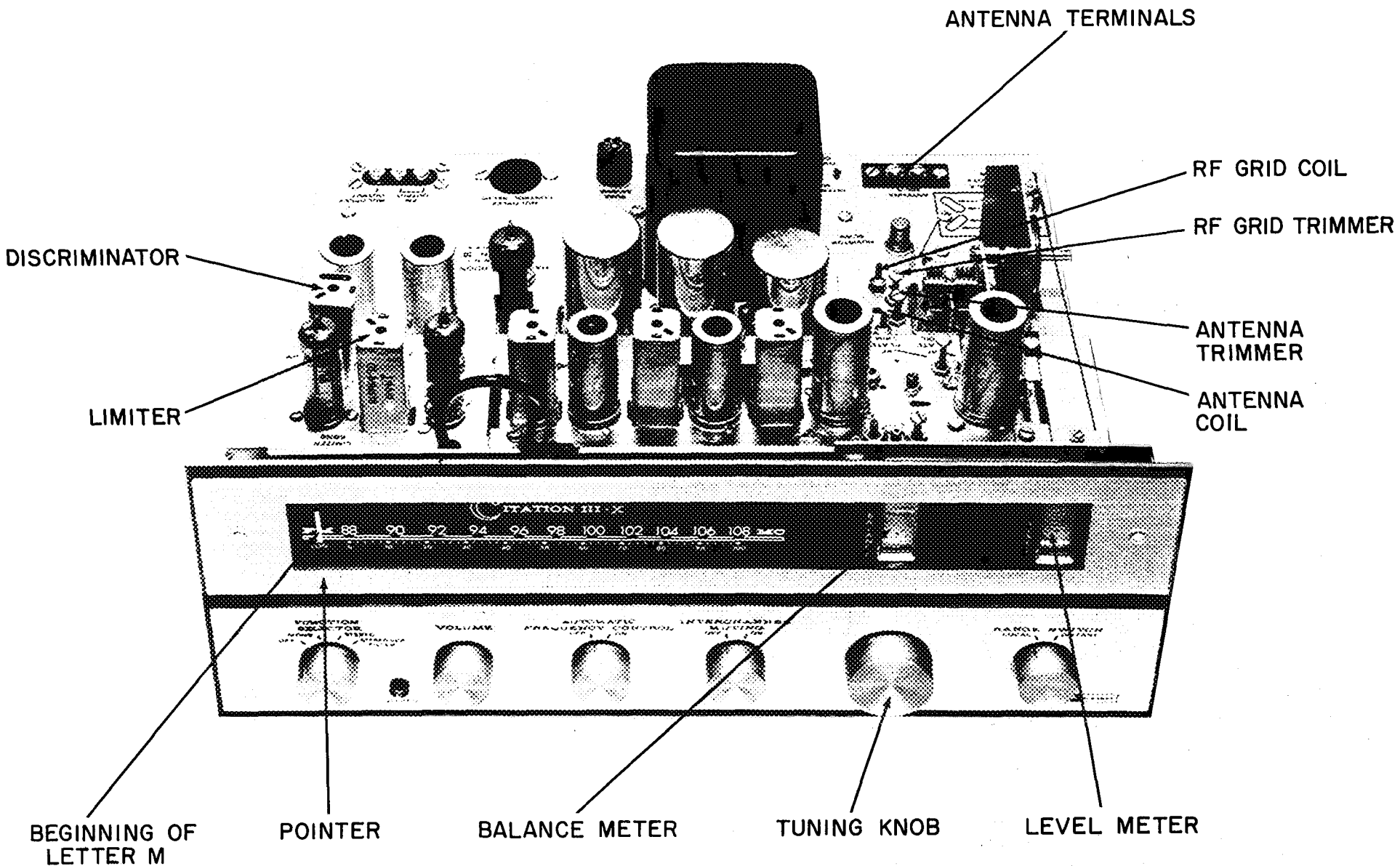
Before proceeding with the alignment of your Citation III-X, prepare the following:

- a. Folded dipole antenna supplied in kit.
- b. Alignment tool supplied in kit.
- c. Small screwdriver.

The steps outlined below are presented in a simple step by step sequence. Please follow them carefully, as they are written so you may obtain the best possible performance from your Citation III-X.

1. Preset the following front panel controls to the indicated positions.
 - a. Volume - maximum counter clockwise.
 - b. Automatic Frequency Control -- off.
 - c. Interchannel Muting -- off.
 - d. Tuning Control -- maximum counter clockwise.
 - e. Range Switch -- distant.
 - f. Function Switch -- mono.

ALIGNMENT PHOTO 4



2. Plug the line cord into a 115 volt, 60 cycle source.
3. Observe that the tubes and pilot lamps light. Allow the set to warm up for 15 minutes before proceeding. If the tubes do not light, refer to the instructions "IN THE EVENT OF DIFFICULTY".
4. Refer to the alignment photograph #4 and locate the discriminator transformer. Insert the thicker end of the alignment tool into the center hole in the top of the discriminator transformer. Rotate this top slug to its fully counter clockwise position and observe that the "Balance" meter should read slightly in the plus (+) direction. NOTE: AT ALL TIMES WHEN VIEWING EITHER METER KEEP YOUR EYE AT THE SAME LEVEL AS THE METER TO AVOID AN ERRONEOUS READING. Remove the alignment tool from the top of the discriminator transformer.
5. Stand the Citation III-X chassis on either side so that the bottom of the discriminator transformer is visible. Carefully insert the alignment tool into the center hole in the bottom of the discriminator transformer. Rotate this slug for a maximum reading in the plus (+) direction on the balance meter. Remove the alignment tool from the bottom of the discriminator.
6. Lay the chassis back down. Insert the alignment tool into the center hole in the top of the limiter transformer and rotate this slug for a maximum plus (+) reading on the balance meter.
7. Remove the alignment tool from the limiter transformer and re-insert into the top of the discriminator transformer. Rotate this slug clockwise for a zero (0) reading on the balance meter.
NOTE: You will notice the meter will go in the plus direction before going toward zero.
8. Check to see that the tuning knob is still in the extreme counter clockwise position.
9. Slide the pointer along the chassis front panel so that it now lines up with the beginning of the letter "M" of the letters "FM" printed on the dial scale. Connect the dial string to the pointer as shown in Pictorial #13, Figure B.
10. Connect the two terminals of the folded dipole antenna supplied with your kit to the "Antenna" terminals on the chassis. Take the other two ends of the antenna and attach them to the wall in front of you so as to form the letter "T" with the antenna.
11. Connect the output of the tuner to your amplifier system. Slowly rotate the tuning knob in the clockwise direction until a station is received and a steady (non-fluctuating) indication of signal strength is noted on the level meter. Choose a signal which reads below "8" on the level meter. Carefully adjust the tuning so that the balance meter reads "0".
12. Using a small screwdriver adjust the "Antenna Coil" and the "RF grid Coil" (starting in a counter clockwise direction) for a maximum reading on the level meter. Go back and forth between these coils until you have reached maximum deflection on the level meter.

13. If the pointer on the dial has been set at 93MC or higher (while performing the previous step), rotate the tuning knob in the counter clockwise direction until you find an indication of "2" or better on the level meter at a dial setting below 93 MC. Try to pick a station where the meter does not fluctuate.
14. Now repeat step #12.
15. Rotate the tuning knob in the clockwise direction to any point above 102 MC on the dial scale, which gives an indication of less than "8" on the level meter. Now adjust the "Antenna Trimmer" and the "RF Grid Trimmer" for a maximum reading on the level meter. Adjust these capacitors alternately until you reach maximum deflection on the level meter.
16. Rotate the tuning knob in the counter clockwise direction to any point below 93MC on the dial scale. Now readjust the "RF Grid Coil" and the "Antenna Coil" for a maximum reading on the level meter. Adjust these coils alternately until you reach a maximum deflection. If you find that this requires more than 1/2 turn, repeat Steps #15 and #16.

FINAL ADJUSTMENTS

1. Tune to any station in your area of which you know the exact frequency (for example in New York City WQXR is 96.3 MC on the dial scale).
2. Hold one end of the dial string against the back of the front panel and with your other hand slide the pointer so it reads the frequency of the station you are listening to. At this point carefully bend over the three tabs on the carriage of the pointer. (Refer to Pictorial #13, Figure B.)
3. The interchannel muting threshold control is located next to the antenna terminal strip and should be adjusted as follows: Tune in the weakest station in your area with the front panel interchannel muting switch in the "off" position. Tune off station and turn the interchannel muting switch to the "on" position. Using a small screwdriver, rotate the screwdriver adjust "threshold control" clockwise until the rushing noise is maximum. Then rotate counter clockwise until only a faint hiss is heard. Tune in again to the weak signal. If it still can be heard, and noise present off station is negligible, the adjustment can be considered satisfactory.

REFER TO PICTORIAL 14 AND PRE-SELECTOR COVER.

- | | | | |
|--------|-----|-----|---|
| STEP # | (1) | (2) | |
| 1 | () | () | Assemble the three spade bolts to the pre-selector cover. Use #6-32 x 1/4" screws, #6 lockwashers under the #6-32 nuts. |
| 2 | () | () | Mount the cover to the chassis (over the tuning capacitor). Position the metal cable clamp over the F.M. Cartridge interconnecting lead and mount to the spade bolt. Use #6 lockwashers under #6-32 nuts. |

REFER TO PICTORIAL 13, FIGURE C, MULTIPLEX SUB-CHASSIS BOTTOM PLATE AND FRONT COVER.

- 1 () () Loosen but do not remove the two (2) #6-32 screws adjacent to the power transformer.
- 2 () () Slide the multiplex sub-chassis in position as shown, slipping the two fork ends on the sub-chassis under these two screws and then tighten these two screws.
- 3 () () Plug in the single phono cable from the multiplex sub-chassis into the multiplex output jack on the output strip.
- 4 () () Plug the plug from the multiplex sub-chassis into the socket on the chassis.

