sams

AUTO RADIO SERVICE DATA

American Motors *5JC3802,5HT3804, 5463944,3697364*

Automatic *UPX-3327*

Boman *460-FM,660-MPX* **Craig** *T605*

Ford *D8AF19A171AB,D8EF19A171AB, D8TF19A171AA,D8VF19A171AA, D9AF19A171AA,D9VF19A171AA*

Midland *67-550* **Panasonic** *CQ-8520EU*

Sanyo *FT871*

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AUTO RADIO SERVICE DATA

AR-277

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

FIRST EDITION
FIRST PRINTING-MAY, 1979

Library of Congress Catalog Card Number: 49-11493

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.

FM ALIGNMENT

GENERAL INFORMATION - The factory alignment is performed with laboratory equipment. The circuits are quite stable and not ordinarily subject to drift, therefore, before alignment is attempted, the set should be thoroughly checked for circuit troubles. An FM generator should be used for FM alignment.

ALIGNMENT CONDITIONS - Input level to the receiver +13.5V DC. During FM alignment, the generator output signal amplitude must be set above or below the receiver limiting level depending on the adjustment made. The limiting level is the point where further increase in input does not increase the output level. During alignment then, either keep the level below this point (below limiting level) or above this point (into limiting) as pointed out in the alignment procedure. In addition, the signal generator leads must be short and carefully shielded. If noise voltage on the generator leads is high enough to cause limiting, it is almost impossible to align the receiver properly because tuning adjustments will not show up as variations in the VTVM reading.

FM ALIGNMENT USING FM GENERATOR - MODELS 3802,3804

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RADIO FREQUENCY	OUTPUT INDICATOR	ADJUST	REMARKS
FM - IF ALIGNMENT						
1	Direct thru ant receptacle	10.7MHz(75KHz deviation @ 400Hz Mod - into limiting, 100KuV or better)	108.5MHz	VTVM-AC probe or scope across 3.2 ohm output load	T2	Adjust for max output.
2	"	10.7MHz(75KHz deviation @ 400Hz Mod - below limiting)	"	"	T1	Adjust for max output. Repeat steps 1 & 2 for optimum peak.
The following steps are required to bring the IF system into line with the ceramic filters in order to achieve maximum sensitivity.						
3	"	98MHz(75KHz deviation @ 400Hz Mod - below limiting)	98MHz	"	Radio freq.	Adjust for best Symmetry on scope, or max output on VTVM.
4	"	98MHz(75KHz deviation @ 400Hz Mod - into limiting 100KuV or better)	"	"	T2	Adjust for max output.
5	"	98MHz(75KHz deviation @ 400Hz Mod - below limiting)	"	"	T1	"
FM - RF ALIGNMENT - DO NOT perform Steps 6 thru 9 unless the tuner has been tampered with or associated components have been replaced. Before proceeding with Step 6, back the FM tuning cores as far as possible out of the coils to eliminate their effect on trimmer adjustments.						
6	Ant receptacle thru termination (FIG. 20)	108.5MHz(22.5 Khz deviation @ 400Hz Mod - use max sig)	108.5MHz	VTVM-AC probe or scope across 3.2 ohm output load	C18	Adjust for max signal output.
7	"	108.5MHz(22.5 Khz deviation @ 400Hz Mod - below limiting)	"	"	C9,C4	"
8	"	98MHz(22.5Khz deviation @ 400Hz Mod - use max sig)	98MHz	"	L4	Adjust for max signal output. See "FM Alignment Locations" detail for core carriage note.
9	"	98MHz(22.5KHz deviation @ 400Hz Mod - below limiting)	"	"	L3,L2	Adjust for max signal output. See Fig. 21 for core carriage note. Repeat steps 6 thru 9.

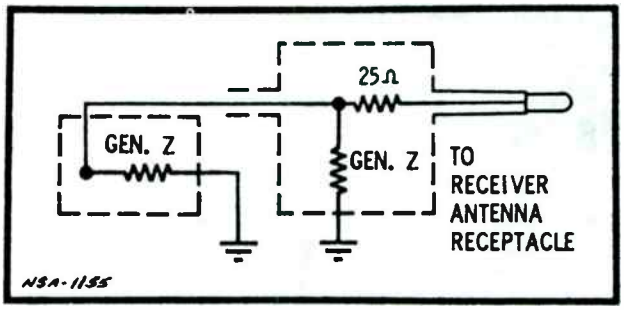


FIG. 20 FM GENERATOR TERMINATION

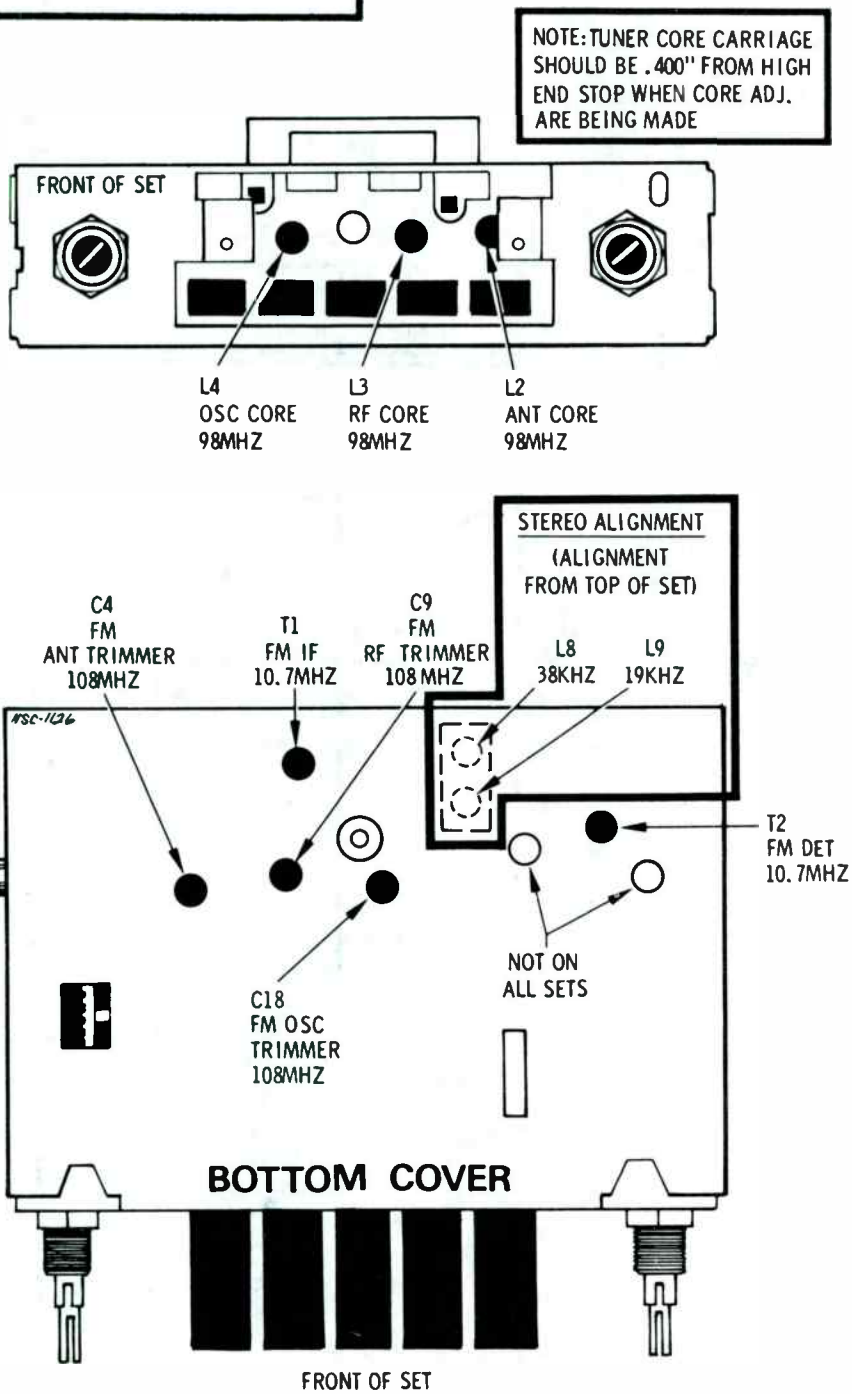


FIG. 21 3802, 3804 FM & MPX ALIGNMENT POINT LOCATION

FM STEREO RECEPTION

When the receiver is tuned to an FM stereo station of sufficient strength, the stereo indicator will become illuminated. As long as 15uV or better of signal strength is received, the indicator will remain illuminated.

A recovered stereo signal is inherently more noisy than a comparable monaural signal; the weaker the signal, the higher the resultant noise level. Typically, the signal/noise ratio for a demodulated stereo signal is 20db less than that of an equivalent monaural signal. Consequently, a 40db signal/noise ratio would be required in monaural operation, before switching to stereo, if adequate signal/noise and separation are to be realized.

To maintain an acceptable signal/noise ratio when tuned to a weak FM stereo station, the receiver switches to the monaural mode of operation. (The stereo indicator light will go out, both speakers will operate, but without the stereo effect.) As the signal strength increases the noise level will drop and the receiver will switch back to a stereo mode of operation. This switching action from stereo to monaural and back to stereo is automatic and requires no adjustments by the customer.

Good stereo reception requires a relatively strong composite signal on pin 3 of IC-2 in addition to a positive DC voltage on pin 4. This DC voltage varies with signal strength and is derived from pin 13 of IC-1. The DC voltage will rise to approximately 1.35 volts and then drop down to 0.9 volts as the receiver switches to stereo operation. In this way, a good signal/noise ratio is assured during stereo operation.

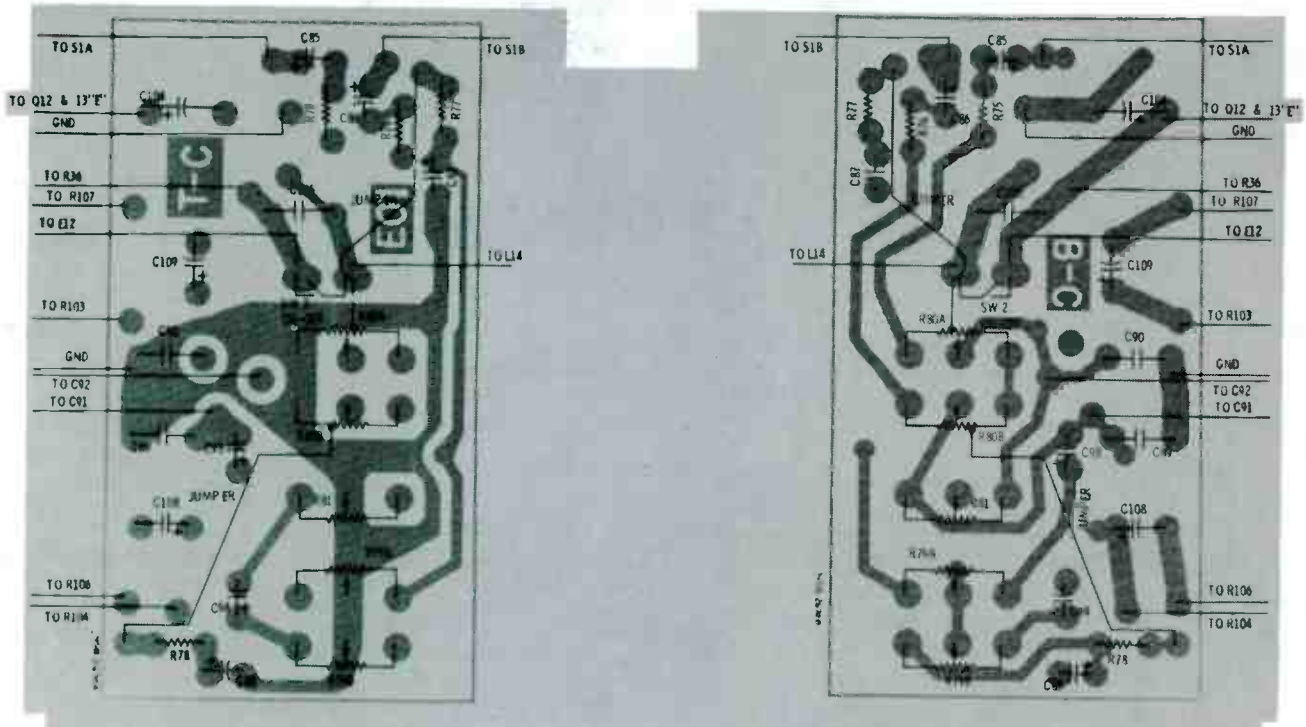
STEREO ALIGNMENT

The FM stereo multiplex system should be aligned only with the use of an FM multiplex generator.

The following steps must be performed before trying to align a FM stereo multiplex system.

1. The "AM-FM" switch must be in the "FM" position.
2. The generator output must be at a high RF level (100uV or better.) The FM stereo light (E4) should be lit during the alignment procedure. If it is not, either the generator output is too low, the circuits are out of alignment or inoperative.
3. FM radio "IF's" must be properly aligned before beginning multiplex alignment. CAUTION should be observed when servicing the multiplex IC. Shorting or grounding of contact pins will cause damage to the IC.

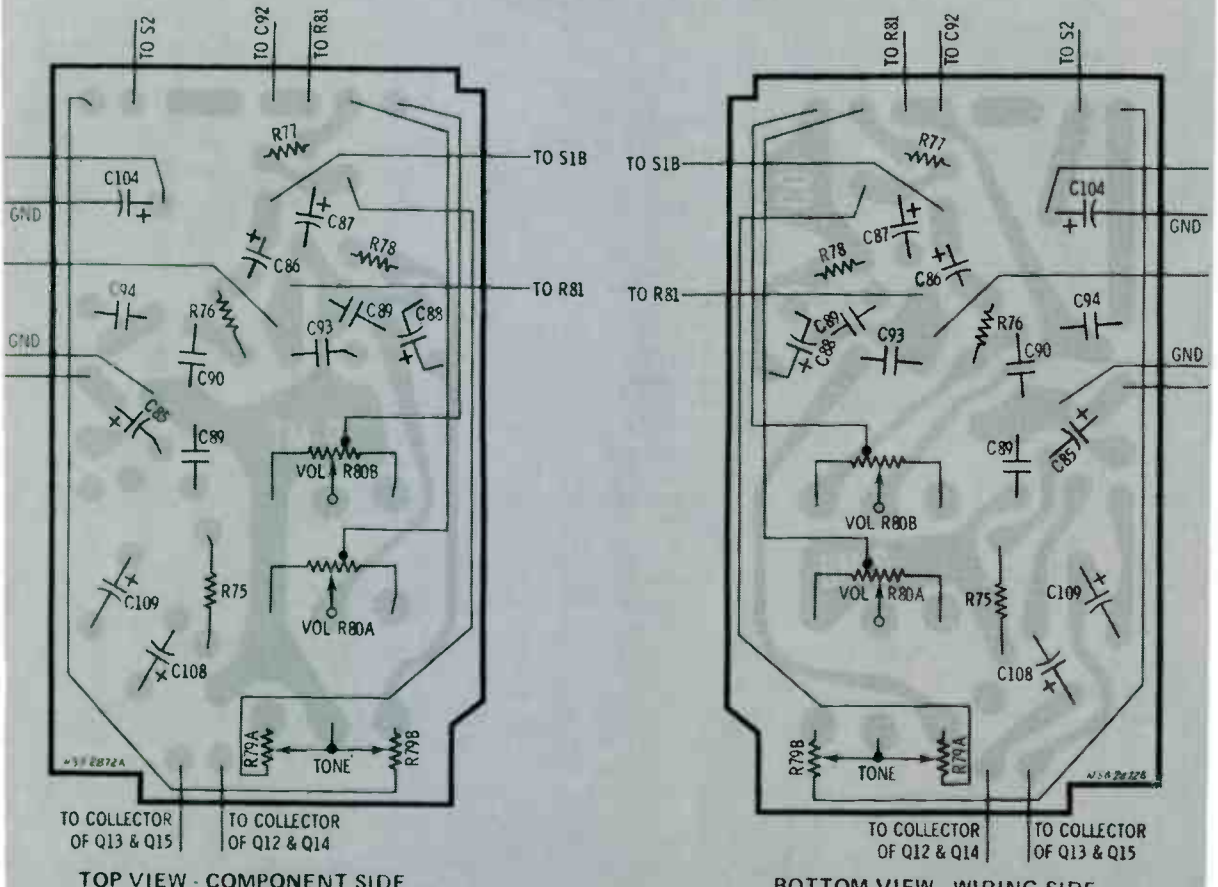
STEP	GENERATOR CONNECTION	GENERATOR MODULATION	OUTPUT INDICATOR	ADJUST	REMARKS
1.	Connect a RF modulated signal from multiplex generator to antenna input.	19Khz pilot @ 10% modulation	Connect low capacity probe of A.C. voltmeter to TP[A] (remove top cover for access to TP[A]). Use lowest possible range on A.C. voltmeter.	L9, (19khz coil), & L8 (38khz)	1. Accurately tune radio to RF frequency of stereo generator. 2. Turn off left and right channel multiplex signals. 3. Adjust L8 and L9 for maximum output.
2.	"	19Khz pilot @ 10% modulation plus MPX signal @ 30% modulation as per remarks	Connect receiver speaker leads to output indicators (either separate meters or part of multiplex generator)	L8, 38Khz coil	1. First turn on left and right channel multiplex signals and adjust audio output to 1 watt in each channel. Then turn off right channel multiplex signal and adjust L8 for a minimum on the right channel output indicator (maximum separation) 2. Repeat procedure for left channel separation 3. Remove all test equipment and check for proper stereo operation.
	"	"			



