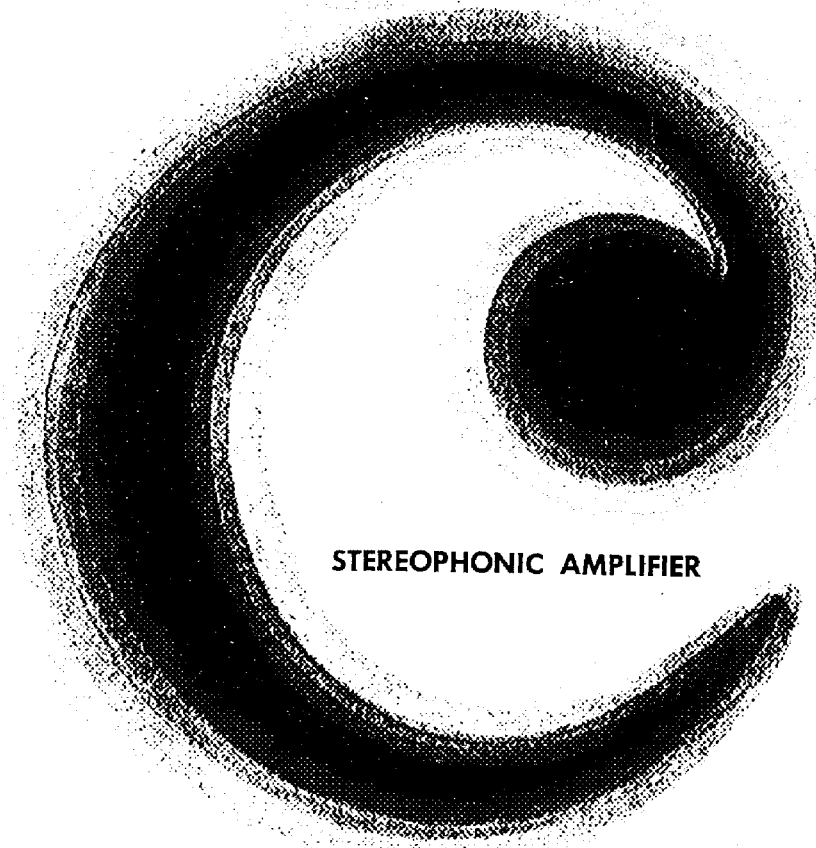
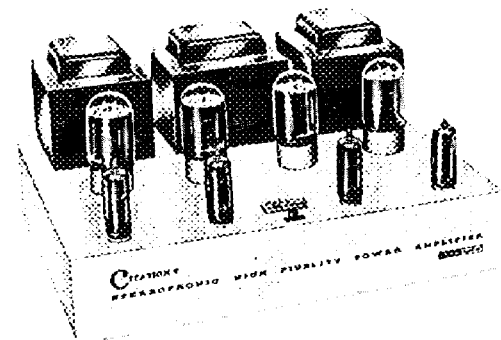


ASSEMBLY
and
OPERATION
MANUAL

CITATION V



STEREOPHONIC AMPLIFIER



harman kardon

CITATION V

ASSEMBLY & OPERATION MANUAL

INTRODUCTION

This new Citation basic amplifier 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 there has been no compromise made in the design of this magnificent instrument. Although the Citation V will perform satisfactorily with any high quality preamplifier, it is strongly recommended it be used with the Citation I or IV preamplifier control center for optimum performance. The Citation preamplifiers match the superb frequency response and distortion specifications of the Citation V resulting in uncompromising performance.

This instruction manual is 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 each 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 an amplifier that performs perfectly the first time it is connected.

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

FEATURES

The Citation V is a smaller version of the powerful Citation II. This magnificent new basic power amplifier has every worthwhile feature required for superb stereophonic reproduction.

- * Conservatively rated at 40 watts RMS per channel with 95 watt peaks at less than 0.5% distortion.
- * Clips clean without breakup.
- * Can be operated as an 80 watt monophonic amplifier.
- * Output stage consists of two 7581's per channel operating conservatively in fixed bias, ultra-balance circuit.
- * Frequency response extends two octaves above and below the normal range of hearing to insure perfect square wave response at all frequencies.
- * Absolutely stable with any type of load.
- * Specially designed output transformers with resonant frequency above 200KC.
- * Power supply consists of four silicon diodes (hermetically sealed) and heavy duty electrolytics for superb B+ regulation and long life. This results in instantaneous recovery time and superb transient response.
- * Bias meter to statically and dynamically adjust each pair of 7581 output tubes.
- * Maximum power output at the extreme ends of the frequency range enables the amplifier to effortlessly drive any of today's inefficient speakers.
- * Military construction represented by rigid component terminal boards for ease of construction, strength and neat appearance.
- * Handsomely styled in charcoal brown and gold.