- | STEP # | (1) | (2) | |
|--------|-----|-----|--|
| 5 | () | () | Mount the nut retainers to the bottom plate. Insert into the square holes (use screwdriver to snap clip in place). Note position of the two alignment holes to determine orientation of bottom plate. |
| 6 | () | () | Mount the grounding forks to the bottom plate. Use #6-32 x 1/4" screws, #6 lockwashers (on both sides of the grounding forks) and #6-32 nuts. |
| 7 | () | () | Mount the plastic feet to the bottom plate. Use #6-32 x 5/8" screws. |
| 8 | () | () | Mount the bottom plate to the chassis. Grounding forks should make contact with the F.M. Cartridge chassis. Use #6 x 1/4" sheet metal screws. Note: one screw should line up with the hole on the multiplex sub-chassis. |
| 9 | () | () | Mount the front cover using #6-32 x 3/8" screws. Hold cover tight against front panel while tightening screws. |

A WORD OF CAUTION. OPERATING VOLTAGES IN THIS UNIT ARE AS HIGH AS 300 VOLTS AND ARE DANGEROUS. ONCE THE TUNER IS TURNED ON, BE EXTREMELY CAUTIOUS WHEN TAKING READINGS OR MAKING MEASUREMENTS.

IN EVENT OF DIFFICULTY

1. Check the fuse. Improper wiring may cause overloading and will blow the fuse. Replace only with the same value supplied with the kit. (2 amp, 3AG)
2. Recheck all wiring beginning with the first step.
3. Have someone with electronic experience review your wiring for he may find an error that is elusive to you.
4. Check all voltages and resistances. Variations in line voltages and components may cause as much as 20% difference from the readings listed in the table. Using a 1000 ohm per-volt instrument may further lower the readings. It is advisable to use a VTVM if one is available.
5. If your voltages do not correspond to the voltage table, critically inspect that portion of the circuit where the readings differ.
6. Check all resistors and capacitors with an ohmmeter where improper operating voltages are noted.
7. If after completing the previous checks you are still unable to locate the difficulty, write to Harman-Kardon, Incorporated, Citation Kit Division, Plainview, Long Island, New York. Give all symptoms, voltages and resistance readings and describe your difficulty in detail. State model and serial number. You will receive our prompt reply to help solve your problem.
8. Our factory service department is at your disposal in the event that you cannot resolve this problem by yourself.

Please write us before shipping your tuner for we may be able to advise you of a local warranty station equipped to assist you to obtain the specified performance from your tuner.

INSTALLATION PROCEDURE

VENTILATION:

The Citation III-X is well ventilated in itself, but sufficient space must be allowed around it to permit proper air flow. Install it in a manner to allow for unrestricted circulation. Do not cut off the air supply by putting books or other objects on or against it. Do not place the Citation III-X directly above the power amplifier.

INSTALLATION:

The Citation III-X may be easily installed in your cabinet by following the simple instructions on the mounting template supplied. Alternatively, a beautiful walnut enclosure is available from your dealer as an optional extra.

AMPLIFIER CONNECTIONS:

The Citation III-X was specifically designed for operation with either Citation I and II, or IV and V stereo systems. However, it is eminently suited to driving any stereo or monophonic system.

There are three output receptacles on the top rear of the chassis. One receptacle is the multiplex output and should be connected to the multiplex sub-chassis. The other two receptacles are used to connect the Citation III-X FM stereo tuner to your stereo amplifier.

For monophonic operation connect either of these two receptacles to your amplifier. For stereophonic operation connect the receptacle labeled CHAN. A to the left channel input of your stereo amplifier and the receptacle labeled CHAN. B to the right channel input of your stereo amplifier.

All connections between the tuner and the amplifier must be made with low capacitance shielded cable to prevent hum and noise pickup. Any length up to 20 feet may be used as the Citation III-X has a low impedance output.

FM ANTENNA:

Due to the exceptionally high sensitivity of the Citation III-X the FM folded dipole supplied with the tuner is sufficient antenna for all but the most difficult locations, however since stereo FM requires greater signal strength than ordinary monophonic reception it might be necessary to use an outdoor FM or TV antenna in order to obtain optimum results. An outside antenna will also help eliminate multipath interference which can result in whistles and noise in your stereo FM system.

Spread out the dipole so that it forms a "T" shape. The stem of the "T" ends in two screw terminal connections, and these should be connected to the 300 ohm FM input terminals on the Antenna Terminal Strip. This is a balanced input circuit, therefore do not ground either FM antenna terminal. Horizontal placement of the antenna offers a maximum polarization for optimum reception. The antenna may be tacked to the back of your hi-fi cabinet, to the molding behind the equipment or to the shelf you use. Use ordinary tacks through the center portion of the antenna leads to avoid shorting out the antenna.

IMPORTANT: Never leave excess lead-in-wire. After installing the antenna, cut off the excess lead-in wire. Then attach to the antenna terminals.

If monophonic reception is satisfactory, and there is a problem with stereophonic reception then an outside antenna is required. The following types of antenna are available.

Antenna designs are of three basic types and have response patterns which are either directional, bi-directional, or omni-directional.

DIRECTIONAL TYPE ANTENNA

This design is used in installations where the FM stations that are within range are in a single direction or if the antenna is used with a rotator enabling it to be "beamed" toward the desired station.

BI-DIRECTIONAL ANTENNA

Antenna of this design have response patterns which pick up signals in opposite directions from the receiver location. Therefore, if you are located directly between the stations you wish to receive, an antenna of this type is usable.

OMNI-DIRECTIONAL ANTENNA

This antenna is capable of receiving FM stations from all directions with equal efficiency. Antenna of this type usually have less gain than the directional types.

DEFINITIONS OF ANTENNA TERMS

1. Antenna - a device used to pick up a signal from a transmitter, and feed it to the receiver.
2. Dipole - a type of antenna - popular for medium range reception. Available bi and omni directional styles.
3. Yagi - a highly directional antenna usually used in difficult locations or where long range reception is desirable.
4. Bay - usually used in connection with the number of antennas mounted on a single mast. Using more than one antenna or a Multiple Bay will increase selectivity and gain of antenna system.

Your choice of FM antenna can be made utilizing the list of FM stations at the end of this book. Use a suitable map with approximately 200 mile radius from your area. As a general rule the range of a station is approximately 4 - 5 miles per kilowatt of power output in flat terrain. However, some electrical phenomenon may allow this figure to be anywhere between 1 - 30 miles per kilowatt of power output. After pin pointing the stations, you can decide what type of antenna is preferable -- i. e.: if the stations are located in every direction and are a considerable distance away, a high gain multiple Bay, Yagi, directional type antenna with a rotor should be used. If the distances in the above example are comparatively close, an omni-directional antenna should be used. In the latter case a rotator would not be required.

When using an outdoor antenna, attach the 300 ohm lead-in wire (twisting it 4-5 times for each running foot) to the FM antenna terminals on the rear of the Citation III-X.

GROUNDING:

It is not generally recommended to separately ground the Citation III-X tuner to your companion amplifier. This may cause a ground loop and induce hum.

POWER REQUIREMENTS:

Plug the AC cord into any outlet furnishing 117 volts, 50 or 60 cycles, AC current. The voltage may vary between 105 and 125 volts.

A switched AC convenience receptacle is located on the top rear of the chassis. You may use it as a power source for your other high fidelity components. The total wattage is not to exceed 200 watts.

DESCRIPTION OF CONTROLS

FUNCTION SWITCH

This switch turns the tuner on and off and controls the convenience outlet located on the top rear of the chassis. It also selects between the monophonic, stereophonic or stereophonic SCA filter positions.

In the **MONO** position both the output receptacle on the rear of the Citation III-X chassis are connected together and therefore the monophonic signal is present at either of these two receptacles.

In the **STEREO** position the left channel stereo signal is present at the **CHAN. A** receptacle and the right channel stereo signal is present at the **CHAN. B** receptacle.

In the **STEREO SCA FILTER** position you are still listening to stereo but with the addition of a special SCA filter circuit.

SCA is the abbreviation for Subsidiary Communications Authority. This is the Authority which controls the broadcasting of FM signals which are used for storecast (background music) reproduction. This SCA filter prevents background music from interfering with the regular FM stereo broadcasts.

For FM stereophonic reception when SCA is not present the function switch should be in the **STEREO** position.

VOLUME CONTROL

The volume control adjusts the audio output level of the tuner for both monophonic or stereophonic operation.

INTERCHANNEL MUTING AND THRESHOLD ADJUSTMENT

The purpose of the muting circuit is to reduce audible noise when tuning from station to station. Since very weak signals may also be muted, the front panel interchannel muting switch may be used to defeat the muting circuit on weak signals. Of course, the noise present between stations on this high sensitivity receiver will then be audible.

NOTE: Maximum sensitivity is obtained with the interchannel muting switch in the "off" position.

METERS:

The Citation III-X incorporates two meters to assure precise tuning. The balance meter is used to tune to the exact center of the station channel, while the level meter indicates the relative signal strength.

Proper tuning is achieved when you are on a station and the balance meter reads "0".

DIAL SCALE:

The Citation III-X Dial Scale is marked with two scales, a frequency scale (88-108 MC), and a logging scale (0-100). Since most FM stations operate on frequencies which are not whole numbers (such as 96 MC as compared to 96.3 MC) ideally each megacycle division on the frequency scale should be divided into 10 parts to enable the user to pinpoint the location of the station. This would require a dial scale which would be longer than the front panel.

The logging scale which is divided into 100 equal parts provides a means of finding your favorite station, once you have noted its position on the logging scale. For example, in New York City, WQXR operates on 96.3 MC. After locating this station through the use of the frequency scale (between 96 and 98 MC) you find that the pointer falls on 46 on the logging scale. Make a note of this setting and when you next want to tune to WQXR, all that is necessary is to set the pointer to 46 on the logging scale.

AUTOMATIC FREQUENCY CONTROL:

FM broadcasting, by its very nature, eliminates almost all natural and man-made static. However, the characteristics of FM which makes this possible also cause specific problems in tuning. The Citation III-X incorporates a special electronic circuit known as AFC (Automatic Frequency Control) that overcomes these problems and insures proper tuning even if the manual tuning is not accurately done. Therefore AFC always keeps the station in the center of the channel and eliminates distortion caused by inaccurate tuning.

The following experiment will lead to an understanding of AFC, and the fuller enjoyment of the Citation III-X tuner. Tune across the FM band with the Automatic Frequency Control switch in "on" position. Note how the stations "pop" into place. Now tune to any station, preferably one with a musical program. Defeat the AFC, and tune slowly through the station from left to right. Notice there are three distinct points where the station sounds clear, interspersed with points of distorted sound. The middle clear-sounding point is the proper tuning position for the best tone quality with minimum noise and interference. Detune the station so that the sound is distorted. Now put the AFC switch in "on" position and notice how the sound clears up. The tuning has been readjusted by the operation of the AFC circuit, which automatically retunes the electronic circuits to the center of the station channel.

