

NAVSHIPS 900,853



INSTRUCTION BOOK

for

SPEAKER-AMPLIFIER
NAVY TYPE CMX 49545

Manufactured for

U. S. NAVY DEPARTMENT

BUREAU OF SHIPS

by

THE MAGNAVOX COMPANY

Fort Wayne, Indiana



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CONTRACT NXsr 93879

Approved 1 JULY 1946



A



ADDRESS: NAVY DEPARTMENT,
BUREAU OF SHIPS

Section 993-100
REFER TO FILE NO.

NAVY DEPARTMENT
BUREAU OF SHIPS
WASHINGTON 25, D. C.

27 June 1946

To: All Activities concerned with the
Installation, Operation and Maintenance
of the Subject Equipment.

Subj: Instruction Book for Speaker-Amplifier
Navy Type CMX-49545 (NAVSHIPS 900,853).

1. NAVSHIPS 900,853 is the instruction book
for the subject equipment and is in effect upon
receipt.

2. When superseded by a later edition, this
publication shall be destroyed.

3. Extracts from this publication may be
made to facilitate the preparation of other Navy
instruction books and handbooks.

4. Copies of this publication may be obtained
from the nearest Electronics Officer.

E. L. COCHRANE
Chief of Bureau

FROM BUREAU OF SHIPS, NAVY DEPARTMENT, WASHINGTON 25, D. C.

Record of Corrections Made

<i>Change No.</i>	<i>Date</i>	<i>Signature of Officer Making Correction</i>

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CONTRACTUAL GUARANTEE

The Contractor guarantees that at the time of delivery thereof the articles provided for under this contract will be free from any defects in material or workmanship and will conform to the requirements of this contract. Except as to vacuum tubes, batteries, rubber and material normally consumed in operation, the equipment, including all spare parts, is guaranteed for a period of one year from the date of its delivery to and acceptance by the Government, with the understanding that all items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental United States designated by the Government, without delay and at no expense to the Government; provided, that such guarantee shall not obligate the Contractor to repair or replace any such defective items unless the defect appears within the aforementioned period and the Contractor is notified within a reasonable time and unless the defect is not the result of normal expected shelf life deterioration. This guarantee shall then continue as to corrected or replacing articles or, if only parts of such are corrected or replaced, to such corrected or replacing parts, until one year after the date of redelivery.

To the extent the equipment, including all parts and spare parts, as defined above, is of the Contractor's design or is of a design selected by the Contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design, with the understanding that if ten percent or more of the total quantity comprising

such item furnished under the contract (but not less than two thereof) is found to be defective as to design, the entire item will be conclusively presumed to be of defective design and shall be subject to one hundred percent correction or replacement by a suitably redesigned item.

All defective items will be subject to ultimate return to the Contractor except that the exigencies of the naval service may necessitate expeditious repair of certain items in order to prevent extended interruption of communications and in such cases the return of the defective items for examination by the Contractor prior to repair or replacement shall be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for effecting expeditious adjustment under the provisions of this contractual guarantee.

If the Government does not require correction or replacement of a defective or nonconforming article, the Contractor, if required by the contracting officer within a reasonable time after the notice of defect or nonconformance, shall repay such portion of the contract price as is equitable in the circumstance. Equitable in the circumstance is to be determined by mutual agreement between the Contractor and the contracting officer. Failure to agree to such adjustment shall be a dispute concerning a question of fact within the meaning of the section of this contract entitled "Disputes".

REPORT OF FAILURE

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the Bureau of Ships Manual, or superseding instructions.

CONTRACT: NXsr 93879

DATE OF CONTRACT: 2 APRIL 1945

SERIAL NUMBER OF EQUIPMENT _____

DATE OF ACCEPTANCE BY THE NAVY _____

DATE OF DELIVERY TO CONTRACT DESTINATION _____

DATE OF COMPLETION OF INSTALLATION _____

DATE PLACED IN SERVICE _____

Blank spaces in this book shall be filled in at time of installation. Operating personnel shall also mark the "date placed in service" on the date plate located below the model nameplate on the equipment, using suitable methods and care to avoid damaging the equipment.

All requests or requisitions for replacement material should include the following data:

1. Name of part desired.
2. Navy stock number or, when ordering from an Army supply depot, the Army stock number.

If the Navy stock number has not been assigned, the requisitions should specify the following:

1. Equipment model designation.
2. Name of part and complete description.
3. Manufacturers designation.
4. Contractors drawing and part number.
5. AWS, JAN, or Navy type designation.

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of Bureau of Ships Manual or superseding instructions on the subject of Radio-Safety precautions to be observed.



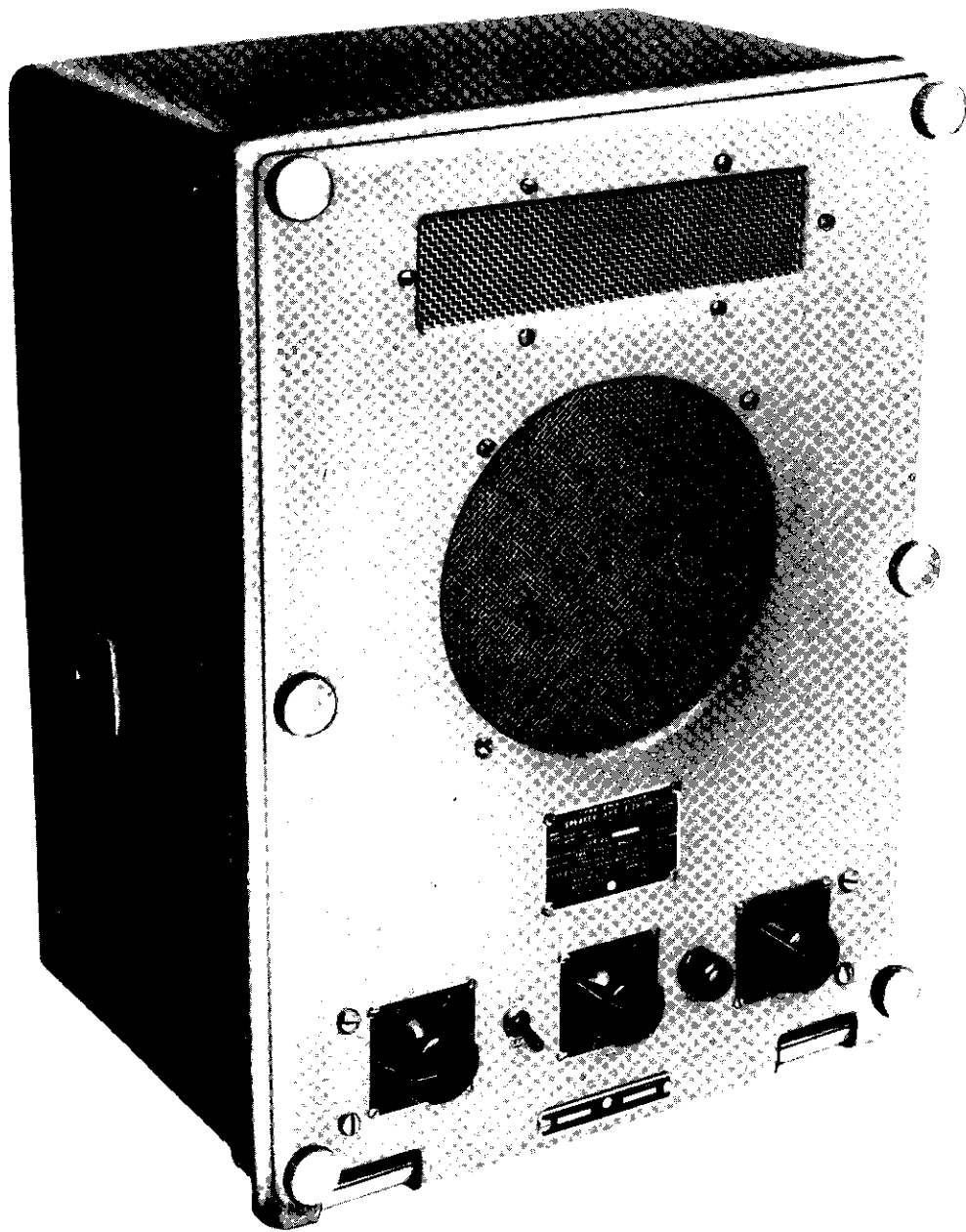


Figure 1-1. Speaker-Amplifier —
Navy Type CMX 49545

SECTION I
GENERAL DESCRIPTION

1. FUNCTION.

The navy type CMX-49545 Speaker-Amplifier is designed for high-fidelity reproduction of speech and music when used with the navy model RBO Radio Receiving equipment for entertainment purposes aboard all types of Naval vessels or at Naval shore radio stations or activities.

2. REFERENCE DATA.

- a. Nomenclature—Navy Type CMX-49545 Speaker-Amplifier.
- b. Contract—NXsr 93879 dated 2 April 1945.
- c. Contractor — The Magnavox Company, Fort Wayne, Indiana.
- d. Cognizant Naval Inspector—Inspector of Naval Material, Detroit, Michigan.

e. Number of Packages per Equipment—Main unit, one box; Spare Parts, one box.

f. Total Cubical Contents—Main unit, crated, 4½ cu. ft., uncrated, 1¾ cu. ft.; Spare Parts, total 2½ cu. ft. crated.

g. Total Weight—Main unit, crated, 100 lbs., uncrated 60 lbs.; Spare Parts, crated, 70 lbs.

b. Frequency Range—100-5000 cps.

i. Rated Output—3 Watts.

j. Voltage—115 V AC±10%, 50-60 cps, 50 Watts, single phase.

k. Input Impedance—620 Ohms±10%, balanced or unbalanced to ground.

3. EQUIPMENT SUPPLIED.

Quantity per Equipment	Name of Unit	Navy Designation	Overall Dimension		Volume		Weight	
			A: Crated	B: Uncrated	A: Crated	B: Uncrated	A: Crated	B: Uncrated
1	Speaker-Amplifier	CMX 49545	A: 27" x 19" x 15"	B: 19¾" x 14" x 11"	A: 4½ cu. ft.	B: 1¾ cu. ft.	A: 100 lbs.	B: 60 lbs.
1 set	Equipment Spares		A: 23¼" x 15¼" x 12¼"	B: 18½" x 12½" x 9½"	A: 2½ cu. ft.	B: 1¼ cu. ft.	A: 70 lbs.	B: 46 lbs.

4. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Quantity per Equipment	Name of Unit	Navy Type Designation	Required Characteristics
1	Radio Receiving Equipment Power Input Cable Interconnecting Cable	Model RBO	600 ohm output impedance; 6 milliwatts to 2 watts audio output

5. VACUUM TUBE COMPLEMENT.

Each of the Speaker-Amplifier units as shipped is equipped with its full complement of vacuum tubes as follows:

Type	Quantity
Amplifier JAN 6V6GT/G	3
Rectifier JAN 5Y3GT/G	1

SECTION II

THEORY OF OPERATION

1. The CMX-49545 SPEAKER-AMPLIFIER consists of a two-stage audio amplifier with power supply, and a magneto-dynamic loudspeaker, all contained in a cast aluminum case.