TOP VIEW - COMPONENT SIDE

BOTTOM VIEW - WIRING SIDE

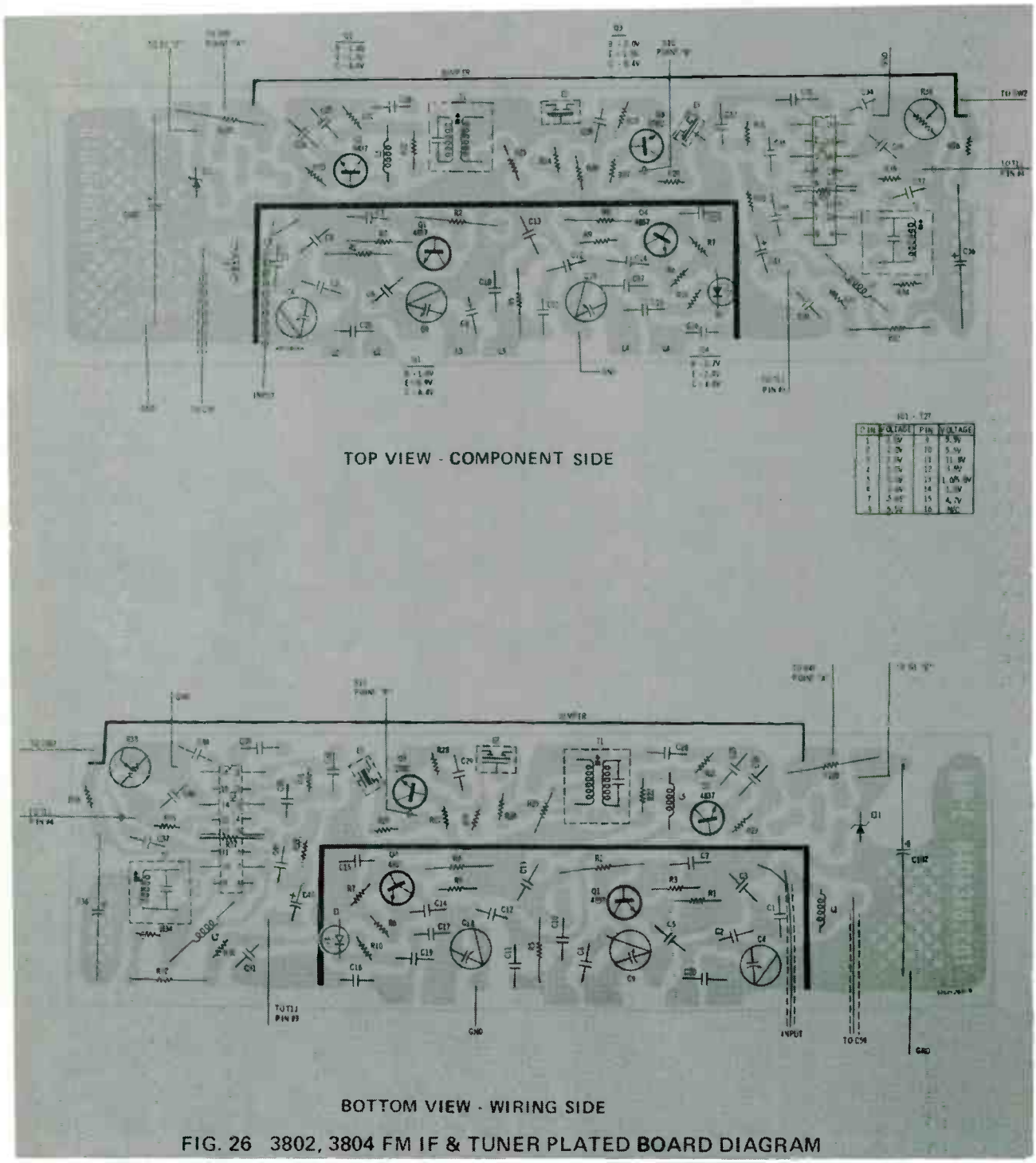
FIG. 24 3802 VOLUME & TONE PLATED BOARD DIAGRAM



TOP VIEW - COMPONENT SIDE

BOTTOM VIEW - WIRING SIDE

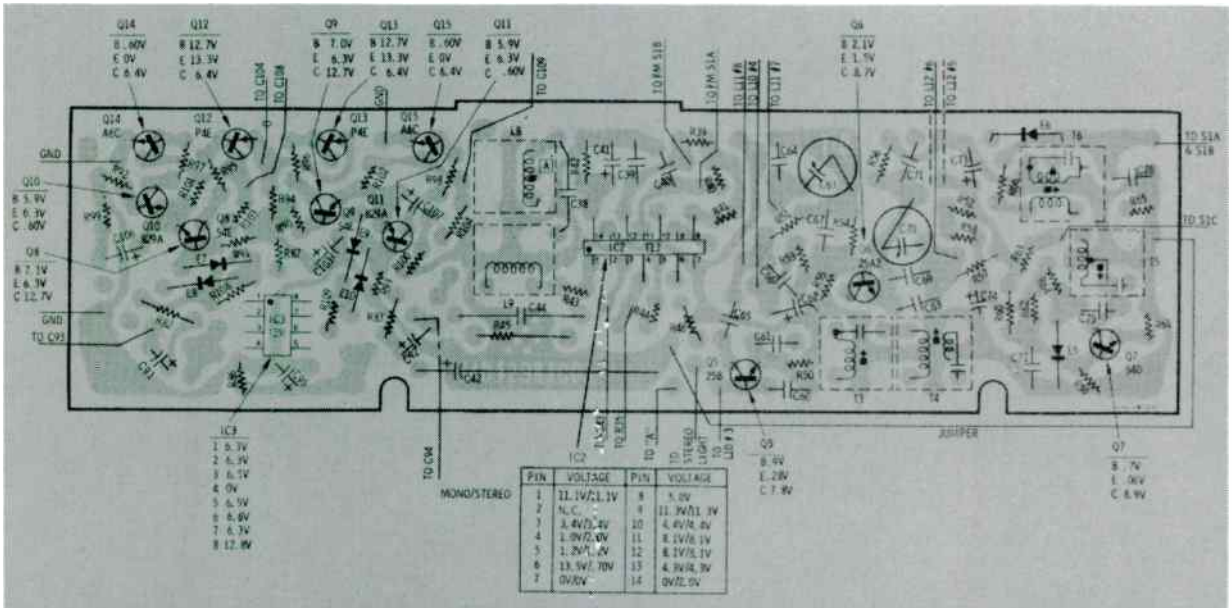
FIG. 25 3804 VOLUME & TONE PLATED BOARD DIAGRAM



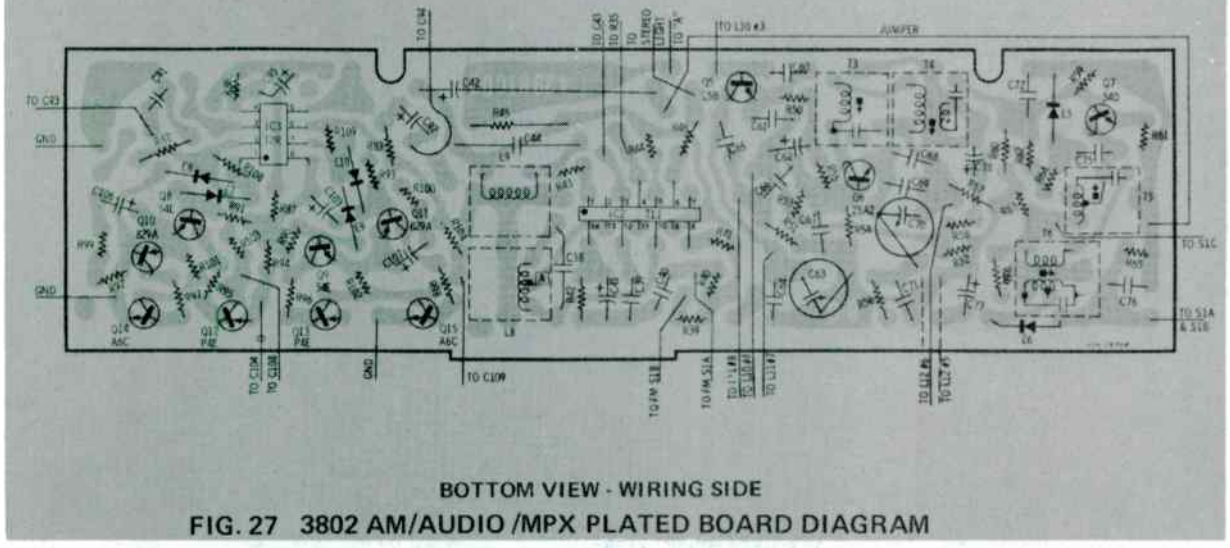
TOP VIEW - COMPONENT SIDE

BOTTOM VIEW - WIRING SIDE

FIG. 26 3802, 3804 FM IF & TUNER PLATED BOARD DIAGRAM



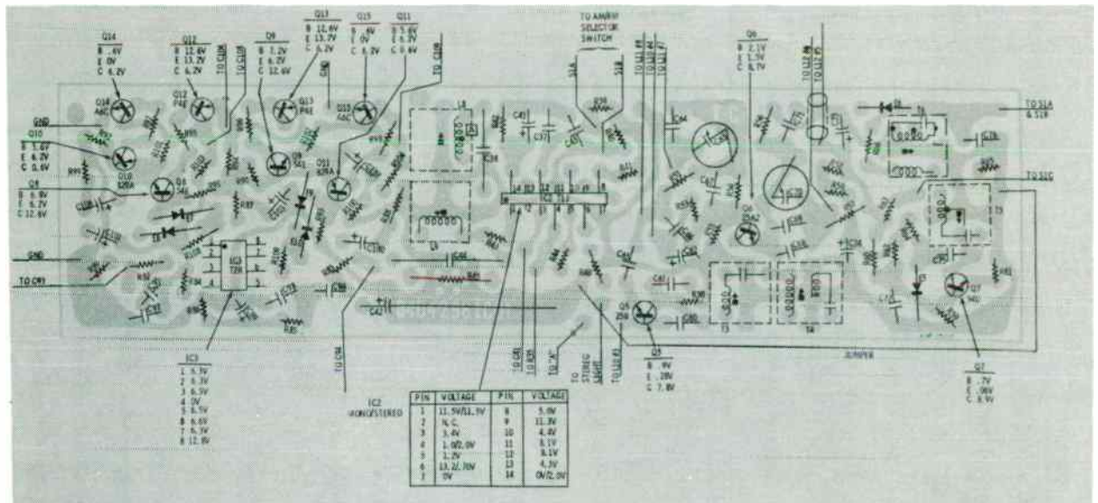
TOP VIEW - COMPONENT SIDE



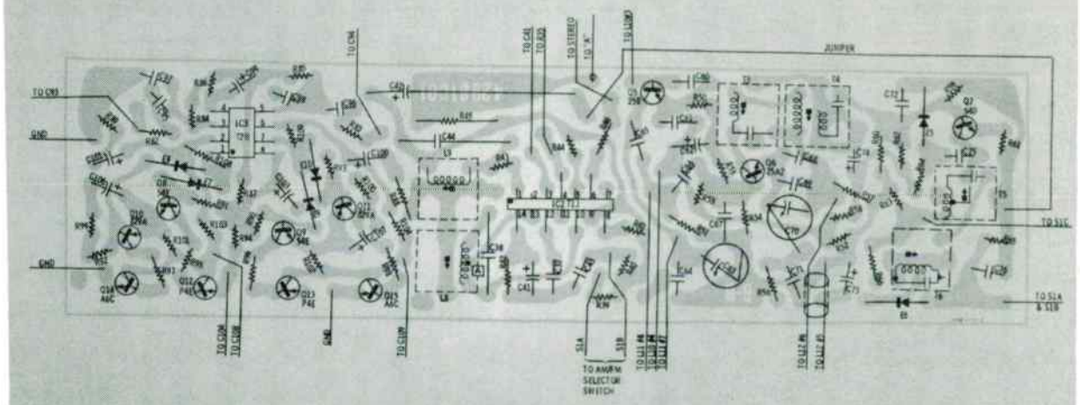
BOTTOM VIEW - WIRING SIDE

FIG. 27 3802 AM/AUDIO /MPX PLATED BOARD DIAGRAM

American Motors 5JC3802,5HT3804, 5463944,3697364



TOP VIEW - COMPONENT SIDE



BOTTOM VIEW - WIRING SIDE

FIG. 28 3804 AM, MPX, & AUDIO PLATED BOARD DIAGRAM

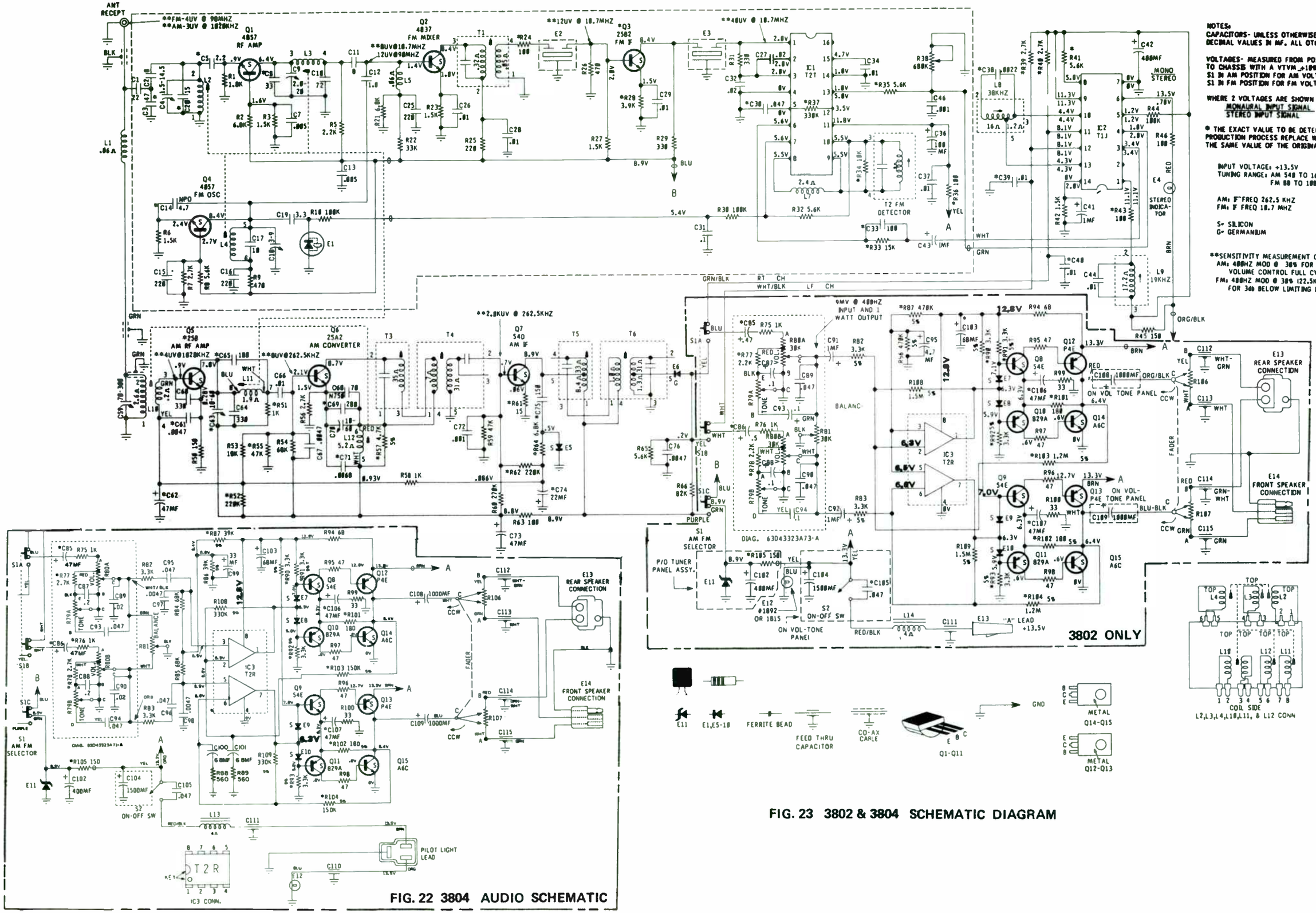
MODELS: 3802, 3804, REPLACEMENT PARTS LIST

NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION
		ELECTRICAL PARTS
		CAPACITORS
C1	21-43539A40	22PF 10% 100V NPO disc
C2	21-43539A25	8PF 10% 100V NPO disc
C3	21-43539A24	47PF 10% 100V N220 disc
C4	20-41188E01	TRIMMER, FM ANT 2-18PF
C5	21-43539A14	2.2PF 10% 100V NPO disc
C7	21-43538A43	.005MF 20% 100V Z5U disc
C8	21-43842B09	39PF 10% 100V mica
C9	20-41188E01	TRIMMER, FM RF 2-18PF
C10	21-43539A89	72PF 10% 100V N150 disc
C11	21-43539A25	8PF 10% 100V NPO disc
C12	21-43539A16	1.0PF ±.25PF 100V NPO disc
C13	21-43538A43	.005MF 10% 100V Z5U disc
C14	21-43539A74	4.7PF ±.25% 100V NPO disc
C15	21-43538A60	220PF 10% 100V Y5F disc
C16	21-40367A07	220PF 5% 100V mica
C17	21-43539A71	10PF 5% 100V N330 disc
C18	20-40613E04	TRIMMER, ceramic: 2.5-6PF
C19	21-43539A18	3.3PF 10% 100V NPO disc
C20	21-43539A73	15PF 5% 100V N220 disc
C25	21-40367A07	220PF 5% 100V mica
C26	8C-2208B15	.01MF 10% 50V mylar
C27	8C-2208B11	.02MF 20% 50V mylar
C28, C29	8-42208B15	.01MF 10% 50V mylar
C30	8-42208B18	.047MF 10% 50V mylar
C31	8-42208B10	.1MF 20% 50V mylar
C32	8-42208B11	.02MF 20% 50V mylar
C33	21-43538A50	100PF 10% 100V Z5F disc
C34	8-42208B15	.01MF 10% 50V mylar
C36	* 1-41099E13	100MF 16V lytic: incl shrink tubing
C37	8-42208B15	.01MF 10% 50V mylar
C38	8-10226A64	.0022MF 5% 33V N150 poly
C39, C40	8-42208B15	.01MF 10% 50V mylar
C41	23-10818A51	1MF 50V lytic
C42	23-42674B10	400MF 16V lytic
C43	23-42582B03	1.0MF 25V lytic
C44	8-10226A64	.01MF 5% 33V N150
C46	8-42208B08	.001MF 10% 50V mylar
C59	20-40647C01	TRIMMER, ant: var mica 70-300PF
C60	21-43538A45	330PF 10% 100V Z5F disc
C61	8-42208B16	.0047MF 10% 50V mylar
C62	23-10818A62	47MF 100V lytic
C63	20-40391F01	TRIMMER, ceramic: 10-60PF
C64	21-40367A27	330PF 5% 100V mica
C65	*21-43539A95	180PF 5% 100V N750 disc
C66	8-42208B15	.01MF 10% 50V mylar
C67	8-42208B16	.0047MF 10% 50V mylar
C68	21-43539A52	70PF 5% 100V N750 disc
C69	21-43842B08	280PF 5% 100V mica
C70	20-40677E01	TRIMMER, ceramic: 10-60PF
C71	8-42208B07	.0068MF 20% 50V mylar
C72	21-43538A31	.001MF 10% 100V Z5F disc
C73	23-10818A62	47MF 10V lytic
C74	23-10818A60	22MF 16V lytic
C75	21-43538A01	150PF 10% 100V Z5F disc
C76	8-42208B16	.0047MF 10% 50V mylar
C85, C86	*23-10818A49	.47MF 50V lytic
C87, C88	23-10818A45	.1MF 50V lytic (3802)
C87, C88	23-10818A47	.22MF 50V lytic (3804)
C89, C90	8-42208B18	.047MF 10 50V mylar (3802)
C89, C90	8-42208B11	.02MM 20% 50V mylar (3804)
C91, C92	23-10818A51	1.0MF 50V lytic (3802)
C91, C92	8-42208B18	.047MF 10% 50V mylar (3804)
C93, C94	23-10818A45	.1MF 50V lytic (3802)
C93, C94	8-42208B18	.047MF 10% 50V mylar (3804)
C95	*23-10818A55	4.7MF 35V lytic (3802)
C95	23-10818A62	47MF 10V lytic (3804)
C97, C98	8-42208B16	.0047MF 10% 50V mylar (3804)
C100, C101	23-42582B10	6.8MF 25V lytic: (3804)
C102	23-42674B10	400MF 16V lytic
C103	*23-10818A64	68MF 16V lytic
C104	23-10818A20	1500MF 16V lytic
C105	8-42208B21	.047MF 20% 50V mylar
C106, C107	23-42674B23	47MF 10V lytic
C108, C109	23-10818A16	1000MF 10V lytic
C111-C115	21-560232	1000PF 500V FEED-THRU
		MISCELLANEOUS ELECTRICAL PARTS
E1 E2, E3	48-137487	DIODE, silicon: D7N
	91-41457C01	FILTER, ceramic (Replace as matched pairs only) USE 91-43353A53
E4	65-40259C04	BULB, stereo indicator
E5	48-134816	DIODE, silicon: DHD800
E6	48-134587	DIODE, IN139
E7-10	48-137514	DIODE, silicon: D7Z
E13	30-43743C02	CABLE, 4 way connector: spks. rear (3804)
E11	48-41763C03	DIODE, zener (8.4-9V)
E14	30-44533A20	CABLE, 3 way connector: spkr. FRONT (3804)
E12	65-135449	BULB, dial light #1815 (3802)
E12	65-138044	BULB, dial light #1893 (3804)
E15	30-40532E01	CABLE, "A" lead (3802)
E16	30-40381F01	CABLE, pilot light & "A" lead (3804)
E14	*30-44533A24	CABLE, 3 way connector: spkr. FRONT (3802)
E13	*30-43743C07	CABLE, 4 way connector: speaker REAR (3802)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

* DENOTES NEW ITEM APPEARING IN ANY LIST FOR FIRST TIME.



NOTES:
CAPACITORS- UNLESS OTHERWISE SPECIFIED, DECIMAL VALUES IN MF. ALL OTHERS IN PF.

VOLTAGES- MEASURED FROM POINT INDICATED TO CHASSIS WITH A VTVM ±10% NO SIGNAL IN. S1 IN AM POSITION FOR AM VOLTAGES. S1 IN FM POSITION FOR FM VOLTAGES.

WHERE 2 VOLTAGES ARE SHOWN
MONAURAL INPUT SIGNAL
STEREO INPUT SIGNAL

* THE EXACT VALUE TO BE DETERMINED BY PRODUCTION PROCESS REPLACE WITH THE SAME VALUE OF THE ORIGINAL PART.

INPUT VOLTAGE: +13.5V
TUNING RANGE: AM 540 TO 1610 KHZ
FM 88 TO 108 MHZ

AM: IF FREQ 262.5 KHZ
FM: IF FREQ 10.7 MHZ

S= SILICON
G= GERMANIUM

**SENSITIVITY MEASUREMENT CONDITIONS
AM: 400HZ MOD @ 30% FOR 1 WATT OUTPUT VOLUME CONTROL FULL CW.
FM: 400HZ MOD @ 30% (22.5KHZ DEV.) FOR 30 DB BELOW LIMITING LEVEL.

FIG. 23 3802 & 3804 SCHEMATIC DIAGRAM

FIG. 22 3804 AUDIO SCHEMATIC

NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION
		MISCELLANEOUS ELECTRICAL PARTS (cont)
	50-43488C01	SPEAKER, 5 1/4" RD 3.2 OHM (3802)
	50-41067E01	SPEAKER, 5 1/4" 2 OHM (3804)
		INTEGRATED CIRCUITS
IC1	51-10658A01	T2T FM LIMITER & DETECTOR
IC2	51-10422A02	T1J MPX
IC3	51-10650A01	T2R AUDIO
		COILS & CHOKES
L1	24-40788A08	COIL, antenna
L2-4, 10-12	1-40640E32	COILS & MTG PLATE: AM & FM (3802)
L2-4, 10-12	1-40750E34	COILS & MTG. PLATE: AM & FM (3804)
L5	24-40788A08	COIL IF TRAP
L7	24-42991C02	COIL, CHOKE
L8, L9	24-42814C02	COIL, MPX: 19KHZ & 38KHZ
L14	24-41694C04	COIL, CHOKE
		TRANSISTORS
Q1	48-134857	4857 FM RF AMP
Q2	48-134837	4837 FM MIXER
Q3	48-137351	25B2 FM IF
Q4	48-134857	4857 FM OSC
Q5	48-134805	25B AM RF AMP
Q6	48-137350	25A2 AM CONVERTER
Q7	48-134811	54D AM IF
Q8, Q9	48-134846	54E AUDIO DRIVER
Q10, Q11	48-134830	829A AUDIO DRIVER
Q12, Q13	48-137331	P4E AUDIO OUTPUT
Q14, Q15	48-137145	A6C AUDIO OUTPUT
		RESISTORS
R1	6-129820	1.8K 5% 1/4W
R2	6-129237	6.8K 5% 1/4W
R3	6-129681	1.5K 5% 1/4W
R5	6-129804	2.2K 5% 1/4W
R6	6-129681	1.5K 5% 1/4W
R7	6-129707	2.7K 5% 1/4W
R8	6-129982	5.6K 5% 1/4W
R9	6-129709	470 5% 1/4W
R10	6-10053A73	100K 5% 1/4W
R21	6-129237	6.8K 5% 1/4W
R22	6-129526	33K 5% 1/4W
R23	6-129681	1.5K 5% 1/4W
R24	6-131524	100 5% 1/4W
R25	6-131275	220 5% 1/4W
R26	6-129709	470 5% 1/4W
R27	6-129681	1.5K 5% 1/4W
R29	6-129806	330 5% 1/4W
R30	6-10053A73	100K 5% 1/4W
R31	6-129806	330 5% 1/4W
R32	6-129982	5.6K 5% 1/4W
R33	6-129236	15K 5% 1/4W
R34	6-129668	10K 5% 1/4W
R35	6-129982	5.6K 5% 1/4W
R36	6-10053C09	100 5% 1/4W
R37	6-129473	330K 5% 1/4W
R38	18-43556C06	CONTROL, trimmer: 680K
R39	6-129707	2.7K 5% 1/4W
R40	6-129707	2.7K 5% 1/4W
R41	6-10053C51	5.6K 5% 1/4W
R42	6-129681	1.5K 5% 1/4W
R43	6-131524	100 5% 1/4W
R44	6-10053A73	100K 5% 1/4W
R45	6-131276	150 5% 1/4W
R46	6-10053C09	100 5% 1/4W
R49	6-131275	220 5% 1/4W
R50	6-131276	150 5% 1/4W
R51	6-129805	1K 5% 1/4W
R52	6-10053A79	220K 5% 1/4W
R53	6-131526	18K 5% 1/4W
R54	6-129299	68K 5% 1/4W
R55	6-131527	47K 5% 1/4W
R56	6-129707	2.7K 5% 1/4W
R57	6-129669	4.7K 5% 1/4W
R58	6-129805	1K 5% 1/4W
R59	6-129067	47K 5% 1/4W
R60	6-131858	270K 5% 1/4W
R61	6-10053A19	15 5% 1/4W
R62	6-10053A79	220K 5% 1/4W
R63	6-131524	100 5% 1/4W
R64	6-129237	6.8K 5% 1/4W
R65	6-129982	5.6K 5% 1/4W
R66	6-10053A71	82K 5% 1/4W
R75, R76	6-129805	1K 5% 1/4W
R77, R78	6-129804	2.2K 5% 1/4W (3802)
R77, R78	6-129707	2.7K 5% 1/4W (3804)
R79, R80, R81	18-41040E01	CONTROL, multiple; 30K tone, 50K vol, bal 30K & 52 (3802)
R79, R80	18-42925C03	CONTROL, multiple; 30K tone, 50K vol. & 52 (3804)
R81	18-43012C03	CONTROL, bal. slide; 20K (3804)
R82, R83	6-129981	3.3K 5% 1/4W
R84, R85	6-129299	68K 5% 1/4W
R86, R87	6-129149	470K 5% 1/4W (3802)
R86, R87	6-129777	39K 5% 1/4W (3804)
R90-R93	6-129981	3.3K 5% 1/4W
R94	6-10053A33	68 5% 1/4W

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

* DENOTES NEW ITEM APPEARING IN ANY LIST FOR FIRST TIME.

MODELS: 3802, 3804, REPLACEMENT PARTS LIST (Cont.)

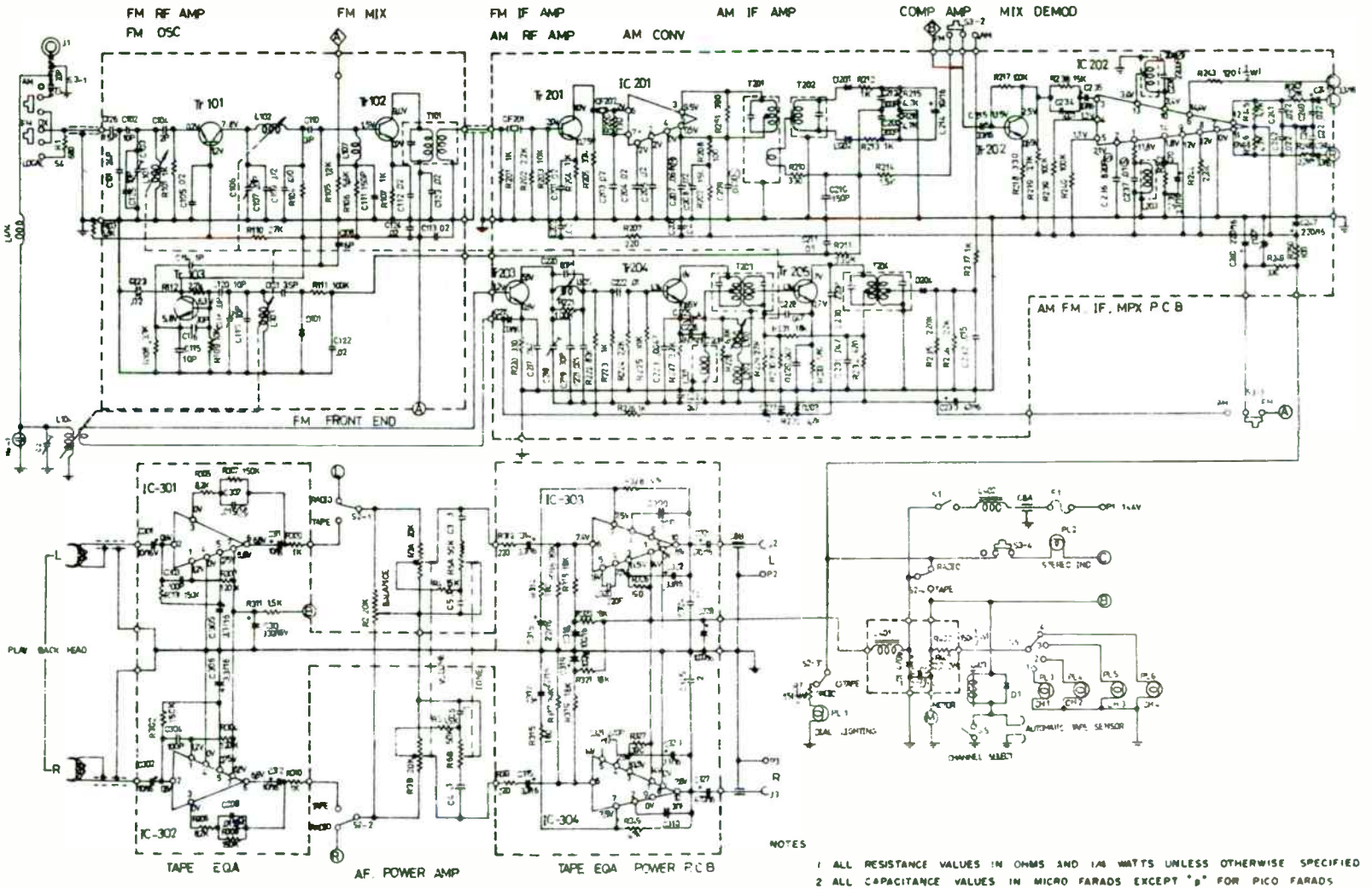
NOTE: ALL PARTS LISTED ARE RECOMMENDED REPLACEMENT PARTS

REF. NO.	PART NUMBER	DESCRIPTION
		RESISTORS (cont)
R95-R98	6-131274	47 5% 1/4W
R99, R100	6-10053A26	33 5% 1/4W
R101, R102	6-129431	180 5% 1/4W
R103, R104	6-124495	1.2M 5% 1/4W
R105	6-10053C13	150 5% 1/4W
R106	18-40521E10	CONTROL, fader 35 OHM
		SWITCHES
S1	40-43939B02	AM/FM selector
S2		PART OF R79 & R80 MULTI CONTROL
		TRANSFORMERS
T1	24-41713C03	1st FM IF
T2	24-42147C02	FM, dectector
T3	24-41714C01	AM 1st IF primary
T4	24-41714C02	AM 1st IF secondary
T5	24-41714C05	AM 2nd IF primary
T6	24-41714C06	AM 2nd IF secondary
		MECHANICAL PARTS
	1V43500C98	ARM, actuating; AM-FM selector (3802)
40	64-42971C01	BACKGROUND, dial (3804)
41	64-42389C06	BACKGROUND, dial (3802)
	3-40730A01	BOLT, speed; 1/4-20 radio mtg. (3802)
	7-41658C01	BRACKET, ant trimmer
	7-43952B01	BRACKET, AM-FM slide switch (3802)
	7-42970C01	BRACKET, AM-FM slide switch (3804)
	* 7-42061C01	BRACKET, FM board mtg. L side
	7-42972C01	BRACKET, dial light (3804)
	* 7-42058C01	BRACKET, FM board mtg. R side
41A	7-41004E01	BRACKET, radio mtg. (3804)
	7-40134E01	BRACKET, speaker mtg. (3802)
	7-43491C01	BRACKET, stereo bulb (3802)
	7-42062C01	BRACKET, stereo bulb (3804)
	* 7-43067C01	BRACKET, transistor output mtg.
	7-43536C01	BRACKET, spkr; door mtg. left (3804)
	7-43536C07	BRACKET, spkr; door mtg. right (3804)
42	36-42927C01	BUTTON, BALANCE (3804)
43	30-40381F03	CABLE, pilot light & "A" lead (also E15 - 3804)
	30-40130E01	CABLE, spkr; radio to spkr. harness (3802)
	30-44533A24	CABLE, spkr; 3-way conn.(front) (also E14-3802)
44A	*30-43743C07	CABLE, 4-way conn. (rear) (also E13-3802)
45	30-43743C05	CABLE, spkr; 4 way connector (also E13 - 3804)
46	49-42607B01	CLUTCH, disc; incl set screw
47	30-44533A20	CABLE, spkr; 3 way connector (also E14 - 3804)
47A	*15-42067C05	COVER, bottom (3802)
48	*30-40532E01	CABLE,"A" lead (3802)
49	15-42067C03	COVER, bottom (3804)
50	15-43412C04	COVER, top (3802)
51	1-40800E91	COVER, top (3804)
	61-41691C02	DIFFUSER, dial light (3802)
	61-41463C01	DIFFUSER, dial light (3804)
52	* 1-41099E01	ESCUTCHEON, trim; incl dial scale & AM-FM button (3802)•
53	13-41064E01	•ESCUTCHEON, trim, incl dial scale only (3802)
54	38-40242E15	•BUTTON, AM-FM selector (3802)
	4-139052	•WASHER, .068 - .188 - .020 (2) (3802)
	32-40131E01	GASKET, speaker (3802)
		GEAR, pinion, part of ref#(64)
55	44-42304C01	GEAR, crown; incl bushing & disc (3804)
	13-41818C02	GRILLE, speaker
	14-43329C01	INSULATOR, vol. control (armite - 3804)
	14-43120C01	INSULATOR, output transistors (Q12 - Q15)
	14-43209C01	INSULATOR, top cover
	*14-42959C01	INSULATOR, 1 5/8" x 6 1/2"
56	1-40750E07	ESCUTCHEON, trim; incl dial scale, button & arm•(3804)
57	61-41162E01	•ESCUTCHEON, incl dial scale only (3804)
	45-42932C01	•ARM, actuating (3804)
58	38-42928C01	•BUTTON, AM-FM selector (3804)
	42-41670B01	•CLIP (3804)
	41-42926C01	•SPRING, detent (3804)
	4-10058A95	•WASHER, teflon (3804)
	1-41186E01	KIT, antenna; less mast (3804)
	* 1-41099E63	KIT, installation: incl the following items•(3802)
	* 7-41190E01	•BRACKET, mtg. (1) (3802)
	36-40979E01	•KNOB, pendant (2) (3802)
	36-40570E02	•KNOB, selector (1) (3802)
	36-40570E01	•KNOB, volume (1) (3802)
	2-124821	•NUT, 1/2-28 x 5/8 (2) (3802)
	2-119913	•NUT, 8-32 x 11/32 (8) (3802)
	2-410091	•NUT, 1/4-20 x 7/16 (1) (3802)
	3-40133E01	•SCREW, tpg: 8-32 (8) Pan head (3802)
	* 3-139560	•SCREW, tpg: 8-18 x 3/8 (8) Phl. (3804)
	3-135228	•SCREW, lock; 1/4-20 (1) (3804)
	1-41099E65	•KIT, installation; incls the following items•(3804)
	8-40505E02	•CAP, suppression (1) (3804)
	42-41191E01	•CLIP (1) (3804)
	36-40412E03	•KNOB, vol. (1) (3804)
	36-40412E04	•KNOB, selector (3804)
	36-43939C01	•KNOB, pendant; tone and rear spkr. control (2) (3804)
	2-124821	•NUT, 1/2 x 28 x 5/8 (2) (3804)
	2-10101A66	•NUT, spring steel (8) (3804)

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

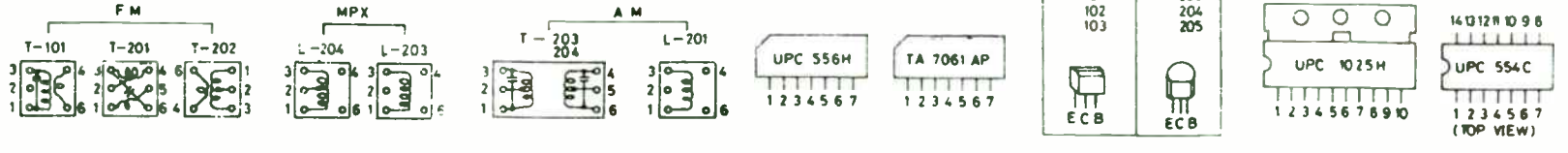
* DENOTES NEW ITEM APPEARING IN ANY LIST FOR FIRST TIME.