RANGE SWITCH:

The full sensitivity of the tuner is utilized when the Range Switch is in the "Distant" position. However, on extremely strong signals, (when the level meter reads above "10") the switch should be in the "Local" position.

FUSE:

In the event of a potentially damaging failure to tubes or components, the Citation III-X is protected by a 2 amp -- 3AG fuse, located on the top rear of chassis. If this fuse blows, replace with only one of the same rating. Replacing with a fuse of a higher rating will not protect the tuner, and may result in severe damage, which will not be covered by the factory warranty.

STEREO INDICATOR LIGHT

The stereo indicator light on the front panel provides instant visual identification of all FM stereo broadcasts and takes the guesswork out of tuning.

To tune for FM stereo, proceed as follows:

1. Tune across the dial until the stereo indicator light goes on. Under certain conditions, the indicator light may flicker as you tune. However, you are not tuned to a stereo broadcast unless the light glows continuously.
2. The stereo indicator light is operative in all the on positions of the function switch. Should you be listening to a monophonic broadcast and the station should change over to stereophonic broadcasting, the indicator light will automatically go on. If you desire to listen to the stereophonic broadcast, throw the function switch to the stereo or stereo SCA position.

TUBE REPLACEMENT

The tubes used in this instrument are available at your dealer or through the factory. Replace only with the same tube type.

ENCLOSURE

A beautiful walnut enclosure is available from your dealer as optional equipment for this tuner. The enclosure is supplied with complete installation instructions.

You have purchased one of the finest tuners made. We hope you enjoy it.

WASHINGTON, District of Columbia (cont.)	MACON, Bibb County WMAZ-FM: 99.1 mc; 3 kw.	ELMWOOD PARK, Cook County WXFM-FM: 105.9 mc; 32 kw.	INDIANAPOLIS, Marion County WFBI-FM: 94.7 mc; 52 kw. WFMS-FM: 95.5 mc; 4.5 kw. WIBC-FM: 93.1 mc; 17.5 kw. WISH-FM: 107.9 mc; 41 kw.	KENTUCKY
WPGC-FM: 95.5 mc; 15.7 kw. WRC-FM: 93.9 mc; 20 kw. WTOP-FM: 96.3 mc; 20 kw. WJMD-FM: 94.7 mc; 20 kw. WWDC-FM: 101.1 mc; 20 kw.	MARIETTA, Cobb County WBIE-FM: 101.5 mc; 1.35 kw.	EVANSTON, Cook County WEAW-FM: 105.1 mc; 36 kw.	JASPER, Dubois County WITZ-FM: 104.7 mc; 1.65 kw.	ASHLAND, Boyd County WCMI-FM: 93.7 mc; 3.75 kw.
FLORIDA	NEWNAN, Coweta County WCOH-FM: 96.7 mc; 33 kw.	HARRISBURG, Saline County WEBQ-FM: 99.9 mc; 1.65 kw.	MADISON, Jefferson County WORX-FM: 96.7 mc; 350 w.	CENTRAL CITY, Muhlenberg County WNES-FM: 101.9 mc; 21.5 kw.
CORAL GABLES, Dade County WVCG-FM: 105.1 mc; 18.5 kw.	SAVANNAH, Chatham County WTOC-FM: 97.3 mc; 7.9 kw.	JACKSONVILLE, Morgan County WLDS-FM: 100.5 mc; 9 kw.	MARION, Grant County WMRI-FM: 106.9 mc; 31 kw.	FULTON, Fulton County WFUL-FM: 104.9 mc; 0.5 kw.
DAYTONA BEACH, Volusia County WNDB-FM: 94.5 mc; 8.5 kw.	TOCCOA, Stephens County WLET-FM: 106.1; 0.73 kw.	JOLIET, Will County WAJP-FM: 93.5 mc; 1 kw. WJOL-FM: 96.7 mc; 1 kw.	MUNCIE, Delaware County WMUN-FM: 104.1 mc; 7.4 kw.	GLASGOW, Barren County WGCG-FM: 95.1 mc; 1.95 kw.
FORT LAUDERDALE, Broward County WFLM-FM: 105.9 mc; 2.9 kw. WWIL-FM: 103.5 mc; 31 kw.	HAWAII	LITCHFIELD, Montgomery County WSMI-FM: 106.1 mc; 6.1 kw.	NEW CASTLE, Henry County WCTW-FM: 102.5 mc; 4 kw.	HAZARD, Perry County WKIC-FM: 94.1 mc; 8.3 kw.
JACKSONVILLE, Duval County WJAX-FM: 95.1 mc; 7.7 kw. WMBR-FM: 96.1 mc; 40 kw. WZFM-FM: 96.9 mc; 9.7 kw.	HONOLULU, Honolulu County KAIM-FM: 95.5 mc; 5.6 kw. KEFW-FM: 96.3 mc; 7.7 kw.	MATTOON, Coles County WLBH-FM: 96.9 mc; 23 kw.	PRINCETON, Gibson County WRAY-FM: 98.1 mc; 8.7 kw.	HENDERSON, Henderson County WSON-FM: 99.5 mc; 20 kw.
MIAMI, Dade County WAFM-FM: 93.1 mc; 17.5 kw. WCKR-FM: 97.3 mc; 50 kw. WGBS-FM: 96.3 mc; 1.55 kw. WWPB-FM: 101.5 mc; 9.2 kw.	IDAHO	MT. CARMEL, Wabash County WSAB-FM: 94.9 mc; 37 kw. WVMC-FM: 101.1 mc; 4.3 kw.	WARSAW, Kosciusko County WRSW-FM: 107.3 mc; 34 kw.	HOPKINSVILLE, Christian County WRLX-FM: 98.7 mc; 8.7 kw. WKOF-FM: 100.3 mc; 3.7 kw.
MIAMI BEACH, Dade County WMET-FM: 93.3 mc; 13 kw.	BOISE, Ada County KBQI-FM: 97.6 mc; 17.5 kw.	MT. VERNON, Jefferson County WMIX-FM: 94.1 mc; 15.2 kw.	WASHINGTON, Wayne County WGLM-FM: 96.1 mc; 32 kw. WSLM-FM: 98.9 mc; 2.7 kw.	LEXINGTON, Fayette County WLAP-FM: 94.5 mc; 3.5 kw.