The amplifier consists of a voltage-amplifier stage using a JAN 6V6GT/G vacuum tube; a push-pull class "A" power output stage using two JAN 6V6GT/G vacuum tubes; and a power supply using a JAN5Y3-GT/G high-vacuum rectifier tube, and furnishing all filament, plate, and grid voltages necessary for operation from 115 volt, 60 cps, single phase alternating current power lines.

Figure 2-1 is a functional block diagram of this equipment.

The amplifier unit is arranged to select any one of five 600 ohm input channels by the proper setting of the channel selector switch (S-102) which is adjustable from the front of the panel. The unused channels are terminated with resistors (R-101 to R-105, incl.).

The input to the grid of the voltage-amplifier tube (V-101) is variable by means of a potentiometer (R-106) having a logarithmic taper, which may be adjusted from the front of the panel to give the desired audio output.

The tuned-filter type tone control circuit is inserted

between the voltage amplifier and the power amplifier and the tone may be regulated by means of a potentiometer (R-112), adjustable from the front of the panel, to give the desired audio response. The tone control circuit is composed of an inductance (L-102), three capacitors (C-108, C-109, and C-110), and the potentiometer (R-112).

The power amplifier stage incorporates a negative-feedback circuit (R-113, R-114, R-115, R-116, C-111, and C-112) to give a better audio response and to reduce distortion.

The power supply stage is a conventional circuit using a high-vacuum rectifier tube (V-104) and a single PI-section inductance-capacitance (L-101, C-107A, and C-107B) filter.

The loudspeaker is a moving coil type speaker using a permanent magnet to furnish the magnetic flux. The moving coil has an impedance of 3.7 ohms at 1000 cps, which is matched to the load resistance of the power amplifier tubes by means of a transformer (T-103) mounted on the amplifier chassis.

The cast aluminum case, housing the amplifier and loudspeaker, forms a vented-baffle type acoustic chamber for improved reproduction of low-frequency tones.

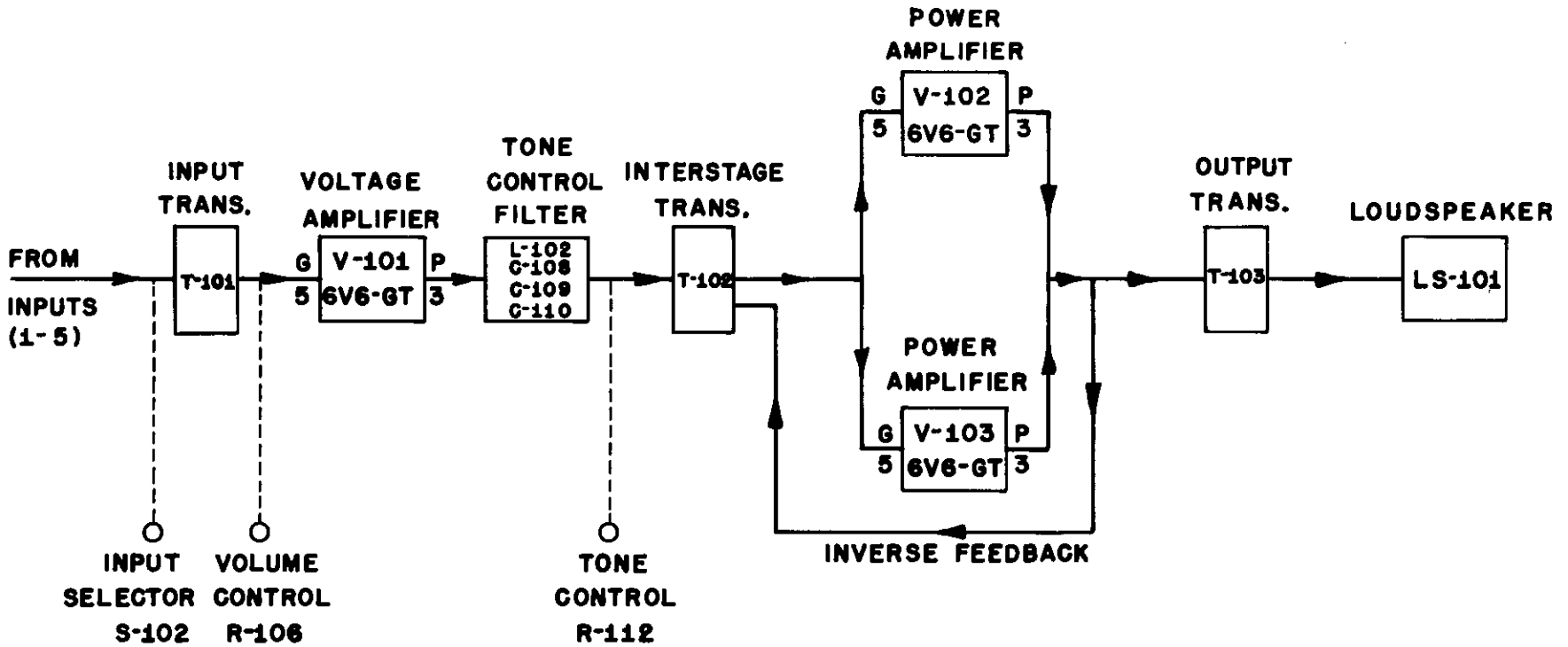


Figure 2-1. Functional Block Diagram

LEGEND:

1. VARIABLE CONTROLS ARE INDICATED BY A CIRCLE AND A DOTTED LINE SHOWING POINT IN CIRCUIT WHERE THEY ARE CONNECTED.
2. LETTERS AND NUMBERS OUTSIDE TUBE BLOCKS INDICATE TUBE ELEMENT AND SOCKET PIN.
3. HEAVY LINES AND ARROW HEADS INDICATE DIRECTION OF ENERGY FLOW.

SPEAKER AMPLIFIER CMX-49545
FUNCTIONAL BLOCK DIAGRAM

SECTION III INSTALLATION AND INITIAL ADJUSTMENTS

1. UNPACKING.

Each Speaker-Amplifier is shipped in completely moisture-proof packing which consists of two separate corrugated cardboard cartons, a moisture-proof bag, desiccant, and an outer wooden box. Care should be exercised in removing the unit from its containers to avoid severe jolts which might damage the vacuum tubes installed in the unit. Hooks or other sharp instruments which might damage the speaker cone should not be used.

2. INSTALLATION.

This equipment is amenable to either bulkhead or table mounting. For bulkhead mounting, four mounting holes are furnished in the back of the cabinet. If table installation is desired, four mounting holes may be drilled where "spotted" on the bottom of the cabinet.

Where two or more units are installed in the same compartment, it is preferred that the units be placed on the same bulkhead and spaced in such a manner that each unit covers an equal deck area.

NOTE

The installation of the Speaker-Amplifier units should be limited to enclosed spaces offering some degree of protection from gun blast as this equipment is neither water-proof, submergence-proof, nor blast-proof.

In order to provide for the entrance of the input and power cables, bosses are furnished on each side and on top of the cabinet in which holes may be drilled to fit the cables. Side or top entrance should be made according to the convenience of installation. After the input cable, containing the output of from one to five stations from the central radio receiving equipment, has been introduced to the cabinet, connections should be made to the input terminals indicated in figure 3-1.

If the output of the central radio receiving equipment incorporates a balanced line, a jumper wire should be placed from terminal #12 (input center tap) to terminal #7 (ground).

Power connection from a 115 V AC line cable is then made to terminals #13 and #14.

NOTE

This Speaker-Amplifier is designed to operate **ONLY** when connected to a 115 volt 60 cps single phase AC power source. **DO NOT** connect to a DC power source as the line fuses (F-101 and F-102) will burn out under these conditions, and damage to the power transformer (T-104) may result.

A direct lead from a good ground shall be connected to terminal #7, which serves as the circuit ground for this equipment.

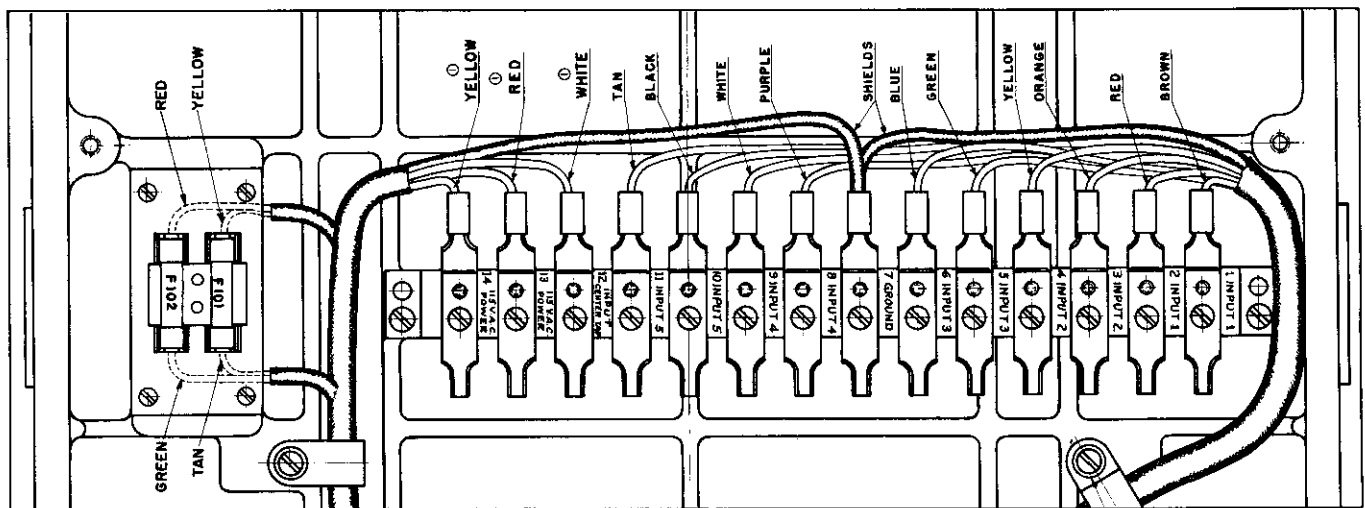


Figure 3-1. Main Terminal Board Diagram

The equipment is so designed that no additional bonding, shielding, or grounding is required except as noted in the preceding paragraph.

No cables for the required external connections between this equipment and the power line, ground, and the companion receiver or receivers are furnished, either in assembled form or as bulk parts.

The external cabling should be installed in the most convenient manner commensurate with the least possible power loss or voltage drop in the lines, and minimum noise pick-up in the input circuit connections.