SCHEMATIC DIAGRAM



TERMINAL GUID

IFT BOTTOM VIEW
TR & IC SIDE VIEW OR TOP VIEW



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

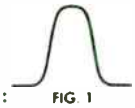


FIG. 1

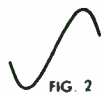


FIG. 2

PUSH-BUTTON ADJUSTMENT

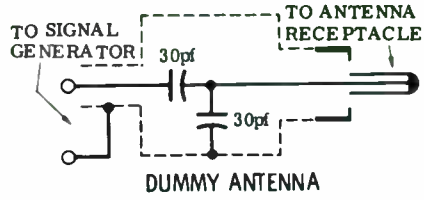
1. Pull button out.
2. Tune manually to desired station.
3. Press button in firmly.
4. Repeat for remaining buttons.

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 to antenna.	262kHz 400Hz mod.	High freq end stop	AIFT4,AIFT3, AIFT2,AIFT1	Adjust for maximum.
Thru dummy antenna to antenna input.	600kHz 400Hz mod.	600kHz	AM OSC2	Adjust for maximum.
Thru dummy antenna to antenna input.	1615kHz 400Hz mod.	1615kHz	TC6,TC5	Adjust for maximum.
Thru dummy antenna to antenna input.	1400kHz 400Hz mod.	1400kHz	TC4	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 TC4 for maximum output. Antenna adjustment is located on rear of unit on left side.



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

High side of generator thru .001uF to TP1.
Use 60-hertz, frequency-modulated signal, 450kHz sweep.
Use 60-hertz sawtooth voltage in scope for horizontal deflection.

GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUST	REMARKS
"	"	Vert input of scope to TP2.	(1)FIFT2, FIFT1	Adjust FIFT2,FIFT1 for maximum amplitude and straightness of line, similar to Fig. 2.

FM RF ALIGNMENT—SELECTOR IN FM POSITION

Connect generator to antenna.
Adjustment of coils by bending should not be attempted unless the coil is deformed or replaced.

GENERATOR FREQUENCY	RADIO DIAL SETTING	INDICATOR	ADJUST	REMARKS
108MHz Modulated	108MHz	AC probe of VTVM to speaker.	TC3,TC2,TC1	Adjust for maximum.

(1) Before adjusting, vary generator frequency slightly. Maximum output indicates exact IF.

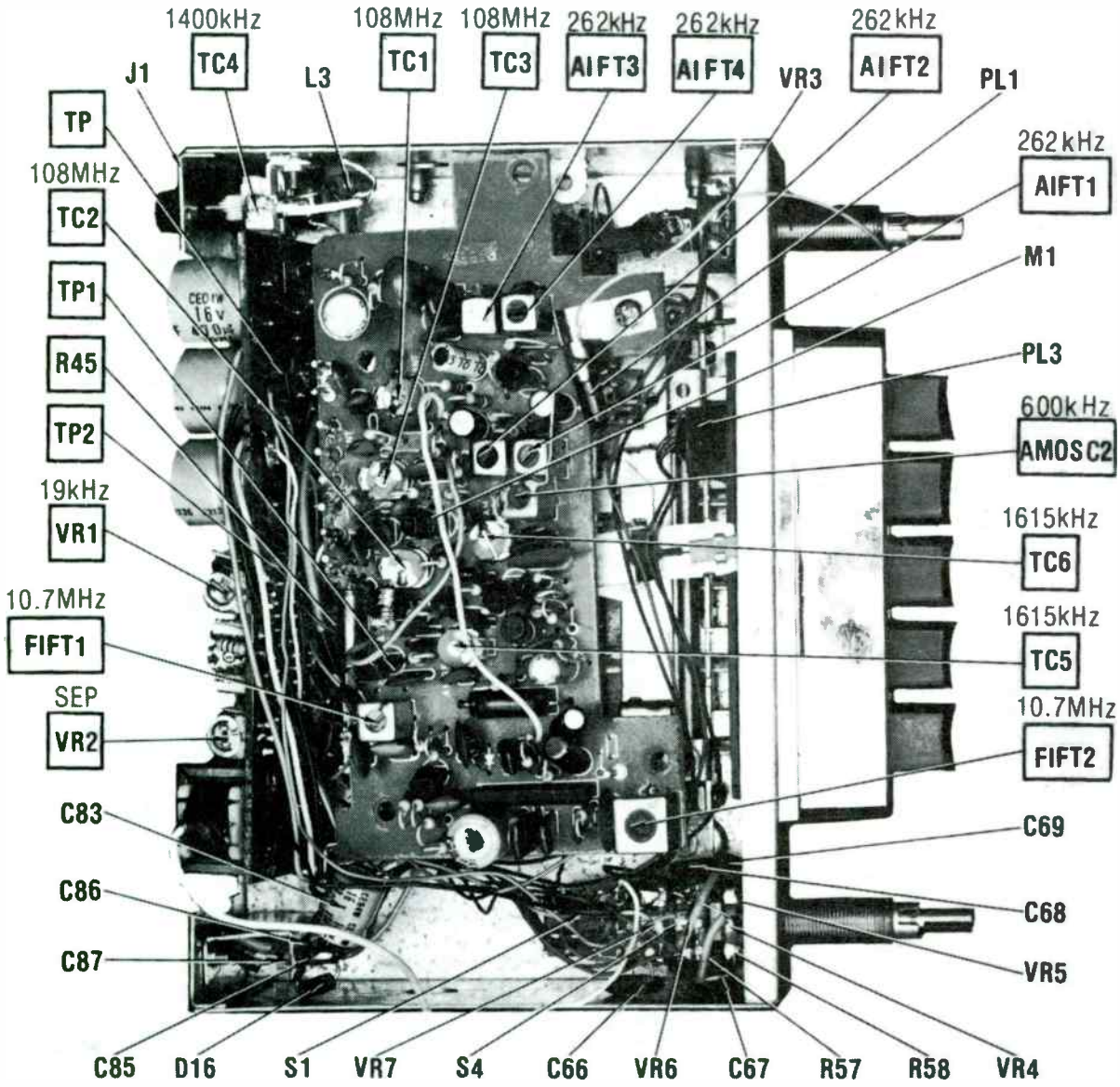
FM STEREO ALIGNMENT

Ground TP2.

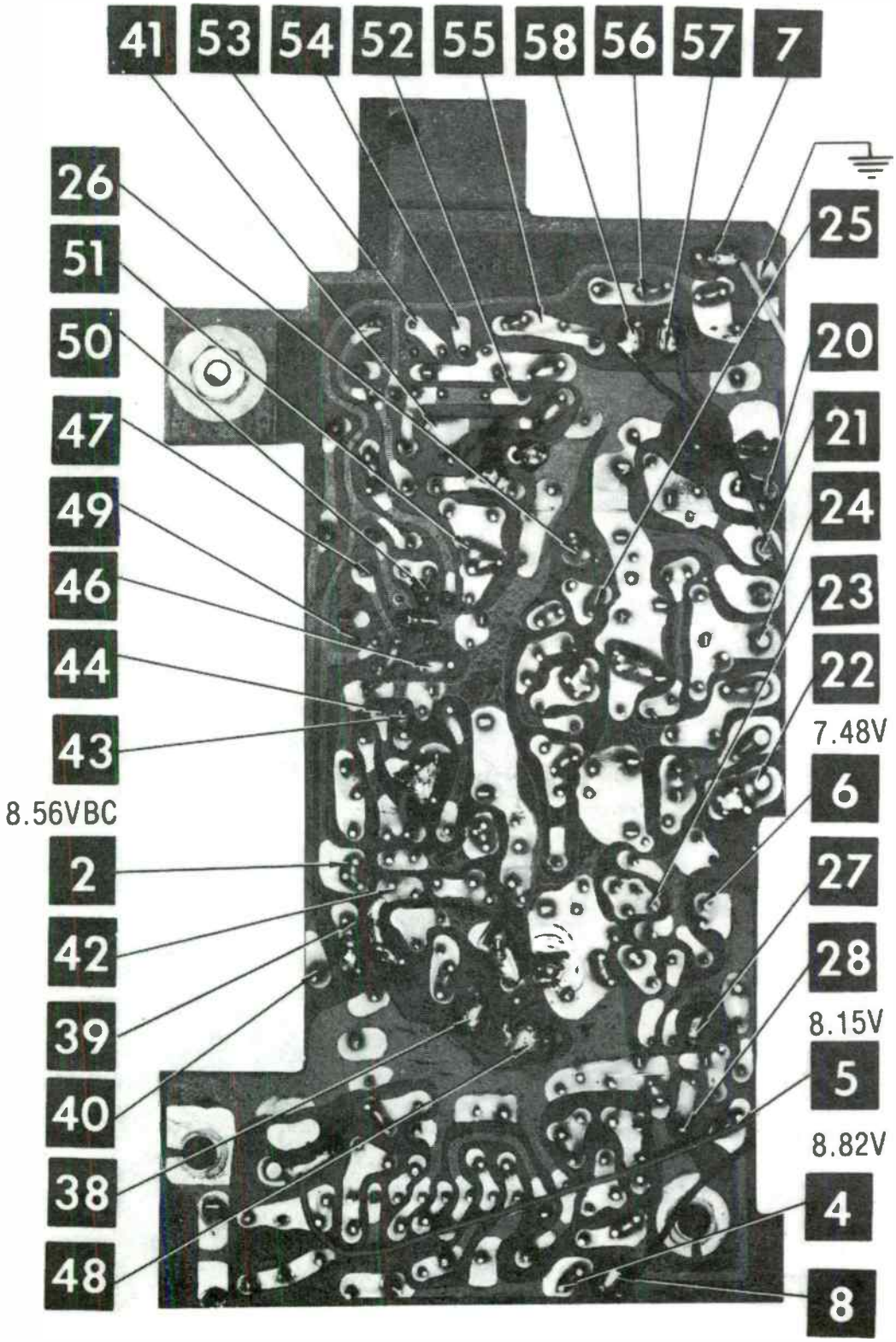
GENERATOR FREQUENCY	INDICATOR	ADJUST	REMARKS
	Connect frequency counter to TP 19kHz.	VR1	Adjust for 19kHz ±20Hz.

FM STEREO ADJUSTMENT

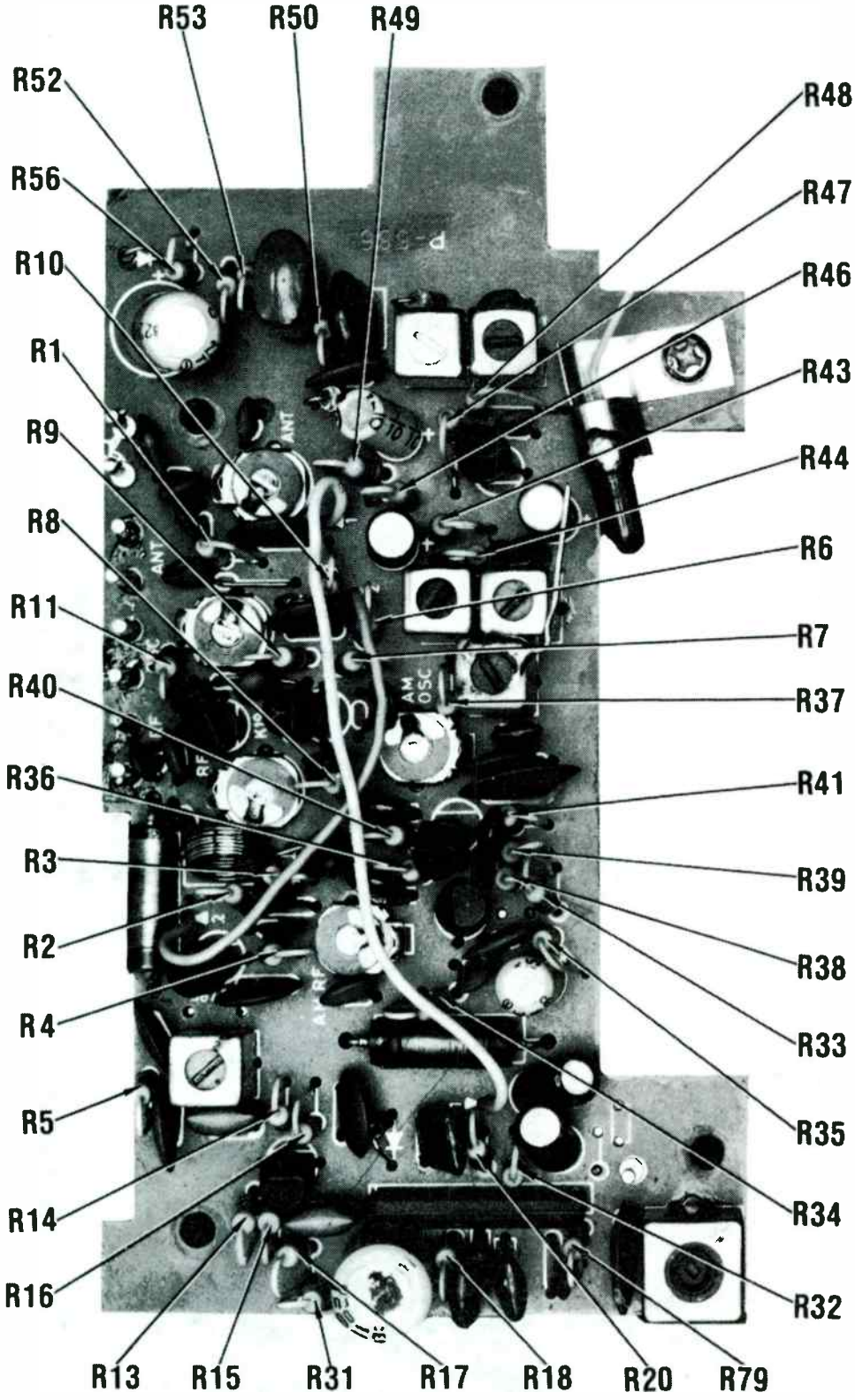
Tune receiver for a stereo signal. Adjust balance control for equal channel output. Adjust Separation control VR2 for best separation.