CITATION V SPECIFICATIONS

CONTINUOUS POWER OUTPUT: 40 watts per channel.

PEAK POWER OUTPUT: 95 watts per channel.

HARMONIC DISTORTION: Less than 0.5%, 20-20,000 cycles per second at 40 watts. Unmeasurable at normal listening level.

INTERMODULATION DISTORTION: Less than 0.5% at 40 watts.

FREQUENCY RESPONSE: 7-45,000 c.p.s. +0, -1.0 db at 40 watts.
2-80,000 c.p.s. +0, -1.0 db at 1 watt.

SENSITIVITY: 1.2 volt RMS.

DAMPING FACTOR: 15 measured at 16 ohm tap. (IHFM method)

FEEDBACK: 22 db.

HUM AND NOISE: Better than 85 db below 40 watts.

POWER SUPPLY: Excellent B+regulation attained through use of low Z silicon diode rectifier supply.

INPUTS: One input for each channel.

OUTPUT IMPEDANCE: 4, 8 and 16 ohms.

CONTROLS: DC and AC balance potentiometers. Internal signal supplied for AC balance.

FUSE: AC primary, externally accessible.

SPECIAL FEATURE: Bias meter with special spring return switch to remove meter from circuit when not needed.

CONSTRUCTION: Military-type terminal boards. Close tolerance components.

TUBE COMPLEMENT: Total 8: 2-12BY7A, 2-6CG7, 4-7581 plus 4 silicon diodes and 1 selenium rectifier.

POWER CONSUMPTION: 250 watts

DIMENSIONS: 13 7/8" W x 5 1/2" H x 11 1/4" D.

SHIPPING WEIGHT: 45 lbs.

FINISH: Gold and charcoal brown.

ACCESSORIES: Metal protective cage.

40320023

UNPACKING

Set aside ample room on your workbench to unpack the contents of this kit. Open the carton carefully and place all of the components on your workbench, separating them into their respective categories. Handle all parts with care, for they may become damaged through carelessness. Check the contents of the carton and folds of the packing material before discarding it.

After all of the parts have been unpacked, check them against the master parts list in this manual 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 the parts to facilitate identification.

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.

PLEASE NOTIFY YOUR DEALER IMMEDIATELY IF A SHORTAGE OR ERRONEOUS PART IS DISCOVERED. ALWAYS STATE MODEL AND SERIAL NUMBER IN YOUR CORRESPONDENCE.

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.

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

If you should have difficulty with this kit and cannot resolve the problem through your own efforts, write directly to us for advice. Harman-Kardon has established a special Citation service division to answer all questions pertinent to the assembly, testing or installation of this instrument. Address all correspondence to:

**HARMAN-KARDON, INC.
CITATION KIT DIVISION
PLAINVIEW, L. I., N. Y.**

If the factory feels your difficulty may not be easily resolved through your own efforts, you will be notified of the authorized warranty service station nearest your home. These stations are at your disposal in the event you require assistance. However, please note they will not accept a unit unless previous factory authorization has been given.

If it is necessary to ship your set, pack the unit carefully and return to the warranty station designated by the factory via Railway Express, PREPAID. Pack the kit in a large, rugged container using a substantial quantity of padding and bracing. Attach a tag to the set indicating your name, address and the specific problem. Mentioning the other components in your installation may be of value.

The Harman-Kardon warranty station will inspect and service your kit at a minimum service charge of \$10 plus the cost of parts or tubes that are out of warranty, provided the unit has been constructed and completed in accordance with the instructions in this manual.

This special repair offer is available to you for the life of the instrument.

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

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), and an adjustable wrench. 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 is provided called "Assembly" to check off each operation as it is performed and will be helpful in preventing omissions or errors. A second space is provided called "Check". This should be used after every 10 or 15 steps to recheck your work to insure accuracy.