3. INITIAL ADJUSTMENTS.

Adjust the output of the companion radio receiver or receivers (Navy Type RBO or equivalent) so that

the input to any Speaker-Amplifier will be within the range of 6 milliwatts (1.9 volts across 600 ohms) to 2 watts (34.7 volts across 600 ohms) for proper operation of the Speaker-Amplifier. The input selector on the outside of the front panel is adjusted to select a total of five inputs. If less than five input circuits are to be used, the switch stop must be adjusted so that the number of switch positions will correspond with the number of input circuits connected to the amplifier. To reset the stop on the input selector switch, first, remove knob from the switch shaft; second, remove the switch mounting nut and pull switch from opening in panel (inside); third, turn the stop plate (with stop pin attached) until placing stop pin in locating hole will give the number of input positions desired; and finally, replace switch in panel, secure with mounting nut, and replace switch knob.

SECTION IV OPERATION

1. This Speaker-Amplifier is designed to furnish the rated three watts of audio power to the integral loud-speaker with a power input to the amplifier of 6 milliwatts (1.9 volts across 600 ohms) to 2 watts (34.7 volts across 600 ohms). An input of less than 6 milliwatts may result in insufficient sound output, and an input of more than 2 watts may result in overloading with objectionable distortion of the sound output. (See paragraph III-3)

2. To operate the Speaker-Amplifier after complete installation has been made, move the "OFF-ON" switch

(figure 4-1) to the "ON" position and set the channel selector switch to the desired station. The volume control on the right side of the panel should then be set to the desired volume which increases with the scale. Finally, the tone control on the left of the "OFF-ON" switch should be set to give the desired tone. It will be noted that the minimum attenuation of the high frequency response occurs with the knob in the most clockwise position. It follows that the attenuation of the high frequency response increases as the knob is turned counterclockwise.

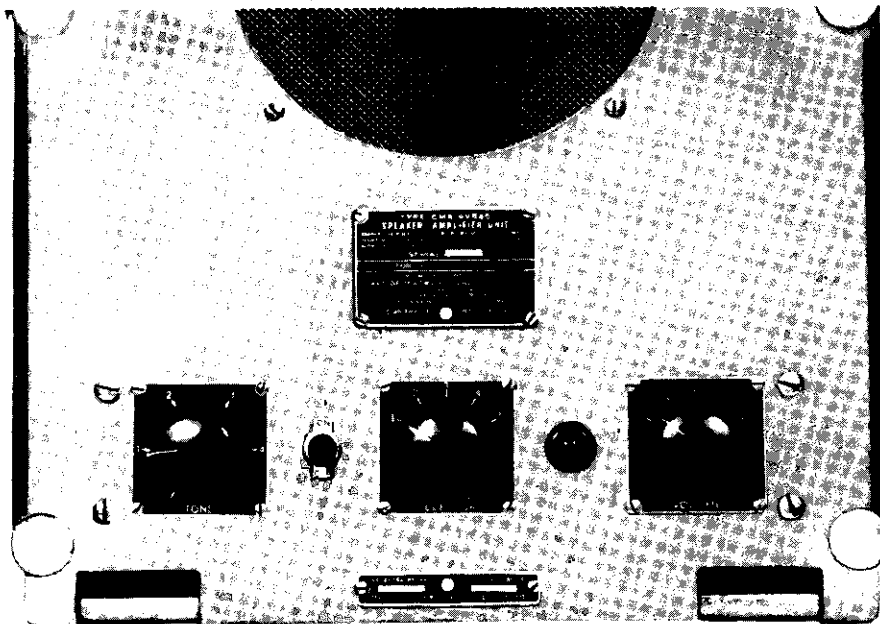


Figure 4-1. Lower Front Panel

FAILURE REPORTS

A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause

of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships, furnish a store of information permitting the Bureau to keep in touch with the performance of the equipment of your ship and all other ships of the Navy.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards and envelopes on board. They may be obtained from any Electronics Officer.

NAVY DEPARTMENT
BUREAU OF SHIPS
WASHINGTON, D. C.
OFFICIAL BUSINESS

NAVY DEPARTMENT
ELECTRONICS DIVISION
BUREAU OF SHIPS, CODE 900
WASHINGTON 25, D. C.

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE DUES.

DATE: 18 Oct. 1946

NAME OF PERSON MAKING REPORT: John Doe

FAILURE REPORT—ELECTRONIC EQUIPMENT

EQUIPMENT SYMBOL: CA0025

ELECTRONIC EQUIPMENT INVOLVED: RADAR SONAR OTHER

CONTRACT NO.: WXSR 51503

DATE REPORT FILED: 2 Nov. 1945

CHUCKER ONE: RADIO

MODEL: Model SS

ITEM WHICH FAILED: SS AGV Indicator Console

THIS CARD FOR TYPES: SEARCH TRACKING MEASUREMENT OTHER

THIS EQUIPMENT IS USED FOR: 65N7-9T

MANUFACTURER: RCA

DATE OF FAILURE: 1608 18-02-1946

ITEM NO. OF PART: 2

ITEM NO. OF STOCK: 105

REASON FOR FAILURE: Shorted plate and grid. This caused

REMARKS: (Do not delay in filling out this form. Forward to commanding officer—BUSHIPS)

Failure of sweep on time multivibrator in PPI Sweep and Video panel, resulting in loss of sweep on PPI scope.

PREPARED BY: [Signature]

REMARKS: (Do not delay in filling out this form. Forward to commanding officer—BUSHIPS)

Sample Failure Report Cards Properly Filled In

SECTION V MAINTENANCE

1. OPERATORS MAINTENANCE.

The only maintenance required of the operator is:

a. REPLACING BURNED-OUT PILOT LAMP (REPLACEABLE FROM FRONT OF PANEL).

- (1) Unscrew and remove the red jewel assembly.
- (2) Remove the defective pilot lamp.
- (3) Insert a new Mazda 51 or equivalent pilot lamp.
- (4) Replace jewel assembly.

b. REPLACING DEFECTIVE VACUUM TUBE.

- (1) Throw "ON-OFF" switch to "OFF" position.
- (2) Open the amplifier case.
- (3) Remove the defective tube. Remove tube with a straight, upward pull. DO NOT move tube from side to side as this may result in the base key breaking off and remaining in the socket.
- (4) Replace with proper type tube.
- (5) Close the amplifier case.

IN ORDER TO OBTAIN FULL TUBE LIFE AND PROPER OPERATION, DO NOT USE TUBES OF OTHER TYPES THAN THOSE HEREIN SPECIFIED.

ALL TUBES FURNISHED AS INITIAL SUPPLY OR SPARES SHALL BE USED PRIOR TO EMPLOYMENT OF TUBES FROM GENERAL STOCK.

c. REPLACING BLOWN FUSES.—DO NOT REPLACE UNTIL THE DEFECT CAUSING THE FUSE TO BLOW HAS BEEN ISOLATED AND CORRECTED.

- (1) Throw "ON-OFF" switch to "OFF" position.
- (2) Open the amplifier case.
- (3) Remove blown fuse from fuse board located on back panel of amplifier case.

CAUTION

Equipment "On-Off" switch does not remove the power from the fuses. The fuse clips at the top of the fuse board have a potential difference of 115 volts AC between them at all times. Use due precaution in removing the defective fuse.

- (4) Insert new fuse Type 3AG, 1.0 ampere.
- (5) Close the amplifier case.

2. PREVENTIVE MAINTENANCE.

Operator shall be guided by Chapter 67 of the "Bureau of Ships Manual".

Vacuum tubes (V-101, V-102, V-103, and V-104) shall be checked on a standard tube checker after every 250 hours of operation or every three months, whichever comes first. Defective tubes shall be replaced immediately for most efficient operation (See paragraph 1b of Section 5).

The dry electrolytic capacitors (C-101 and C-102) are used as cathode by-pass capacitors, and, under normal conditions of operation, have sufficient safety factor to insure a life expectancy equal to that of the entire equipment.

The balance of the components in this equipment are not subject to deterioration due to operation, and need to be checked only in case of equipment failure (See paragraph 3 of Section 5 on "Corrective Maintenance").

3. CORRECTIVE MAINTENANCE.

If any major repairs or replacements become necessary, it is recommended that such repairs or replacements be made in a well equipped shop where the proper tools, measuring equipment, and personnel are available.

Before making any repairs or adjustments in the Speaker-Amplifier, it should be definitely ascertained that the difficulty being experienced is not the result of external or deteriorating influences such as worn out tubes, improper operating voltrages, blown fuses, exterior noises, etc.

Over- and under-chassis views (figures 5-1, 5-2, and 5-3) show the location of tubes and other parts of the Speaker-Amplifier.

Figure 5-4 shows a typical audio frequency response curve, and may be used in checking the over-all performance of the amplifier if the required audio oscillator and output meter is available.

Following is a suggested systematic procedure of "trouble-shooting" malfunctions of the equipment:

a. If the equipment does not operate when the switch is moved to the "ON" position:

- (1) Check the power supply to make sure that the source is 115 volt AC 60 cps.
- (2) Check the fuses.
- (3) Check the circuit continuity through the cables. (see figures 3-1 and 5-5).

