sams

AUTO RADIO SERVICE DATA

American Motors *5HT1801/2, 5JC1803/7,3697362/3,5463943*

Chrysler by Mitsubishi
Dodge Colt *AR-1730CR,CR-B*

Craig *T611*

Ford *D8TF19A241AA*

International Harvester *111643C1, 111645C1*

J.I.L. *632*

Midland *67-455*

Panasonic *CQ-5500EU,EC*

Sanyo *F8702*

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HOWARD W. SAMS & CO., INC.
INDIANAPOLIS INDIANA

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TABLE OF CONTENTS

GENERAL SERVICING INFORMATION

The following information applies to all tape units in this volume, and should be followed before any adjustments are made or trouble diagnosis is attempted. Any exceptions or additions will be found in the detailed servicing procedures for each tape unit.

POWER SOURCES

Many tape units require full supply voltage for proper operation. Be sure the supply voltage is maintained at the rated value under load while making adjustments.

CLEANING

All head faces should be cleaned with head cleaner or methyl alcohol to remove dust and accumulated oxide. (An applicator may be fashioned from absorbent cotton.) Do not use a screwdriver or any metallic object near the head faces.

CAUTION: *Avoid getting head cleaner on any plastic surface.*

Clean capstans, pressure rollers, and tape guides with alcohol using a soft lint-free cloth. Also use alcohol to remove oil and grease from drive belts and other driving surfaces.

LUBRICATING

Clean all surfaces before lubricating. Apply a few drops of #20 machine oil to all bearings and rotating bushings. Apply a thin film of light, nonhardening grease to all cam surfaces and pawls, if they have been factory lubricated. Always wipe excess oil or grease from parts that have been lubricated.

CAUTION: *Oil and grease must be kept off all driving surfaces as well as any parts which may transfer oil or grease to them.*

DEMAGNETIZING

Heads require demagnetizing at regular intervals to maintain high-frequency response, dynamic range, and low distortion. (Follow instructions included with the demagnetizing unit.) After demagnetizing the heads, keep all screwdrivers and other metallic objects away from the head faces. Tape guides may also require occasional demagnetizing.

IMPORTANT: *Be sure to demagnetize the heads after making resistance measurements in the head circuits.*

CARTRIDGES

Many problems associated with tape units result from defective cartridges. Always try a cartridge known to be good before attempting repairs.

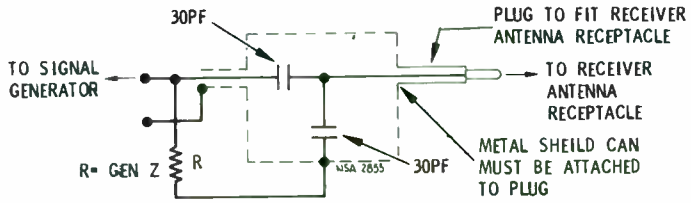


FIG. 6 DUMMY ANTENNA DETAIL

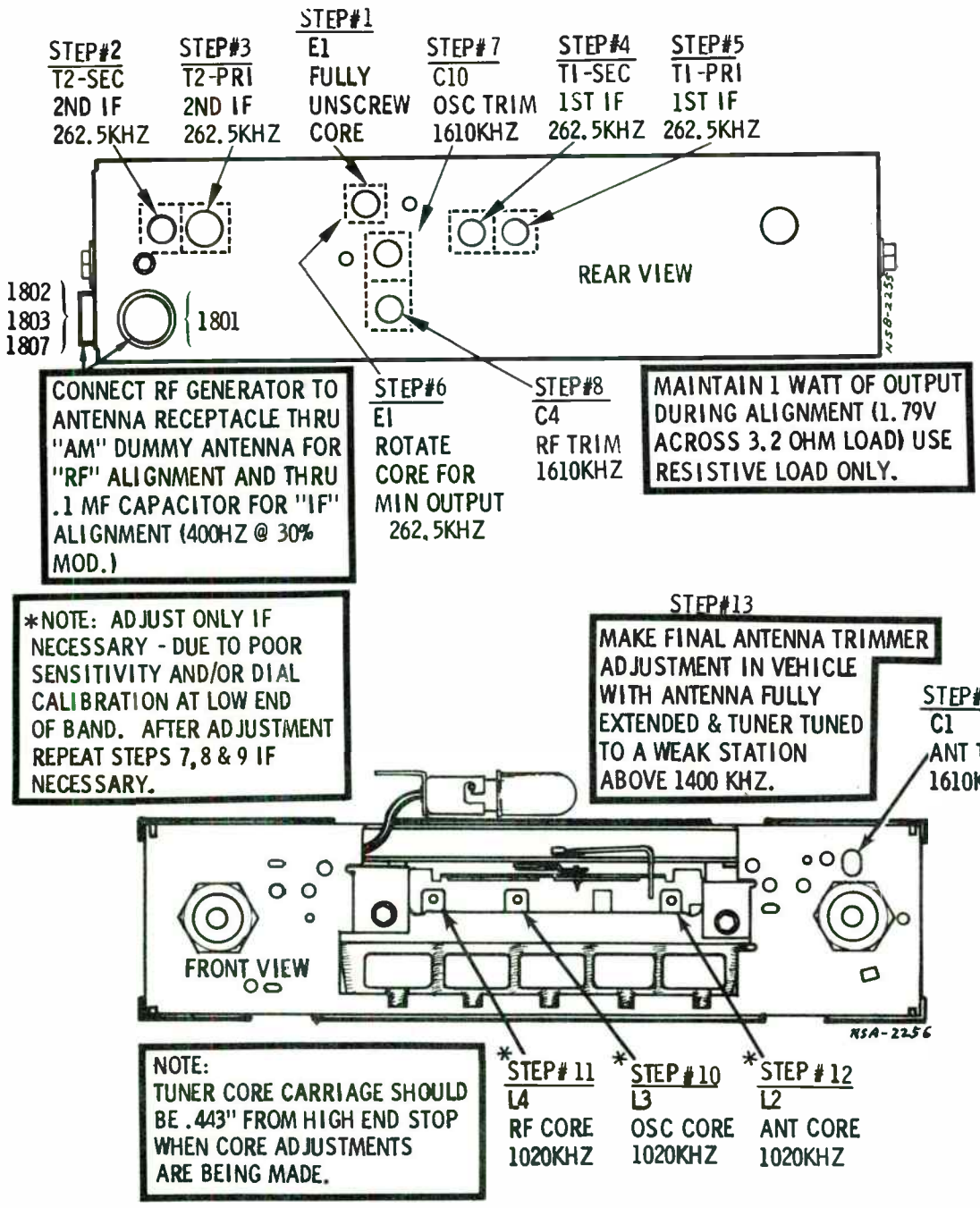
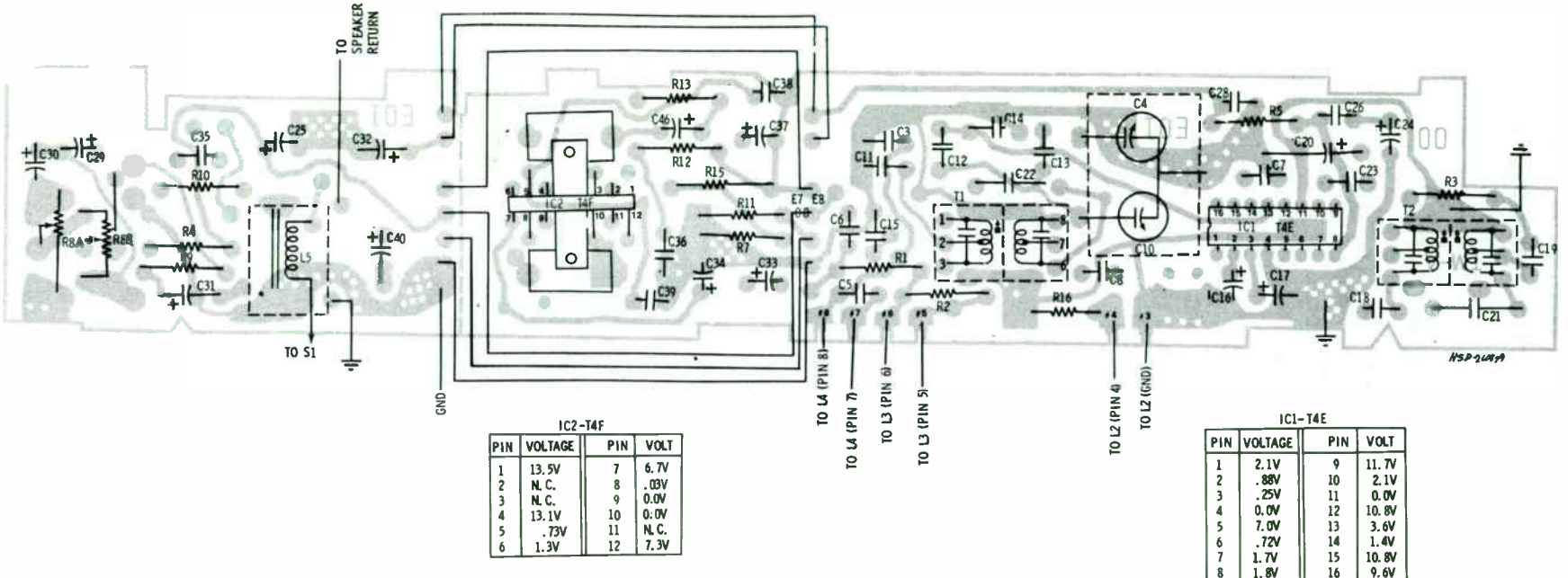


FIG. 7 ALIGNMENT INFORMATION AND POINT LOCATION



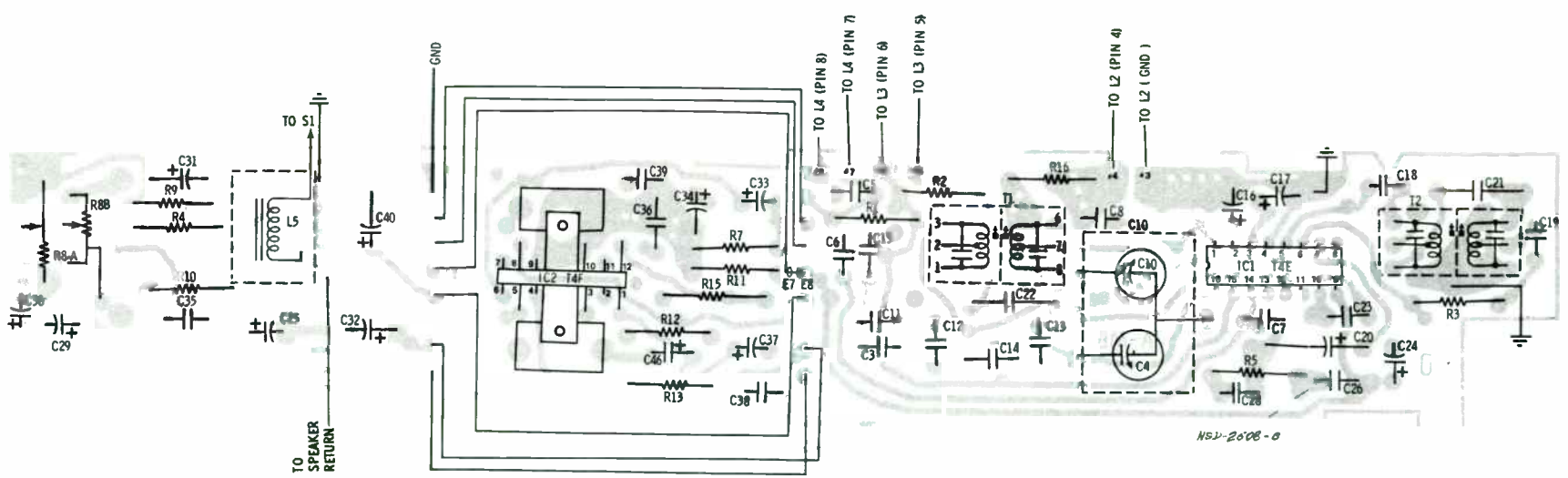
IC2-T4F

PIN	VOLTAGE	PIN	VOLT
1	13.5V	7	6.7V
2	N.C.	8	.03V
3	N.C.	9	0.0V
4	13.1V	10	0:0V
5	.73V	11	N.C.
6	1.3V	12	7.3V

IC1-T4E

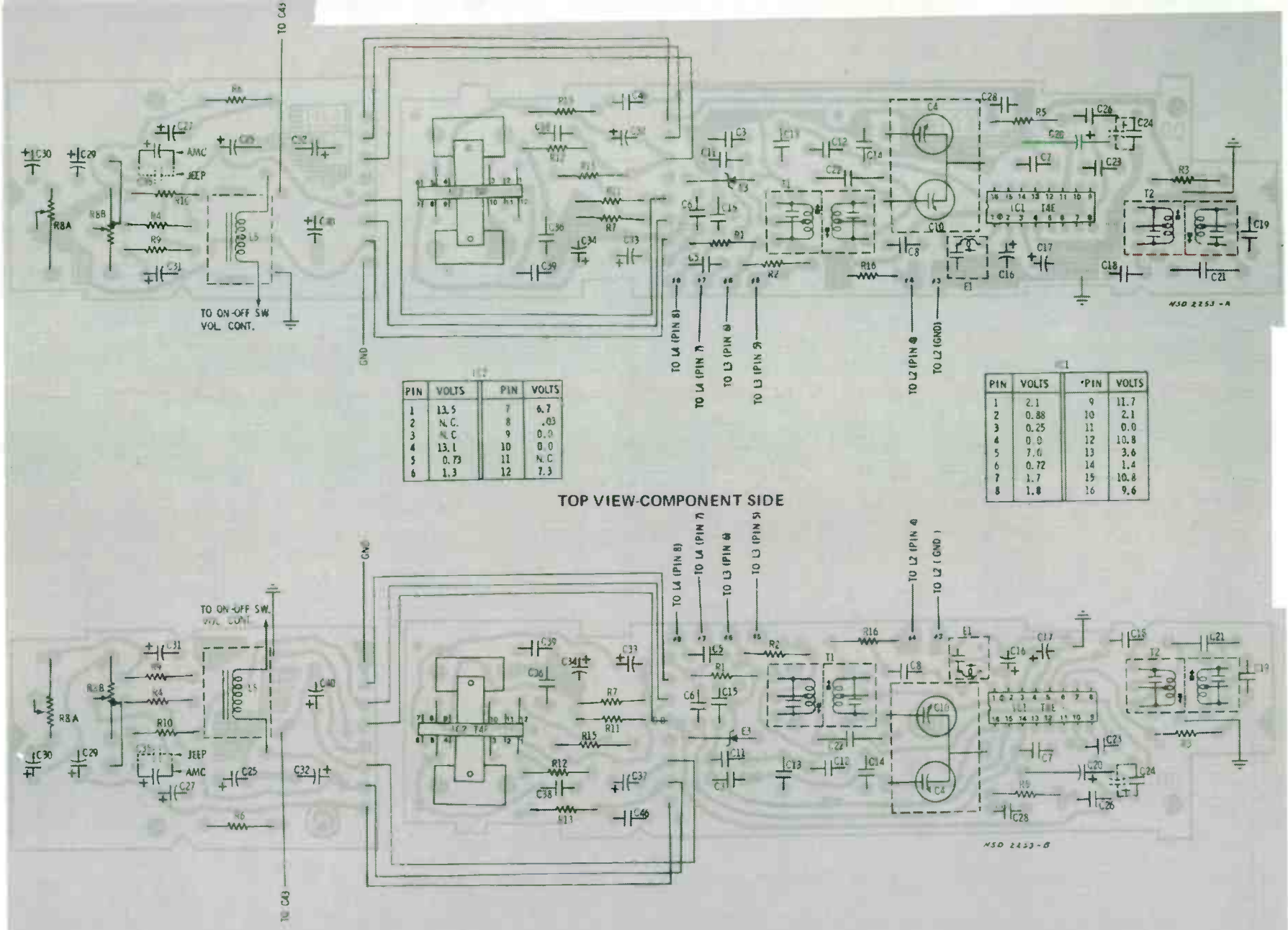
PIN	VOLTAGE	PIN	VOLT
1	2.1V	9	11.7V
2	.88V	10	2.1V
3	.25V	11	0.0V
4	0.0V	12	10.8V
5	7.0V	13	3.6V
6	.72V	14	1.4V
7	1.7V	15	10.8V
8	1.8V	16	9.6V

TOP VIEW-COMPONENT SIDE



BOTTOM VIEW-WIRING SIDE

FIG. 4 1801 PLATED BOARD DIAGRAM



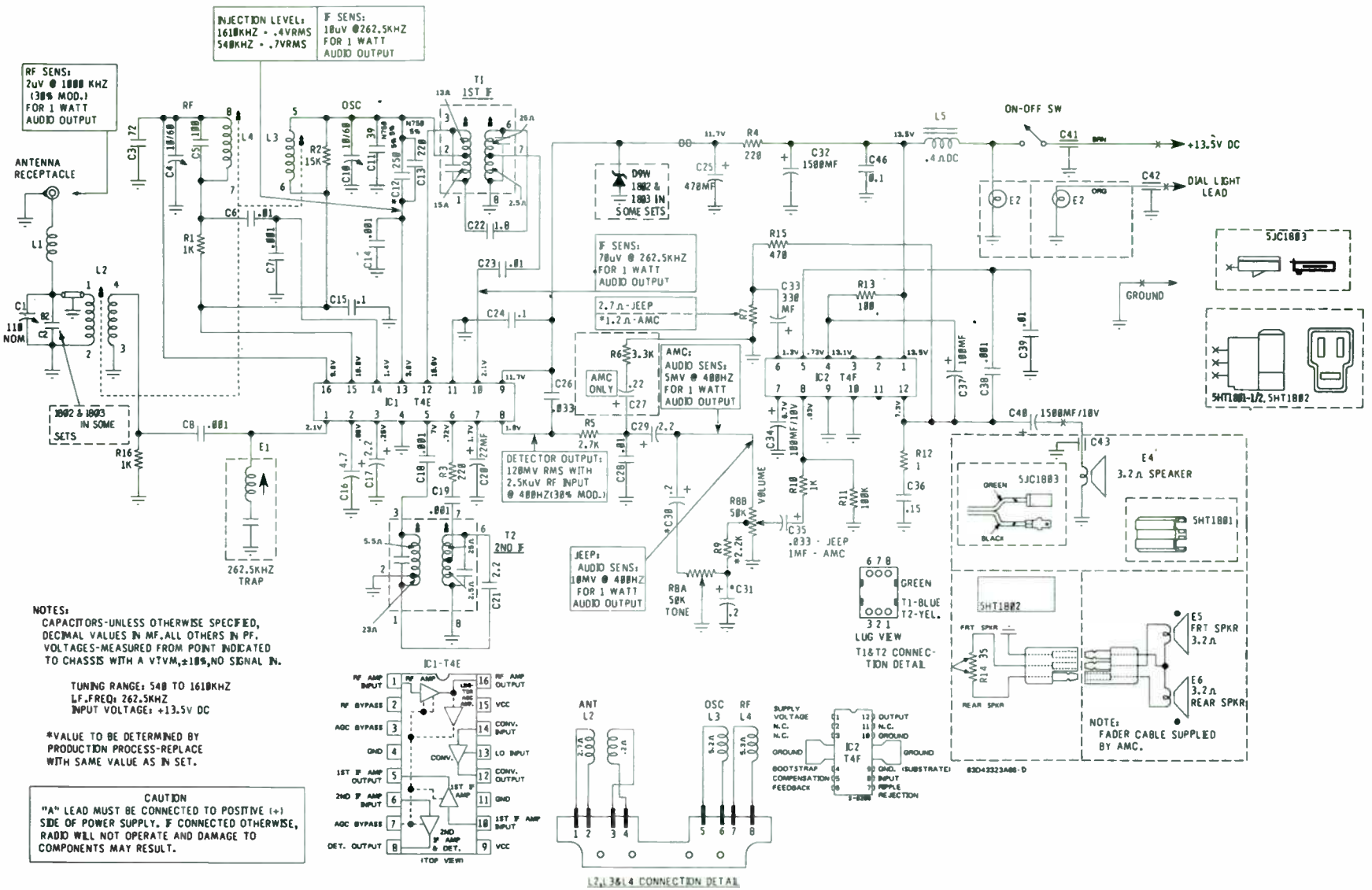
PIN	VOLTS	PIN	VOLTS
1	13.5	7	6.7
2	N.C.	8	.03
3	N.C.	9	0.0
4	13.1	10	0.0
5	0.73	11	N.C.
6	1.3	12	7.3

PIN	VOLTS	PIN	VOLTS
1	2.1	9	11.7
2	0.88	10	2.1
3	0.25	11	0.0
4	0.0	12	10.8
5	7.0	13	3.6
6	0.72	14	1.4
7	1.7	15	10.8
8	1.8	16	9.6

TOP VIEW-COMPONENT SIDE

BOTTOM VIEW-WIRING SIDE

FIG. 5 1802, 1803, 1807 PLATED BOARD DIAGRAM



NOTES:
CAPACITORS-UNLESS OTHERWISE SPECIFIED, DECIMAL VALUES IN MF. ALL OTHERS IN PF. VOLTAGES-MEASURED FROM POINT INDICATED TO CHASSIS WITH A V7VM, ±10%, NO SIGNAL IN.

TUNING RANGE: 540 TO 1610KHZ
I.F. FREQ: 262.5KHZ
INPUT VOLTAGE: +13.5V DC

*VALUE TO BE DETERMINED BY PRODUCTION PROCESS-REPLACE WITH SAME VALUE AS IN SET.

CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. IF CONNECTED OTHERWISE, RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS MAY RESULT.

FIG. 3 SCHEMATIC DIAGRAM

MODELS: 5HT1801, 1802, 5JC1803, 1807 REPLACEMENT PARTS LIST
NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION
		ELECTRICAL PARTS
		CAPACITORS
C1	20-40647C04	TRIMMER, mica: ant 30-220PF
C3	21-43539A89	72PF 10% 100V N150 disc
C4	20-40847E01	TRIMMER, dual: 10-65PF
C5	21-43539A59	100PF 5% 100V N330 disc
C6	8-42208B15	.01MF 10% 50V mylar
C7, C8	8-42208B27	.001MF 10% 50V mylar
C10	20-40847E01	TRIMMER, dual: 10-65PF
C11	21-43539A72	39PF 10% 100V N750 disc
C12	21-43842B13	250PF 5% 100V mica
C13	21-43539A96	220PF 5% 100V N750 disc
C14	8-10299B36	.001MF 10% 100V
C15	8-42208B03	.1MF 10% 50V mylar
C16	23-10818A05	4 7MF 25V lytic
C17	23-10818A03	2.2MF 50V lytic
C18, C19	8-42208B27	.001MF 10% 50V mylar
C20	23-10818A07	22MF 16V lytic
C21	21-115948	2.2PF 10% 500V
C22	*21-115961	1.8PF 10% 500V
C23	8-42208B15	.01MF 10% 50V mylar
C24	23-10818A32	.1MF 50V lytic
C25	*23-10818A25	470MF 16V lytic
C26	8-42208B17	.033MF 10% 50V mylar
C27	23-10818A34	.22MF 50V lytic (1801-1802 ONLY)
C28	8-42208B15	.01MF 10% 50V mylar
C29	23-10818A03	2.2MF 50V lytic
C30, C31	23-10818A34	.22MF 50V lytic
C32	*23-40850E02	1500MF -10+50% 16V
C33	23-10818A59	330MF 6.3V lytic
C34	23-10818A12	100MF 10V lytic
C35	23-10818A38	1.0MF 50V lytic (1801-1802 ONLY)
C35	8-42208B17	.033MF 10% 50V mylar (1803-1807 ONLY)
C36	21-41680A26	.15MF 20% 12V Y5T disc
C37	21-10818A13	100MF 16V lytic
C38	8-42208B27	.001MF 10% 50V mylar
C39	8-42208B15	.01MF 10% 50V mylar
C40	23-10818A19	1500MF 10V lytic
C41	21-560232	1000PF FEED-THRU
C42	21-560232	1000PF FEED-THRU
C43	21-560232	1000PF FEED-THRU
C44	21-560232	1000PF FEED-THRU
		MISCELLANEOUS ELECTRICAL PARTS
E1	24-40846E01	TRAP, IF
E2	65-138044	BULB, dial light #1893 (1801, 1802)
E2	65-135449	BULB, dial light #1815 (1803, 1807)
E4	*50-40268E01	SPEAKER, 4x10 3.2 OHM (1801, 1802)
E4	50-40976E01	SPEAKER, 5 1/4 3.2 OHM (1803)
E4	50-40029C05	SPEAKER, 5x7 3.2 OHM (1807)
E7, E8	76-544401	FERRITE, bead
		INTEGRATED CIRCUITS
IC1	51-10829A01	T4E, RF & IF
IC2	51-10830A01	T4F AUDIO
		COILS & CHOKES
L1	24-40788A12	COIL, ant choke
L2-L4	1-40750E79	COILS & mtg plate
L5	25-41163E01	CHOKE, filter
		RESISTORS
		Those listed, 5% or better, also unique values
R1	6-129805	1K 5% 1/4W
R2	6-129236	15K 5% 1/4W
R3	6-131275	220 5% 1/4W
R4	6-131275	220 5% 1/4W
R5	6-129707	2.7K 5% 1/4W
R6	6-129981	3.3K 5% 1/4W (1801 & 1802 ONLY)
R7	6-10053A01	2.7 OHM 5% 1/4W (1803 & 1807)
R7	6-10164150	1.2 OHM 5% 1/4W (1801 & 1802)
R8A, R8B	*18-40796E06	CONTROL, multi: tone & vol 50K tone & vol
R9	6-129804	2.2K 5% 1/4W
R10	6-129805	1K 5% 1/4W
R11	6-131524	100K 5% 1/4W
R12	6-10053J05	1.0 5% 1/4W
R13	6-10053A73	100 5% 1/4W
R14	18-40521E09	CONTROL, fader: 35 OHMS (1802) 3/9 - 32
R16	6-129805	1K 5% 1/4W
		TRANSFORMERS
T1	24-41103D03	1st AM IF
T2	24-41103D02	2nd AM IF
		MECHANICAL PARTS
	*84-40868E01	BOARD, plated; less components
	64-41819C01	BACKGROUND, dial (1801, 1802)
	64-41798C01	BACKGROUND, dial (1803, 180/)
	7-40849E01	BRACKET, IC mtg
	*7-41004E01	BRACKET, radio mtg (1801, 1802)
	7-41658C01	BRACKET, support; clutch shaft
	*30-41305E01	CABLE, adapter (1802)
	*30-40532E07	CABLE, "A" lead (1803, 1807)
	30-40381F03	CABLE, "A" lead & dial light (1801, 1802)
	*30-40352F05	CABLE, speaker (1801)
	*30-44533A22	CABLE, speaker (1802)
	30-43189B06	CABLE, speaker (1803, 1807)
1	49-42607C01	CLUTCH, disc: incl set scre
	*15-41187E01	COVER, speaker (1801, 1802)
	15-40799E10	COVER, radio; top & bottom (1803, 1807)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
* DENOTES NEW ITEM APPEARING IN ANY LIST FOR FIRST TIME.

MODELS: 5HT1801, 1802, 5JC1803, 1807 REPLACEMENT PARTS LIST (Cont.)

NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION
		MECHANICAL PARTS (cont)
	*15-40799E09	COVER, radio; top & bottom (1803, 1807)
	61-41463C01	DIFFUSER, dial light (1801, 1802)
	61-41691C02	DIFFUSER, dial light (1803, 1807)
	*61-41162E02	ESCUTCHEON, trim; incl dial scale (1801, 1802)
	13-41064E02	ESCUTCHEON, trim; incl dial scale (1803, 1807)
2	44-42947C01	GEAR, crown; incl bushing & disc
	26-40852E01	HEATSINK, mtg brkt.
	85-41186E01	KIT, ant; less mast (1801, 1802)
	* 1-41099E61	KIT, installation: 5HT1801 includes the following items•
	8-40505E02	•CAP, suppressor (1)
	36-40412E04	•KNOB, selector (1)
	36-43939C01	•KNOB, pendant (2)
	36-40412E03	•KNOB, volume (1)
	* 2-41183E01	•NUT, U spring (4)
	* 2-41184E01	•NUT, push in plastic (3)
	2-43169C01	•NUT, round spanner (2)
	* 3-136492	•SCREW, tpg 8-18x5/8 Pln (4)
	* 3-138416	•SCREW, tpg 8-18x5/8 Pkl (3)
	75-41185E01	•PAD, ant (1)
	* 1-41099E71	KIT, installation 5HT1802 include the following items•
	8-40505E02	•CAP, suppression (1)
	36-40412E04	•KNOB, selector (1)
	36-43939C01	•KNOB, pendant (2)
	36-40412E03	•KNOB, volume (1)
	* 2-41184E01	•NUT, plastic; push on (3)
	* 2-41282D01	•NUT, speed: push on (4)
	2-43169C01	•NUT, spanner (2)
	* 3-136492	•SCREW, 8-18x5/8 Pln. (4)
	* 3-138416	•SCREW, 8-18x5/8 Phl. (3)
	75-41185E01	•PAD, ant (1)
	* 1-40800E45	KIT, installation; 5JC1803 includes the following items•
	7-40978E01	•BRACKET, radio mtg. (1)
	36-40570E02	•KNOB, selector (1)
	36-40979E01	•KNOB, pendant (2)
	36-40570E01	•KNOB, volume (1)
	2-124821	•NUT, hex: 1/2x28x5/8 (2)
	2-115221	•NUT, hex; 10-24x3/8
	2-10080A05	•NUT, spring; 8-32x11/32 (4)
	3-139563	•SCREW, tpg; 12-24x3/8 (1)
	* 1-41099E28	KIT, installation 5JC1807; include the following items•
	3-40652C01	•BOLT, 8-32x5/8 (4)
	* 7-41167E01	•BRACKET, mtg (1)
	36-40570E02	•KNOB, selector (1)
	36-40979E01	•KNOB, pendant (2)
	36-40570E01	•KNOB, volume (1)
	2-115221	•NUT, 10-24x3/8 (1)
	2-119913	•NUT, 8-32x11/32 (4)
	2-124821	•NUT, 1/2-28x5/8 (2)
	*2-410091	•NUT, 1/4-20x7/16 (1)
	3-135228	•SCREW, mch. 1/2-20x1/2 (1)
	9-42576A28	RECEPTACLE, dial light (1801, 1802)
	9-42576A27	RECEPTACLE, dial light (1803, 1807)
	42-43732C01	PLATE, retainer; fader control (1802)
	52-40281C29	POINTER & ARM (1801, 1802)
	52-40281C30	POINTER & ARM (1803, 1807)
	38-42185B02	PUSHBUTTON (1801, 1802)
	38-42185B01	PUSHBUTTON (1803, 1807)
3	1-43200B05	SCREW & NUT, carriage adj.
4	3-563128	SCREW, set; clutch disc
5	*47-42251C09	SHAFT, man. tuning; incl pinion gear (1801)
6	47-42306C17	SHAFT, man. tuning; incl. pinion gear (1802)
7	47-42251C12	SHAFT, man. tuning; incl. pinion gear (1803, 1807)
	26-40851E01	SHIELD, ant.
	9-42764B01	SOCKET, ant.
	* 43-41655C06	SPACER, control mtg; vol. & tuning (1801, 1802)
	* 43-41655C05	SPACER, control mtg; vol. & tuning (1803, 1807)
	41-40684E01	SPRING, bias; pinion gear
	41-40648B01	SPRING, cam; declutch bar
	41-41805A01	SPRING, pointer tension
	41-40719E01	SPRING, shaft retainer (1802)
	46-565414	STUD, trimount; escutcheon
	46-565403	STUD, trimount; background (1801, 1802)
	*46-565412	STUD, trimount; background (1803, 1804)
8	*77-40700E22	TUNER, AS 437 (1801)
9	*77-40700E23	TUNER, AS 438 (1802)
10	*77-40700E24	TUNER, AS 439 (1803, 1807)
	42-10219A10	WASHER, "C" pointer retainer
	42-10113A07	WASHER, "E" ring; clutch shaft
	42-10219A47	WASHER, "C" clutch shaft (in some sets) (1803, 1807)

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6. ALIGNMENT PROCEDURES

6.1 . Required Meter

10.7 MHz SWEEP GENERATOR
FM SIGNAL GENERATOR
AM SIGNAL GENERATOR
OSCILLOSCOPE
CIRCUIT TESTER
ALIGNMENT DRIVER

6.2 Caution of Adjustment

- For turning the screw core of the oscillation transformer and intermediate frequency transformer, use of the driver made of bakelite stick is recommended for avoiding aberration due to adjusting.
- The output of the signal generator shall be kept within the lowest level sufficient to read the output indication.

6.3 Procedure of Adjustment

FM Section

Procedure	Circuit	Generator and Oscilloscope Coupling	Generator frequency	Dial Setting	Adjust	Remarks
1	IF Circuit	Fig. 4	10.7 MHz	Point of non-interference	T_3	Center frequency is decided of ceramic filter. If the phase is delayed, adjust the wave for amplitude and symmetry. Adjust the height by VR 1.
2					T_2	
3					T_1	
4					Repeat procedures 1 – 4	
5	Detection circuit	Fig. 5	10.7 MHz	Point of non-interference	VR_2	Adjust VR_2, T_4 to make the linear part of the S curve sharp and the wave from large.
6					T_4	
7					Repeat procedures 5 – 6	
9	Oscillation circuit	Fig. 6 Fig. 7	87.0 MHz 109.0 MHz	Low freq. end stop. High freq. end stop.	VC_3	Select the receiving frequency range from 87.5 MHz low to 108 MHz high.
10	RF circuit	Fig. 6 Fig. 7	98 MHz	Tuned to signal	VC_2 VC_1	Adjust VC_1, VC_2 to get the maximum voltage.

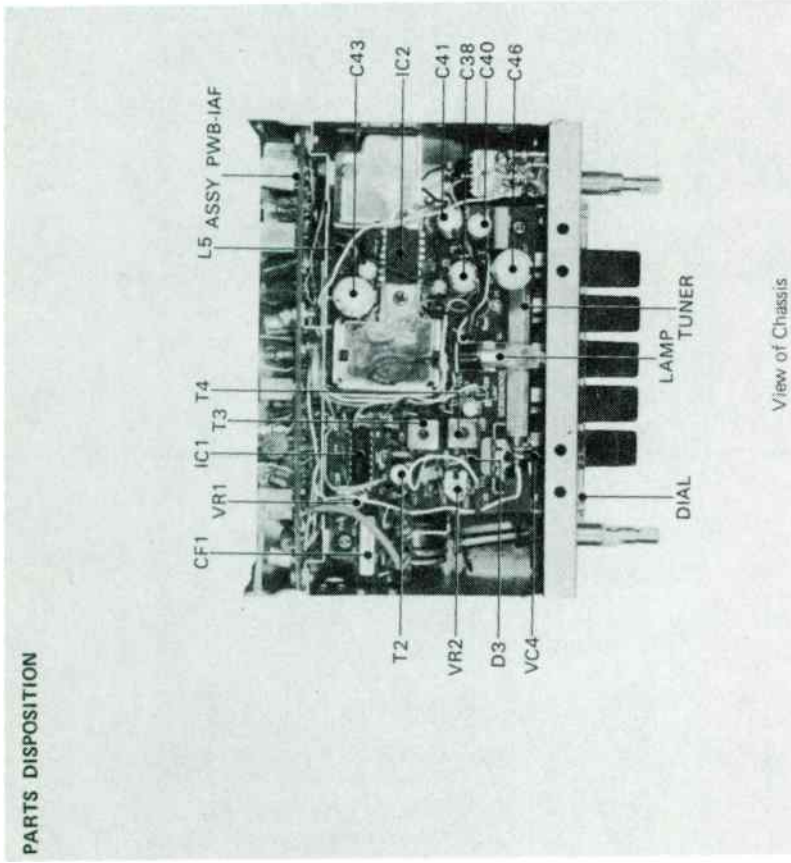
Center frequency of ceramic filter

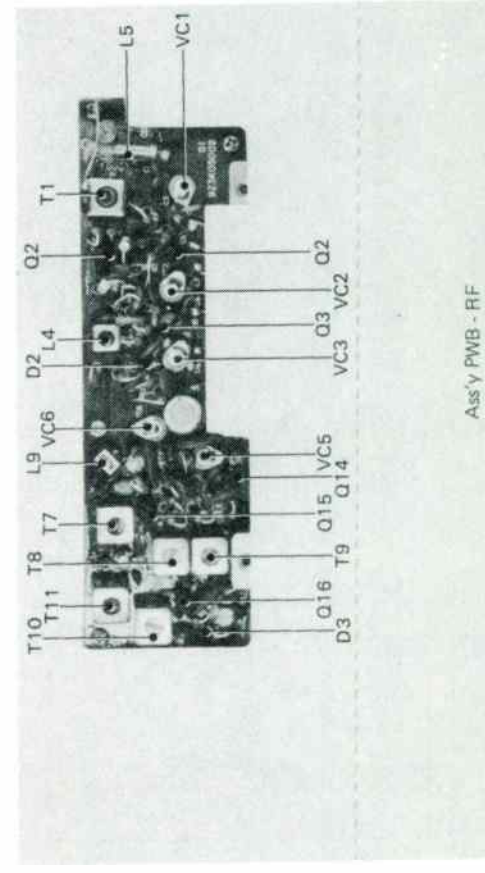
Color	Center frequency
Red	10.70 ± 0.03 MHz
Black	10.64 ± "
White	10.76 ± "
Orange	10.73 ± "
Blue	10.67 ± "

AM Section

Proçe-dures	Circuit	Signal generator connection	Signal generator frequency	Radio dial setting	Indicator con-nection	Adjust	Remarks
1	IF circuit	Fig. 8	450 KHz (400 Hz Mod.)	Point of noninterference near 1600 KHz	Output meter across Voice Coil	T_{11}, T_{10}	Try to equalize the degree of diminution near ±3 KHz.
2						T_9, T_8	
3						Repeat procedures 1 – 2	
4	Oscillation circuit and RF circuit	Fig. 9	1630 KHz	High freq. end stop	,,	VC_6	
5			510 KHz	Low freq. end stop	,,	T_7	
6					,,	Repeat procedures 2 – 3	
7			1400 KHz	1400 KHz		VC_4 VC_5	Adjust VC_4, VC_5 and get the maximum voltage of the output.
8			600 KHz	600 KHz	,,	T_7	Turn T_7 gradually and find the maximum sen-sitivity near 600 KHz.
9			1400 KHz	1400 KHz	,,	VC_6	When the receiving frequency has changed because of adjusting 8, adjust VC_6 to correct.
10					,,	Repeat procedures 7 – 9	Check the range of the frequency of the received wave. This is the end of the adjustment.

PARTS DISPOSITION





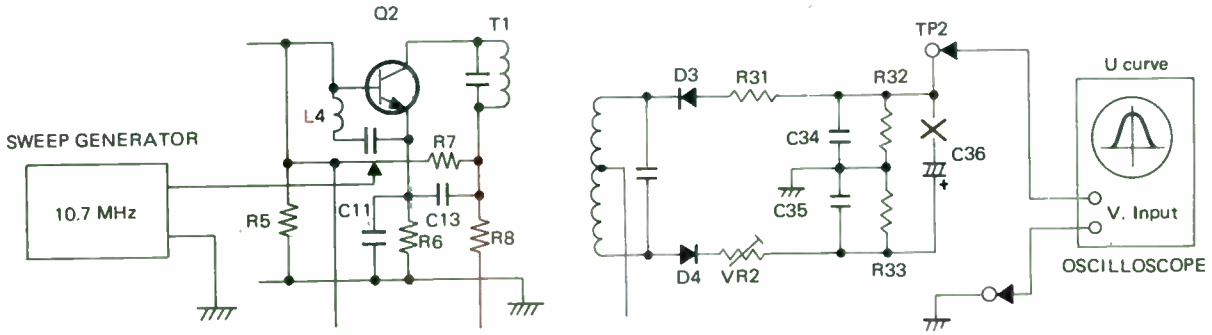


Fig. 4

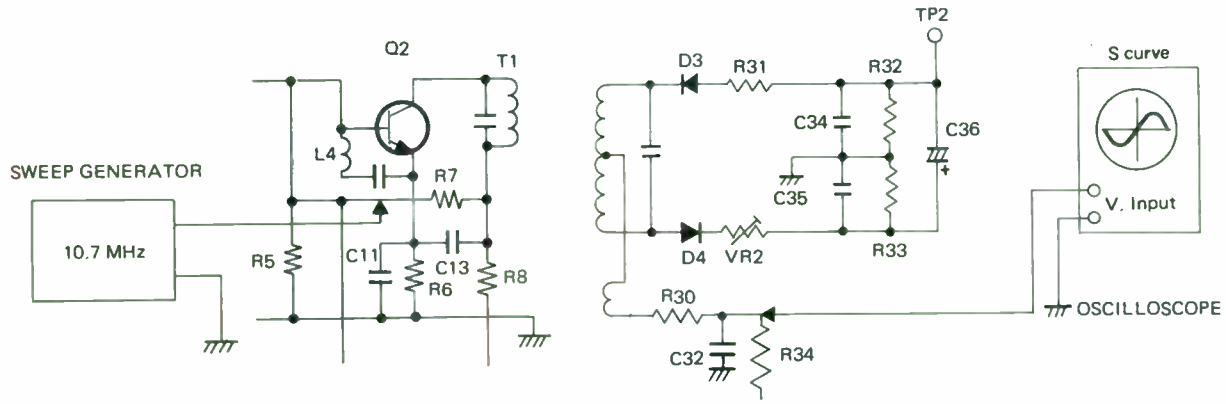


Fig. 5

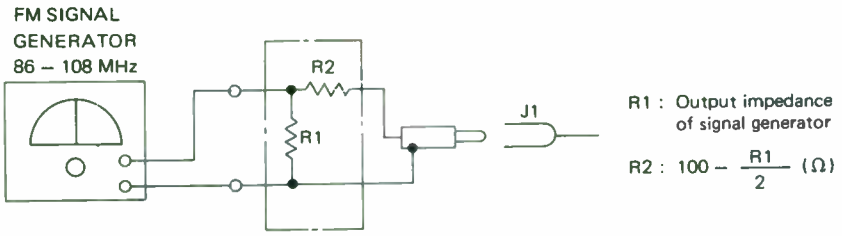


Fig. 6

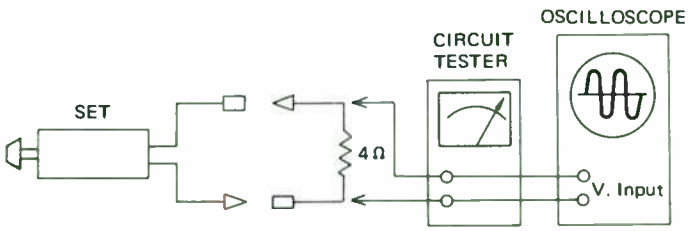


Fig. 7

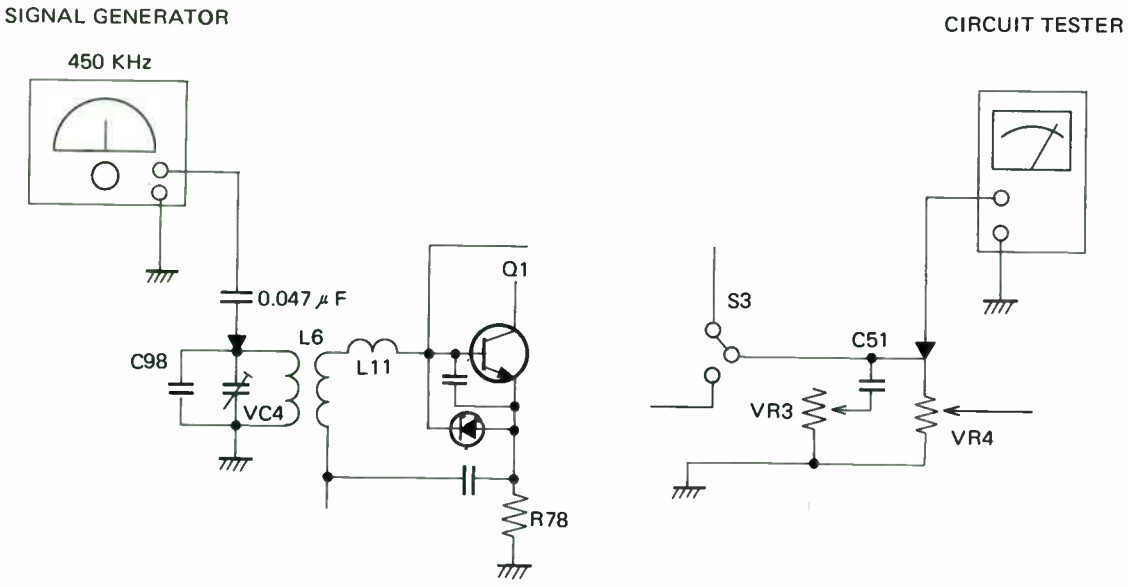
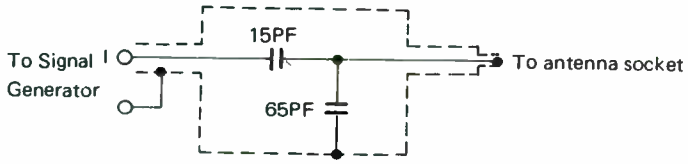
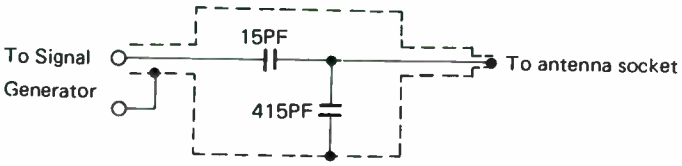


Fig. 8



For Pole Antenna



For Lid Antenna

Fig. 9

Trouble	Circuit	Causes	Repair
No sound at all	Power source circuit	· Fuse open · Coil L10 open · Switch S_1 on volume control damaged · C_{47}, C_{48} short	· Replace · Replace or soldering · " · "
	AF circuit	· Voice coil of speaker open · CP_2 short · C_{44} open · IC_2 open or short · C_{38} open · Volume control VR_4 damaged	· Replace or soldering · Replace · " · " · " · "
	RF, IF circuit and Detection circuit	FM · Transistor Q_1, Q_2, Q_4 and IC_1 open or short · IFT, $T_1 - T_3$ open or short · Coil L_1, L_2, L_3 open or short · Bias resistance open · R_{28}, R_{29} open · C_1, C_3, C_5, C_9 open · C_{34}, C_{35}, C_{36} short · CF_1 CF_2 open · D_1 short	· Replace · " · " · " · " · " · " · " · "
		MW · Transistor $Q_{14} - Q_{16}$ open or short · IFT $T_8 - T_{11}$ open or short · Coil L_6, L_7, L_8, L_9, L_{11} open · C_{75}, C_{77}, C_{72} open · Diode D_{14} open · C_{87}, C_{88} short · R_{88} open	· Replace · " · " · " · " · " · "
Low sound and low sensitivity	AF circuit	· IC_2 deteriorated · C_{52}, C_{57}, C_{58} capacity decreasing · Bias resistance varying	· Replace · " · "
	RF, IF circuit and detection circuit	FM · Q_2, Q_3 and IC_1 deteriorated · Diode D_3, D_4 deteriorated · Radio frequency off · U curve off · Capacitor inserted in IFT open · C_{11} capacity varying	· Replace · " · Readjust · " · Replace · "
		MW · Transistor $Q_{14} - Q_{16}$ weak · Diode D_{13} weak · Capacitor in IFT open · C_{72}, C_{73}, C_{84} capacity varying · Bias resistance varying	· Replace · " · " · " · "

Trouble	Circuit	Causes	Repair
Distorted sound	AF circuit	· IC_2 damaged · R_{36} open	· Replace · "
	RF, IF circuit Detection and AGC circuit	FM · Tuning improper · S curve off · U curve off	· Recover tuning · Readjust · "
		MW · Diode D_{13} weak · R_{77}, R_{83} resistance varying or open	· Replace · "
Oscillatory case	AF circuit	· C_{63}, C_{64} capacity decreasing	· Replace
	RF and IF circuit	MW · C_{70}, C_{82} open	· Replace
Tuning difficulty	AFC circuit	FM · Diode D_2 open · R_{14}, R_{15} open	· Replace · "
	IF circuit	FM · S curve off · U curve off	· Readjust · "

11. PARTS LIST

In order to expedite delivery of replacement part orders.

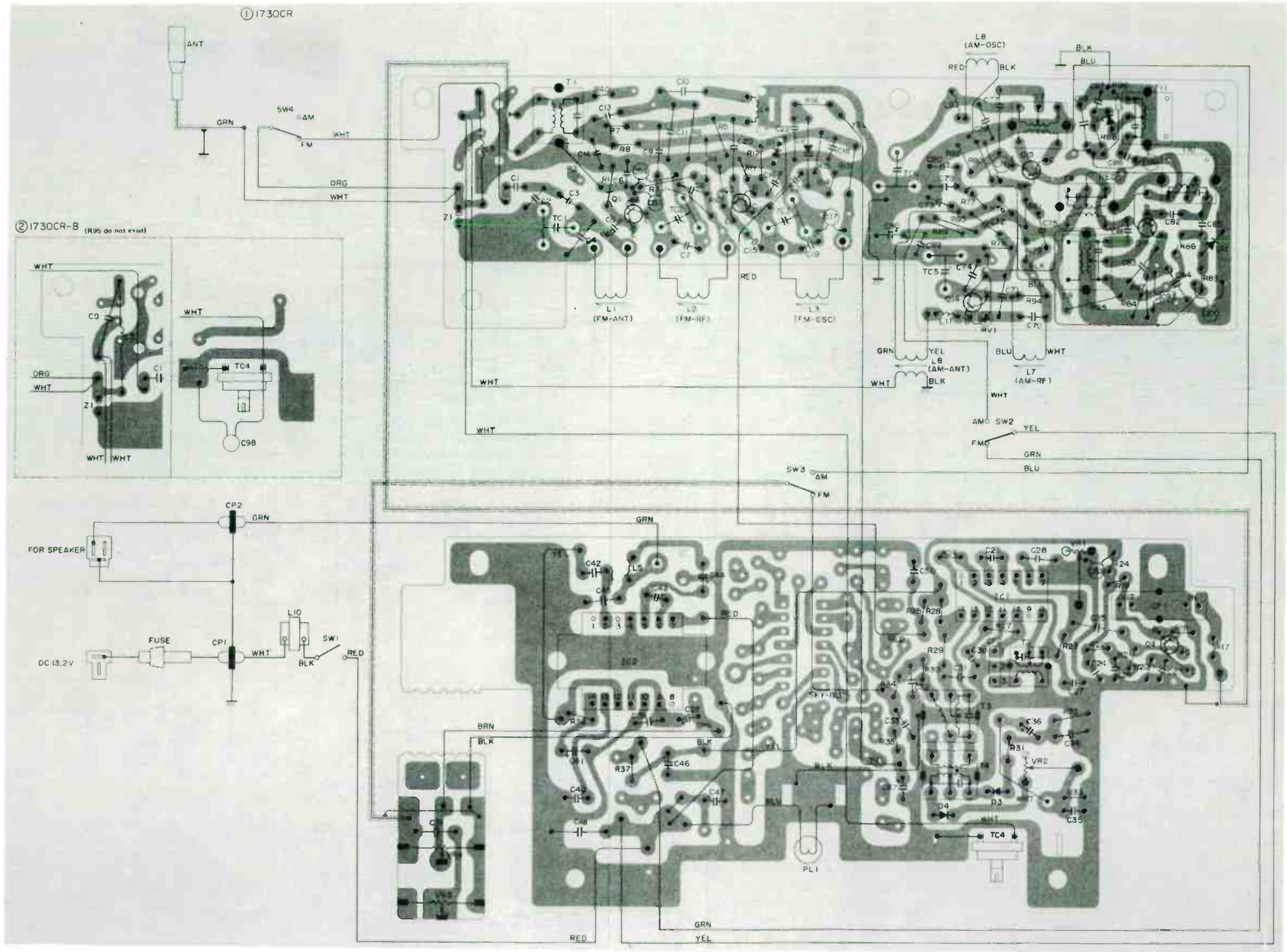
Unless full information is supplied, delay in processing of orders will result.