Note that in the pictorials, each component is identified by a code designation and in addition, each terminal has also been assigned a number. For example, TB-A-4, means Terminal Board A, Lug #4 or VI-2 means tube socket VI 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 that time. (NS) indicates that more than one 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 it should be soldered.

Two types of hook-up wire are used in the assembly of this kit. One type has light insulation and will be referred to as (LI). The other type has heavy insulation and will be referred to as (HI).

When wire lengths are specified, measure the length with a ruler so that the finished wiring will be accurate and neat. The solid wire supplied in this kit requires no pre-tinning. ("Tinning" is the process of applying a thin film of solder to the part to be soldered before the actual connection.)

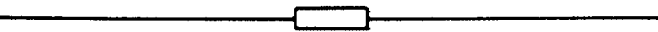
When the instructions call for the use of a "white/black" wire it means a white wire with a black spiral tracer. When the instructions call for a "black/white" wire it means a black wire with a white spiral tracer.

This Citation amplifier is assembled and wired as three separate units.

1. Terminal Boards
2. Electrolytic Bracket
3. Main Chassis

As each assembly is completed it should be checked and put aside for later installation. In this way any errors can be corrected before the construction of the kit has progressed to the final assembly.

There are several resistor sizes used in this kit. Below are the exact full scale drawings of these values so they can be easily identified. Resistors with values above 2 watts have the wattage rating imprinted on the resistor body.



$\frac{1}{2}$ WATT RESISTOR



1 WATT RESISTOR



2 WATT RESISTOR

RESISTOR HOLDING CARD

The cards on which the resistors and small condensers are mounted may serve as a convenient holder during construction. Remove the tape by peeling it free from the resistor leads, holding the body of the resistors down to prevent them from being pulled out of the holder. Bend the card on the scored line until it forms a right angle and then use a small piece of tape from the lacing tape roll to hold it in shape.

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

PRELIMINARY TERMINAL BOARD WIRING

REFER TO PICTORIAL #1.

Channel A Terminal Board (TB-A) and Channel B Terminal Board (TB-B) are identical except for the fact that they are mirror images of each other. Therefore, they may be wired simultaneously to save time.

Connect jumpers to the lower section of the terminal lugs using bare wire. All wires should be wrapped one complete turn around the lug and then crimped to insure a mechanically secure connection. Note that each lug is numbered for easy identification. Put a check mark in the "Assembly" column as you perform each operation. REFER TO FIGURE A.

STEP #	ASSEMBLY	CHECK	FROM LUG #	TO LUG #	
	CHANNEL A	CHANNEL B			
1	()	()	()	17 (NS)	18 (S-1)
2	()	()	()	22 (S-1)	23 (NS)
3	()	()	()	20 (S-1)	24 (NS)
4	()	()	()	3 (NS)	4 (NS)
5	()	()	()	4 (S-2)	28 (S-1)

The following (HI) wires are connected to the lugs from the rear of the boards through the holes designated by a letter. Cut two each of the length specified. Strip 1/2" of insulation from each end. Connect to the bottom section of the lugs, wrapping tightly one complete turn. Crimp and clip any excess bare ends. REFER TO FIGURE A.

CHANNEL A	CHANNEL B	COLOR	LENGTH	FROM LUG #	TO LUG #		
6	()	()	()	Black	4 3/4"	B-8 (NS)	C-23 (NS)
7	()	()	()	Yellow	3"	A-1 (S-1)	F-21 (NS)

The following capacitors are mounted to the rear (unprinted side) of the terminal board. The leads are connected to the lugs either by bending over the edge of the board or through holes designated by a letter, as indicated.

Slip sleeving over all the capacitor leads as shown in the pictorial. Connect to the bottom section of the lugs wrapping tightly one complete turn. Crimp and clip off any excess bare ends. Bands on condenser body indicates outside foil. Polarity is unimportant. REFER TO FIGURE B.

STEP #	ASSEMBLY	CHECK	VALUE - MARKING	FROM LUG #	TO LUG #
	CHANNEL A	CHANNEL B			
8	()	()	()	.47 MFD/600 V	10 (S-1) 12 (NS)
9	()	()	()	.47 MFD/600 V	6 (S-1) 15 (NS)
10	()	()	()	.47 MFD/400 V	8 (NS) 14 (NS)
11	()	()	()	.47 MFD/400 V	D-21 (NS) E-16 (NS)

This completes the preliminary wiring of the terminal boards. Inspect your work carefully against pictorials and text. Put this assembly aside for later use.