ORLANDO, Orange County WDBO-FM: 92.3 mc; 25 kw. WHOO-FM: 96.5 mc; 59 kw. WKIS-FM: 100.3 mc; 16.5 kw.	ILLINOIS	OAK PARK, Cook County WOPA-FM: 102.7 mc; 3.6 kw.	TERRE HAUTE, Vigo County WTHI-FM: 99.9 mc; 7.4 kw. WYTS-FM: 100.7 mc; 3.9 kw.	LOUISVILLE, Jefferson County WLVL-FM: 97.5 mc; 35 kw.
PALM BEACH, Palm Beach County WQXT-FM: 97.9 mc; 22 kw.	ANNA, Union County WRAJ-FM: 102.7 mc; 1 kw.	OLNEY, Richland County WVLN-FM: 92.9 mc; 18.5 kw.	WARSAW, Daviess County WFML-FM: 106.5 mc; 14 kw.	MADISONVILLE, Hopkins County WFMW-FM: 93.9 mc; 28 kw.
PENSACOLA, Escambia County WPEX-FM: 94.1 mc.	ARLINGTON HEIGHTS, Cook County WNWC-FM: 92.7 mc; 1 kw.	PARIS, Edgar County WPRS-FM: 98.3 mc; 1 kw.	MAYFIELD, Graves County WNGO-FM: 94.7 mc; 0.583 kw.	OWENSBORO, Daviess County WOMI-FM: 92.5 mc; 19.5 kw. WVJS-FM: 96.1 mc; 10 kw.
ST. PETERSBURG, Pinellas County WTCX-FM: 99.5 mc; 31 kw.	AURORA, Kane County WKKD-FM: 95.9 mc; 1 kw.	PEORIA, Peoria County WMBD-FM: 92.5 mc; 2.5 kw.	PADUCAH, McCracken County WKYB-FM: 93.3 mc; 32 kw. WPAD-FM: 96.9 mc; 36 kw.	LOUISIANA
SARASOTA, Sarasota County WYAK-FM: 102.5 mc.	BLOOMINGTON, McLean County WJBC-FM: 101.5 mc; 5.1 kw.	QUINCY, Adams County WGEM-FM: 105.1 mc; 8.3 kw. WTAD-FM: 99.5 mc; 27 kw.	CLINTON, Clinton County KROS-FM: 96.1 mc; 13 kw.	ALEXANDRIA, Rapides Parish KALB-FM: 96.9 mc; 8.4 kw.
TAMPA, Hillsborough County WDAE-FM: 100.7 mc; 64 kw. WFLA-FM: 93.3 mc; 46 kw. WPKM-FM: 104.7 mc; 10.5 kw.	CAMI, White County WROY-FM: 97.3 mc; 11 kw.	ROCKFORD, Winnebago County WRCK-FM: 97.5 mc; 16 kw.	DAVENPORT, Scott County WOC-FM: 103.7 mc; 33 kw.	BATON ROUGE, East Baton Rouge Parish WJBO-FM: 98.1 mc; 2.5 kw.
GEORGIA	CHAMPAIGN, Champaign County WDWS-FM: 97.5 mc; 27 kw.	ROCK ISLAND, Rock Island County WHBF-FM: 98.9 mc; 3.7 kw.	DES MOINES, Polk County KDMI-FM: 97.3 mc; 115 kw. KSO-FM: 98.5 mc; 9.06 kw. WIO-FM: 100.3 mc; 24 kw.	MONROE, Ouachita Parish KMLB-FM: 104.1 mc; 17 kw.
ATHENS, Clark County WGAU-FM: 102.5 mc; 4.4 kw.	CHICAGO, Cook County WBBM-FM: 96.3 mc; 10.5 kw. WCLM-FM: 101.9 mc; 18 kw. WDHF-FM: 95.5 mc; 52 kw. WEBH-FM: 93.9 mc; 35 kw. WEFM-FM: 99.5 mc; 44 kw. WEHS-FM: 97.9 mc; 21 kw. WFMP-FM: 100.3 mc; 33 kw. WFMQ-FM: 107.5 mc; 11 kw. WFMT-FM: 98.7 mc; 29.5 kw. WKFM-FM: 103.5 mc; 50 kw. WENR-FM: 94.7 mc; 4.3 kw. WMAQ-FM: 101.1 mc; 24 kw. WNIB-FM: 97.1 mc; 11 kw. WSBC-FM: 93.1 mc; 27.5 kw. WSEL-FM: 104.3 mc; 40 kw.	SPRINGFIELD, Sangamon County WTAX-FM: 103.7 mc; 6.7 kw.	DUBUQUE, Dubuque County WDBQ-FM: 103.3 mc; 15 kw.	NEW ORLEANS, Orleans Parish WDSU-FM: 105.3 mc; 3.4 kw. WRCM-FM: 97.1 mc; 5.9 kw. WWMT-FM: 95.7 mc; 47 kw.
ATLANTA, Fulton County WAVQ-FM: 94.9 mc; 7.1 kw. WGKA-FM: 92.9 mc; 9.4 kw. WPLO-FM: 103.3 mc; 36 kw. WSB-FM: 98.5 mc; 49 kw.	CICERO, Cook County WEHS-FM: 97.9 mc; 21 kw.	TAYLORVILLE, Christian County WGGM-FM: 95 mc; 3.4 kw.	MASON CITY, Cerro Gordo County KGLO-FM: 101.1 mc; 16 kw.	SHREVEPORT, Caddo Parish KBCL-FM: 96.5 mc; 11 kw. KRMD-FM: 101.1 mc; 11.5 kw. KWKH-FM: 94.5 mc; 13.5 kw.
AUGUSTA, Richmond County WAUG-FM: 105.7 mc; 9 kw. WBBQ-FM: 103.7 mc; 19.5 kw.	DECATUR, Macon County WSOY-FM: 102.9 mc; 39 kw.	INDIANA	MUSCATINE, Muscatine County KWPC-FM: 99.7 mc; 780 w.	MAINE
COLUMBUS, Muscogee County WRBL-FM: 93.3 mc; 25 kw.	EAST ST LOUIS, St. Clair County WAMV-FM: 101.1 mc; 37 kw.	BLOOMINGTON, Monroe County WTTV-FM: 92.3 mc; 37 kw.	STORM LAKE, Buena Vista County KAYL-FM: 101.5 mc; 8.9 kw.	AUGUSTA, Kennebec County WFAU-FM: 101.3 mc; 4.8 kw.
GAINESVILLE, Hall County WDUN-FM: 103.9 mc; 0.34 kw.	EFFINGHAM, Effingham County WSEI-FM: 95.7 mc; 20 kw.	COLUMBUS, Bartholomew County WCSI-FM: 98.3 mc; 0.76 kw.	KANSAS	CARIBOU, Aroostock County WFST-FM: 97.7 mc; 220 w.
LA GRANGE, Troup County WLAG-FM: 104.1 mc; 2.3 kw.	ELGIN, Kane County WELG-FM: 103.9 mc; 1 kw. WRMN-FM: 94.3 mc; 1 kw.	CONNERSVILLE, Fayette County WCNB-FM: 100.3 mc; 9.8 kw.	KANSAS CITY, Wyandotte County KCJC-FM: 98.1 mc; 63 kw.	LEWISTON, Androscoggin County WCOU-FM: 93.9 mc; 13 kw.
		ELKHART, Elkhart County WTRC-FM: 100.7 mc; 9.7 kw.	TOPEKA, Shawnee County KTOP-FM: 100.3 mc; 3.5 kw.	POLAND SPRING, Androscoggin County WMTW-FM: 94.9 mc; 49.1 kw.
		EVANSVILLE, Vanderburgh County WKYV-FM: 104.1 mc; 19 kw.	WICHITA, Sedgwick County KCBM-FM: 107.3 mc; 30 kw. KPH-FM: 100.3 mc; 11 kw.	
		FT. WAYNE, Allen County WPTH-FM: 95.1 mc; 44 kw.		
		HAMMOND, Lake County WYCA-FM: 92.3 mc; 3.1 kw.		