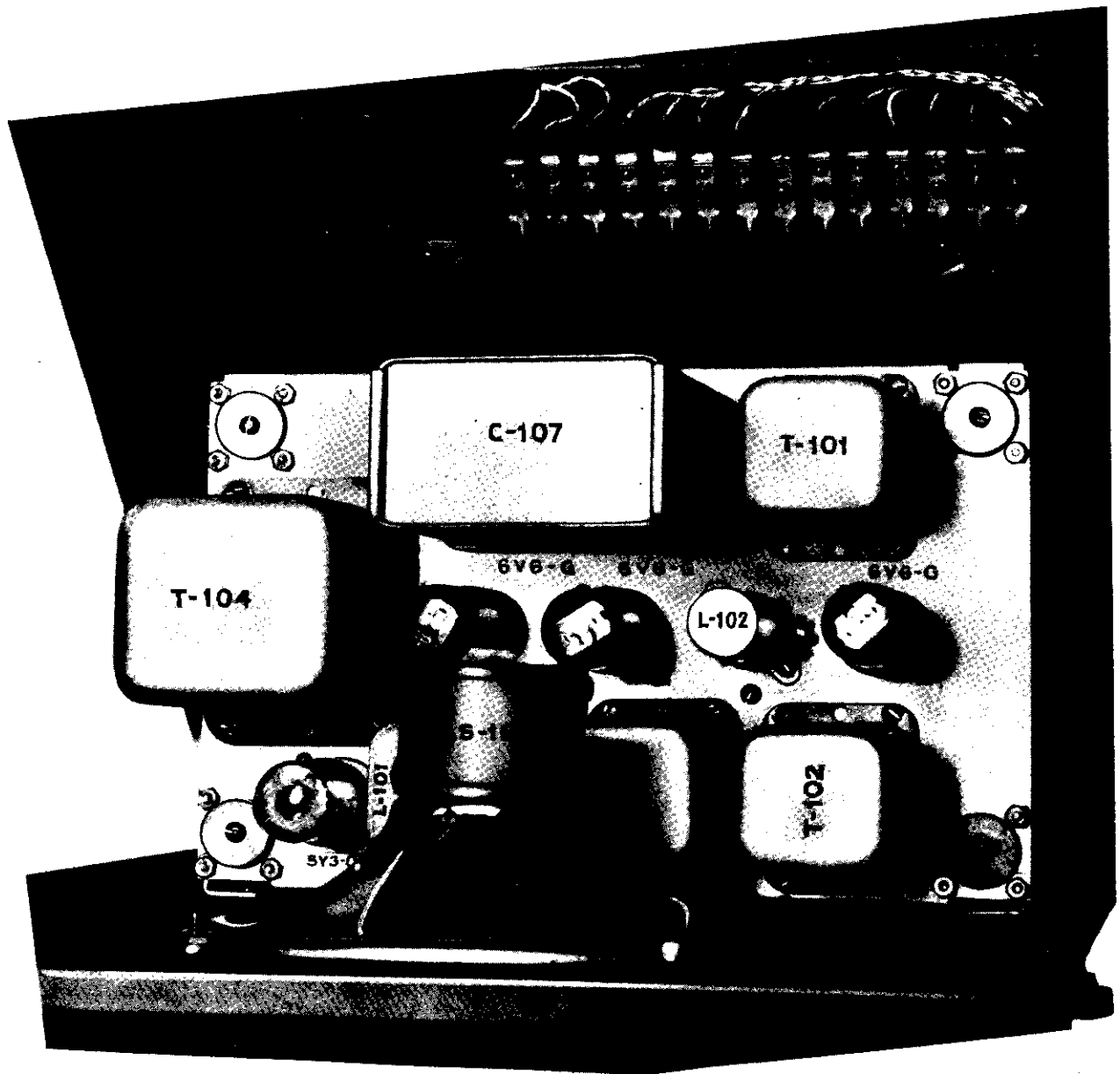


Figure 5-1. Speaker-Amplifier CMX-49545 Top Chassis View

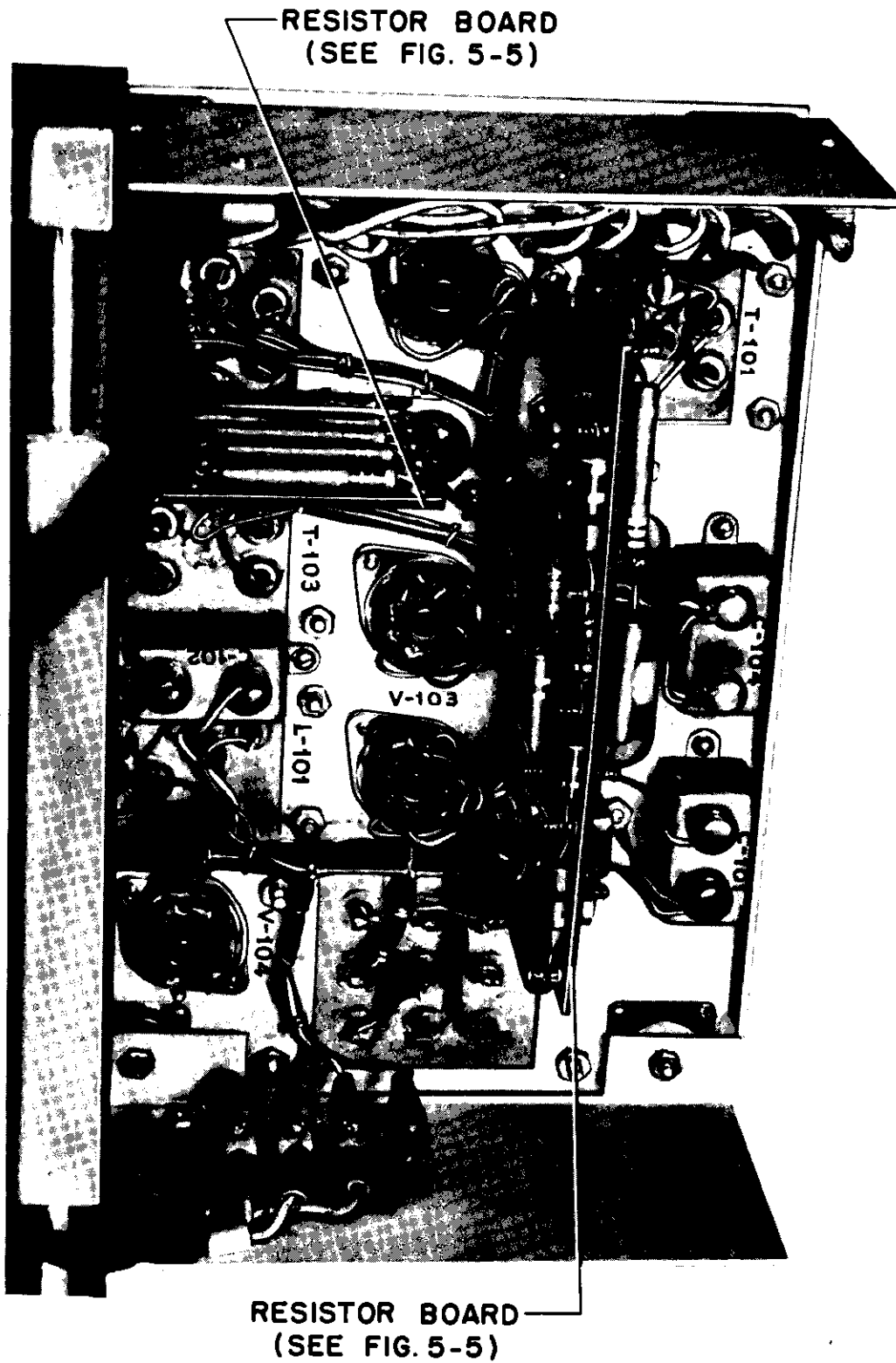
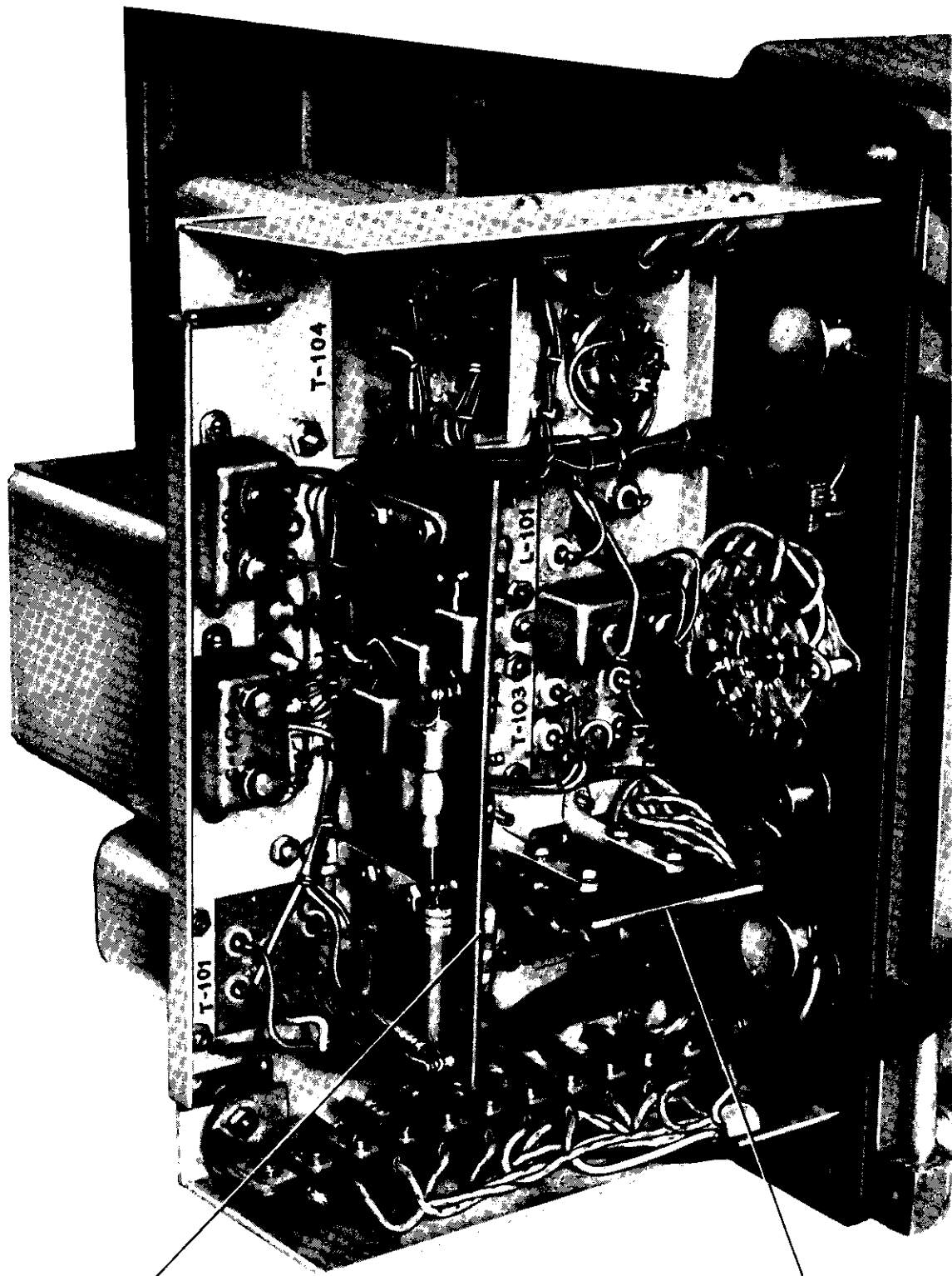


Figure 5-2. Speaker-Amplifier CMX-49545 Lower Chassis View



RESISTOR BOARD
(SEE FIG. 5-5)

RESISTOR BOARD
(SEE FIG. 5-5)