Specify: 1. Model number

2. Part number and description

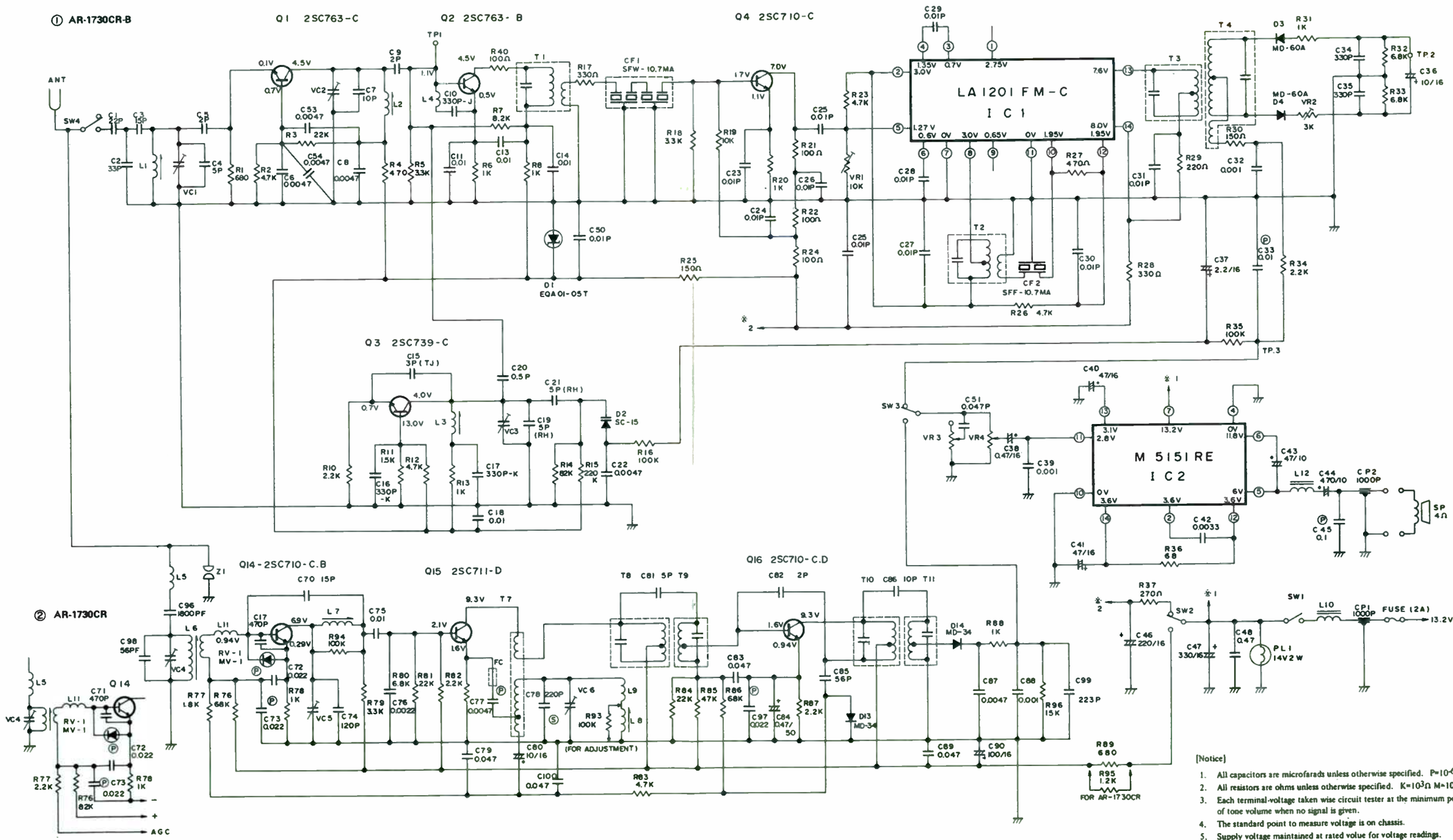
3. Quantity

Symbol No.	Part No.	Description	Remarks
		CAPACITORS	
C 1	154 P02200	22PF ±5%	Ceramic
2	154 P02204	33PF ±5%	"
3	154 P02106	15PF ±5%	"
4	154 P02007	5PF ±0.5PF	"
5	154 P02004	2PF ±0.5PF	"
6	*	0.0047μF $^{+100}_{0}$%	"
7	154 P02509	10PF ±1PF	"
8	*	0.0047μF $^{+100}_{0}$%	"
9	154 P02004	2PF ±0.5PF	"
10	154 P02408	330PF ±5%	"
11	*	0.01μF $^{+100}_{0}$%	"
13	*	"	"
14	*	"	"
15	154 P13005	3PF ±0.25PF-TJ	"
16	154 P02707	330PF ±10%	"
17	"	"	"
18	*	0.01μF $^{+100}_{0}$%	"
19	154 P14505	5PF ±0.5PF-RH	"
20	154 D01009	0.5PF ±0.5PF	"
21	154 P14505	5PF ±0.5PF-RH	"
22	*	0.0047μF $^{+100}_{0}$%	"
23–31	*	0.01μF $^{+100}_{0}$%	"
32	*	0.001μF $^{+100}_{0}$%	"
33	*	0.01μF ±10%	Polyester
34	154 P02408	330PF ±5%	Ceramic
35	"	"	"
36	181 P06709	10μF/16WV	Electrolytic
37	181 P06200	2.2μF/16WV	"
38	181 P06600	0.47μF/16WV	"
39	*	0.001μF $^{+100}_{0}$%	Ceramic
40	181 P06206	47μF/16WV	Electrolytic
41	"	"	"
42	*	0.0033μF ±20%	Ceramic
43	181 P06009	47μF/10WV	Electrolytic
44	181 L01102	470μF/10WV	Electrolytic
45	172 P01403	0.1μF ±20%	Polyester
46	181 L01206	220μF/16WV	Electrolytic
47	181 L01204	330μF/16WV	"
48	181 P00801	0.47μF	ML
50	*	0.01μF $^{+100}_{0}$%	Ceramic
51	*	0.047μF $^{+100}_{0}$%	"
52	*	0.01μF $^{+100}_{0}$%	"
53	*	0.0047μF $^{+100}_{0}$%	"
70	154 P02106	15PF ±5%	"
71	*	470PF ±10%	"
72, 73	*	0.022μF ±20%	Polyester
74	154 P01004	140PF ±5% SL	Ceramic
75	*	0.01μF $^{+100}_{0}$%	"
76	*	0.0022μF ±20%	"
77	*	0.0047μF ±10%	"
78	172 P06001	220PF ±5%	"
79	*	0.047μF $^{+100}_{0}$%	"
80	181 P06709	10μF/16WV	Electrolytic
81	154 P02007	5PF ±0.5PF	Ceramic
82	154 P02004	2PF ±0.5PF	"
83	*	0.47μF $^{+100}_{0}$%	"
84	181 P06600	0.47μF/50WV	Electrolytic
85	154 P02608	56PF ±10%	Ceramic
86	154 P02509	10PF ±1PF	"
87	*	0.0047μF $^{+100}_{0}$%	"
88	*	0.001μF $^{+100}_{0}$%	"
89	*	0.047μF $^{+100}_{0}$%	"
90	181 L01202	100μF/16WV	Electrolytic
96	189 D01907	1800PF ±5%	Styrol
97	*	0.022μF ±20%	Polyester
98	154 P02608	56PF ±10%	Ceramic
CP1, 2	141 P02001	1000PF	Ceramic (Lead through type)



Chrysler by Mitsubishi
***Dodge Colt** AR-1730CR,CR-B*

AR-1730 CR/CRB SCHEMATIC DIAGRAM



[Notice]

1. All capacitors are microfarads unless otherwise specified. P=10-6μF
2. All resistors are ohms unless otherwise specified. K=10³Ω M=10⁶Ω
3. Each terminal-voltage taken wise circuit tester at the minimum position. of tone volume when no signal is given.
4. The standard point to measure voltage is on chassis.
5. Supply voltage maintained at rated volue for voltage readings.
6. Capacitors Ⓢ mark · · · · STYROL CAPACITOR
7. Capacitors Ⓟ mark · · · · POLYESTER FILM CAPACITOR
8. Capacitors ML mark · · · · POLYPROPILENE FILM CAPACITOR
9. S1 a radio power switch.
10. S2~4 are FM, AM change-over switchs.

Symbol No.	Part No.	Description	Remarks
VC1–3	202 P10402	10PF	Trimmer
4	202 L00201	60PF	"
5, 6	202 P10401	50PF	"
	RESISTORS		
R 1	•	680 ±10% 1/4W	Carbon
2	•	4.7K " "	"
3	•	22K " "	"
4	•	470 " "	"
5	•	3.3K " "	"
6	•	1K " "	"
7	•	8.2K " "	"
8	•	1K " "	"
10	•	2.2K " "	"
11	•	1.5K " "	"
12	•	4.7K " "	"
13	•	1K " "	"
14	•	82K " "	"
15	•	220K " "	"
16	•	100K " "	"
17	•	330 " "	"
18	•	3.3K " "	"
19	•	10K " "	"
20	•	1K " "	"
21	•	100 " "	"
22	•	" " "	"
23	•	4.7K " "	"
24	•	100 " "	"
25	•	150 " "	"
26	•	4.7K " "	"
27	•	470 " "	"
28	•	330 " "	"
29	•	220 " "	"
30	•	150 " "	"
31	•	1K " "	"
32	•	6.8K " "	"
33	•	" " "	"
34	•	2.2K " "	"
35	•	100K " "	"
36	•	68 " "	"
37	•	270 " "	"
76	•	68K " "	" (CR-B)
"	•	82K " "	" (CR)
77	•	1.8K " "	" (CR-B)
77	•	2.2K ±10% 1/4W	Carbon (CR)
78	•	1K " "	"
79	•	3.3K " "	"
80	•	6.8K " "	"
81	•	22K " "	"
82	•	2.2K " "	"
83	•	4.7K " "	"
84	•	22K " "	"
85	•	47K " "	"
86	•	68K " "	"
87	•	2.2K " "	"
88	•	1K " "	"
89	•	680 " "	"
90	•	3.3K " "	"
93	•	100K " "	"
94	•	100K " "	"
95	•	1.2K " "	"
VR 1	127M02101	10K	Semifixed resistor
2	127M02103	3K	"
3,4	122 C13005	30K -A	Variable resistor
	IC, TRANSISTORS, DIODES AND VARISTORS		
IC 1	266 P30402	LA1201FM-C	FM IF Amplifier
2	266 P30801	M5151RE	Power Amplifier
Q 1	260 P17603	2SC 763-C	FM RF Amplifier
2	260 P17602	2SC 763-B	FM Mixer
3	260 P10403	2SC 739-C	FM Oscillater
4	260 P17103	2SC 710-C	FM IF Amplifier
14	260 P17101	2SC 710-BC	AM RF Amplifier
15	260 P17503	2SC 711-D	AM Converter
16	260 P17102	2SC 710-CD	AM IF Amplifier
D 1	264 P11001	EQA01-05T	For stability of voltage
2	264 P07501	SC - 15	A.F.C
3,4	264 P03802	MD - 60A	Detector
13,14	264 P00401	MD - 34	"
RV 1	265 P03301	MV - 1	Temperature Compensation
	COILS, TRANSFORMERS AND FILTER		
L1–3,6–8	295 K02901		Tuner (CR)
"	295 K02902		" (CR-B)
4	320 D04601		Trap Coil

Symbol No.	Part No.	Description	Remarks
5	351M00201		Choke Coil
9	351D02103		Oscillation Coil
10	351 P00106		Power Supply Choke Coil
11	321 P00106		RF Choke Coil
12	351M00201		Choke Coil
T 1	374D02402		FM IF Transformer
2	374 L00202		"
3	374 C00401		"
4	374 C00402		"
7	373D03502		AM Osillation Transformer
8	374 C00105		AM IF Transformer
9	374 C00102		"
10	374 C00105		"
11	374D02106		"
CF 1,2	296M00102	10.7 MHz	Ceramic Filter

Symbol No.	Part No.	Description	Remarks
	OTHERS		
	283 P00102	2A	Fuse
	253D00301		Lamp
	704D91802		Knob - A
	704M01902		" - B
	707 L03101		Dial (CR, CR-B)
	923K12502		Assy PWB-RF(CR)
	923K12501		" (CR-B)
	923K12401		Assy PWB-IAF(CR, CR-B)
	242 L02704		Speaker lead (Attached set)
	242 L07504		Power supply lead (Attached set)

Notice: * Part available in local areas.

Pages 23-28 Courtesy of CRAIG CORP.

ALIGNMENT PROCEDURES

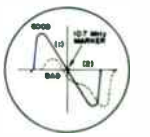
Alignment is performed at factory with laboratory test equipment. Therefore, before alignment is attempted, the unit should be thoroughly checked for circuit trouble.

EQUIPMENT REQUIRED:

1/ Power Supply (14V DC)
2/ V.T.V.M.
3/ AM Signal Generator
4/ FM Signal Generator
5/ Sweep Generator (455kHz-10.7MHz)
6/ Oscilloscope
7/ FM Stereo Modulator
8/ Digital Frequency Counter

NOTES:

- Non-Metalic tools should be used.
- Keep Generator signal level as low as possible to avoid clipping.
- Volume Control should be set to minimum.
- Tone Control should be set to maximum treble.
- Standard modulation is 400Hz at 30% amplitude for AM and 1kHz at 22.5kHz deviation for FM.

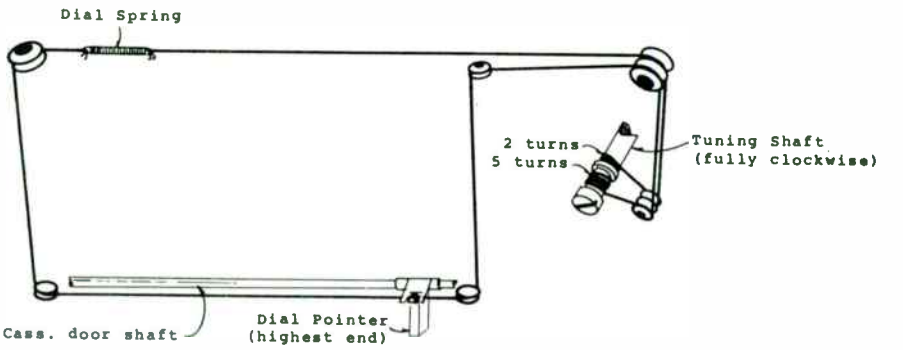
STEP	ADJUSTING CIRCUIT	CONNECTIONS INPUT	CONNECTIONS OUTPUT	FREQ'CY	DIAL SETTING	ADJUST	ADJUST FOR
AM							
1	IF	Connect Sweep - Generator to ANT. receptacle.	Connect VTVM to speakers terminals of either channel	262.5MHz	LOW END	T601 T602	Maximum reading on VTVM
2	COVERAGE	Connect AM Signal Generator to ANT. receptacle.		505kHz	LOW END	C610	Maximum reading on VTVM.
				1650kHz	HIGH END	L606	
3	Repeat step 2 at 505kHz and 1650kHz alternately.						
4	TRACKING	Connect AM Signal Generator to ANT. receptacle.	Connect VTVM to speaker terminals of either channel	1400kHz	1400kHz	C602 C604	Maximum reading on VTVM.
FM							
1	RF	Connect FM Signal Generator to ANT. receptacle.	Connect VTVM to speaker terminals of either channel	108MHz (Mod.)	HIGH END	C403	Maximum reading on VTVM.
2	IF	Connect Sweep Gen. to TP Ⓐ & ground to chassis.	Connect Scope to TP Ⓑ & ground to chassis.	10.7MHz (Mod.)	LOW END	T401	
NOTE: The 10.7MHz marker need not be in center position of Scope wave form.							
3	OSC	Connect FM Signal Generator to ANT. receptacle.	Connect VTVM to speaker terminals of either channel	109MHz (Mod.)	HIGH END	C419	Maximum reading on VTVM.
MPX							

A/ Connect a Digital Frequency Counter to TP Ⓒ (pin #12 IC502) then adjust R526 (SVR) for a reading of 19kHz.

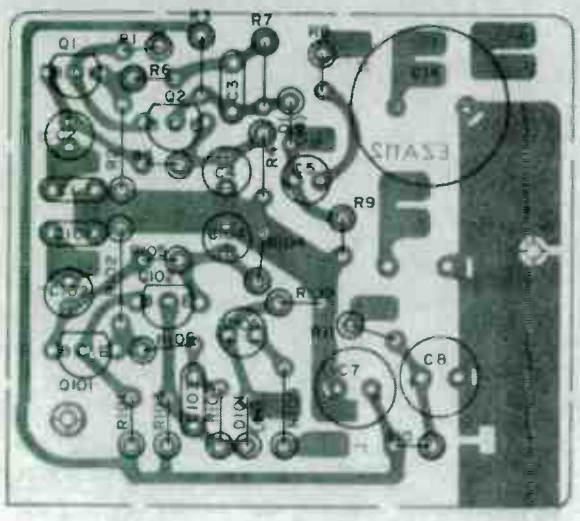
B/ Connect FM Signal Generator and Signal Modulator to Antenna receptacle. Set Stereo Modulator to 7.5kHz deviation (10%) for pilot signal (19kHz) and 65.5kHz deviation (90%) for left & right main signal. Set FM Signal Generator to 98MHz, 1uV, 75kHz deviation (100%)

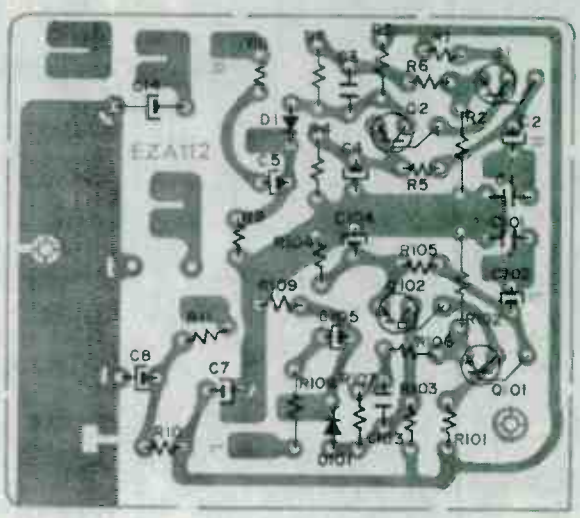
c/ Turn Mode Selector of Stereo Modulator to L or R and obtain more than 30dB of channel separation by adjusting R530 (SVR). Also confirm that stereo indicator lamp of receiver goes ON & OFF when STEREO/MONO Switch is operated.

DIAL STRING DIAGRAM

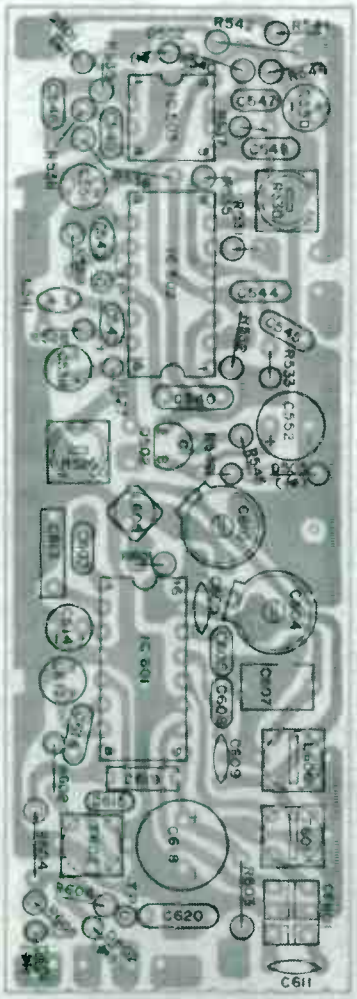


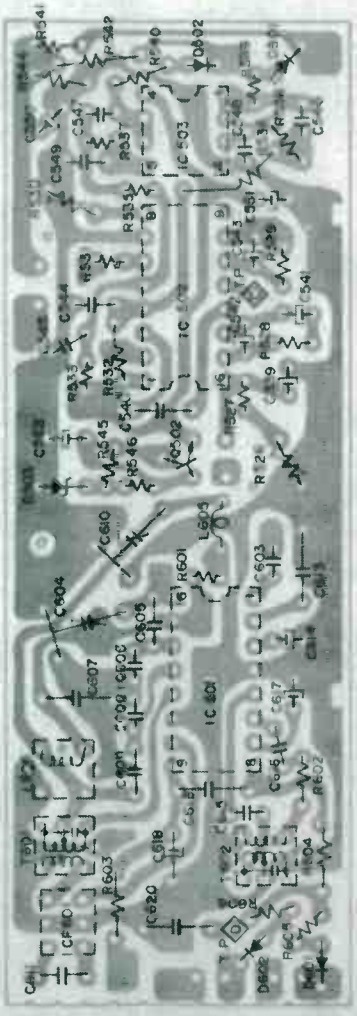
PRE-AMP. P.C.B. (Top & Bottom Views)



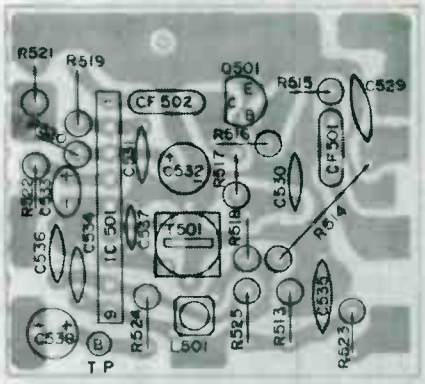


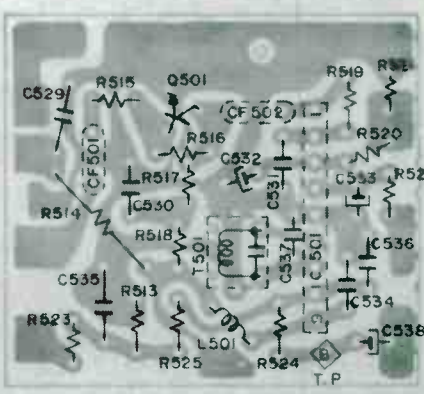
AM/RF/IF & FM/MPX P.C.B. (Top & Bottom Views)



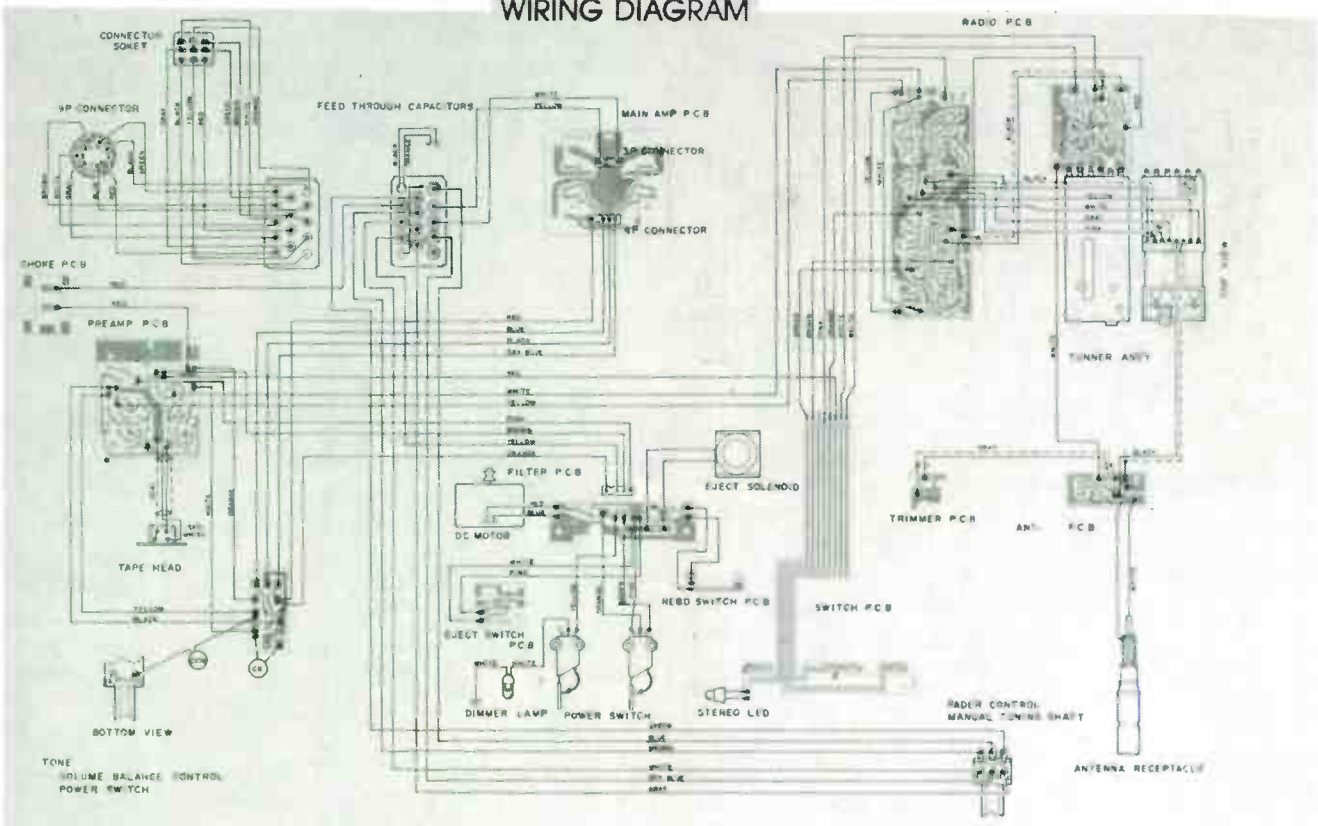


FM/IF P.C.B. (Top & Bottom Views)

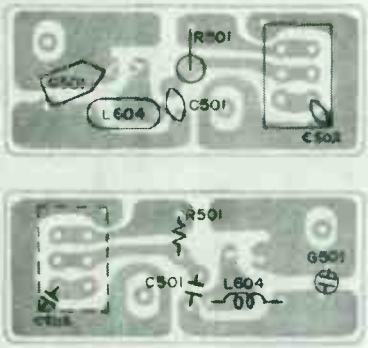




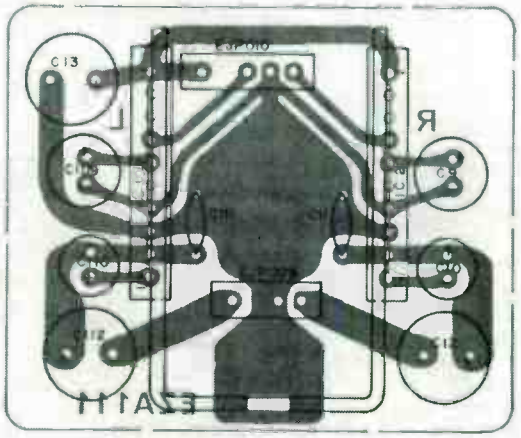
WIRING DIAGRAM



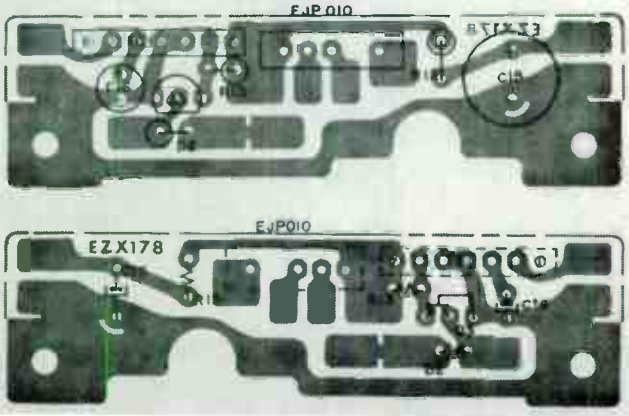
ANTENNA P.C.B.
(Top & Bottom Views)

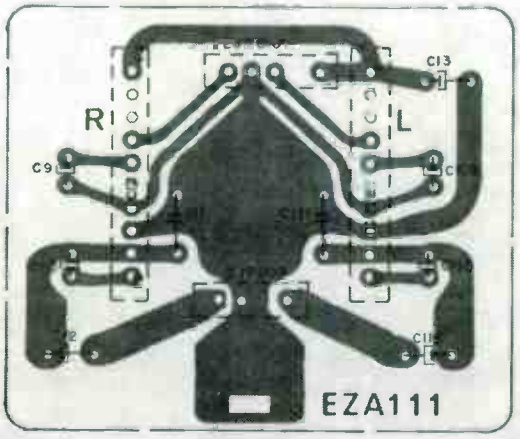


AMP. P.C.B.
(Top & Bottom Views)

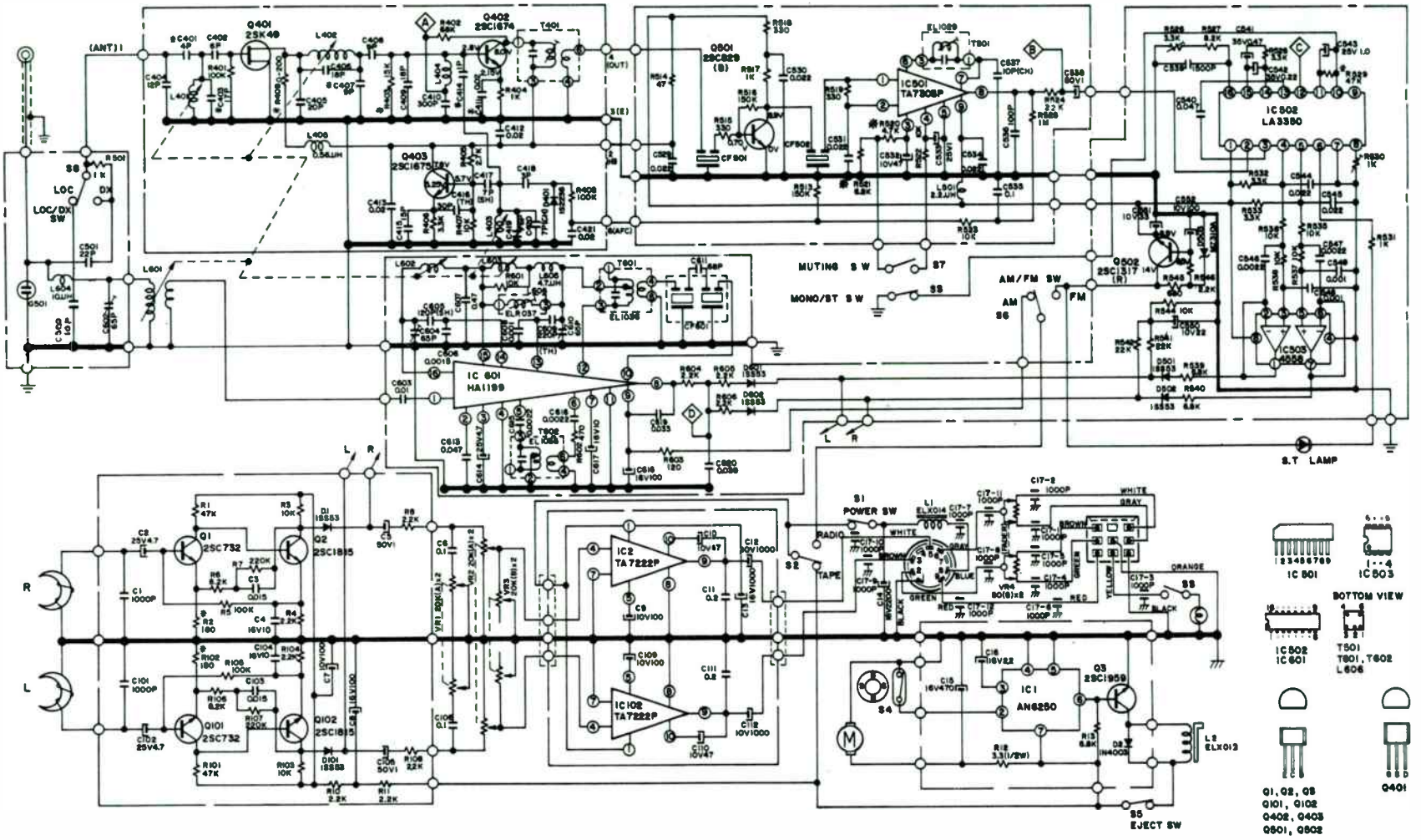


FILTERS P.C.B. (Top & Bottom Views)





SCHEMATIC DIAGRAM



NOTES

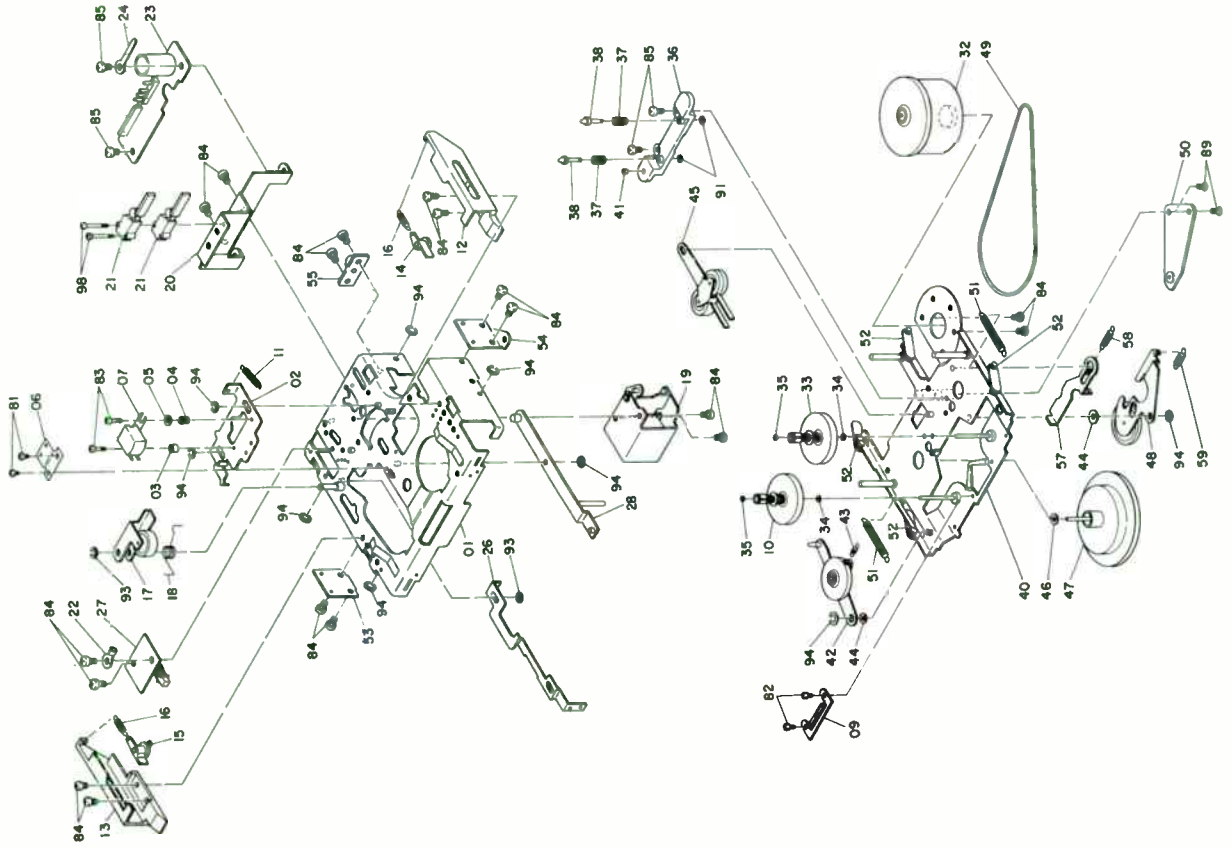
1. ALL RESISTANCE VALUES IN OHMS AND 1/4 WATTS UNLESS OTHERWISE SPECIFID.
2. ALL CAPACITANCE VALUES IN MICRO FARAD EXCEPT P FOR PICO PARAD.
3. VOLTAGES TAKE FROM GROUNDING METAL AT NO SIGNAL INPUT. (TESTER BY 20KV)
4. ※ MARKS INDICATE ADJUSTABLE IN PRODUCTION.

※ SUBJECT TO MINOR CHANGE WITHOUT NOTICE.

IC TERMINAL VOLTAGE (VOLT)

PIN NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC1	—	0.7	1.2	0	0	0.8	14									
IC 2, 102	14	—	—	0	1.8	—	0	0	7.0	13						
IC 501	1.8	1.8	0	1.1	0	3.5	3.5	4.5	8							
IC 502	8	2.6	4.6	8.7	8.7	13	0	0.3	6	1.1	2	2	1.9	2	2	2.6
IC 503	8.7	8.7	8.7	0	8.7	8.7	8.7	8								
IC 601	2.1	0.9	0.3	0	6.7	0.7	1.6	1.8	11.4	2.1	0	10.6	3.5	1.3	10.6	10.6

MECHANISM



MECHANISM

1	NSP	Ass'y, Mechanism Chassis		28	T681342	Ass'y, F.FWD Cont. Lever	1.75
2	T681266	Ass'y, Slide Head Base	1.25	32-	W150500	MOTOR (EMD013)	13.95
3	W150231	Collar, Head Mtg	.25		T681311	Pulley, Motor	.50
4	3516D54	Spr, Azimuth	.25	33	W150460	Ass'y, Clutch Reel	1.70
5	-------	Plain Wsh, M6x2.2x0.4	.25	34	-------	Poly Wsh, M5x1.6x0.25	.25
6	W150387	Holder, Slide Head Base	.40	35	-------	Poly Wsh, M3x1.2x0.25	.25
7	T681503	HEAD, (EAH011)	8.65	36	T681203	Flywheel Capstan Bearing	1.25
9	T681530	Ass'y, Reed Switch (S4)	2.10	37	W150272	Spr, Adjust Pin	.25
10	T681460	Ass'y, Clutch Reel (L)	3.55	38	W150514	Pin, Cassette Adjust	.70
11	W150275	Spr, Slide Head Base	.25	40	T681415	Ass'y, Chassis (B)	5.50
12	T603420	Cassette Guide (R)	.65	41	W150232	Collar, Flywheel Capstan	.25
13	T603421	Cassette Guide (L)	.65	42	W150260	Ass'y, Idler Arm (L)	2.25
14	W150422	Guide (R), Cass.	.35	43	T180057	Spr, Idler Arm	.25
15	W150423	Guide (L), Cass.	.35	44	-------	Poly-Wsh, M6x3.1x0.25	.25
16	T180073	Spr, Guide Return	.30	45	T681260	Ass'y, F.FWD Idler	3.55
17	W150347	Ass'y, Pinch Rcller Arm (R)	1.50	46	3516067	Wsh, Flywheel	.25
18	W150273	Spr, Pinch Roller	.25	47	T681205	FLYWHEEL	3.40
19	T681598	Ass'y, Eject Electro Magnet	6.40	48	T681261	Ass'y, Rewind Idler	1.65
20	NSP	Bkt, Switch Mtg		49	T681208	BELT	.80
21	S180094	Micro Sw., RADIO/TAPE (S2)		50	T681267	Flywheel Base	.65
		Dial Lamp (S3)	1.25	51	T681270	Spr, Mech. Chassis Return	.25
22	NSP	Lead Termianl		52	W150386	Chassis Link	.25
23-	T681516	Ass'y, FILTER PCB w/Comp.	2.85	53	NSP	Bkt, Mechanism Mtg (A)	
	T681620	4P Plug (EJP010)	.70	54	NSP	Bkt, Mechanism Mtg (B)	
24	NSP	Clamp		55	NSP	Bkt, Mechanism Mtg (C)	
26	T681341	Lever, Eject	.40	57	T681345	Lever,Rewind Idler	.40
27-	T681517	Ass'y, Eject Sw. w/PCB	2.40	58	T681271	Spr, Rewind Lever	.25
	T681531	Push Switch, Eject (S5)	2.00	59	T681272	Spr, Rewind Idler Pressure	.25

HARDWARE (25¢ each or noted)

81		Scr, PH M2x2	.25	90		Scr, BH M2.6x5	.25
82		Scr, BH M2x3	.25	91		E-Ring, M1.2	.25
83		Scr, BH M2x5	.25	92		E-Ring, M1.5	.25
84		Scr, BH M2.6x3	.25	93		E-Ring, M2.0	.25
85		Scr, BH M2.6x4	.25	94		E-Ring, M2.5	.25
86		Scr, BH M3x4	.25	96		CS-Ring, M2.0	.25
87		Scr, BH M3x6	.25	98		Scr, PH M2x13	.25
88		Scr, FH M2.6x4	.25	89		Scr, FH M2.6x6	.25

PACKAGING

REF. NO.	CRAIG KEY NO.	DESCRIPTION	MFR'S SUGG RET. PRICE
	T611001	Individual Carton	2.05
	3128054	Bkt, Perforated Mtg Strap	.40
	T681002	Styrofoam set L&R	.95
	3513400	Gasket	1.70
	S680007	Trim Plate	2.10
	T600005	Index Label, VOL/BAL/TONE	.60
	T600006	Index Label, TUNING/FADER	.60
	3149052	9P Pwr&SP Conn. (car side)	2.00
	3149004	Mtg Hardware Kit	1.15
	3148020	Knob,.TONE & FADER Cont.	.75
	3148021	Knob, VOL & TUNING	.80
	XFU005	Spare Fuse, 5A	.40

COILS, TRIMMERS & TRANSF.

L1	T610671	Choke Filter	1.80
L2	T681598	Electro Magnet, Eject	6.40
L501	W110670	Peaking Coil, 2.2uH	.45
L604	1902046	Antenna Coil, 10uH	.60
L605	W110673	RF Coil, 4.7uH (Org)	.65
L606	W110672	OSC Coil, 200uH (Red)	.95
T401	T681675	FM IFT	1.05
T501	W110642	FM IFT 10.7MHz	1.05
T601	T681674	AM IFT 455kHz (Blu)	1.40
T602	W110644	AM Detector 455kHz	1.05
C602, C604, C610	S630079	Trimmer, 65pF	1.85
R526	T681590	Semi-Fixed Res, 3.3k	.45
R530	T681591	Semi-Fixed Res, 1k	.45
CF501, CF502	T681672	Ceramic Filter, 10.7kHz	1.55

CAPACITORS

C539	Polyester, 1500pF ±5% /50V	
C606	" 0.0015uF ±10% /50V	
C1,101,548, 549,608	" 0.001uF " /50V	
C546,547,615 616	" 0.0022uF ±10% /50V	
C603	" 0.01uF ±10% /50V	
C3,103	" 0.015uF ±10% /50V	
C544,545	" 0.022uF " /50V	
C620	" 0.039 " /50V	
C540,613	" 0.047uF " /50V	
C619	" 0.33uF " /50V	
C607	" 0.47uF " /50V	
C5,105,538	Electrolytic, 1uF /50V	
C4,104,617	" 10uF /16V	
C550	" 22uF /10V	
C551	" 33uF /10V	
C10,110,532	" 47uF /10V	
C2,102,614	" 47uF /25V	
C9,7,109,552	" 100uF /10V	
C8	" 100uF /16V	
C15	" 470uF /16V	
C13	" 1000uF /16V	
C14	" 2200uF /16V	
C12,112	" 1000uF /10V	
C502,537,601	Ceramic, 10pF ±0.5pF /50V	
C501	" 22pF " /50V	
C611	" 68pF " /50V	
C536	" 100pF " /50V	
C605	" 120pF " /50V	
C609	" 220pF " /50V	
C529,530,531, 534	" 0.022uF +80-20% /50V	
C6,106,535	" 0.1uF ±20% /12V	
C11,111	" 0.2uF ±20% /12V	
C542	Tantalum, 0.22uF /35V	
C541	" 0.47uF /35V	
C533,543	" 1uF /25V	
C16	" 2.2uF /16V	
C602,604,610	Trimmer 65pF (S630079)	1.85

SEMICONDUCTORS

REF. NO.	CRAIG KEY NO.	DESCRIPTION	MFR'S SUGG RET. PRICE
Q1,101	2SC732	Transistor	1.10
Q2,102	2SC1815	Transistor	1.70
Q3	2SC1959	Transistor	1.80
Q401	2SK49	F.E.T	1.50
Q402	2SC1674	Transistor	1.35
Q403	2SC1675	Transistor	.95
Q501	2SC829	Transistor	1.85
Q502	2SC1317	Transistor	1.80
IC601	HA1199	I.C., AM	5.25
IC1	AN6250	I.C., Filter	5.25
IC2, IC102	TA7222P	I.C., AMP.	6.25
IC501	TA7303P	I.C., FM/IF	3.50
IC502	LA3350	I.C., MPX	6.80
IC503	NJM4558	I.C.,	3.85
ST	SLP119B	LED, Stereo Indicator	.95
D1,101, D501, D502, D601, D602	1SS53	Diode	.85
D503	MZ310A	Zener Diode	.75

MISCELLANEOUS ELECTRICAL

VR4	T681570	FADER Cont. w/TUNING shaft	10.25
VR1		TONE Cont., 20k x 2	
VR2		VOLUME Cont., 20k x 2	
VR3	T603570	BALANCE Cont., 20k x 2	9.95
S1		Power Switch. ON/OFF	
S2	S180094	Micro Sw., RADIO/TAPE	1.25
S3	S160094	Micro Sw., Dial Lamp	1.25
S4	T681530	Reed Sw., Auto-Eject	2.10
S5	T681531	Push Sw., Manual Eject	2.00
S6	T681533	Push Sw., AM/FM	2.65
S7	T681533	Push Sw., MUTE	2.65
S8	T681532	Push Sw., LOC/DX	2.30
S9	T681533	Push Sw., MONO/ST	2.65
PL	T681550	Pilot Lamp, Dial Scale, 14V	1.30
G501	W110550	Neon Lamp	.70
	3149052	9P Pwr/SP Conn. (car side)	2.00
	3149005	9P Pwr/SP Conn. (unit side)	2.00
	W110608	Ass'y, 9P Pwrplay Adaptor	4.75
	3516044	9P Dummy Plug	1.35
	T611620	3P Plug (EJP009)	.85
	T681620	4P Plug (EJP010)	.85
	T681607	Ass'y, 4P Conn., Filter PCB	1.55
	T611606	Ass'y, 3P Conn., Amp. PCB	1.50
	T611607	Ass'y, 4P Conn., Amp. PCB	1.55

RESISTORS (25¢ each or noted)

R12	3.3 ohm ±5%, ¼W	
R514	47 ohm " , ¼W	
R603	120 ohm " "	
R2,102	180 ohm " "	
R515,518,519	330 ohm " "	
R602	470 ohm " "	
R545	680 ohm " "	
R501	1k ohm ±5% 1/10W	
R517,531	1k ohm " ¼W	
R4,8,10,11, 104,108,546 604,605,606	2.2k ohm ±5%, ¼W	
R528,532,533	3.3k ohm " "	
R520	4.7k " " "	
R13,521,539, 540	6.8k ohm ±5%, ¼W	
R6,106,527	8.2k " " "	
R3,14,103, 522,523,536 537,538,544 601,691	10k ohm ±5%, ¼W	
R524,541,542	22k " " "	
R1,101,529	47k " " "	
R5,105	100k ohm ±5%, ¼W	
R513,516	150k " " "	
R7,107	220k " " "	
R525	1M " " "	
R526 (T681590)	Semi-Fixed Res, 3.3k	
R530 (T681591)	Semi-Fixed Res, 1k	

ALIGNMENT INFORMATION

FM ALIGNMENT

AM-FM STEREO MODEL D8TF

EQUIPMENT

1. Power Supply—Hewlett Packard 6285A or equivalent.
2. A-C VTVM—Hewlett Packard 400H or equivalent.
3. FM Generator—Boonton 202H or equivalent.
4. Oscilloscope—Tektronix 504 or equivalent.
5. RF Voltmeter or Detector Probe (See diagram A for information on building an RF detector probe.)
6. Varactor supply voltage from AM tuner panel.

SERVICE NOTES

Before proceeding with the FM alignment, read the Service Notes and follow preliminary information steps 1 through 3 under VARACTOR POWER SUPPLY ALIGNMENT to determine whether the varactor voltages are within acceptacle limits.
Use a VTVM with an input impedance of 1 megohm or greater for voltage measurements.
A wiring harness as shown in Figure 5-23 can be used when performing FM alignment.

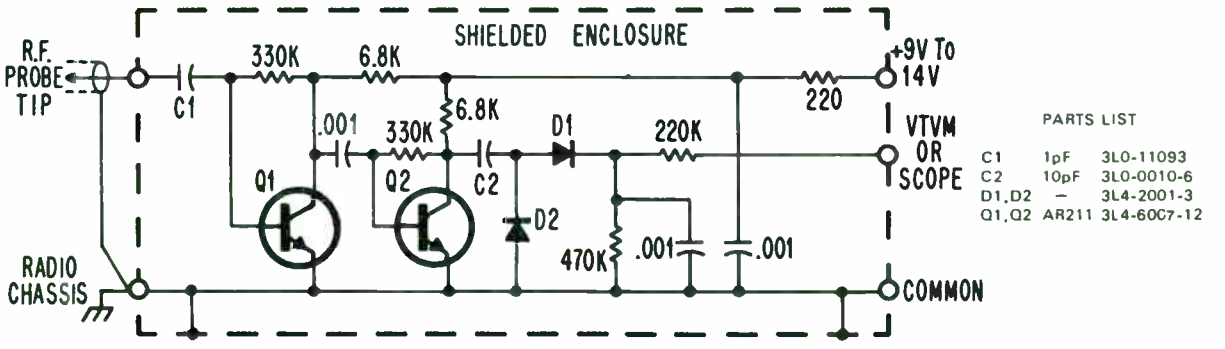
PRELIMINARY INFORMATION

1. Connect RF signal generator through dummy antenna to antenna input jack J401. (Refer to Diagram C for dummy antenna configuration.) Use 22.5 KHz modulated signal at frequency indicated in complete FM alignment procedure (except where otherwise indicated), and keep generator output at 1 millivolt for entire procedure.
2. Use test point J205 or P305 for indication of FM audio output.

PARTIAL FM ALIGNMENT PROCEDURE FOLLOWING PARTS REPLACEMENT

When replacing a component on the FM tuner panel, alignment should be performed only on the component replaced. The procedure in each case is shown in simplified chart form below.

PART REPLACED	GENERATOR SETTING	ADJUSTMENT FOR MAX. OUTPUT
L206	88MHz	L206
C231	108MHz	C231
C203, C209, C210	104MHz	Only the capacitor or capacitors replaced
L201, L203	92MHz	Only the coil or coils replaced
VRAC202	108MHz	C231
	88MHz	L206
VRAC201 VRAC203 VRAC204	104MHz	The associated capacitor (C203, C209 or C210)
	92MHz	The associated coil (L201 or L203)
T202 FM DETECTOR TRANSFORMER	Follow procedure as explained in step 15 of COMPLETE FM ALIGNMENT procedure.	



PARTS LIST

C1	1pF	3L0-11093
C2	10pF	3L0-0010-6
D1,D2	—	3L4-2001-3
Q1,Q2	AR211	3L4-6007-12

DIAGRAM A. RF DETECTOR PROBE SCHEMATIC

COMPLETE FM ALIGNMENT PROCEDURE

STEP	PROCEDURE
1	Connect VTVM or scope to test point J205 or P305 for indication of FM audio output.
2	Set gain adjust control VR203 for max. gain indication on scope or meter.
3	With no signal input, set AGC adjust control VR202 for 1.8 to 2.0 VDC on VTVM at base of FM RF amplifier Q201.
4	Apply 1.8 to 2.0 VDC from low impedance source (50 ohms or less) to base of Q201 to defeat AGC.
5	Connect RF voltmeter or scope to input (pin 4) of IC202 (junction of FL202 and R224). (If RF voltmeter is not available, use detector probe suggested in Diagram A.)
6	Pull out high end pushbutton to unlock. Manually tune radio to 108 MHz for varactor tuning voltage into FM panel (J203) of +6.5 VDC on VTVM. Push the button in to lock-in voltage setting.
7	Set generator to 108MHz.
8	Adjust oscillator trimmer C231, antenna trimmer C203, and RF trimmers C209 and C210 for max. output on scope or meter. Adjust generator output as needed to prevent limiting in IC201.
9	Pull out low end pushbutton to unlock. Manually tune radio to 88 MHz for varactor tuning voltage of 0.75 VDC on VTVM. Push the button in to lock-in voltage setting.
10	Set generator to 88MHz.
11	Adjust oscillator coil L206, antenna coil L201, and RF coil L203 for max. output on scope or meter.
12	Repeat steps 6 and 7. If output reading on scope or meter is within 1 dB of max. output, no further tuning is required. If output reading is not within limit specified, repeat steps 7 through 11 until output is within the limit.
13	Tune radio to 98 MHz. Set generator to 98 MHz, 75 KHz modulation, and 1 millivolt output. Record audio output level.
14	Reduce generator input level to zero. Adjust VR203 so that noise level is 25 to 31 dB below recorded audio level.
15	Align FM detector as follows: a. Ground AFC line at junction of R217, R223, C225, and C250. b. Adjust generator frequency for max. output at pin 4 of IC202. c. Set generator to 75KHz deviation, 400Hz modulated signal at 1 millivolt output. d. Adjust FM detector transformer T202 for max. output on scope or meter. e. Adjust generator frequency for min. distortion in output indication. f. At null point, readjust T202 for max. output on scope or meter.

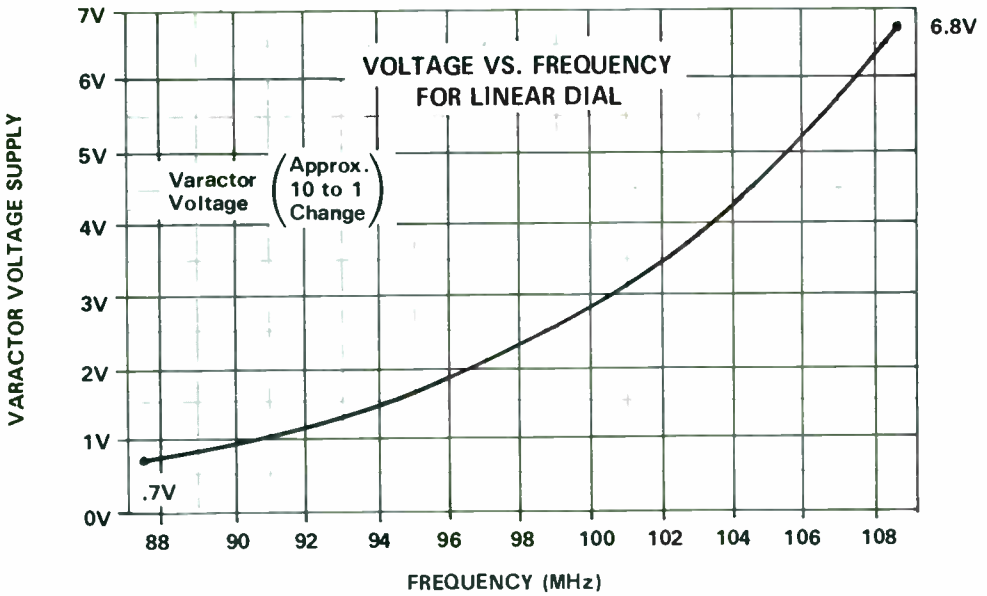


DIAGRAM B. FM VOLTAGE TUNING CHART

VARACTOR POWER SUPPLY ALIGNMENT
AM-FM STEREO MODEL 08TF

SERVICE NOTES

Follow preliminary information steps 1 through 3 below to determine whether the varactor power supply on the AM tuner panel requires complete alignment.

The external test point and adjustment locations in Diagram E (Troubleshooting Procedures) can be used during this procedure.

The FM voltage tuning chart in Diagram B can be used as a visual aid to determine whether complete alignment is required. A wiring harness as shown in Figure 5-23 can be used when aligning the varactor power supply.

PRELIMINARY INFORMATION

1. Connect +14 VDC output from power supply to A+ cable lead, and negative lead of power supply to radio chassis.
2. Set AM-FM mode switch for FM operation.
3. To determine whether varactor power supply alignment is necessary, use VTVM to measure VRAC tuning voltage at J303 under conditions listed below. (If any voltage measured is not within limits specified, proceed with COMPLETE VARACTOR ALIGNMENT procedure.)
   a. Dial pointer set to extreme high end (at stop)—output on VTVM should be 6.7 to 6.9 VDC.
   b. Dial pointer set to 94 MHz—output on VTVM should be 1.4 to 1.6 VDC.
   c. Dial pointer set to extreme low end (at stop)—output on VTVM should be below 0.72 VDC.

COMPLETE VARACTOR ALIGNMENT PROCEDURE

STEP	PROCEDURE
1	Disassemble radio as required. (See Disassembly Instructions.)
2	Rotate core of L101D to minimum inductance (fully out of coil).
3	Set dial pointer to extreme high end of band. (Lightly press a push button to release the clutch.) † Adjust VR201 for 6.8 ± 0.05 VDC on VTVM at P103.
4	Set dial pointer to 94 MHz. (Make sure dial pointer is straight and centered on dial pointer arm before tuning to 94 MHz.) Adjust L101D for 1.5 ± 0.05 VDC on VTVM at P103.
5	Repeat steps 3 and 4 until desired voltages are obtained. End alignment with adjustment of VR201 at high end of band.
6	Set dial pointer to extreme low end of band. (Release clutch as instructed in step 3.) Check voltage at extreme low end is below 0.72 VDC on VTVM at P103. If voltage is not correct, proceed with step 7.
7	If voltage at low end is greater than 0.72 VDC, adjust L101D at 94MHz for a voltage slightly greater than 1.5 VDC. Re-check and adjust VR201 for 6.8 VDC at high end; then re-check voltage at low end. Repeat, as required, until voltage at low end is less than 0.72 VDC.

† It is necessary to release the clutch in order to remove the spring tension on the paddle bar at the extreme ends of the dial. This is done to get repeatability of dial end setting.

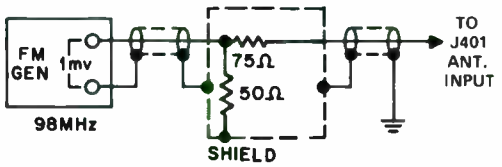


DIAGRAM C. FM DUMMY ANTENNA

MPX ALIGNMENT
AM-FM STEREO MODEL 08TF

EQUIPMENT

Frequency Counter—Itron 600 or equivalent.

SERVICE NOTES

Good multiplex operation requires proper alignment of FM RF, I.F., and detector circuits. See Troubleshooting Procedure before proceeding to determine whether multiplex alignment is necessary.