ROCHESTER, Monroe County WBBP-FM: 101.3 mc; 23.5 kw. WCMF-FM: 96.5 mc; 1.35 kw. WHFM-FM: 98.9 mc; 8.7 kw. WROC-FM: 97.9 mc; 18 kw.	HENDERSON, Vance County WHNC-FM: 92.5 mc; 9.5 kw.	BARBERTON, Summit County WDBN-FM: 94.9 mc; 110 kw.	OXFORD, Butler County WOXR-FM: 97.7 mc; 600 w.	BEAVER FALLS, Beaver County WBVP-FM: 106.7 mc; 16.5 kw.
SCHENECTADY, Schenectady County WGPM-FM: 99.5 mc; 6 kw.	HENDERSONVILLE, Henderson County WHKP-FM: 102.5 mc; 9.5 kw.	BELLAIRE, Belmont County WOMP-FM: 100.5 mc; 9 kw.	PORTSMOUTH, Scioto County WPAV-FM: 104.1 mc; 7 kw.	BETHLEHEM, Northampton County WGPA-FM: 95.1 mc; 10 kw.
SOUTH BRISTOL TOWNSHIP, Tompkins WRRB-FM: 95.1 mc; 5.3 kw.	HICKORY, Catawba County WHKY-FM: 102.8 mc; 14.8 kw.	CANTON, Stark County WAND-FM: 106.9 mc; 28 kw. WHBC-FM: 94.1 mc; 15 kw.	SALEM, Columbiana County WSOM-FM: 105.1 mc; 100 kw.	BLOOMSBURG, Columbia County WHLM-FM: 106.5 mc; 8.8 kw.
SPRINGVILLE, Erie County WSPE-FM: 88.1 mc; 10 w.	HIGH POINT, Guilford County WHPE-FM: 95.5 mc; 13 kw. WMFR-FM: 99.5 mc; 8 kw. WNOS-FM: 100.3 mc; 2.7 kw.	CINCINNATI, Hamilton County WAEF-FM: 104.3 mc; 4.8 kw. WCPO-FM: 105.1 mc; 16.5 kw. WKRC-FM: 101.9 mc; 14.5 kw. WSAI-FM: 102.7 mc; 14.7 kw.	SANDUSKY, Erie County WLEC-FM: 102.7 mc; 6.9 kw.	BOYERSTOWN, Berks County WBYC-FM: 107.5 mc; 20 kw.
SYRACUSE, Onondaga County WDDS-FM: 93.1 mc; 97 kw. WONO-FM: 100.9 mc; 260 w. WSYR-FM: 94.5 mc; 10 kw.	LAURINBURG, Scotland County WEWO-FM: 96.5 mc; 9.2 kw.	CLEVELAND, Cuyahoga County KYW-FM: 105.7 mc; 27 kw. WABQ-FM: 106.5 mc; 16.5 kw. WCRF-FM: 103.3 mc; 21.3 kw. WDOK-FM: 102.1 mc; 31 kw. WERE-FM: 98.5 mc; 40 kw. WGAR-FM: 99.5 mc; 31 kw. WHK-FM: 100.7 mc; 32 kw. WCUY-FM: 92.3 mc; 26 kw. WJW-FM: 104.1 mc; 2.8 kw. WNOB-FM: 107.9 mc; 135 kw.	SPRINGFIELD, Clark County WBLV-FM: 103.9 mc; 1 kw.	BRADDOCK (Pittsburgh), Allegheny Co. WLOA-FM: 96.9 mc; 68 kw.
TROY, Rensselaer County WFLY-FM: 92.5 mc; 5.4 kw. WRPI-FM: 91.5 mc; 710 w.	LEAKSVILLE, Rockingham County WLOE-FM: 94.5 mc; 13.5 kw.	CLEVELAND HEIGHTS, Cuyahoga Co. WCUY-FM: 92.3 mc; 26 kw.	STEBENVILLE, Jefferson County WSTV-FM: 103.5 mc; 3.1 kw.	BUTLER, Butler County WBUT-FM: 97.7 mc; 720 w.
UTICA, Oneida County WRUN-FM: 105.7 mc; 4.3 kw.	LEXINGTON, Davidson County WBUX-FM: 94.3 mc; 300 w.	COLUMBUS, Franklin County WBNS-FM: 97.1 mc; 54 kw. WCOL-FM: 92.3 mc; 7.2 kw. WTVN-FM: 96.3 mc; 26 kw. WVCO-FM: 94.7 mc; 52 kw.	TOLEDO, Lucas County WMHE-FM: 92.5 mc; 10 kw. WSPD-FM: 101.5 mc; 23 kw. WTRT-FM: 99.9 mc; 8.8 kw. WTOL-FM: 104.7 mc; 1.3 kw.	CARLISLE, Cumberland County WHYL-FM: 102.3 mc; 714 w.
WETHERSFIELD, Wyoming County WRRL-FM: 107.7 mc; 5.4 kw.	RALEIGH, Wake County WKIX-FM: 96.1 mc; 29.5 kw. WPTP-FM: 94.7 mc; 50 kw. WRAL-FM: 101.5 mc; 54 kw.	DAYTON, Montgomery County WHIO-FM: 99.1 mc; 19 kw. WIPB-FM: 104.7 mc; 24 kw.	WOOSTER, Wayne County WWST-FM: 104.5 mc; 13 kw.	CHAMBERSBURG, Franklin County WCHA-FM: 95.1 mc; 3.2 kw.
WHITE PLAINS, Westchester County WFAS-FM: 103.9 mc; 120 w.	REIDSVILLE, Rockingham County WREB-FM: 102.1 mc; 106 kw.	EAST LIVERPOOL, Columbiana County WOH-FM: 104.3 mc; 27 kw.	YOUNGSTOWN, Mahoning County WBBW-FM: 93.3 mc; 17.5 kw. WRDZ-FM: 101.1 mc; 24.5 kw. WKBN-FM: 98.9 mc; 50 kw.	DUBOIS, Clearfield County WCED-FM: 102.1 mc; 3.2 kw.
NORTH CAROLINA	ROCKY MOUNT, Nash County WFMA-FM: 100.7 mc; 33 kw. WEED-FM: 92.1 mc; 270 w.	ELYSIA, Lorain County WEOL-FM: 107.3 mc; 15 kw.		EASTON, Northampton County WEEB-FM: 99.9 mc; 16 kw. WEST-FM: 107.9 mc; 11 kw.
ALBEMARLE, Stanly County WABZ-FM: 100.9 mc; .75 kw.	ROXBORO, Person County WROX-FM: 96.7 mc; 600 w.	DAYTON, Montgomery County WHIO-FM: 99.1 mc; 19 kw. WIPB-FM: 104.7 mc; 24 kw.	OKLAHOMA	ERIE, Erie County WERC-FM: 99.9 mc; 9.7 kw.
ASHEBORO, Randolph County WGWR-FM: 92.3 mc; 10 kw.	SALISBURY, Rowan County WSTP-FM: 106.5 mc; 15 kw.	EAST LIVERPOOL, Columbiana County WOH-FM: 104.3 mc; 27 kw.	DURANT, Bryan County KSEO-FM: 107.3 mc; 2.75 kw.	HARRISBURG, Dauphin County WHP-FM: 97.3 mc; 1.85 kw.
ASHEVILLE, Buncombe County WLOS-FM: 104.3 mc; 9.1 kw.	SANFORD, Lee County WWGP-FM: 105.5 mc; 490 w.	ELYRIA, Lorain County WEOL-FM: 107.3 mc; 15 kw.	OKLAHOMA CITY, Oklahoma County KEFM-FM: 94.7 mc; 3 kw. KYFM-FM: 98.9 mc; 1.5 kw.	HAZELTON, Luzerne County WAZL-FM: 97.9 mc; 2.6 kw.
BURLINGTON-GRAHAM, Alamance Co. WBAG-FM: 92.9 mc; 2.8 kw. WBBB-FM: 101.1 mc; 3.8 kw.	SHELBY, Cleveland County WOHS-FM: 96.1 mc; 2.6 kw.	FINDLAY, Hancock County WFIN-FM: 100.5 mc; 8.2 kw.	STILLWATER, Payne County KSPJ-FM: 93.9 mc; 3.9 kw.	HOMESTEAD, Allegheny County WILY-FM: 105.9 mc; 2.74 kw.
CHARLOTTE, Mecklenburg County WMTT-FM: 106.9 mc; 36 kw. WSOC-FM: 103.5 mc; 35 kw. WYFM-FM: 104.7 mc; 3.8 kw.	STATESVILLE, Iredell County WPMX-FM: 105.7 mc; 2.4 kw.	FOSTORIA, Seneca County WFOB-FM: 99.3 mc; 1 kw.	TULSA, Tulsa County KOGM-FM: 92.9 mc; 3.9 kw.	JOHNSTOWN, Cambria County WARD-FM: 92.1 mc; 285 w. WJAC-FM: 95.5 mc; 8.3 kw.
CLINGMAN'S PEAK, Mecklenburg Co. WMTT-FM: 106.9 mc; 36 kw.	TARBORO, Edgecombe County WCPS-FM: 104.3 mc; 7 kw.	PREMONT, Sandusky County WPRO-FM: 99.3 mc; 1 kw.	OREGON	LANCASTER, Lancaster County WDAC-FM: 94.5 mc; 15 kw. WGAL-FM: 101.3 mc; 3.8 kw. WLAN-FM: 96.9 mc; 6.7 kw.
DURHAM, Durham County WDNC-FM: 105.1 mc; 36 kw.	THOMASVILLE, Davidson County WTNC-FM: 98.3 mc; 450 w.	HAMILTON, Butler County WHOH-FM: 103.5 mc; 8.7 kw. WQMS-FM: 96.7 mc; 290 w.	EUGENE, Lane County KFMJ-FM: 97.9 mc; 3.6 kw. KUGN-FM: 99.1 mc; 390 w.	LEBANON, Lebanon County WLBR-FM: 100.1 mc; 720 w.
ELKIN, Surry County WIFM-FM: 100.9 mc; 0.35 kw.	WILMINGTON, New Hanover WPRV-FM: 93.9 mc; 6.8 kw.	LANCASTER, Fairfield County WHOK-FM: 95.5 mc; 18 kw.	GRANTS PASS, Josephine County KGPO-FM: 96.9 mc; 1.3 kw.	MEADVILLE, Crawford County WMGW-FM: 100.3 mc; 10 kw.
FAYETTEVILLE, Cumberland County WFNC-FM: 98.1 mc; 14 kw.	WINSTON-SALEM, Forsyth County WAIR-FM: 93.1 mc; 34 kw. WSJS-FM: 104.1 mc; 12.5 kw. WYPS-FM: 107.5 mc; 1.55 kw.	LIMA, Allen County WIMA-FM: 102.1 mc; 15 kw.	MEDFORD, Jackson County KBOY-FM: 95.3 mc; 800 w.	MONTROSE, Susquehanna County WPEL-FM: 96.5 mc; 57 kw.
FOREST CITY, Rutherford County WBBO-FM: 93.3 mc; 1.5 kw.	OHIO	MARION, Marion County WRRN-FM: 106.9 mc; 25 kw.	PORTLAND, Multnomah County KEX-FM: 92.3 mc; 56 kw. KMGF-FM: 95.5 mc; 68.25 kw. KOIN-FM: 101.1 mc; 48 kw. KPOJ-FM: 98.7 mc; 4.4 kw. KQFM-FM: 100.3 mc; 17 kw.	OIL CITY, Vanengo County WDJR-FM: 98.5 mc; 2.92 kw.
GASTONIA, Gastonia County WGNC-FM: 101.9 mc; 11.1 kw.	AKRON, Summit County WAKR-FM: 97.5 mc; 4.4 kw. WDBN-FM: 94.9 mc; 110 kw.	MIDDLETOWN, Butler County WFPB-FM: 105.9 mc; 29.4 kw.	SPRINGFIELD and EUGENE, Lane Co. KEED-FM: 93.1 mc; 1.35 kw.	PALMYRA, Lebanon County WJWR-FM: 92.1 mc; 760 w.
GOLDSBORO, Wayne County WBQR-FM: 96.9 mc; 41 kw.	ALLIANCE, Stark County WFAH-FM: 101.7 mc; 1 kw.	MT. VERNON, Knox County WMVO-FM: 93.7 mc; 2.9 kw.	PENNSYLVANIA	PHILADELPHIA, Philadelphia County WCAU-FM: 98.1 mc; 10 kw. WDAS-FM: 105.3 mc; 20 kw. WFIL-FM: 102.1 mc; 6.3 kw. WFLN-FM: 95.7 mc; 20 kw. WHAT-FM: 96.5 mc; 20 kw. WIBG-FM: 94.1 mc; 20 kw. WIFI-FM: 92.5 mc; 20 kw. WIP-FM: 93.3 mc; 20 kw. WPEN-FM: 102.9 mc; 20 kw. WQAL-FM: 106.1 mc; 7.7 kw.
GREENSBORO, Guilford County WMDE-FM: 98.7 mc; 5.8 kw.	ASHLAND, Ashland County WNCO-FM: 101.3 mc; 10.2 kw.	NEWARK, Licking County WCLT-FM: 100.3 mc; 8.5 kw.	ALLENTOWN, Lehigh County WAEZ-FM: 104.1 mc; 8.9 kw. WFMZ-FM: 100.7 mc; 4.8 kw.	