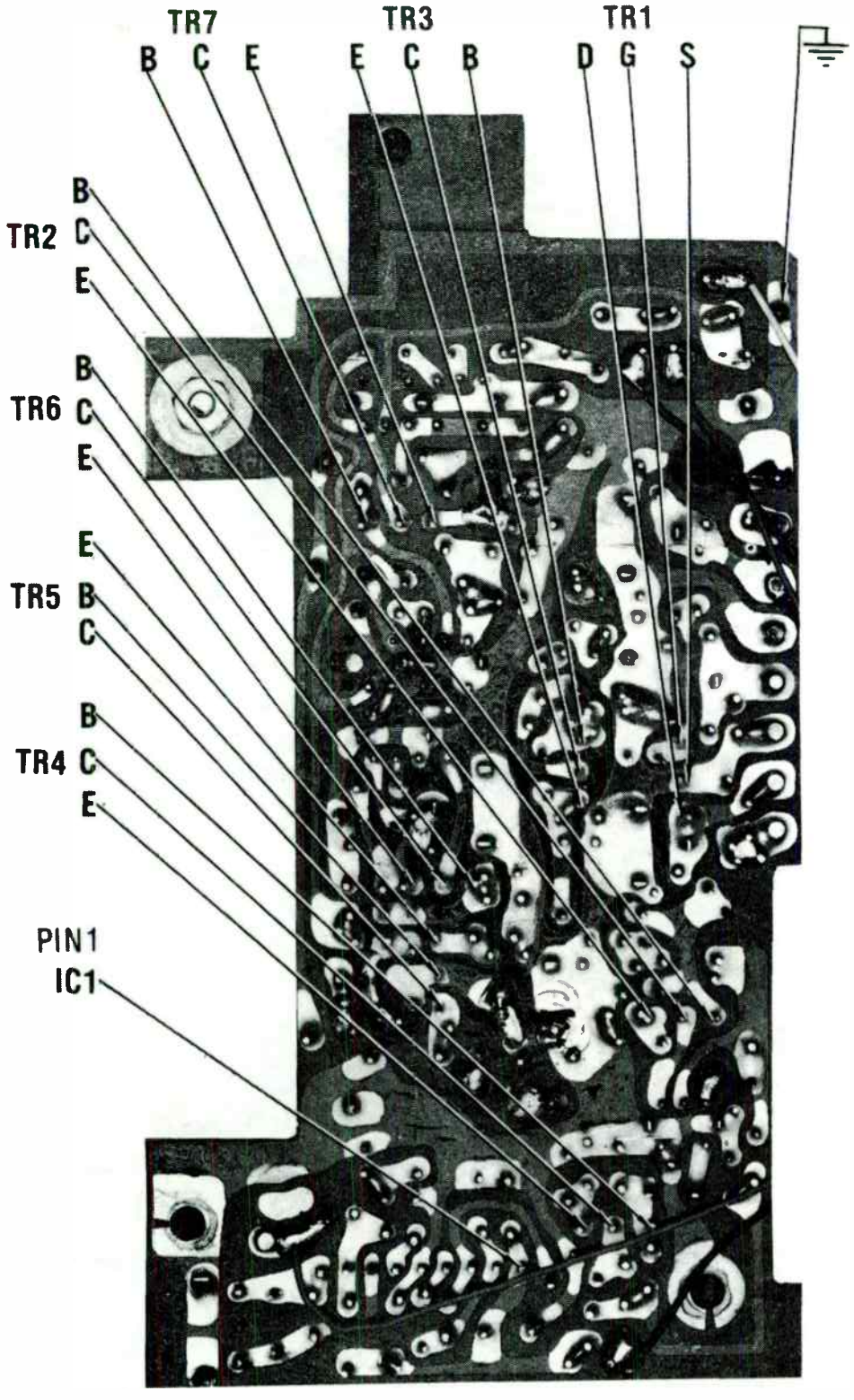
OVERALL-TOP



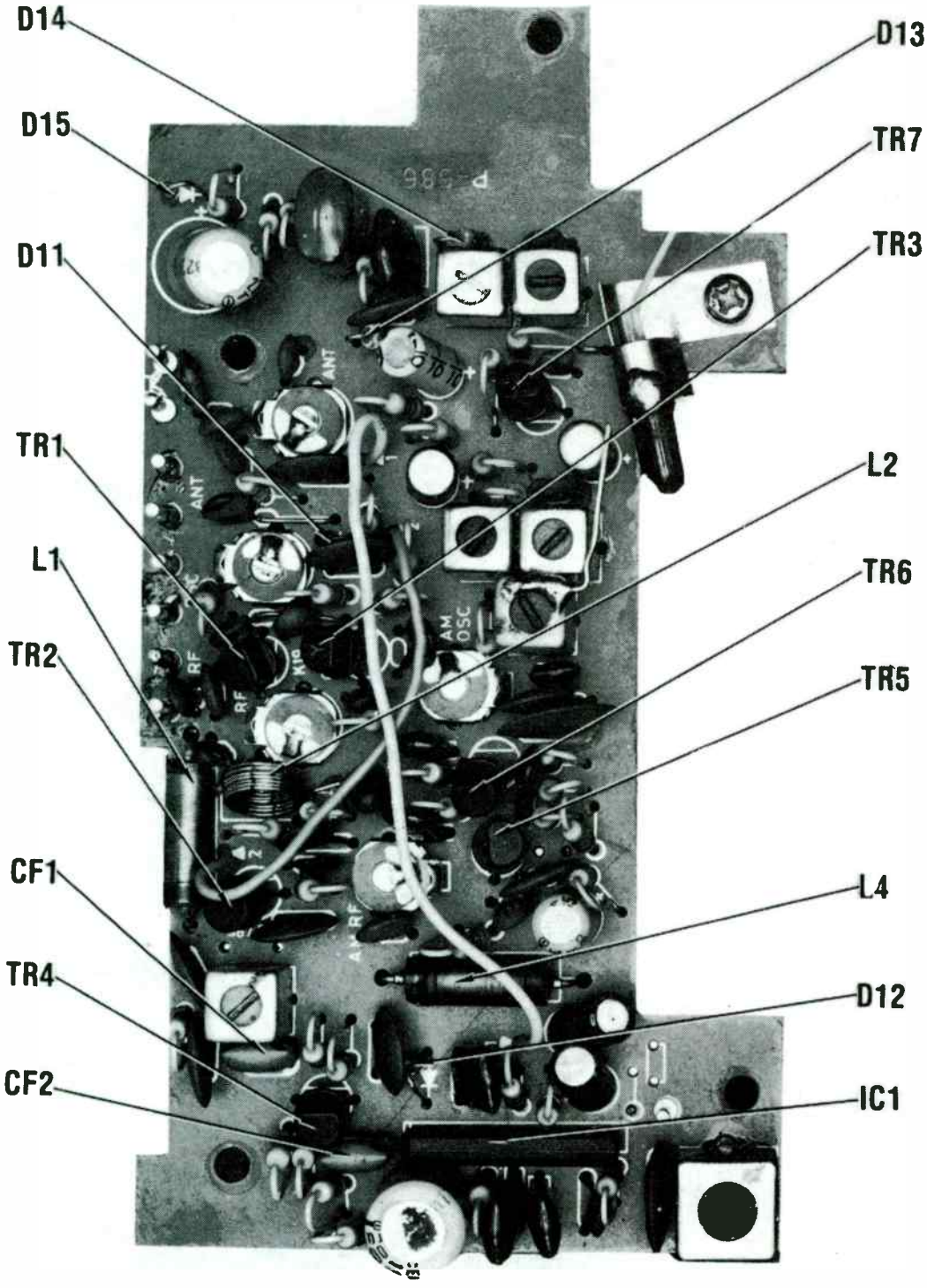
MAIN BOARD



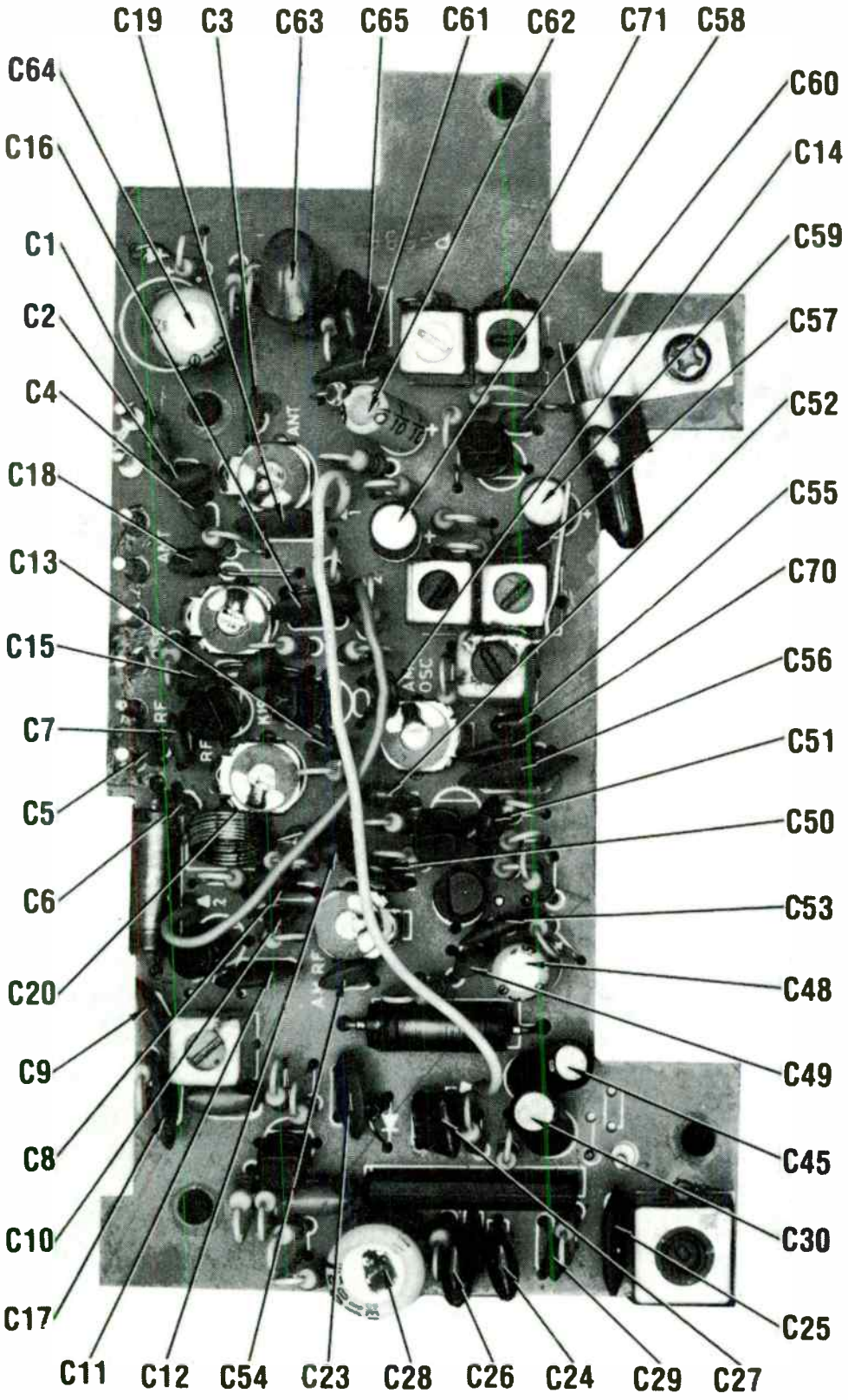
MAIN BOARD



MAIN BOARD

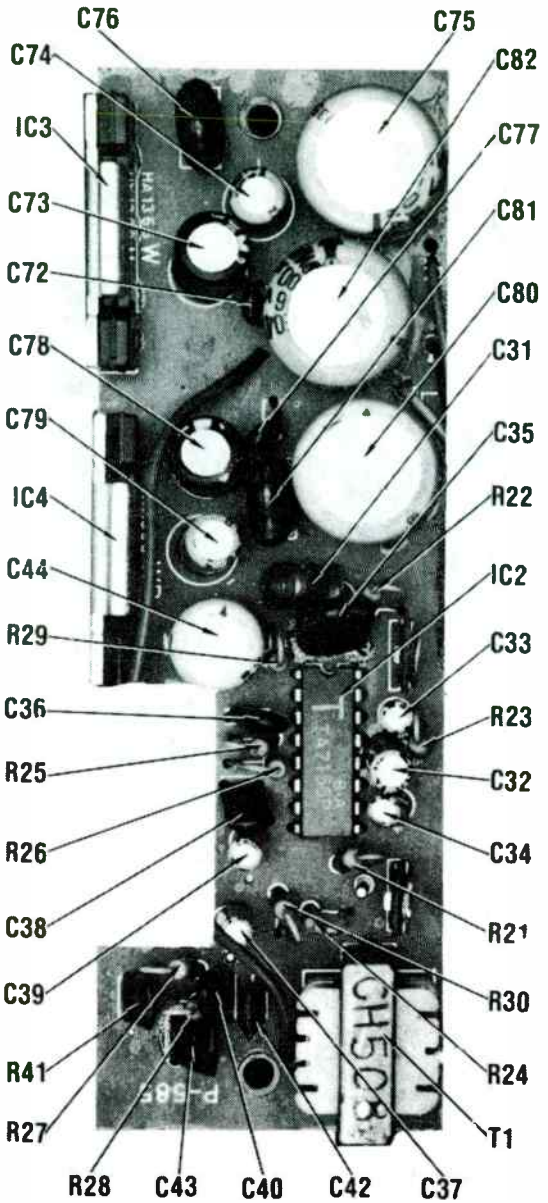


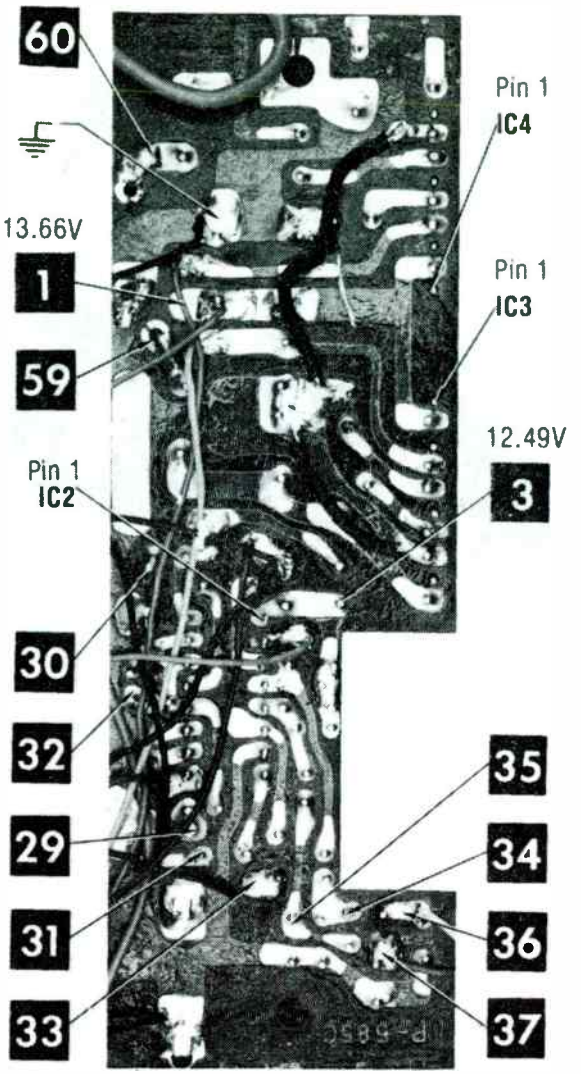
MAIN BOARD



MAIN BOARD

AUDIO BOARD





PARTS LIST AND DESCRIPTION

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements. Have your local distributor check Sams COUNTER FACTS for the most up-to-date replacement.

WIRING DATA

General-use Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in 12 Colors 8524 (Stranded) Available in 12 Colors
Shielded Antenna Lead	Use BELDEN No. 8240 (Solid) Miniature (RG-58/U) 8259 (Stranded) Miniature (RG-58A/U)
Shielded Cable	Use BELDEN No. 8499 Single-conductor Shielded (Neoprene)

SEMICONDUCTORS (Select replacement transistor for best results)

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.
D11	1S2236	103-176		PTC311	HEPR2501				ECG611			103-146
D12	0528.2U	103-177	GEZD-8.2	Z88.2A	HEPZ0411	REN 5072	SK3136	RT-257	ECG5072	TM5072/**	WEP1108	
D13	1N60	103-006	1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D14	1N60	103-006	1N60	PTC206	HEPR9135	REN 109	SK3088	RT-263	ECG109	TM109/**	WEP134	103-Z9001
D15	0528.2U	103-177	GEZD-8.2	Z88.2A	HEPZ0411	REN 5072	SK3136	RT-257	ECG5072	TM5072/**	WEP1108	
D16	SR-1K	103-088	GE-504A	PTC201	HEPR0052	REN 116	SK3311	RT-213	ECG116	TM116	WEP156	212-76-02
IC1	TA7321P	101-088										
IC2	TA7155P	101-089										
IC3	HA1366W	101-071					SK3744		ECG1260			
IC4	HA1366WR	101-121							ECG1261			
TR1	2SK19Y	102-163	GE-FET-2	PTC161	HEPF0021	REN 132	SK3448	RT-175	ECG312	TM312	WEP920	121-756
	2SK19	102-163	GE-FET-2	PTC161	HEPF0021	REN 132	SK3448	RT-175	ECG3J2	TM312	WEP920	121-756
TR2	2SC785R	102-100	GE-60*	PTC132*	HEPS0016*	REN 229*	SK3122	RT-187	ECG229*	TM229*	WEP535	121-Z9021
TR3	2SC394Y	102-058	GE-61*	PTC121*	HEPS0014*	REN 229*	SK3018*	RT-309	ECG229*	TM229*	WEP394	121-Z9021
TR4	2SC380Y	102-056	GE-61*	PTC136*	HEPS0016*	REN 107	SK3245	RT-107A	ECG107	TM107	WEP380	121-Z9001*
TR5	2SC380Y	102-056	GE-61*	PTC136*	HEPS0016*	REN 107	SK3245	RT-107A	ECG107	TM107	WEP380	121-Z9001*
TR6	2SC380Y	102-056	GE-61*	PTC136*	HEPS0016*	REN 107	SK3245	RT-107A	ECG107	TM107	WEP380	121-Z9001*
TR7	2SC380Y	102-056	GE-61*	PTC136*	HEPS0016*	REN 107	SK3245	RT-107A	ECG107	TM107	WEP380	121-Z9001*

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

ELECTROLYTIC CAPACITORS

ITEM No.	RATING	REPLACEMENT DATA				
		BOMAN PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
					Q-LINE	GENERAL LINE
C28	100 16V		PC100-16	VTT100F16	QV1-95	EV-1230
C30	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C32	.47 25V		PC1-50	VTTR47A63	QV1-3	EV-1610
C33	.22 25V	(1)		TDC224M050EL	QDT1-10	SD50-R229
C34	.22 25V	(1)		TDC224M050EL	QDT1-10	SD50-R229
C37	.22 25V	(1)		TDC224M050EL	QDT1-10	SD50-R229
C39	.22 25V	(1)		TDC224M050EL	QDT1-10	SD50-R229
C44	220 16V		PC250-25	VTT220H16	QV1-117	EV-1240
C45	2.2 50V		PC2-100	VTT2R2A50	QV1-19	EV-1517
C48	33 10V		PC30-25	VTT33B10	QV1-61	EV-1125
C58	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C59	10 16V		PC10-25	VTT10B25	QV1-41	EV-1222
C62	1 10V		PC1-50	VTT1A50	QV1-9	EV-1315
C64	220 10V		PC250-10	VTT220F10	QV1-115	EV-1140
C73	100 10V		PC100-10	VTT100E10	QV1-93	EV-1130
C74	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C75	470 16V		PC500-16	VTT470K16	QV1-151	EV-1250
C78	100 10V		PC100-10	VTT100E10	QV1-93	EV-1130
C79	47 10V		PC50-16	VTT47D16	QV1-73	EV-1226
C80	470 16V		PC500-16	VTT470K16	QV1-151	EV-1250
C82	1000 16V		PC1000-16	VTT1000L16	QV1-183	EV-1260
C83	100 16V		PC100-16	VTT100F16	QV1-95	EV-1230

(1) Tantalum used as a lytic.