This phase-locked loop IC multiplex decoder system is quite simple to align as only adjustment of the 76 KHz oscillator is required. This system also provides inherent rejection of unwanted signals, such as SCA, and rejection of supply line transients since the IC has an internal power supply regulator.

Refer to Diagram E (Troubleshooting Procedures) for 76 KHz oscillator test point and adjustment locations.

PRELIMINARY INFORMATION

1. Connect +14 VDC output from power supply to A+ cable lead, and negative lead of power supply to radio chassis.
2. Use 76 KHz oscillator test point (pin 11, IC301) for indication of oscillator output.
3. Do not connect a signal input during the MPX alignment procedure.

MPX ALIGNMENT PROCEDURE

STEP	PROCEDURE
1	Connect frequency counter to 76KHz osc. test point.
2	Adjust 76 KHz osc. control VR301 for 18,950 to 19,050 Hz on frequency counter.

AM ALIGNMENT
AM-FM STEREO MODEL D8TF

PRELIMINARY INFORMATION

1. Disassemble radio as required. (See Disassembly Instructions.)
2. Connect +14 VDC output from power supply to A+ cable lead, and negative lead of power supply to chassis ground.
3. Connect VTVM on scope to J306 for indication of AM audio output.
4. Connect AM signal generator as directed in AM ALIGNMENT procedure. (See diagram D for the dummy antenna circuit and for value of shunt capacitor to be used to obtain desired antenna pre-trim.)
5. See AM-FM mode switch for AM operation.

NOTE: Antenna trimmer C403 is preset using a dummy antenna of total series and shunt capacitance as specified in diagram D. No further adjustment in the vehicle is recommended.

AM ALIGNMENT PROCEDURE

STEP	SPECIAL INSTRUCTIONS	SIGNAL GENERATOR		RECEIVER	
		CONNECTION TO RECEIVER	DIAL SETTING	DIAL SETTING	ADJUST
*1	FOLLOW PRELIMINARY INSTRUCTIONS.	TO Q102 BASE (CONVERTER) THRU .1MF CAPACITOR.	262.5 KHz	1000 KHz	T102 (BLACK CORE) FOR MAX.
*2	SAME AS STEP 1.	SAME AS STEP 1.	262.5 KHz	1000 KHz	T102 (BLUE CORE) FOR MAX.
*3	SAME AS STEP 1.	SAME AS STEP 1.	262.5 KHz	1000 KHz	T101 (BLACK CORE) FOR MAX.
*4	SAME AS STEP 1.	SAME AS STEP 1.	262.5 KHz	1000 KHz	T101 (RED CORE) FOR MAX.
5	RE-ASSEMBLE RADIO WITH EXCEPTION OF COVER. CONNECT +14 VDC TO A+ CABLE LEAD OF RADIO. REMOVE EITHER THE BLUE OR YELLOW LEAD FROM THE FADER CONTROL TERMINAL BOARD & CONNECT A 3.2 OHM LOAD RESISTOR BETWEEN THE LEAD & CHASSIS GND. OR SET FADER CONTROL TO MID-RANGE & CONNECT THE 3.2 OHM LOAD RESISTOR BETWEEN EITHER PIN 2 OR PIN 3 OF OUTPUT SOCKET J402 & CHASSIS GND. CONNECT VTVM OR SCOPE ACROSS LOAD RESISTOR. SET VOL. CONTROL TO MAX. & ADJUST GENERATOR OUT. FOR 1.8V RMS ACROSS LOAD RESISTOR.	THRU DUMMY ANTENNA (DIAGRAM D) TO ANTENNA INPUT.	1610 KHz	1610 KHz	1. C109B (OSC.) MAX. 2. C109A (R.F.) MAX. 3. C403 (ANT.) MAX. (REPEAT)

† 73.5 PF FOR D8TF

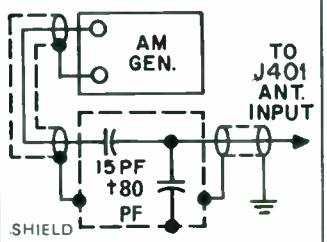


DIAGRAM D.
AM DUMMY ANTENNA

PERFORM THE FOLLOWING ALIGNMENT PROCEDURE ONLY IF TUNING COIL OR CORES HAVE BEEN REPLACED. FACTORY INSTALLED TUNER ASSEMBLIES ARE FACTORY ALIGNED.

1,2,3,4	SAME AS ABOVE.				
5	REMOVE BEZEL & SUB DIAL. ROTATE SCREW PART OF ALL THREE AM CORES COUNTERCLOCKWISE AS MUCH AS POSSIBLE; THEN FOLLOW STEP 5 ABOVE EXCEPT DO NOT RE-ASSEMBLE BEZEL & SUB DIAL.**	(THRU DUMMY ANTENNA TO ANTENNA INPUT. (REFER TO DIAGRAM D FOR DUMMY ANTENNA.)	1610 KHz	1610 KHz	1. C109B (OSC.) MAX. 2. C109A (R.F.) MAX. 3. C403 (ANT.) MAX. (REPEAT)
6	TUNE COILS BY ADJUSTING SCREW PART OF EACH CORE.	SAME AS STEP 5.	1000 KHz	1000 KHz	1. L101C (OSC.) MAX. 2. L101B (R.F.) MAX. 3. L101A (ANT.) MAX. (REPEAT)
7	REPEAT ADJUSTMENTS IN STEPS 5 & 6, IF NECESSARY, TO IMPROVE DIAL TRACKING.				
8	AFTER DIAL TRACKING IS COMPLETED, CEMENT BRASS SCREW PART OF EACH CORE TO ITS GROMMET ON CARRIAGE HOUSING. RE-ASSEMBLY SUB DIAL, BEZEL & COVER.				

*WIRING HARNESS (SHOWN IN FIGURE 5-23) FOR TROUBLESHOOTING MAY BE USED FOR ALIGNING THE I.F. TRANSFORMERS ONLY.
**CAUTION: AVOID SCRATCHING SUB DIAL ON REMOVAL. (SEE DISASSEMBLY INSTRUCTIONS.)

TROUBLESHOOTING PROCEDURES
AM-FM STEREO MODEL D8TF

LOCATING THE FAULTY PANEL

Because of the modular construction and the ease of disconnecting leads between panels, the service technician should have no difficulty in localizing most failures to the faulty section requiring service. Most likely only one panel will be at fault and the other two panels will operate satisfactory. It is possible, with proper grounding, to cross-patch panels between a good operating receiver and panels in a faulty or dead receiver as a method in determining which panel is bad.

Once the faulty or dead panel has been found, the other two panels in the radio can be used as an aid in servicing through use of the wiring harness suggested in figure 5-23. For example: the FM tuner panel can supply a stereo signal for servicing the multiplex or the audio sections of the MPX panel. The varactor supply voltage from the AM tuner panel can supply tuning voltage when servicing the FM tuner panel, the AM tuner panel can supply a signal to the MPX panel when servicing the amplifier section; etc.

The General Troubleshooting Chart below will help in determining the probable panel requiring service from the various trouble symptoms given. The external test point and adjustment locations given in Diagram E should also be helpful in localizing a trouble to a probable faulty panel before disassembling the radio.

GENERAL TROUBLESHOOTING PRECAUTIONS

1. All a-c powered test equipment and soldering devices should be grounded to avoid voltage transients greater than transistors can withstand.
2. Avoid applying excessive heat to prevent loosening of the terminals and possible damage to the printed circuit boards.
3. Replace stereo lamp with type 1892 only. Any other type bayonet bulb could draw excessive current to damage lamp driver transistor Q302 or IC301.
4. Use Aeronutronics Ford replacement parts and transistors as indicated in the Parts List of this manual. If other than recommended parts are substituted, equipment performance may be affected.
5. When the MPX panel is operated separate from the chassis, provide additional external heat sinks for the output transistors on the panel. The normal heat sink assemblies provided for the output transistors may get quite hot if this precaution is not followed.

GENERAL TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE FAULTY PANEL		
	AM	FM	MPX
AM Dead—FM OK—Left and Right Channel audio OK	X		
FM Dead—AM OK—Left and Right audio OK—Varactor tuning voltage to FM tuner panel OK		X	
FM Dead—AM OK—Left and Right audio OK—No Varactor Tuning voltage from AM tuner panel	X		
Distorted or weak on AM—FM OK—Left and Right audio OK	X		
Distorted output on FM—AM OK—Left and Right output OK—stereo light OK		X	
Distorted output—Left or Right channel only—Both AM and FM reception			X
FM weak—AM OK—Left and Right audio OK		X	
FM stations too far off calibration with dial scale—AM OK	X		
FM Microphonic—AM OK		X	
Blows fuses			X
No or poor stereo separation—AM and FM OK			X
Stereo indicator light on at all times—Both AM and FM			X
Both AM and FM reception together AM—FM selector bar in either position			X

FM TUNER PANEL TROUBLESHOOTING AM-FM STEREO MODEL D8TF

After a trouble has been localized to the FM tuner panel, follow systematic troubleshooting procedures using the troubleshooting chart for assistance in locating the trouble.

The FM tuner panel can be powered through use of the wiring harness method shown in figure 5-23 or by a separate 14 volt B+ source to J204 and an external varactor supply voltage to J203 obtained through a 10K potentiometer across a 9 volt battery.

FM TUNER PANEL TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE	CORRECTION
FM MICROPHONIC	1a. VR201 DIRTY 1b. SEAL BROKEN	1a. CLEAN OR REPLACE IF DEFECTIVE. 1b. RESEAL WITH SEALING WAX AFTER ALIGNMENT.
FM AND AM ON AT SAME TIME—FUNCTION SW. SET FOR AM	1. Q301 SHORTED ON MPX PANEL 2. SWITCH S301 ON MPX PANEL OPERATING IMPROPERLY	REFER TO AM-FM B+ SWITCH SECTION OF MPX PANEL TROUBLESHOOTING.
LOW AUDIO OUTPUT ON STATION, CRITICAL AFC, NO NOISE BETWEEN STATIONS	1. IC201 IC202 T202	1a. CHECK IC201, IC202 AND ASSOCIATED CIRCUITRY FOR FAULTY COMPONENTS. 1b. REPLACE FAULTY IC IF VOLTAGE OR RESISTANCE MEASUREMENTS INDICATE A DEFECTIVE UNIT. 1c. FM DETECTOR TRANSFORMER ALIGNMENT.
NO AFC	1. D201 OR C207 OPEN OR SHORTED, OR D201 BIAS VOLTAGE INCORRECT 2. DEFECTIVE IC202	1. CHECK COMPONENTS AND ASSOCIATED CIRCUITRY AND REPLACE ANY DEFECTIVE COMPONENT. 2. CHECK CIRCUITRY AND VOLTAGES AND REPLACE IC IF DEFECTIVE.
NO FM STATION, ONLY NOISE—AM OK	1. NO VARACTOR TUNING VOLTAGE	1a. CHECK FOR BROKEN OR DEFECTIVE CONNECTION FROM VARACTOR TUNING VOLTAGE SOURCE TO J203. 1b. J203 AND P303 CONNECTION OPEN AND POWER OFF SHOULD MEASURE WELL OVER 100 MEGOHMS. IF NOT, CHECK FOR A SHORTED VARACTOR OR C204. 2. CHECK VARACTOR VOLTAGE AT J203. REFER TO VARACTOR POWER SUPPLY SECTION TROUBLESHOOTING CHART IN AM-TUNER PANEL TROUBLESHOOTING.
NO FM STATION OR SOUND—AM OK	1. NO FM B+	1a. CHECK FOR BROKEN OR DEFECTIVE CONNECTION IN FM B+ LINE. 1b. NO VOLTAGE ON FM B+ LINE. REFER TO AM-FM B+ SWITCH SECTION OF MPX PANEL TROUBLESHOOTING.
NO FM STATION, SOME BACKGROUND SOUND —AM OK	1. DEFECTIVE I.F. STAGE 2. VRAC OSC. CIRCUIT DEAD (Q205), DC BIAS OK	1. CHECK IC201 AND ASSOCIATED CIRCUITRY AND REPLACE ANY DEFECTIVE COMPONENT. 2. CHECK FOR OPEN OR PARTIALLY SHORTED CAPACITORS C242, C243, AND C244.
POOR SENSITIVITY AND/OR SELECTIVITY	1. DEFECTIVE ANTENNA SOCKET 2. DEFECTIVE C202, C203, VRAC201, L201, OR Q201 3. DEFECTIVE FL201 OR FL202 4. Q208 DEFECTIVE OR BIAS VOLTAGE INCORRECT	1. CHECK AND REPLACE, AS REQUIRED. 2. CHECK CIRCUIT AND REPLACE DEFECTIVE COMPONENT. 3. CHECK DB LOSS THROUGH CERAMIC FILTER (—3 DB DROP IS NORMAL). 4. CHECK VRAC OSC. DC BIAS AND ASSOCIATED CIRCUITRY AND REPLACE ANY DEFECTIVE COMPONENT.

FM Tuner Panel Transistors
Voltage and Resistance Checks

Should suspicion or troubleshooting checks point to the possibility of a faulty transistor, it is recommended that voltage and resistance measurements be made at the terminals of the transistor on the panel before proceeding with replacement. Attempt to make sure the transistor is at fault to avoid an unnecessary replacement. The normal, averaged d-c voltage (to ground) values are given on the schematic; the d-c resistance (to ground) values are given in the accompanying chart.

FM TUNER PANEL TRANSISTORS
D-C RESISTANCE CHART

TRANSISTOR	*RESISTANCE (OHMS)		
	E	B	C
Q201	330	2.1K	1.4K
Q202	1.8K	2.6K	2.7K
Q203	1.8K	650	1.8K
Q204	68	1.7K	2.1K

*All readings RX100 scale.

FM Tuner Panel ICs
Voltage and Resistance Checks

Should suspicion or troubleshooting checks point to the possibility of a faulty IC, it is recommended that voltage and resistance measurements be made at the terminals of the chip on the panel before proceeding with replacement. Attempt to make sure the IC is at fault to avoid an unnecessary replacement. The normal, averaged d-c voltage (to ground) values are given on the schematic; the d-c resistance (to ground) values are given in the accompanying chart.

PW Panel Service Tips

Use a hot, well tinned iron when unsoldering a component so removal can be made quickly without damage to panel or associated components through excessive heat conduction. The PW panel has "plated through" holes to assure adequate grounding of the ground shield copper on the component side of panel. Consequently, all components are well soldered in the panel assembly.

Observe physical position and polarity of component before removal to assure replacement is installed correctly. This applies partically to the ceramic filters, varactors, coils, transistors, diodes and the ICs.

When installing replacement components, keep the leads as short as possible.

FM TUNER PANEL ICs
D-C RESISTANCE CHART

IC (PIN NO.)	*RESISTANCE (OHMS)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC201	1.8K	1.7K	1.6K	1.6K	4K	**22K	**20K	0	1.6K	1.6K				
IC202	2.2K	3.3K	1.3K	1.7K	1.7K	1.6K	0	NC	68	500	2K	3.4K	2.2K	3.8K

*All readings RX100 scale unless otherwise noted.
**RX1000 scale.
NC–No connection.

AM TUNER PANEL TROUBLESHOOTING AM-FM STEREO MODEL D8TF

After a trouble has been localized to the AM tuner panel, follow systematic troubleshooting procedures using the troubleshooting chart for assistance in locating the trouble. For servicing, the AM tuner panel can be operated in the following ways:

1. Varactor Power Supply – 14 volts B+ on main B+ lead; varactor tuning voltage from P103.

2. AM Radio Section – B+ supply and AM audio output through MPX panel; AM input signal either through J401 through FM tuner panel or direct to P101. The wiring harness shown in figure 5-23 is recommended.

AM RADIO SECTION TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE	CORRECTION
DEAD AM RECEPTION-AIR SIGNAL	NO SIGNAL FED INTO AM INPUT	CHECK FOR BROKEN OR DEFECTIVE CONNECTION FROM J201 ON FM PANEL TO AM PANEL INPUT.
POOR SENSITIVITY	1. MISALIGNMENT 2. DEFECTIVE L101B, C111, C113, OR C109B.	1. PERFORM NECESSARY AM ALIGNMENT. 2. CHECK RF AND I.F. CIRCUITRY TO LOCATE DEFECTIVE COMPONENT.
OSCILLATES WITH LOW OR MODERATE INPUT SIGNAL	PROBLEM IN AVC CIRCUIT	LOCATE DEFECTIVE C115, D101, C103, R109, OR R115 AND REPLACE.
DEAD AM RECEPTION-AIR CHECK OR SIGNAL GENERATOR	OPEN L205 OR L101A PRIMARY	REPLACE.
DEAD AIR CHECK. GENERATOR SENS 4-5K μv	SHORTED C102	REPLACE.
DEAD AIR CHECK. GENERATOR SENS 10-15K μv	L101A SECONDARY OPEN	REPLACE.

AM TUNER PANEL VARACTOR POWER SUPPLY TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE	CORRECTION
NO VARACTOR TUNING VOLTAGE	OPEN OR SHORTED COMPONENT IN VARACTOR OSCILLATOR OR OSCILLATOR CONTROL CIRCUITRY	LOCATE CAUSE THROUGH STEP BY STEP VOLTAGE MEASUREMENTS FROM THE OUTPUT TOWARDS THE OSCILLATOR.
INCORRECT RANGE ON CALIBRATION	1. OUT OF ALIGNMENT ON CALIBRATION 2. L208, L101D OR CORE OF L101D DEFECTIVE	1. PERFORM ALIGNMENT PROCEDURE FOR VARACTOR POWER SUPPLY. 2. REPAIR OR REPLACE FAULTY COMPONENT.
INSUFFICIENT RANGE OF VR201 DURING ALIGNMENT	1. IMPROPER ALIGNMENT 2. R245 INCREASED IN VALUE 3. LOW DC VOLTAGE AT CATHODE OF D205	1. REPEAT ALIGNMENT BEFORE SUSPECTING A FAULTY COMPONENT. 2. REPLACE. 3. REPLACE DEFECTIVE D205 OR C246.

AM Tuner Panel Transistors Voltage and Resistance Checks

Should suspicion or troubleshooting checks point to the possibility of a faulty transistor, it is recommended that voltage and resistance measurements be made at the terminals of the transistor on the panel before proceeding with replacement. Attempt to make sure the transistor is at fault to avoid an unnecessary replacement. The normal, averaged d-c voltage (to ground) values are given on the schematic; the d-c resistance (to ground) values are given in the accompanying chart.

AM TUNER PANEL TRANSISTORS D-C RESISTANCE CHART

TRANSISTOR	*RESISTANCE (OHMS)		
	E	B	C
Q101	330	1.8K	2.2K
Q102	1.8K	2.2K	1.9K
Q103	5.6	1.5K	2.2K
Q205	100	1.7K	1.3K
Q206	0	1.4K	1.3K
Q207	7K	5K	1.2K
Q208	0	1.4K	1.7K

*All readings RX100 scale.

MPX PANEL-TROUBLESHOOTING AM-FM STEREO MODEL D8TF

After a trouble has been localized to the MPX panel, follow systematic troubleshooting procedures using the troubleshooting charts for assistance in locating the trouble.

For servicing, the MPX panel can be interconnected with the AM tuner and FM tuner panels using the wiring harness shown in figure 5-23, or in the following ways:

1. MPX Decoder Section or Audio Section – 14 volts fed to main B+ line, and 3.2 ohm speaker (or 3.2 ohm load) from blue and yellow audio output leads to ground.

2. AM-FM B+ Switch Section – 14 volts fed to main B+ line; VRAC B+ from J304, AM B+ from J305, and FM B+ from P304.

MPX PANEL DECODER SECTION TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE
NO STEREO LIGHT NO AM OR FM AUDIO OUTPUT	C303 OPEN IC301 DEFECTIVE
STEREO LIGHT OPERATES NORMAL NO AUDIO	IC301 DEFECTIVE
NO STEREO LIGHT MONAURAL AUDIO ONLY	IC301 DEFECTIVE
NO STEREO LIGHT STEREO AUDIO LOW IN VOLUME	IC301 DEFECTIVE
STEREO LIGHT OPERATES NORMAL SQUEALS ON EDGE OF STATION	C302 OPEN
STEREO LIGHT ON AT ALL TIMES ON AM OR FM AUDIO OK ON AM-FM-STEREO	Q302 SHORTED (CHECK FOR PROPER STEREO LAMP #1892)
NO STEREO LIGHT AUDIO OK ON AM-FM-STEREO	Q302 OPEN, OR STEREO LAMP BURNED OUT
RIGHT CHANNEL 50% DOWN FROM LEFT CHANNEL	IC301 DEFECTIVE
LEFT CHANNEL 50% DOWN FROM RIGHT CHANNEL	IC301 DEFECTIVE
NO AUDIO ON LEFT AND/OR RIGHT CHANNELS	IC301 DEFECTIVE
MONAURAL OUTPUT AT ALL TIMES. STEREO LIGHT OPERATES OK. VOLUME GOOD. STEREO SOUNDS LIKE MONAURAL	NO SEPARATION—CHECK ALIGNMENT

MPX PANEL AM-FM B+ SWITCH SECTION TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE	CORRECTION
NO FM B+	1. AM-FM SWITCH S301 OPERATING IMPROPERLY	1a. CHECK FOR PROPER S301 SWITCH SPRING OPERATION WITH AM-FM SHUTTLE BAR. SWITCH CIRCUIT SHOULD CLOSE WHEN SHUTTLE BAR IS SHIFTED TO FM OPERATION. 1b. CHECK SOLDERING OF SWITCH SPRING TO SHUTTLE BAR.
	2. NO A+ VOLTAGE AT Q301 EMITTER	2. R301 OPEN-REPLACE.
	3. A+ VOLTAGE AT Q301 EMITTER OK BUT NO VOLTAGE ON Q301 COLL.	3. Q301 OPEN-REPLACE.
AM AND FM ON AT SAME TIME (SET FOR AM)	Q301 SHORTED	CHECK AND REPLACE.
FM RECEPTION WHEN SHUTTLE BAR IS IN AM POSITION	S301 SWITCH SPRING IMPROPERLY ACTUATED BY SHUTTLE BAR	SEE NOTE UNDER MPX PANEL REMOVAL IN DISASSEMBLY INSTRUCTIONS FOR PROPER SETTING OF S301.

MPX Panel Audio Section

When the trouble appears to be in the audio section, it may be helpful to remember that the driver is the most vulnerable component, with the output transistors, most likely the NPN transistors, next. It is very unlikely that the problem will occur inside the packaged networks as the transistors in the networks are protected by limiting resistors. The single most serious fault would be a short to ground of the driver collector or output emitter point. If this happens, it is possible for all transistors in the output stage to be destroyed, even the P.T.C. resistors could fail. A glowing P.T.C. resistor could be a sure indication of a shorted speaker lead.

Because of the loop effect and the directly coupled relationship of all components to each other, measuring voltages after a fault can be misleading. The best way to troubleshoot the circuit would be to disconnect both output collectors, short the driver collector to the P.T.C., and then activate the circuit. If the packaged network and driver are satisfactory, the driver collector will be 7.2 volts and exhibit a signal across a high impedance speaker. If the above does not check out, chances are the driver is destroyed. If the check out is satisfactory, the output transistors may be the problem.

Unfortunately, the troubleshooting method described above is not always practical to achieve. The output transistor collectors may be difficult to disconnect. One very simple test which can be performed on the audio secticn is to momentarily ground the d-c feedback filter or pin 3 of the audio PEM (N301 or N302). By doing this, the loop control is upset and the output bias voltage should jump to the supply voltage. If a driver is damaged, but not shorted or opened, the output bias may not jump to the supply voltage. It can then be assumed that the driver needs replacing.

Another test that can be used to verify the condition of the driver is to short its base to its emitter. For normal operation, the output bias voltage should drop to zero. If the input current to the receiver is excessive, look for the following:

1. Shorted A-line filter, output coupling, d-c feedback filter, or input coupling.
2. Shorted driver or either output transistor.
3. Open transistor multiplier, open 62 ohm resistor, or shorted 75 ohm resistor.
4. Shorted speaker lead, or short to P.T.C. resistor.

If the current is too low, look for the following:

1. Open driver or either output transistor.
2. Open speaker lead.
3. Open P.T.C. resistor.
4. Filter in emitter of pre-driver shorted.
5. B+ filter shorted.

If there is distortion or early clipping on one side, look for the following:

1. One or both output transistors destroyed.
2. Driver damaged.

If there is poor A-line rejection or excessive crosstalk, look for the following:

1. Filter in emitter of pre-driver open.
2. B+ filter open.
3. A+ filter open.

If there is crosstalk in the output stage, suspect a defective V_{BE} multiplier.

MPX PANEL AUDIO SECTION TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE
MORE THAN 6.5 VOLTS AT OUTPUT TRANSISTOR EMITTERS	1. DRIVER Q305 OR Q311 SHORTED 2. R324 OR R326 (100 OHMS) OR SPEAKER LEAD OPEN 3. NPN OUTPUT TRANSISTOR Q307 OR Q314 SHORTED 4. PIN 2 OF NETWORK N301 OR N302 SHORTED TO GROUND.
LESS THAN 6.5 VOLTS AT OUTPUT TRANSISTOR EMITTERS	1. DRIVER TRANSISTOR Q305 OR Q311 OPEN 2. SHORTED PNP OUTPUT TRANSISTOR Q308 OR Q313 3. SHORTED PIN 6 OF NETWORK N301 OR N302
BLOWN DRIVER OR NPN OUTPUT TRANSISTOR	SHORT AT COLLECTOR OF DRIVER OR EMITTER OF OUTPUT TRANSISTOR
EXCESSIVE CURRENT OR HIGH VOLTAGE AT COLLECTOR OF DRIVER	OPEN Q306 OR Q312
EXCESSIVE CURRENT OR GLOWING P.T.C.	SPEAKER LEAD SHORTED
BLOWN PNP OUTPUT TRANSISTOR	SHORT AT BASE OF PNP OUTPUT TRANSISTOR

FIGURE 5-17. FM TUNER PANEL-TOP AND BOTTOM COPPER VIEWS
AM-FM STEREO MODEL D8TF

MPX Panel Transistors
Voltage and Resistance Checks

Should suspicion or troubleshooting checks point to the possibility of a faulty transistor, it is recommended that voltage and resistance measurements be made at the terminals of the transistor on the panel before proceeding with replacement. Attempt to make sure the transistor is at fault to avoid an unnecessary replacement. The normal, averaged d-c voltage (to ground) values are given on the schematic; the d-c resistance (to ground) values are given in the accompanying chart.

MPX Panel IC
Voltage and Resistance Checks

Should suspicion or troubleshooting checks point to the possibility of a faulty IC, it is recommended that voltage and resistance measurements be made at the terminals of the chip on the panel before proceeding with replacement. Attempt to make sure the IC is at fault to avoid an unnecessary replacement. The normal, averaged d-c voltage (to ground) values are given on the schematic; the d-c resistance (to ground) values are given in the accompanying chart.

MPX PANEL TRANSISTORS
D-C RESISTANCE CHART

TRANSISTOR	*RESISTANCE (OHMS)		
	E	B	C
Q301	1K	1.8K	1.2K
Q302	1.1K	**39K	38
Q305	1.1K	1.25K	250
Q306	100	200	250
Q307	900	250	1.1K
Q308	900	100	0
Q311	1.1K	1.25K	250
Q312	100	200	250
Q313	900	100	0
Q314	900	250	1.1K

*All readings RX100 scale unless otherwise noted.
**RX1000 scale.

MPX PANEL IC
D-C RESISTANCE CHART

IC (PIN NO.)	*RESISTANCE (OHMS)															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC301	9K	2.5K	2.6K	2K	2K	2.6K	**42K	0	3.8K	4K	2.8K	2.2K	2.2K	2.2K	2.6K	1.1K

*All readings RX100 scale unless otherwise noted.
**RX1000 scale.

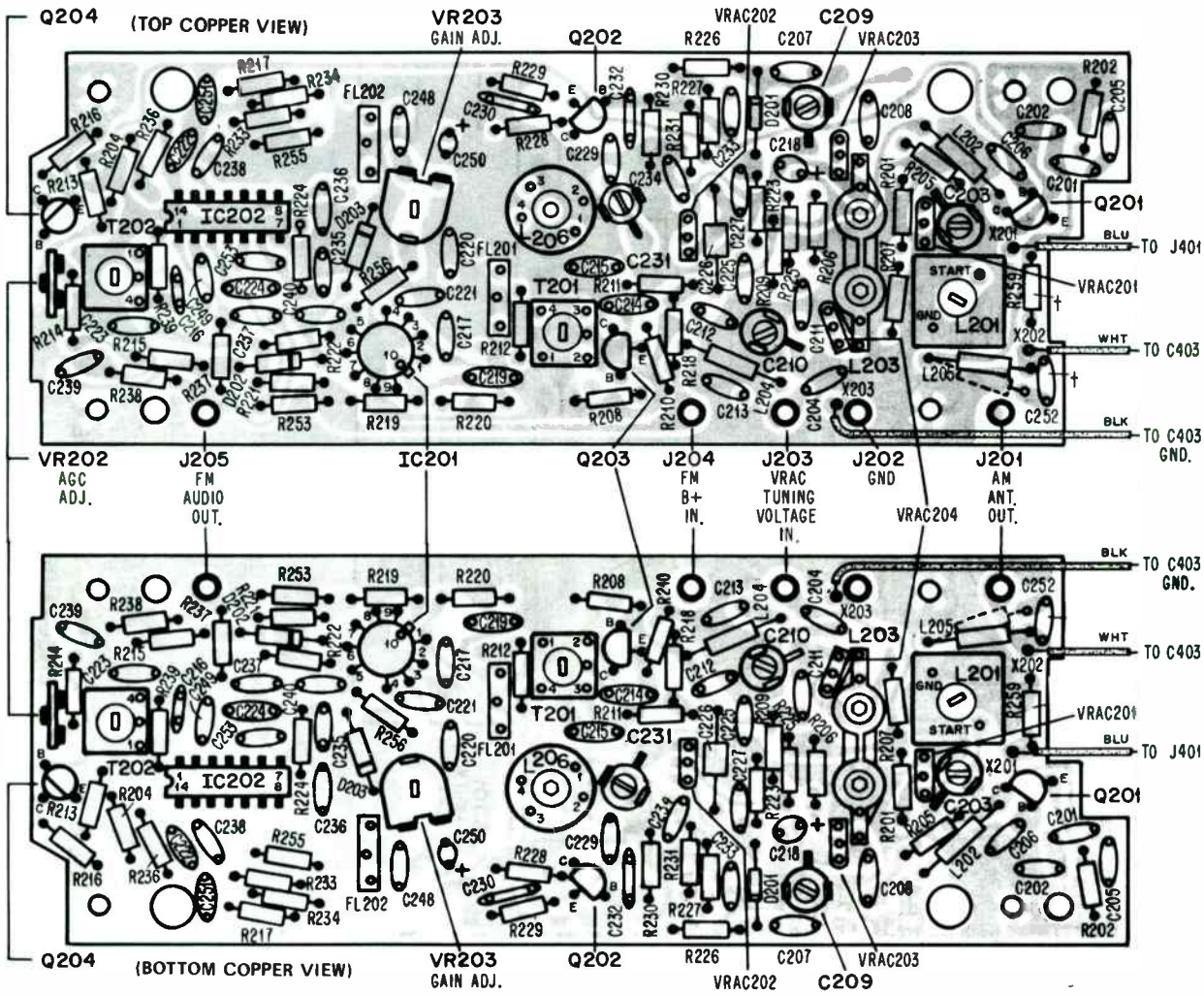


FIGURE 5-17. FM TUNER PANEL-TOP AND BOTTOM COPPER VIEWS
AM-FM STEREO MODEL D8TF

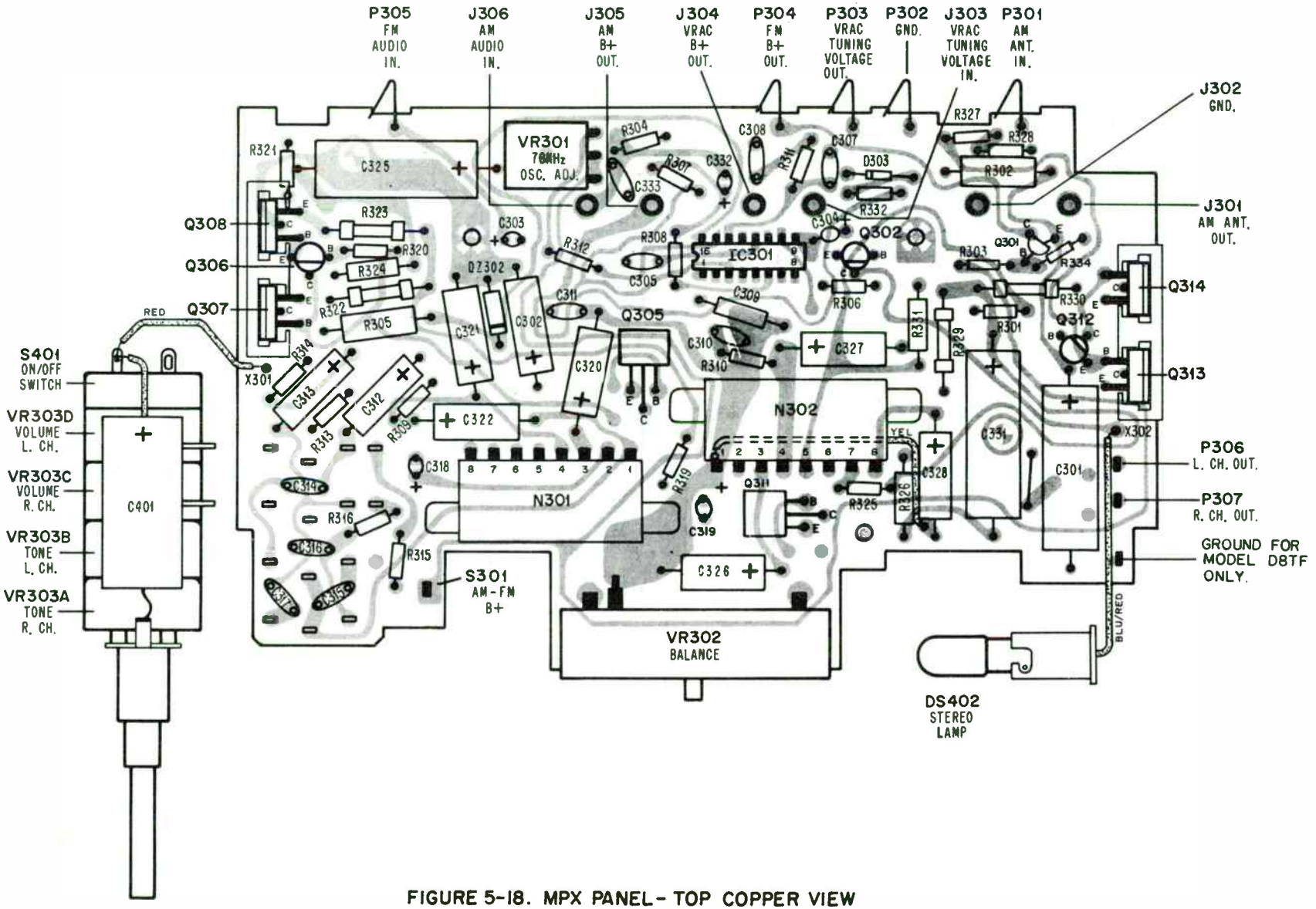


FIGURE 5-18. MPX PANEL- TOP COPPER VIEW
AM-FM STEREO MODEL D8TF

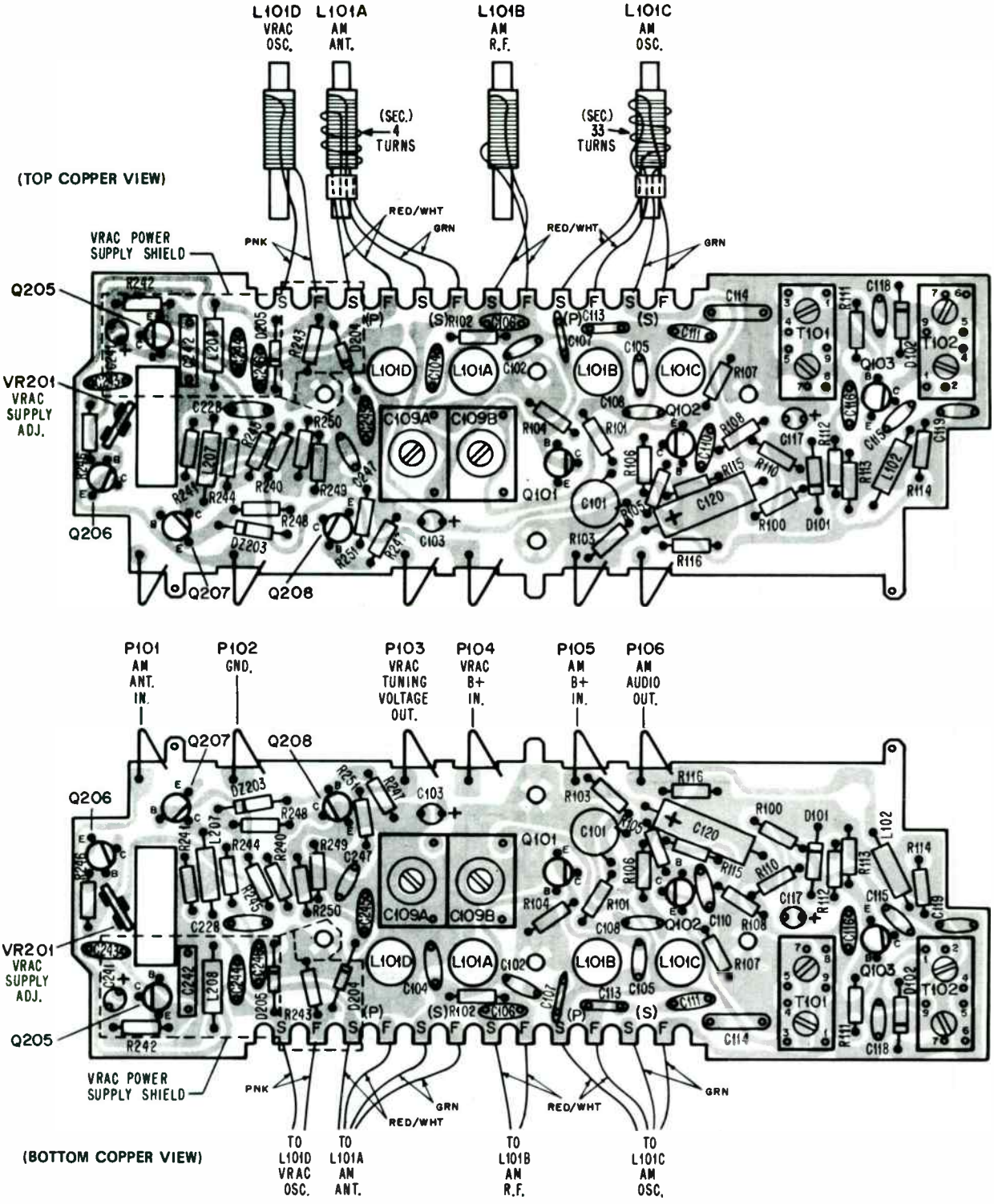


FIGURE 5-20. AM TUNER PANEL-TOP AND BOTTOM COPPER VIEWS
AM-FM STEREO MODEL D8TF

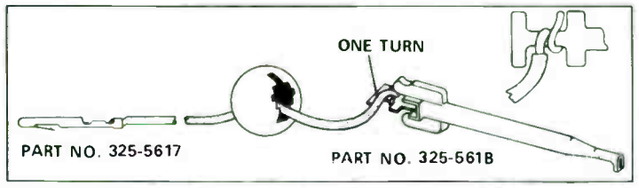
LEAD	COLOR	FROM	TO	FUNCTION
1	BLU	P301	J201	AM ANT. INPUT
2	BLK	P302	J202	GND
3	BRN	P303	J203	VRAC TUNING VOLTAGE
4	ORN	P304	J204	FM B+
5	WHT	P305	J205	FM AUDIO
6	BLU	P101	J301	AM ANT. INPUT
7	BLK	P102	J302	GND
8	BRN	P103	J303	VRAC TUNING VOLTAGE
9	YEL	P104	J304	VRAC B+
10	VIO	P105	J305	AM B+
11	GRN	P106	J306	AM AUDIO
12	BLK	S301	CHASSIS	GND
13	BLK	HEAT SINK	CHASSIS	GND
14	BLK	HEAT SINK	CHASSIS	GND
15	RED	S401	A+ TERM.	A+ INPUT

COLORS LISTED ARE RECOMMENDED TO PREVENT ACCIDENTAL IMPROPER CONNECTION OF LEADS.

1. Leads 1 thru 11.
   a. To be thermoplastic lead, 24 AWG (45 x 40), 12 inches long, skin and tin 3/4 inch each end to allow attachment to connectors. Use colors recommended in lead assignment chart.
   b. To be constructed as follows (see blocked diagram):
      - Pull on ball and shank to open mini-clip.
      - Feed wire through hole in ball. Wrap skinned end as shown.
      - Use least solder needed and solder quickly.
      - Wrap wire one turn as shown.
      - Push pieces together keeping loop taut while assembling.
      - Crimp and solder male connector to other end of wire.
   c. Connectors carried in stock under part numbers shown. Both types of connectors available in cable harness kit package (12 of each type of connector in kit). One kit (Part No. 424-9637) recommended for servicing (Thermoplastic leads not carried in kit).

2. Leads 12 thru 14.
   a. To be 22 AWG stranded black vinyl wire, 15 inches long, skin and tin 1/4 inch both ends and solder on alligator clips.
   b. To be constructed from locally purchased items.

3. Lead 15.
   a. To be 18 AWG stranded red vinyl wire, 20 inches long, skin and tin 1/4 inch both ends and solder on alligator clips.
   b. To be constructed from locally purchased items.



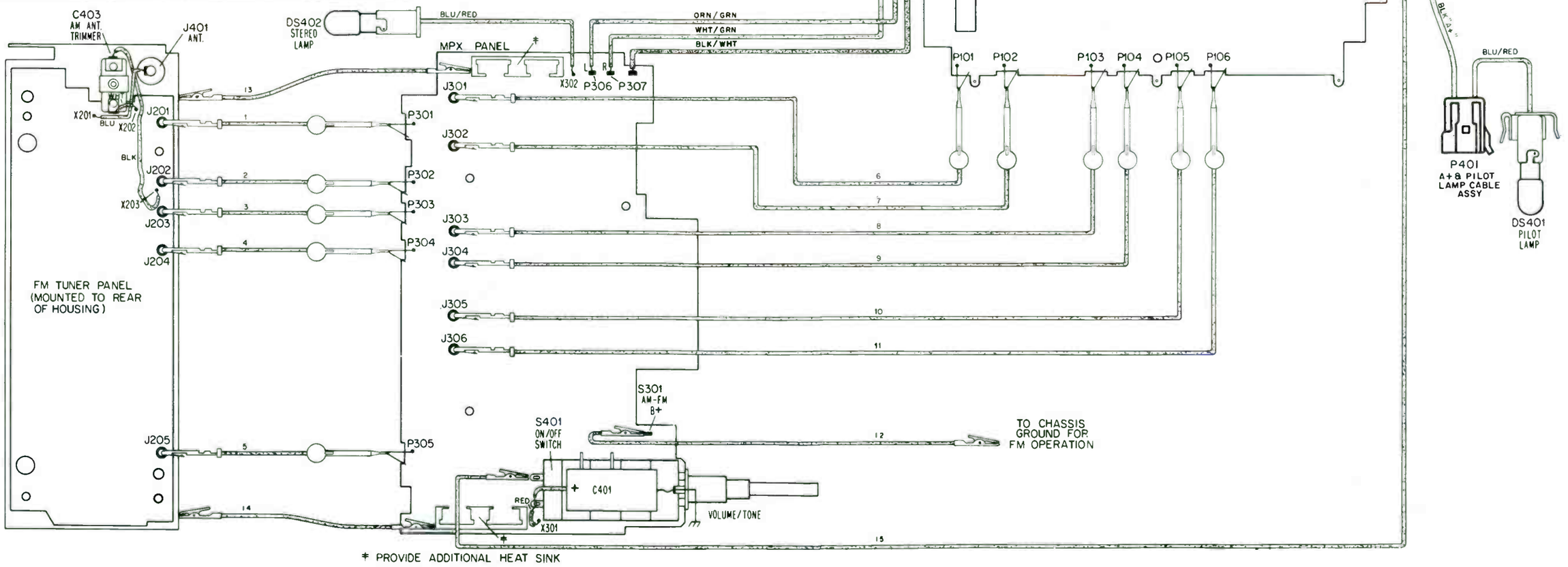
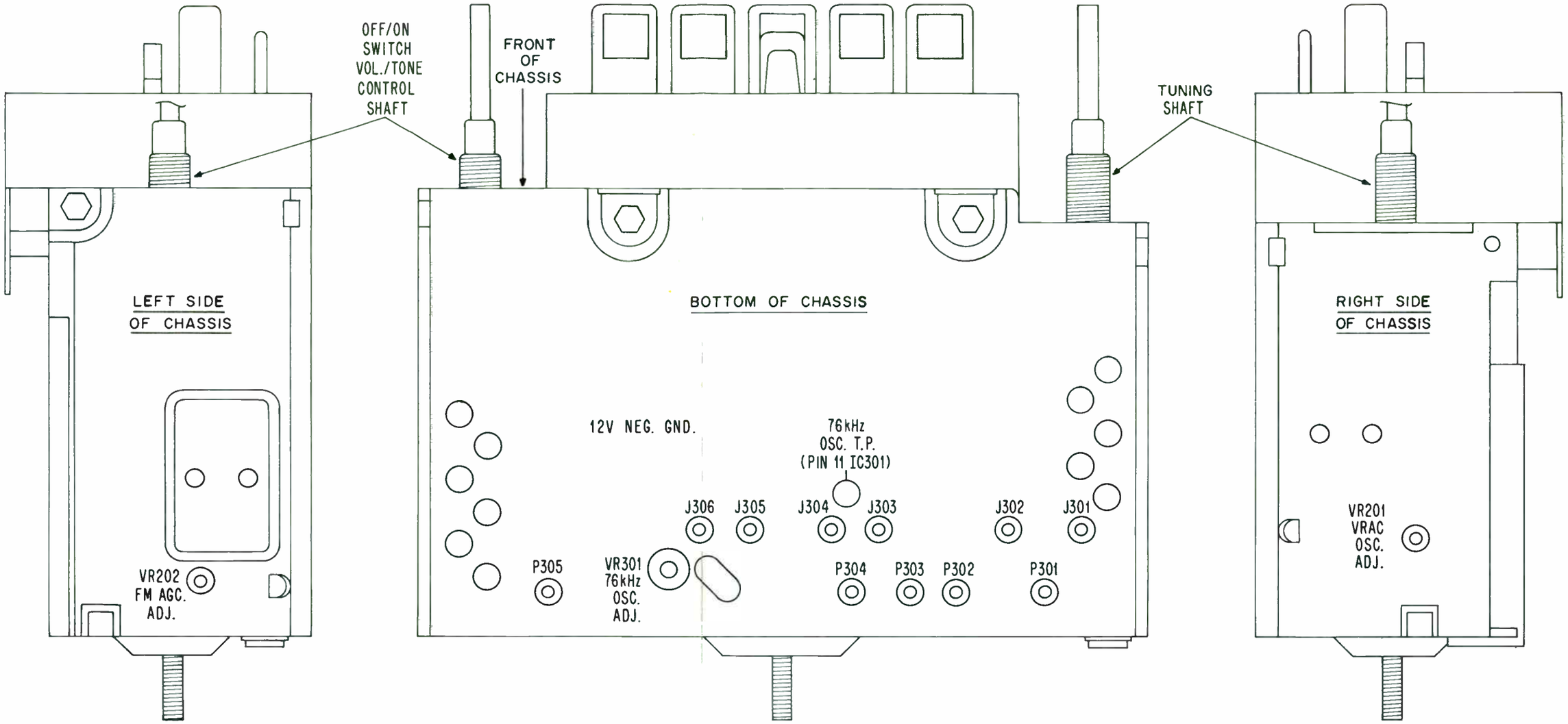


FIGURE 5-23. SUGGESTED WIRING HARNESS AM-FM STEREO MODEL D8TF

Ford D8TF19A241AA



TEST POINT			SIGNAL/VOLTAGE
J201	P301	J301	AM ANT. INPUT
J202	P302	J302	GND.
J203	P303	J303	VRAC TUNING VOLTAGE
J204	P304		FM B+
		J304	VRAC B+
J205	P305		FM AUDIO
		J305	AM B+
		J306	AM AUDIO
IC301 (PIN 11)			76kHz OSC.

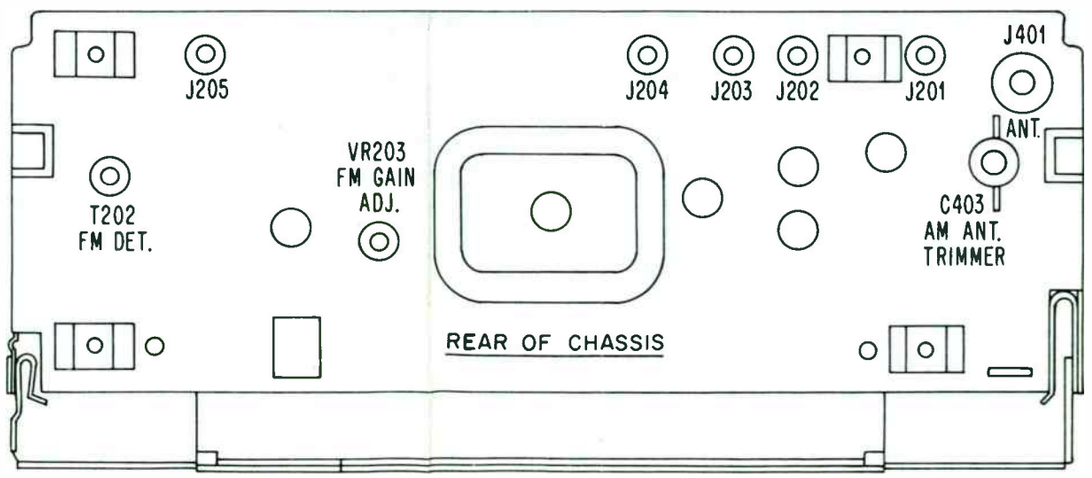


DIAGRAM E. EXTERNAL TEST POINT AND ADJUSTMENT LOCATIONS
AM-FM STEREO MODEL D8TF

TUNER REPLACEMENT PARTS
AM-FM STEREO MODEL D8TF

New parts not previously carried are indicated by symbol "≠" following number

All parts listed are in Warranty Component Category F

DESCRIPTION	SERVICE PART NO.
Arm, dial pointer	7L6-0423-46
Ball Bearing, paddle bar	7L6-0150-7
Bracket, clutch	7L6-0423-6
"C" washer, pointer arm	**7L6-0150-25**
De-Clutch Cam	7L6-0423-7
De-Clutch Lever	7L6-0423-9
De-Clutch Plate Assy.	7L6-0423-8
Gear & Clutch Assy.	7L6-0423-13
Nut, paddle bar	**7L6-0150-11**

DESCRIPTION	SERVICE PART NO.
Screw & Nut Assy., paddle bar	**7L6-0423-15**
Screw, paddle bar	7L6-0423-16
Set Screw, de-clutch cam	7L6-0423-11
Spring, clutch	7L6-0423-12
Spring, de-clutch	7L6-0423-10
Spring, pointer arm	7L6-0150-51
Tuner Assembly, mechanical	**7L6-0686-1**

ELECTRICAL PARTS LIST
AM-FM STEREO MODEL D8TF

Parts listed are for all models unless otherwise noted.