PITTSBURGH, Allegheny County KDKA-FM: 92.9 mc; 47 kw. WFMP-FM: 99.7 mc; 24 kw. WINE-FM: 107.9 mc; 36 kw. WILY-FM: 105.9 mc; 2.74 kw. WKJF-FM: 93.7 mc; 40 kw. WPIT-FM: 101.5 mc; 19 kw. WWSW-FM: 94.5 mc; 50 kw.	SENECA, Seneca County WSNW-FM: 98.1 mc; 4.9 kw.	GAINESVILLE, Cooke County KGAF-FM: 94.5 mc; 2.5 kw.	NORFOLK, Norfolk County WRVC-FM: 102.5 mc; 8.7 kw. WYFI-FM: 99.7 mc; 11.5 kw.	PARKERSBURG, Wood County WAAM-FM: 106.5 mc; 8.9 kw.
POTTSVILLE, Schuylkill County WPPA-FM: 101.9 mc; 2.8 kw.	SPARTANBURG, Spartanburg County WSPA-FM: 98.9 mc; 4.9 kw.	HARLINGEN, Cameron County KELT-FM: 94.5 mc; 3 kw.	PORTSMOUTH, Norfolk County WAVY-FM: 96.9 mc; 26 kw.	WHEELING, Ohio County WKWK-FM: 97.3 mc; 10 kw. WVVA-FM: 98.7 mc; 7.4 kw.
SCRANTON, Lackawanna County WGBI-FM: 101.3 mc; 1.8 kw.	TENNESSEE	HOUSTON, Harris County KAHO-FM: 94.5 mc; 7.6 kw. KPMK-FM: 97.9 mc; 10.5 kw. KJGM-FM: 99.1 mc; 49 kw. KHUL-FM: 95.7 mc; 15.5 kw. KQUE-FM: 102.9 mc; 64.24 kw. KRBE-FM: 104.1 mc; 40 kw. KTRH-FM: 101.1 mc; 29.5 kw.	RICHMOND, Henrico County WCOD-FM: 90.1 mc; 34 kw. WRNL-FM: 102.1 mc; 50 kw. WRVA-FM: 94.5 mc; 25 kw.	WISCONSIN
SHARON, Mercer County WPIC-FM: 102.9 mc; 26 kw.	BRISTOL, Sullivan County WOPI-FM: 96.9 mc; 9.7 kw.	LUBBOCK, Lubbock County KFPM-FM: 96.3 mc; 3.6 kw. KRKH-FM: 93.7 mc; 9.6 kw.	ROANOKE, Roanoke County WDBJ-FM: 94.9 mc; 14.5 kw. WLSL-FM: 99.1 mc; 21 kw.	FORT ATKINSON, Jefferson County WFAW-FM: 107.3 mc; 2.95 kw.
SUNBURY, Northumberland County WKOK-FM: 94.1 mc; 4.4 kw.	JACKSON, Madison County WTSJ-FM: 104.1 mc; 50 kw.	MARSHALL, Harrison County KMHT-FM: 97.3 mc; 5.9 kw.	SOUTH BOSTON, Halifax County WHLP-FM: 97.5 mc; 2.4 kw.	GREENFIELD TOWNSHIP, Sauk County WWCF-FM: 94.9 mc; 37 kw.
TOWANDA, Bradford County WTTC-FM: 92.7 mc; 720 w.	JOHNSON CITY, Washington County WJCV-FM: 100.7 mc; 9.6 kw.	MIDLAND, Midland County KNFM-FM: 92.3 mc; 4.8 kw.	STAUNTON, Augusta County WAFC-FM: 93.5 mc; 500 w.	JANESVILLE, Rock County WCLO-FM: 99.9 mc; 15.5 kw.
WARREN, Warren County WRRN-FM: 92.3 mc; 3 kw.	KINGSPORT, Sullivan County WKPT-FM: 98.5 mc; 10 kw.	PORT ARTHUR, Jefferson County KFMP-FM: 93.3 mc; 3.2 kw.	WINCHESTER, Frederick County WRFL-FM: 92.5 mc; 22 kw.	MADISON, Dane County WIBA-FM: 101.5 mc; 10 kw. WISM-FM: 98.1 mc; 1 kw. WMPF-FM: 104.1 mc; 7.5 kw. WVRV-FM: 102.5 mc; 3.9 kw.
WAYNESBORO, Franklin County WAYZ-FM: 101.5 mc; 3.21 kw.	MEMPHIS, Shelby County WDIA-FM: 102.7 mc; 5.2 kw. WFMB-FM: 105.9 mc; 3.1 kw. WMC-FM: 99.7 mc; 300 kw. WMP5-FM: 97.1 mc; 6.6 kw. WQMM-FM: 95.5 mc; 1.3 kw.	SAN ANTONIO, Bexar County KEEZ-FM: 97.3 mc; 17.5 kw. KISS-FM: 99.5 mc; 12.9 kw. KIYI-FM: 92.9 mc; 1.4 kw. KAKI-FM: 8.1 mc; 5 kw.	WOODBIDGE, Prince William County WBVA-FM: 105.9 mc; 9.5 kw.	MILWAUKEE, Milwaukee County WPMR-FM: 96.5 mc; 15 kw. WISN-FM: 97.3 mc; 5.1 kw. WMIL-FM: 95.7 mc; 25.5 kw. WQFM-FM: 93.3 mc; 30 kw. WRIT-FM: 102.9 mc; 22 kw. WTMJ-FM: 94.5 mc; 4.6 kw.
WILLIAMSPORT, Lycoming County WLYC-FM: 105.1 mc; 3.8 kw. WRAK-FM: 100.3 mc; 3.2 kw.	NASHVILLE, Davidson County WPMB-FM: 105.9 mc; 3.1 kw. WSIX-FM: 97.5 mc; 9 kw.	TEXARKANA, Bowie County KCMC-FM: 98.1 mc; 1.4 kw.	WASHINGTON	MONROE, Green County WEKZ-FM: 93.7 mc; 14.860 kw.
YORK, York County WNOV-FM: 105.7 mc; 1.2 kw.	TEXAS	WACO, McLennan County KEFC-FM: 95.5 mc; 3.2 kw.	BELLINGHAM, Whatcom County KGMI-FM: 92.9 mc; 16.5 kw.	POYNETTE, Columbia County WWCF-FM: 94.9 mc; 37 kw.
RHODE ISLAND	AMARILLO, Potter County KGNC-FM: 93.1 mc; 14.1 kw.	WAXAHACHIE, Ellis County KBEC-FM: 93.5 mc; 350 w.	EDMONDS, King County KGFN-FM: 105.3 mc; 120 kw.	RACINE, Racine County WRJN-FM: 100.7 mc; 15 kw.
CRANSTON, Providence County WLOV-FM: 99.9 mc; 3.4 kw.	AUSTIN, Travis County KAZZ-FM: 95.5 mc; 340 w. KHFI-FM: 98.3 mc; 780 w. KTBC-FM: 93.7 mc; 94 kw.	UTAH	OPPORTUNITY, Spokane County KZUN-FM: 96.1 mc; 3.3 kw.	RICE LAKE, Barron County WJMC-FM: 96.3 mc; 50 kw.
PROVIDENCE, Providence County WPJB-FM: 105.1 mc; 20 kw. WICE-FM: 107.7 mc; 20 kw. WPFM-FM: 95.5 mc; 20 kw. WPRO-FM: 92.3 mc; 15 kw. WXCN-FM: 101.5 mc; 20 kw.	BEAUMONT, Jefferson County KRIC-FM: 97.5 mc; 9.1 kw.	SALT LAKE CITY, Salt Lake County KCPX-FM: 98.7 mc; 1.2 kw. KLUB-FM: 97.1 mc; 4.8 kw. KSL-FM: 100.3 mc; 4 kw.	SEATTLE, King County KETO-FM: 101.5 mc; 10 kw. KGMJ-FM: 95.7 mc; 3.6 kw. KING-FM: 98.1 mc; 15 kw. KIRO-FM: 100.7 mc; 16.5 kw. KISW-FM: 99.9 mc; 2.1 kw. KLSN-FM: 96.5 mc; 19 kw. KMCS-FM: 98.9 mc; 10.5 kw.	SPARTA, Monroe County WCOW-FM: 97.1 mc; 16 kw.
WOONSOCKET, Providence County WWON-FM: 106.2 mc; 390 w.	CLEBURNE, Johnson County KCLE-FM: 94.9 mc; 6.35 kw.	VIRGINIA	SPOKANE, Spokane County KHQ-FM: 98.1 mc; 47 kw. KREM-FM: 92.9 mc; 4.8 kw. KXLY-FM: 99.9 mc; 2 kw.	WATERTOWN, Jefferson County WTTN-FM: 104.7 mc; 3 kw.
SOUTH CAROLINA	CORPUS CHRISTI, Nueces County KMPF-FM: 95.5 mc; 10 kw.	ARLINGTON, Arlington County WARL-FM: 90.1 mc; 20 kw.	TACOMA, Pierce County KLAY-FM: 106.3 mc; 830 w. KTNT-FM: 97.3 mc; 10.2 kw. KTWR-FM: 103.9 mc; 0.83 kw.	WAUKESHA, Waukesha County WAUX-FM: 106.1 mc; 3.3 kw.
ANDERSON, Anderson County WCAC-FM: 101.1 mc; 6.4 kw.	DALLAS, Dallas County KIXL-FM: 104.5 mc; 20.5 kw. KQRO-FM: 102.9 mc; 7.6 kw. KRLD-FM: 92.5 mc; 40 kw. WRR-FM: 101.1 mc; 68 kw.	CHARLOTTESVILLE, Albemarle County WCCV-FM: 97.5 mc; 3.4 kw. WINA-FM: 95.3 mc; 0.62 kw.	WAUSAU, Marathon County WLIN-FM: 95.5 mc; 20.5 kw.	WAUTATOSA, Milwaukee County WTO5-FM: 107.3 mc; 3.3 kw.
CHARLESTON, Charleston County WCSC-FM: 96.9 mc; 68 kw. WTMA-FM: 95.1 mc; 10 kw.	DENTON, Denton County KDNT-FM: 106.3 mc; 760 w.	CREWE, Nottoway County WSVS-FM: 104.7 mc; 14 kw.	WEST VIRGINIA	WEST BEND, Washington County WBKV-FM: 92.5 mc; 18 kw.
COLUMBIA, Richland County WCOS-FM: 97.9 mc; 5.3 kw. WNOK-FM: 104.7 mc; 3.4 kw.	DIBOLL, Angelina County KSPL-FM: 95.5 mc; 6 kw.	FREDERICKSBURG, WFVA-FM: 101.5 mc; 5.1 kw.	BECKLEY, Raleigh County WBKW-FM: 99.5 mc; 34 kw.	WISCONSIN RAPIDS, Wood County WFHR-FM: 103.3 mc; 2.1 kw.
DILLON, Dillon County WDSC-FM: 92.9 mc; 8.8 kw.	DUMAS, Moore County KDDD-FM: 95.3 mc; 680 w.	GRETNA, Pittsylvania County WMNA-FM: 103.3 mc; 3 kw.	CHARLESTON, Kanawha County WKNA-FM: 98.5 mc; 2.65 kw.	PUERTO RICO
GREENVILLE, Greenville County WESC-FM: 92.5 mc; 12 kw. WFBC-FM: 93.7 mc; 9.9 kw. WMUU-FM: 94.5 mc; 840 w.	EL PASO, El Paso County KHMS-FM: 94.7 mc; 2.5 kw.	HARRISONBURG, Rockingham County WSVA-FM: 100.7 mc; 7.3 kw.	HUNTINGTON, Cabell County WKEE-FM: 100.5 mc; 53 kw.	MAYAGUEZ WORA-FM: 97.5 mc; 400 w.
ROCK HILL, York County WRHI-FM: 98.3 mc; 650 w.	FORT WORTH, Tarrant County KFJZ-FM: 97.1 mc; 22 kw. WBAP-FM: 96.3 mc; 52 kw.	LYNCHBURG, Campbell County WWOD-FM: 100.1 mc; .94 kw.	MARTINSBURG, Berkeley County WEPM-FM: 94.3 mc; 81 kw.	RIO PIEDRAS WFID-FM: 95.7 mc; 17 kw.
		MARTINSVILLE, Henry County WMVA-FM: 96.3 mc; 2.9 kw.	MORGANTOWN, Monongalia County WAJR-FM: 99.3 mc; 1 kw.	SAN JUAN WITA-FM: 93.7 mc; 3.4 kw. WKAQ-FM: 104.7 mc. 350 w. WPRM-FM: 98.5 mc; 17.5 kw.
		NEWPORT NEWS WGH-FM: 97.3 mc; 36 kw.	OAK HILL, Fayette County WOAY-FM: 94.1 mc; 14.5 kw.	