Figure 5-3. Speaker-Amplifier CMX-49545 Lower Chassis View

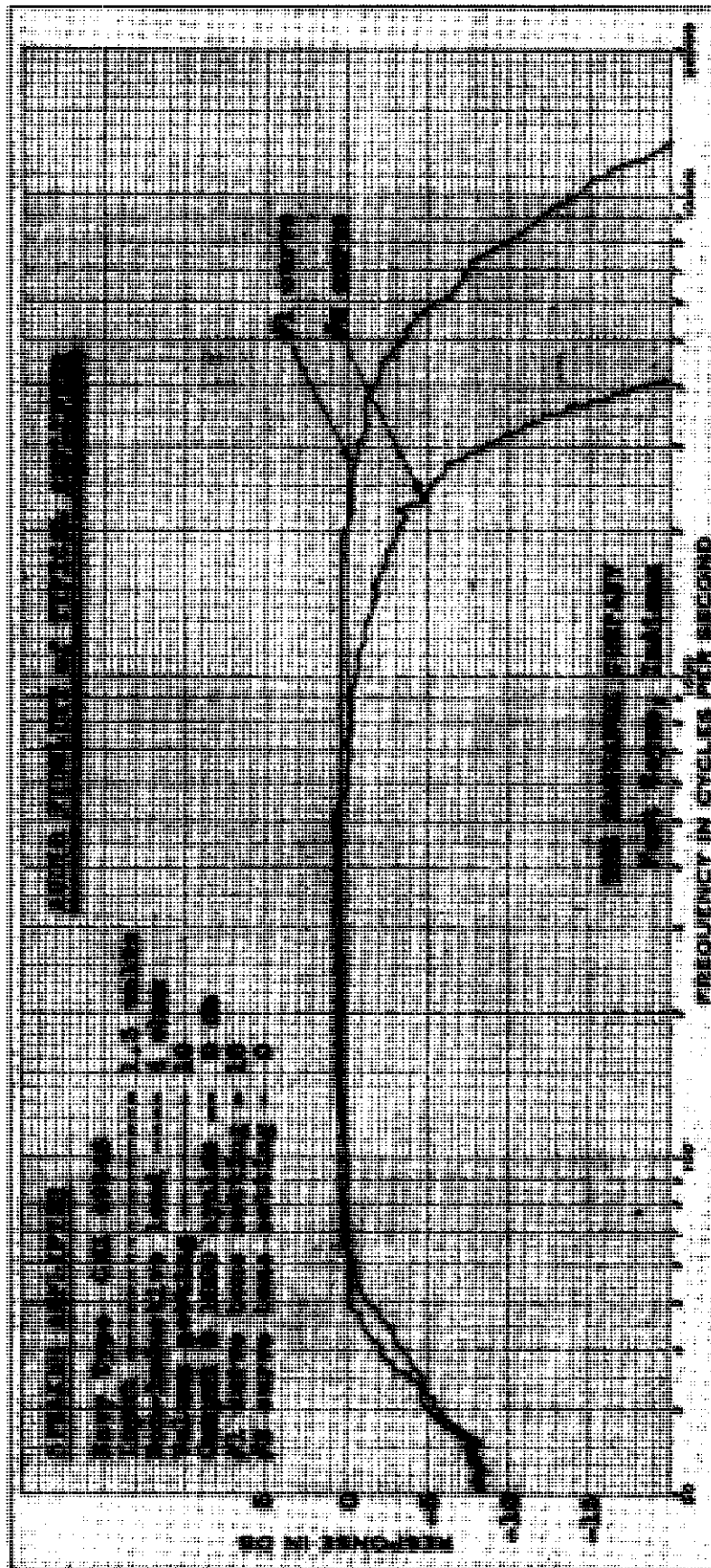


Figure 5-4. Audio Frequency Curve

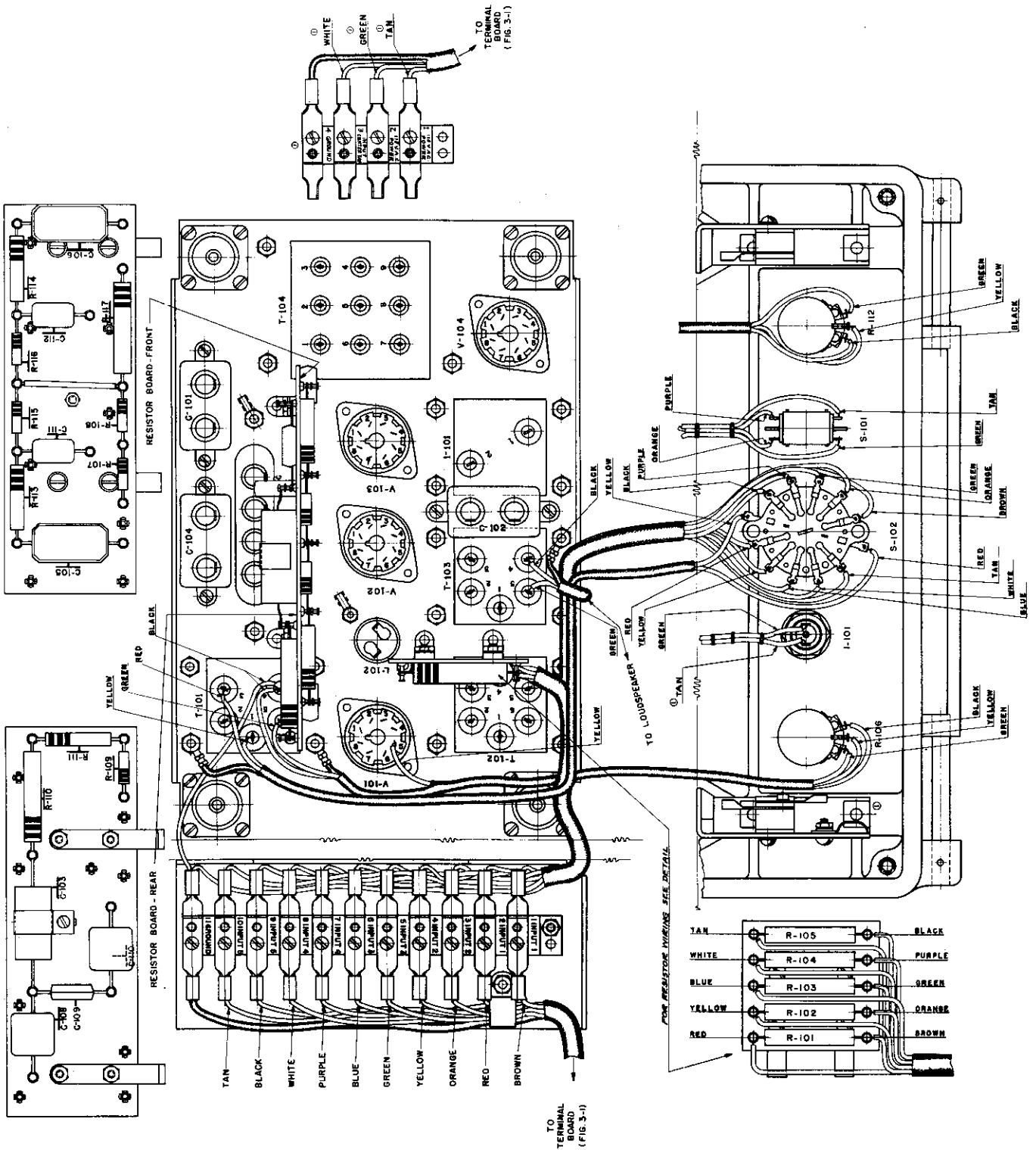


Figure 5-5. Cable Connection Diagram

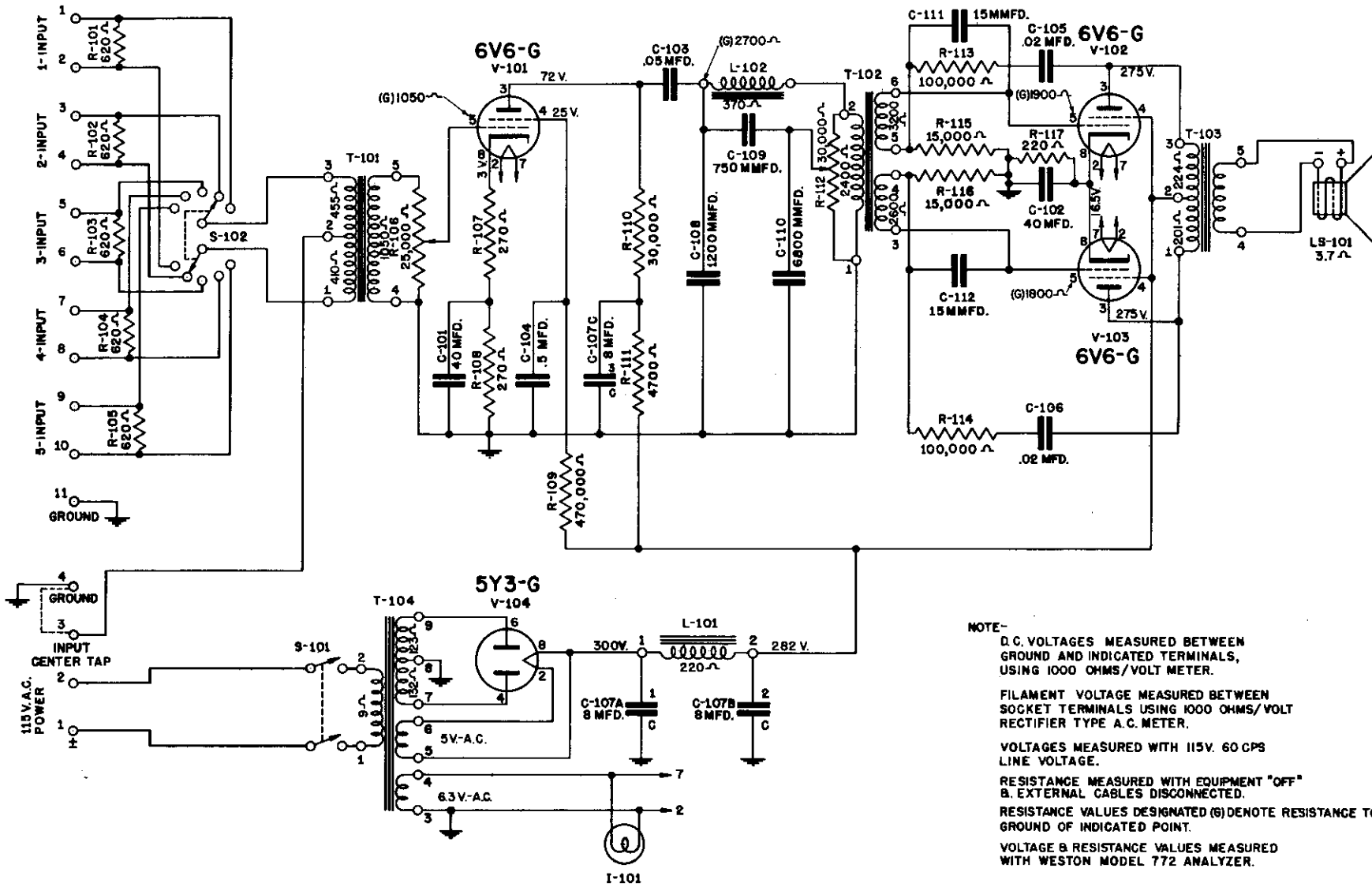


Figure 5-6. Schematic Circuit Diagram

Paragraphs 3a-3b(3)

(4) Check the tubes to see that they light, and if necessary replace with known good ones.

(5) Introduce an audio signal to the circuit and check to see where it stops.

b. If the equipment operates but operates poorly:

(1) With equipment switched "ON" and 115 volt single phase 60 cps AC applied to the power terminals, check component voltages against the voltages shown in figures 5-6 and 5-9.

(2) With equipment switched "OFF", volume control set at 10, tone control set at 10, and all external cables disconnected, check resistance to ground of components against the resistance values shown in figures 5-6 and 5-9.