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements. Have your local distributor check Sams COUNTER FACTS* for the most up-to-date replacement.

CAPACITORS

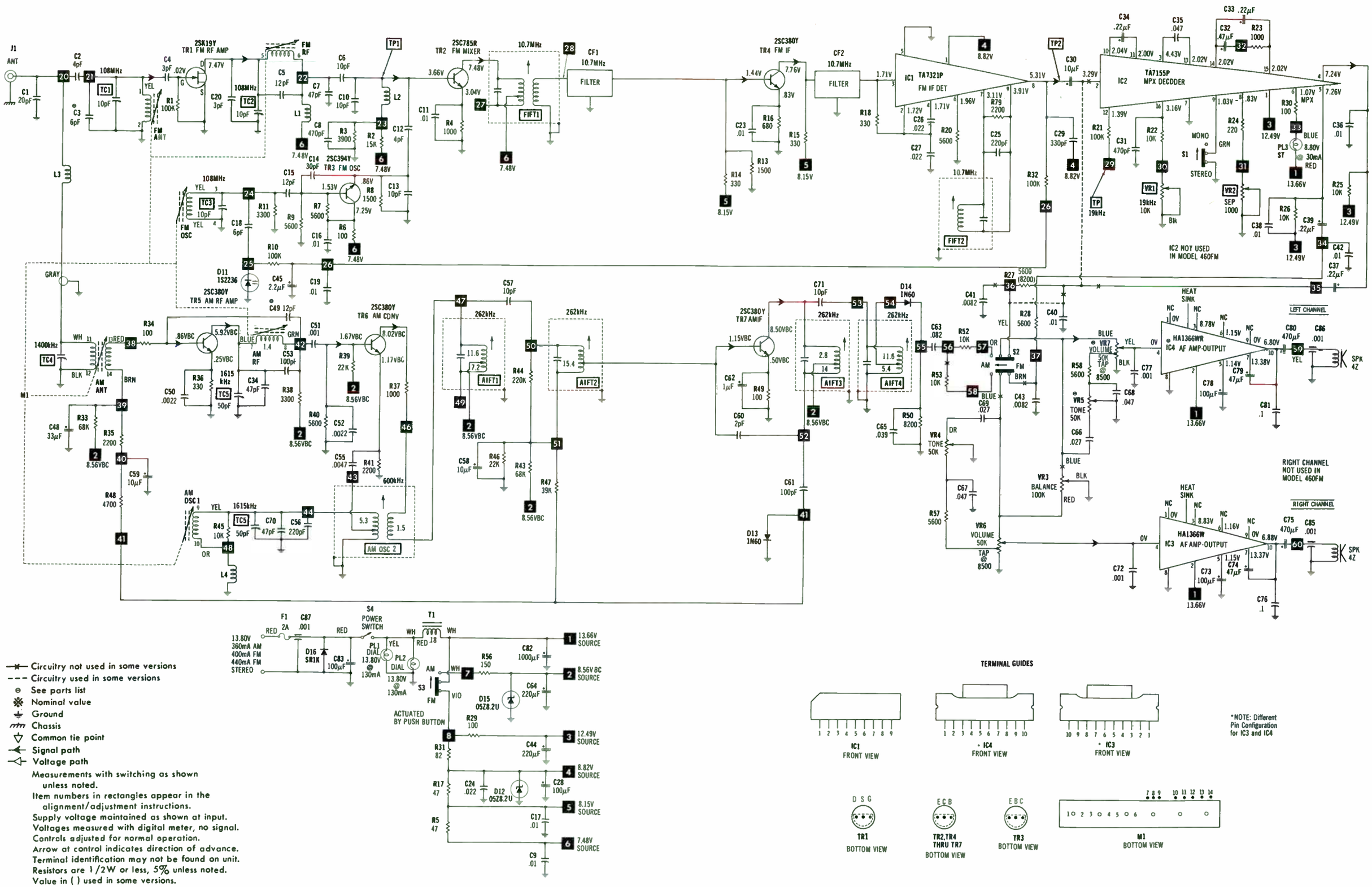
ITEM No.	RATING	BOMAN PART No.	REPLACEMENT DATA				
			CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
						Q-LINE	GENERAL LINE
C1	20			GP22	GP420	QC2-17	5GA-Q20
C2	4			GP5	GP550	QC2-1	5GA-V50
C3	6				GP568		5GA-V68
C4	3			GP5	GP535	QC2-1	5GA-V50
C5	12				GP412 *	QC2-11	5GA-Q12 10TCS-Q10
C6	10 N330						
C7	47			GP47	GP447	QC2-31	5GA-Q47
C8	470		DD-471	GP470	GP347		10TS-T47
C9	.01		UK16-103		MAG1611 *		HY-420 10TCS-Q10
C10	10 N330						
C11	.01		UK16-103		MAG1611 *		HY-420 10TCS-V47
C12	4 N330						
C13	10 N750		DTN-10	N10	CN7410		10TCU-Q10
C14	30 N750						
C15	12 N750				CN7412		10TCU-Q12
C16	.01		UK16-103		MAG1611		HY-420
C17	.01		UK16-103		MAG1611		HY-420
C18	6 N750				CN7568		10TCU-V68
C19	.01		UK16-103		MAG1611		HY-420
C20	3			GP5	GP533	QC2-1	5GA-Q50
C23	.01		UK16-103		MAG1611		HY-420
C24	.022			DPMS2S22	M192P2239R8	QFT2-127	1FT-S22
C25	220		DD-221		GP322		10TS-T22
C26	.022			DPMS2S22	M192P2239R8	QFT2-127	1FT-S22
C27	.022			DPMS2S22	M192P2239R8	QFT2-127	1FT-S22
C29	330		DD-331	GP330	GP333		10TS-T33
C31	470 10%			CD15FD471J03	SX347	QW1-42	MWA-471
C35	.047			DPMS2S47	EWF1A147	QFT2-171	1FT-S47
C36	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C38	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C40	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C41	.0082			WMF1D82	EWF1A282	QFT2-85	1FT-D82
C42	.01			WMF1S1	EWF1A110	QFT2-91	1FT-S10
C43	.0082			WMF1D82	EWF1A282	QFT2-85	1FT-D82
C49	12				GP412	QC2-11	5GA-Q12
C50	.0022			DPMS6D22	M192P2229R8	QFT2-27	1FT-D22
C51	.001			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C52	.0022			DPMS6D22	M192P2229R8	QFT2-27	1FT-D22
C53	100		DD-101	GP100	GP310		10TS-T10
C54	47			GP47	GP447	QC2-31	5GA-Q47
C55	.0047			WMF1D47	M192P4729R8	QFT2-63	1FT-D47
C56	220		DD-221		GP322		10TS-T22
C57	10			GP10	GP410	QC2-9	5GA-Q10
C60	2			GP5	GP533	QC2-1	5GA-V50
C61	100		DD-101	GP100	GP310		10TS-T10
C63	.082 50V 10%				M192P8239R8		192P8239R8
C65	.039			DPMS6S39	M192P3939R8	QFT2-159	1FT-S39
C66	.027			DPMS6S27	M192P2739R8	QFT2-139	1FT-S27
C67	.047			DPMS2S47	EWF1A147	QFT2-171	1FT-S47
C68	.047			DPMS2S47	EWF1A147	QFT2-171	1FT-S47
C69	.027			DPMS6S27	M192P2739R8	QFT2-139	1FT-S27
C70	47			GP47	GP447	QC2-31	5GA-Q47
C71	10			GP10	GP41D	QC2-9	5GA-Q10
C72	.001			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C76	.1			WMF05P1	EWF05010	QFT2-215	1FT-P10
C77	.001			DPMS6D1	EWF1A210	QFT2-1	1FT-D10
C81	.1			WMF05P1	EWF05010	QFT2-215	1FT-P10
C85	.001						
C86	.001						
C87	.001						
TC1	10pF						
TC2	10pF						
TC3	10pF						
TC4	100pF						
TC5	50pF						
TC6	50pF						

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS (All wattages 1/2 watt, or less, unless listed)

ITEM No.	FUNCTION	RESISTANCE	REPLACEMENT DATA			
			BOMAN PART No.	CENTRALAB PART No.	MALLORY PART No.	TRW PART No.
VR1	19kHz	10K				X260R103B
VR2	Separation	1000				X260R102B
VR3	Balance/1/2 Tuning Shaft	100K	139-100(19)			
VR4	Tone-Right	50K	138-172(18)			
VR5	Tone-Left	50K				
VR6	Volume-Right	50K Tap @ 8500				
VR7	Volume-Left	50K Tap @ 8500				
	Power Switch/Mono-Stereo Switch					

(18) Includes VR4, VR5, VR6, VR7, S1 and S4.
(19) Used in Model 660-MPX. Tuning Shaft with 1/2 Universal (Part Number 151-027) Used in Model 460-FM.



- 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.

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TERMINAL GUIDES

PARTS LIST AND DESCRIPTION (CONTINUED)

(When ordering parts, state Model, Part Number, and Description.)

Replacement parts shown may be superseded by the availability of newly introduced replacements. Have your local distributor check Sams COUNTER FACTS for the most up-to-date replacement.

COILS (RF-IF)

ITEM No.	FUNCTION	REPLACEMENT DATA			REMARKS
		BOMAN PART No.	OTHER IDENTIFICATION	MILLER PART No.	
A1FT-1	IF (262kHz)	131-622			(1) Part of M1 (Tuner).
A1FT-2	IF (262kHz)	131-623	8511		
A1FT-3	AM IF (262kHz)	131-624	8512		
A1FT-4	AM IF (262kHz)	131-625	8513		
F1FT-1	Mixer (10.7MHz)	131-620	F507		
F1FT-2	FM IF Detector	131-621	F510E842		
L1	RF Choke				
L2	RF Choke				
L3	RF Choke				
L4	RF Choke				
	AM Antenna	(1)			
	AM Oscillator	(1)			
OSC 2	AM Oscillator (600kHz)	131-627			
	FM Antenna	(1)			
	FM Oscillator	(1)			
	FM RF	(1)			

FUSE DEVICES

ITEM No.	DESCRIPTION	REPLACEMENT DATA						
		BOMAN PART No.		BUSS PART No.		LITTELFUSE PART No.		WORKMAN PART No.
		DEVICE	HOLDER	DEVICE	HOLDER	DEVICE	HOLDER	DEVICE
F1	2A Quick Acting			AGC2	HRK	312002	150145	FG2-2

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000~)	BOMAN PART No.	THORDARSON PART No.	TRIAD PART No.	
T1	.44A	.18	.65mH	124-049 CH-508(1)			(1) Number on unit.

MISCELLANEOUS

ITEM No.	PART NAME	BOMAN PART No.	NOTES
CF1	Filter	157-068(1)	10.7MHz
CF2	Filter	157-068(1)	10.7MHz
J1	Jack		Antenna
M1	Tuner		
PL1	Lamp	267-007	Dial (13.80V @ 130mA)
PL2	Lamp	267-007	Dial (13.80V @ 130mA)
PL3	Lamp		Stereo (8.80V @ 35mA)
S1	Switch		Mono/Stereo (Part of Volume Control)
S2	Switch		AM/FM
S3	Switch		AM/FM (Actuated by Pushbutton)
S4	Switch		On Power (Part of Volume Control)
	Cord		DC Power (With In Line Fuse)
	Printed Circuit Board		P-585C
	Printed Circuit Board		P-586D

(1) When replacing CF1 and CF2 should also be replaced.

CABINETS & CABINET PARTS (When ordering specify model, chassis & color)

ITEM	PART No.
Case, Bottom	
Case, Top	
Escutcheon Assembly	198-024

ITEM	PART No.
Knob, Balance	191-016
Knob, On/Off, Volume	191-015
Knob, Tone	191-016
Knob, Tuning	191-015

Pages 33-40 Courtesy of CRAIG CORP.

ALIGNMENT PROCEDURES

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

NOTE:
1) Signal Generator Output:
   - Modulation Frequency: 400 Hz
   - Modulation percentage: 30%
   - Signal level just high enough to provide Meter deflection.
2) Signal Application:
   - Antenna Receptacle thru a dummy ANT.
3) Output meter connection:
   - Across a speaker or a Dummy load (4 Ohm)
4) Setting of Radio Control:
   - Volume Control at Maximum
   - Tone Control at Treble
5) Power supply: 14V DC

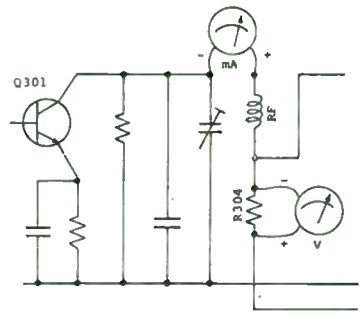


Fig. 1

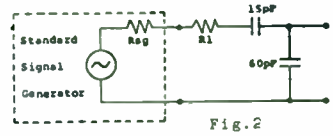


Fig.2

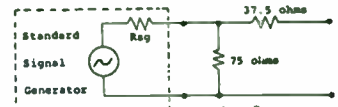


Fig.3

R1=80-Rsg (ohms)
Rsg: Internal Resistance of Signal Generator.

AM/COLLECTOR CURRENT

STEP	ADJUSTING CIRCUIT	CONNECTIONS INPUT	CONNECTIONS OUTPUT	FREQ'CY	DIAL SETTING	ADJUST	ADJUST FOR
1	AM/RF	Operate unit in AM mode. Do not connect Antenna. (see Fig.1)	Connect mA meter in series with collector of Q301 and Tuner Coil RF as shown in Fig.1			R310	A reading of 500±50uA at collector of Q301(2SC2210)

AM / IF

1	AM/IF	Connect AM Signal Generator thru dummy Antenna. (see Fig.2)	Connect VTVM to speaker outputs of either channel	455kHz	Low End	T302,T303 T304,T305	Maximum output
2				500 ± 5kHz	Low End	T301	
3				1690 ± 20kHz	High End	CT303	
4				1400kHz	1400kHz	CT301,CT302	

FM / IF

1	FM/IF	Connect FM Sweep Marker Generator to Antenna-Receptacle	Connect Oscillo-scope to TP1 and Ground.	10.7MHz		T201 T401	Max. amplitude & symmatrical Response curve 
2						T201	Symmatrical "N" Curve. 

NOTE: It is not necessary to tune the 10.7MHz marker to the center of "N" curve.

FM / RF

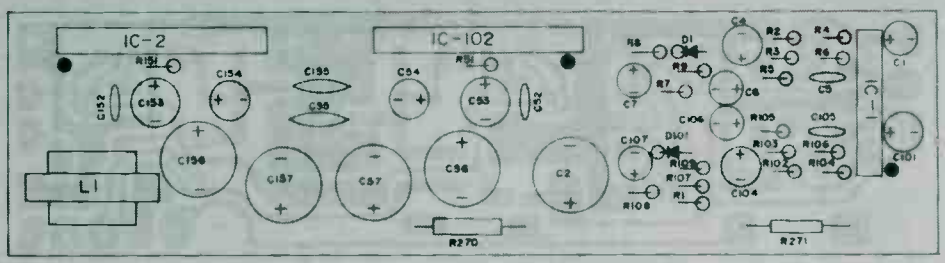
1	FM/RF	Connect FM Signal Generator thru dummy Antenna. (see Fig.3)	Connect VTVM across a speaker output.	86.7 ± 0.3MHz	Low End	OSC Trimmer: CT403	Maximum output
2				98MHz	98MHz	RF Trimmer: CT402 ANT. Trimmer: CT401	
3			Confirm overall tuning range to be from 109MHz thru 110 MHz.				

FM / MPX

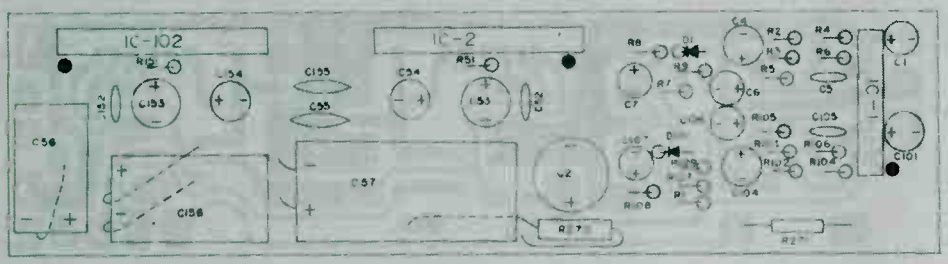
1	19kHz PILOT	NO SIGNAL	Connect Frequency counter to pin#12 of IC251 and ground	No signal	98MHz	R255	19.00kHz
2	SEPARATION	Connect FM Stereo Signal Generator to Antenna Receptacle thru dummy Antenna.	Connect VTVM to Audio output of left Channel.		98MHz	R268	MINIMUM output on VTVM

NOTE: *Modulated only by pilot signal at 10% modulation and stereo signal at 30% modulation.
*MPX switch at stereo position.
*FM signal : 60dB modulated as described above.