INSTRUMENT ALIGNMENT PROCEDURE

THE FOLLOWING INFORMATION IS SUPPLIED FOR THOSE WHO MAY WISH TO ALIGN THIS TUNER WITH THE USE OF TEST INSTRUMENTS, HOWEVER IT IS NOT NECESSARY TO USE INSTRUMENTS TO OBTAIN PROPER PERFORMANCE.

Control Settings: Automatic Frequency Control off. Interchannel Muting Switch off. Range Switch in "Distant" position, Function Switch, Mono.

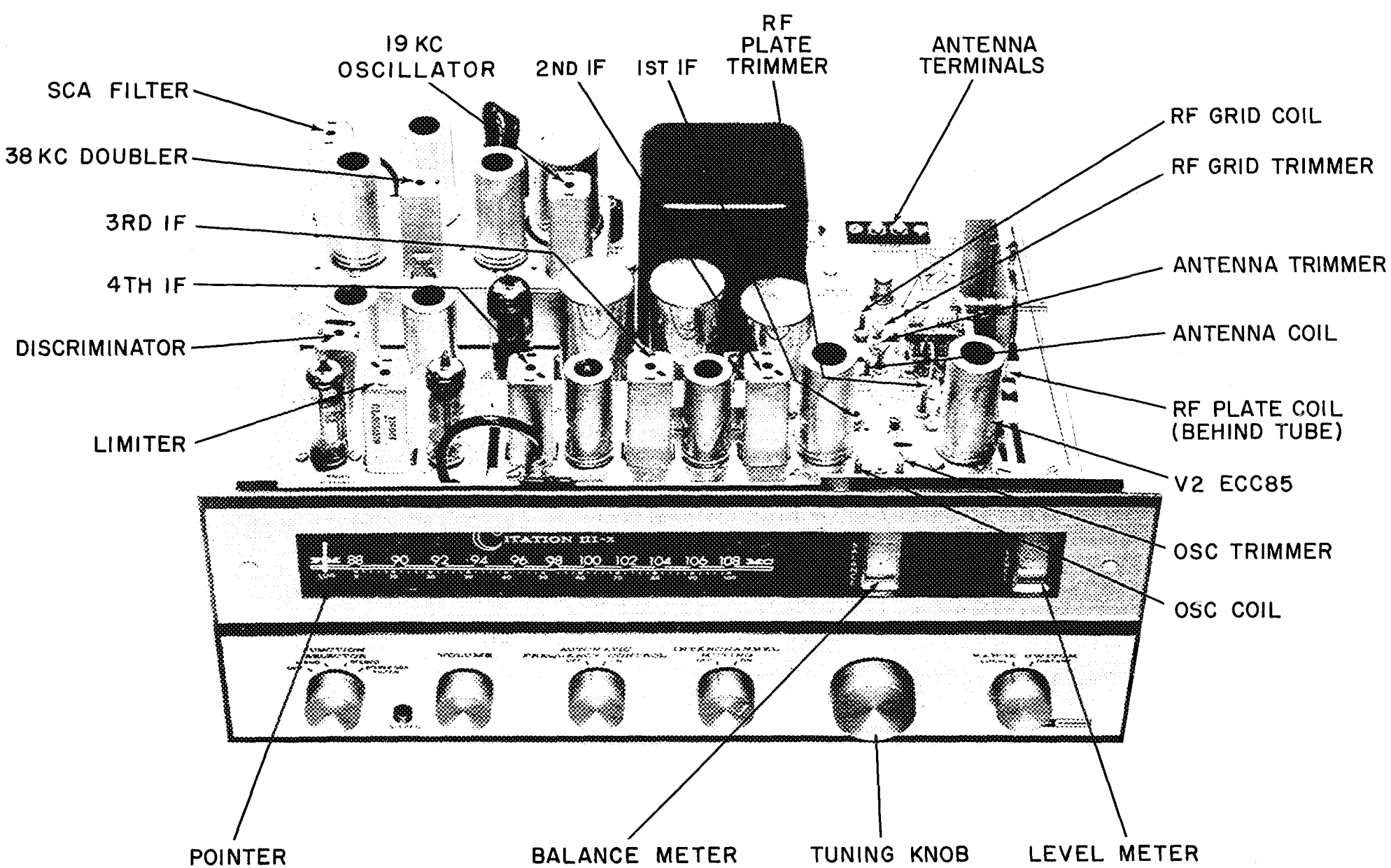
STEP	ALIGN.	GENERATOR SETTING		FEED SIGNAL	OUTPUT IND.	DIAL SETTING	ADJUST	ADJUST FOR	NOTES	
		FREQ.	MODULATION							
1	IF	10.7 MC	None	See Note, last column	Level Meter	90 MC	1st, 2nd, 3rd, 4th, IF Tran.	Maximum	Remove ECC85 (V2) tube shield. Couple signal by loop around tube.	
2	Oscillator	90 MC	None	Antenna Terminals	Same	90 MC	Osc. Coil	Maximum		
3	Oscillator	106 MC	None	Same	Same	106 MC	Osc. Trimmer	Maximum		
4	Repeat steps 2 and 3.									
5	RF Amplifier	90 MC (See Note)	None	Same	Same	90 MC	Antenna Coil, RF Grid Coil, RF Plate Coil	Maximum	Alternatively, an FM station, near specified frequency may be used as a signal source for steps 5 & 6.	
6	RF Amplifier	106 MC	None	Same	Same	106 MC	Antenna Trimmer,	Maximum		
7	Repeat steps 5 and 6.									
8	Limiter Transformer (See Note)	Remove generator. Tune off station.			Balance Meter	Off Station	Limiter Transformer.	Maximum Positive Indication	Rotate top slug of discriminator transformer fully counter-clockwise before adjusting limiter transformer.	
9	Discriminator Transformer Primary	Same as Step 8			Balance Meter	Off Station	Disc Primary (Bottom)	Maximum Positive Indication		
10	Discriminator Transformer Secondary				Balance Meter	Off Station	Disc Secondary (Top)	Zero on Balance Meter		

MULTIPLEX ALIGNMENT PROCEDURE

DO NOT ATTEMPT ALIGNMENT UNLESS FOLLOWING EQUIPMENT IS AVAILABLE:

1. Multiplex Stereo Generator 2. FM Signal Generator 3. Oscilloscope 4. AC VTVM 5. Audio Oscillator

STEP	ALIGN.	GENERATOR	FEED SIGNAL	OUTPUT IND.	ADJUST	ADJUST FOR	NOTES
1.	SCA Filter	Audio Gen set at 67.5 KC	Multiplex Input	VTVM at junction R81 and R82	Top and Bottom	Minimum	Function Switch in Stereo SCA Pos.
2.	19 KC Oscillator	FM signal Gen modulated 30% by Stereo Gen (B CHANNEL)	Antenna terminals. Tune to signal.	Junction of C78 & R81	Top	Maximum	Loudness Control maximum, Function Switch in Stereo position
3.	38 KC Doubler	Same	Same	Same	Top and Bottom	Maximum	
4.	19 KC Oscillator	FM Signal Gen modulated 30% by stereo Gen (B CHANNEL)	Antenna terminals. Tune to signal.	Scope at Output A	Top	Minimum	



REPLACEMENT PARTS LIST

As you remove the following items, put a check mark in the space provided. Replace all the parts in component Boxes 1, #2, and #3 to their respective compartments.

Refer to the pictorials and the hardware identification sheet to identify the parts.

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
MAIN CARTON			
() FM Tuner Cartridge (long metal box with pulley attached)	1		#377
() Multiplex Adaptor Sub-chassis	1		
() Power Transformer	1		FT4445804
() Meter (level)	1		M3654467
() Meter (balance)	1		M3654468

LEFT PARTITION CONTAINING

() *Escutcheon Back Plate (large brown plate)	1		P3654261
() *Escutcheon Front Plate (top) (Do not remove covering)	1		B3654536
() *Escutcheon Front Plate (Bottom) (Gold)	1		P6437322
() *Dial Scale (Do not remove covering)	1		B4445807
() *Dial Plate (small brown plate)	1		P3654530

Return the * items to their respective locations in the carton to prevent scratching the finish during construction.

COMPONENT BOX #1

() #6-32 x 3/8" long, binding head machine screw	48		KM632-6SC
() #6 lockwasher	71		KL6-SC
() #6-32 hex nut	50		KN632-SC
() #6-32 x 1/4" long binding head machine screw	13		KM632-4SC
() #4-40 x 1/4" long binding head machine screw	10		KM440-4SC
() #4 lockwasher	10		KL4-SC
() #4-40 hex nut	10		KN440-SC
() #6 x 1/4" long binding head sheet metal screw	19		KP6-4SC
() #6-32 speed nut	10		STCOM3762
() Idler Pulley	6		PCOM4617
() #2-56 x 1/2" long binding head machine screw	6		KM256-8SC

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() Nylon Washer	6		Z3654651
() Nylon Bushing	6		Z3654616
() #2 lockwasher	6		KL2-SC
() #2-56 hex nut	6		KN256-SC
() Nylon Shaft Bearing	1		PCOM3253
() #3/8 lockwashers	5		KL18-SC
() #3/8-32 hex nut	5		KN1832-SC
() 3 position output socket	1		STCOM4253
() 3 position insulating wafer	1		STCOM4312
() Lug Strip (3AUA)	1		HLCOM2731
() Stereo Control Receptacle (11 Pin Socket)	1	V11	STCOM5951
() Lug Strip (2AU)	1	LS11	HLCOM3132
() AC Convenience Socket	1		HC24625
() Antenna Terminal Strip	1		STCOM4566
() #6 solder lug (internal tooth #409)	2	SL7, SL8	Z1021705
() Electrolytic Capacitor Mounting Wafer	3		STCOM2702
() Lug Strip (2AU)	2	LS8, LS10	HLCOM3132
() Lug Strip (3AUA)	1	LS9	HLCOM2731
() Harness Lug	4		PCOM4173
() #6 Solder Lug (internal tooth #409)	2	SL5, SL6	Z1021705
() Cartridge Input Terminal Strip	1		STCOM4782
() Interchannel Muting Control	1	R2	ER3654653
() Solder Shield	1		PCOM2547
() #6 Solder Lug (#141)	2		Z3654776
() Fuse Holder (Rubber washer, lockwasher & nut)	1		HCCOM3750
() Fuse, 2 amp, 3AG	1		ZCOM2856
() Standoff (Terminal Board)	4		VN3654538
() Tube Socket, 9 pin with shield base	2	V8, V9	STCOM4036
() Tube Socket, 9 pin (bottom mount)	1	V10	STCOM4514
() Tube Socket, 7 pin (bottom mount)	2	V6, V7	STCOM4565
() #4 Solder Lug (#652)	2	SL3, SL4	Z621396
() Lug Strip (4AOAU)	1	LS6	HLCOM4775
() Lug Strip (2AH)	1	LS7	HLCOM3091
() #8 lockwasher (external tooth)	4		KX8-SC
() #8-32 hex nut	4		KN832-SC
() Discriminator Transformer	1		GL3654577
() Limiter Transformer	1		GL3654578
() Transformer Mounting Clip	2		Z24614
() Nuvistor Socket	1	V1	STCOM4564
() Resistor 3 watt 12K ohm 10%	1	R70	RSCOM3692
() Resistor, 5 watt, 330 ohm - 10%	3	R61, R62, R63	RS3654592