(3) Check the loudspeaker for poor connections and for dirty or sticky voice coil. If the cone and voice coil assembly is found to be defective, replacement may be made by using Cone and Voice Coil Assembly #16C50G2, which is furnished with the spare parts, and adhering to the following instructions:

(*a*) Remove the flexible moving coil leads from the terminal strip by the application of a hot soldering iron.

(*b*) Cut carefully around the edge of both cone and corrugated paper spider so that the entire moving structure assembly may be removed at once.

(*c*) Immediately cover the air gap with tape to prevent the entry of iron filings, etc.

(*d*) Soften the water-proof cement which attached the cone and spider to the housing with lacquer thinner or acetone. Use thinner liberally and in a few minutes wipe away all remains of the paper and cement.

(*e*) Then remove all remains of the paper and cement from the housing, after which remove the tape and blow the air gap with compressed air if available, or wipe out with a piece of Scotch tape.

(*f*) Apply evenly an ample supply of some good grade, fast drying water-proof cement to the housing rim and in the circular depression which seats the spider (see figure 5-7). Put the new assembly lightly in place with the moving coil leads in correct position to be properly soldered to the terminal strip and with the cone edge in contact with the housing rim all the way around. Immediately then slip the 0.006" paper spacer (packed with the replacement cone assembly) curved to fit around the core between the inside of the moving coil and steel core. Next, apply an even coat of cement to the top side of the pulpboard gasket and press lightly in place (see figure 5-8). Take care not to slide the cone one way or another when assembling the gasket. Make certain that the moving coil has entered the air gap far enough to place the rim of the spider in good contact with the housing, yet not so far as to seriously depress the spider in its center section.

(*g*) Place the assembly on a smooth, flat surface (gasket down) with a small weight on the back and allow to become thoroughly dry before proceeding (approximately 30 minutes).

(*h*) Remove the paper spacers and solder the flexible leads to the terminal strip, allowing just sufficient slack for free maximum excursion of the moving coil. Be certain that the flexible leads do not contact the housing or cone at any time while in motion.

(*i*) Apply a bead of cement around the circumference of the felt dust cap disc, and position the dust cap centrally over the voice coil opening. Press lightly in place and let dry.

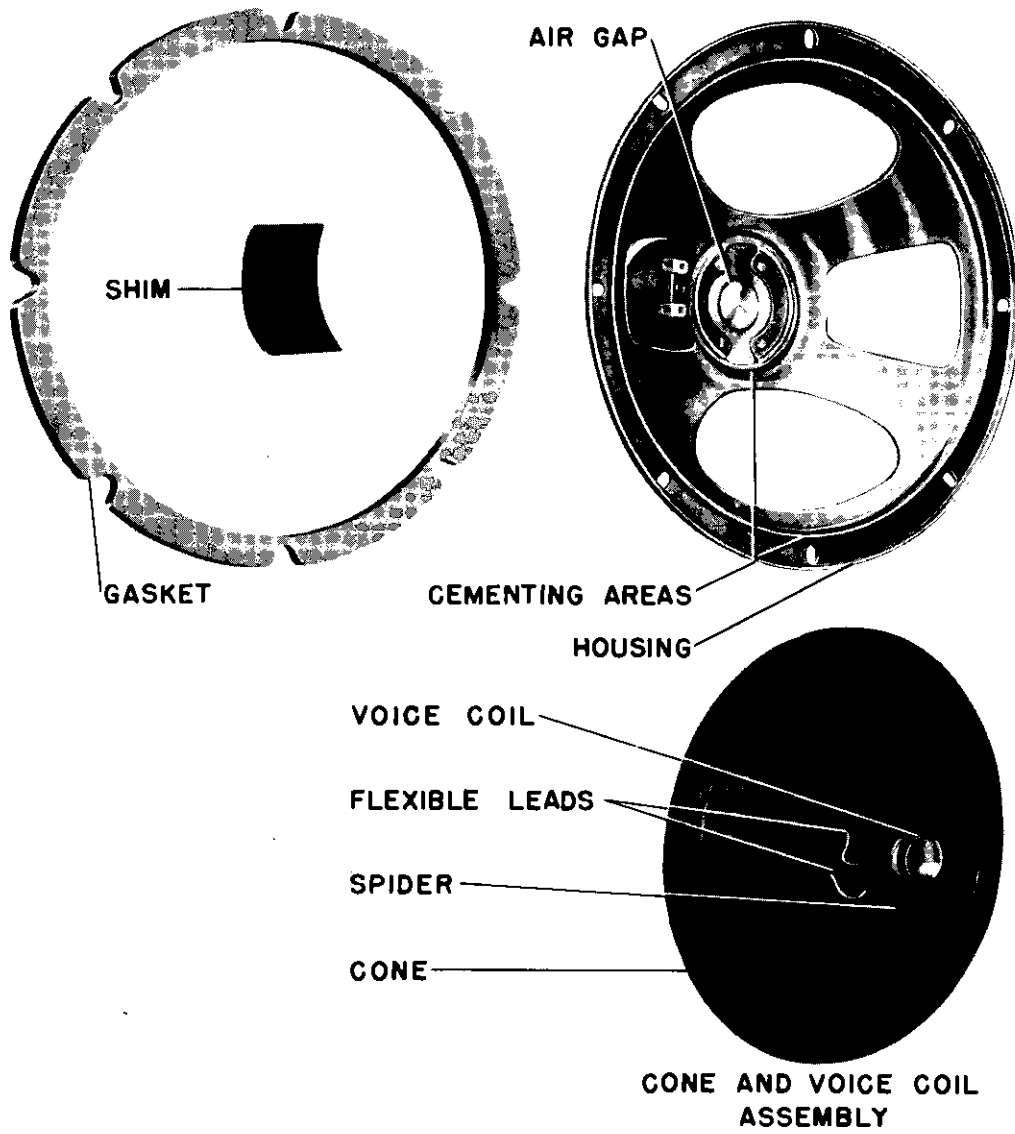


Figure 5-7. Parts for Cone Replacement

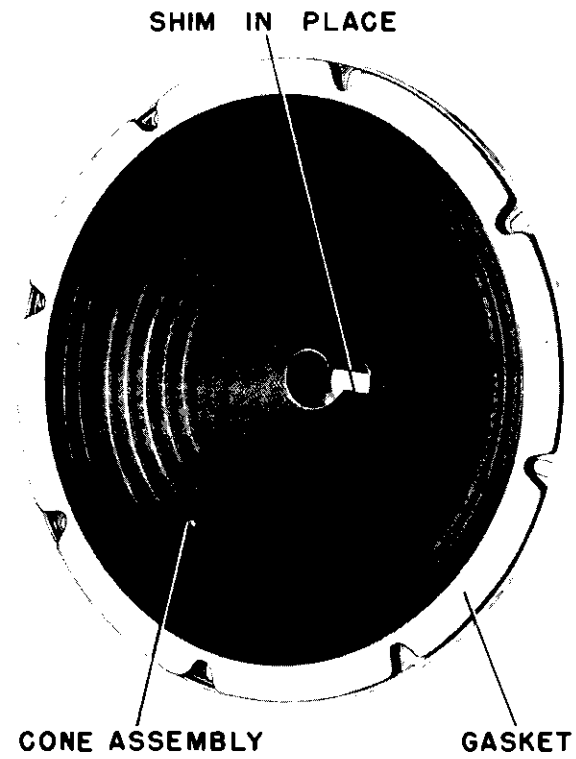
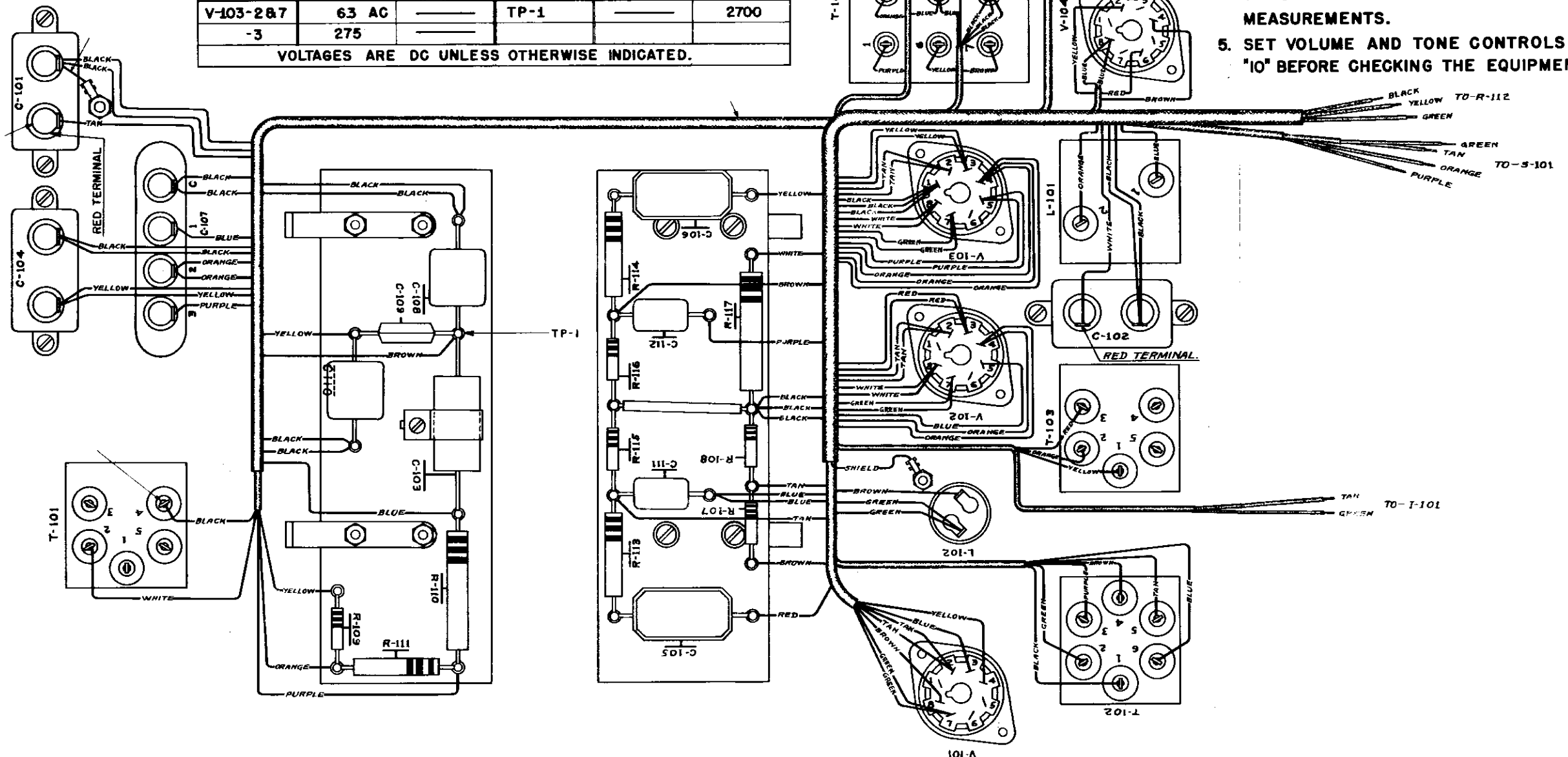


Figure 5-8. Completed Cone Replacement. (Ready for Drying)

VOLTAGE & RESISTANCE TABLE					
TEST POINT	VOLTAGE	RESISTANCE	TEST POINT	VOLTAGE	RESISTANCE
V-101-2 & 7	63 AC	—	V-103-4	282	—
-3	70	—	-5	—	18000
-4	25	—	-8	16.5	220
-5	—	1050	V-104-2 & 8	5.0 AC	—
-8	3	540	-4	—	140
V-102-2 & 7	63 AC	—	-6	—	130
-3	275	—	L-101-2	282	—
-4	282	—	-1	300	—
-5	—	19000	T-104-1 & 2	115 V AC	9
-8	16.5	220	T-103-1 & 3	—	430
V-103-2 & 7	63 AC	—	TP-1	—	2700
-3	275	—			

VOLTAGES ARE DC UNLESS OTHERWISE INDICATED.