New parts not previously carried are indicated by symbol "≠" following number

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
		CAPACITORS	
C101	C	.05 mf +80 –20%/25V, RF B+ filter	3L0-0008-44
C102	C	22 pf ±10%/500V, RF feedback	3L0-0007-13
C103	C	10 mf ±20%/20V, AGC filter	3L0-0011-10
C104	C	.001 mf ±20%/50V, Q101 base	3L0-0007-37
C105	C	.05 mf +80 –20%/10V, Q101 emitter	3L0-0008-10
C106	C	150 pf ±10%/50V, image rejection	**3L0-0006-28**
C107	C	150 pf 10%/50V, RF tank	3L0-0006-28
C108	C	.015 mf ±20%/25V, RF coupling	3L0-0008-18
**C109A	C	200 pf (nom.), RF trimmer	3L1-0002-4
**C109B	C	75 pf (nom.), osc. trimmer	3L1-0002-4
C110	C	.005 mf ±20%/500V, Q102 base	3L0-0007-22
C111	C	180 pf ±20%/50V, osc. tank	3L0-0006-25
C113	C	200 pf ±5%/50V, osc. tank	3L0-0010-16
C114	C	.01 mf ±10%/50V, osc. tank	3L0-1001-8
C115	C	330 pf ±10%/500V, AGC coupling	3L0-0007-1
C116	C	.001 mf ±20%/50V, Q103 base	3L0-0007-37
C117	C	10 mf ±20%/20V, AGC filter	3L0-0011-10
C118	C	.02 mf +80 –20%/16V, 2nd I.F. B+ filter	3L0-0008-17
C119	C	.001 mf ±20%/50V, AM det. filter	3L0-0007-37

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
C120	C	33 mf +50 –10%/16V, AM B+ filter	3L0-0009-37
C201	C	4.7 pf ±.5 pf/500V, ant. input coupling	3L0-0006-17
C202	C	22 pf ±10%/500V, ant. input shunt	3L0-0007-13
C203	C	1.7–10 pf, FM ant. trimmer	3L1-0004-1
C204	C	.01 mf +80 –20%/25V, VRAC tuning voltage filter	3L0-0008-16
C205	C	3.3 pf ±.5 pf/500V, Q201 signal input coupling	3L0-0006-13
C206	C	.01 mf +80 –20%/25V, Q201 base	3L0-0008-16
C207	C	.05 mf +80 –20%/10V, B+ filter, D201	3L0-0008-10
C208	C	.001 mf ±20%/50V, RF output tuning, VRAC203	3L0-0007-37
C209	C	1.7–10 pf, RF trimmer, VRAC203	3L1-0004-1
C210	C	1.7–10 pf, RF trimmer, VRAC204	3L1-0004-1
C211	C	4.7 pf ±0.5 pf/500V, mixer input divider	3L0-0006-17
C212	C	8.2 pf ±10%/500V, mixer input divider	3L0-0007-30
C213	C	220 pf ±10%/500V, mixer 10.7MHz trap	3L0-0007-15
C214	C	.001 mf ±20%/50V, Q203 emitter	**3L0-0007-37**
C215	C	.05 mf +80 –20%/16V, FM I.F. B+ filter	3L0-0008-41

*Warranty Component Category
**Parts of the same unit

ELECTRICAL PARTS LIST (Cont'd)

AM-FM STEREO MODEL D8TF

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
C216	C	82 pf ±5%/500V, FM I.F. shunt, T202	3L0-0010-14
C217	C	.05 mf +80 –20%/10V, bypass, IC201	3L0-0008-10
C218	C	10 mf ±20%/20V, RF bypass	3L0-0011-10
C219	C	.05 mf +80 –20%/16V, RF bypass	3L0-0008-41
C220	C	.01 mf +80 –20%/25V, bypass, IC201	3L0-0008-16
C221	C	.01 mf +80 –20%/25V, bypass, IC201	3L0-0008-16
C222	C	180 pf ±20%/500V, bypass, IC202	3L0-0007-36
C223	C	.01 mf +80 –20%/25V, bypass, IC201	3L0-0008-16
C224	C	.01 mf +80 –20%/16V, bypass, IC202	3L0-0008-38
C225	C	.05 +80 –20%/10V, RF bypass, FM AFC	3L0-0008-10
C226	C	2 pf ±10%, osc. injection, VRAC202	3L0-12093
C227	C	6.8 pf ±.5 pf/500V, AFC diode coupling	3L0-0006-14
C228	C	.1 mf +80 – 20%/10V, VRAC osc. control bypass	3L0-0008-11
C229	C	6.8 pf ±.5 pf/500V, FM osc. tank	3L0-0006-14
C230	C	68 pf ±10%/500V, FM osc.	3L0-0010-7
C231	C	1.7-10 pf	3L1-0004-1
——	—	——	——
C233	C	.01 mf ±20%/16V, Q202 base	3L0-0008-21
C234	C	.01 mf ±20%/16V, 8+ filter	3L0-0008-21
C235	C	.05 mf +80 –20%/10V, bypass, IC202	3L0-0008-10
C236	C	.05 mf +80 –20%/10V, bypass, IC202	3L0-0008-10
C237	C	.01 mf ±20%/16V, FM audio compensating	3L0-0008-21
C238	C	6.8 pf ±.5 pf/500V, coupling, IC202	3L0-0006-22
C239	C	.05 mf +80 –20%/10V, FM AGC filter	3L0-0008-10
C240	C	180 pf ±20%/500V, FM AGC coupling	3L0-0007-36
C241	C	10 mf ±20%/20V, Q205 base	3L0-0011-10
C242	C	.1 mf ±10%/50V, VRAC osc. tank	3L0-1001-15
C243	C	.0012 mf ±10%/500V, VRAC osc. tank	3L0-0007-20
C244	C	820 pf ±10%/500V, VRAC osc. coupling	3L0-0007-25
C245	C	.1 mf +80 –20%/10V, VRAC rectifier filter	3L0-0008-11
C246	C	.05 mf +80 –20%/25V, VRAC rectifier filter	3L0-0008-39
C247	C	.01 mf +80 –20%/16V, VRAC output filter	3L0-0008-15
C248	C	.01 mf +80 –20%/25V, FM I.F. coupling	3L0-0008-16
C249	C	.05 mf +80 –20%/10V, bypass, IC202	3L0-0008-10
C250	C	.47 mf ±20%/10V, FM AFC filter	3L0-0011-7
C251	C	.05 mf +80 –20%/10V, FM AGC bypass	3L0-0008-10
C253	C	.05 mf +80 –20%/10V, coupling, IC202	3L0-0008-10
C301	C	1000 mf/16V, B+ filter	3L0-0009-44
C302	C	150 mf/16V, B+ filter	3L0-0009-45
C303	C	1 mf ±20%/35V, FM audio input coupling	3L0-0011-3
C304	C	.47 mf ±20%/10V, coupling, IC301	3L0-0011-14
C305	C	.05 mf +80 –20%/10V, coupling, IC301	3L0-0008-10
C307	C	.22 mf ±30%/3V, DC filter	3L0-0008-30
C308	C	.47 mf ±30%/3V, DC filter	3L0-0008-14
C309	C	390 pf ±3%/100V, 76kHz osc. tuning	3L0-0010-15
C310	C	.015 mf ±20%/12V, de-emphasis, R-ch.	3L0-0008-18
C311	C	.015 mf ±20%/12V, de-emphasis, L-ch.	3L0-0008-18
C312	C	1.5mf/16V, audio coupling, L-ch.	3L0-0009-67
C313	C	1.5mf/16V, audio coupling, R-ch.	3L0-0009-67
C314	C	.22mf ±30%/3V, bass boost, L-ch.	3L0-0008-30
C315	C	1.0 mf ±30%/3V, hi-cut, L-ch.	3L0-0011-29
C316	C	1.0 mf ±30%/3V, hi-cut, R-ch.	3L0-0011-29
C317	C	.22mf ±30%/3V, bass boost, R-ch.	3L0-0008-30
C318	C	.47 mf ±20%/10V, audio coupling, L-ch.	3L0-0011-7
C319	C	.47 mf ±20%/10V, audio coupling, R-ch.	3L0-0011-7
C320	C	150 mf/6V, audio filter, L-ch.	3L0-0009-50
C321	C	150 mf/16V, audio filter, L-ch.	3L0-0009-45
C322	C	150 mf/6V, audio filter, L-ch.	3L0-0009-50
C325	C	1000 mf/16V, audio coupling, L-ch.	3L0-0009-44
C326	C	150 mf/6V, audio filter, R-ch.	3L0-0009-50
C327	C	150 mf/16V, audio filter, R-ch.	3L0-0009-45
C328	C	150 mf/6V, audio filter, R-ch.	3L0-0009-50
——	—	——	——
C331	C	1000 mf/16V, audio coupling, R-ch.	3L0-0009-44
C332	C	.33 mf ±20%/10V, AM audio input coupling	3L0-0011-6
C333	C	.005 mf ±20%/500V, AM det. filter	3L0-0007-22
——	—	——	——
C401	C	1400 mf/16V, A+ line filter	3L0-0009-23
C402	C	1000 pf/500V, A+ line feedthrough bypass	3L0-0022-1

*Warranty Component Category

P401
A+ & PILOT LAMP
CABLE ASSY.
SEE D8TF A+
CABLE BELOW.

FM TUNER PANEL (TOP COPPER VIEW)

J401
ANT.

X201
BLU
C403
AM ANT.
TRIMMER
X202
WHT
BLK
J205
J204
J203
X203
J202
J201

BLK "A+"
BLU/RED
L401
A+
CHOKE
DS401
PILOT LAMP

* SEE INSERT
DRAWING FOR LEAD DRESS.

FM AUDIO
FM B+
VRAC TUNING VOLTAGE
GND.
FM ANT. INPUT

DS402
STEREO
LAMP

BLK
C402
FEED-THROUGH

P305
P304
P303
P302
P301
MPX PANEL (TOP COPPER VIEW)
J306
J305
J304
J303
J302
J301

RED
X301
A+
X302
P306
P307
ORN/GRN
L. CH.
WHT/GRN
R. CH.
BLK/WHT

S401
ON/OFF
SWITCH
VR303D
VOLUME
L. CH.
VR303C
VOLUME
R. CH.
VR303B
TONE
L. CH.
VR303A
TONE
R. CH.
C401
S301
AM-FM
B+

* TO CHASSIS GROUND
THRU SPRING SECTION OF SWITCH.

J402
SPEAKER
CABLE
ASSY.

AM AUDIO
AM B+
VRAC B+
VRAC TUNING VOLTAGE
GND.
AM ANT. INPUT

AM TUNER PANEL (TOP COPPER VIEW)
P106
P105
P104
P103
P102
P101

L101C
L101B
L101A
L101D
F S F S F S F S F S F S

GRN
RED/WHT
GRN
RED/WHT
PINK

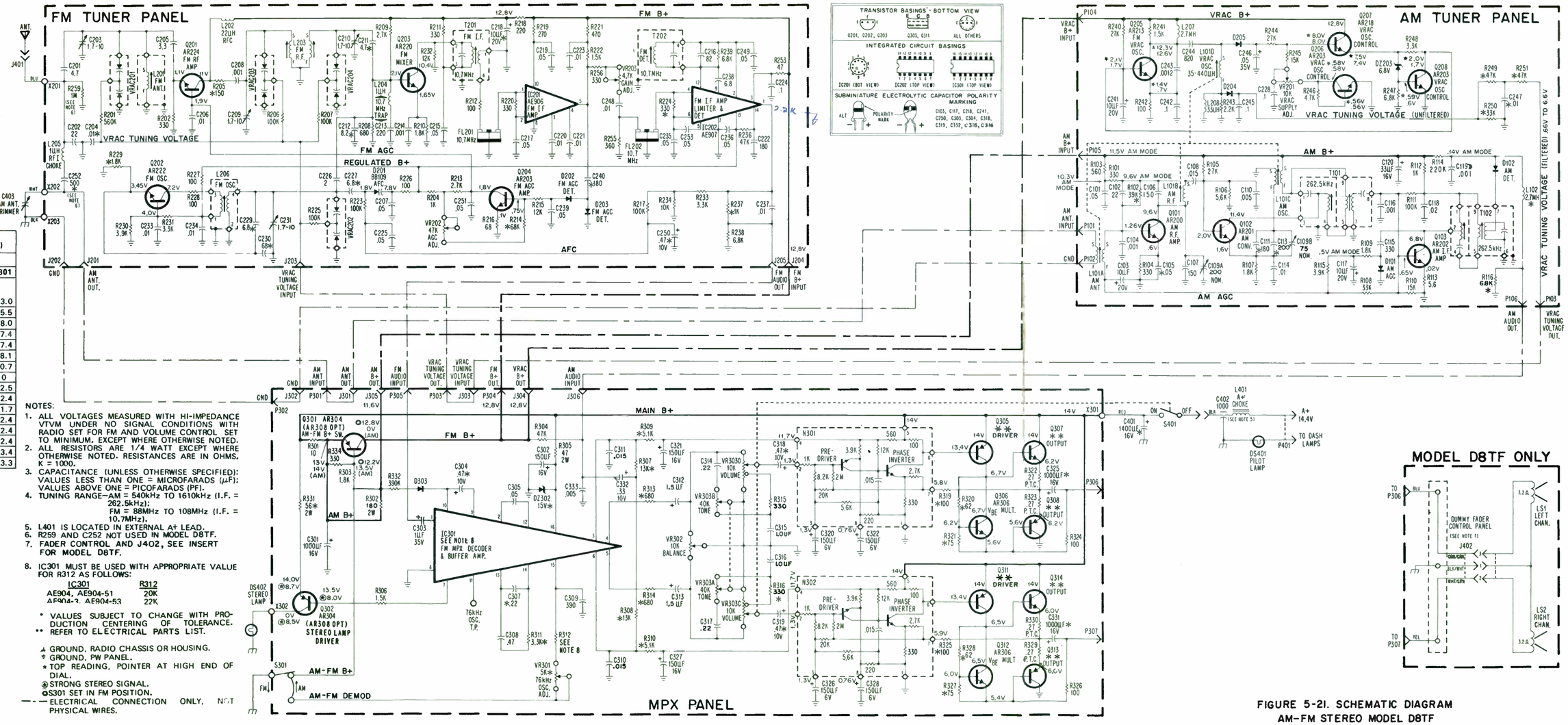
L101C
AM
OSC.
L101B
AM
R.F.
L101A
AM
ANT.
L101D
VRAC
OSC.

P4**
A+ & PILOT
LAMP CABLE
ASSY.
BLK "A+"
L401
A+ CHOKE
BLK A+
TO C402
BLU/RED
DS401
PILOT LAMP

(FOR MODEL D8TF ONLY)

LEAD DRESS DRAWING
BLUE WIRE
(TO LIE FLAT ON PANEL AND
PASS UNDER WHITE WIRE)
BACK PLATE
WHITE WIRE
(TO PASS OVER BLUE WIRE)
FM
TUNER
PANEL
L203
Q201
X201
C403
AM ANT.
TRIMMER
VRAC
204
L201
C204
X203
L205
X202
J401
ANT.
J203
J202
J201
BLACK WIRE
(TO LIE FLAT ON PANEL AND
PASS UNDER BLUE WIRE)

FIGURE 5-22. WIRING DIAGRAM
AM-FM STEREO MODEL D8TF



IC VOLTAGE CHART (VDC)			
PIN NO.	IC 201	IC 202	IC 301
1	2.2	4.0	3.0
2	2.2	3.6	5.5
3	2.2	11.8	8.0
4	2.2	1.45	7.4
5	11.4	1.45	7.4
6	1.8	1.45	8.1
7	0.1	0	0.7
8	0	0	0
9	9.2	0.22	2.5
10	9.2	1.5	2.4
11		2.95	1.7
12		3.6	2.4
13		7.8	2.4
14		4.6	2.4
15			3.4
16			13.3

NOTES:
1. ALL VOLTAGES MEASURED WITH HI-IMPEDANCE VTVM UNDER NO SIGNAL CONDITIONS WITH RADIO SET FOR FM AND VOLUME CONTROL SET TO MINIMUM, EXCEPT WHERE OTHERWISE NOTED.
2. ALL RESISTORS ARE 1/4 WATT EXCEPT WHERE OTHERWISE NOTED. RESISTANCES ARE IN OHMS, K = 1000.
3. CAPACITANCE (UNLESS OTHERWISE SPECIFIED): VALUES LESS THAN ONE = MICROFARADS (μF); VALUES ABOVE ONE = PICOFARADS (PF).
4. TUNING RANGE—AM = 540kHz TO 1610kHz (I.F. = 262.5kHz); FM = 88MHz TO 108MHz (I.F. = 10.7MHz).
5. L401 IS LOCATED IN EXTERNAL A+ LEAD.
6. R259 AND C252 NOT USED IN MODEL D8TF.
7. FADER CONTROL AND J402, SEE INSERT FOR MODEL D8TF.
8. IC301 MUST BE USED WITH APPROPRIATE VALUE FOR R312 AS FOLLOWS:

IC301	R312
AE904, AE904-51	20K
AE904-3, AE904-53	22K

* VALUES SUBJECT TO CHANGE WITH PRODUCTION CENTERING OF TOLERANCE.
** REFER TO ELECTRICAL PARTS LIST.

⏚ GROUND, RADIO CHASSIS OR HOUSING.
⏚ GROUND, PW PANEL.
* TOP READING, POINTER AT HIGH END OF DIAL.
◉ STRONG STEREO SIGNAL.
⊙ S301 SET IN FM POSITION.
– – – ELECTRICAL CONNECTION ONLY, NOT PHYSICAL WIRES.

FIGURE 5-21. SCHEMATIC DIAGRAM AM-FM STEREO MODEL D8TF

ELECTRICAL PARTS LIST (Cont'd)

AM-FM STEREO MODEL D8TF

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
C403	C	85 pf (nom.), AM ant. trimmer	3L1-0003-2
		DIODES	
D101	P	AGC Detector	3L4-2003-1
D102	P	AM Detector	3L4-2003-1
D201	P	AFC (green)	**3L4-3503-5**
D201	P	AFC (blue) (opt.)	**3L4-3503-6**
D201	P	AFC (violet) (opt.)	**3L4-3503-7**
D202	P	FM AGC Detector	3L4-2003-3
D203	P	FM AGC Detector	3L4-2003-3
D204	P	VRAC Osc. Rectifier	3L4-3002-7
D205	P	VRAC Osc. Rectifier	3L4-3002-7
—	—		—
D303	P	AM-FM B+ Switching	3L4-3002-4
DZ203	P	6.8V Zener, VRAC supply regulator	3L4-3506-2
DZ302	P	15V Zener, IC301 protection	3L4-3506-29
		VARACTORS	
VRAC201	P	Varactor, ant. tuning (blue)	3L4-3508-2
VRAC202	P	Varactor, osc. tuning (white)	3L4-3508-1
VRAC203	P	Varactor, RF tuning (blue)	3L4-3508-2
VRAC204	P	Varactor, RF tuning (blue)	3L4-3508-2
		CAUTION: Varactors are used together in the combinations listed above. Replace a defective varactor only with a varactor having the same color dot shown on the unit removed.	
		PILOT LAMPS	
DS401	K	1893, pilot lamp	3L4-0001-6
DS402	K	1892, stereo lamp	3L4-0001-8
		COILS	
L101A	D	AM Ant. Tuning	3L2-0007-11
L101B	D	AM RF Tuning	3L2-0007-10
L101C	D	AM Osc. Tuning	3L2-0002-8

*Warranty Component Category

SYM-BOL	* WARR.	DESCRIPTION	
L101D	D	VRAC Osc. Tuning	3L2-0027-1
L102	D	2.7 mH, RF choke	3L2-0023-5
L201	D	FM Ant. Tuning	3L2-0016-1
L202	D	22 μH ±10%, RF choke	3L2-0023-3
L203	D	FM RF Tuning	3L2-0029-1
L204	D	1 μH ±5%, 10.7 MHz trap	3L2-0023-1
L205	D	1 μH ±5%, RF choke, AM ant. input	3L2-0023-1
L206	D	FM Osc. Tuning	3L2-0028-1
L207	D	2.7 mH ±5%, RF choke	3L2-0023-5
L208	D	33 μH ±5%, VRAC osc. tank	3L2-0023-4
L401	D	A+ Line Choke	3L2-0020-2
		NETWORKS	
FL201	B	I.F. Filter, 10.7 MHz	**3L5-5003-1**
FL202	B	I.F. Filter, 10.7 MHz NOTE: Replace I.F. Filter with same color code as on component removed, or replace both filters with a pair having the same color code.	**3L5-5003-1**
N301	B	Audio, L-ch.	**3L5-0011-9**
N302	B	Audio, R-ch.	**3L5-0011-9**
		TRANSISTORS	
Q101	A	AR200 (white), AM RF amp.	3L4-6007-1
Q102	A	AR201 (yellow), AM conv.	3L4-6007-2
Q103	A	AR202 (green), AM I.F. amp.	3L4-6007-3
Q201	A	AR224 (white, yellow), FM RF amp.	3L4-6007-35
Q202	A	AR222 (blue, yellow), FM osc.	3L4-6007-23
Q203	A	AR220 (green, yellow), FM mixer	3L4-6007-21
Q204	A	AR203 (red), FM AGC amp.	3L4-6007-4
Q205	A	AR213 (violet), VRAC osc.	3L4-6007-14
Q206	A	AR203 (red), VRAC osc. control	3L4-6007-4
Q207	A	AR218 (red, orange), VRAC osc. control	3L4-6007-19
Q208	A	AR203 (red), VRAC osc. control	3L4-6007-4
Q301	A	AR304 (red), AM-FM B+ switch	3L4-6010-4
Q302	A	AR304 (red), stereo lamp driver	3L4-6010-4
Q302	A	AR308 (violet), stereo lamp driver (opt.)	**3L4-6010-8**
Q305	A	AR44 audio driver, L-ch.	3L4-6011-11
Q305	A	audio driver, L-ch. (opt.)	3L4-6011-14
Q306	A	AR306 (orange or blue), V_{BE} multiplier, L-ch.	3L4-6010-6
Q307 **	A	NPN Output Amp., L-ch. order assy. no., includes Q307, Q308 & heatsink	7L6-0444-1
Q308**	A	PNP Output Amp., L-ch. order assy. no., includes Q307, Q308 & heatsink	7L6-0444-1

** See output transistor chart figure 5-24.

ELECTRICAL PARTS LIST (Cont'd)
AM-FM STEREO MODEL D8TF

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
Q311	A	AR44, audio driver, R-ch.	3L4-6011-11
Q311	A	audio driver, R-ch. (opt.)	3L4-6011-14
Q312	A	AR306 (orange or blue), VBE multiplier, R-ch.	3L4-6010-6
Q313**	A	NPN Output Amp., R-ch. order assy. No. includes Q313, Q314 & heatsink	7L6-0444-I
Q314 **	A	PNP Output Amp., R-ch. order assy. No. includes Q313, Q314 & heatsink	7L6-0444-I
		INTEGRATED CIRCUITS	
IC201	S	AE906, FM I.F. amp.	3L4-9006-1
IC202	S	AE907, FM I.F. amp., limiter, and detector	3L4-9007-1
IC301	S	AE904 FM MPX decoder and buffer amp. (See Note 8, Figure 5-21)	3L4-9004-1
IC301	S	AE904-3 FM MPX decoder and buffer amp. (opt.) (See Note 8, Figure 5-21)	3L4-9004-3

SYM-BOL	* WARR.	DESCRIPTION	
		RESISTORS	
R101	G	330 ohms ±10%, 1/4W, Q101 collector load	
R102	G	39K ±10% 1/4W, Q101 base bias	
R103	G	560 ohms ±10% 1/4W, RF B+ dropping	
R104	G	330 ohms ±10% 1/4W, Q101 emitter	
R105	G	27K ±10% 1/4W, Q102 base bias	
R106	G	5.6K ±10% 1/4W, Q102 base bias	
R107	G	1.8K ±10% 1/4W, Q102 emitter	
R108	G	33K ±10% 1/4W, Q103 base	
R109	G	1.8K ±10% 1/4W, AM AGC det. load	
R110	G	15K ±10% 1/4W, Q103 base bias	
R111	G	100K ±10% 1/4W, Q103 base bias	
R112	G	1K ±10% 1/4W, AM I.F. B+ dropping	
R113	G	5.6 ohms ±10% 1/4W, Q103 emitter	

*Warranty Component Category
** See output transistor chart figure 5-24

ELECTRICAL PARTS LIST (Cont'd)
AM-FM STEREO MODEL D8TF

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
R315	G	330 ohms ±5% 1/4W, volume control top, L-ch.	
R316	G	330 ohms ±5% 1/4W, volume control top, R-ch.	
R319	G	100 ohms ±10% 1/4W, DC feedback, L-ch.	
R320	G	62 ohms ±5% 1/4W, Q306 bias	3L3-062123
R320 **	G	59 ohms ±5% 1/4 W, Q306 bias	3L3-059210
R321 **	G	75 ohms ±5% 1/4W, Q306 bias	3L3-075123
R321 **	G	68 ohms ±5% 1/4 W, Q306 bias	3L3-068123
R322 **	G	.27 ohms P.T.C., Q307 emitter	3L3-0004-7
R323	G	.27 ohms P.T.C., Q308 emitter	3L3-0004-7
R324	G	100 ohms ±10% 1/2W, Q305 collector load	
R325	G	100 ohms ±10% 1/4W, DC feedback, R-ch.	
R326	G	100 ohms ±10% 1/2W, Q311 collector load	
R327 **	G	75 ohms ±5% 1/4W, Q312 bias	3L3-075123
R327 **	G	68 ohms ±5% 1/4W, Q312 bias	3L3-068123
R328 **	G	62 ohms ±5% 1/4W, Q312 bias	3L3-062123
R328 **	G	59 ohms ±5% 1/4W, Q312 bias	3L3-059210
R329 **	G	.27 ohms P.T.C., Q313 emitter	3L3-0004-7
R330	G	.27 ohms P.T.C., Q314 emitter	3L3-0004-7
R331	G	56 ohms ±10% 2W, Q302 emitter	

SYM-BOL	* WARR.	DESCRIPTION	SERVICE PART NO.
R332	G	390K ±10% 1/4W, D303 isolation	
R334	G	330 ohms ±10% 1/4W, Q301 emitter	
		CONTROLS	
VR201	H	10K, VRAC osc. adjust	3L3-0018-4
VR202	H	47K, FM AGC adjust	3L3-0018-8
VR203	H	4.7K, FM I.F. gain adjust	3L3-0018-7
VR301	H	5K, 76kHz osc. adjust	3L3-0027-1
VR302	H	10K, balance	3L3-0048-I
VR303A, B, C, D	H	Dual 10K Vol/40K Tone & On-Off Switch S401,	3L3-0025-10
		TRANSFORMERS	
T101	E	262, 5kHz, AM 1st I.F.	3L2-0019-1
T102	E	262, 5kHz, AM 2nd I.F.	3L2-0019-2
T201	E	10, 7MHz, FM I.F.	3L2-0022-1
T202	E	10.7MHz, FM detector	3L2-0030-1
		SWITCHES	
S301	I	Spring, AM-FM B+ switch	2L8-0390-3
S401	I	On-Off Switch	(Part of VR303A,B, C,D)

*Warranty Component Category
**See output transistor chart figure 5-24.

International Harvester 111643C1, 111645C1

ALIGNMENT INSTRUCTIONS

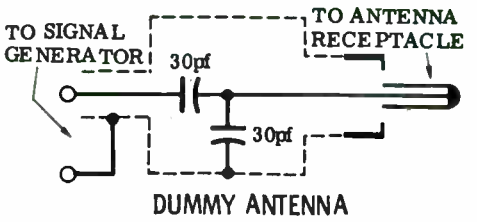
Check for specified source voltage
Connect low sides of generator and
indicator to ground unless specified otherwise.
Use only enough generator output
to provide a usable indication.
Suggested Alignment Tools: GC ELECTRONICS:
ALL coils and trimmers.....5000,8276,9089

AM ALIGNMENT—SELECTOR IN AM POSITION

Connect output meter across speaker voice coil.

GENERATOR COUPLING	GENERATOR FREQUENCY	RADIO DIAL SETTING	ADJUST	REMARKS
High side thru .1uF antenna.	262kHz 400-Hz mod.	High freq end stop	T402, CF401	Adjust for maximum.
Thru dummy antenna to antenna input.	600kHz 400-Hz mod.	600kHz	T401	"
Thru dummy antenna to antenna input.	1615kHz 400-Hz mod.	1615kHz	TC402, TC401	"
Thru dummy antenna to antenna input.	1400kHz 400-Hz mod.	1400kHz	TC001	Adjust for maximum. Repeat alignment until no further improvement is noted.

With radio installed in car and antenna extended 36", tune in a weak station near 1400kHz and adjust TC001 for maximum output. Antenna adjustment is located on top of cabinet along right edge when viewed from front.



FM IF ALIGNMENT USING FM SIGNAL GENERATOR—SELECTOR IN FM POSITION

High side of generator thru .001uF to Antenna.
Use only enough marker signal for indication. Use 60-hertz, frequencey-modulated signal, 450kHz sweep.
Use 60-hertz sawtooth voltage in scope for horizontal deflection.

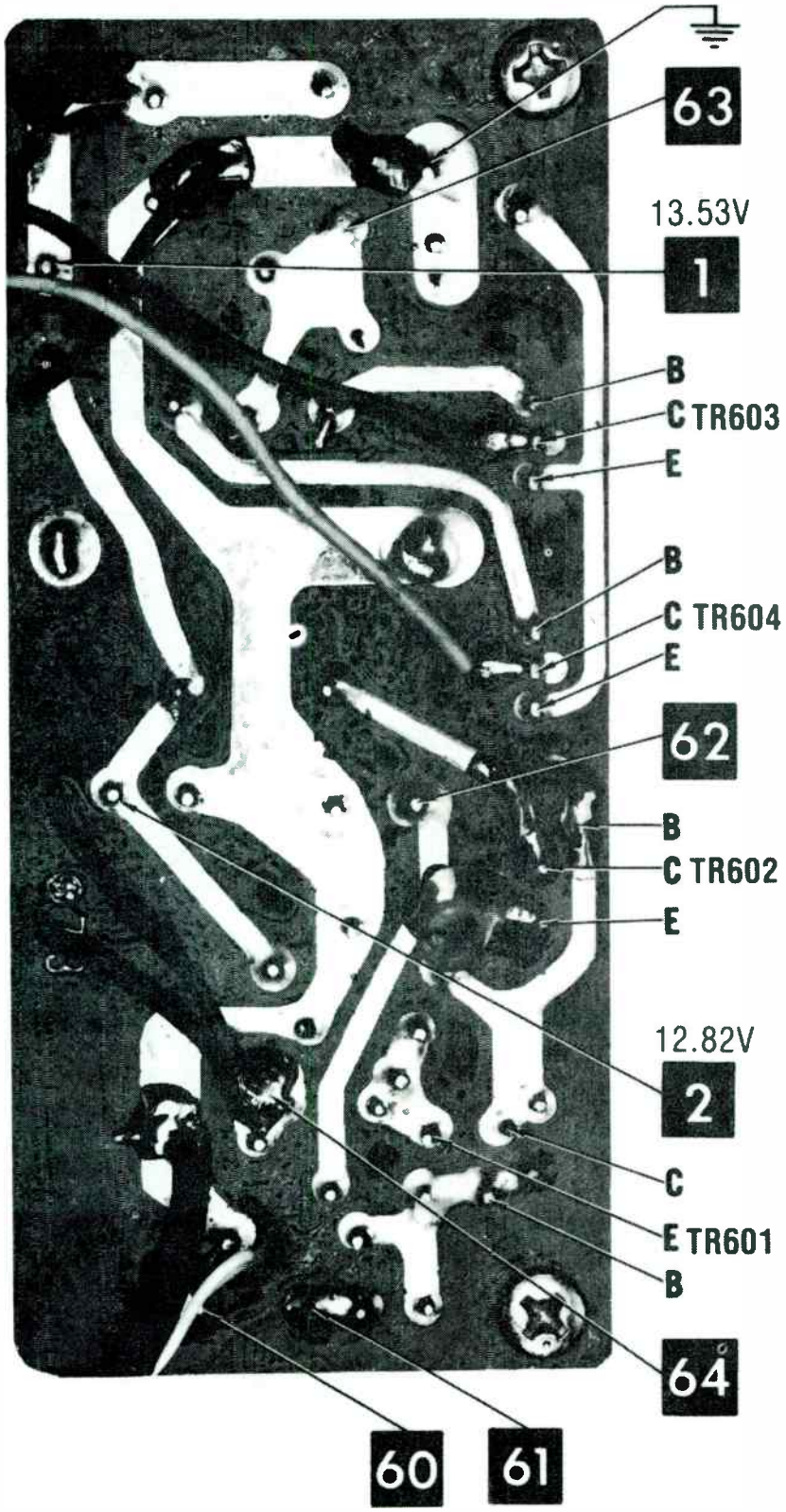
GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUST	REMARKS
10.7MHz 450kHz Sweep	Point of non-interference	Vert input of scope to TP2.	T203,T202, T201,T101	Adjust T203 to place marker at center of S curve similar to Fig. 2. Readjust T202 for maximum amplitude and straightness of line.

FM RF ALIGNMENT—SELECTOR IN FM POSITION

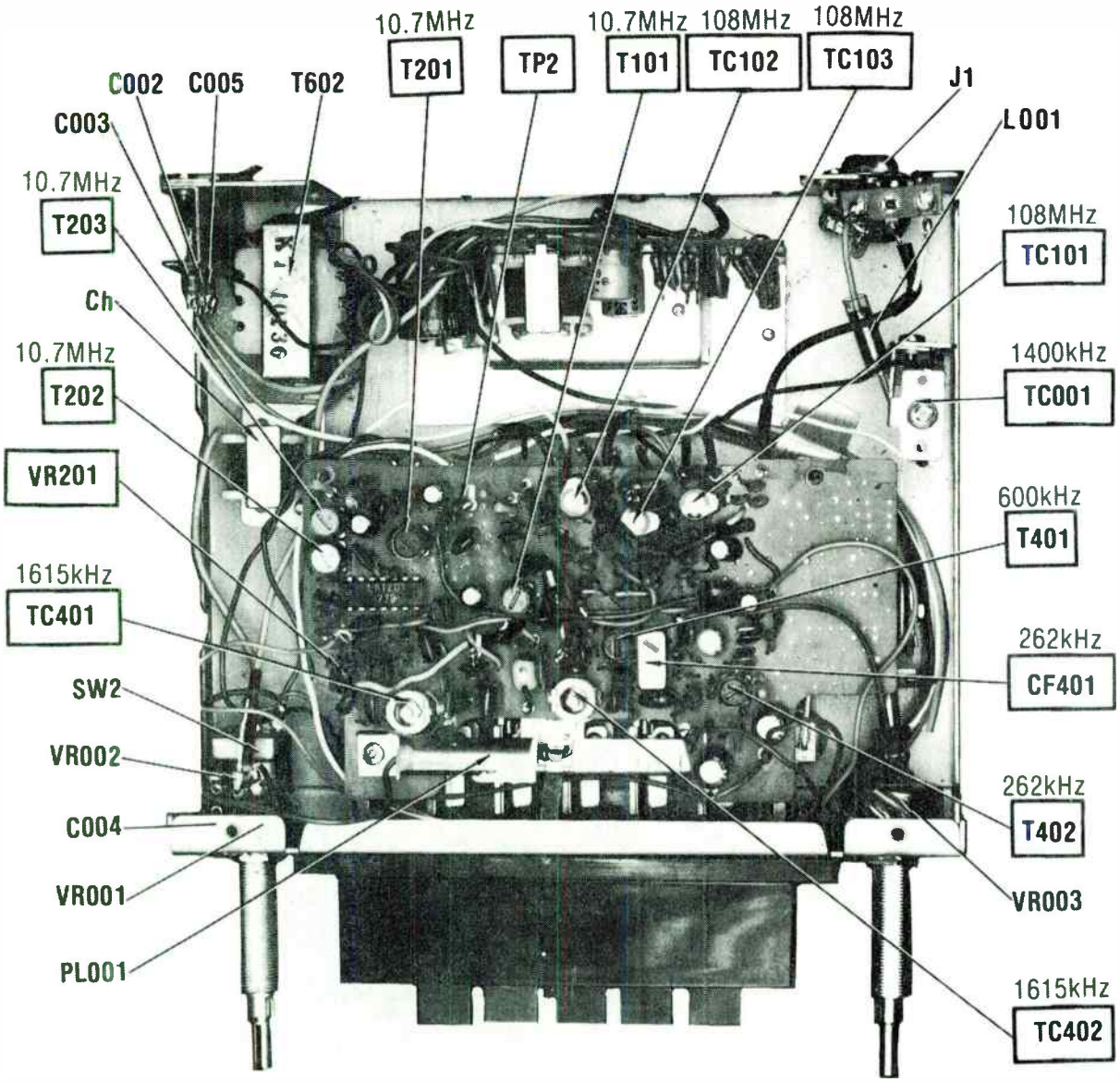
GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUST	REMARKS
108MHz Modulated	108MHz	DC probe of VTVM to speaker.	TC103, TC102,TC101	Adjust for maximum.

BIAS ADJUST

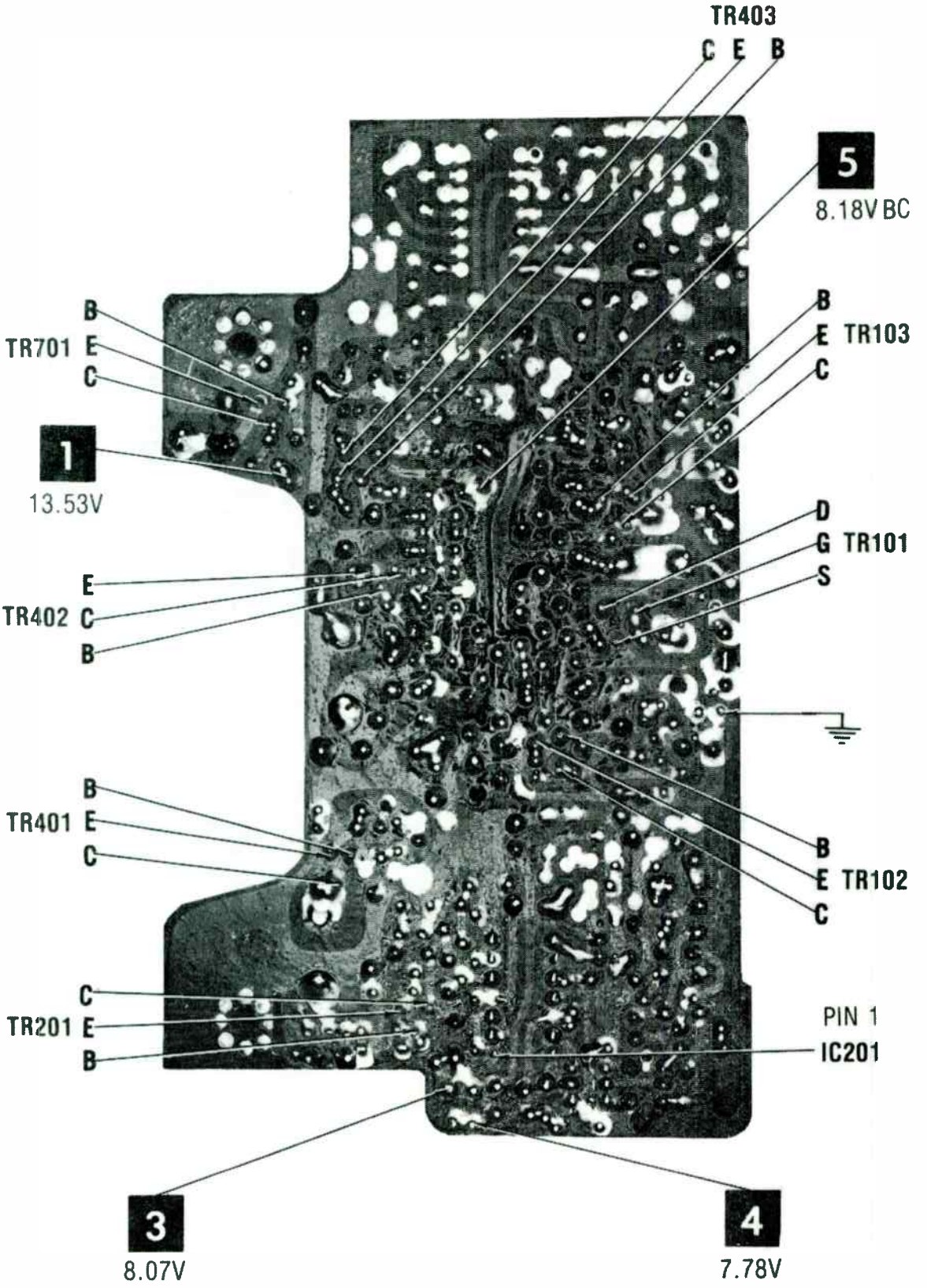
Adjust VR201 for .64V DC at base of TR201.



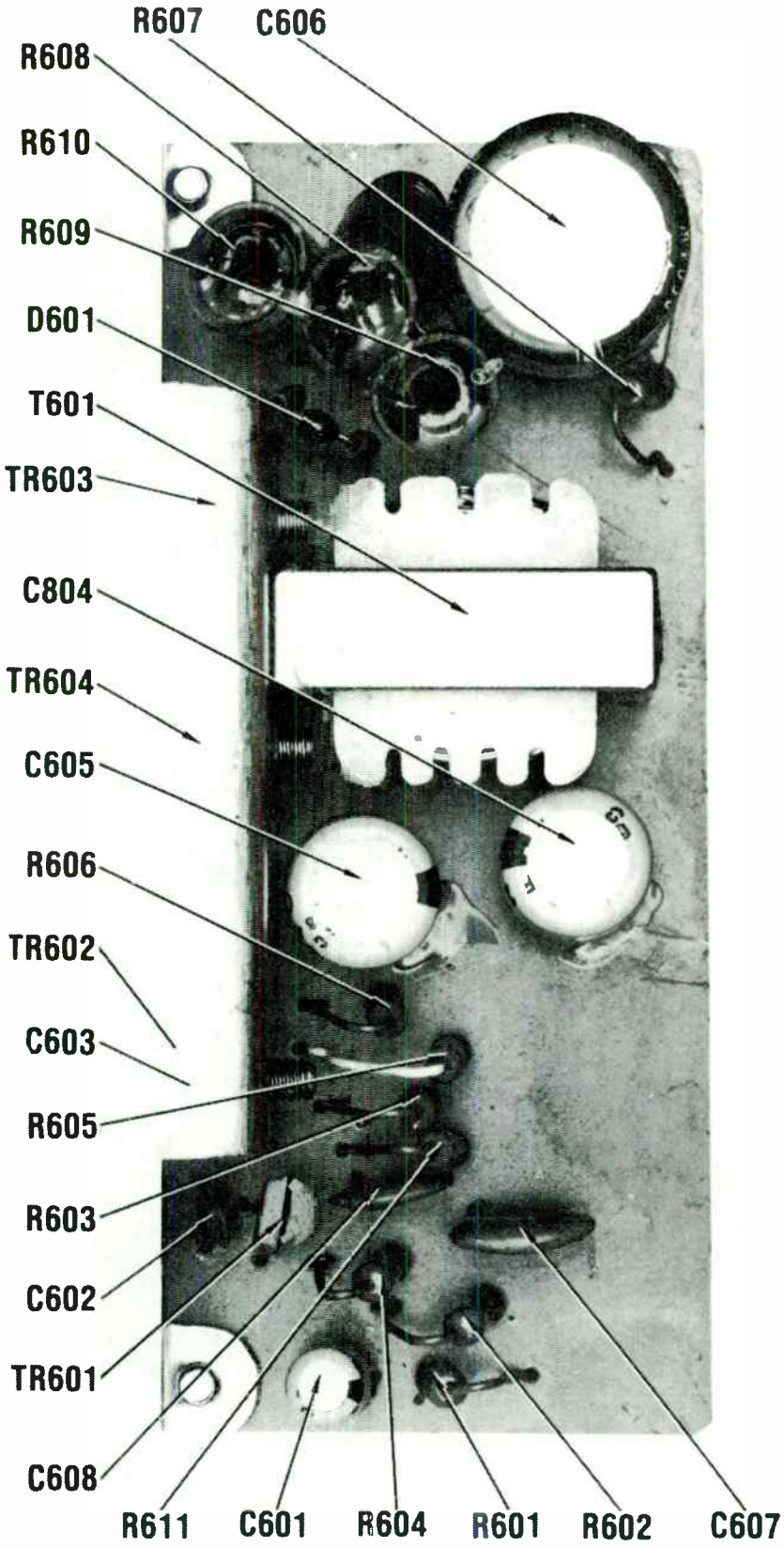
AUDIO BOARD



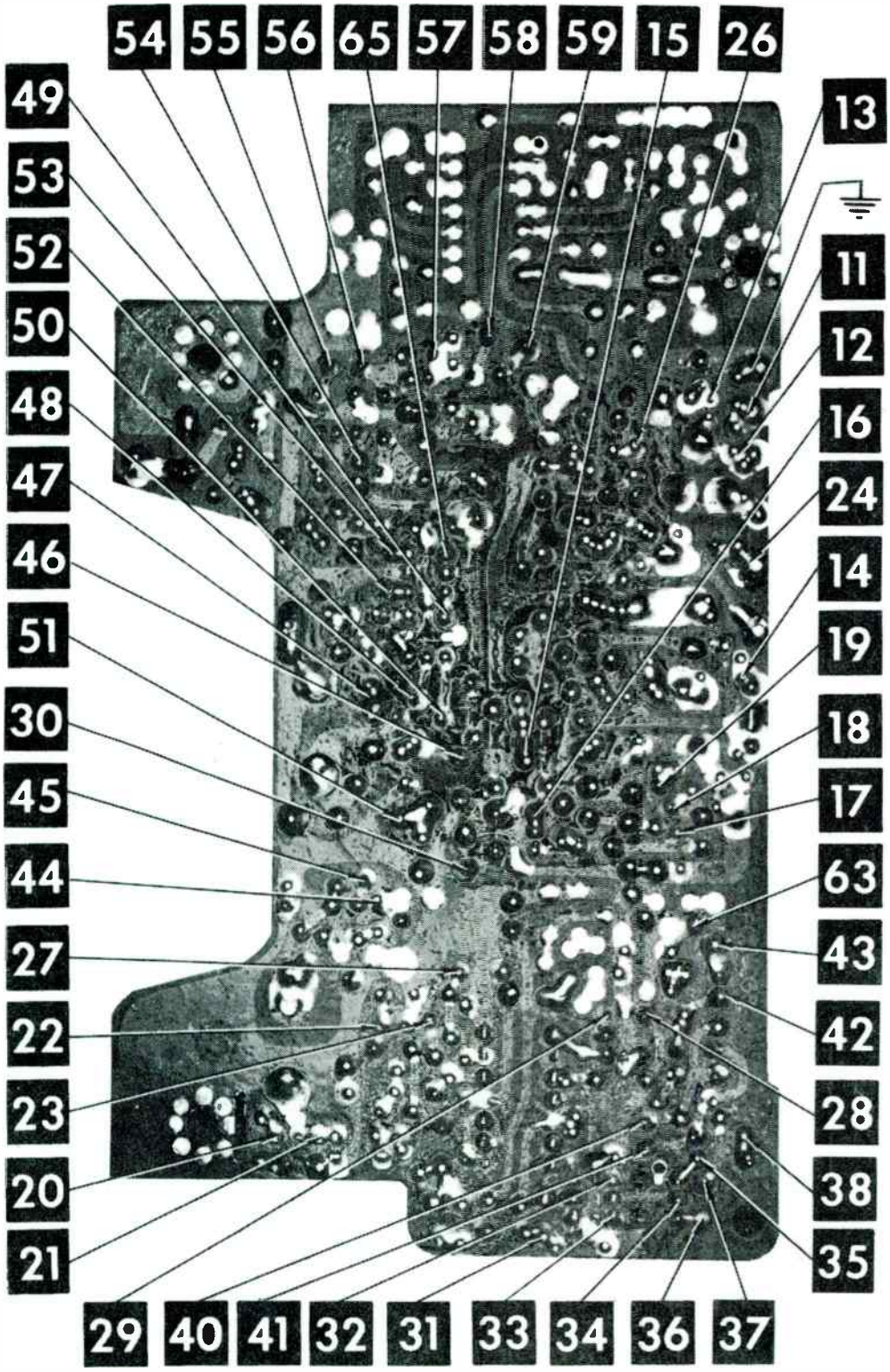
OVERALL-TOP



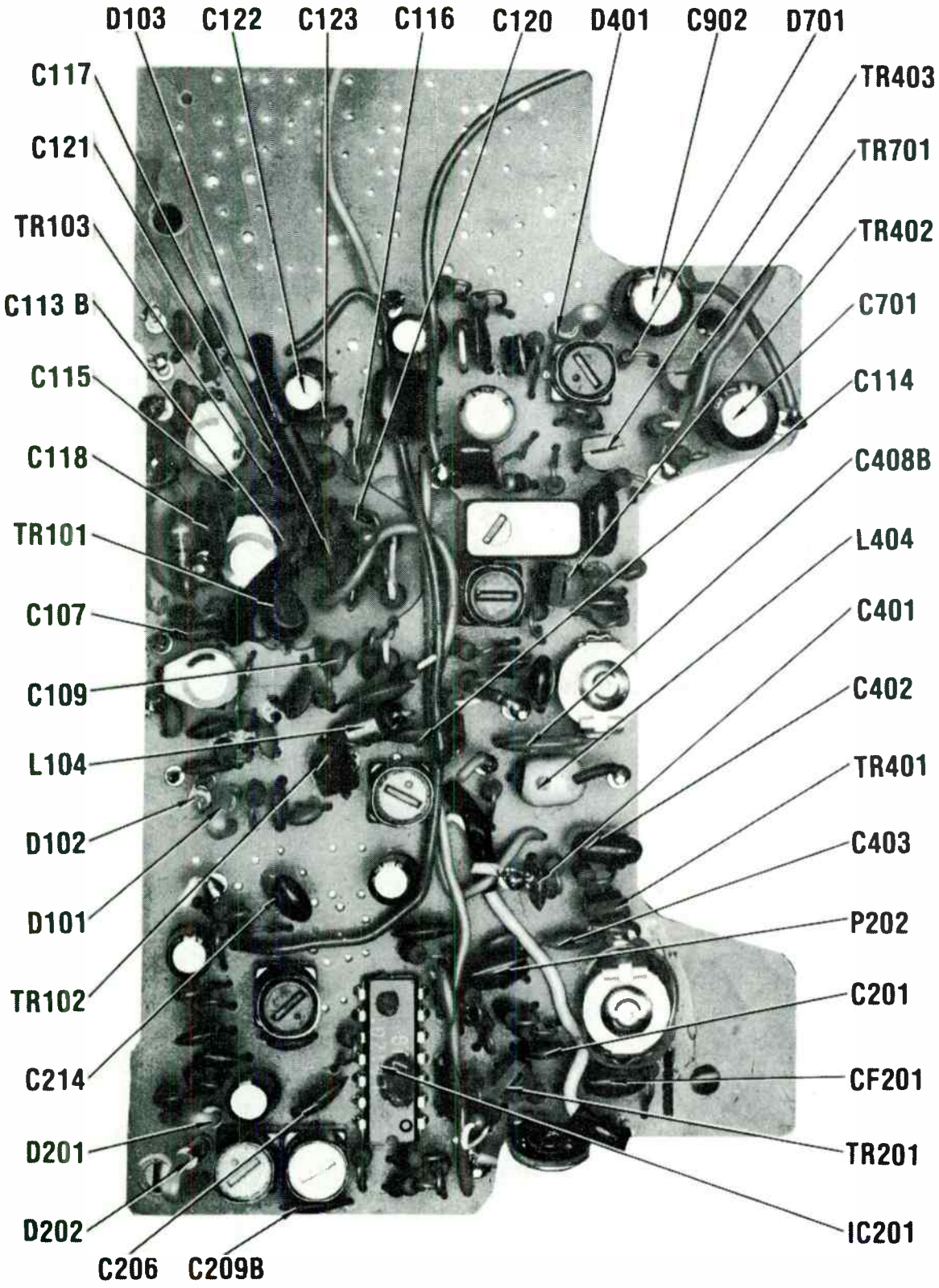
MAIN BOARD



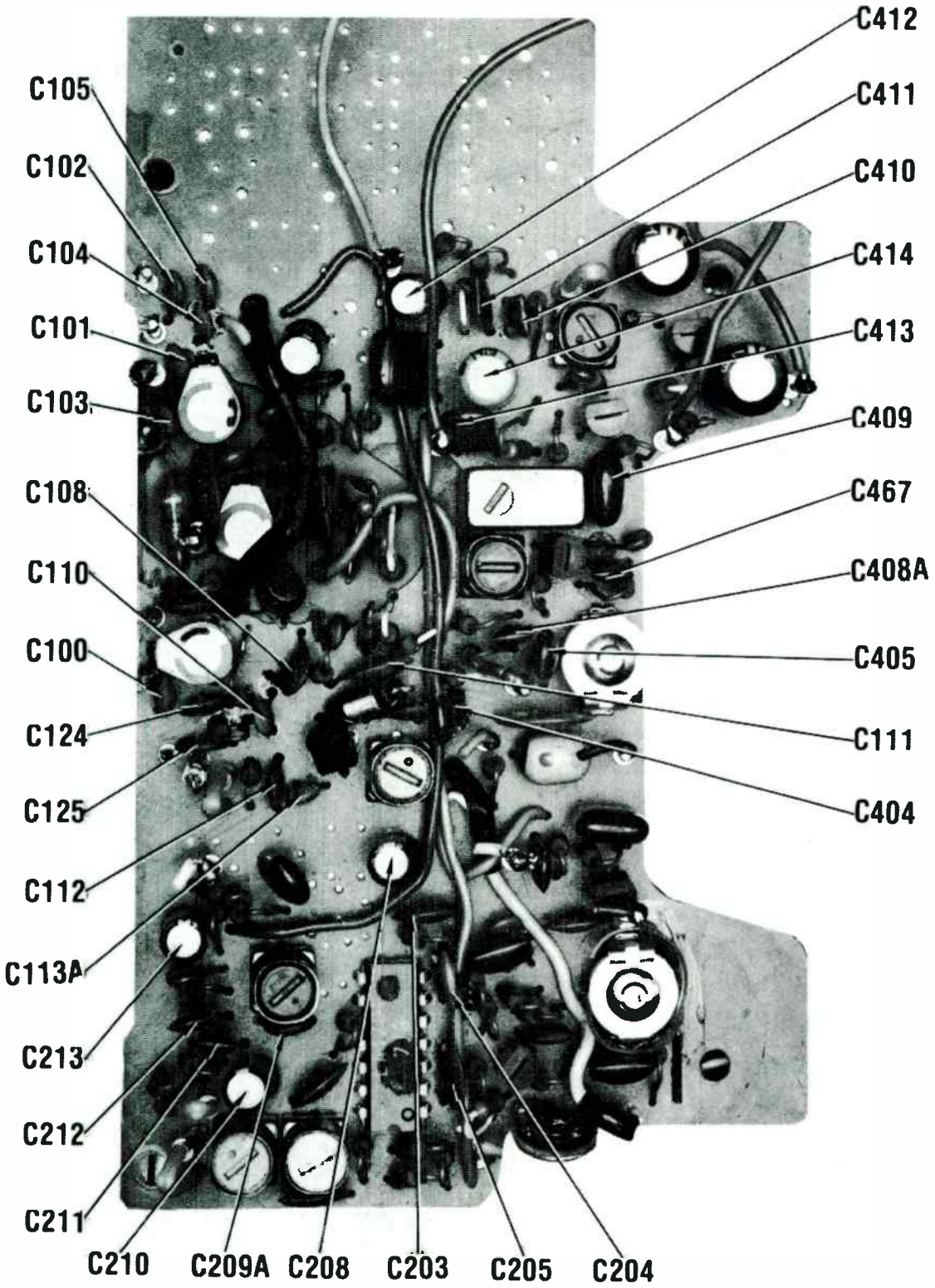
AUDIO BOARD



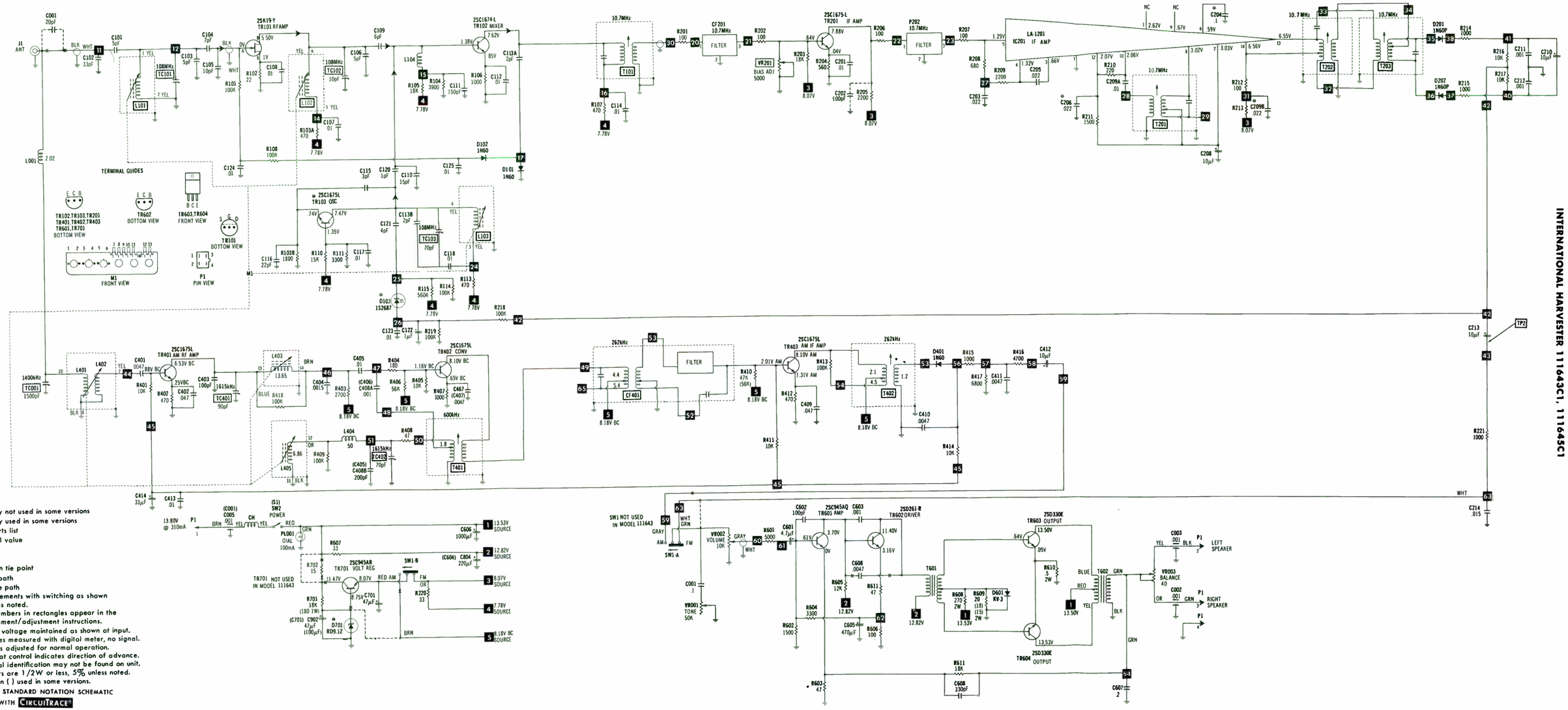
MAIN BOARD



MAIN BOARD



MAIN BOARD

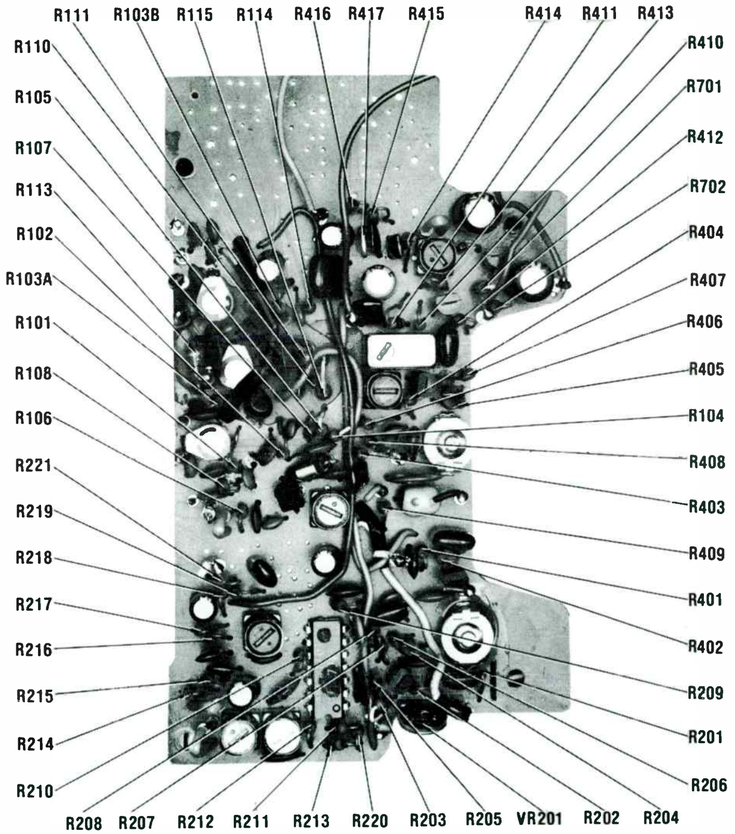


- Circuitry not used in some versions
- Circuitry used in some versions
- See parts list
- Nominal value
- Ground
- Chassis
- Common tie point
- Signal path
- Voltage path

Measurements with switching as shown unless noted.
Item numbers in rectangles appear in the alignment/adjustment instructions.
Supply voltage maintained as shown at input.
Voltages measured with digital meter, no signal.
Controls adjusted for normal operation.
Arrow at control indicates direction of advance.
Terminal identification may not be found on unit.
Resistors are 1/2W or less, 5% unless noted.
Value in ( ) used in some versions.