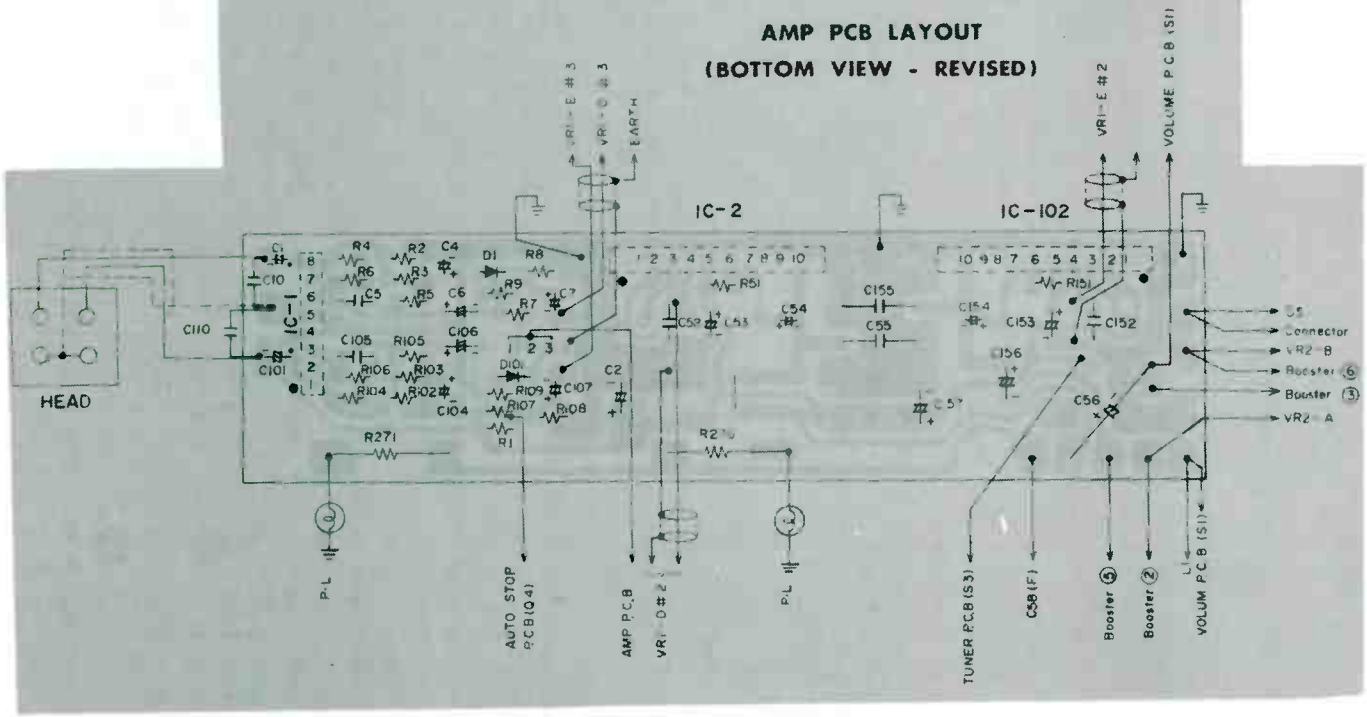
AMP PCB LAYOUT (TOP VIEW)



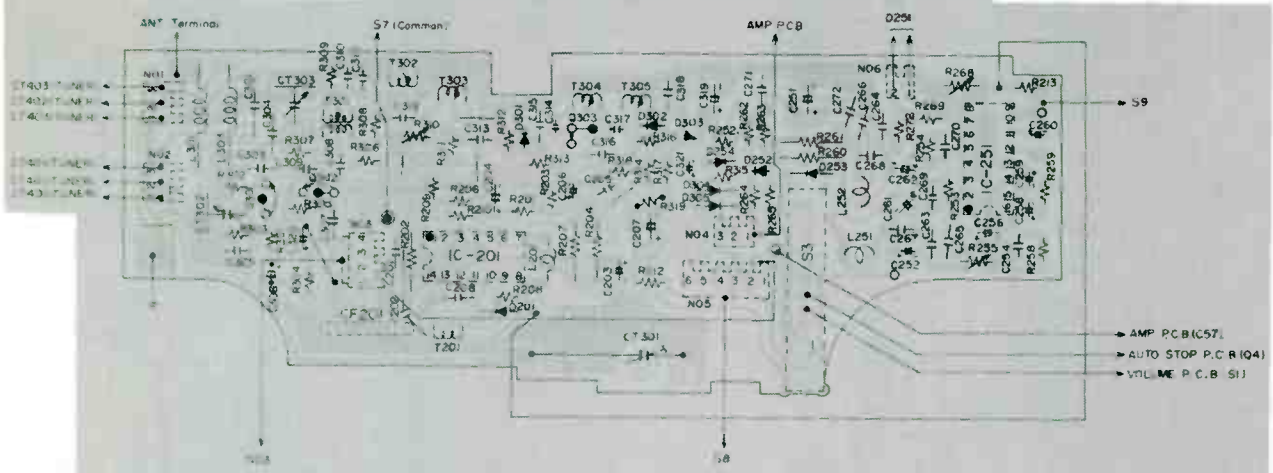
AMP PCB LAYOUT (TOP VIEW - REVISED)



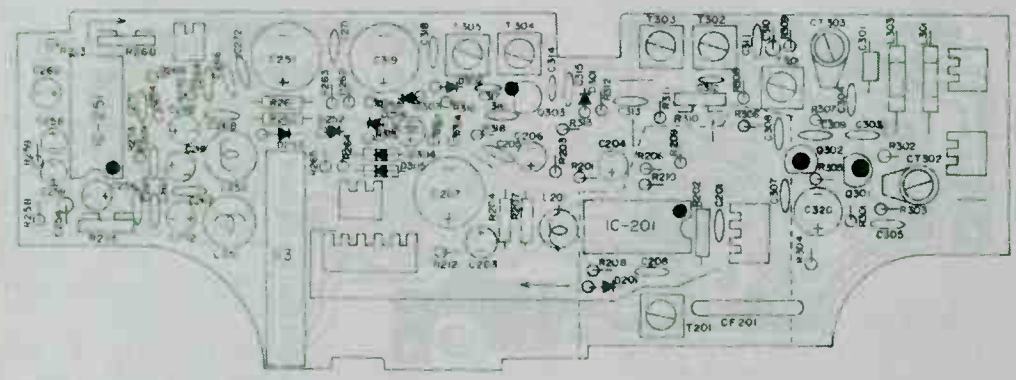
AMP PCB LAYOUT (BOTTOM VIEW - REVISED)



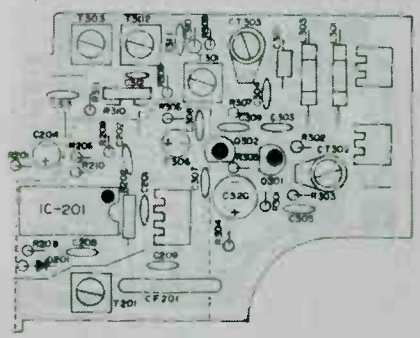
IF/MPX PCB LAYOUT (BOTTOM VIEW - REVISED)



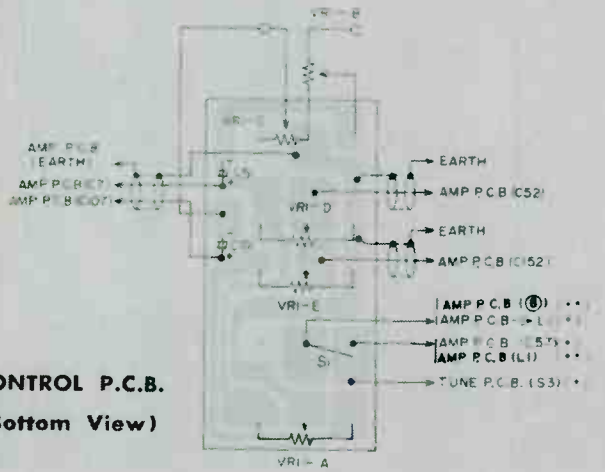
IF/MPX PCB LAYOUT (TOP VIEW - REVISED)



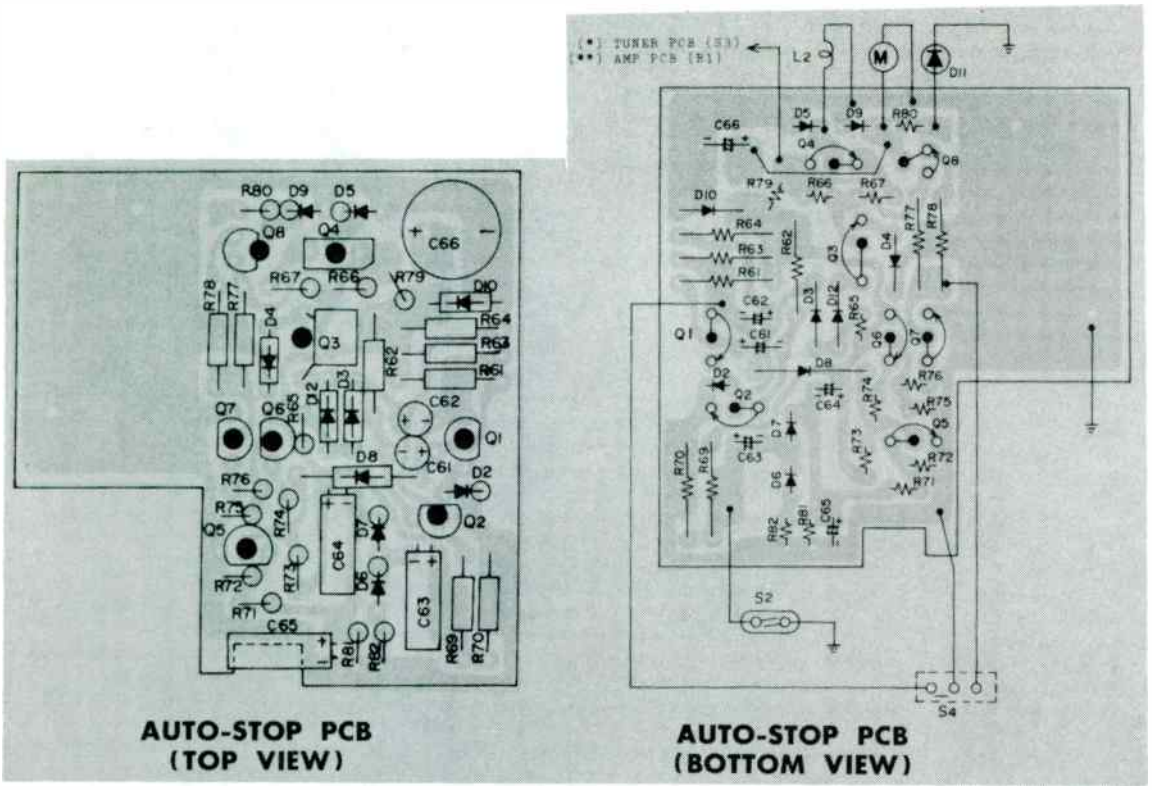
THE DIFFERENT PORTION OF IF/MPX PCB (TOP VIEW - EARLY)



CONTROL P.C.B. (Bottom View)



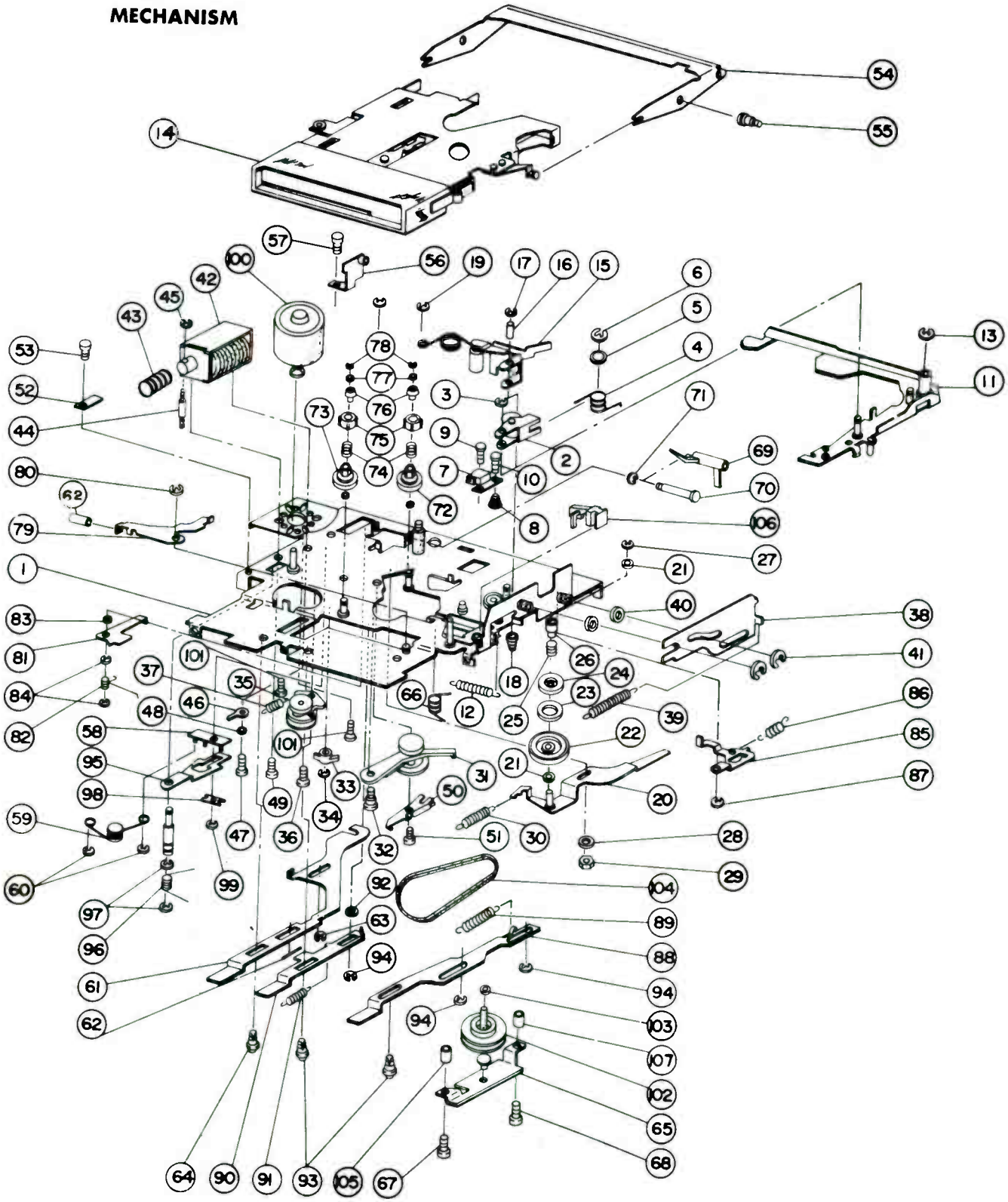
CAUTION: (•): LATE PRODUCTION ONLY
(••): EARLY PRODUCTION ONLY



MECHANISM

1	NSP	Ass'y, Main Chassis	++++	51	-------	Screw, BH M2.6x3	.25
2	T631258	Ass'y, Pinch Roller	3.30	52	T631526	Printed Circuit Board	.35
3	-------	E-Ring, M2	.25	53	-------	Screw, Tap BH M2.6x4	.25
4	T631270	Spring, Pinch Roller	.30	54	T631347	Arm, Cass. Housing	2.50
5	-------	Thrust washer, M4x0.25	.25	55	T631232	Sleeve, Cass. Housing Arm	.60
6	-------	E-Ring, M3	.25	56	T631402	Bkt, Cass. Housing Arm Mtg	1.30
7	T631503	HEAD	10.25	57	-------	Screw, PH M3x4	.25
8	T631271	Spring, Head Azimuth	.25	58	T631355	Lever, Auto-Repeat	1.80
9	-------	Scr, PH M2x3	.25	59	T631277	Spring, Lever Return	.25
10	-------	Scr, PH M2x5	.25	60	-------	E-Ring, M2	.25
11	T631342	Ass'y, Head Lever	5.20	61	T631348	Lever, Rewind	1.00
12	T631285	Spring, Head Lever Return	.25	62	T631225	Pin, M2Øx10	.25
13	-------	E-Ring, M3	.25	63	-------	E-Ring, M3	.25
14	T631321	Ass'y, Cass. Case	6.20	64	T631218	Special Screw	.25
	T631041	Cassette Lid	.95	65	T631404	Bkt, Flywheel	1.10
	T631214	Shaft, Cass. Lid	.25	66	T631278	Spring, F.FD Idler Tension	.25
	T631272	Spring, Cass. Lid	.25	67	-------	Scr, BH M3x4	.25
15	T631343	Ass'y, Push-Out Lever	2.05	68	-------	Scr, BH M3x6	.25
	T631284	Spring, Push-Out	.25	69	T631349	Lever, Plastic	.50
16	T631215	Shaft, Push-Out	.70	70	T631228	Shaft, Plastic Lever	.30
17	-------	E-Ring	.25	71	-------	E-Ring, M1.5	.25
18	T631216	Shaft, Head Lever	.25	72	T631311	Ass'y, Rewind Reel	1.60
19	-------	E-Ring, M2	.25	73	T631312	Reel, Take Up	.35
20	T631344	Lever, Clutch	1.60	74	T631279	Spring, Tension	.25
21	-------	Thrust washer, M1.5x0.25	.25	75	T631313	Reel Guide	.30
22	T631260	Idler (A)	.40	76	T631241	Cap, Reel Guide	.25
23	T631430	Cushion, Idler	.25	77	-------	Thrust washer, M1.5x0.25	.25
24	T631261	Idler (B)	.40	78	-------	E-Ring, M1.2	.25
25	T631273	Spring, Tension	.25	79	T631350	Lever, EJECT	.40
26	T631262	Reel, Clutch	.50	80	-------	E-Ring, M2	.25
27	-------	E-Ring, M1.2	.25	81	T631356	Lever, Latch	.30
28	-------	Flat washer, M3.3x10x1	.25	82	T631287	Spring	.25
29	-------	Nut, HH M3	.25	83	-------	Thrust washer, M3x0.13	.25
30	T631274	Spring, Clutch	.25	84	-------	E-Ring, M2	.25
31	T631263	Ass'y, Idler F.FD	4.30	85	T631351	Lever, Latch	.40
32	T631217	Special Screw	.25	86	T631280	Spring, Lever Return	.25
33	T631345	Lever, F.FD & REW	.25	87	-------	E-Ring, M4	.25
34	-------	E-Ring, M2	.25	88	T631352	Lever, EJECT	.75
35	T631264	Ass'y, Idler REWIND	3.85	89	T631281	Spring, Lever Return	.25
36	T631217	Special Screw	.25	90	T631353	Lever, F.FD	.50
37	T631286	Spring, Idler REWIND	.25	91	T631282	Spring, Lever Return	.25
38	T631346	Ass'y, Slide Plate	1.50	92	-------	Thrust washer, M4x0.13	.25
39	T631275	Spr, Slide Plate return	.25	93	T631220	Special Screw	.25
40	-------	Thrust washer, M5x0.25	.25	94	-------	E-Ring, M3	.25
41	-------	E-Ring, M4	.25	95	T631354	Lever, Solenoid	.45
42	T631598	SOLENOID w/ Shaft	5.80	96	T631283	Spring, Lever Return	.25
43	T631276	Spr, Solenoid shaft Return	.25	97	-------	E-Ring, M3	.25
44	T631219	Shaft, Auto-Repeat	.50	98	T631403	Bkt, Auto-Repeat Lever	.25
45	-------	E-Ring, M2	.25	99	-------	E-Ring, M2	.25
46	NSP	Lug	++++	100	T631500	MOTOR	14.50
47	-------	Scr, BH M3x4	.25	101	-------	Scr, PH M2.6x3	.25
48	-------	Flat washer, M3	.25	102	T631205	FLYWHEEL	3.50
49	-------	Scr, FH M3x4	.25	103	-------	Thrust washer, M2Øx0.13	.25
50	T631534	Ass'y, Lead Switch	3.75	104	T631208	BELT	1.25
	T631382	Holder, Lead Sw. Mtg	.35	105	T631431	Spacer	.30
107	T631247	Spacer, Rubber	.30	106	T631420	Guide, Head Lever	.25