- NOTES:**
- CHECK VOLTAGES WITH EQUIPMENT "ON" AND 115 V. 60 \sim POWER CONNECTED.
 - CHECK RESISTANCES WITH EQUIPMENT "OFF" AND ALL EXTERNAL CABLES DISCONNECTED.
 - CHECK BETWEEN INDICATED TEST POINT AND GROUND, OR BETWEEN THE TEST POINTS WHERE TWO ARE LISTED.
 - MEASUREMENTS MADE WITH WESTON MODEL 772 ANALYZER, USING 1000 OHMS PER VOLT SENSITIVITY ON ALL MEASUREMENTS.
 - SET VOLUME AND TONE CONTROLS TO "10" BEFORE CHECKING THE EQUIPMENT.

Figure 5-9. Amplifier Wiring Diagram

SECTION VI PARTS AND SPARE PARTS LISTS

TABLE 6-1
MAJOR UNIT

Quantity	Navy Type Number	Name of Major Unit	Part Designation Group
6382	CMX 49545	Speaker-Amplifier	101 - 199

TABLE 6-2
COMBINED PARTS AND SPARE PARTS LIST

For Speaker-Amplifier CMX-49545

Contract NXsr 93879

Symbol Desig.	Name of Part and Description	Function	AWS, JAN or Navy Type Designation	Magnavox Drawing No.	Mfr. Ref.	Mfr. Part No.	Total No. Per Equip.	Quantity Equip. Spare	Quantity Tender Spare	Quantity Stock Spare
C-101	Capacitor, dry electrolytic; 40 mfd 40 WVDC	Cathode by-pass, first audio stage	-483949	16B20G1	13	16B20G1	2	2	6	6
C-102	Same as C-101	Cathode by-pass, output stage	-483949							
C-103	Capacitor, paper; 0.05 mfd $\pm 10\%$, 600 V	Plate blocking, first audio stage	CP26A1EF503K	16A269G1	21	P11695	1	1	2	3
C-104	Capacitor, paper; 0.5 mfd $\pm 5\%$, 600 V	Screen by-pass, first audio stage	-481002-5	16A252G1	20	XTMRTW6-5-5	1	1	2	3
C-105	Capacitor, paper; 0.02 mfd $\pm 10\%$, 600 V	Coupling for inverse feedback	CN42E203K	16A267G1	15	342YL14	2	1	3	5
C-106	Same as C-105	Coupling for inverse feedback	CN42E203K							
C-107	Capacitor, paper, triple section; ea sect 8 mfd $\pm 20\%$ 500 V; A, B, and C denote sections 1, 2, and 3 resp.	Plate power filter	-484591-20	16A115G3	10	A8587	1	1	2	3
C-108	Capacitor, mica; 1200 mmfd $\pm 5\%$, 500 V	Audio filter, tone control circuit	CM30A122J	16A270G4	19	42621	1	1	1	1
C-109	Capacitor, mica; 750 mmfd $\pm 5\%$, 500 V	Audio filter, tone control circuit	CM30A751J	16A270G3	19	60670	1	1	1	1

TABLE 6-2 (Continued)

Symbol Desig.	Name of Part and Description	Function	AWS, JAN or Navy Type Designation	Magnavox Drawing No.	Mfr. Ref.	Mfr. Part No.	Total No. Per Equip.	Quantity Equip. Spares	Quantity Tender Spares	Quantity Stock Spares
C-110	Capacitor, mica; 6800 mmfd $\pm 10\%$, 500 V	Audio filter, tone control circuit	CM35A682K	16A270G1	19	60500	1	1	1	1
C-111	Capacitor, mica; 15 mmfd $\pm 10\%$, 500 V	High frequency by-pass inverse feedback circuit	CM20A150K	16A270G2	19	60519	2	1	2	2
C-112	Same as C-111	High frequency by-pass inverse feedback circuit	CM20A150K							
F-101	Fuse, cartridge; 1.0 amp 250 V	Used in input line	-28032-1	M600G1	3	3AG-1	2	40	80	200
F-102	Same as F-101	Used in input line	-28032-1							
I-101	Lamp, pilot; 6.3 V Mazda type 51, bayonet base	"ON-OFF" indicator		M795G1	11	Mazda 51	1	2	4	6
L-101	Reactor, filter; DC resist. 270 ohms; imped. 2800 ohms @ 60 cps and 70 ma DC load	Smoothing choke, plate power supply	-304045	16C70G1	5	9999	1	1	2	3
L-102	Reactor, audio; DC resist. 370 ohms; inductance 1.035 henries; impedance @ 1000 cps 6400 ohms	Audio filter choke, tone control circuit	-303953	16C72G1	13	16C72G1	1	1	2	3
LS-101	Loudspeaker, 8" magneto-dynamic; voice coil DC resist. 2.9 ohms; imped. @ 1000 cps — 3.7 ohms	Electro-acoustic transducer	-491636	16B19G1	13	16B19G1	1	1	2	2
R-101	Resistor, fixed composition; 620 ohms $\pm 5\%$, 2 watts	Input channel load resistor	RC41BF621J	16A266G2	12	BT-2	5	3	15	25
R-102	Same as R-101	Input channel load resistor	RC41BF621J							
R-103	Same as R-101	Input channel load resistor	RC41BF621J							
R-104	Same as R-101	Input channel load resistor	RC41BF621J							
R-105	Same as R-101	Input channel load resistor	RC41BF621J							
R-106	Potentiometer; 25000 ohms $\pm 20\%$; taper — 4% @ 50% rotation	Volume control	-634809-20	16C83G1	6	37W-25000	1	1	3	5
R-107	Resistor, fixed composition; 270 ohms $\pm 10\%$, 1/2 watt	Cathode bias resistor, first audio stage	RC21BF271K	16A110G3	9	504-B	2	1	6	10
R-108	Same as R-107	Cathode bias resistor, first audio stage	RC21BF271K							
R-109	Resistor, fixed composition; 0.47 meg- ohms $\pm 10\%$, 1/2 watt	Screen voltage dropping resistor, first audio stage	RC21BF474K	16A110G2	7	C1/2	1	1	3	5
R-110	Resistor, fixed composition; 33,000 ohms $\pm 10\%$, 2 watt	Plate load resistor, first audio stage	RC41BF333K	16A266G3	12	BT-2	1	1	3	5
R-111	Resistor, fixed composition; 4700 ohms $\pm 10\%$, 1 watt	Plate voltage dropping re- sistor, first audio stage	RC31BF472K	16A265G1	12	BT-1	1	1	3	5
R-112	Potentiometer; 30000 ohms $\pm 20\%$; linear taper	Tone control	-634805-20	16C83G2	6	37W-30000	1	1	3	5
R-113	Resistor, fixed composition; 0.1 meg- ohm $\pm 10\%$, 1 watt	Inverse feedback circuit	RC31BF104K	16A265G2	12	BT-1	2	1	6	10

R-114	Same as R-113	Inverse feedback circuit	RC31BF104K							
R-115	Resistor, fixed composition; 15000 ohms $\pm 10\%$, $\frac{1}{2}$ watt	Inverse feedback circuit	RC21BF153K	16A110G4	9	524	2	1	6	10
R-116	Same as R-115	Inverse feedback circuit	RC21BF153K							
R-117	Resistor, wire-wound; 220 ohms $\pm 10\%$, 2 watts	Cathode bias resistor, output stage	RU6A221K	16A286G1	12	BW-2	1	1	3	5
S-101	Switch, toggle; DPST, 3 amp 125 V	"ON-OFF" switch	-24001	16C82G1	2	20902-JB	1	1	1	1
S-102	Switch, rotary wafer; 1-gang 2-circuit, 5-position	Selection of one of five input channels		16C48G2	14	B118118	1	1	1	1
T-101	Transformer, input; pri. term. 1 and 3, DC resist. 860 ohms; pri. CT term. 2; sec. term. 4 and 5, DC resist. 1030 ohms; turns ratio 1:1	Couple input to grid of first audio stage	-304046	16C70G2	5	9989	1	1	2	3
T-102	Transformer, interstage; pri. term. 1 and 2, DC resist. 2435 ohms; sec. term. 3 and 4, DC resist. 3140 ohms; sec. -2 term. 5 and 6, DC resist. 3190 ohms; turns ratio pri. to either sec. 1:1.17	Couple output of first audio stage to grid of output stage	-304047	16C70G3	5	9980	1	1	2	3
T-103	Transformer, output; pri. term. 1 and 3, DC resist. 410 ohms; pri. CT term. 2; sec. term. 4 and 5, DC resist. 0.170 ohms; turns ratio 52:1	Couple output to voice-coil of loudspeaker	-304048	16C70G4	5	9988	1	1	2	3
T-104	Transformer, power; 115 V, 50-60 cps, input term. 1 and 2; 6.3 V output term. 3 and 4; 5 V output term. 5 and 6; 580 V output term. 7 and 9; CT high voltage sec. term. 8	Furnish all filament voltages, and plate and screen voltages	-304049	16C71G1	5	9990	1	1	2	3
V-101	Tube, amplifier	Voltage amplifier	JAN 6V6GT/G		17	6V6GT/G	3	6	9	0
V-102	Same as V-101	Power amplifier	JAN 6V6GT/G							
V-103	Same as V-101	Power amplifier	JAN 6V6GT/G							
V-104	Tube, rectifier	Furnish DC plate volt	JAN 5Y3GT/G		16	5Y3GT/G	1	2	3	0
X-101	Tube socket	For voltage amplifier tube	-49351	16A111G1	1	RNS8TM	4	2	2	4
X-102	Same as X-101	For power amplifier tube	-49351							
X-103	Same as X-101	For power amplifier tube	-49351							
X-104	Same as X-101	For rectifier tube	-49351							
	Cone and Voice Coil Assem.	For replacement in loudspeaker		16C50G2	13	16C50G2	1	2	2	3
	Gasket, Vellutex	For loudspeaker mounting		16A231G1	22		1	1	2	4
	Gasket, Vellutex	Equipment case vent seal		16A233G1	22		1	1	2	4
	Screws, knurled	Front panel security		16A240G1	18		6	0	0	6
	Gasket, rubber	Front panel seal		16A229G1	4	4143	1	1	2	4
	Lamp socket assembly (includes hardware)	For indicator lamp		16C81G1	8	DV88-51 SAO-RED	1	1	1	1
	Fuse holders	Holdere for input line fuses		16C61G1	13	16C61G1	1	1	1	1
	Instruction book			16A288G1	23		2			