A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE®

INTERNATIONAL HARVESTER 1116443C1, 1116445C1



MAIN BOARD

PARTS LIST AND DESCRIPTION

WIRING DATA

General-use Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 13 Colors 8524 (Stranded) Available in 13 Colors
Shielded Antenna Lead	Use BELDEN No. 8240 (Solid) Miniature (RG-58/U) 8259 (Stranded) Miniature (RG-58A/U)
Shielded Cable	Use BELDEN No. 8401 or 8421

SEMICONDUCTORS

ITEM No.	TYPE No.	BOMAN PART No.	REPLACEMENT DATA									
			GENERAL ELECTRIC PART No.	MALLORY PART No.	MOTOROLA PART No.	RAYTHEON PART No.	RCA PART No.	SPRAGUE PART No.	SYLVANIA PART No.	THORDARSON PART No.	WORKMAN PART No.	ZENITH PART No.
D101	1N60	103-007	1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D102	1N60	103-007	1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D103	1S2687				HEPR2502	REN 612			ECG612			103-176
D201	1N60P		1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
0202	1N60P		1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D401	1N60	103-007	1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D601	KV-3(1)	103-148		PTC301		REN 601	SK3463		ECG601			
	MV-3(2)	103-148		PTC301		REN 601	SK3463		ECG601			
D701	RD9.1Z(1)	103-106	GEZD-9.1	ZB9.1B		REN 139	SK3041	RT-240	ECG139A	TM139/**	WEP1109	103-272
	XZ-082(2)	103-147	GEZD-8.2	ZB8.2B		REN 5072	SK3136	RT-257	ECG5072A	TM5072/**	WEP1108	
IC201	LA1201	101-011	GEIC-43		HEPC6083P	KEN 1003	SK3288	TVCM-75	ECG1003	LA1201	WEP2122	221-Z9021
TR101	2SK19Y	102-163	GE-FET-4	PTC182	HEPF2007	REN 222	SK3065	RT-181	ECG222	TM222	WEP905	121-826
TR102	2SC1674L		GE-61	PTC132*	HEPS0010*	REN 229*	SK3246	RT-308	ECG229*	TM229*	WEP784	121-Z9021
TR103	2SC1675L	102-143	GE-213	PTC132*	HEPS0025*	REN 229*	SK3122	RT-308	ECG229*	TM229*	WEP773	121-Z9021
	2SC839H	102-108	GE-61*	PTC132*	HEPS0015*	REN 123A*	SK3444	RT-308	ECG123A*	TM123A*/**	WEP1945	121-Z9000A*
TR201	2SC1675L	102-143	GE-213	PTC132*	HEPS0025*	REN 229*	SK3122	RT-308	ECG229*	TM229*	WEP773	121-Z9021
TR401	2SC1675L	102-143	GE-213	PTC132*	HEPS0025*	REN 229*	SK3122	RT-308	ECG229*	TM229*	WEP773	121-Z9021
	2SC839H	102-108	GE-61*	PTC132*	HEPS0015*	REN 123A*	SK3444	RT-308	ECG123A*	TM123A*/**	WEP1945	121-Z9000A*
TR402	2SC1675L	102-143	GE-213	PTC132*	HEPS0025*	REN 229*	SK3122	RT-308	ECG229*	TM229*	WEP773	121-Z9021
	2SC839H	102-108	GE-61*	PTC132*	HEPS0015*	REN 123A*	SK3444	RT-308	ECG123A*	TM123A*/**	WEP1945	121-Z9000A*
TR403	2SC1675L	102-143	GE-213	PTC132*	HEPS0025*	REN 229*	SK3122	RT-308	ECG229*	TM229*	WEP773	121-Z9021
	2SC839H	102-108	GE-61*	PTC132*	HEPS0015*	REN 123A*	SK3444	RT-308	ECG123A*	TM123A*/**	WEP1945	121-Z9000A*
TR501	2SC945AQ		GE-212	PTC121*	HEPS0015*	REN 199	SK3124	RT-107A	ECG199	TM199/**	WEP1945	121-972
	2SC945-O(1)		GE-212	PTC121*	HEPS0015*	REN 199	SK3124	RT-107A	ECG199	TM199/**	WEP1945	121-972
	2SC945G(2)		GE-212	PTC121*	HEPS0015*	REN 199	SK3124	RT-107A	ECG199	TM199/**	WEP1945	121-972
TR602	2SD261R(2)	102-158	GE-63*	PTC178		REN 192*	SK3137		ECG192*	TM192*	WEP753*	121-Z9014*
	2SC261R(1)		GE-63*	PTC178		REN 192*	SK3137		ECG192*	TM192*	WEP753*	121-Z9014*
TR603	2SD330E	102-191	GE-66	PTC167	HEPS5027	REN 152	SK3054	RT-154	ECG152	TM152	WEP745	121-987-02
TR604	2SD330E	102-191	GE-66	PTC167	HEPS5027	REN 152	SK3054	RT-154	ECG152	TM152	WEP745	121-987-02
TR701	2SC945AR		GE-212	PTC121*	HEPS0015*	REN 199	SK3124	RT-107A	ECG199	TM199/**	WEP1945	121-972
	2SC945R	102-118	GE-212	PTC121*	HEPS0015*	REN 199	SK3124	RT-107A	ECG199	TM199/**	WEP1945	121-972

* Lead configuration may vary from original.
/** Also available as exact type replacement.

(1) Used in Model 111645.
(2) Used in Model 111643.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA				
		BOMAN PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No. Q-LINE	SPRAGUE PART No. GENERAL LINE
C122	1 50V		PC1-50	VTT1A50	QV1-11	EV-1615
C208	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C210	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C213	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C412	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C414	33 16V		PC30-25	VTT33D25	QV1-63	EV-1325
C601	4.7 25V		PC5-50	VTT4R7B50	QV1-27	EV-1319
C605	470 10V		PC500-16	VTT470K16	QV1-149	EV-1150
C606	1000 16V		PC1000-16	VTT1000L16	QV1-183	EV-1260
C701	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
C804	220 16V		PC250-25	VTT220H16	QV1-117	EV-1240
(C604)		(1)				
C902	47 16V		PC50-16	VTT47D16	QV1-73	EV-1226
(C701)	100	(1)				

(1) Callouts in parenthesis are used in Model 111643.

CAPACITORS

ITEM No.	RATING	BOMAN PART No.	REPLACEMENT DATA				
			CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No. Q-LINE	SPRAGUE PART No. GENERAL LINE
C001	20						
C002	.001						
C003	.001						
C004	.1 12V		UK12-104		MAG1201		HY-360
C005	.001						
(C001)		(1)					
C101	5			GP5	GP550	QC2-1	5GAV50
C102	33			GP33	GP433	QC2-27	5GAQ33
C103	5			GP5	GP550	QC2-1	5GAV50
C104	7				GP580		5GAV75
C105	10			GP10	GP410	QC2-9	5GAQ10
C106	5			GP5	GP550	QC2-1	5GAV50
C107	.01		UK16-103		MAG1611		HY-420
C108	.01		UK16-103		MAG1611		HY-420
C109	6				GP568		5GAV68
C110	15				GP415	QC2-13	5GAQ15
C111	150		DD-151		GP315		10TS-T15
C112	.01		UK16-103		MAG1611		HY-420
C113A	2				GP533		30GA-V15
C113B	2 N750 ±.5				CN7522		
C114	.01		UK16-103		MAG1611		HY-420
C115	3 N750				CN7533		
C116	22 N750		DTN-22	N22	CN7422		10TCU-Q22
C117	.01 10%			GP10000	MAG1611		
C118	.01 10%			GP10000	MAG1611		
C120	1 NPO				CN0510		10TCC-V10
C121	4 N750				CN7547		10TCU-V47
C123	.01		UK16-103		MAG1611		HY-420
C124	.01		UK16-103		MAG1611		HY-420
C125	.01		UK16-103		MAG1611		HY-420
C138	.01		UK16-103		MAG1611		HY-420
C202	100						HY-625
C203	.022		UK16-223				
C204	.02 12V		UK50-223		MAG5012		
	.1 12V		UK12-104		MAG1201		HY-360
C205	.022		UK16-223				HY-625
C206	.022		UK16-223				HY-625
	.02		UK50-223		MAG5012		
C209A	.01		UK16-103		MAG1611		HY-420
C209B	.022		UK16-223				HY-625
C211	.001 10%			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C212	.001 10%			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C214	.015			WMF1S15	M192P1539R8	QFT2-105	1FT-S15
C401	.0047 10%			WMF1D47	M192P4729R8	QFT2-63	1FT-D47
C402	.047			DPMS2S47	EWF1A147	QFT2-171	1FT-S47
C403	100		DD-101	GP100	GP310		10TS-T10
C404	.0015 10%			DPMS6D15	EWF6215	QFT2-13	1FT-D15
C405	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C408A	.001 10%			DMPS6D1	EWF1A210	QFT2-1	1FT-D10
(C406)		(1)			*		10TCT-T20
C408B	200 N470 5%						
(405)		(1)					
C409	.047			DPMS2S47	EWF1A147	QFT2-171	1FT-S47
C410	.0047 10%			WMF1D47	M192P4729R8	QFT2-63	1FT-D47
C411	.0047 10%			WMF1D47	M192P4729R8	QFT2-63	1FT-D47
C413	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C467	.0047 10%			WMF1D47	M192P4729R8	QFT2-63	1FT-D47
(C407)		(1)					
C602	100		DD-101	GP100	GP310		10TS-T10
C603	.001 10%			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C607	.2 12V		UK16-204				HY-470
C608	330		DD-331	GP330	GP333		10TS-T33
TC001	1500pF						
TC101							
TC102	10pF						
TC103	70pF						
TC401	90pF						
TC402	70pF						

(1) Used in Model 111643.

CONTROLS

ITEM No.	FUNCTION	RESISTANCE	REPLACEMENT DATA			
			BOMAN PART No.	CENTRALAB PART No.	MALLORY PART No.	TRW PART No.
VR001	Tone	50K				
VR002	Volume/Power Switch	10K				
VR003	Balance	40 2W				
VR201	Bias Adj	5000				X260R502B (2)

(2) Cut off one of the end terminals and bend to fit PC board.

PARTS LIST AND DESCRIPTION (CONTINUED)

COILS (RF-IF)

ITEM No.	FUNCTION	REPLACEMENT DATA			REMARKS
		BOMAN PART No.	OTHER IDENTIFICATION	MILLER PART No.	
CF401	IF (262kHz)		7822C		(1) Part of M1 (Tuner)
L001	RF Choke				(2) Used in Model 111643
L101	FM Antenna Matching	(1)			
L102	RF Amp	(1)			
L103	Oscillator				
L104	RF Choke				
L401	AM Antenna Matching	(1)			
L402	AM Antenna Matching	(1)			
L403	AM RF Amp	(1)			
(L402)		(1)(2)			
L404	RF Choke				
L405	Oscillator				
(L403)		(2)			
T101	Mixer (10.7MHz)		A750111M		
T201	FM IF Amp (10.7MHz)		L470053N		
T202	Ratio Detector				
T203	Ratio Detector				
T401	Oscillator (600kHz)				
T402	AM IF Amp (262kHz)		M22162N		

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	CURRENT (Meosured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	BOMAN PART No.	THORDARSON PART No.	TRIAD PART No.	
CH	.31A	.18	.77mH				

TRANSFORMER (Driver)

ITEM No.	TURNS RATIO			REPLACEMENT DATA			NOTES
	PRI.	SEC. 1	SEC. 2	BOMAN PART No.	THORDARSON PART No.	TRIAD PART No.	
T601	1	.5CT					

TRANSFORMER (Audio Output)

ITEM No.	IMPEDANCE		REPLACEMENT DATA			NOTES
	PRI.	SEC.	BOMAN PART No.	THORDARSON PART No.	TRIAD PART No.	
T602	32	8	KT-10130 (1)			(1) Number on unit.

MISCELLANEOUS

ITEM No.	PART NAME	BOMAN PART No.	NOTES
CF201	Filter		10.7MHz
CF401	Filter		262kHz
J1	Jack		Antenna
P1	Plug		DC Power Left/Right Speaker
PL001	Lamp		Dial (13.80V DC @ 100mA)
P202	Filter		10.7MHz
SW1	Switch		AM/FM
SW2	Switch		Power
(S1)		(1)	
	Printed Circuit Board		Audio
	Printed Circuit Board		Main

(1) Used in Model 111643.

CABINETS & CABINET PARTS

ITEM	PART No.
Cabinet, Bottom	
Cabinet, Top	
Escutcheon Assembly	
Knob AM/FM	

ITEM	PART No.
Knob, Tuning Assembly	
Knob, Volume Assembly	
Pushbutton, (5 used)	

Pages 73-86 Courtesy of J.I.L. CORP. of AMERICA

ALIGNMENT PROCEDURE OF AM-FM RADIO

Alignment was performed at factory with laboratory test equipments. Therefore, before alignment the set should be thoroughly checked for defects before proceeding alignment, and note following prior to alignment.

* Check the specified Voltages and source polarity.
* Use fresh batteries or well regulated DC power supply.
* Connect speaker or dummy load resistor 4 to 8 ohms to output cables.
* Non-metallic tools must be used for IF and RF Sect. alignments.
* Signal input must be kept as low as possible to avoid over load and clipping using highest possible sensitivity output indicator.
* Be sure there is no static coupling between input and output signal.

i) FM RADIO SECTION ALIGNMENT using sweep signal generator.

Notes: 1. When sweep signal generator is used for alignment of FM IF stage, the marker color is set at center part of "S" curve trace. Because of fixed ceramic filters, five kinds of center frequency, are used, which is identified as follows; Yellow-10.78, Red-10.70, White-10.74, Black-10.66 and Green-10.62 MHz.
2. In order to make correct alignment of front end and IF-stage, input signal must be kept lower than 10 uV at antenna input.

STEP	CONNECT SIGNAL SOURCE TO	CONNECT OUTPUT INOICATOR TO	SET SIGNAL SOURCE	SET RAOIO OIAL	AOJUST ON	AOJUST FOR
1	Slide FM/AM switch to the left side for FM position.					
2	Sweep signal generator to test point located in front end unit through 1K ohm resistor	Oscilloscope to the test point through 0.01μF capacitor	10.7MHz (unmodulated)	Quiet point on band	IFT-101	Maximum amplitude ("S" curve trace)
3					IFT*	Maximum amplitude *Located in front end unit
4	Repeat above steps to make sure the alignment has been made correctly.					
5	Signal generator to antenna input terminal through matching net work (no sweep)	VTVM to the speaker cable terminated with 4 to 8 ohms dummy load	108.7MHz	108.7MHz	OT*	Maximum amplitude
6			87MHz	87MHz	OSC	Maximum amplitude
7			106MHz	106MHz	AT* & RT*	Maximum amplitude
8	Repeat above three steps to make sure the alignment has been made correctly.					*Located in front end unit.

ii) AM RADIO SECTION ALIGNMENT

Notes: 1. RF signal generator is connected to the antenna input terminal through matching net-work.
2. Modulation level is 40% maximum.
3. RF signal level is kept as lower as possible.
4. Output indicator is connected to the Left or Right speaker cable terminated with 4 to 8 ohms resistor.

STEP	SOURCE SIGNAL	SET RADIO DIAL TO	ADJUST ON	ADJUST FOR
1	Slide FM-AM switch to the right side for AM position.			
2	455 KHz	Quiet point on band	IFT-202, 203, 204, 205	Maximum amplitude.
3	1,650 KHz	1,650 KHz	CT-203	Maximum amplitude.
4	515 KHz	515 KHz	OSC, IFT201	Maximum amplitude.
5	1,400 KHz	1,400 KHz	CT-201, 202	Maximum amplitude.
6	Repeat above steps to make sure the correct alignment has been made.			

iii) FM MULTIPLEX DEMODULATOR ALIGNMENT using FM signal generator and MULTIPLEX STEREO signal generator.

1. Connect the frequency counter to the test point (TP) of IC103 (Pin No. 10) through 0.02 μF capacitor and then adjust VR102 within the limits of 19 KHz ±100 Hz.
2. Adjust VR103 to obtain the maximum separation.

TROUBLE SHOOTING

TROUBLES	POSSIBLE CAUSE OF TROUBLE	CORRECTIVE ACTION
No sound (pilot light off)	Disconnected wires/Improper ground connection. Blown fuse. (Wrong polarity connection) Open contact of power switch or choke. (CH401) Defective Diode (D401)	Replace or Repair
Poor or no sound of Left or Right in both TAPE & RADIO	Disconnected wires. Defective IC103, 301, 401, 402.	Replace or Repair
No RADIO sound	Disconnected wires or antenna cable. Defective IC-103. Open contact of TAPE/RADIO switch	Replace or Repir
No AM-RADIO sound	Disconnected wires or antenna cable. Defective transistor Q201, 202, 203 and other components relative AM sect. Open contact of AM/FM switch. Misalignment of AM section.	Replace or Repair or Realign
No FM-RADIO SOUND	Disconnected wires. Defective IC102, or Q101, and other components relative FM section. Open contact of AM/FM switch. Misalignment of FM section. Defective front end unit	Replace or Repair or Realign
Intermittent or noisy AM or FM-RADIO	Poor or intermittent contact of AM/FM or TAPE/RADIO switch. Misalignment of RADIO section. Bad connection of solder joint. Defective components.	Replace or Repair or Realign
Oscillation in RADIO reception	Poor alignment of RF or IF section of RADIO. Defective front end unit	Realign
AFC not effective	Disconnected wires. Defective components in FM section. Misalignment of RF or IF stage of FM section Defective front end unit	Replace or Repair or Realign
FM MULTIPLEX separation not working properly	Defective IC103, Misalignment of IF or RF or FM MPX demodulator section.	Replace or Repair or Realign
Stereo indicator does not light on	Defective MPX Lamp. Disconnected wires. Misalignment of RF or IF or FM MPX demodulator section.	Replace or Repair or Realign
Poor sound or no sound of tape play-back	Dirty tape head. Defective tape head or tape head connector. Misalignment of tape head azimuth. Motor does not rotate or tape not driven properly. Open contact of RADIO/TAPE switch. Disconnected wires.	Replace or Repair or Realign
Motor does not rotate	Defective motor. Frozen capstan. Open contact of RADIO/TAPE switch. Disconnected wires.	Repair or Replace
Wow and Flutter	Defective Motor, Drive belt, capstan shaft or pinch roller. Slippage of tape or drive belt caused of oily capstan, pinch roller or motor pulley.	Replace or Repair
Low or High tape speed	Defective motor, drive belt or cassette cartridge. Frozen capstan shaft. Loose pulley lock.	Replace or Repair
Auto Reverse inoperative	Defective rotary contact and other components relative circuit. Defective channel solenoid. Defective REW/F.F. change switch. Defective Q601, 602, 603, 604, 605	Replace or Repair or Realign

TECHNICAL SERVICE INFORMATION

Note: In order to perform the following technical service properly, all of technical services should be performed only by qualified technician and service station equipped with proper instruments and tools. And also the tape player must be removed from vehicle and operated on the service bench.

AZIMUTH ADJUSTMENT

1. Connect two VTVM's to the speaker cables Left and Right terminated with dummy load 4 to 8 ohms resistor.
2. Insert a test tape.
3. Set volume control at maximum, balance control at center and tone control at maximum.
4. Turn the azimuth adjustment screw until both VTVM's indicate maximum voltage output.
5. Repeat this process a few times to make sure the correct adjustment has been made.

VOLTAGE READINGS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC101	–	–	–	–	3.8 (0.1) *a	0.1 (3.7) *b	0	–	3.7	–	–	–	–	4.9
IC102	2.1	2.1	0	0 (1.7) *c	5.6	5.3	5.4	5.4	5.4	10.1	1.8	0	0	2
IC103	10.1	2.8	5	6.8	6.8	13.7 (1.1) *d	0	2.1	2.1	1.5	2.1	2.1	2.1	2.8
IC301	1.2	0.7	2.7	12.4	0	2.7	0.7	1.2	–	–	–	–	–	–
IC401, 402	0	–	1.3	0	6.8	12.6	13.7	–	–	–	–	–	–	–

( )*a, b: LO/DX switch is in DX position. ( )*c: Muting switch is on. ( )*d: On FM stereo.

	Q101	Q201	Q202	Q203	Q501	Q502	Q503	Q601	Q602	Q603	Q604	Q605
Emitter	2.4	0.3	1.1	0.4	0	0.2	10.1	6.7	0.6	0.6	0.2	0
Collector	6.6	7.0	9.2	10.1	13.7	13.7	12.9	0	1.1	0.7	13.7	13.7
Base	3.0	1.0	1.6	1.1	0.2	0	10.8	13.6	−0.6	1.2	0.4	0.2

THESE VOLTAGES MEASURED WITH VTVM AT NO SIGNAL INPUT.

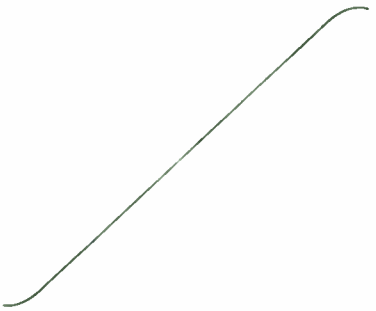


Fig. 5
"S" CURVE TRACE

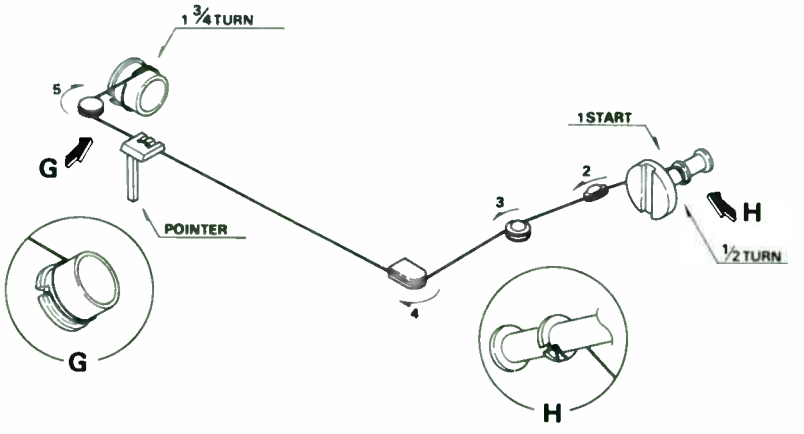


Fig. 6
DIAL STRING ARRANGEMENT

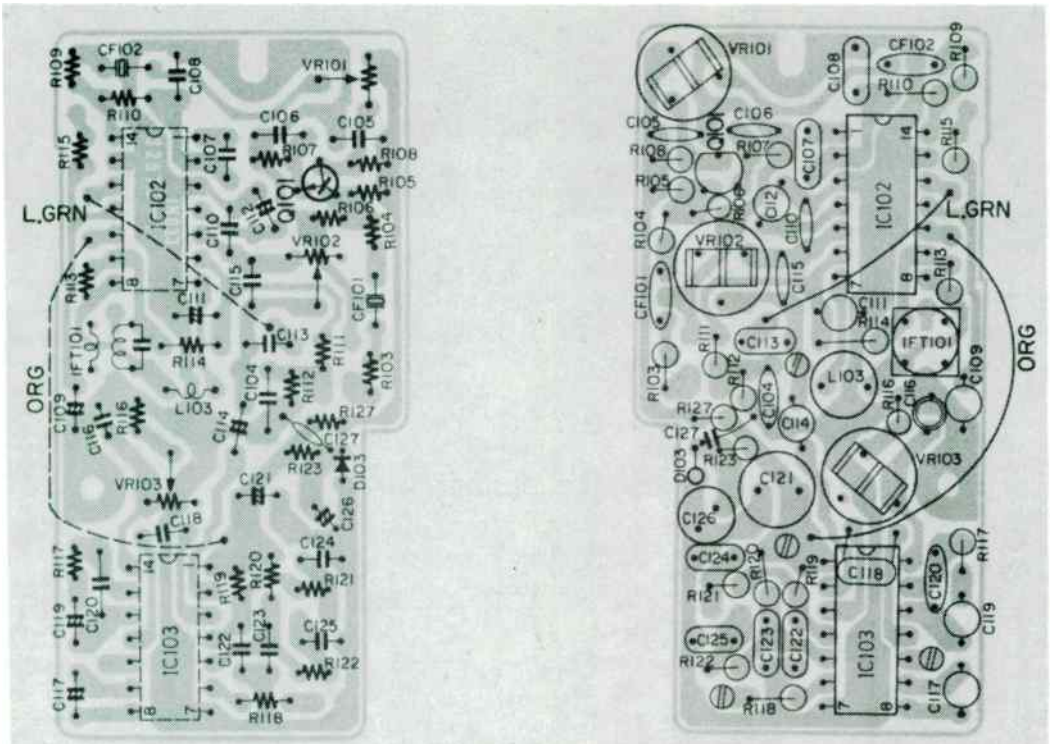


Fig. 11
IF AMP. P.C. BOARD
WIRING/COMPONENT SIDES

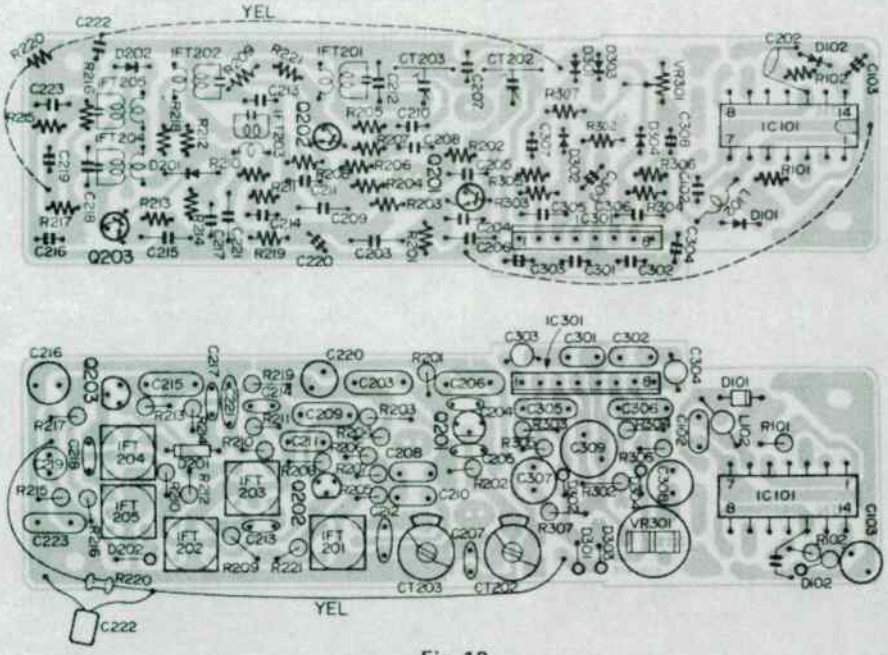


Fig. 12
AM PRE-AMP. P.C. BOARD
WIRING/COMPONENT SIDES

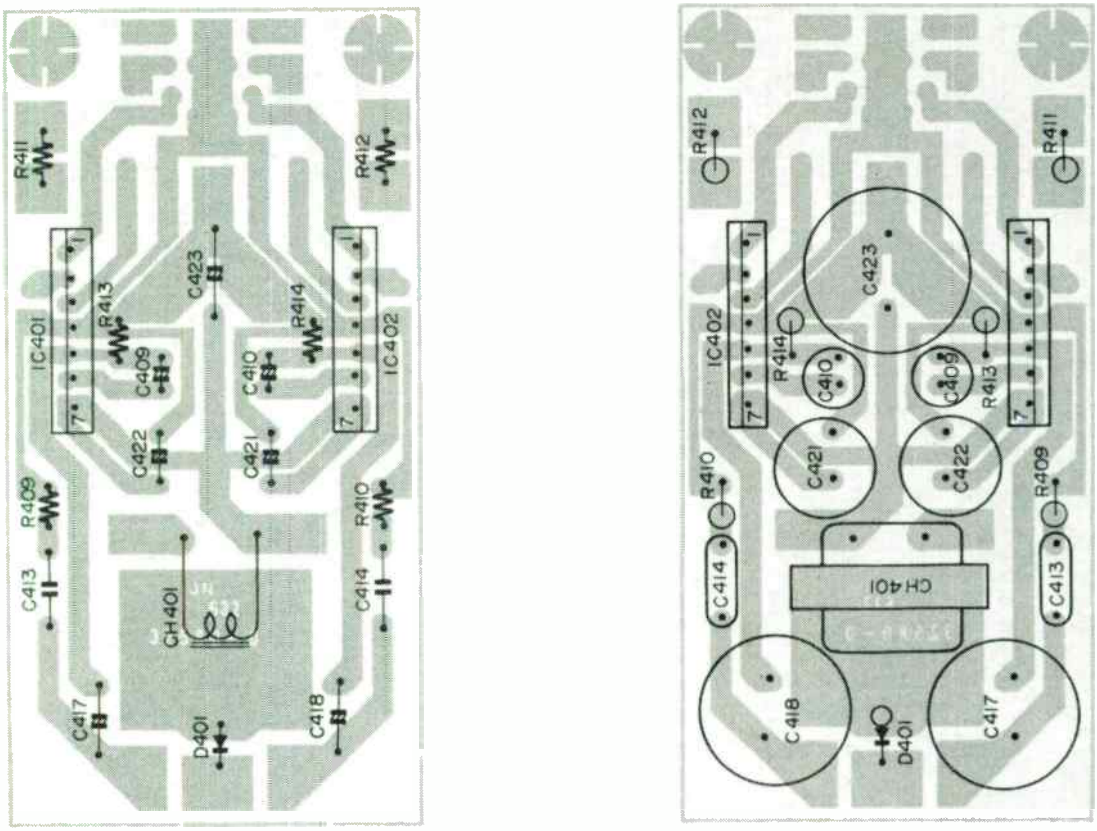


Fig. 13
POWER AMP. P.C. BOARD
WIRING/COMPONENT SIDES

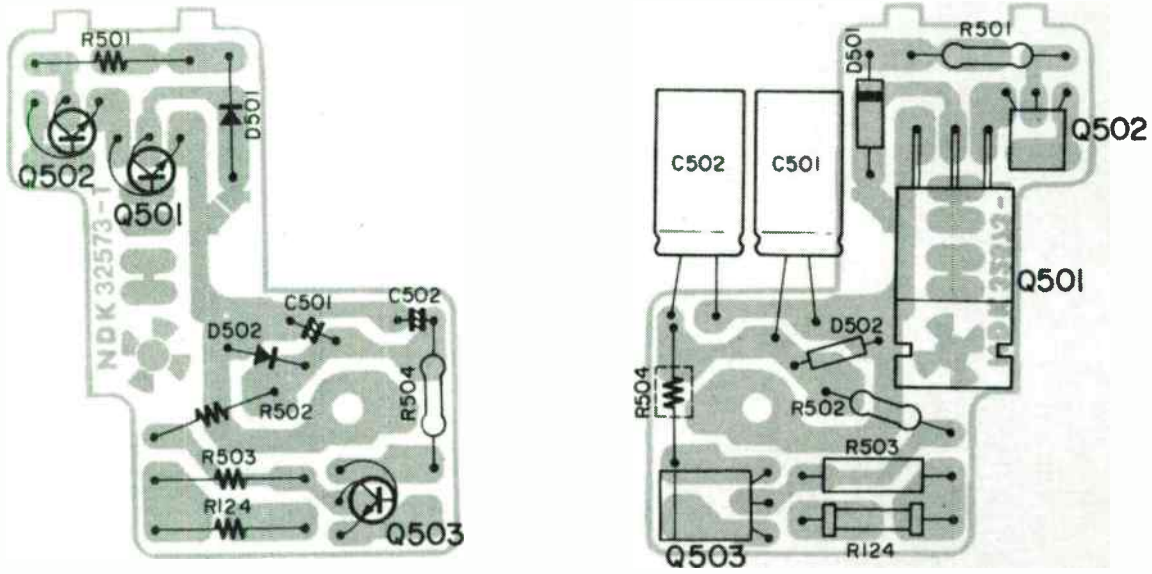


Fig. 14
POWER SUPPLY P.C. BOARD
WIRING/COMPONENT SIDES

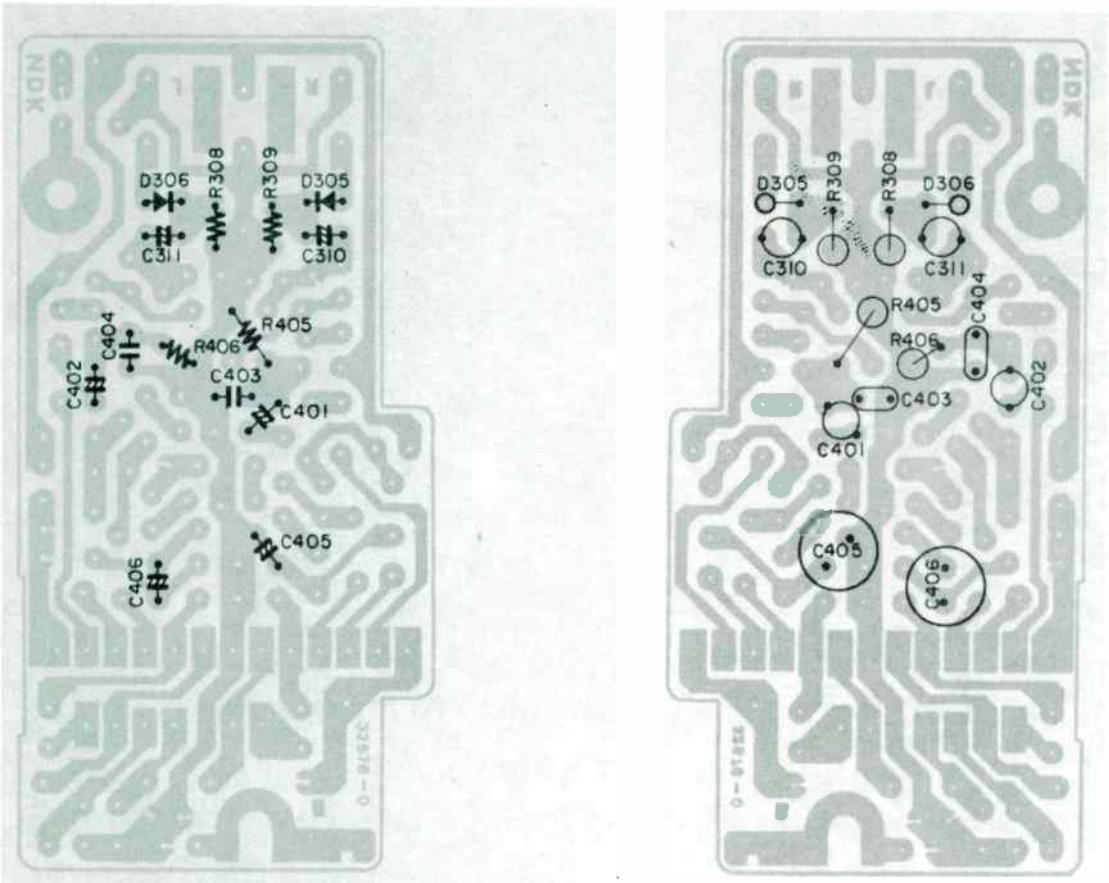


Fig. 15
TONE AMP. P.C. BOARD
WIRING/COMPONENT SIDES

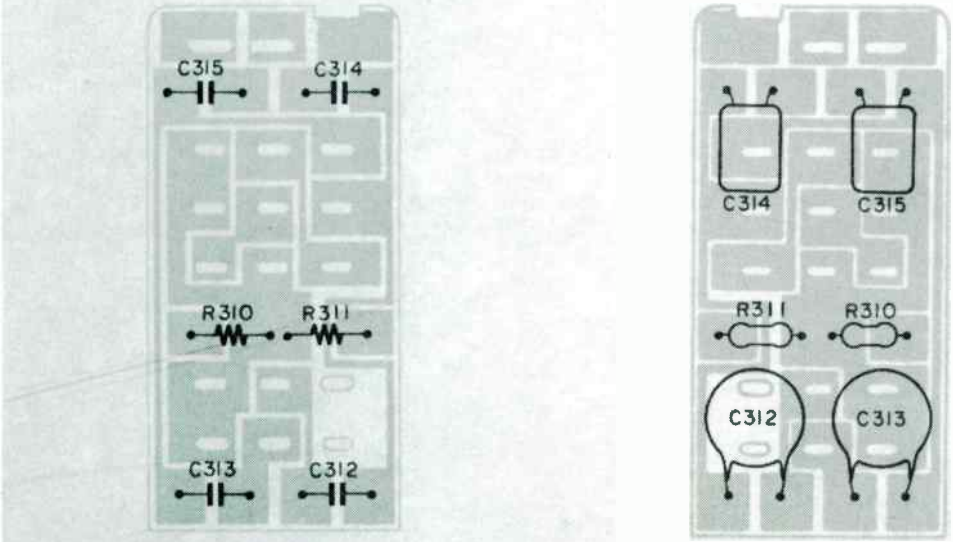


Fig. 16
VOLUME P.C. BOARD
WIRING/COMPONENT SIDES

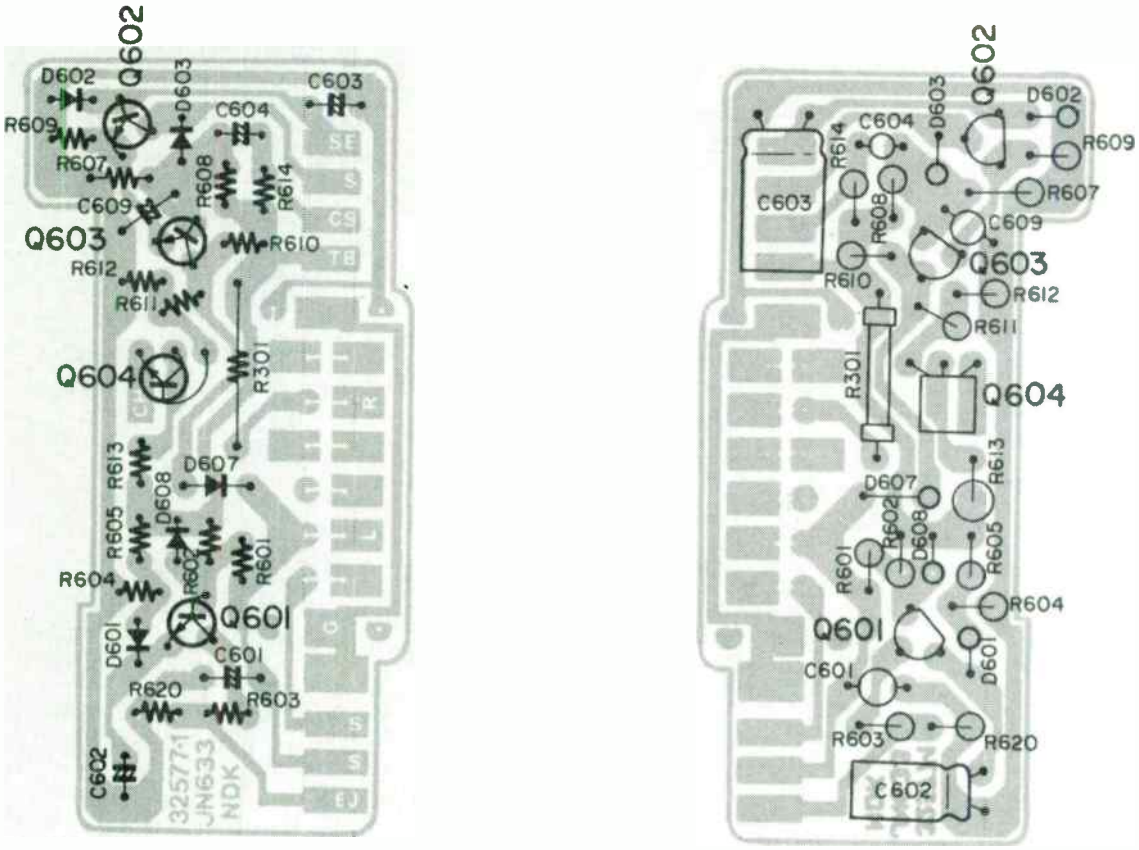


Fig. 17
CONTROL P.C. BOARD (A)
WIRING/COMPONENT SIDES

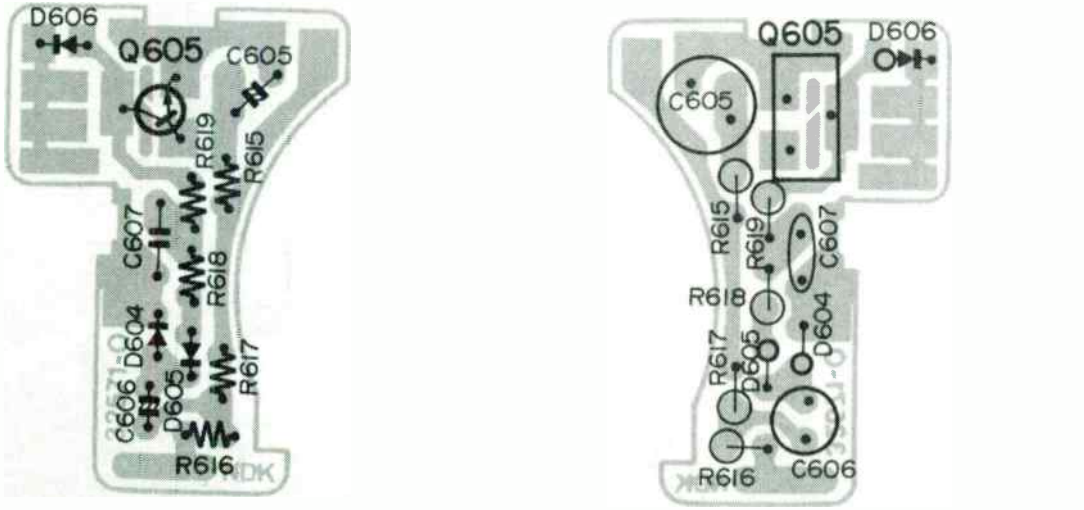
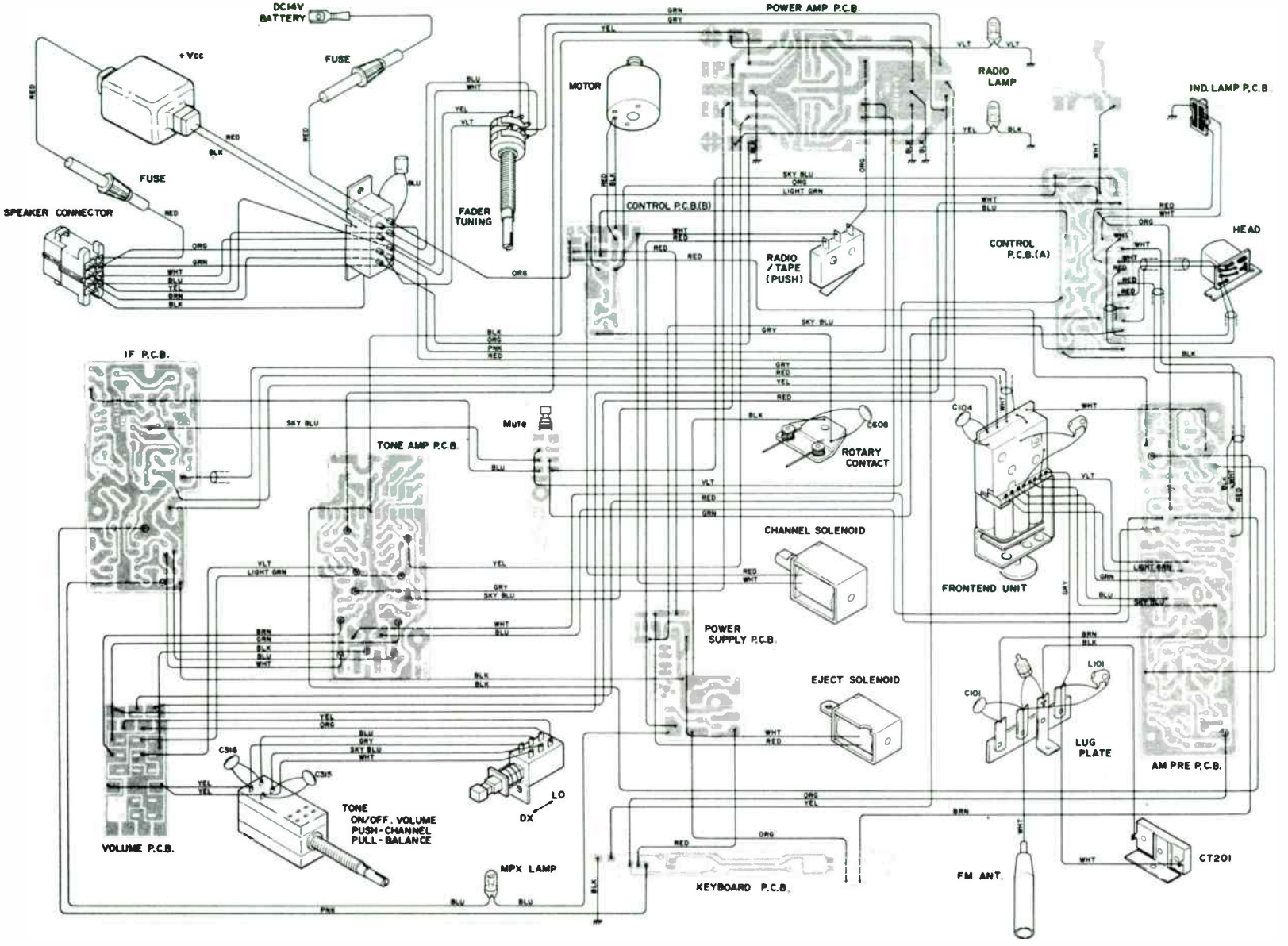


Fig. 18
CONTROL P.C. BOARD (B)
WIRING/COMPONENT SIDES

WIRING DIAGRAM AND PART LOCATION Fig. 10



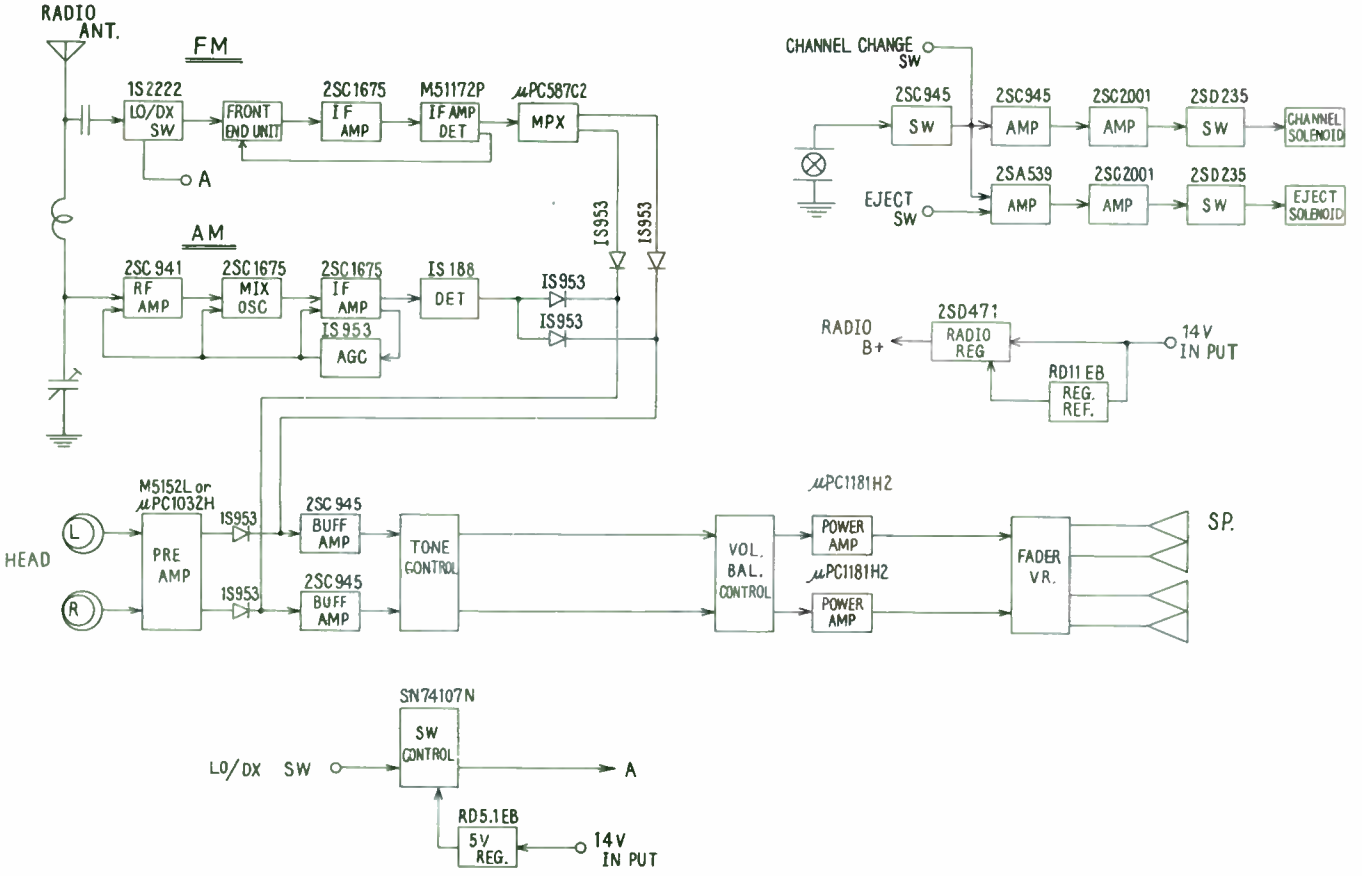
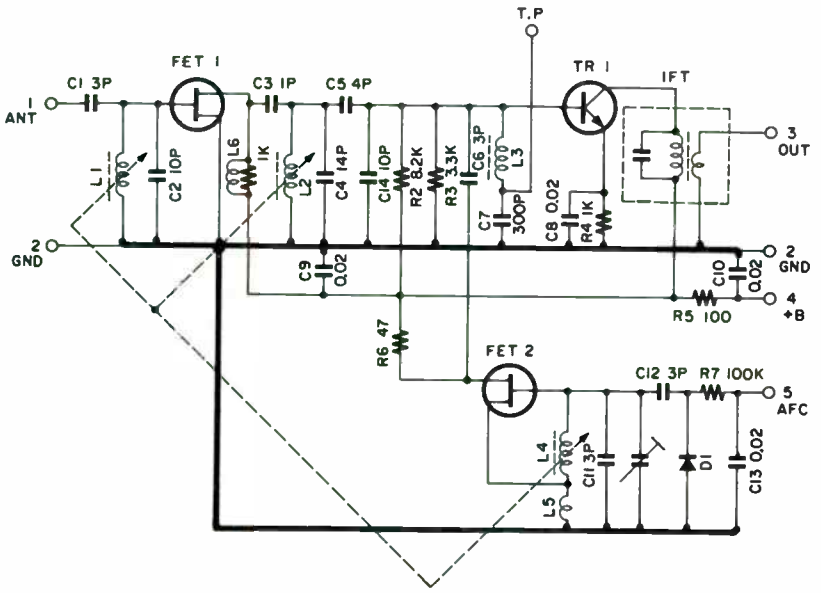


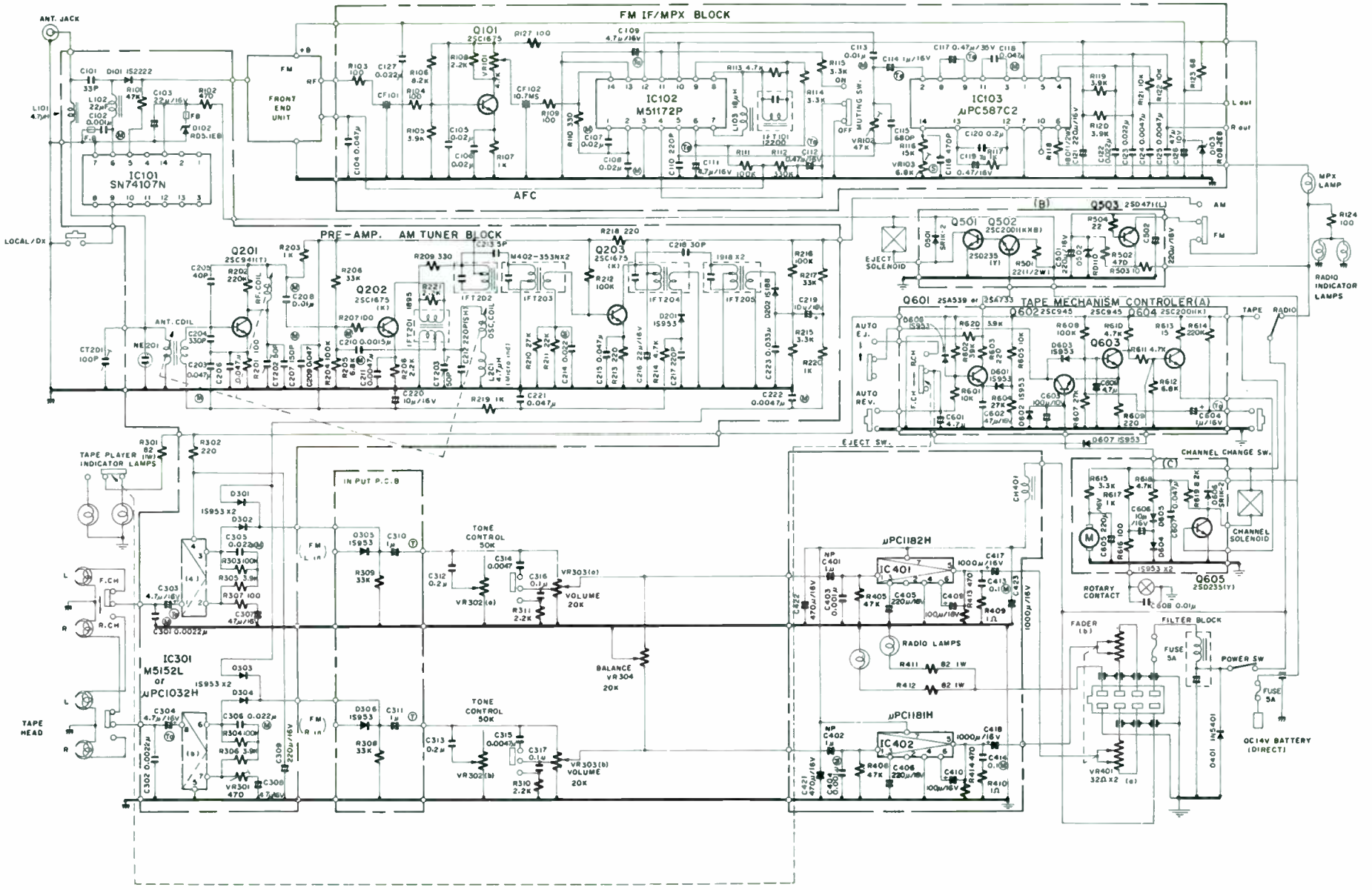
Fig. 7
BLOCK DIAGRAM



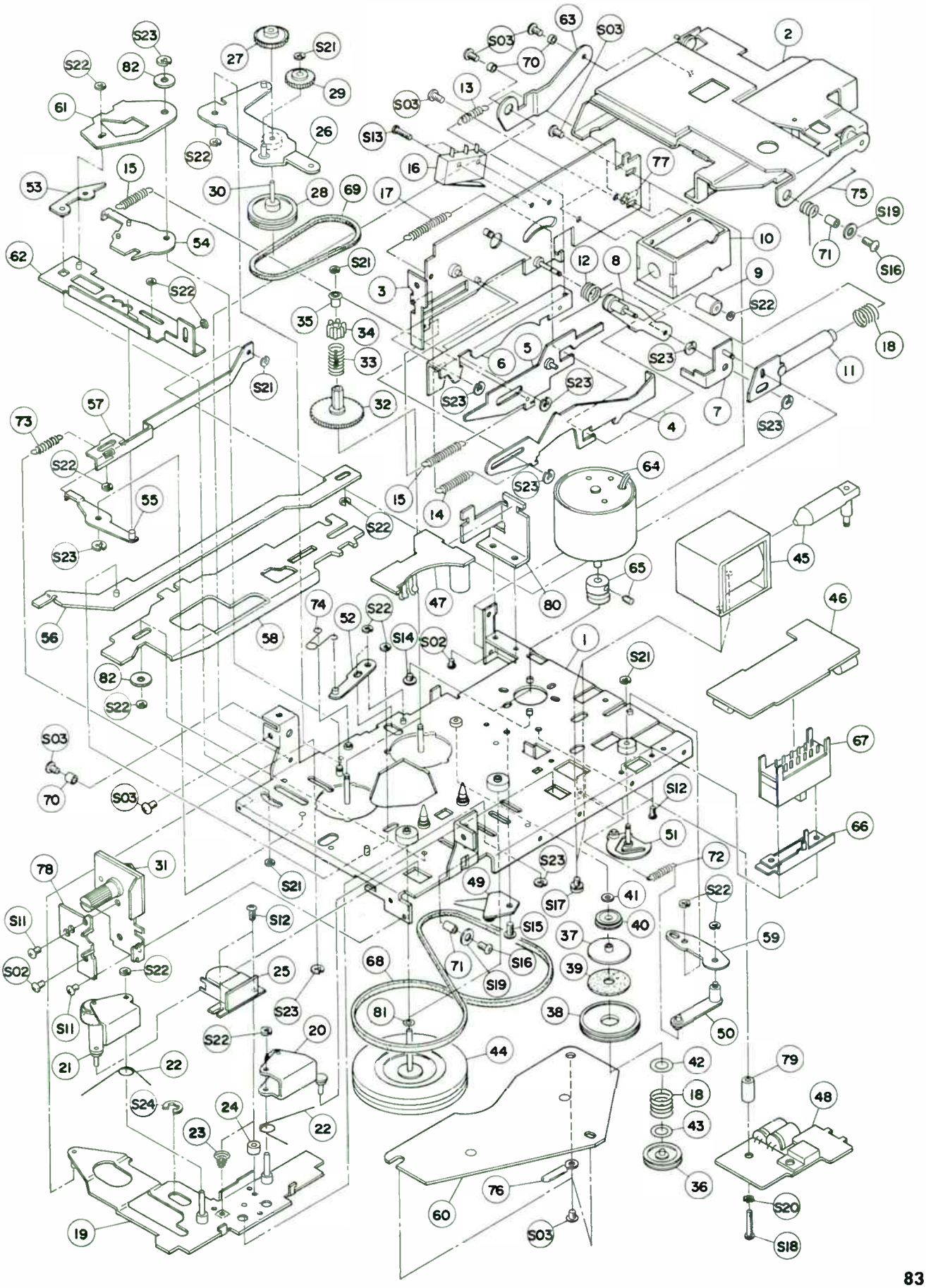
NOTE 1 INPUT IMPEDANCE 75 OHMS.
2 OUTPUT IMPEDANCE 300 OHMS.
3 SUPPLY VOLTAGE 8.2V.
4 REFERENCE OF AFC 5V.