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() Resistor, 5 watt, 220 ohm - 10%	1	R65	RS3654593
() Resistor, 1/2 watt, 22K ohm - 10%	1	R64	RA223-1
() Resistor, 1/2 watt, 47K ohm - 10%	1	R8	RA473-1
() Capacitor, disc,.01 MFD +80 - 20%	1	C64	JCST222
() Capacitor, disc, 2 x 10K - 1400 volt	1		JCST263
() Cable Wrap	1 length		
() Plastic Cable Clamp (large) #E-5	1		STCOM3944
() Plastic Cable Clamp (small) #E-3	1		STCOM3942
() #6 flatwasher	2		KW6-SC
() Nylon Shaft Bearing	1		PCOM3253
() "E" Retaining Ring	2		STCOM4569
() #8-32 x 1/4" long set screw	1		VS3654574
() Flywheel	1		P3654301
() Automatic Frequency Control Switch	1		ER3654655
() Interchannel Muting Switch	1		ER3654655
() Range Switch	1		ER3654551
() Volume Control	1	R1	RV4715791

MAIN CARTON (CENTER PARTITION)

() Chassis	1		P3654556
() Chassis Front Panel	1		P3654529

COMPONENT BOX #2

() Pilot Light Socket (short bracket)	1		HC3654915
() Pilot Light Socket (long bracket)	1		HC3654598
() Meter Pad	1		P3654618
() Meter Screws	4		
() Lug Strip (32AUR)	1		HLCOM4826
() Small Screwdriver	1		STCOM4929
() Pilot Light Socket (short bracket)	1		HC3654599
() Pilot Lamp #44 Clear	3		KBCOM3429
() Pilot Lamp Shield	1		Z25891
() Fibre Bushing	2		STCOM3656
() A. C. Power Switch Cover (with Fibre washer & insulating sleeve)	1		STCOM5825
() Small metal cable #511	1		STCOM3945
() Fishpaper Shield	1		PCOM4597
() Lug Strip Cover	1		P3634194

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() #6 Solder Lug (#141)	1		Z3654776
() #16 Heavy Bare Wire	1 length		WCOM4931
() #6-32 x 3/16" long set screw	2		VS3654573
() Drive Pulley	1		A3654295
() Dial Cord Assembly	1		A3654576
() Spacer, 1/4" long	2		P27751
() Dial Pad	4		Z3654621
() Spacer, 5/8" long	2		VN3283766
() #6 Flatwasher	1		KW6-SC
() Pointer	1		P3654619
() #4-40 speednut	2		STCOM4670
() #6 flatwasher	2		KW6-SC
() Thumb Screw	2		STCOM4572
() #4-40 x 1/2" oval head machine screw	2		VT440-8SDC
() Nuvistor	1		6CW4
() Tube	1		EZ81/6CA4
() Tube	2		6BN6
() Tube	2		12AX7/ECC83
() Tube Shield	2		STCOM3453
() Spade Bolt	3		Z3654654
() Metal Cable Clamp	1		Z1122090
() Nut Retainer	4		STCOM3763
() Grounding Fork	2		P3654919
() Plastic Foot	4		STCOM2480
() #6-32 x 5/8" long binding head machine screw	4		KM632-10SC

COMPONENT BOX #3

() Pre-Selector Cover (metal box)	1		P3654778
() Pre-Selector Assembly (inside of Pre-Selector Cover)	1		A3654662
() Terminal Board	1		B3654546
() Pulley Mounting Bracket	1		P3654834
() Small Knob	5		PCIT4610
() Knob, Tuning	1		P3654613
() Tuning Shaft Mounting Bracket	1		P3654300
() Tuning Shaft	1		P3654326
() Folded Dipole	1		WCOM4427
() Alignment Tool	1		T3654835
() AC Line Cord	1		WCOM4415
() Lug Strip (12H3AH3AH3A)	1	LS1	HL3654772
() Lug Strip (82AH4AH)	1	LS5	HLCOM4861

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() Lug Strip	1	LS2	HLCOM5356
() Lug Strip (6H4AH)	1	LS12	HLCOM4795
() Lug Strip (53AHA)	1	LS4	HLCOM4774
() Lug Strip (3AHA)	1	LS13	HLCOM3092
() Lug Strip (2AU)	1	LS3	HLCOM3132
() #6 Solder Lug (internal tooth #409)	2	SL1, SL2	Z1021705
() Electrolytic Capacitor 500 MFD/25 volt	1	C63	JV3654549
() Electrolytic Capacitor 50 MFD/400 volt	1	C61	JV3655080
() Electrolytic Capacitor 50 MFD/350 volt			
() Electrolytic Capacitor 50-50 MFD/300 volt, 50 MFD/250 volt	1	C62	JV3655079
() .1 MFD, 200 V Tubular Capacitor	1	C49	STCOM4730
() .1 MFD, 400 V Tubular Capacitor	1	C54	STCOM4732
() .047 MFD, 400 V Tubular Capacitor	1	C57	STCOM4948
() .47 MFD, 200 Volt Tubular Capacitor	2	C51, C53	STCOM4731
() 4 MFD, 350 volt Tubular Electrolytic Capacitor	1	C50	JE4385449
() Large Kupfrian Shield (Black flexible metal tubing)	1 length		ZCOM3967
() Small Kupfrian Shield (Black flexible metal tubing)	3 lengths		ZCOM4908
() Sleeving (small diameter)	1 length		STCOM3939
() Sleeving (larger diameter)	1 length		STCOM4922
() Antenna Cable	1		W3654837
() Interconnecting lead (with plug)	1		W3654663
() Interconnecting lead	1		W3654664
() Function Switch	1		ER4715790
() Hook Up Wire (assorted colors)	1 bag		
() Bare Wire #22	1 length		
() Black Wire Heavy Insulation	1 length		
() Shielded Wire, Black	1		
() Shielded Wire, Brown	2		
() Shielded Wire, Red	1		
() Shielded Wire, Orange	2		
() Shielded Wire, Yellow	1		
() Shielded Wire, Green	1		
() Shielded Wire, Blue	1		
() Shielded Wire, White	1		
() Shielded Wire, Red/Green	1		
() Shielded Wire, Blue/Green	1		
() Shielded Wire, White/Green	1		
() Shielded Wire, Green/White	1		
() Shielded Wire, White/Orange	1		
() Shielded Wire, Black/White	1		
() Neon Lamp Assembly	1		

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() Yellow Wire with Amp. Clip	1		
() Black Wire with Amp. Clip	1		
() Vinyl Tubing	1		

The following are all disc capacitors which are mounted on one of the component cards.

() 10 mmf, 10%	2	C66, C69	JCST332
() 100 mmf, 20%	1	C46	JCST223
() 220 mmf, 10%	3	C36, C42, C103	JCST281
() 470 mmf, 20%	1	C9	JCST277
() 500 mmf, 10%	1	C52	JCST288
() .001 mfd, 10%	3	C6, C7, C41	JCST270
() .002 mfd, 20%	3	C8, C43, C65	JCST285
() .003 mfd, 10%	1	C40	JCST284
() .01 mfd, +80 -20%	8	C35, C37, C38, C39, C44, C45, C67, C68	JCST222
() .02 mfd, 20%	3	C47, C48, C60	JCST269
() .05 mfd, 50 volt	3	C56, C59, C102	JCST305

The following parts are mounted on the other component card.

RESISTORS -- ALL 1/2 WATT, UNLESS INDICATED

() 39 ohm (orange, white, black, silver)	3	R6, R66, R67	RA390-1
() 220 ohm (red, red, brown, silver)	2	R29, R34	RA221-1
() 680 ohm (blue, gray, brown, silver)	2	R43, R48	RA681-1
() 1K ohm (brown, black, red, silver)	2	R33, R36	RA102-1
() 1.2K ohm (brown, red, red, silver)	1	R53	RA122-1
() 3.3K ohm (orange, orange, red, silver)	1	R57	RA332-1
() 8.2K ohm (gray, red, red, silver)	1	R30	RA822-1
() 10K ohm (brown, black, orange, silver)	2	R44, R49	RA103-1
() 22K ohm (red, red, orange, silver)	1	R27	RA223-1
() 27K ohm 1 watt (red, violet, orange, silver)	2	R7, R9	RB273-1
() 33K ohm (orange, orange, orange, silver)	1	R51	RA333-1
() 47K ohm 5% (yellow, violet, orange, gold)	2	R37, R38	RA473-.5
() 47K ohm (yellow, violet, orange, silver)	2	R3, R111	RA473-1
() 100K ohm (brown, black, yellow, silver)	11	R4, R25, R26, R39, R47, R54, R56, R60, R68, R113, R114	RA104-1
() 150K ohm (brown, green, yellow, silver)	1	R31	RA154-1
() 270K ohm (red, violet, yellow, silver)	1	R45	RA274-1
() 470K ohm (yellow, violet, yellow, silver)	2	R28, R50	RA474-1
() 680K ohm (blue, gray, yellow, silver)	1	R58	RA684-1
() 1 Meg ohm (brown, black, green, silver)	5	R40, R41, R42, R46, R52	RA105-1

DESCRIPTION	PARTS PER KIT	CODE DESIGNATION	PART NUMBER
() 1.5 Meg ohm (brown, green, green, silver)	1	R59	RA155-1
() 2.2 Meg ohm (red, red, green, silver)	1	R69	RA225-1
() 22K ohm 1 watt (red, red, orange, silver)	2	R32, R35	RB223-1
() 220K ohm (red, red, yellow, silver)	1	R112	RA224-1
DIODE			
() 1N87	2		Z2923361
CHOKES			
() .24 uh	1	L4	GC28831
() 1.0 uh	1	L2	GL3654798
() 3.3 uh	3	L7, L8, L9	GC2503070
() 80 uh	1	L6	GL3654594
ELECTROLYTIC CAPACITOR			
() 2 MFD, 25 volt Tubular Electrolytic Capacitor	3	C55, C72, C73	JE3283790
MAIN CARTON (CENTER PARTITION)			
() Front Cover (long metal box)	1		P3654309
() Bottom Plate	1		P3654288

This completes the master parts list. When ordering replacement parts be sure to specify the number listed in the "Part Number" column.