ELECTROLYTIC BRACKET ASSEMBLY

REFER TO PICTORIAL #2.

STEP # ASSEMBLY CHECK

- () () Mount (4) capacitor insulating wafers at positions A through D. (Wafers are mounted on side of bracket indicated in the diagram.) Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts.
- () () Mount selenium rectifier SR-1 using #6-32 x 1 1/4" screw through bracket as indicated in diagram. Slip rectifier on screw, negative lug first and engage the locating tab in the hole provided on the electrolytic bracket. Positive terminal may be identified by red band or plus symbol. Fasten with #6 lockwasher under #6-32 hex nut.
- () () Mount lug strip T6 as shown. Use #6-32 x 3/8" screw and #6 lockwasher under #6-32 hex nut.
- () () Mount silicon diode holder T5 as shown. Insert #6-32 x 3/8" screws through holder, then through bracket. Fasten with #6 lockwashers under #6-32 hex nuts on side of bracket indicated in diagram.

Mount the following electrolytics at their respective positions by inserting through the insulating wafer and twisting the mounting tabs 1/4 turn. (Use heavy duty broad nose pliers using care when twisting tabs.) Note that each electrolytic has 4 possible mounting positions. Since only one is correct, observe the orientation as shown in the pictorial. Observe that of the 4 mounting tabs on each electrolytic only one is blank, the other 3 have holes. This blank tab is the key referred to in the pictorial.

STEP # ASSEMBLY CHECK

- () () C1, (90-30-30 MFD/500 Volt) at Position A
- () () C2, (200 MFD/250 Volt) at Position B
- () () C3, (200 MFD/250 Volt) at Position C
- () () C4, (80-80 MFD/150 Volt) at Position D
- () () Insert the 4 silicon diodes into the clips on the holder T5 as shown in the Pictorial. It is imperative that the silicon diodes are installed in the manner shown. Note that the large discs on SD-1 and SD-2 are at the left, while the large discs on SD-3 and SD-4 are at the right.

STEP # ASSEMBLY CHECK

- 10 () () Hook the cathode lead from SD-1 with the anode lead from SD-2 as shown in the connecting detail (S-2). Cut off excess wire. **FRAGILE!!!** Use caution handling leads.
- 11 () () Hook anode lead from SD-3 with cathode lead from SD-4 (S-2). Cut off excess wire.
- 12 () () Connect free end (cathode) of SD-2 to T5 lug #2 (NS).
- 13 () () Connect free end (cathode) of SD-3 to T5 lug #1 (NS).
- 14 () () Connect free end (anode) of SD-1 to T5 lug #1 (NS).
- 15 () () Connect free end (anode) of SD-4 to T6 lug # 1 (NS).
- 16 () () Slip 3/4" of sleeving over each end of a .01 mfd (10K) / 1400 volt Disc. capacitor (value marked on body). Connect between T5 lug #1 (NS) and T6 lug #2 (S-1).

This would be a good time to stop and inspect your previous steps before proceeding.

ELECTROLYTIC BRACKET WIRING

REFER TO PICTORIAL #3.

Cut the following (HI) wires to the lengths specified. Strip 1/4" of insulation from each end and connect between the points indicated.

STEP #	ASSEMBLY	CHECK	COLOR	LENGTH	FROM LUG #	TO LUG #
1	()	()	black	2 1/4"	A5 (S-1)	B3 (NS)
2	()	()	black	4 1/4"	B3 (S-2)	T6-1 (NS)
3	()	()	red	2 1/4"	C1 (NS)	T5-2 (S-2)
4	()	()	red	1 1/2"	B1 (S-1)	C2 (S-1)
5	()	()	black	10 1/2"	B2 (S-1)	D1 (NS)
6	()	()	orange	2 1/2"	D2 (NS)	SR1-1 (S-1)

Cut the following (HI) wires to the length specified. Strip 1/4" of insulation from one end and connect to the points indicated. Strip 1/2" of insulation from the other end and leave this end free.