Fig. 8
CIRCUIT DIAGRAM OF FRONT END UNIT

SCHEMATIC DIAGRAM Fig. 9



ASSEMBLY LAYOUT Tape transport mechanism Fig. 20



COMPONENTS LIST (Re. Fig. 20 Tape Transport mechanism)

Drawing Ref. No.	Part No.	Description	Q'ty
1	21629	Main Chassis	1
2	21630	Cassette Housing Ass'y	1
3	24293	Eject Base	1
	24347	Pin A	1
	24360	Pin B	1
	24359	Pin C	1
	24361	Pin D	1
4	24330	Lever, Pack Case	1
5	24255	Lever, Head Base	1
	24365	Pin, Head Base	1
	24366	Pin, Head Base Spring	1
6	24280	Lock Bridge	1
	24356	Pin, Lock Bridge	1
7	24252	Lever, EJ Spring up	1
	24342	Pin, EJ Spring up	1
8	24251	Arm, Pack push	1
	24370	Pin A	1
	24371	Pin B	1
	24372	Pin C	1
	24373	Pin D	1
9	24313	Collar, Pack push	1
10	24329	Plunger, Eject	1
11	24256	Lever, Plunger	1
	24314	Pin, Plunger	1
12	24246	Spring, Pack push	1
13	24238	Spring, Lock Bridge	1
14	23857	Spring, REW/FF Lever	1
15	24235	Spring, Idle Lever	2
16	912084	Power Switch	1
17	24385	Tension Spring, Pack Push Arm	1
18	24230	Spring, Torque	2
19	24296	Head Bracket	1
20/21	21638	Pinch Roller Ass'y, L/R	1
22	24267	Spring, Pinch Roller	2
23	24331	Spring, Azimuth	1
24	24353	Washer, Head	1
25	917021	Head	1
26	24278	Idle Gear Plate w/Pin/Metal	1
27	24248	Idle Gear (Large)	1
28	24368	Pulley, Idle Gear	1
29	24276	Idle Gear (Small)	1
30	24311	Idle Stay	1
31	21634	FF/REW Bracket Ass'y	1
32	24275	Rim Gear	2
33	24316	Spring, Rim Wheel	2
34	23856	Rim Wheel	2
35	24030	Cap, Post	2
36	24271	Idle Pulley	1
37	24272	Post, Pulse Detector	1
38	24270	Post Pulley, Pulse Detector	1
39	24334	Felt Washer	1
40	24045	Ring, Pulse Detector	1
41	24386	Torque Washer	1
42	24393	Torque Washer (A)	1
43	24394	Torque Washer (B)	1
44	21636	Flywheel Ass'y	2

Drawing Ref. No.	Part No.	Description	Q'ty
45	21656	CH Plunger Ass'y	1
46	30986	Control P.C. Board (A)	1
47	30987	Control P.C. Board (B)	1
48	30988	Power Regulator P.C. Board	1
49	21667	Brush Holder Ass'y	1
50	21657	Cam Lever Ass'y	1
51	21658	Change Cam Ass'y	1
52	21659	Kick Arm Ass'y	1
53	21660	Hinge Lever Ass'y	1
54	21661	Head Bracket Idle Lever Ass'y	1
55	21662	Lock Arm Ass'y	1
56	21663	Lock off Lever (CH) Ass'y	1
57	24240	Lock off Lever, Eject	1
58	24295	Change Lever	1
59	24284	Idle Lever, CH Plunger	1
60	24257	Bottom Plate	1
61	24249	Idle Plate, REW/FF	1
62	21664	REW/FF Lock Lever Ass'y	1
63	24281	Sub-Arm, Pack Case	1
64	911030	Motor	1
65	24289	Motor Pulley	1
66	45933	Bracket, Switch	1
67	912087	Channel Change Switch	1
68	24242	Belt, Main	1
69	24241	Belt, Take up Reel	1
70	23875	Washer, Eject Lever	3
71	24355	Collar 5.3L, Pack Arm	2
72	23964	Spring, Change Cam	1
73	24234	Spring, REW/FF Lock Lever	1
74	24265	Spring, Kick	1
75	24328	Spring, Pack Case	1
76	923362	Pad, Lead Wire	1
77	922255	Lug	1
78	45941	Mfg. Hardware, Keyboard	1
79	46082	Collar, Print Board	1
80	45955	Mfg. Foot, Control P.C.B.	1
81		Washer, Nylon	2
82		Washer, Adjustment	2
S02	022607	Screw M2.6 x 4, RH	3
S03	022655	Screw M2.6 x 4, Truss	11
S11	022032	Screw M2 x 3, Truss	2
S12	022012	Screw M2 x 5, Truss	4
S13	022304	Screw M2.3 x 8, RH	2
S14	022678	Screw M2.6 x 3, Truss	2
S15	022680	Screw M2.6 x 6, Truss	1
S16	022669	Screw M2.6 x 8, Truss	2
S17	022176	Screw M3 x 4, BH	2
S18		Screw M2.6 x 12, RH	1
S19	038003	Washer M3, Plain	2
S20		Washer M2.6, Teethed	1
S21	031501	E Ring M1.5	5
S22	032003	E Ring M2	15
S23	032501	E Ring M2.5	9
S24	033026	E Ring M3	1

ELECTRICAL COMPONENT LIST

Ref. No.	Part No.	Description	Q'ty
SEMI-CONDUCTORS			
IC101	916134	IC SN74107N	1
IC102	916157	IC M51172P	1
IC103	916155	IC uPC587C2	1
IC301	916106	IC M5152L	1
IC401	916205	IC uPC1182H	1
IC402	916204	IC uPC1181H	1
Q101	916144	Silicon Transistor 2SC1675	1
Q201	916127	Silicon Transistor 2SC941(Y)	1
Q202, 203	916144	Silicon Transistor 2SC1675	2
Q501	916161	Silicon Transistor 2SD235(Y)	1
Q502	916162	Silicon Transistor 2SC2001(K)	1
Q503	916126	Silicon Transistor 2SD471(L)	1
Q601	916107	Silicon Transistor 2SA539	1
Q602, 603	916033	Silicon Transistor 2SC945	2
Q604	916162	Silicon Transistor 2SC2001(K)	1
Q605	916161	Silicon Transistor 2SD235(Y)	1
D101	923395	Diode IS2222	1
D102	923147	Diode RD5.1EB	1
D103	923428	Diode RD8.2EB	1
D201	923147	Diode IS953	1
D202	922604	Diode IS188	1
D301 thru. 306	923147	Diode IS953	6
D401	923677	Diode IN5401	1
D501	922969	Diode SR1K-2	1
D502	923450	Diode RD110EB	1
D601 thru. 605	923147	Diode IS953	5
D606	922969	Diode SR1K-2	1
D607, 608	923147	Diode IS953	2
COILS AND OTHERS			
L101	913572	Micro Inductor 4.7uH	1
L102	913573	Micro Inductor 22uH	1
L103	913557	Micro Inductor 18uH	1
L201	913572	Micro Inductor 4.7uH	1
CH401	914028	Choke Coil 4016	1
IFT101	923133	IFT 12200, FM IF	1
IFT201	922592	IFT, AM 1895	1
IFT202, 203	922838	IFT, AM M402-353N	2
IFT204, 205	923593	IFT, AM 1918	2
CF101, 102	922974	Ceramic Filter SFE10.7MS2	2
RESISTORS, all are 1/8W tolerance unless otherwise specified.			
R101	915343	47K ohm	1
R102	915057	470 "	1
R103. 104	915009	100 "	2
R105	915325	3.9K "	1
R106	915055	8.2K "	1
R107	915003	1K "	1
R108	915007	2.2K "	1
R109	915009	100 "	1
R110	915351	330 "	1
R111	915039	100K "	1
R112	915443	330K "	1
R113	915327	4.7K "	1
R114, 115	915004	3.3K "	2
R116	915341	15K "	1

Ref. No.	Part No.	Description	Q'ty
R117	915003	1K ohm	1
R118	915175	180 " 1/2W	1
R119, 120	915325	3.9K "	2
R121, 122	915015	10K "	2
R123	915356	68 "	1
R124	915087	100 " 1/2W	1
R125, 126		No component	
R127	915009	100 ohm	1
R201	915009	100 "	1
R202	915344	220K "	1
R203	915003	1K "	1
R204	915039	100K "	1
R205	915340	6.8K "	1
R206	915052	33K "	1
R207	915009	100 "	1
R208	915007	2.2K "	1
R209	915443	330 "	1
R210	915395	27K "	1
R211	915342	22K "	1
R212	915039	100K "	1
R213	915336	220 "	1
R214	915327	4.7K "	1
R215	915004	3.3K "	1
R216	915039	100K "	1
R217	915052	33K "	1
R218	915336	220 "	1
R219, 220	915003	1K "	2
R221	915007	2.2K "	1
R301	915216	82 " 1W	1
R302	915336	220 "	1
R303, 304	915039	100K "	2
R305, 306	915325	3.9K "	2
R307	915009	100 "	1
R308, 309	915052	33K "	2
R310, 311	915007	2.2K "	2
R405, 406	915343	47K "	2
R409, 410	915523	1 "	2
R411, 412	915216	82 " 1W	2
R413, 414	915057	470 "	2
R501	915083	22 " 1/2W	1
R502	915057	470 "	1
R503	915091	10 " 1/2W	1
R504	915002	22 "	1
R601	915015	10K "	1
R602	915054	39K "	1
R603	915336	220 "	1
R604, 605	915395	27K "	2
R606		No component	
R607	915395	27K "	1
R608	915039	100K "	1
R609	915336	220 "	1
R610, 611	915327	4.7K "	2
R612	915340	6.8K "	1
R613	915030	15 " 1/2W	1
R614	915344	220K "	1
R615	915085	3.3K " 1/2W	1
R616	915009	100 "	1
R617	915003	1K "	1
R618	915327	4.7K "	1
R619	915427	82K "	1
R620	915325	3.9K "	1
VR101	915370	Solid Volume 4.7K ohm	1
VR102	915428	Solid Volume 47K ohm	1

ELECTRICAL COMPONENTS LIST (Cont'd)

Ref. No.	Part No.	Description	Q'ty
VR103	915434	Solid Volume 6.8K ohm	1
VR301	915431	Solid Volume 470 ohm	1
VR302 thru. 304	915485	Potentiometer, Volume/ On-Off Switch/Tone/ Balance/Channel Selector	1
VR401	915484	Potentiometer, Fader/Tuning	1
CAPACITORS, all are in 50 working voltage unless otherwise specified.			
C101	913171	Ceramic 30pF	1
C102	913071	Mylar 0.001uF	1
C103	913217	Electrolytic 22uF 16V	1
C104	913063	Ceramic 0.047uF	1
C105, 106	913366	Ceramic 0.02uF	2
C107, 108	913064	Mylar 0.022uF	2
C109	913425	Tantalum 4.7uF 16V	1
C110	913077	Ceramic 220pF	1
C111	913425	Tantalum 4.7uF 16V	1
C112	913581	Tantalum 0.47uF 16V	1
C113	913020	Mylar 0.01uF	1
C114	913462	Tantalum 1uF 16V	1
C115	913162	Ceramic 680pF	1
C116	913096	Polystyren 470pF	1
C117	913436	Tantalum 0.47uF 35V	1
C118	913044	Mylar 0.047uF	1
C119	913581	Tantalum 0.47uF 16V	1
C120	913284	Semi-Con. 0.2uF 12V(SC)	1
C121	913069	Electrolytic 220uF 16V	1
C122, 123	913064	Mylar 0.022uF	2
C124, 125	913043	Mylar 0.0022uF	2
C126	913196	Electrolytic 47uF 10V	1
C127	913125	Ceramic 0.022uF	1
C203	913044	Mylar 0.047uF	1
C204	913073	Ceramic 330pF	1
C205	913172	Ceramic 40pF	1
C206	913063	Ceramic 0.047uF	1
C207	913249	Ceramic 150pF	1
C208	913020	Mylar 0.01uF	1
C209	913044	Mylar 0.047uF	1
C210	913210	Mylar 0.0015uF	1
C211	913040	Mylar 0.0047uF	1

Ref. No.	Part No.	Description	Q'ty
C212	913241	Ceramic 220pF (SH)	1
C213	913053	Ceramic 5pF	1
C214	913045	Mylar 0.022uF	1
C215	913063	Ceramic 0.047uF	1
C216	913217	Electrolytic 22uF 16V	1
C217	913077	Ceramic 220pF	1
C218	913171	Ceramic 30pF	1
C219, 220	913175	Electrolytic 10uF 16V	2
C221	913063	Ceramic 0.047uF	1
C222	913020	Mylar 0.01uF	1
C223	913550	Mylar 0.033uF	1
C301, 302	913043	Mylar 0.0022uF	2
C303, 304	913471	Tantalum 4.7uF 16V	2
C305, 306	913045	Mylar 0.022uF	2
C307, 308	913180	Electrolytic 47uF 16V	2
C309	913069	Electrolytic 220uF 16V	1
C310, 311	913462	Tantalum 1uF 16V	2
C312, 313	913284	Semi-Con. 0.2uF 12V (SC)	2
C314, 315	913040	Mylar 0.0047uF	2
C316, 317	913331	Semi-Con. 0.1uF 12V (SC)	2
C401, 402	913349	Electrolytic 1uF (NP)	2
C403, 404	913071	Mylar 0.001uF	2
C405, 406	913069	Electrolytic 220uF 16V	2
C409, 410	913097	Electrolytic 100uF 16V	2
C413, 414	913021	Mylar 0.1uF	2
C417, 418	913061	Electrolytic 1000uF 16V	2
C421, 422	913030	Electrolytic 470uF 16V	2
C423	913061	Electrolytic 1000uF 16V	1
C501,502	913069	Electrolytic 220uF 16V	2
C601	913148	Electrolytic 4.7uF 16V	1
C602	913180	Electrolytic 47uF 16V	1
C603	913013	Electrolytic 100uF 10V	1
C604	913462	Tantalum 1uF 16V	1
C605	913069	Electrolytic 220uF 16V	1
C606	913175	Electrolytic 10uF 16V	1
C607	913063	Ceramic 0.047uF	1
C608	913060	Ceramic 0.01uF	1
C609	913148	Electrolytic 4.7uF 16V	1
CT201	913287	Trimmer, Antenna 100pF	1
CT202, 203	913519	Trimmer 50pF	2

Pages 87-98 Courtesy of MIDLAND INTERNATIONAL CORP.

I. ALIGNMENT PROCEDURES

Alignment is performed at factory with laboratory equipment. Therefore, before alignment is attempted, the unit should be throughly checked for circuit troubles.

NOTES:
1. Check for specified source voltage, DC 14 Volts.
2. Connect an AC voltmeter (VTVM) across speaker or dummy load either front or rear only. 4 ohms, 10W, wirewound resistor ..... See Fig. 6
3. Signal input must be kept as low as possible to avoid overload and clipping (Use highest possible sensitivity of output indicator).
4. Repeat adjustment to insure good results.
5. Non-metalic alignment tools must be used (espe cially at FM alignment)

I-1. AM IF & RF ALIGNMENT USING AM SIGNAL GENERATOR

Set the radio for AM reception. AM signal generator should be coupled with antenna receptacle through AM dummy antenna (See Fig. 1). Set volume control to maximum and tone to treble. Adjust signal generator output to maintain 1 watt (2.0 volts across 4 ohm load) on AC volt meter.

STEP	GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
1	455KHz 400Hz, 30% mod.	Around 1000KHz of non-interference.	AC VTVM across voice coil(L or R) or 4 ohm load.	FL151 L157	Adjust for maximum
2	510KHz	Low frequency end stop.	AC VTVM across voice coil (L or R) or 4 ohm load.	L154	Adjust for maximum
3	1640KHz	High frequency end stop.	AC VTVM across voice coil(L or R) or 4 ohm load.	VC152	Adjust for maximum
4	Repeat steps 2 and 3 two or three times.				

With radio installed in car and antenna extended to desired height, tune in a weak station around 1400 KHz and adjust antenna trimmer VC151 for maximum output.

I-2. FM IF ALIGNMENT USING FM SWEEP GENERATOR

Set the radio for FM reception. Connect test equipment as shown in Figs.2 and 8. Use only enough marker signal for indication. Set volume control to minimum and tone treble.

STEP	GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
1	10.7MHz (sweep)	Point of non-interference.	Vert. amp of scope to terminal with blue lead wire of volume control.	L102	Adjust L102 to obtain symmetry of response similar to Fig. 9,10 or 11 according to the color of Ceramic filter used.
2	10.7MHz (sweep)	point of non-interference.	Vert. amp of scope to terminal with blue lead wire of volume control.	L7 L101	Adjust L7 and L101 for maximum amplitude and straightness of line.
3	Repeat above steps 1 and 2 two or three times.				

NOTE:

1. FM SWEEP GENERATOR should be definitely required for FM IF Alignment, because ceramic filters are used in IF circuit. Five kinds of ceramic filters are used and they are differenct in their center frequencies as shown below: RED: 10.7MHz, BLUE: 10.67MHz, ORANGE: 10.73MHz, BLACK: 10.64MHz, WHITE: 10.76MHz.

2. If the ceramic filters except RED are used, 10.7MHz marker will not appear at the center of "S" curve (See Fig. 10 or 11). In these cases, disregard 10.7MHz marker.

3. The color of ceramic filters used is different according to the production lots, but, the same color dotted ceramic filters should be replaced as one pair on the individual units.

4. Be careful of static coupling between output lead of sweep generator and input lead of scope. The leads must be as short as possible and carefully shielded.

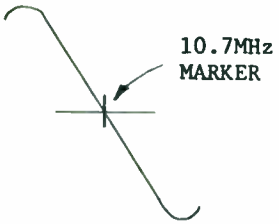


Fig. 9
RED

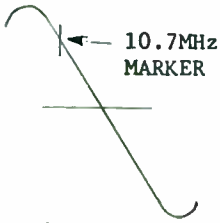


Fig. 10
(WHITE or ORANGE)

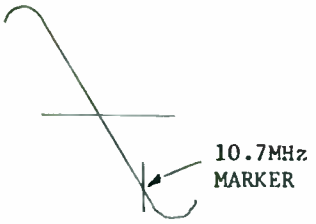


Fig.11
(BLACK or BLUE)

I-3. FM RF ALIGNMENT USING FM SIGNAL GENERATOR

Set the radio for FM reception. Connect FM signal generator with antenna receptacle through FM dummy antenna FM S.G. output level; 5-10 microvolts. Set volume control to 1 watt output (2.0 volts at 4 ohm load) and tone to treble. Connect test equipment as shown is Fig. 9.

STEP	GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
1	87MHz (400Hz,22.5KHz dev)	Low frequency end stop	Output meter across 4 ohm load	VC1 (OSC)	Adjust for maximum.

I-4. MULTIPLEX ADJUSTMENT USING FREQUENCY COUNTER

NOTE:

This adjustment is required only if IC102 is replaced. Set the radio for FM reception. Connect Frequency FM stereo signal generator with 19KHz pilot OFF with antenna receptacle through FM dummy antenna. Counter to test point TP101 (counter probe capacitance should not exceed 30pF.) Adjust VR101 for 19.0KHz.

I-5. TAPE PLAYER ALIGNMENT USING TEST CARTRIDGE

STEP	ITEM	ADJUSTMENT
1	Head Azimuth	Play a test cassette, monitor RIGHT channel output and adjust Azimuth adjustment screw for maximum. (Use TEAC TAPE NO. MTT-113 or MTT-116.

EQUIPMENT CONNECTION INSTRUCTIONS

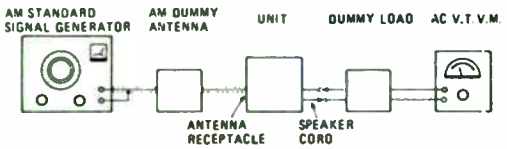


Fig. 1

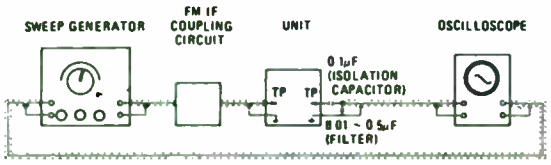


Fig. 2

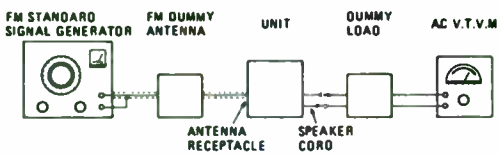


Fig. 3

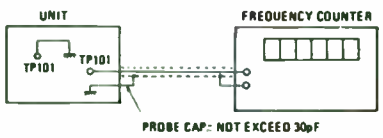


Fig. 4

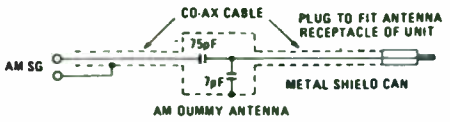


Fig. 5

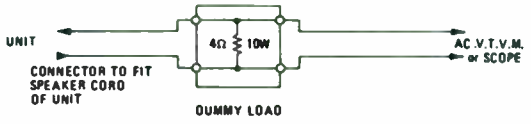


Fig. 6

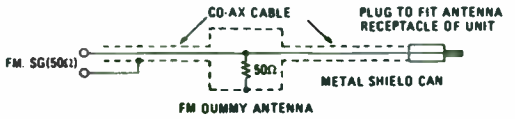


Fig. 7

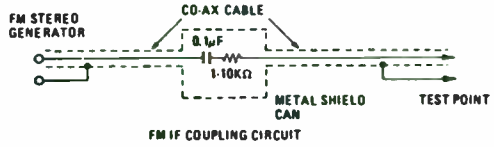
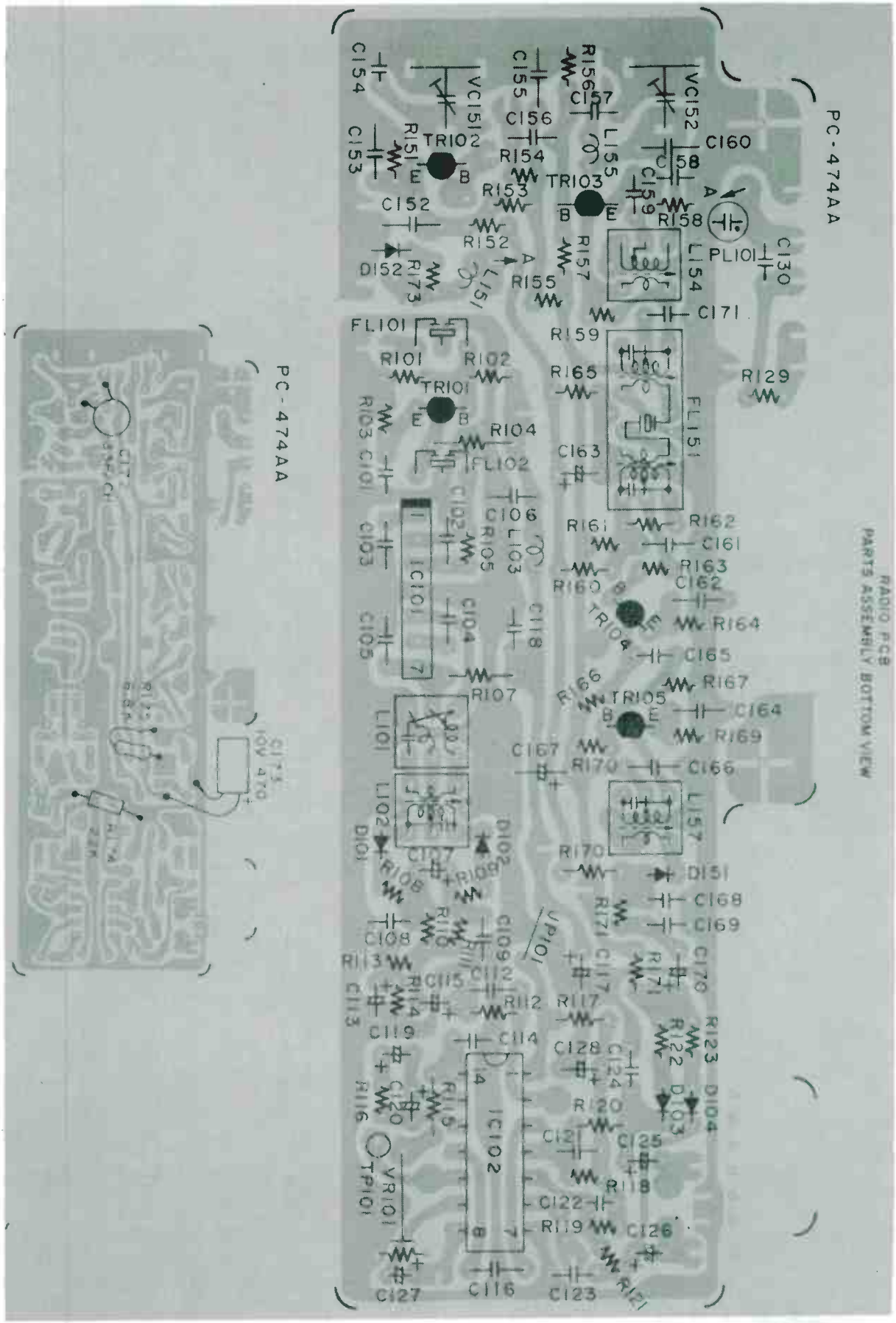
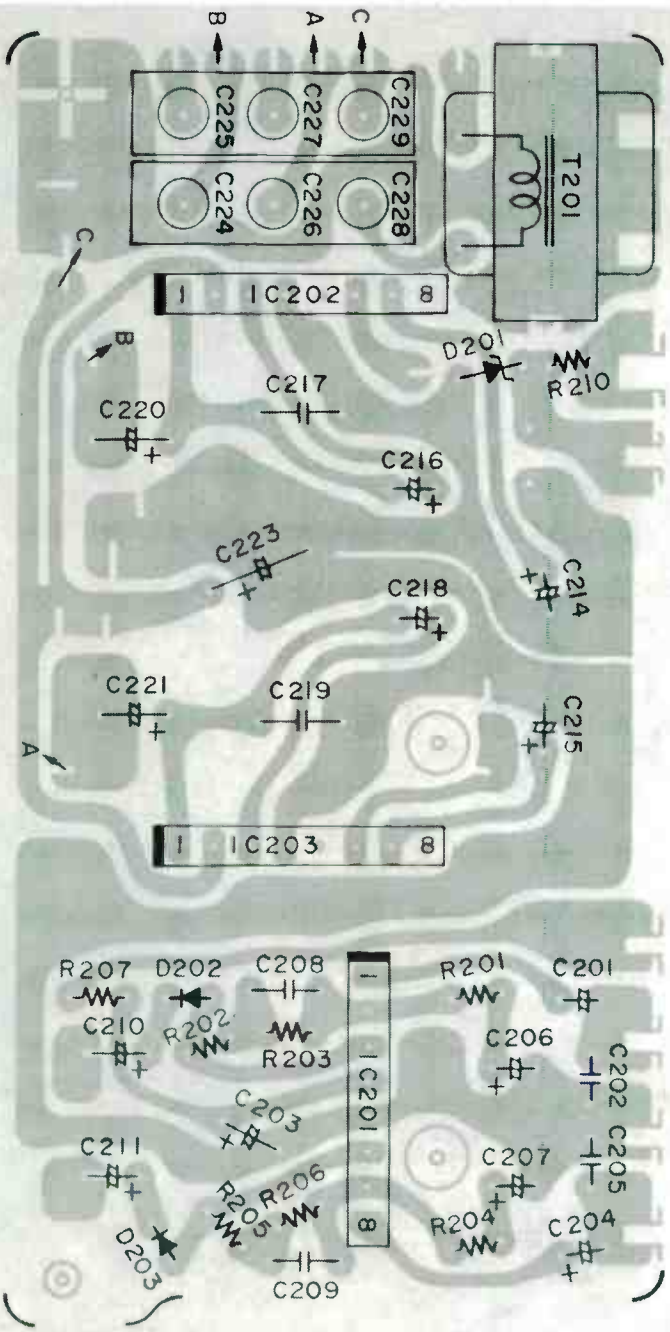


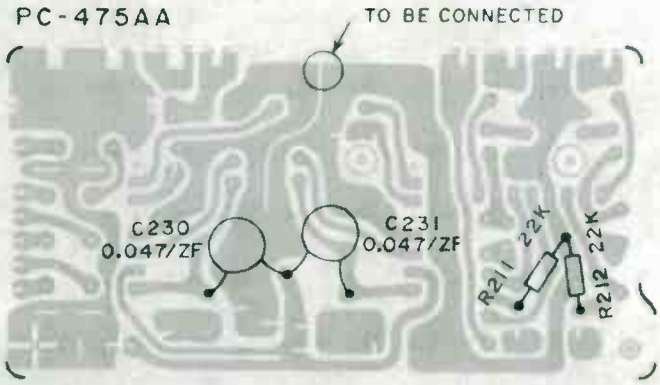
Fig. 8



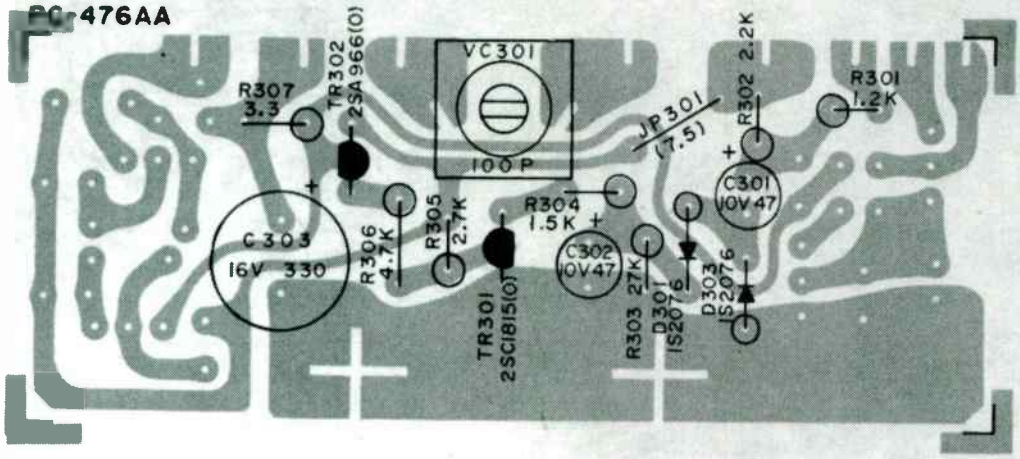
AF AMP PCB
PARTS ASSEMBLY BOTTOM VIEW

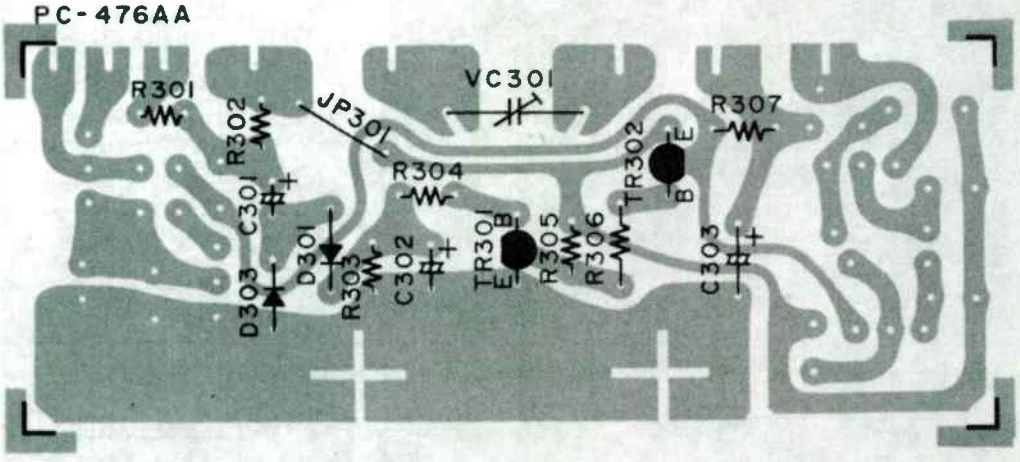


AF PCB
ADDITIONAL PARTS ON BOTTOM

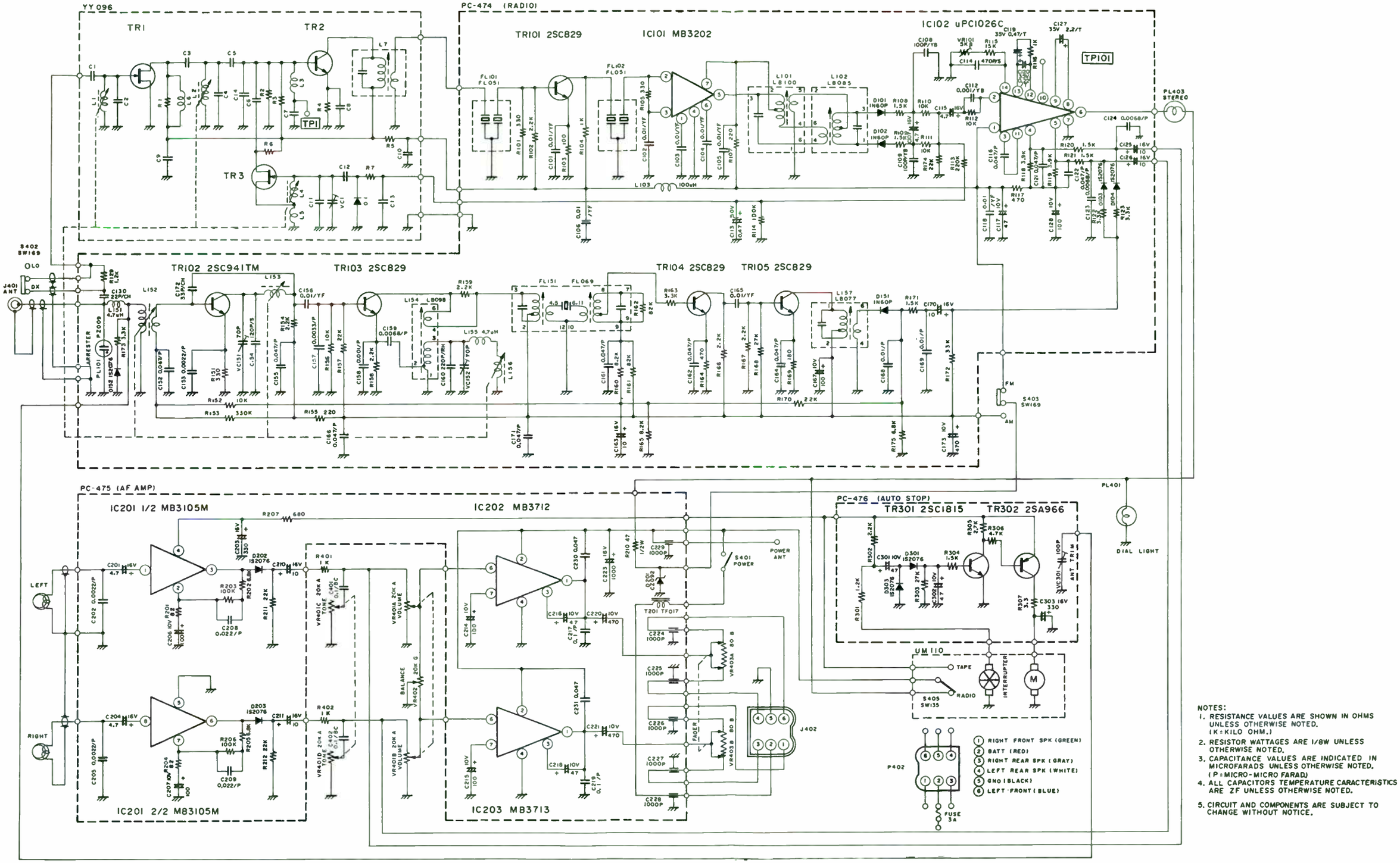


AUTO STOP
PARTS ASSEMBLY TOP



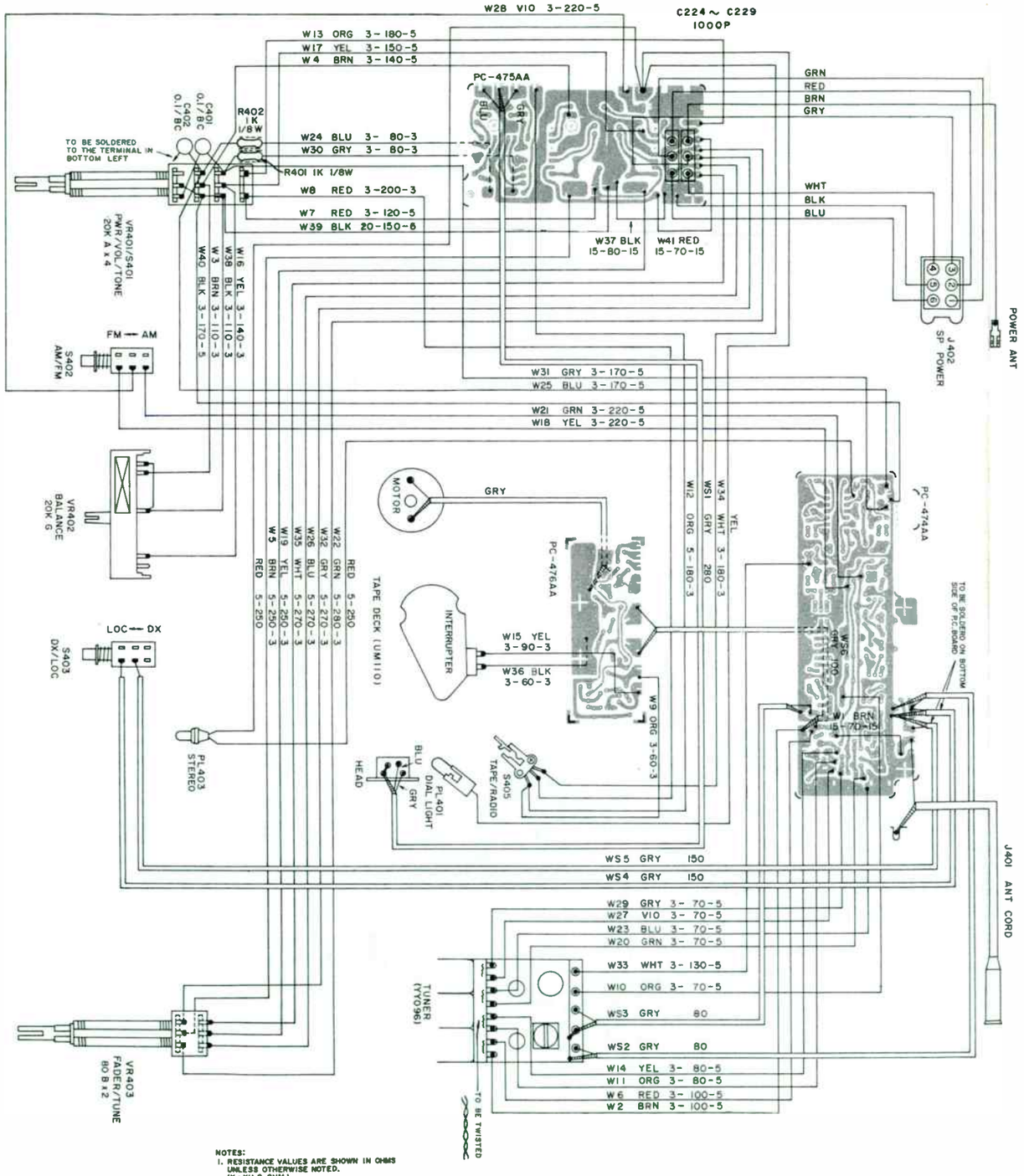


AUTO STOP PCB
PARTS ASSEMBLY BOTTOM VIEW



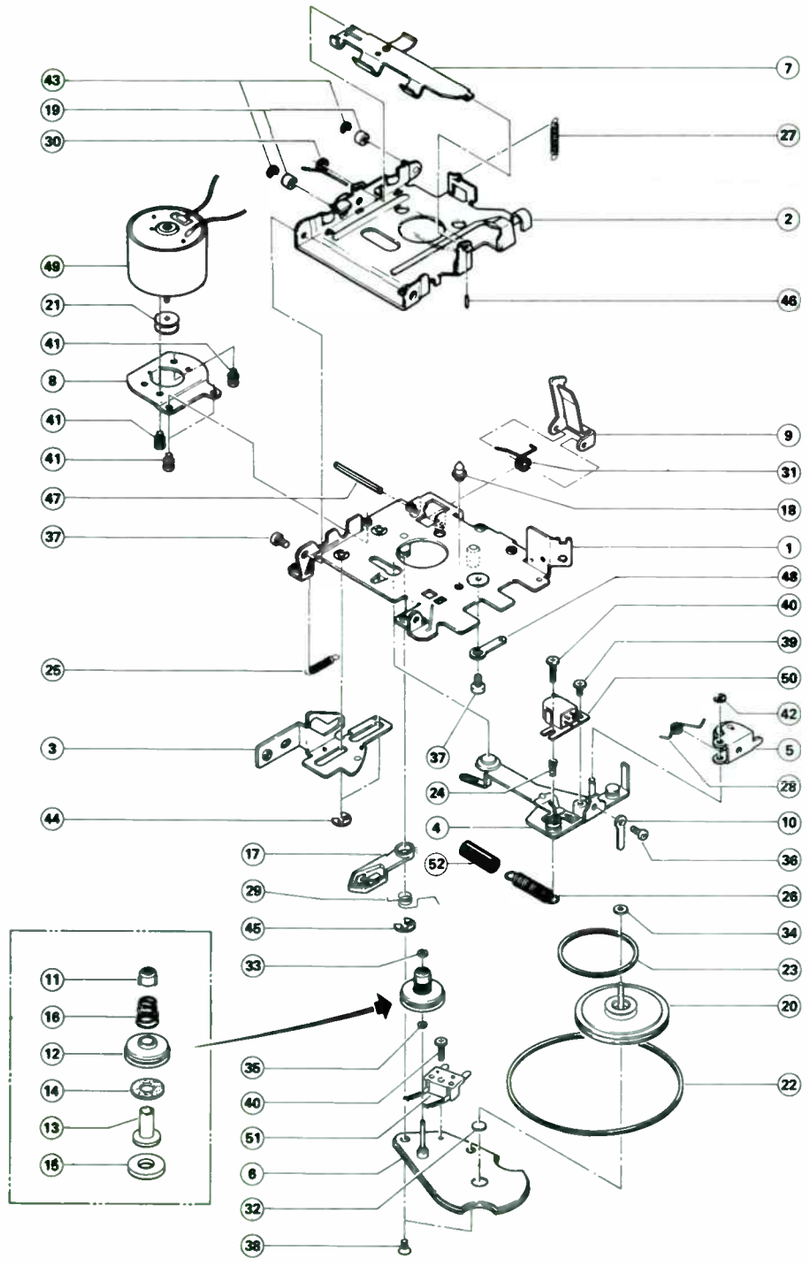
NOTES:
1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K=KILO OHM.)
2. RESISTOR WATTAGES ARE 1/8W UNLESS OTHERWISE NOTED.
3. CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE NOTED. (P=MICRO-MICRO FARAD)
4. ALL CAPACITORS TEMPERATURE CARACTERISTICS ARE ZF UNLESS OTHERWISE NOTED.
5. CIRCUIT AND COMPONENTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

WIRING DIAGRAM



NOTES:
1. RESISTANCE VALUES ARE SHOWN IN OHMS UNLESS OTHERWISE NOTED. (K = KILO OHM)
2. CAPACITANCE VALUES ARE INDICATED IN MICROFARADS UNLESS OTHERWISE NOTED.
3. CIRCUIT AND COMPONENTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

DECK
EXPLODED VIEW



REF. NO.	PART NO.	DESCRIPTION	Q'TY
1		Chassis Ass'y	1
		Chassis	(1)
		Flywheel Metal	(1)
		Reel Holder Stud A	(1)
		Reel Holder Stud B	(1)
		Eject Lever Shaft	(2)
2		Sub Chassis Ass'y	1
		Sub Chassis	(1)
		Cassette Spring	(1)
		Roller Shaft	(2)
3		Eject Lever Ass'y	1
		Eject Lever	(1)
		Eject Lever Pin	(1)
4		Head Base Ass'y	1
		Head Base	(1)
		Head Base Spring	(1)
		Head Stud A	(1)
		Head Stud B	(1)
		Pinch Roller Arm Shaft	(1)
		Head Base Stud	(1)
		Head Base Metal	(1)
		Head Base Pin	(1)
		Washer A ϕ7 x ϕ4	(1)
		Rivet Flat Hd ϕ2 x 2	(1)
5		Pinch Roller Ass'y	1
		Pinch Roller Arm	(1)
		Pinch Roller	(1)
		Pinch Roller Shaft	(1)
6		Reel Holder Ass'y	1
		Reel Holder	(1)
		Reel Shaft	(1)
7		Cassette Holder Ass'y	1
		Cassette Holder	(1)
		Cassette Spring A	(1)
		Rivet Flat Hd ϕ2 x 2	(1)
8		Motor Holder A	1
9		Eject Arm	1
10		Cord Clamp	1
11		Reel Stopper	1
12		Reel	1
13		Reel Driver	1
14		Felt Washer	1
15		Senser PC Board	1
16		Reel Spring	1
17		FF Lock Cam	1
18		Cassette Guide Boss A	1
19		Roller	2
20		Flywheel	1
21		Motor Pulley	1
22		Belt A	1
23		Belt B	1
24		Spring A	1
25		Spring B	1
26		Spring C	1
27		Spring D	1
28		Spring E	1
29		Spring F	1
30		Spring G	1
31		Spring H	1
32		Spacer	1
33		Washer B ϕ3 x ϕ1.2	1
34		Washer C ϕ5 x ϕ2	1
35		Washer D ϕ3 x ϕ1.5	1
36		Screw, Pan Hd ⊕ M2.6 x 4	1
37		Screw, Pan Hd ⊕ M3 x 4	2
38		Screw, Flat Hd ⊕ M2.6 x 4	2
39		Screw, Bind Hd ⊕ M2 x 4	1
40		Screw, Bind Hd ⊕ M2 x 8	2
41		Screw, Pan Hd ⊕ Sems M2.6 x 4	4
42		E-Ring ϕ1.5	1
43		E-Ring ϕ2	2
44		E-Ring ϕ3	2
45		E-Ring ϕ4	1
46		Spring Pin ϕ1.2 x 4	1
47		Spring Pin ϕ2.5 x 25	1
48		Terminal Lug ϕ3.2 x ϕ8 x 16	1
49		Motor YY-095	1
50		Head YY-091	1
51		Sensing Contact Ass'y	1
52		Vinyl Sleeve	1

PARTS LIST

MODEL NO. 67-455 PAGE 1

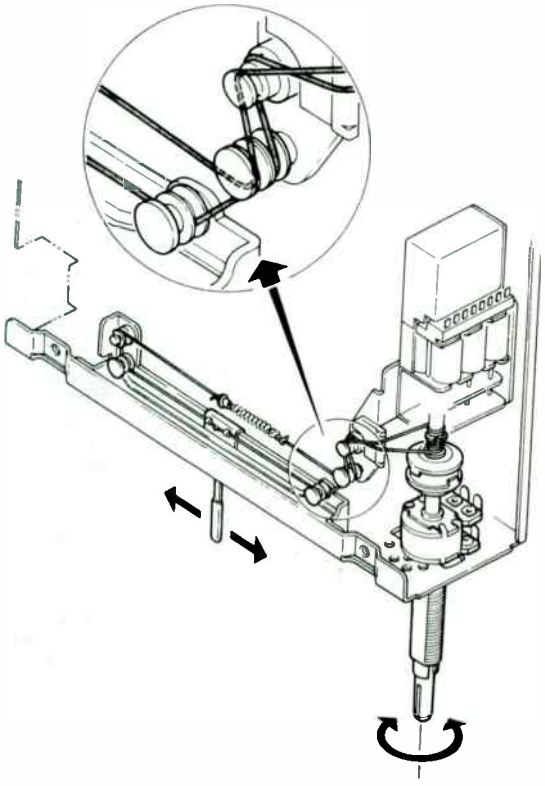
REF. NO.	DESCRIPTION	PART NO.
	EXPLODED VIEW: (CASE MATERIALS)	
2	Case, Top	67-011005
4	Bracket, Pulley	67-158039
5	Pointer, Dial	67-150003
6	Heat Sink	67-089024
7	Clamp, Ant. Cable	67-158040
8	Washer, Control	65-151271
9	Bracket, PC Board	67-158041
10	Bracket, Lamp	67-158042
11	Escucheon, Case Front	67-010008
12	Coupler, Control Fader	67-156017
13	Coupler, Control Fader	67-156018
14	Knob, Balance	67-115019
15	Spacer, Dial	67-156019
16	Indicator, Stereo	67-150004
17	Plate, Dial Scale	67-150005
18	Knob, AM/FM,LO/DX	67-115020
19	Knob, Eject	67-115021
20	Holder, Lamp	67-158043
21	Frame, Door	67-020012
22	Plate, Name	67-020013
23	Plate, Control	67-020014
24	Door Tape/Dial Scale Plate	67-020015
25	Plate, Optical Shield	67-150006
26	Insulator	67-157019
27	Spring, Door	67-152033
28	Spring, Dial String	67-152034
29	Shaft, Tape Door	67-156020
32	Plate, Serial No.	67-023002
44	Clamp, Cord, Nylon	63-157004
	EXPLODED VIEW: (CASSETTE DECK)	
3	Lever, Eject	67-155014
4	Bracket, Head, Assy.	67-158044
5	Roller Pinch, Assy.	65-199200
6	Plate, Spindle	67-155015
7	Arm, Cassette, Assy.	67-155016
8	Bracket, Motor	67-158045
9	Arm, Eject	67-155017
10	Clamp, Cord	63-157004
11,12,13,14, 15,16	Reel, Assy.	67-199014
17	Cam, FF Lock	67-156021
18	Pin, Cassette Guide	67-156022
19	Roller, Cassette	67-156023
20	Flywheel	67-199015
21	Pulley, Motor	67-156024
22	Belt, Rubber (Large)	67-198004
23	Belt, Rubber (Small)	65-198026
24	Spring, A	67-152035
25	Spring, B	67-152036
26	Spring, C	67-152037
27	Spring, D	67-152038
28	Spring, E	67-152039
29	Spring, F	67-152040
30	Spring, G	67-152041
31	Spring, H	67-152042
32	Spacer	67-156025
46	Pin	67-156026
47	Pin	67-156027
49	Motor	63-190002
50	Head	65-193029
51	Switch, Tape Sensing	67-183013
	MISCELLANEOUS:	
PL101	Lamp, Neon	67-201001
PL401	Lamp, Pilot	63-201012
PL403	Lamp, Red, W/Leads	67-201008
M4	Socket, Lamp	65-157155
M5	Tuner, Assy. (Complete)	67-078002
M6	Deck, Tape, Assy. (Complete)	67-075034
	Fuse, 3 Amp	13-204017
	Strap, Unit Mount	65-158407

REF. NO.	DESCRIPTION	PART NO.
	ACCESSORIES:	
	Plate, Front Trim	67-020016
	Plate, Off/Vol/Tone	67-020017
	Plate, Tuning/Fader	67-020018
	Knob, On-Off-Vol/Tune	67-115022
	Knob, Tone/Fader	67-115023
	Gasket, Rubber	67-157020
	Accessory Pack, (4 Knobs, Front/Trim Plates)	67-205002
	CONTROLS:	
VR101	Control, Sensitivity 5K OHM B	79-164013
VR401,(S401)	Control, Vol./Tone	65-160075
VR402	Control, Balance	67-162003
VR403	Control, Fader/Tone	67-162004
	SWITCHES:	
SW135(S405)	Switch	63-183019
SW169(S402,403)	Switch, AM/FM,LO/DX	67-183014
	CERAMIC FILTERS:	
FL101,102	Filter, Ceramic	63-179013
	TRIMMER CAPACITORS:	
VC151,152	Capacitor, Trimmer 70PF	63-123006
VC301	Capacitor, Trimmer	63-123020
	FEED THRU CAPACITOR:	
C224,225,226, 227,228,229	Capacitor, Feed Thru (CZ-051)	67-130011
	CABLES:	
J402	Cable, Spkr/Pwr (Unit)	63-034005
P402	Cable, Spkr/Pwr (Accy)	63-034007
J401	Cable, Antenna	65-034065
M7	Cable, Power Ant. Lead	65-034070
	COILS AND TRANSFORMERS:	
L101	Coil, FM IFT (Grey)	65-090118
L102	Coil, FM IFT (Blue)	65-090119
L103	Coil, 100uH, Choke	13-176574
L151,155	Coil, 4.7uH	63-178014
L154	Coil, Oscillator AM (Red)	63-170004
L157	Coil, AM IFT (Black)	65-090107
T201	Coil, Choke	65-178061
FL151	Coil, Disc, W/Filter	65-090117
	INTEGRATED CIRCUITS:	
IC101	MB3202	02-173202
IC102	UPC1026C	02-301026
IC201	MB3105M	02-173105
IC202	MB3712	02-173712
IC203	MB3713	02-173713
	TRANSISTORS:	
TR101,103, 104,105	2SC829-B	01-030829
TR102	2SC941-TM	01-030941
TR301	2SC1815-0	01-031815
T302	2SA966-0	01-010966
	DIODES:	
D101,102,151, 152,202,203	1N60	05-170060
D103,104, 301,303	1S2076	05-182076
D201	CZ092	05-090092

PARTS LIST

MODEL NO. 67-455 PAGE 2

REF. NO.	DESCRIPTION	PART NO.
	PRINTED CIRCUIT BOARDS: (COMPLETE WITH COMPONENTS)	
M1	Board, PC, Radio	67-075035
M2	Board, PC, AF Amp.	67-075036
M3	Board, PC, Auto Stop	67-075037
	RESISTORS: Resistors not shown on this parts list are carbon type, 1/8 watt. Refer to schematic for specific values.	
	CARBON:	
R210	47 OHM, 1/2 W	04-994070
	CAPACITORS: Capacitors not shown on this parts list are ceramic disc type, 50 volt. Refer to schematic for specific values.	
	MYLAR:	
C116,121,122 152,153,161, 162,164,166,171	.047uF, 50V	03-000300
C123,124,159	.0068uF, 50V	03-000360
C153,202,205	.0022uF, 50V	03-000245
C157	.0033uF, 50V	03-000275
C168,169	.01uF, 50V	03-000205
C158	.001uF, 50V	03-000210
C208,209	.015uF, 50V	03-000335
C217,219	.1uF, 50V	03-000200
	TANTALUM:	
C119	.47uF, 35V	03-003026
C120	.22uF, 35V	03-003030
C127	2.2uF, 35V	03-003041
	POLYSTYROL:	
C114	470PF, 50V	03-009065
C154	120PF, 50V	03-009017
	ELECTROLYTIC:	
C107,115, 201,204	4.7uF, 16V	00-132595
C113	.47uF, 50V	00-132575
C117,216, 218,301,302	47uF, 10V	00-132625
C125,126, 163,170,210	10uF, 16V	00-132115
C128,167, 206,207, 214,215	100uF, 10V	00-132165
	330uF, 16V	00-132540
173	470uF, 10V	00-132665
	1000uF, 16V	00-132210



DIAL STRINGING

Pages 99-112 Courtesy of PANASONIC CONSUMER PARTS DIV.