TABLE 6-3
LIST OF PARTS BY NAVY NUMBERS

(The quantities listed do not include spare parts)

For Speaker-Amplifier CMX-49545

Quantity	Navy Type Number	Symbol Desig.	Description
SWITCHES (Class 24)			
1	-24001	S-101	Toggle; DPST, 3 amp, 125 V
1		S-102	Rotary Wafer; 1-gang, 2-circuit, 5-position
FUSES (Class 28)			
2	-28032-1	F-101, F-102	Cartridge; 1.0 amp, 250 V
TRANSFORMERS and REACTORS (Class 30)			
1	-303953	L-102	Audio; DC resistance 370 ohms, inductance 1.035 henries, impeded @ 1000 cps 6400 ohms
1	-304045	L-101	Filter; DC resistance 207 ohms, impedance 2800 ohms @ 60 cps and 70 ma. DC load
1	-304046	T-101	Input; primary DC resistance 860 ohms, sec DC resistance 1030 ohms
1	-304047	T-102	Interstage; primary DC resistance 2435 ohms, sec DC resistance 3140 ohms
1	-304048	T-103	Output; primary DC resistance 410 ohms, sec DC resistance 0.170 ohms
1	-304049	T-104	Power; 115 V, 50-60 cps
VACUUM TUBES (Class 38)			
1	JAN 6V6GT/G	V-101	Amplifier, voltage
1	JAN 6V6GT/G	V-102	Amplifier, power
1	JAN 6V6GT/G	V-103	Amplifier, power
1	JAN 5Y3GT/G	V-104	Rectifier
CAPACITORS (Class 48)			
2	CM20A150K	C-111, C-112	Mica; 15 mmfd $\pm 10\%$, 500 V
1	CP26A1EF503K	C-103	Paper; 0.05 mfd $\pm 10\%$, 600 V
1	CM30A122J	C-108	Mica; 1200 mmfd $\pm 5\%$, 500 V
1	CM30A751J	C-109	Mica; 750 mmfd $\pm 5\%$, 500 V
1	CM35A682K	C-110	Mica; 6800 mmfd $\pm 10\%$, 500 V
2	CN42E203M	C-105, C-106	Paper; 0.02 mfd $\pm 10\%$, 600 V
1	-481002-5	C-104	Paper; 0.5 mfd $\pm 5\%$, 600 V
2	-483949	C-101, C-102	Electrolytic, dry; 40 mfd 40 WVDC
1	-484591-20	C-107	Paper; 8-8-8 mfd $\pm 20\%$, 500 V

TABLE 6-3 (Continued)
LIST OF PARTS BY NAVY NUMBERS

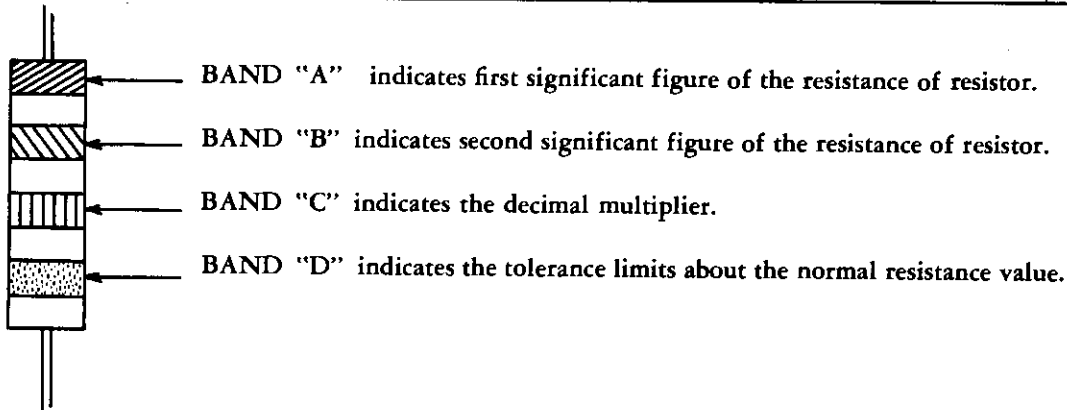
(The quantities listed do not include spare parts)

For Speaker-Amplifier CMX-49545

<i>Quantity</i>	<i>Navy Type Number</i>	<i>Symbol Desig.</i>	<i>Description</i>
4	-49351	X-101, X-102, X-103, X-104	VACUUM TUBE SOCKETS (Class 49) For vacuum tubes JAN 6V6GT/G and JAN 5Y3GT/G
1	-491636	LS-101	LOUDSPEAKER (Major Unit Class 49) 8" Magneto-dynamic
1	RU6A221K	R-117	Resistor; wire wound, 220 ohms $\pm 10\%$, 2 watts
2	RC21BF153K	R-115, R-116	Resistor; fixed composition, 15000 ohms $\pm 10\%$, 1/2 watt
2	RC21BF271F	R-107, R-108	Resistor; fixed composition, 270 ohms $\pm 10\%$, 1/2 watt
1	RC21BF474K	R-109	Resistor; fixed composition, 0.47 megohms $\pm 10\%$, 1/2 watt
2	RC31BF104K	R-113, R-114	Resistor; fixed composition, 0.1 megohms $\pm 10\%$, 1 watt
1	RC31BF472K	R-111	Resistor; fixed composition, 4700 ohms $\pm 10\%$, 1 watt
1	RC41BF333K	R-110	Resistor; fixed composition, 33000 ohms $\pm 10\%$, 2 watts
5	RC41BF621J	R-101, R-102, R-103, R-104, R-105	Resistor; fixed composition, 620 ohms $\pm 5\%$, 2 watts
1	-634805-20	R-112	Potentiometer; 30000 ohms $\pm 20\%$, linear taper
1	-634809-20	R-106	Potentiometer; 25000 ohms $\pm 20\%$

TABLE 6-4**APPLICABLE RESISTOR COLOR CODES
AND MISCELLANEOUS DATA**

FIXED COMPOSITION RESISTORS				
Color	Significant Figure	Power of 10	Multiplying Value	Tolerance
Black	0	10^0	1	
Brown	1	10^1	10	
Red	2	10^2	100	
Orange	3	10^3	1000	
Yellow	4	10^4	10,000	
Green	5	10^5	100,000	
Blue	6	10^6	1,000,000	
Violet	7	10^7	10,000,000	
Gray	8	10^8	100,000,000	
White	9	10^9	1,000,000,000	
Gold	—	10^{-1}	0.1	5%
Silver	—	10^{-2}	0.01	10%
No Color	—	—	—	20%



In this equipment, the nominal resistance values of the fixed composition resistors are indicated by bands of color around the body of the resistors in accordance with the system shown above. Also, the significant figures of the resistance values, the decimal multipliers, and

the tolerances of the fixed composition resistors used in this equipment are indicated above with modifications and extensions of the Standard R. M. A. Color Code M4-213.

TABLE 6-5**APPLICABLE CAPACITOR COLOR CODES
AND MISCELLANEOUS DATA**

<i>FIXED CAPACITORS</i>				
<i>Color</i>	<i>Significant Figure</i>	<i>Decimal Multiplier</i>	<i>Tolerance</i>	<i>Voltage Rating</i>
Black	0	1	—	—
Brown	1	10	1%	100
Red	2	100	2%	200
Orange	3	1000	3%	300
Yellow	4	10,000	4%	400
Green	5	100,000	5%	500
Blue	6	1,000,000	6%	600
Violet	7	10,000,000	7%	700
Gray	8	100,000,000	8%	800
White	9	1,000,000,000	9%	900
Gold	—	0.1	5%	1000
Silver	—	0.01	10%	2000
No Color	—	—	20%	500

In this equipment, where color marking of the nominal capacitance, tolerance, and voltage rating of the capacitor is employed, these items are indicated in accordance with the extension of the R. M. A. Color Code M4-213 as shown above. The nominal capacitance of small capacitors of polygonal transverse sections and voltage ratings of 500 volts as used in this equipment, is indicated by a row of three markers colored to express the capacitance of the capacitor. The first significant figure is designated by the first color, reading in the direction of the arrow; the second significant figure by the second color; and the multiplier by the third color. The characteristics of capacitors with voltage ratings

other than 500 volts are indicated by the use of six markers arranged in two rows of three markers each. The upper of the two rows of markers is colored to indicate the three significant figures of the capacitance. Reading to the right in the direction of the arrow, the first significant figure is designated by the first color; the second by the second color; and the third by the third color. The right-most of the lower row of markers is colored to indicate the decimal multiplier; the intermediate of the lower markers is colored to indicate the tolerance; and the left-most is colored to indicate the voltage rating.

TABLE 6-6
LIST OF MANUFACTURERS

<i>Mfr. Reference</i>	<i>Mfr. Prefix Letter</i>	<i>Manufacturer</i>	<i>Address</i>
1	CPH	American Phenolic Corporation	Chicago, Ill.
2	CHH	Arrow Hart & Hegeman	Hartford, Conn.
3	CFA	Bussman Mfg. Co.	St. Louis, Mo.
4	—	Canfield Rubber Co.	Bridgeport, Conn.
5	CTR	Chicago Transf. Co.	Chicago, Ill.
6	CMC	Clarostat Mfg. Co.	Brooklyn, N. Y.
7	CCC	Continental Carbon Co.	New York, N. Y.
8	—	Dial Light Corp. of America	New York, N. Y.
9	CER	Erie Resistor Co.	Erie, Pa.
10	CBV	John E. Fast Co.	Chicago, Ill.
11	CG	General Electric Co.	Schenectady, N. Y.
12	CIR	International Resistance Co.	Philadelphia, Pa.
13	CMX	The Magnavox Co.	Fort Wayne, Ind.
14	CMA	P. R. Mallory Co.	Indianapolis, Ind.
15	CMR	Micamold Radio Corp.	Brooklyn, N. Y.
16	CRP	Raytheon Mfg. Co.	Waltham, Mass.
17	CRC	RCA Mfg. Co.	Harrison, N. J.
18	—	J. T. Ryerson & Son	Chicago, Ill.
19	CAN	Sangamo Electric Co.	Springfield, Ill.
20	CSL	Solar Mfg. Co.	Bayonne, N. J.
21	CSF	Sprague Electric Co.	North Adams, Mass.
22	—	Vellumoid Company	Worcester, Mass.
23	—	Reynolds & Reynolds Co.	Dayton, Ohio