7	()	()	black/white	11"	B4 (NS)
8	()	()	black/white	9 3/4"	B4 (S-2)
9	()	()	white/black	13 1/4"	A4 (NS)
10	()	()	white/black	13 1/4"	A4 (S-2)
11	()	()	red/white	14 1/2"	A2 (NS)
12	()	()	red/white	8 3/4"	A2 (NS)
13	()	()	white/red	7 1/2"	A1 (NS)
14	()	()	white/red	15 3/4"	A1 (NS)

Cut the following (HI) wires to the lengths specified. Strip 1/4" of insulation from each end. Connect one end to the points indicated and leave the other end free.

STEP #	ASSEMBLY	CHECK	COLOR	LENGTH	FROM LUG #
15	()	()	orange	11"	A3 (NS)
16	()	()	black	21 1/4"	A6 (NS)
17	()	()	black	10"	A6 (S-2)
18	()	()	gray	4"	D4 (NS)
19	()	()	gray	11 1/2"	D4 (S-2)

Connect the following resistors to the points indicated.

	VALUE	MARKING	FROM LUG #	TO LUG #
20	() () 1.5K 3 watt	value marked on body	D1 (S-2)	D2 (S-2)
21	() () 390 ohm 1 watt	orange, white, brown, silver	A1 (S-3)	A2 (NS)
22	() () 180 ohm 3 watt	value marked on body	A2 (S-4)	A3 (NS)
23	() () 270 ohm 10 watt	value marked on body	A3 (S-3)	C1 (NS)
24	() ()	Cut the lead on one end of a 33 ohm 1/2 watt 5% resistor (orange, orange, black, gold) to 1/2" and connect this end to T6-1 (NS). Leave the other end free.		
25	() ()	Cut the lead on one end of a 33 ohm 1/2 watt 5% resistor (orange, orange, black, gold) to 1/2" and connect this end to T6-1 (S-4). Leave the other end free.		
26	() ()	Group together the following 9 wires and carefully dress and tape at the points A and B indicated in the pictorial:		

1. 21 1/4" black from A6
2. 15 3/4" white/red from A1
3. 14 1/2" red/white from A2
4. 11" orange from A3
5. 13 1/4" white/black from A4
6. 13 1/4" white/black from A4
7. 11" black/white from B4
8. 9 3/4" black/white from B4
9. 11 1/2" gray from D4

- 27 () () Break out the orange, red/white, the two black/white and the two white/black wires just past tape Point B, as indicated in the diagram.
- 28 () () Dress the remaining black, white/red and gray wires, which are part of the harness, as shown and tape at Point C.

This completes the preliminary wiring of the electrolytic bracket. Inspect your work against pictorials and text. Put this assembly aside for later use.

CHASSIS ASSEMBLY

REFER TO PICTORIAL #4.

In order to prevent marring of the fine finish of the Citation V, it is suggested that the work bench be cleared and covered with one of the flat filler pieces originally used in the packaging of this kit.

Use of a good screwdriver, properly ground, (not chisel-pointed) will reduce the possibility of scratching and gouging the chassis.

Note that most components may be mounted facing in several directions. For example, each tube socket has two possible mounting positions, one rotated 180° from the other. Since only one position is correct, be sure to observe the orientation indicated on the pictorial.

STEP # ASSEMBLY CHECK

- 1 () () Install (4) nine pin tube sockets (V1, V2, V5 and V6), noting orientation. Use #4-40 x 3/8" screws and #4 lockwashers under #4-40 hex nuts. Note lug strip T7 on V1 and lug strip T8 on V5.
- 2 () () Install (4) octal tube sockets (V3, V4, V7 and V8), noting orientation. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts.
- 3 () () Install (2) DC balance potentiometers, P6 and P7. Place fishpaper solder shield between potentiometer and chassis. Bend tabs down toward chassis to fasten. Exercise caution. Do not mar chassis when bending tab.
- 4 () () Install (2) AC balance potentiometers, P4 and P5. Place fishpaper solder shield between potentiometer and chassis. Bend tabs down toward chassis to fasten. Exercise caution. Do not mar chassis when bending tab.
- 5 () () Install slide switch S1. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts. Switch may be mounted in either way.
- 6 () () Install meter M1 with meter clamps and #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts. Remove fine wire shunt across meter terminals.
NOTE: Do not tighten the two meter bracket nuts excessively as this may result in damage to the meter.
- 7 () () Install Phono receptacle P 3 and Lug Strip T3 using phenolic insulating shield between chassis and receptacle. Note orientation. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts.
- 8 () () Install (2) Phono receptacles, P1 and P2 using phenolic insulating shield between chassis and receptacle. Note orientation. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts. These two sockets mount the same as P3 except they do not have any lug strip.
- 9 () () Install speaker terminal strip T2 and Lug Strip T4. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts.
- 10 () () Install speaker terminal Strip T1. Use #6-32 x 3/8" screws and #6 lockwashers under #6-32 hex nuts. This strip mounts the same as T2 except it does not have any lug strip.
- 11 () () Install fuseholder F1. Slide rubber washer on holder before inserting in chassis. Use lockwasher and nut supplied.