ALIGNMENT INSTRUCTIONS

■ EQUIPMENT REQUIRED

- Signal Generator: AM 450 ~ 1700 kHz, 400 Hz Mod. @30%
  FM 10.7 MHz, 86 ~ 110 MHz, 400 Hz Mod. @30% and Stereo Signal Generator
- Sweep Generator: 450 kHz, 10.7 MHz
- Antenna Pad: Refer to Fig. 1 and Fig. 3.
- Indicator: Output meter (AC voltmeter or VTVM)
  Oscilloscope
  Frequency Counter
- Power Source: DC 13.8 V (standard voltage for measurement)

AM (I-F & RF) ALIGNMENT

- Set Volume Control at maximum, and Tone Control in the treble position.
- Set Band Selector Switch in the AM position.
- Set Balance Control in the center.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1)
- Keep the signal generator output low enough to prevent overloading the circuit.

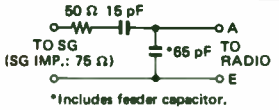


Fig. 1 Antenna Pad

	STEP	GENERATOR FREQUENCY	RADIO-DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
IF	❶~❹	450 kHz [Unmodulated or 400 Hz Mod.]	Point of non interference. (on/about 600 kHz)	Through the pad (Fig. 1) to antenna receptacle.	Beween Test Point Ⓐ and ground or speaker terminals.	IFT104 ↕ IFT101	Adjust for maximum.
AM RF	❺	510 kHz [400 Hz Mod.]	Low freq. end stop.	"	Output meter across speaker terminals.	L104 (OSC)	"
	❻	1640 kHz [400 Hz Mod.]	High freq. end stop.	"	"	C114 (OSC)	"
	❼~❽	1400 kHz [400 Hz Mod.]	Tune to signal.	"	"	C107 (RF) C101 (ANT)	"

- When radio is installed in car, antenna fully extended, tune in a weak station near 1400 kHz, and adjust C101 for maximum output.
- Refer to the ANTENNA TRIMMER ALIGNMENT in page 1.
- Repeat steps, two or three times.

NOTE: Test Point Ⓐ is the band selector switch side of R116.

FM (I-F & RF) ALIGNMENT

● FM I-F ALIGNMENT USING SIGNAL GENERATOR AND SWEEP GENERATOR

- Volume, Tone and Balance Controls may be left in any position.
- Set Band Selector Switch in the FM position.
- Keep the signal generator output low enough to prevent overloading the circuits.

	STEP	GENERATOR FREQUENCY	RADIO-DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
FM	❾	10.7 MHz	Point of non interference.	Through the pad (Fig. 3) to antenna receptacle or Test Point Ⓔ.	Vert. amp. of scope to Test Point Ⓑ, low side to ground.	IFT (FM Tuner Ass'y)	Adjust for maximum amplitude and proper linearity between ±100 kHz markers.
IF	❿	"	"	"	"	IFT151 IFT152	10.7 MHz Fig. 2

- Repeat steps two or three times.

NOTES: Test Point Ⓑ is the point of R158 in the IFT line.
Test Ponit Ⓔ is shown the side view photo on page 11.

• FM RF ALIGNMENT

- Set Volume Control at maximum, and Tone Control in the treble position.
- Set Band Selector Switch in the FM position.
- Set Balance Control in center.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 3)
- Keep the signal generator output low enough to prevent overloading the circuits.

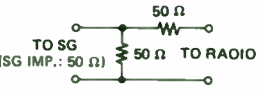


Fig. 3 Antenna Pad

	STEP	GENERATOR FREQUENCY	RADIO-DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST (FM Tuner Ass'y)	REMARKS
FM RF	⑪	87.0 MHz [400 Hz Mod.]	Low freq. end stop.	Through the pad (Fig. 3) to antenna receptacle.	Output meter across speaker terminals	OSC Trimmer	* Adjust for maximum. * Repeat steps, two or three times.
	⑫	98 MHz [400 Hz Mod.]	Tune to signal.	"	"	RF Trimmer	
	⑬	98 MHz [400 Hz Mod.]	Tune to signal.	"	"	ANT Trimmer	

- In step ⑪, adjust lower frequncy at 87.0 MHz. The upper frequency will be within 108 ~ 110 MHz, because of design characteristics. It is non-adjustable.

MULTIPLEX ALIGNMENT USING FM SIGNAL GENERATOR AND STEREO SIGNAL GENERATOR

- Set Volume Control at maximum, and Tone Control in the treble position.
- Set Balance Control in center.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 3)
- Keep the signal generator output low enough to prevent overloading the circuits.
- FM Signal Generator should be modulated by Stereo Signal Generator.

Modulation Level	19 kHz, 10% 400 Hz, 30%
FM Signal Generator Output Level	1 mV
FM Signal Generator Frequency	98 MHz

	STEP	MODULATION FREQUENCY	INDICATOR	ADJUST	REMARKS
FM	⑭	No signal input	Frequency counter to Test Point Ⓒ, low side to ground.	VR172	Adjust to 19 kHz +50 Hz.
MPX	⑮	19 kHz, 400 Hz (Right channel)	VTVM to left speaker terminals.	VR171	Adjust for minimum.
		19 kHz, 400 Hz (Left Channel)	VTVM to right speaker terminals.		Adjust for minimum.

- Repeat steps, two or three times.

NOTE: Test Point Ⓒ is Terminal No. 12 of IC171.

FM INPULSE NOISE QUIETING CIRCUIT ALIGNMENT USING SIGNAL GENERATOR AND PULSE GENERATOR

- Set Band Selector Switch in the FM position.
- Connect the signal generator and the pulse generator to the antenna receptacle through the two-signal antenna pad.

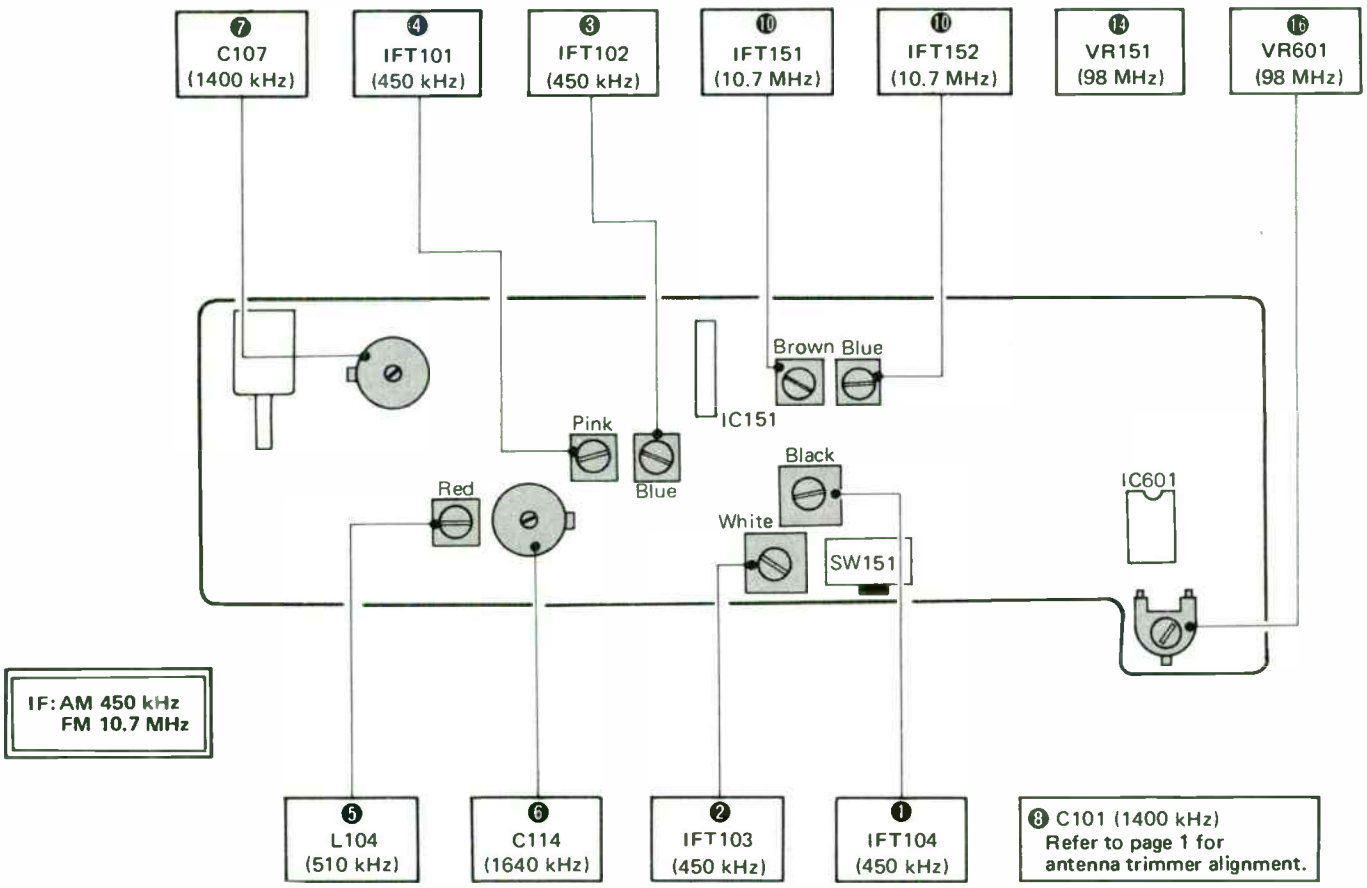
Signal Generator	Frequency	98 MHz (400 Hz Mod.)
	Dev. 19 kHz pilot signal	7.5 kHz
	Main signal	22.25 kHz
	Output level	30 ~ 40 dB/μV
Pulse Generator	Rising time	5 ~ 10 nsec
	Width	40 μsec
	Interval	1 kHz
	Level	+5 Vp-p

- Firstly set Radio-Dial to the signal, and the output level of the signal generator to 30 dB/μV.
- Nextly cut the modulation level and Volume Control to maximum.

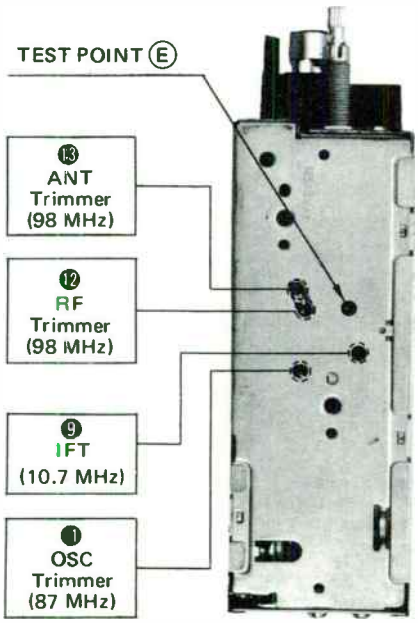
	STEP	GENERATOR FREQUENCY	INDICATOR	ADJUST	REMARKS
INQ	⑯	98 MHz [Unmodulated]	Speaker to the speaker terminals.	VR601	Adjust VR601 for minimum noise level.

ALIGNMENTS POINTS

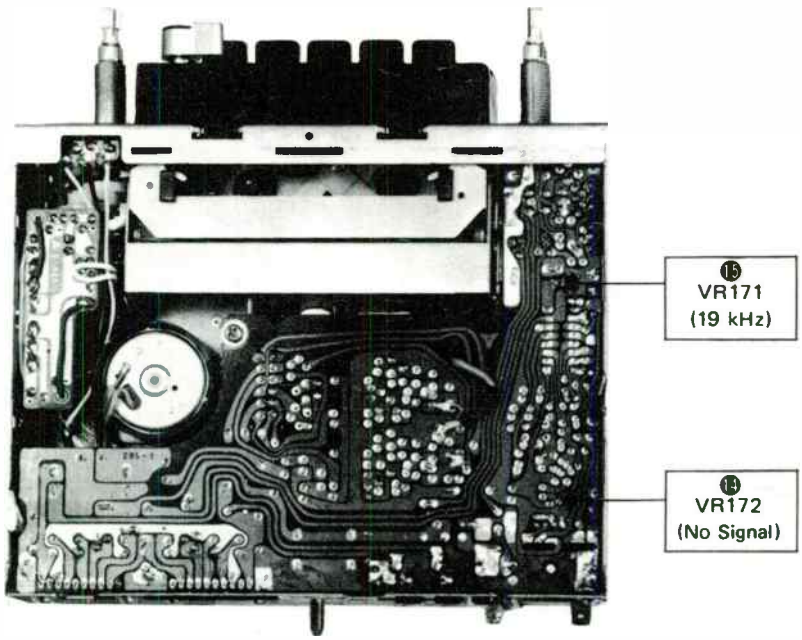
■ Numbers in ● are indicated ALIGNMENT STEPS.



RIGHT SIDE VIEW



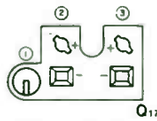
TOP VIEW, WITH COVER REMOVED



Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
M260 (2-B)	YEJE01009	E-ring	1	
M261	XYN26 + C4FXS	⊕Screw w/Washer, 2.6mmø x 4mm	5	
M262	XSB26 + 6FXS	⊕Screw, Bind 2.6mmø x 6mm	4	
M263	XSN2 + 4FXS	⊕Screw, Pan 2mmø x 4mm	1	
M264	XYN2 + C5FXS	⊕Screw w/Washer, 2mmø x 5mm	1	
M265 (1-B)	YEFX209132	Reel Base Ass'y (FF)	1	
M266 (4-A)	YEFX005379	Hook Spring	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
ICs AND TRANSISTORS				
RF & IF BLOCK				
IC151	YEAMUPC577H	FM IF Amp	1	
IC601	AN101	FM EIA	1	
Q101	2SC2076	AM RF Amp	1	
Q102, 103, 151	2SC829	AM Conv, AM IF Amp, AM IF Amp	3	
Q601	2SC828	FM AF Amp	1	
AUDIO BLOCK				
IC171	AN362	FM MPX Amp	1	
IC221	YEAMHA1366WR	AF Power Amp	1	
IC321	YEAMHA1366W	AF Power Amp	1	
Q171, 202, 302	2SC828	AF Amp, Tape EQ Amp	3	
Q201, 301	2SC644	Tape EQ Amp	2	
DIODES				
DX/LOC BLOCK				
D51, 52, 53	MA150	DX/LOC Selector	3	
RF & IF BLOCK				
D101, 102	YAAD009	AM AGC	2	
D103	MA150	AM Det	1	
D151, 152	YEAD032	FM Disc	2	
D702	YEAD024	Voltage Stabilizer	1	

SPEAKER TERMINAL



Q_{171}

1. Power Supply for Motor Antenna
2. Speaker Output (Left Speaker)
3. Speaker Output (Right Speaker)

SPEAKER TERMINAL

L701

F: 3 A

POWER SUPPLY CORD (DC + 13.8 V)

IC_{321}

IC_{221}

SW101
TAPE/RADIO
SELECTOR SWITCH

DC MOTOR

IC_{171}

TEST POINT ©

PLAYBACK HEAD

SW701
POWER SWITCH

VR201, 301
TONE CONTROL
& VOLUME CONTROL

IC_{601}

Q_{201} Q_{202} Q_{301} Q_{302} Q_{601}

TEST POINT Ⓑ

IC_{151} Q_{151} Q_{102} Q_{101}

ANTENNA RECEPTACLE

SW151
AM/FM
SELECTOR
SWITCH

TEST POINT Ⓐ

FLEXIBLE PCB

SW171
DX/LOC
SELECTOR
SWITCH

PL PILOT LAMP

D171 STEREO INDICATOR
D201 TAPE INDICATOR

ANTENNA TRIMMER

VR BALANCE CONTROL

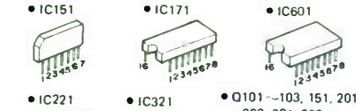
- Negative side is shown in blue.

NO	VOLTAGE	NO	VOLTAGE	PIN. NO	VOLTAGE	PIN. NO	VOLTAGE	PIN. NO	VOLTAGE
❶	0.7V	⑮	1.3V	IC221,321		IC171		IC601	
❷	0.4V	⑯	0.8V	1		1	11.0V	1	4.0V
❸	5.6V	⑳	6.0V	2	13.8V	2	3.4V	2	2.0V
❹	1.0V	㉑	1.6V	3	9.2V	3	2.8V	3	3.4V
❺	0.5V	㉒	1.0V	4	0V	4	4.8V	4	3.7V
❻	8.2V	㉓	2.8V	5	1.2V	5	4.6V	5	3.7V
❼	3.4V			6		6	12.0V	6	2.5V
❽	2.8V			7	13.8V	7	0V	7	1.2V
❾	8.2V	PIN NO	VOLTAGE	8	0V	8	0.2V	8	0.7V
❿	1.5V	IC151		9		9	0V	9	11.0V
⓫	0.8V	1	5.0V	10	7.1V	10	1.8V	10	11.0V
⓬	8.0V	2	1.8V			11	1.7V	11	0V
⓭	1.6V	3	1.8V			12	1.5V	12	11.0V
⓮	1.0V	4	0V			13	1.7V	13	2.8V
⓯	4.8V	5	11.0V			14	1.8V	14	2.8V
⓰	0.6V	6	2.8V			15	1.8V	15	2.0V
⓱	0V	7	11.0V			16	2.6V	16	0V

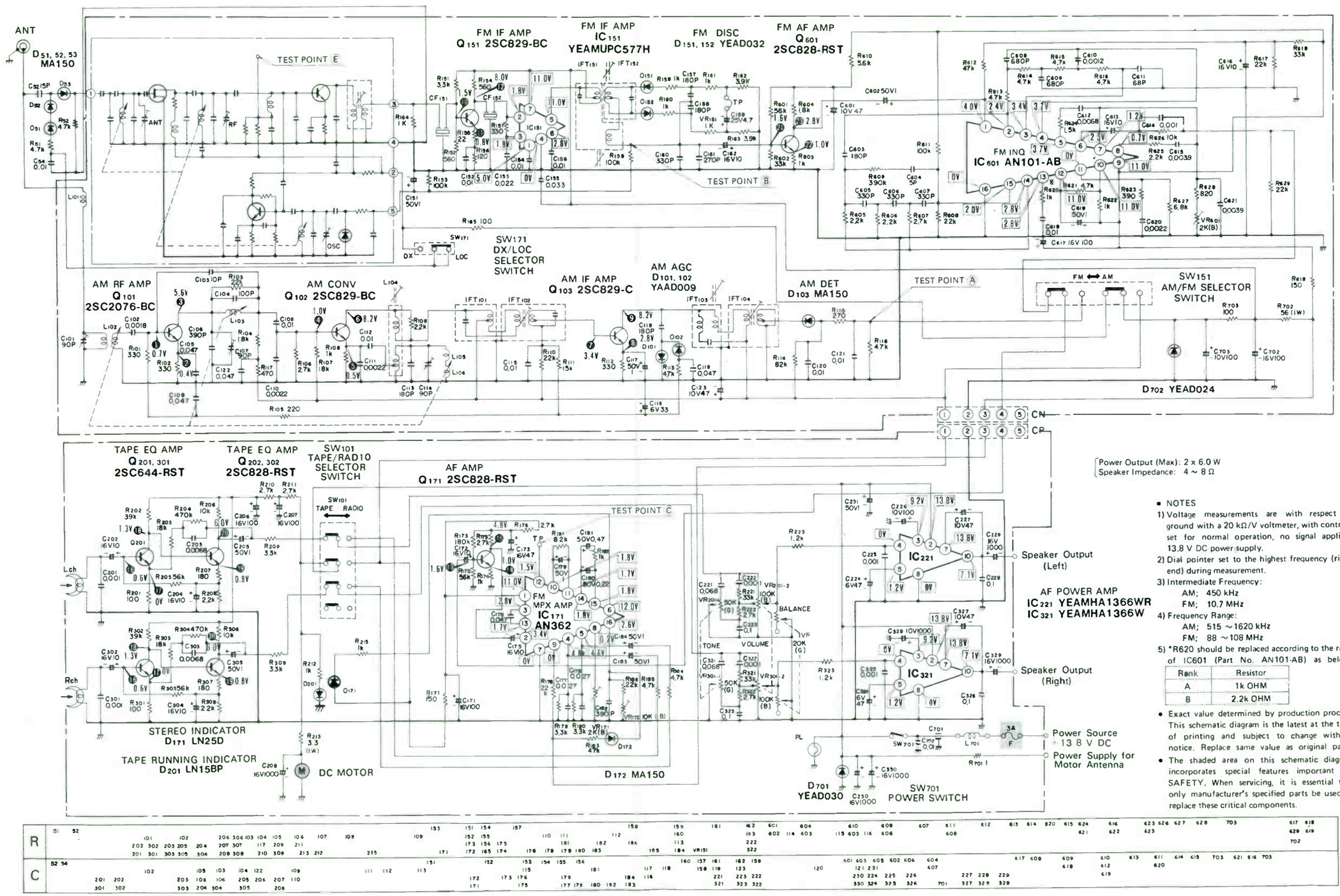
- Wire Color Code

BLK	Black
BLU	Blue
BRN	Brown
GRN	Green
GRY	Gray
ORG	Orange
RED	Red
WHT	White
YEL	Yellow

- IC's AND TRANSISTORS



SCHEMATIC DIAGRAM MODELS CQ-5500EU/EC



Power Output (Max): 2 x 6.0 W
Speaker Impedance: 4 ~ 8 Ω

■ NOTES

1) Voltage measurements are with respect to ground with a 20 kΩ/V voltmeter, with controls set for normal operation, no signal applied, 13.8 V DC power supply.
2) Dial pointer set to the highest frequency (right end) during measurement.
3) Intermediate Frequency:
   AM; 450 kHz
   FM; 10.7 MHz
4) Frequency Range:
   AM; 515 ~1620 kHz
   FM; 88 ~108 MHz
5) *R620 should be replaced according to the rank of IC601 (Part No. AN101-AB) as below.

Rank	Resistor
A	1k OHM
B	2.2k OHM

- Exact value determined by production process. This schematic diagram is the latest at the time of printing and subject to change without notice. Replace same value as original parts.
- The shaded area on this schematic diagram incorporates special features important for SAFETY. When servicing, it is essential that only manufacturer's specified parts be used to replace these critical components.

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		AUDIO BLOCK		
D172	MA150	Reverse Voltage Prevention	1	
D701	YEAD030	Spark Suppression	1	
		MAIN UNIT		
D171	LN25D	LED, Stereo Indicator	1	
D201	LN15BP	LED, Tape Running Indicator	1	
		CAPACITORS		
		DX/LOC BLOCK		
C52	YECCD1H150KM	15 PF 50WV ±10% Ceramic	1	
C54	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
		RF & IF BLOCK		
C102	YECQN1H182K	0.0018 MFD 50WV ±10% Polyester	1	
C103	YECCD1H100FM	10 PF 50WV ±1% Ceramic	1	
C104	YECCD1H101KM	100 PF 50WV ±10% Ceramic	1	
C105	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C106	YECCD1H391KM	390 PF 50WV ±10% Ceramic	1	
C108	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C109	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C110	YECQN1H222K	0.0022 MFD 50WV ±10% Polyester	1	
C111	YECQN1H222K	0.0022 MFD 50WV ±10% Polyester	1	
C112	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C113	YECCD1H181JS	180 PF 50WV ±5% Ceramic	1	

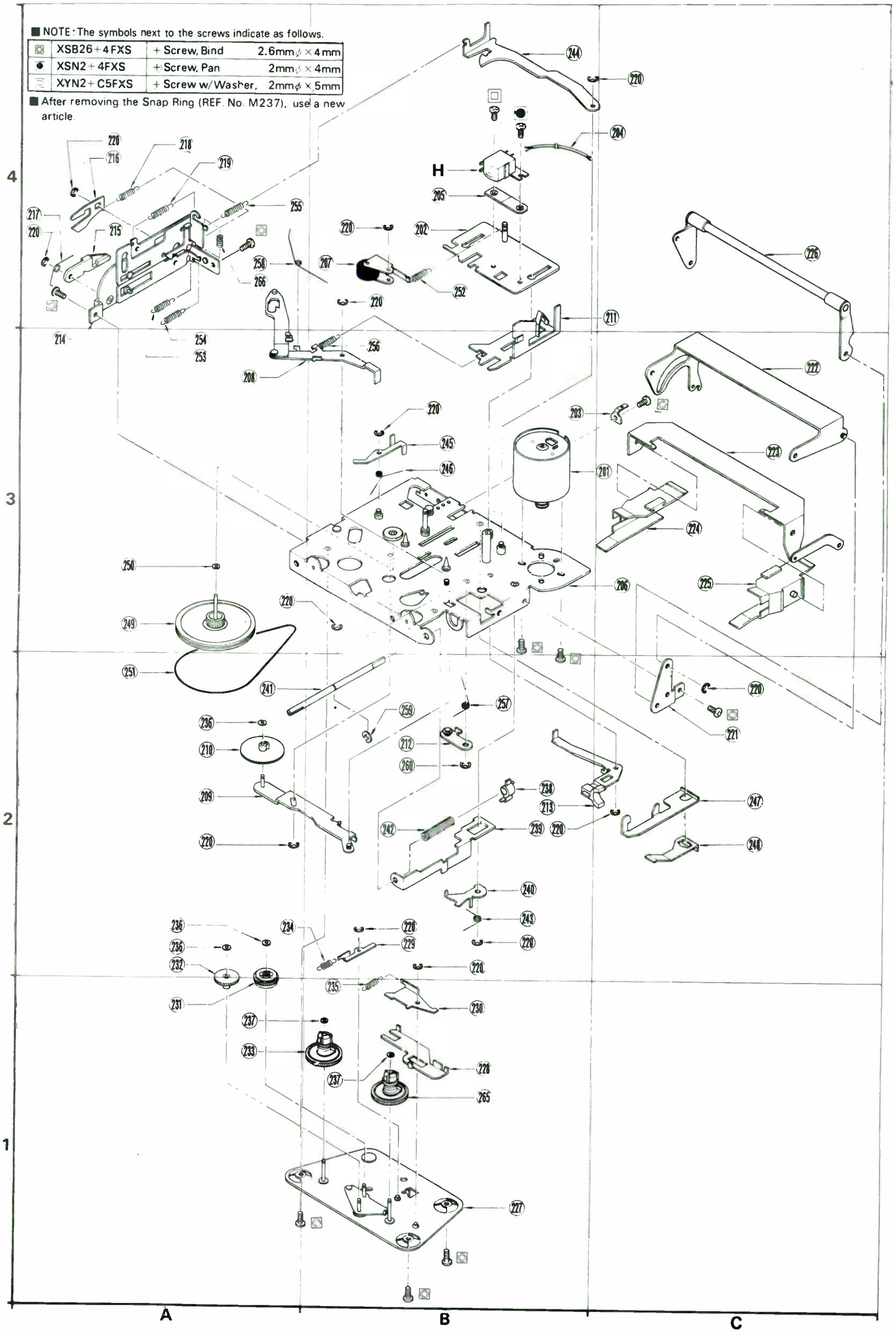
Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C115	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C116	ECEA6V33L	33 MFD 6WV Electrolytic	1	
C117	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C118	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C119	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C120	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C121	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C122	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C123	ECEA10V47L	47 MFD 16WV Electrolytic	1	
C151	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C152	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C153	YECQN1H223M	0.022 MFD 50WV ±20% Polyester	1	
C154	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C155	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C156	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C157	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C158	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C159	ECEA25V4R7L	4.7 MFD 25WV Electrolytic	1	
C160	YECCD1H331KM	330 PF 50WV ±10% Ceramic	1	
C161	YECCD1H271JM	270 PF 50WV ±5% Ceramic	1	
C162	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C601	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C602	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C603	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C604	YECCD1H150DM	15 PF 50WV ±0.5 PF Ceramic	1	
C605	YECCD1H331KM	330 PF 50WV ±10% Ceramic	1	
C606	YECCD1H331KM	330 PF 50WV ±10% Ceramic	1	
C607	YECCD1H331KM	330 PF 50WV ±10% Ceramic	1	
C608	ECQS1681JZ	680 PF 125WV ±5% Polystyrene	1	
C609	ECQS1681JZ	680 PF 125WV ±5% Polystyrene	1	
C610	YECQN1H122K	0.0012 MFD 50WV ±10% Polyester	1	
C611	YECCD1H680KM	68 PF 50WV ±10% Ceramic	1	
C612	YECQN1H682M	0.0068 MFD 50WV ±20% Polyester	1	
C613	ECEA16V10L	10 MFD 16WV Electrolytic	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
TAPE DECK PARTS				
HEAD				
H (4-B)	YEAH1542YA	Playback Head	1	
MECHANICAL PARTS				
M201 (3-C)	YASAK91035	DC Motor Ass'y (w/Pulley)	1	
M202 (4-B)	YEFX018025	Head Base Ass'y	1	
M203 (3-B)	YEFX007149	Cord Clamper	1	
M204 (4-C)	YEAJ18091	Head Shielded Wire	1	
M205 (4-B)	YEFX005263A	Head Azimuth Adjustment Spring	1	
M206 (3-C)	YEFA01260	Main Chassis Sub Ass'y	1	
M207 (4-B)	YEFX21B14BA	Pinch Roller Ass'y	1	
M208 (3-A)	YEP0FX079	Eject Hook Ass'y	1	
M209 (2-A)	YEFX046232	Idler Selector Sub Ass'y	1	
M210 (2-A)	YEFX003073	Idler Gear	1	
M211 (4-C)	YEP0FX080	SW Selector Plate Ass'y	1	
M212 (2-B)	YEP0FX083	Idler Arm Ass'y	1	
M213 (2-B)	YEP0FX085	FR Lever Ass'y	1	
M214 (3-A)	YEFX046231	Retainer Plate A Sub Ass'y	1	
M215 (4-A)	YEFX030020A	Timing Stopper	1	
M216 (4-A)	YEFX030023	Slide Plate Stopper	1	
M217 (4-A)	YEFX005351	Timing Stopper Spring	1	
M218 (4-A)	YEFX005345	Slide Plate Stopper Spring	1	
M219 (4-A)	YEFX00535B	Slide Spring	1	
M220	YEJE01004	E-ring	13	
M221 (2-C)	YEP0FX084	Retainer Plate B Ass'y	1	
M222 (3-C)	YEFK06036	Cassette Holder Sub Ass'y	1	
M223 (3-C)	YEFK06035	Guide Holder Sub Ass'y	1	
M224 (3-C)	YEFX235103	Tape Guide A	1	
M225 (3-C)	YEFX235104	Tape Guide B	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
M226 (4-C)	YEP0FX082	Charge Plate Ass'y	1	
M227 (1-B)	YEFX209130	Reel Plate Sub Ass'y	1	
M228 (1-B)	YEFX046215	FR Slide Plate	1	
M229 (2-B)	YEFX046214	FF Plate	1	
M230 (1-B)	YEFX046213	REW Plate	1	
M231 (1-A)	YEFX003072	FF Gear	1	
M232 (2-A)	YEFX003071	REW Gear	1	
M233 (1-A)	YEFX209131	Reel Base Ass'y (Supply)	1	
M234 (2-A)	YEFX005363	FF Spring	1	
M235 (1-B)	YEFX005346	REW Spring	1	
M236 (2-A)	YEFX014008	Snap Ring	3	
M237 (1-A) (1-B)	YEFX014007	Snap Ring	2	
M238 (2-B)	YEFX234114	FR Selector Cam	1	
M239 (2-B)	YEFX04621B	FR Release Plate A	1	
M240 (2-B)	YEFX046217	FR Release Plate B	1	
M241 (2-A)	YEFW06341	Eject Shaft	1	
M242 (2-B)	YEFX00534B	Eject Shaft Spring	1	
M243 (2-B)	YEFX005353	FR Release Spring	1	
M244 (4-B)	YEFX046226	Eject Plate	1	
M245 (3-B)	YEFX030022	Stopper	1	
M246 (3-B)	YEFX005352	Stopper Spring	1	
M247 (2-C)	YEFX030021	Head Base Stopper	1	
M248 (2-C)	YEFX005359	Lock Plate Spring	1	
M249 (3-A)	YEFX213126	Flywheel	1	
M250 (3-A)	YAJW05011	Polyslider	1	
M251 (2-A)	YEFR03025	Drive Belt	1	
M252 (4-B)	YEFX005354A	Head Base Spring	1	
M253 (3-A)	YEFX005356	Cassette Holder Spring	1	
M254 (3-A)	YEFX005355	Pop Up Spring	1	
M255 (4-A)	YEFX005357A	Eject Spring	1	
M256 (3-B)	YEFX005347	FR Lock Spring	1	
M257 (2-B)	YEFX005350A	Idler Arm Spring	1	
M258 (4-A)	YEFX005349	Eject Hook Spring	1	
M259 (2-B)	YEJE01003	E-ring	1	

EXPLODED VIEW (TAPE DECK)

- Numbers in ◯ are indicated REF. NO. in the REPLACEMENT PARTS LIST.



Ref. No.	Part No.	Part Name & Description		Pcs Set	Remarks
C614	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C615	YECQN1H392K	0.0039 MFD 50WV ±10%	Polyester	1	
C616	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C617	ECEA16V100L	100 MFD 16WV	Electrolytic	1	
C618	YECQN1H103M	0.01 MFD 50WV ±20%	Polyester	1	
C619	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C620	YECQN1H222K	0.0022 MFD 50WV ±10%	Polyester	1	
C621	YECQN1H392K	0.0039 MFD 50WV ±10%	Polyester	1	
C702	ECEA16V100L	100 MFD 16WV	Electrolytic	1	
C703	ECEA10V100L	100 MFD 10WV	Electrolytic	1	
AUDIO BLOCK					
C171	ECEA16V100L	100 MFD 16WV	Electrolytic	1	
C172	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C173	ECEA16V47L	47 MFD 16WV	Electrolytic	1	
C175	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C176	YECQN1H473M	0.047 MFD 50WV ±20%	Polyester	1	
C177	YECQN1H273M	0.027 MFD 50WV ±20%	Polyester	1	
C178	YECQN1H273M	0.027 MFD 50WV ±20%	Polyester	1	
C179	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C180	ECEA50MR22	0.22 MFD 50WV	Electrolytic	1	
C181	ECEA50MR47	0.47 MFD 50WV	Electrolytic	1	
C182	ECQS1391JZ	390 PF 125WV ±5%	Polystyrene	1	
C183	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C184	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C201	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C202	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C203	YECQN1H682M	0.0068 MFD 50WV ±20%	Polyester	1	
C204	ECEA16V10L	10 MFD 16WV	Electrolytic	1	

Ref. No.	Part No.	Part Name & Description		Pcs Set	Remarks
C205	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C206	ECEA16V100L	100 MFD 16WV	Electrolytic	1	
C207	ECEA16V100L	100 MFD 16WV	Electrolytic	1	
C208	ECEA16V1000Z	1000 MFD 16WV	Electrolytic	1	
C221	YECQN1H683M	0.068 MFD 50WV ±20%	Polyester	1	
C222	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C223	YECCD12104M	0.1 MFD 12WV ±20%	Ceramic	1	
C224	ECEA6V47L	47 MFD 6WV	Electrolytic	1	
C225	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C226	ECEA10V100L	100 MFD 10WV	Electrolytic	1	
C227	ECEA10V47L	47 MFD 10WV	Electrolytic	1	
C228	ECQM1H104MZ	0.1 MFD 50WV ±20%	Polyester	1	
C229	ECEA16V1000Z	1000 MFD 16WV	Electrolytic	1	
C230	ECEA16V1000Z	1000 MFD 16WV	Electrolytic	1	
C231	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C301	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C302	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C303	YECQN1H682M	0.0068 MFD 50WV ±20%	Polyester	1	
C304	ECEA16V10L	10 MFD 16WV	Electrolytic	1	
C305	ECEA50V1L	1 MFD 50WV	Electrolytic	1	
C321	YECQN1H683M	0.068 MFD 50WV ±20%	Polyester	1	
C322	YECQN1H102K	0.001 MFD 50WV ±10%	Polyester	1	
C323	YECCD12104M	0.1 MFD 12WV ±20%	Ceramic	1	
C324	ECEA6V47L	47 MFD 6WV	Electrolytic	1	
C325	YECQN1H102K	0.001 MFD 50WV ±20%	Polyester	1	
C326	ECEA10V100L	100 MFD 10WV	Electrolytic	1	
C327	ECEA10V47L	47 MFD 10WV	Electrolytic	1	
C328	ECQM1H104MZ	0.1 MFD 50WV ±20%	Polyester	1	
C329	ECEA16V1000Z	1000 MFD 16WV	Electrolytic	1	
C330	ECEA16V1000Z	1000 MFD 16WV	Electrolytic	1	
C701	YECCL510354	1000 PF	Feedthrough	1	
C702	YECKD05103Z	0.01 MFD 50WV +80, −20%	Ceramic	1	

Ref. No.	Part No.	Part Name & Description		Pcs Set	Remarks
VARIABLE CAPACITORS					
C101, 107, 114	YECTT1090	90 PF	Trimmer	3	
VARIABLE RESISTORS					
VR171, 601	EVNK4AA00B23	2k OHM (B)	Semi-fixed	2	
VR172	EVNK4AA00B14	10k OHM (B)	Semi-fixed	1	
VR201, 301	EWKPRBS07916	50k OHM (G) x 2	Tone Control	1	
w/SW701		100k OHM (B) x 2	Volume Control		
		with Power Switch			
VR	EWKYXAS75G24	20k OHM (G)	Balance Control Ass'y	1	
SWITCHES					
SW101	YEAS07026	Tape/Radio Selector Switch		1	
SW151	YEAS07046	AM/FM Selector Switch		1	
SW171	YEAS09086	DX/LOC Selector Switch		1	
TUNER					
M50	YEAU05247	Tuner Ass'y (L102, 103, 106)		1	
M50-1	YEFE10237	Pushbutton, AM		2	
M50-2	YEFE10236	Pushbutton, FM		3	

Ref. No.	Part No.	Part Name & Description		Pcs Set	Remarks
COILS, TRANSFORMERS AND CERAMIC FILTERS					
L101	YELQ05C044	AM Loading Coil		1	
L104	YELL07S069	AM OSC Coil		1	
L105	YELT06N5R6	AM OSC Series Coil		1	
IFT101	YEIA07S7076A	AM IFT		1	
IFT102	YEIA07S7077B	AM IFT		1	
IFT103	YEIA10S7091	AM IFT		1	
IFT104	YEIA10S7092	AM IFT		1	
IFT151	YEIF07S7048	FM IFT		1	
IFT152	YEIF07S7047	FM IFT		1	
CF151, 152	YEIN09N5007	FM IF Ceramic Filter		2	

ANTENNA TRIMMER ADJUSTMENT

With radio installed in car and antenna fully extended, tune in a weak station near 1400 KHz and adjust CT401 for maximum output.

ALIGNMENT PROCEDURES

IMPORTANT This receiver is designed for 12 volt electrical system having negative battery ground only. Therefore, metal casing of the unit serves as negative terminal which receives the dead line (i.e. negative pole) of power supply source, while the blue cord receives the hot line (i.e. positive side) of the power supply source.

COLLECTOR CURRENT ADJUSTMENT

Traisistor (Q401 2SA322)

With power supply voltage (13.2V) and load (4 ohms) applied, operate the unit in AM mode without connection of car antenna. Insert a milliammeter between the collector and the coil (L4) as shown, and adjust Mini-pot (R531 250K) for the collector current of Q401 (2SA322) to be 350 ~ 450μA. (See Fig. 1)

Transistor (Q201 2SC668)

Operate the unit in FM mode without connection of car antenna. Insert a millivoltmeter across R201 as shown. Adjust Mini-pot (R203) for the voltage by Q201 collector current to be 100 ±10mV. (See Fig. 2)

AM IF & RF ALIGNMENT

STEP	ALIGNMENT	SIGNAL INPUT	FREQUENCY OF SIGNAL GEN	DIAL SETTING OF RADIO	COMPONENTS TO BE ADJUSTED FOR MAXIMUM OUTPUT	
1	AM IF TRANSFORMER	Thru Dummy Ant. (Fig. 3)	455 KHz	Low end stop	IF Transformer T504, T505, T506 and T507	
2	AM OSCILLATOR	Thru Dummy Ant.	525 KHz	Low end stop	Oscillator Coil	T401
		Thru Dummy Ant.	1625 KHz	High end stop	Oscillator Trimmer	CT403
3	AM ANTENNA/INTER	Thru Dummy Ant.	1400 KHz	1400 KHz	RF Inter-stage Trimmer Antenna Trimmer	CT402 CT401

FM IF ALIGNMENT

STEP	ALIGNMENT	SETTING OF CONTROL KNOBS ON RADIOS	ALIGNMENT FREQUENCY	TEST EQUIPMENT CONNECTION	ADJUSTMENT
4	FM 1 STAGE	Volume control at minimum.	10.7 MHz	Connect output cable of FM sweep marker generator to FM ANT terminals, and cathode ray oscilloscope thru network (shown in Fig. 4) to R519 and common ground.	Tune T201, T501 & T502 for maximum amplitude and symmetrical response curve as shown in Fig. 6.
5	FM 2 STAGE	The same as above.	10.7 MHz	Connect output cable of FM sweep marker generator to FM ANT terminals, and cathode ray oscilloscope thru network (shown below) to R524 and common ground.	Tune T503 for symmetrical S curve as shown in Fig. 7.

FM RF ALIGNMENT

STEP	ALIGNMENT	SIGNAL INPUT	FREQUENCY OF SIGNAL GEN	DIAL SETTING OF RADIO	COMPONENTS TO BE ADJUSTED FOR MAXIMUM OUTPUT	
6	FM OSCILLATOR	Thru Dummy Ant. (Fig. 5)	87 MHz	Lowest End	Oscillator Trimmer	CT203
7	FM INTER-STAGE	Thru Dummy Ant.	98 MHz	98 MHz	Inter-stage Trimmer	CT202
8	FM BAND COVERAGE	Thru Dummy Ant.	Confirm overall tuning range to be from 87 MHz thru 108 MHz			

Fig. 1

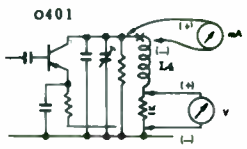


Fig. 2

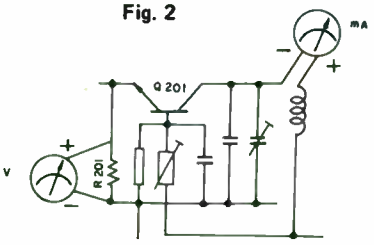


Fig. 3

DUMMY ANTENNA FOR AM RF ALIGNMENT

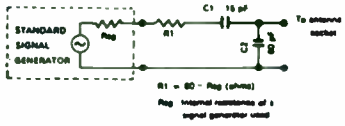


Fig. 4

NETWORK FOR IF ALIGNMENT

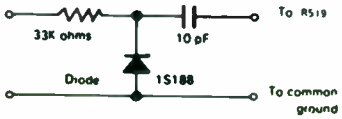


Fig. 5

DUMMY ANTENNA FOR FM RF ALIGNMENT

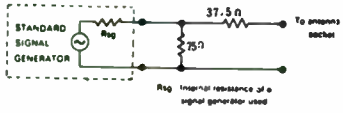


Fig. 6

SYMMETRICAL RESPONSE CURVE

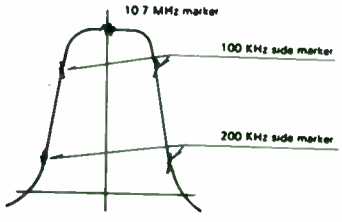
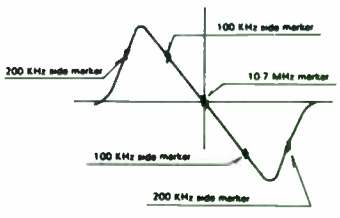


Fig. 7

SYMMETRICAL S CURVE



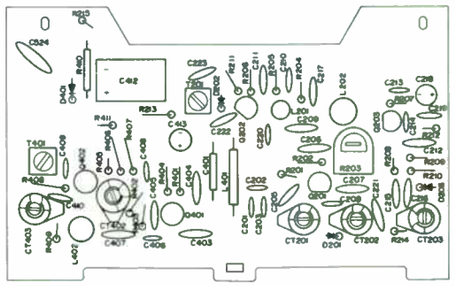
FM MULTIPLEX ALIGNMENT

PRELIMINARIES;

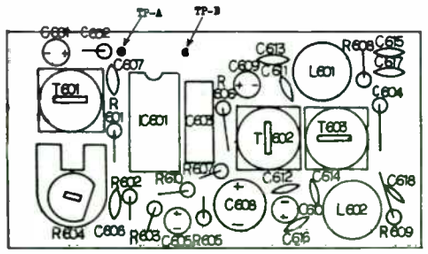
1. A stereo signal modulator (SSM) and an SCA signal generator are necessary to perform this alignment.
2. All adjustments below must be done, setting the dial pointer at 98 MHz on dial scale and applying 60dB FM signal modu.. specified signals as described below.

STEP	ALIGNMENT	INSTRUMENT CONNECTIONS		ADJUSTMENT
		INPUT	OUTPUT	
9	SCA SIGNAL FILTER	Feed 67 KHz SCA signal thru S.S.M. to FM SSG. Apply FM signal (modulated only by SCA signal) thru dummy ant. to ANT TERMINALS. Turn FM stereo signal and pilot signal of S.S.M. OFF.	Connect VTVM to TP-A and common ground.	Adjust SCA Trap Coil (T601) for minimum output on VTVM.
10	19 KHz PILOT	Apply FM signal (modulated only by pilot signal) thru dummy ant. to ANT TERMINALS, and turn FM stereo signal of S.S.M. OFF.	Connect VTVM to TP-B and common ground.	Adjust MPX Transformer (T602) for maximum output on VTVM.
11	SUB SIGNAL	Apply FM stereo signal (modulated only by pilot signal at 10% modulation and stereo signal at 30% modulation) thru dummy ant. to ANT TERMINALS. Place output signal switch of S.S.M. in SUB Position.	Connect VTVM to Speaker output leads of Rigth or left channel.	Adjust 38 KHz (T603) for maximum output on VTVM.
12	STEREO SIGNAL	Apply FM stereo signal (modulated only by pilot signal and stereo signal) thru dummy ant. to ANT TERMINALS. Place output signal switch of SSM in RIGHT position.	Connect VTVM to speaker output leads of Left Channel.	Adjust Stereo Separation Control (R604) for minimum output on VTVM.
		Apply FM stereo signal (modulated only by pilot signal and stereo signal) thru dummy ant. to ANT TERMINALS. Place output signal switch of S.S.M. in LEFT position.	Connect VTVM to speaker output leads of Right Channel.	Adjust Stereo Separation Control (R604) for minimum output on VTVM.

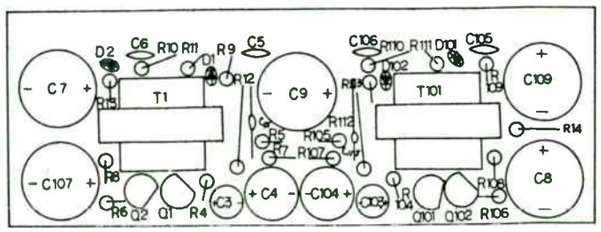
CIRCUIT BOARD DIAGRAM (TOP VIEW)



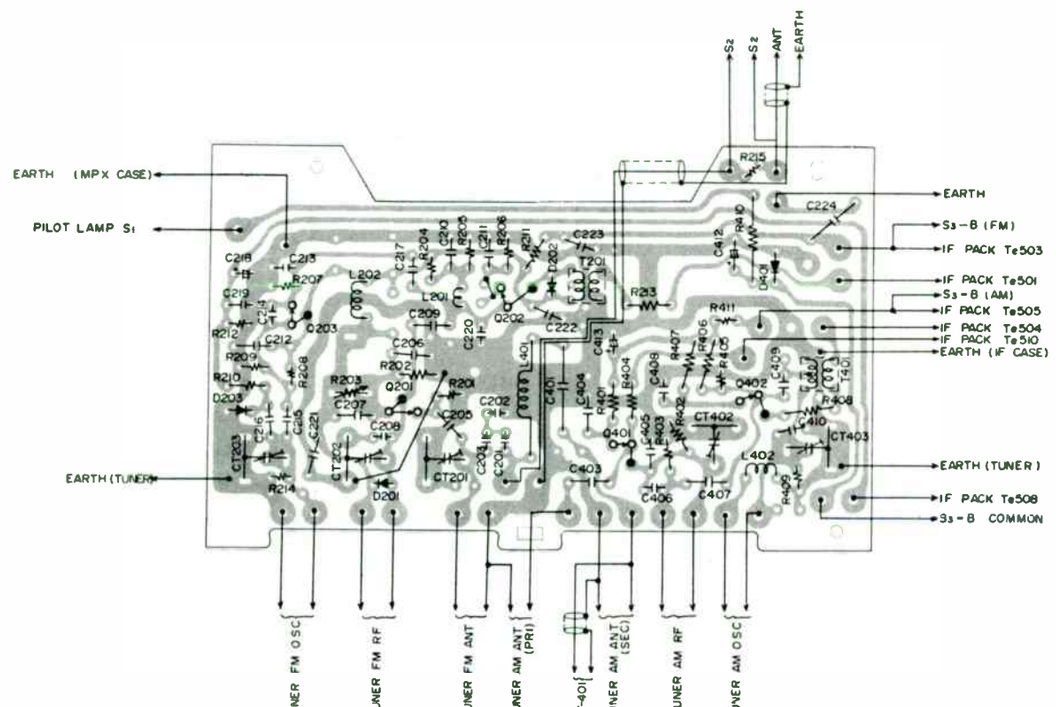
MULTIPLEX STEREO CIRCUIT BOARD

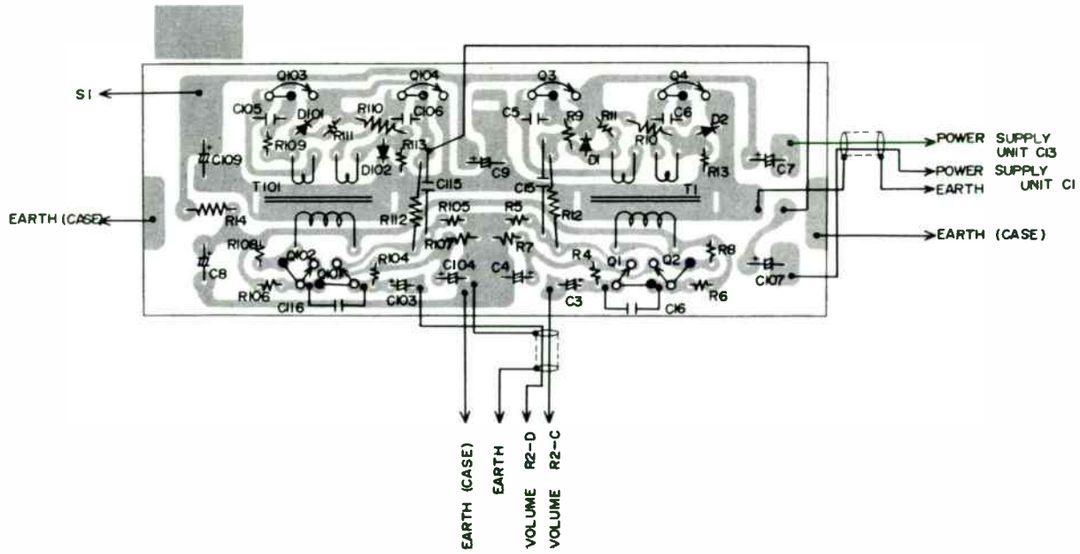


AUDIO AMPLIFIER CIRCUIT BOARD

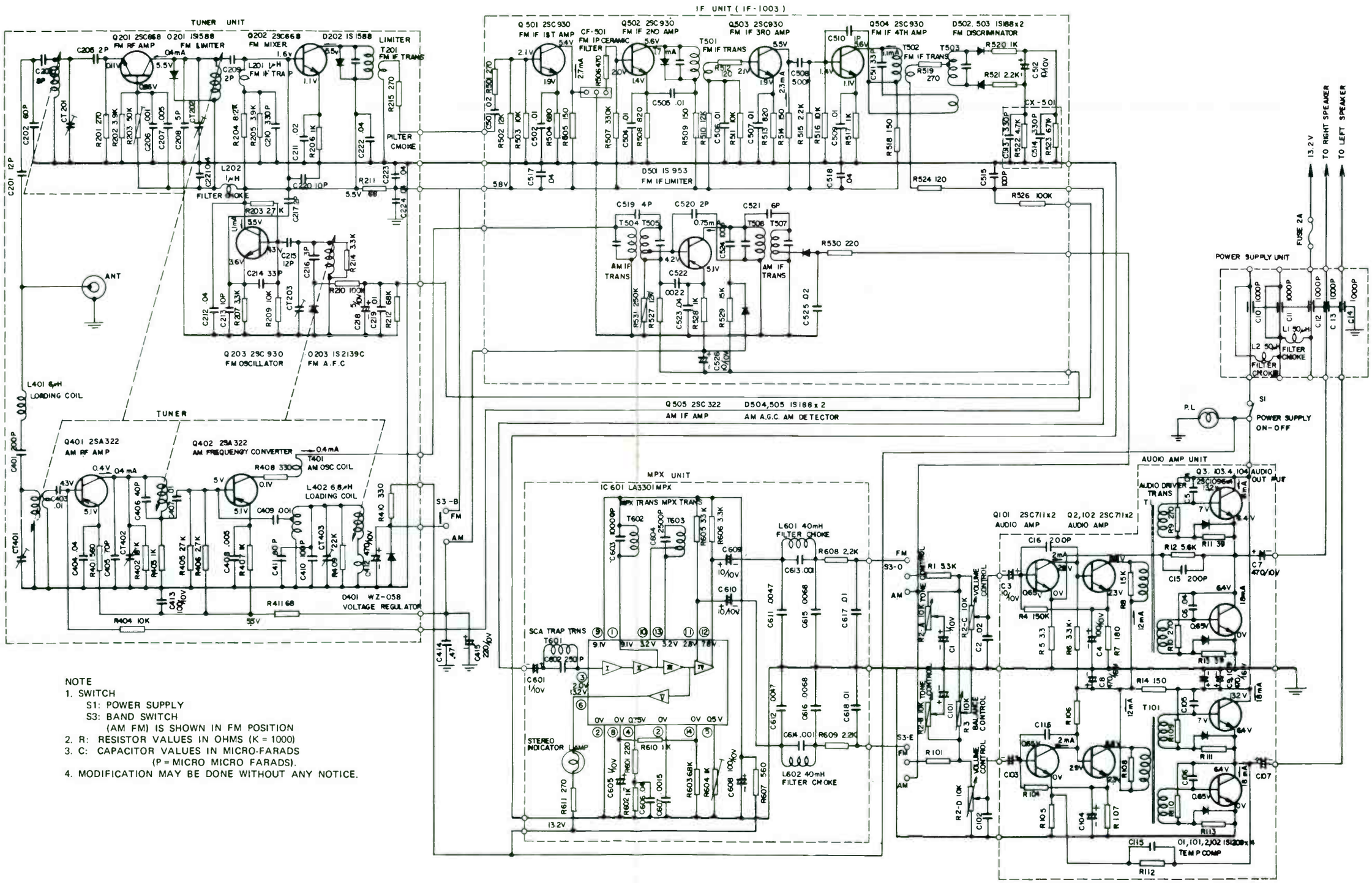


CIRCUIT BOARD DIAGRAM (BOTTOM VIEW)





SCHEMATIC DIAGRAM

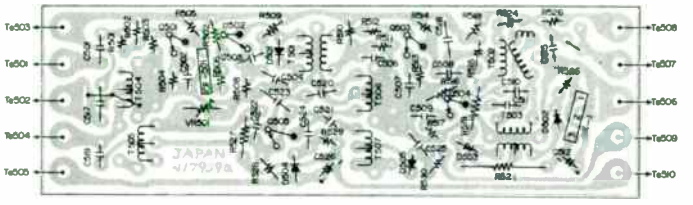


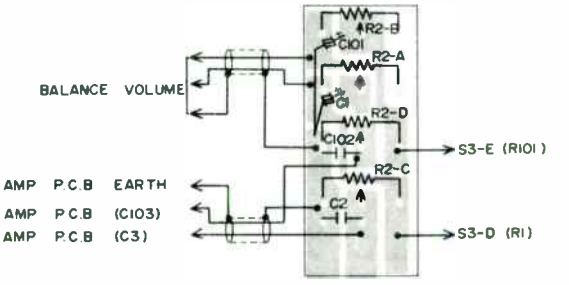
NOTE
1. SWITCH
   S1: POWER SUPPLY
   S3: BAND SWITCH
   (AM FM) IS SHOWN IN FM POSITION
2. R: RESISTOR VALUES IN OHMS (K = 1000)
3. C: CAPACITOR VALUES IN MICRO-FARADS
   (P = MICRO MICRO FARADS).
4. MODIFICATION MAY BE DONE WITHOUT ANY NOTICE.

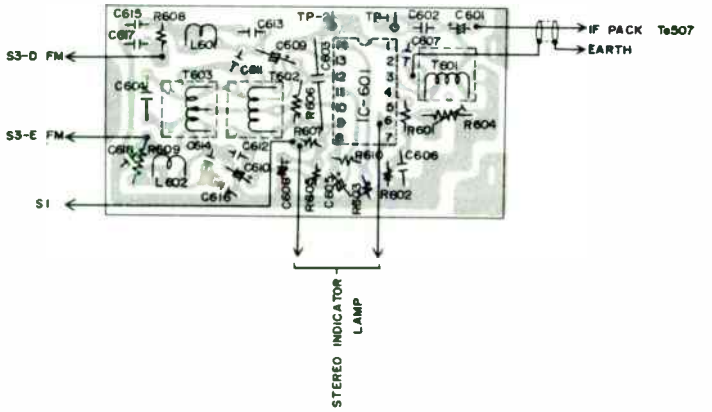
IF AMPLIFIER STAGE ASSEMBLY (#IF-1003)

Schematic Location	Part No.	Description	Q'ty
IF CIRCUIT ASSEMBLY (#IF-1003)			
	R-127462d	Shield case	1
	R-417959a	Printed board, w/o components	1
CF501	R-S17092	Ceramic filter, UKW	1
T501	R-W5T747	IF Transformer, UKW	1
T502	R-W5T309	IF Transformer, UKW	1
T503	R-W5T310	IF Transformer, UKW	1
T504	R-W5T244	IF Transformer, MW	1
T505	R-W5T245	IF Transformer, MW	1
T506	R-W5T246	IF Transformer, MW	1
T507	R-W5T247	IF Transformer, MW	1
CX-1 (R522,523 C513,514)	R-CXC713	Packed resistor & capacitor	1
VR501	R-R110720 or R-R110728	Preset resistor, 250K-B	1
		SEMICONDUCTORS	
Q501,502 503,504		Transistor, 2SC930 E	4
Q505		Transistor, 2SA322 Gr	1
D501		Diode, 1S188 FM-1	1
D502,503		Diode, 1S188 FM pair	2
D504,505		Diode, 1S188 AM	2
		RESISTORS	
		Resistors of ±10%, ¼W unless otherwise noted.	
R501		270 ohm	1
R515		22K ohm	1
R503,511 516		10K ohm	3
R504		680 ohm	1
R505,509 514,518		150 ohm	4
R506		470 ohm	1

Schematic Location	Part No.	Description	Q'ty
IF CIRCUIT ASSEMBLY (#IF-1003)			
R507		330K ohm	1
R508,513		820 ohm	2
R512		120 ohm	1
R517,520 528		1K ohm	3
R526		100K ohm	1
R502,510 527		12K ohm	3
R529		15K ohm	1
R530		220 ohm	1
R519		270 ohm	1
R524		120 ohm	1
R521		2.2K ohm	1
		CAPACITORS	
C501,517 525		Mylar, 0.02 mfd, +30 −20%, 50WV	3
C518,523		Mylar, 0.04 mfd, +30 −20%, 50WV	2
C522		Mylar, 0.002 mfd, +30 −20%, 50WV	1
C502,504 505,506 507,509		Ceramic, 0.01 mfd, +80 −20%, 25WV	6
C508		Ceramic, 500 pF, ±10%, 50WV	1
C510		Ceramic, 1 pF, ±0.25 pF, 50WV	1
C511		Ceramic, 33 pF, ±10%, 50WV, N220	1
C519		Ceramic, 4 pF, ±0.25 pF, 50WV	1
C520		Ceramic, 2 pF, ±0.25 pF, 50WV	1
C521		Ceramic, 6 pF, ±0.5 pF, 50WV	1
C524,515		Ceramic, 100 pF, ±10%, 50WV	2
C512,526		Electrolytic 10 mfd/10V	2







PARTS LIST

Schematic Location	Part No.	Description	Q'ty
PACKAGE			
	R-4072660	Individual carton	1
	R-4170130	Styro-foam cushion, Set right	1
	R-4170131	Styro-foam cushion, Set left	1
	R-4771444	Instruction book	1
	R-477958a	Guarantee card	1
	R-4770983	Guarantee card	1
	R-4770933	Catalog	1
		Polyethylene bag, 65 x 200 x 280, Set	1
		Polyethylene bag, 80 x 200, Screw	1
		Polyethylene bag, 80 x 250, Panel	1
		Polyethylene bag, 50 x 90, Knob	1
		Polyethylene bag, 80 x 200, Lead wire	1
ACCESSORIES			
	R-A70398	Trim panel assembly	1
	R-A70380	Knob assembly, OFF-VOL./TUNING	2
	R-3970341	Knob, TONE/BALANCE	2
	R-117092	Washer, Panel	2
	R-247206	Nut, Panel	2
	R-1170556	Nut, Shaft	2
	R-111663a-1	Metal bracket, Front	2
	R-111685a-1	Perforated metal, Rear	1
	R-C4005	Noise suppression capacitor	1
	R-R7006	Noise suppression resistor	1
	R-127072	Terminal, Power	1
	R-S3760-2	Lead terminal, Speaker, Red	1
	R-S3760-3	Lead terminal, Speaker, White	1
		Bolt, Hex Hd., 5 x 8	3
		Washer, Spring, 5	3
		Washer, Flat, 5	3
		Bolt, Hex Hd., 6 x 20	3
		Washer, Spring, 6	3
		Washer, Flat, 6	6
		Nut, Hex Hd., 6	3
CABINET			
	R-127531	Metal casing, Left	1
	R-127532	Metal casing, Right	1
	R-A71239	Nose panel assembly, with dial scale	1
	R-127755L	Back plate	1
	R-1170541	Pointer	1
	R-127535	Metal lid, Top	1
	R-127536	Metal lid, Bottom	1
	R-4771445	Specification sheet	1
	R-477984	Lable, FCC	1
	R-477504	Label, Antenna trimmer	1
	R-4170388	Sheet, Sign board	1
CHASSIS			
	R-A71002	Circuit board assembly, Tuner	1
	R-A70401	Circuit board assembly, Amp.	1
	R-A70402	Circuit board assembly, FM MPX	1
	R-A71005	Circuit board assembly, Control	1
	R-127537	Shield case, Power	1
	R-127538	Case, Amp.	1
	R-127539	Case, FM MPX	1
	R-127375-1	Metal bracket, Speaker lead	1
	R-127665a	Metal bracket, Antenna lead	1
	R-127320a-1	Washer, Shaft	1
	R-247206	Nut, Shaft	1
SEMICONDUCTORS			
		(TUNER)	
Q201,202		Transistor, 2SC668	2
Q203		Transistor, 2SC930	1
Q401		Transistor, 2SA322	1
Q402		Transistor, 2SA322	1
D201,202		Diode, 1S1588	2
D203		Silicon varicap, 1S2139C	1

Schematic Location	Part No.	Description	Q'ty
SEMICONDUCTORS			
D401		Diode, WZ-058, 1S331Az or RD-6A	1
		(MPX)	
IC601		Integrated circuit, LA3301	1
		(AMP.)	
Q1,2,101,102		Transistor, 2SC711	4
Q3,4,103,104		Transistor, 2SC1096	4
D1,2,101,102		Varistor, 1S1209	4
COILS			
L1,2	R-W1739a	Choke coil	2
		(TUNER)	
L201	R-W1750	Choke coil, 1μH	1
L202	R-W1055	Choke coil, 1μH	1
L401	R-W1015e	Choke coil, 6μH	1
L402	R-W1752	Choke coil, 6.8μH	1
		(MPX)	
L601,602	R-W1751	Choke coil, 40mH	2
TRANSFORMERS			
		(TUNER)	
T201	R-W5T766	IF transformer	1
T401	R-W8189a	OSC coil	1
		(AMP.)	
T1,101	R-W6339	Input transformer	2
		(MPX)	
T601	R-W4701	MPX coil	1
T602	R-W4712	MPX coil	1
T603	R-W4713	MPX coil	1
CONTROLS			
CT401	R-C0714	Trimmer	1
	R-S870737a	Tuner assembly	1
	R-S870604a	Tuner	(1)
	P061-N01	Slide switch	(1)
	R-3970237	Button, FM	(3)
	R-3970238	Button, AM	(2)
	R-127540	Panel	(1)
	R-127320a-1	Washer	(1)
	R-247206	Nut	(1)
R3	R-R116771	Variable resistor	(1)
		(TUNER)	
CT201,202, 203	R-C0710	Trimmer	3
CT402,403	R-C0702a	Trimmer	2
R203	R-R110705	Preset resistor, 50K-B	1
		(MPX)	
R604	R-R110727	Preset resistor, 1K-B	1
		(VR)	
R-2A,B,C,D	R-R116772	Variable resistor	1

NOTES: 1. Part orders must contain Model Number, Part Number and Description.
2. Unless otherwise noted, component parts indicated by parentheses in the column Q'ty are not available.
3. Ordering quantity of screws and/or resistors must be multiple of 10 pcs.

PARTS LIST

Schematic Location	Part No.	Description	Q'ty
MISCELLANEOUS			
C10,11,12, 13,14	R-C4008	Special capacitor	5
	R-S870178	IF pack assembly, AM/FM IF	1
	R-S1789b	Fuse holder	1
	R-S1090	Fuse, 2A	1
	R-S1715a	Pilot lamp, 14V 143mA	1
	R-S2734-3	Socket, Pilot lamp	1
	R-S3760-8	Lead terminal, Speaker, Red	1
	R-S3760-9	Lead terminal, Speaker, White	1
	R-S2156-1	Socket, Antenna	1
	R-24372	Tip, IF pack	9
	R-S3063	Lug, Earth	1
	R-127702	Lug, Earth	1
	R-S1816	Pilot lamp, Stereo indicator, 14V 30mA	1
	R-S3006	Lug board	1
	R-247505-1	Pin	24
	R-24372	Tip	2
RESISTORS			
(Resistors are of carbon type, ±10% allowance and 1/4W unless otherwise noted.)			
	R1,101	3.3K ohm	2
		(TUNER)	
	R201	270 ohm	1
	R202,205	3.9K ohm	2
	R204	8.2K ohm	1
	R206,403, 407	1K ohm	3
	R208,406	2.7K ohm	2
	R207,214	3.3K ohm	2
	R209,404	10K ohm	2
	R211,411	68 ohm	2
	R213	270 ohm	1
	R401	560 ohm	1
	R402	18K ohm	1
	R405	27K ohm	1
	R409	22K ohm	1
	R408	330 ohm	1
	R210	100K ohm	1
	R212	68K ohm	1
	R410	Solid, 330 ohm, ±10%, 1/2W	1
		(AMP.)	
	R6,106	3.3K ohm	2
	R4,104	150K ohm	2
	R5,105	3.3 ohm	2
	R7,107	180 ohm	2
	R8,108	1.5K ohm	2
	R9,10,109, 110	Carbon, 270 ohm, ±5%, 1/4W	4
	R11,13,111, 113	Carbon 39 ohm, ±5%, 1/4W	4
	R12,112	5.6K ohm	2
	R14	Solid, 150 ohm, ±10%, 1/2W	1
		(MPX)	
	R601	220 ohm	1
	R602,610	1K ohm	2
	R603	6.8K ohm	1
	R605,606	3.3K ohm	2
	R607	560 ohm	1
	R608,609	2.2K ohm	2
	R611	Solid, 270 ohm, ±10%, 1/2W	1

Schematic Location	Part No.	Description	Q'ty
CAPACITORS			
	C414	M.L., 0.47mfd, ±20%, 50V	1
	C415	Electrolytic 220mfd/10V	1
		(TUNER)	
	C206,409	Mylar, 0.001mfd, +30 −20%, 50V	2
	C207,408	Mylar, 0.0047mfd, +30 −20%, 50V	2
	C212,221, 222,223, 224,404	Mylar, 0.039mfd, +30 −20%, 50V	6
	C403,407	Mylar, 0.01mfd, +30 −20%, 50V	2
	C201	Ceramic, 12pF, ±10%, 50V, SL	1
	C202	Ceramic, 60pF, ±10%, 50V, SL	1
	C203	Ceramic, 8pF, ±10%, 50V, SL	1
	C205,209, 217	Ceramic, 2pF, ±10%, 50V. NPO	3
	C208	Ceramic, 5pF, ±10%, 50V, N470	1
	C210	Ceramic, 330pF, ±10%, 50V, YW	1
	C214	Ceramic, 33pF, ±10%, 50V, N330	1
	C213,220	Ceramic, 10pF, ±10%, 50V, SL	2
	C216	Ceramic, 3pF, ±10%, 50V, N750	1
	C215	Ceramic, 12pF, ±10%, 50V, N330	1
	C211	Ceramic, 0.02mfd, +80 −20%, 25V, YM	1
	C219	Ceramic, 0.01mfd, +80 −20%, 25V, YM	1
	C406	Ceramic, 40pF, ±10%, 50V, SL	1
	C405	Ceramic, 70pF, ±10%, 50V, SL	1
	C410	Ceramic, 100pF, ±10%, 50V, SL	1
	C401	Styrol, 200pF, ±10%, 50V	1
	C218	Electrolytic, 0.5mfd/10V	1
	C413	Electrolytic 100mfd/10V	1
	C412	Electrolytic 470mfd/10V	1
	C411	Styrol, 80pF, ±10%, 50V	1
		(AMP.)	
	C5,6,105, 106	Mylar, 0.039mfd, +30 −20%, 50V	4
	C15,16,115, 116	Ceramic, 200pF, ±10%, 50V	4
	C3,103	Electrolytic 10mfd/10V	2
	C4,104	Electrolytic 100mfd/10V	2
	C7,107	Electrolytic 470mfd/10V	2
	C8,9,109	Electrolytic 470mfd/16V	3
		(MPX)	
	C606	Mylar, 0.039mfd, +30 −20%, 50V	1
	C607	Mylar, 0.0015mfd, +30 −20%, 50V	1
	C611,612	Mylar, 0.0047mfd, +30 −20%, 50V	2
	C613,614	Mylar, 0.001mfd, +30 −20%, 50V	2
	C615,616	Mylar, 0.0068mfd, +30 −20%, 50V	2
	C617,618	Mylar, 0.01mfd, +30 −20%, 50V	2
	C602	Styrol, 250pF, ±10%, 50V	1
	C603	Styrol, 10000pF, ±10%, 50V	1
	C604	Styrol, 2500pF, ±10%, 50V	1
	C601,605	Electrolytic 1mfd/10V Alsicon	2
	C609,610	Electrolytic 10mfd/10V	2
	C608	Electrolytic 100mfd/10V	1
		(CONTROL)	
	C2,102	Mylar, 0.02mfd, +30 −20%, 50V	2
	C1,101	Electrolytic 0.1mfd/10V Alsicon	2
SCREW, NUT & WASHERS			
		Screw, Bind Hd., 3 x 4	5
		Screw, Bind Hd., 3 x 6	5
		Screw, Bind Hd., 2.6 x 6	3
		Screw, Bind Hd., 3 x 8, Transistor mtg.	4
		Screw, Bind Hd., 3 x 6, Tuner mtg.	2
		Tap. Screw, Pan Hd., 3 x 6, Metal casing mtg.	11
		Tap. Screw, Pan Hd., 3 x 6, Back plate mtg.	2
		Screw, Flat Hd., 3 x 6, Nose panel mtg.	2

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OFBF(Early Prod.)(See Pg. 59) ... AR-73
●OFBG(DOGA-19A241) ... AR-81
OFBJ ... AR-75
OFBM (DOMA-19A241)(See Pg. 47) ... AR-85
OFBM(DOMY-18805B) ... AR-85
●OFBO ... AR-79
●OFBSW ... AR-96
●OFBW(DOWA-19A241) ... AR-81
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●OFBZ ... AR-79
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1BLSS(See Pg. 37) ... AR-82
1BTF ... AR-115
1CP1047 ... AR-106
1CP1323 ... AR-153
1CP2033 ... AR-109
1CP2235 ... AR-135
1CP2417 ... AR-182
1CR4005 ... AR-86
1F1RAM4 ... AR-178
1F2RFM4 ... AR-178
1F3RMX4 ... AR-180
1FBA ... AR-98
1FBF ... AR-94
1FBG ... AR-98
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1FBO ... AR-94
1FBOO, FBOX ... AR-98
1FBSS, FBSX ... AR-100
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1FBTPP, FBTPX, FBW ... AR-98
1FBWW, FBWX ... AR-97
1FBZ ... AR-94
1FBZX, FBZZ ... AR-98
1FD2507 ... AR-200
●1FD4103 ... AR-104
1FD4217 ... AR-135
1FD4302 ... AR-155
1FD4505 ... AR-222
1FD4510 ... AR-199
1FD4511 ... AR-222
1FD4602 ... AR-228
1FD4607/8 ... AR-223
●1FD5001 ... AR-80
●1FD5003 ... AR-87
●1FD5101 ... AR-106
1LN4003 ... AR-108
1LN4213 ... AR-135
1LN4306 ... AR-155
1LN4606 ... AR-228
1MA2119 ... AR-108
1MA2233 ... AR-133
1MT4002 ... AR-92
1MY4106 ... AR-105
1MZ4004 ... AR-86
1MZ4218 ... AR-135
1MZ4304 ... AR-153
1PN2120 ... AR-108
1PN2216 ... AR-133
1PN2318 ... AR-178
1PN2513 ... AR-200
1PN4605 ... AR-223
1TB4008 ... AR-84
1TB4211(D2SA-19A242-AH) ... AR-135
●2BL,BLAF ... AR-126
2CR7/4107 ... AR-105
2FBF,FBFAK,FBL,FBO ... AR-127
●2FBTP ... AR-126
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2FBZ ... AR-127
●2FD4103 ... AR-104
2FD4607/8 ... AR-223
2LN4110 ... AR-102
2MR4111 ... AR-105
●2MT4108 ... AR-104
2MY4106 ... AR-105
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2TB4109 ... AR-102
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5F1RAM4 ... AR-178
5F2RFM4 ... AR-178
5F3RMX4 ... AR-180
5FD2507 ... AR-200
5FD4510 ... AR-199
5FD4706(Sim.to Pg45) ... AR-228
5FD4B02/3 ... AR-275
5FD4804(Sim.to Pg. 45) ... AR-228
5FD4804 ... AR-274
5FD4806 ... AR-275
5LN4707/714/4805 (Sim. to Pg. 45) ... AR-228
5LN4805 ... AR-274
5PN2318 ... AR-178
5PN2411 ... AR-179
5PN2508(Sim.to Pg79) ... AR-179
5PN2513 ... AR-200
6A-D6DA19A171 ... AR-226
6A D6DA1880e,AA ... AR-221
6A-D6EA19A171 ... AR-226
7SF19A241AB ... AR-249
9FBF ... AR-73
9FBL, FBLU ... AR-71
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●9FBS ... AR-76
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01APB2(Late Prod) ... AR-101
●01BFM1/2 ... AR-77
01BFMT1/2 ... AR-75
01BFP1/2 ... AR-74
01BFP3 ... AR-92
01BPB1/2 ... AR-70
01BPBT1/2 ... AR-74
●01BT411 ... AR-76
●01EFM1 ... AR-86
●01FFM1 ... AR-77
01FFMT1(Sim.To Pg.19) ... AR-75
01FFP1 ... AR-92
●01FPB1 ... AR-76
01FPBT1(Sim.to Pg. 57) ... AR-74
01TFP3 ... AR-92
●01TPB1/2(Early Prod) ... AR-74
01TPB2(Late Prod) ... AR-101
●01VFM1/2 ... AR-78
01VFM3 ... AR-90
01VFP1/2 ... AR-74
01VFP3 ... AR-92
●01VMPA1 ... AR-78
●01VMPH1 ... AR-78
●02AFM1 ... AR-76
●02AFM2(One Piece Unit) ... AR-79
02AFM2(Two Piece Unit) ... AR-89
02AFP1/2 ... AR-94
02AFPK1 ... AR-94
02APB1(Early Prod.) ... AR-82
02APB1(Late Prod.) ... AR-101
02APBK1(Early Prod.) ... AR-82
●02BFM1 ... AR-76
02BFM2 ... AR-89
02BFP1 ... AR-94
02BFPK1 ... AR-94
●02BMF1 ... AR-76
02BPB1 ... AR-75
02BPBK1 ... AR-75
●02BT411 ... AR-80
02BT412 ... AR-90
02FBPK2 ... AR-101
●02FFM1 ... AR-76
●02FFM2 ... AR-79
02FFP1/2 ... AR-94
02FFPK2 ... AR-94
02FPB1(Early Prod) ... AR-82
02FPB1(Late Prod) ... AR-101
02FPB2(Early Prod) ... AR-82
02FPB2(Late Prod) ... AR-101
02FPBK2 ... AR-82
02FT412 ... AR-90
●02GFM1 ... AR-79
02GFP1 ... AR-94
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02GPB1 ... AR-75
02GPBK1 ... AR-75
●03AFM1 ... AR-80
03AFM2 ... AR-88
03APB1(Early Prod) ... AR-84
03APB1(Late Prod) ... AR-98
●03BFM1 ... AR-80
03BFM2 ... AR-88
03BPB1 ... AR-73
●03BT411 ... AR-78
●03BT412 ... AR-80
●03EFM1 ... AR-80
03EFM2 ... AR-88
03EPB1 ... AR-73
●03ET411 ... AR-78
●03ET412 ... AR-87
04AFP1 ... AR-75
04AFP2 ... AR-88
●04APB1(Early Prod) ... AR-80
04APB1(Late Prod) ... AR-100
04AT411 ... AR-82
●04AT412 ... AR-81
04BFM1 ... AR-83
04BFP1 ... AR-75
●04BPB1 ... AR-77
04BPB2 ... AR-73
●04BPB4/84 ... AR-77
04BT411 ... AR-82
●04BT412 ... AR-81
●04CFP1 ... AR-76
04EFPK2 ... AR-93
●04CFW1 ... AR-79
●04CMW1 ... AR-78
●04CMWK1 ... AR-78
04CT411 ... AR-83
04CT412 ... AR-94
04EFM1 ... AR-83
04EFPK2 ... AR-88
04EFP1 ... AR-75
04EFP2 ... AR-88
●04EPB1 ... AR-77
04EPB2 ... AR-73
●04EPB4 ... AR-77
●04LPB1 ... AR-78
●05CFP1 ... AR-76
05CFPK2 ... AR-93
●05CFW1 ... AR-79
●05CMW1 ... AR-78
●05CMWK1 ... AR-78
05CT411 ... AR-83
05CT412 ... AR-94
06TCFP2 ... AR-92
06TFM1 ... AR-94
06TT411 ... AR-84
06TT412 ... AR-93
06TTCP1 ... AR-74
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YFP1 ... AR-80
●1APB ... AR-80
●1APB2 ... AR-76
1BFMT1/2 ... AR-75
1BPBT1/2 ... AR-74
●1BT411 ... AR-76
1BT412 ... AR-85
1FFMT1(Sim to Pg.19) ... AR-75
1FPBT1(Sim to Pg. 57) ... AR-74
2BFM2 ... AR-89
2BT412 ... AR-90
2FFP2 ... AR-94
2FT412 ... AR-90
●2GFM1 ... AR-79
2GFP1 ... AR-94
●3BT411 ... AR-78
●3ET411 ... AR-78
●3ET412 ... AR-87
4AT411 ... AR-82
●4AT412 ... AR-81
●4BPB4 ... AR-77
4BT411 ... AR-82
●4BT412 ... AR-81
4LPB1 ... AR-100
4PPB1 ... AR-100
5BFPK1(See Pg. 103) ... AR-191
5CT411 ... AR-83
5CT412 ... AR-94
5D8PBT3 ... AR-215
6TT411 ... AR-84
6TT412 ... AR-93
11AFM1 ... AR-100
11AFMT1(See Pg. 19) ... AR-75
●11AFP1 ... AR-104
●11APB1 ... AR-96
11BPBT1(See Pg. 57) ... AR-74
11BFM1/2 ... AR-101
11BFM3(Sim.to Pg. 25) ... AR-101
11BFMT1 ... AR-105
●11BFMT2 ... AR-118
11BFP1/2 ... AR-93
11BFP3(Sim.to Pg. 47) ... AR-93
11BFP4 ... AR-93
11BFPK3(Sim.to Pg. 47) ... AR-93
11BPB2 ... AR-97
11BPBK2 ... AR-97
11BPBT1 ... AR-102
11BPBT2 ... AR-115
11BT411 ... AR-97
11HFP2 ... AR-97
11HPB2 ... AR-97
●11TFP1 ... AR-104
●11TPB1 ... AR-96
11TT411 ... AR-97
●11VFM1(See Pg. 25) ... AR-78
●11VFP1 ... AR-104
●12AFM1 ... AR-106
●12AFP1(1971 1/2) ... AR-120
12AFP1(197) ... AR-97
●12AFPK1(1971 1/2) ... AR-120
12AFPK1(1971) ... AR-97
12APB1 ... AR-98
12APBK1 ... AR-98
12AT411 ... AR-97
12BFM1 ... AR-100
12BFM2(Sim to Pg.87) ... AR-100
●12BFMT1 ... AR-104
12BFMT2 ... AR-115
12BFP1 ... AR-102
12BFP2(Sim to Pg. 101) ... AR-102
12BFPK1 ... AR-102
12BFPK2(Sim to Pg. 101) ... AR-102
12BPB2 ... AR-105
12BPBK2 ... AR-105
12BPBT1 ... AR-101
12BPBT2 ... AR-117
12BPT1 ... AR-101
12BT411 ... AR-97
●12FFM1 ... AR-106
●12FFP1(1971 1/2) ... AR-120
12FFP1(1971) ... AR-97
●12FFPK1(1971 1/2) ... AR-120
12FFPK1(1971) ... AR-97
12FPB1 ... AR-98
12FPBK1 ... AR-98
12FT451 ... AR-97
●12GFM1 ... AR-106
●12GFP1(1971 1/2) ... AR-120
12GFP1(1971) ... AR-97
●12GFPK1(1971 1/2) ... AR-120
12GFPK1(1971) ... AR-97
12GPB1 ... AR-98
12GPBK1 ... AR-98
13AFM1 ... AR-105
13APB1 ... AR-101

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13AT411 ... AR-97
13BFM1/2 ... AR-98
13BFMT1 ... AR-97
13BFMT2 ... AR-117
13BPB2 ... AR-101
●13BPBT1 ... AR-96
●13BPBT2 ... AR-118
14AFP1 ... AR-101
●14APB1 ... AR-106
14AT411 ... AR-97
14BFM1 ... AR-102
14BFMT1 ... AR-96
●14BFMT2 ... AR-120
●14BFP1 ... AR-96
●15BFP2(Sim.to Pg. 11) ... AR-96
14BPB1 ... AR-97
14BPBT1 ... AR-100
14BPBT2 ... AR-114
14BT411 ... AR-97
●14LPB2 ... AR-96
14PPB1 ... AR-97
●15CFMT1/2 ... AR-96
15CFMT3 ... AR-114
15CFP1 ... AR-100
15CFP2(Sim.to Pg. 29) ... AR-100
15CMW1 ... AR-102
15CMW2(Sim.to Pg. 19) ... AR-102
15CT411 ... AR-97
●16TFP1 ... AR-104
●16TRMP1 ... AR-96
16TT411 ... AR-97
●16TTCP1 ... AR-96
16UT411 ... AR-97
20BCT11 ... AR-115
21AFM1 ... AR-113
21AFMT1(See Pg. 19) ... AR-75
21AFP1 ... AR-117
21AFP2/3 ... AR-127
●21APP21 ... AR-120
21AFPK1 ... AR-117
21AFPK2/3 ... AR-127
●21APB1(Early Prod.) ... AR-110
21APB1(Late Prod.) ... AR-114
21APB2(Early Prod.) ... AR-124
●21APBK1(Early Prod.) ... AR-110
21APBK1(Late Prod.) ... AR-114
21APBK2(Late Prod.) ... AR-124
●21APBK2(Late Prod.) ... AR-126
21APBT1(See Pg. 57) ... AR-74
21AT411 ... AR-112
21ATFP2 ... AR-127
21BFM1 ... AR-114
21BFM3/4(Sim.to Pg. 41) ... AR-114
●21BFMT1 ... AR-118
21BFP1 ... AR-113
21BFP2(See Pg. 61) ... AR-113
21BFPK1 ... AR-113
21BFPK2(See Pg. 61) ... AR-113
21BPB1 ... AR-112
●21BPB2 ... AR-120
●21BPBK1 ... AR-112
●21BPBK2 ... AR-120
21BPBT1 ... AR-115
●21BPBT2 ... AR-125
21HPB1 ... AR-112
●21HPB2 ... AR-120
21HPBK1 ... AR-112
●21HPBK2 ... AR-120
21TFP1 ... AR-117
21TFP3 ... AR-127
●21TPB1 ... AR-110
21TPB2 ... AR-124
21TT411 ... AR-112
●21VFM1(See Pg. 25) ... AR-78
21VFP1 ... AR-117
21VFP2/3 ... AR-127
●21VMPA1(See Pg. 39) ... AR-78
●21VMPH1(See Pg. 39) ... AR-78
●21XFMT1(7930121) ... AR-118
●21XFMT1(7936191) ... AR-118
21XPB1 ... AR-115
21XPBT1(Early Prod.) ... AR-115
21XPBT1(Late Prod.) ... AR-117
22AFM1 ... AR-113
●22AFP1/2 ... AR-120
●22AFP3(See Pg. 89) ... AR-120
●22AFPK1/2/3 ... AR-120
22APB1 ... AR-114
●22APB2 ... AR-126
22APBK1 ... AR-114
●22APBK2 ... AR-126
22AT411 ... AR-112
22BFM1/2 ... AR-112
22BFM4(Sim to Pg. 91) ... AR-112
22BFMT1 ... AR-115
22BFP1 ... AR-109
22BFP2(See Pg. 99) ... AR-109
22BFPK1 ... AR-109
22BFPK2(See Pg. 99) ... AR-109
●22BPB1 ... AR-118
22BPB2 ... AR-122
22BPB2A ... AR-138
22BPB3(Sim.to Pg. 93) ... AR-115
22BPB22KA ... AR-138
●22BPBK1 ... AR-118
22BPBK2 ... AR-122
22BPBK2A ... AR-138
22BPBK3 ... AR-122
22BPBT1 ... AR-117
22BPBT2 ... AR-127
22BT411 ... AR-112
22FBPK1 ... AR-114
22FFM1 ... AR-113
●22FFP1 ... AR-120
●22FFP2 ... AR-120
●22FFP3(See Pg. 89) ... AR-120
●22FFPK1/2/3 ... AR-120
22FPB1 ... AR-114
●22FPB2/22 ... AR-126
●22FPBK2 ... AR-126
22FT411 ... AR-112
22GFM1 ... AR-113
●22GFP1/2 ... AR-120
●22GFPK1 ... AR-120
●22GFPK2 ... AR-120
●22GFPK3 ... AR-120
22GPB1 ... AR-114
●22GPB2 ... AR-126
22GPBK1 ... AR-114
●22GPBK2 ... AR-126
22KA2 ... AR-138
22XT411 ... AR-112
23AFM1 ... AR-112
23AFP1 ... AR-115
●23AFP2/3 ... AR-128
●23APB1 ... AR-120
●23APB2 ... AR-128
23AT411 ... AR-112
●23BFM1 ... AR-110
●23BFM3(Sim.to Pg. 91) ... AR-110
23BFMT1 ... AR-117
23BFP1 ... AR-114
23PBB1 ... AR-115
●23BPB2 ... AR-125
●23BPBT1 ... AR-118
●23BPBT2 ... AR-126
23FPBK1 ... AR-114
●24AFP1 ... AR-118
24AFP2/3 ... AR-129
24APB1 ... AR-115
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24BFM1 AR-113
#24BFMT1 AR-120
#24BFP1 AR-110
24BPB1 AR-117
24BPB2 AR-124
24BPBT1 AR-114
#24BPBT2(1972 1/2) AR-128
24BPBT2(1972) AR-114
#24BPT2 AR-128
24BT411 AR-112
24LPB1 AR-114
#24LPB2 AR-126
24PPB1 AR-112
24PPB2 AR-127
25CFMT1/2 AR-114
25CFP1 AR-112
#25CMW1/2 AR-110
25CT411 AR-112
26TCFP2/3 AR-127
26TFP1 AR-117
#26TRMP1 AR-110
26TRMP2 AR-124
26TT411 AR-112
#26TTCP1 AR-110
26TTCP2 AR-124
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30LPB2(See Pg. 17) AR-144
30PPB1(See Pg 73) AR-127
31APB1 AR-137
31APB2 AR-145
31APBK1 AR-137
31APBK3 AR-145
31BFB1 AR-138
31BFM1 AR-140
31BFMT1 AR-151
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31BFP1 AR-138
31BFPK1 AR-138
31BPB1 AR-137
31BPB2 AR-145
31BPBK1 AR-137
31BPBK2 AR-145
31BPBT1 AR-139
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31TPB1(See Pg. 47) AR-124
31TTCP1(See Pg. 47) AR-124
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31XFP1(See Pg. 25) AR-127
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31XPBK1(See Pg. 47) AR-124
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#31YFM1(See Pg. 25) AR-78
31YFP1(See Pg. 25) AR-127
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32AFM1 AR-144
32AFM2 AR-154
32AFMT1 AR-152
32AFMT2 AR-148
32AFP1 AR-137
32AFP2 AR-149
32AFP31 AR-137
32AFP32 AR-149
32AFPK1 AR-137
32AFPK2 AR-149
32APB1 AR-138
32APB2 AR-138
32APB31 AR-140
32APB32 AR-138
32APBK1 AR-140
32APBK2 AR-138
32APBT1 AR-145
32BFM1 AR-146
32BFMT1 AR-152
32BFMT2 AR-148
32BFP1/31 AR-137
32BFPK1 AR-137
32BPB2 AR-138
32BPB32 AR-140
32BPBK1 AR-138
32BPBK2 AR-138
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32FFM1(See Pg.81) AR-113
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#32FPB1(See Pg.107) AR-126
#32FPBK1(See Pg.107) AR-126
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32GPBK2 AR-138
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33AFMT2 AR-144
33AFP1 AR-146
33AFPK1 AR-146
33APB1 AR-142
33APB2 AR-147
33APBK1 AR-142
33APBK2 AR-147
33APBT1 AR-140
33BFM1 (PCBAR-151) AR-139
33BFMT1 AR-145
33BFMT2 AR-144
33BFP1 AR-146
33BPB1 AR-142
33BPB2 AR-147
33BPBT1 AR-140
34AFM1 AR-142
34AFMT1 AR-150
34AFMT2 AR-145
34AFP1 AR-140
34AFPK1 AR-140
34APB1 AR-139
34APB2 AR-144
34APBK1 AR-139
34APBK2 AR-144
34APBT1 AR-138
34BFM2 AR-142
34BFM4 AR-172
34BFMT1 AR-145
34BFP1 AR-141
34BPB1 AR-139
34BPB2 AR-144
34BPBT1 AR-138
34FMT1 AR-145
35TFP1(See Pg. 25) AR-127
35TFP2 AR-127
35TRMP1(See Pg. 47) AR-124
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36CFMT1 AR-139
36CFP1 AR-142
36CMW1 AR-144
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40LPB1 AR-171
41APB1 AR-165
41APBK1 AR-165
41BFM1 AR-174
41BFM2 AR-169
41BFMT1 AR-171
41BFP1 AR-168
41BFPK1 AR-168
41BPB1 AR-165
41BP8K1 AR-165
41BPBT1 AR-166
41FFMT1(Sim.to Pg. 19) AR-75
41FPBT1(Sim.to Pg. 17) AR-101
41SVB1 AR-167
41SVPB1 AR-167
41TFP1(Sim.to Pg. 25) AR-127
41TPB1 AR-167
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41XFP1(Sim.to Pg. 25) AR-127
41XFPK1(Sim.to Pg. 25) AR-127
41XPB1(Sim.to Pg. 51) AR-107
41XPBK1(Sim.to Pg. 51) AR-107
41YFP1/2(Sim.to Pg. 25) AR-127
42AFM1 AR-176
42AFMT1 AR-169
42AFP1 AR-173
42AFPK1 AR-173
42APB1 AR-175
42APBK1 AR-175
42APBK3(See Pg. 85) AR-175
42APBT1 AR-170
42BFM1 AR-179
42BFM2 AR-168
42BFM3 AR-176
42BFMT1 AR-169
42BFP1 AR-173
42BFPK1 AR-172
42BFPK2 AR-173
42BPB1/41 AR-175
42BPBK1 AR-175
42BPBT1 AR-170
42FFM1(Sim.to Pg. 81) AR-113
#42FFP1/41(Sim.to Pg. 89) AR-120
42FPB1 AR-174
42FPBK1/41 AR-174
42GPB1 AR-175
42GPBK1 AR-175
42GPBK3(See Pg. 85) AR-175
43APB1 AR-173
43APBK1 AR-173
43BFM1 AR-171
43BFMT1 AR-168
43BFP1 AR-176
43BFPK1 AR-176
43BPB1 AR-171
43BPBK1 AR-173
44AFM1 AR-175
44AFM2 AR-172
44AFMT1 AR-173
44AFP1 AR-170
44APK1 AR-170
44APBK1 AR-171
44APBT1 AR-169
44BFM1 AR-175
44BFM3 AR-172
44BFMT1 AR-173
44BFP1 AR-170
44BPB1 AR-171
44BPBT1 AR-169
45RFMT1(PCBAR-175) AR-151
45TFP1(Sim.to Pg. 25) AR-127
45TPB1 AR-167
45TTCP1 AR-167
46CFMT1/2 AR-170
46CFP AR-175
46CFP1 AR-175
46CMW1 AR-178
46CMW2 AR-179
50APB1 AR-192
50APB3(See Pg. 29) AR-192
50APBK1 AR-192
50APBK3(See Pg. 29) AR-192
50BFM1(See Pg. 103) AR-188
50BFMT1/2 AR-191
50BFMT3 AR-210
50BFP1(See Pg. 103) AR-191
50BPB1 AR-192
50BPB3(See Pg. 29) AR-192
50BPBK1 AR-192
50BPBK3(See Pg. 29) AR-192
50BPBT1 AR-190
50BPBT2 AR-190
50BPBT3 AR-215
50MFM1(See Pg. 103) AR-188
50MFP1(See Pg. 103) AR-191
50MFPK1(See Pg. 103) AR-191
51AFMT1 AR-187
51APB1 AR-187
51APBK1 AR-187
51BFM1/2 AR-191
51BFMT1/2 AR-189
51BFP1 AR-186
51BFPK1 AR-186
51BK1 AR-187
51BPB1 AR-187
51BPBK1 AR-187
51BPBT1/2 AR-188
51BPBT3 AR-207
51FFM1 AR-191
51PK1 AR-186
51SVPB1 AR-186
51SVPB2 AR-217
51TFP1 AR-189
51TPB1 AR-186
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51XFP1 AR-189
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51YFM1 AR-191
51YFP1 AR-189
52AFM1 AR-190
52AFMT1 AR-192
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52AFP1 AR-189
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52APBT1/2 AR-192
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52BFP1 AR-189
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52BK1 AR-186
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60BPB1(See Pg. 29) AR-192
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60XFM1(See Pg. 85) AR-191
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61TBP1 AR-217
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61TFP1 AR-218
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61XFM1(See Pg. 85) AR-191
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62APB1(See Pg. 107) AR-193
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70APB1 AR-239
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70BCB1 AR-250
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70BFMC1/2 AR-250
70BFMC3 AR-254
70BFMD1/2 AR-257
70BFMT1/2 AR-245
70BFP1 AR-240
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70BPB1 AR-239
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70BPBT1/2 AR-246
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70FP1 AR-240
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70HFM1 AR-242
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70HPB1 AR-239
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70HPBT1/2 AR-246
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71BPB1 AR-239
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71GUP81 AR-253
71GUPBK1 AR-253
71GVFK1(Sim.to Pg. 85) AR-189
71HBPT1/2 AR-246
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71TPB1(Sim.to Pg. 43) AR-217
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72AFM1 AR-242
72AFMT1 AR-255
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72AFP1 AR-240
72AFPK1 AR-240
72APB1 AR-239
72APBK1 AR-239
72APK1 AR-240
72FP81 AR-252
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73AFM1 AR-242
73AFMC1/2 AR-250
73AFMC3 AR-254
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73AFP1 AR-240
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73APB1 AR-239
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76KFMC1/2 AR-250
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80BFM1 AR-265
80BFMC1(Sim.to Pg.23) AR-250
80BFMD1 AR-259
80BFMT1/2 AR-261
80BP81 AR-262
80BFPC1 AR-262
80BFPK1 AR-260
80BFTC1/2 AR-264
80BFTD1 AR-265
80BPB1 AR-273
80BPBK1 AR-273
80BPBT1/2 AR-273
81TFM2 AR-270
81TFP1(Sim.to Pg.93) AR-239
81TPB1 AR-273
81TPBK1 AR-273
81YFMC1 AR-262
81YFMT1/2 AR-261
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86CFMD1 AR-260
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793361 AR-191
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934164 AR-173
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7305841 AR-186
#7305841(1971 Prod.) AR-96
7305841(1972 1/2 Prod.) AR-124
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7305841(41SVPB1) AR-167
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7312234(1972 Prod.) AR-112
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7313514(1971 Prod.) AR-101
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7313522(1971) AR-98
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7313522(76/77 Prod) AR-252
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7313532(1971 Prod) AR-97
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7313542(1972) AR-113
7313542(1975 Prod) AR-191
7313552(1972) AR-98
#7313552(1972 1/2 Prod.) AR-126
7313552(1972) AR-114
7313552(1974 Prod.) AR-174
7313552(76/77 Prod) AR-252
#7313562 (1971 1/2 and 1972 Prod.) AR-120
7313562(1971 Prod) AR-97
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7313604(1972 Prod.) AR-115
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7313971(1971 Prod.) AR-97
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7314201(1971 Prod.) AR-97
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7314201(1972 Prod.) AR-112
7314201(1973 Prod.) AR-137
7314201(1973-1/2 Prod.) AR-145
7314201(1974 Prod.) AR-165
7314201(1975 Prod.) AR-187
7314201(71BPB1) AR-239
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7314211(1971 Prod.) AR-101
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7314211(1973 Prod.) AR-140
7314211(41BFM2) AR-169
7314211(41BFMT1) AR-174
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7898220 AR-250
7898340 AR-262
7898426 AR-250
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7898436 AR-250
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7898510 AR-261
7898570 AR-250
7898940 AR-255
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7914201 AR-187
7930012(1971 Prod) AR-105
7930012(1972 1/2 Prod.) AR-122
#7930012(1972 Prod.) AR-118
7930013 AR-101
7930015(1971 Prod.) AR-100
7930015(1972 Prod.) AR-112
7930021(1971) AR-102
7930022(1972) AR-109
7930025(1971 Prod.) AR-102
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7930032(13BMF1/2) AR-98
7930032(1971) AR-100
7930032(1972) AR-112
7930033 AR-98
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#7930053(1971 1/2 Prod) AR-118
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7930061(1972) AR-115
7930134(34AFM1) AR-142
7930134(44AFM1) AR-175
7930134(44AT M2) AR-172
7930134(1971 1/2) AR-114
7930134(1971) AR-100
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7930144(1971 Prod.) AR-98
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7930161 AR-115
7930202(1971) AR-105
7930202(1972 1/2 Prod.) AR-122
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7930202(1972) AR-115
7930212(1971) AR-102
7930212(1972) AR-109
#7930224(1971 Prod.) AR-104
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7930224(1972-1/2 Prod.) AR-124
#7930234(1971 Prod.) AR-96
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7930244(1971 Prod.) AR-102
7930244(1972 Prod.) AR-113
7930252 AR-115
#7930254(1971 Prod.) AR-96
#7930254(1972 1/2 Prod.) AR-126
7930254(1972 Prod.) AR-114
7930254(1973 Prod.) AR-139
7930254(1974 Prod.) AR-171
7930254(1975 Prod.) AR-192
7930492(1971) AR-97
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7930495(1971 Prod.) AR-97
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#7930542(1971) AR-106
7930542(1972) AR-113
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7931034(1973 Prod.) AR-139
7931466(1971 Prod.) AR-117
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7931466(1975 Prod.) AR-189
#7931766(1971 Prod.) AR-96
7931766(1972 1/2 Prod.) AR-124
#7931766(1972 Prod.) AR-110
7931766(1974 Prod.) AR-167
7931766(1975 Prod.) AR-186
7932743 AR-101
7932753 AR-105
7932763 AR-97
#7933241(1971 Prod.) AR-96
#7933241(1972 Prod.) AR-110
7933241(1972-1/2 Prod.) AR-124
7933241(1974 Prod.) AR-167
7933241(1975 Prod.) AR-186
7933251(1972 1/2 Prod) AR-127
7933251(1972 Prod) AR-117
7933251(1975 Prod.) AR-189
7933261(1971 Prod.) AR-100
7933261(1972 Prod.) AR-109
7933261(1975 Prod.) AR-191
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7933291(1971 Prod.) AR-97
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7933291(1972 Prod.) AR-112
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7933291(1973 Prod.) AR-137
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7933291(1975 Prod.) AR-187
7933291(71BPBK1) AR-239
7933301(1971 Prod.) AR-93
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7933301(1973 Prod.) AR-138
7933301(1974 Prod.) AR-168
7933301(1975 Prod.) AR-186
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7933501(1972 1/2 Prod.) AR-124
#7933501(1972 Prod.) AR-110
7933501(1974 Prod.) AR-167
7933501(1975 Prod.) AR-186
7933501(1976 Prod.) AR-114
7933511(1972 1/2 Prod.) AR-127
7933511(1972 Prod.) AR-117
#7933511(1972 Prod.) AR-120
7933511(1975 Prod.) AR-189
#7933641(1972 1/2 Prod.) AR-120
7933641(1972 Prod.) AR-112
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7933641(1973 Prod.) AR-137
7933641(1974 Prod.) AR-165
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7935002(1973 Prod.) AR-140
7935002(1974 Prod.) AR-175
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7935004(1973 Prod) AR-139
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7935004(1974 Prod.) AR-171
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7935012(1974 Prod.) AR-175
7935013 AR-112
7935014 AR-140
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7935021(1972 Prod.) AR-112
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7935053(1973 1/2 Prod.) AR-144
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7936181(1972 Prod.) AR-117
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7937973(1973 Prod) AR-145
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7939081(7IAFMT1) AR-255
7939102(1973 1/2 Prod.) AR-138
7939102(1973 Prod.) AR-140
7939102(1974 Prod) AR-175
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7939112(1973 1/2 Prod.) AR-138
7939112(1973 Prod) AR-140
7939112(1974 Prod) AR-175
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7939122(42BFP1) AR-172
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7939142(42BFM1) AR-179
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7939152(42BPBT1) AR-170
7939152(52BPBT1/2) AR-192
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7939162(52BFMT1/2) AR-187
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