NOTE: DO NOT MOUNT TRANSFORMERS AT THIS TIME. THEY WILL BE MOUNTED AT A LATER STEP.

PRELIMINARY CHASSIS WIRING

REFER TO PICTORIAL #5.

Note the solder lance located at the center of the rear panel of the chassis. This lance is covered with a piece of tape. Remove this tape before proceeding.

Using bare wire make the following connections.

STEP #	ASSEMBLY	CHECK	FROM PIN #	TO PIN #
1	()	()	V1-1 (NS)	V1-9 (S-1)
2	()	()	V2-8 (NS)	V2-3 (S-1)
3	()	()	V6-3 (S-1)	V6-8(NS)
4	()	()	V5-9 (S-1)	V5-1 (NS)

Using (HI) wire cut the following to the lengths specified. Strip 1/4" of insulation from each end. Dress all leads tight to chassis.

	COLOR	LENGTH	FROM PIN OR LUG #	TO PIN OR LUG #
5 () ()	Brown	4 1/2"	V2-4 (S-1)	T7-2 (NS)
6 () ()	Brown	8"	T7-2 (NS)	V3-7 (NS)
7 () ()	Brown	5 3/4"	V3-7 (S-2)	V4-7 (NS)
8 () ()	Brown	5 1/2"	V4-7 (NS)	V8-7 (NS)
9 () ()	Brown	5 1/2"	V8-7 (NS)	V7-7 (NS)
10 () ()	Brown	8 3/4"	V7-7 (S-2)	T8-2 (NS)
11 () ()	Brown	6 3/4"	T8-2 (NS)	V6-4 (S-1)
12 () ()	Brown/white	4"	V2-5 (S-1)	T7-1 (NS)
13 () ()	Brown/white	8"	T7-1 (NS)	V3-2 (NS)
14 () ()	Brown/white	5 1/2"	V3-2 (S-2)	V4-2 (NS)
15 () ()	Brown/white	5 1/2"	V4-2 (NS)	V8-2 (NS)
16 () ()	Brown/white	5 1/2"	V8-2 (NS)	V7-2 (NS)
17 () ()	Brown/white	7"	V7-2 (NS)	T8-1 (NS)
18 () ()	Brown/white	6"	T8-1 (NS)	V6-5 (S-1)
19 () ()	Connect a 1 ohm 1/2 watt 10% resistor (brown, black, gold, silver) from T8-2 (S-3) to V5-6 (S-1).			
20 () ()	Connect a 1 ohm 1/2 watt 10% resistor (brown, black, gold, silver) from T8-1 (S-3) to V5-4 (S-1) and V5-5 (S-1).			
21 () ()	Connect a 1 ohm 1/2 watt 10% resistor (brown, black, gold, silver) from T7-1 (S-3) to V1-4 (S-1) and V1-5 (S-1).			
22 () ()	Connect a 1 ohm 1/2 watt 10% resistor (brown, black, gold, silver) from T7-2 (S-3) to V1-6 (S-1).			
23 () ()	Orange	5"	V3-4 (S-1)	V4-4 (NS)
24 () ()	Orange	5"	V4-4 (NS)	V8-4 (NS)
25 () ()	Orange	5"	V8-4 (S-2)	V7-4 (S-1)
26 () ()	Blue/white	4 1/4"	V1-7 (NS)	V2-2 (NS)
27 () ()	Blue/white	4 1/4"	V5-7 (NS)	V6-2 (NS)
28 () ()	Black/white	5 1/4"	V3-6 (NS)	V4-6 (NS)
29 () ()	Black/white	5 1/4"	V8-6 (NS)	V7-6 (NS)
30 () ()	Violet	2 3/4"	S1-4 (S-1)	M1-2 (S-1)
31 () ()	Yellow	2 1/2"	S1-3 (S-1)	M1-1 (S-1)

STEP #	ASSEMBLY	CHECK	COLOR	LENGTH	FROM PIN OR LUG #	TO PIN OR LUG #
32	()	()	Yellow	12 1/2"	S1-2 (S-1)	V3-8 (NS)
33	()	()	Yellow/white	8 1/4"	S1-1 (S-1)	V4-8 (NS)
34	()	()	Violet	7 1/2"	S1-6 (S-1)	V8-8 (NS)
35	()	()	Violet/white	10"	S1-5 (S-1)	V7-8 (NS)
36	()	()	Black	7 1/4"	P1-2 (NS)	Solder Lance (NS)
37	()	()	Black	7 1/2"	P2-2 (NS)	Solder Lance (S-2)

Make this a good connection!

Again, this is a good place to stop and check the previous operations.

Connect the following resistors between the points indicated:

	VALUE	MARKING	FROM PIN OR LUG #	TO PIN OR LUG #
38	() () 1 meg 1/2 watt 10%	brown, black, green, silver	V2-2 (S-2)	V2-7 (NS)
39	() () 1 meg 1/2 watt 10%	brown, black, green, silver	V6-2 (S-2)	V6-7 (NS)
40	() () 3.3 ohm 1.2 watt 10%	orange, orange, gold, silver	V3-8 (NS)	V3-6 (S-2)
41	() () 3.3 ohm 1/2 watt 10%	orange, orange, gold, silver	V4-8 (NS)	V4-6 (NS)
42	() () 3.3 ohm 1/2 watt 10%	orange, orange, gold, silver	V8-8 (NS)	V8-6 (NS)
43	() () 3.3 ohm 1/2 watt 10%	orange, orange, gold, silver	V7-8 (NS)	V7-6 (S-2)

Slip 3/4" of sleeving over each end of the 4 (10K) resistors wired in steps 44, 45, 46 and 47.

44	() () 10K ohm 1/2 watt 10%	brown, black, orange, silver	V3-8 (S-3)	P6-1 (NS)
45	() () 10K ohm 1/2 watt 10%	brown, black, orange, silver	V4-8 (S-3)	P6-3 (NS)
46	() () 10K ohm 1/2 watt 10%	brown, black, orange, silver	V8-8 (S-3)	P7-1 (NS)
47	() () 10K ohm 1/2 watt 10%	brown, black, orange, silver	V7-8 (S-3)	P7-3 (NS)
48	() () 2.2K ohm 1/2 watt 20%	red, red, red	T3-1 (NS)	P3-1 (NS)
49	() () 330 ohm 1/2 watt 20%	orange, orange, brown	P3-1 (S-2)	P3-2 (S-1)

TRANSFORMER INSTALLATION AND WIRING

REFER TO PICTORIAL #4

- () () Mount Output Transformer OT-1 into chassis. Use protective cover over transformer to prevent scratches during assembly. Observe orientation of leads. Use #8 lockwashers under #8-32 Hex nuts.
- () () Mount Output Transformer OT-2 and Power Transformer PT-1 in the same manner. Use protective covers. Observe orientation of leads. Use #8 lockwashers under #8-32 Hex nuts.

REFER TO PICTORIAL #5.

STEP #ASSEMBLY CHECK

- 3 () () With a long nose pliers carefully bend fuse side tab F1-2 on fuse holder.
- 4 () () Connect the black wire from PT-1 to Lug #2 (S-1) on fuse holder F1.
- 5 () () Connect white/black wire from PT-1 to Lug #2 (NS) on Lug strip T4.
- 6 () () Insert line cord into hole in rear of chassis. Push until it snaps into place. Use screw driver if necessary, with extreme care.
- 7 () () Connect one black wire to T4 Lug #2 (S-2).
- 8 () () Connect the other black wire to T4 Lug #1 (NS).
- 9 () () Cut a (HI) black wire 5" long. Strip 1/4" of insulation from each end. Connect between T4 Lug #1 (S2) and F1 Lug #1 (S-1).
- 10 () () Slip rubber grommet over all remaining leads of the Power Transformer PT-1.

Connect the following wires from OT-1

	COLOR	TO
11 () ()	Black	T1-G (NS)
12 () ()	Orange	T1-4 (S-1)
13 () ()	Yellow	T1-8 (S-1)
14 () ()	Green	T1-16 (NS)

Tape all 4 leads together as shown.

Connect the following wires from OT-2

15 () ()	Black	T2-G (NS)
16 () ()	Orange	T2-4 (S-1)
17 () ()	Yellow	T2-8 (S-1)
18 () ()	Green	T2-16 (NS)

Tape all 4 leads together as shown.

Cut the following (HI) wires to the length specified. Strip 1/4" of insulation from one end and connect to the points indicated. Strip 1/2" of insulation from the other end. Dress through the rubber grommet and leave this end free.

	COLOR	LENGTH	FROM
19 () ()	White	16"	T2-16 (S-2)
20 () ()	White/Orange	16"	T1-16 (S-2)
21 () ()	Brown/ White	13"	T3-1 (S-2)
22 () ()	Take one of the 13" black shielded cables and strip 3/4" of outer insulation, then unwrap the shield from the inner conductor. Twist the resulting strands of wire together. Strip 1/2" of insulation from the inner conductor, then tin the inner conductor and the shield. Strip 3/4" of insulation from the other end. Unwrap the shield and twist the resulting strands of wire together. Strip 1/2" of insulation from the inner conductor, then tin the inner conductor and the shield. Connect either end of the shield to P1 lug #2 (S-2) and the inner conductor to P1 lug #1 (S-1). Dress shielded lead as shown. Other end remains free.		
23 () ()	In the same manner as above take the other 13" black shielded cable. Connect the shield to P2 lug #2 (S-2) and the inner conductor to P2 lug #1 (S-1).		

ELECTROLYTIC BRACKET INSTALLATION AND WIRING

REFER TO PICTORIAL #6.

STEP # ASSEMBLY CHECK

- 1 () () Place the electrolytic bracket in the chassis and align with the mounting holes. All the 9 leads which are in the grommet should pass through the large round cut-out. Move the grommet to align with the cut-out on the bracket. Insert the grommet in the cut-out and maneuver the bracket to re-align with the mounting holes. Be sure no wires are caught under the bracket. Fasten to chassis using #6-32 x 3/8" screws and #6 lockwashers under #6-32 Hex nuts.

Connect the following leads which are coming out from the grommet. Dress as shown.

	COLOR	TO PIN OR LUG #
2 () ()	White/Gray	SR1-2 (S-1)
3 () ()	Gray	D3 (S-1)
4 () ()	White/Red	T5-1 (S-4)
5 () ()	Red	C3 (S-1)
6 () ()	Green	V8-2 (S-3)
7 () ()	White/Green	V8-7 (S-3)
8 () ()	Brown/White	V7-2 (S-3)

The white and white/orange wires will be connected at a later time.

Connect the following output transformer leads to the points indicated. Dress as shown in the Pictorial and cut the leads to the necessary length.

	COLOR	FROM	TO PIN OR LUG #
9 () ()	Brown	OT-1	V3-3 (S-1)
10 () ()	Blue	OT-1	V4-3 (S-1)
11 () ()	Red	OT-1	C1 (on bracket) (NS)
12 () ()	Brown	OT-2	V7-3 (S-1)
13 () ()	Blue	OT-2	V8-3 (S-1)
14 () ()	Red	OT-2	C1 (on bracket) (S-4)

The following connections are for the wires which have previously been connected to the electrolytic bracket forming the taped harness. Dress as shown in Pictorial #6.

15 () ()	Short Gray	D4	P7-2 (S-1) (Dress under 10K Resistor)
16 () ()	Long Gray	D4	P6-2 (S-1) (Dress under 10K Resistor)
17 () ()	Long Black/white	B4	V4-6 (S-3)
18 () ()	Short Black/white	B4	V8-6 (S-3)
19 () ()	Orange	A3	V4-4 (S-3)
20 () ()	Long Red/white	A2	P5-2 (S-1)
21 () ()	Short Red/white	A2	P4-2 (S-1)
22 () ()	Short Black	A6	T1-G (S-2)
23 () ()	Long Black	A6	T2-G (S-2)

The remaining 2 white/red and 2 white/black wires will be connected at a later time.