MECHANISM



MISCELLANEOUS ELECTRICAL

REF NO.	CRAIG KEY NO.	DESCRIPTION	RET. PRICE	REF. NO.	CRAIG KEY NO.	DESCRIPTION	RET. PRICE
S1	T605571	Power Switch (see VOL. Cont.)	9.85		T631620	2P Plug, IF/RF PCB Conn.	.25
S2	T631534	Lead Sw. (Ref#50 Mechanism)	3.75		T631621	3P Plug, IF/RF PCB Conn.	.25
S3	T631532	Slide Sw., TAPE/RADIO	1.20		T631622	4P Plug, IF/RF PCB Conn.	.30
S4	T631530	Push Sw., REPEAT	2.20		T631624	6P Plug, IF/RF PCB Conn.	.40
S5	T631531	Push Sw., MATRIX	2.10		T631608	2P Socket, IF/RF PCB Conn.	.25
S7,9	T631530	Push Sw., LO/DX MO/ST	2.30		T631609	3P Socket, IF/RF PCB Conn.	.25
S8	T631533	Push Sw., AM/FM	2.30		T631610	4P Socket, IF/RF PCB Conn.	.30
VR1	T605571	Var Res, BAL/VOL/TONE	9.85		T631612	6P Socket, IF/RF PCB Conn.	.40
VR2	T605570	Var Res, FADER 80 Ohm x 2	7.85	PL	T605550	Pilot Lamp, 5V 60mA	1.50
C58	T605601	Ass'y, 6P Feed Thru Cap.	2.05	PL	T605551	Pilot Lamp, 5V 60mA	1.50
	.3149052	9P Female Conn. (Car side)	2.00		3510076	Socket, ANTENNA Receptacle	1.50

CHOKES, COILS, TRIMMERS & TRANSFORMERS

L302	T605670	Choke Coil, 5uH	.50	T401	T605644	IFT (Ref.#45 Cabinet)	1.30
L1	T631674	Choke Coil	1.60	T301	T605675	OSC Coil	1.25
L251,252	T605671	Choke Coil	.85	CT301	T605673	Trimmer	1.60
L301,303	T605672	Choke Coil, 6uH	.45	CT302,303	T605674	Trimmer, 50pF	1.30
L201	T631676	Choke Coil, 18uH	.65	R255	T631671	Semi-Var Res, 5k Ohm	.60
T201	T631641	IF Transformer	1.15	R268	T631672	Semi-Var Res, 1k Ohm	.60
T302,304	T605641	IF Transformer	1.10	R310	T605645	Semi-Var Res, 200k Ohm	.60
T303	T605642	IF Transformer	1.10	CF201	T605676	Ceramic filter	3.30
T305	T605643	IF Transformer	1.10				

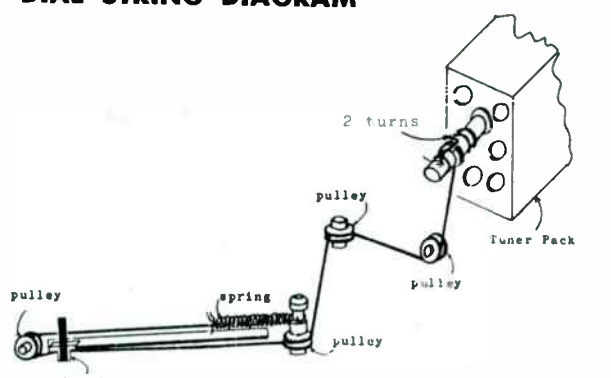
SEMICONDUCTORS

D11	SLP241	L.E.D	2.10	D251	SLP114	L.E.D	1.50
IC1	M51521L	I.C.	3.60	IC201	M51172PA	I.C.	5.80
IC2	HA1366	I.C.	5.80	IC251	LA3350	I.C.	6.80
IC102	HA1366R	I.C.	5.80	Q301	2SC2210	Transistor	1.00
D1,101	1S1588	Diode	1.00	Q302,303	2SC711	Transistor	.90
Q1,2,5,7	2SC1740	Transistor	.80	D301	1S188	Diode	.60
Q4	2SA634	Transistor	.40	D201,252			
Q6	2SA826	Transistor	.70	253,302			
Q8	2SA934	Transistor	1.80	304,305	1S1588	Diode	1.00
D2,3,4,6				D254,303	WZ081	Zener Diode	1.35
7,8,9,12	1S1588	Diode	1.00	D10	WZ058	Zener Diode	2.30
D5	SM102	Diode	.70	Q3	2SC1317	Transistor	1.80

CAPACITORS

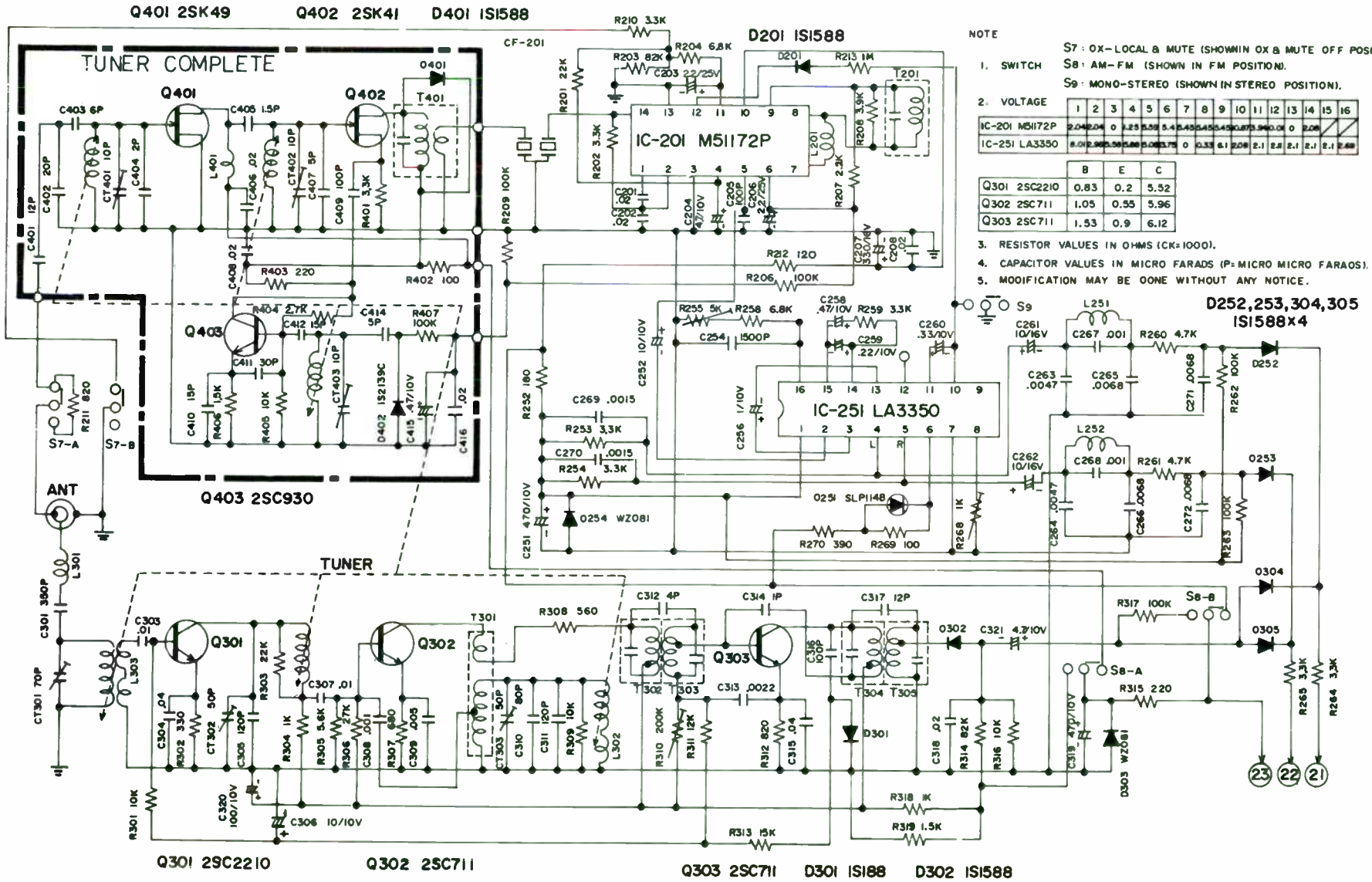
C10,110	Mylar, 0.0022uF, +30-20% /.50V	C313	Mylar, 0.0022uF, +30-20% /50V
C5,105,52,152	" 0.01uF +30-20% / 50V	C318,201,202,208	" 0.022uF, +30-20% /50V
C55,155	" 0.1uF " "	C269,270	" 0.0015uF " "
C1,101	Electrolytic, 4.7uF/10V	C263,264,309	" 0.005uF " "
C2	" 470uF/16V	C267,268,308	" 0.001uF " "
C4,104	" 17uF/6.3V	C265,266	" 0.0068uF " "
C6,106,7,107	" 10uF/16V	C271,272,303,307	" 0.01uF " "
C53,153	" 100uF/6.3V	C304,315	" 0.04uF " "
C4,154	" 47uF/10V	C205,316	Ceramic, 100pF, ±10% /50V
C56,156	" 1000uF/10V	C305,311	" 120pF " "
C57	" 2200uF/10V	C314	" 1pF " "
C312	Ceramic, 5pF, ±10% / 50V	C317	" 20pF " "
C254	Styrol, 1500pF, ±10% / 50V	C260	Electrolytic, 0.33uF /10V
C301	" 350pF " "	C261,262	" 10uF/16V
C310	" 80pF, ±5% / 50V	C320	" 100uF/10V
C203,206	Electrolytic, 2.2uF / 25V	C251,319	" 470uF/10V
C204,321	" 4.7uF / 10V	C256	" 1uF/10V
C207	" 330uF / 16V	C63,64,65	" 47uF/10V
C252,306	" 10uF / 10V	C61,62	" 10uF/10V
C258	" 0.47uF / 10V	C66	" 470uF/16V
C259	" 0.22uF / 10V	C51,151	" 0.2uF/10V

DIAL STRING DIAGRAM



Note: - Dial pointer at FM 88 MHz
- Tune the Tuner fully counterclockwise.

SCHEMATIC DIAGRAM - TUNER SECTION



NOTE

1. SWITCH — S7 : OX–LOCAL & MUTE (SHOWNIN OX & MUTE OFF POSITION).
S8 : AM–FM (SHOWN IN FM POSITION).
S9 : MONO-STEREO (SHOWN IN STEREO POSITION).

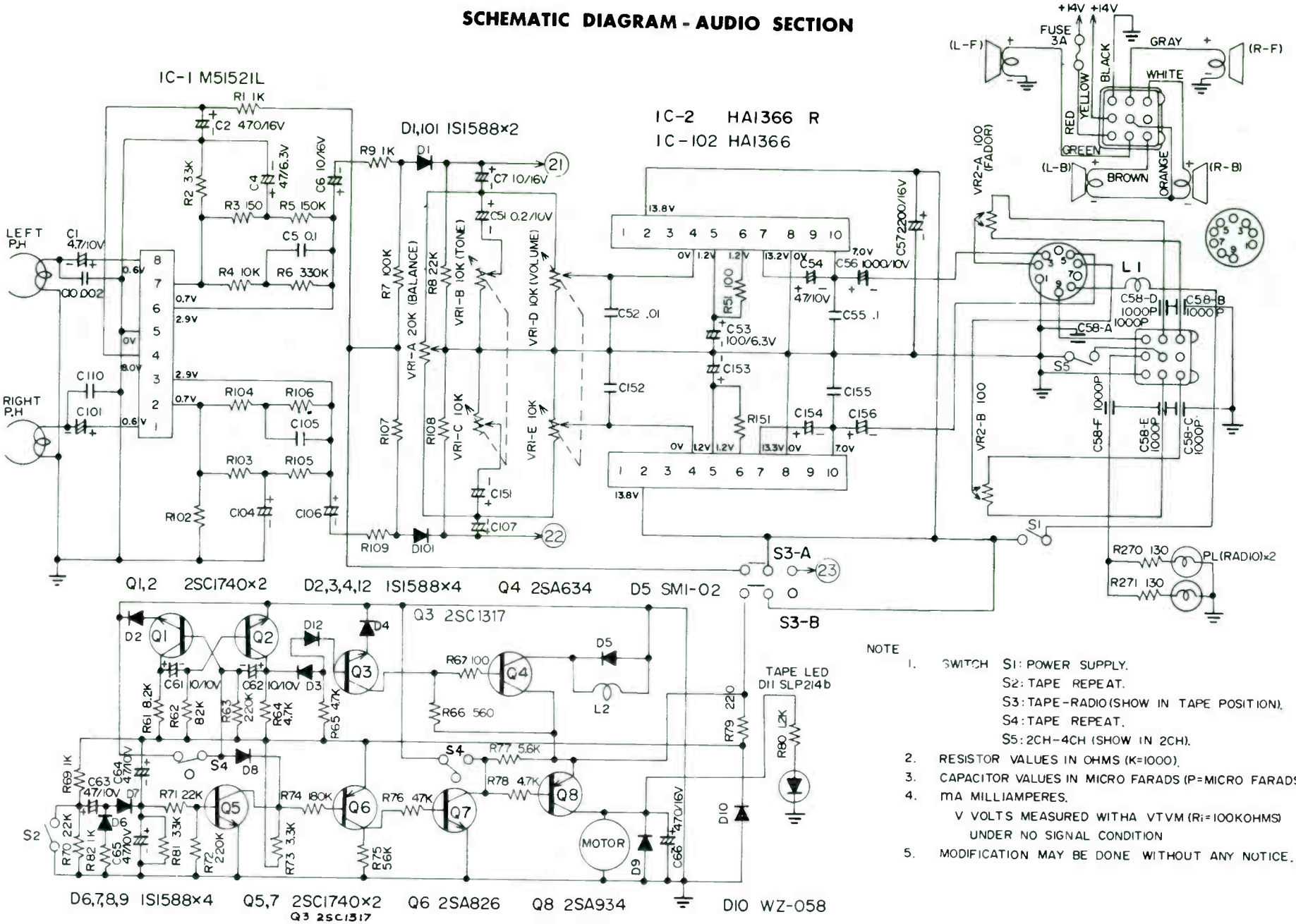
2. VOLTAGE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IC-201 M51172P	2.04	2.04	0	2.25	5.59	5.4	5.45	5.45	5.45	5.45	0.87	3.94	0.04	0	2.06	
IC-251 LA3350	8.01	2.98	5.36	5.68	5.08	3.75	0	0.33	6.1	2.08	2.1	2.8	2.1	2.1	2.1	2.68

	B	E	C
Q301 2SC2210	0.83	0.2	5.52
Q302 2SC711	1.05	0.55	5.96
Q303 2SC711	1.53	0.9	6.12

3. RESISTOR VALUES IN OHMS (CK=1000).
4. CAPACITOR VALUES IN MICRO FARADS (P= MICRO MICRO FARAOS).
5. MODIFICATION MAY BE DONE WITHOUT ANY NOTICE.

SCHEMATIC DIAGRAM - AUDIO SECTION



NOTE

1. SWITCH S1: POWER SUPPLY.
   S2: TAPE REPEAT.
   S3: TAPE-RADIO (SHOW IN TAPE POSITION).
   S4: TAPE REPEAT.
   S5: 2CH-4CH (SHOW IN 2CH).
2. RESISTOR VALUES IN OHMS (K=1000).
3. CAPACITOR VALUES IN MICRO FARADS (P=MICRO FARADS).
4. mA MILLIAMPERES.
   V VOLTS MEASURED WITHA VTVM (Ri=100KOHMS) UNDER NO SIGNAL CONDITION
5. MODIFICATION MAY BE DONE WITHOUT ANY NOTICE.

Ford D8AF19A171AB,D8EF19A171AB, D8TF19A171AA,D8VF19A171AA, D9AF19A171AA,D9VF19A171AA

ALIGNMENT INFORMATION

FM ALIGNMENT
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

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 Varactor Supply 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 acceptable limits.
Use a VTVM with an input impedance of 1 megohm or greater for voltage measurements.
A wiring harness as shown in Figure 6-10 can be used when performing FM alignment.

PRELIMINARY INFORMATION

1. Connect RF signal generator through dummy antenna to antenna input jack J101. (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 J201 or P401 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
L207	88MHz	L207
C226	108MHz	C226
C203, C208	104MHz	Only the capacitor or capacitors replaced
L201, L204	92MHz	Only the coil or coils replaced
TD203	108MHz 88MHz	C226 L207
TD201 TD202	104MHz 92MHz	The associated capacitor (C203 or C208) The associated coil (L201 or L204)
T202 FM detector transformer	Follow procedure as explained in step 10 of COMPLETE FM ALIGNMENT PROCEDURE.	

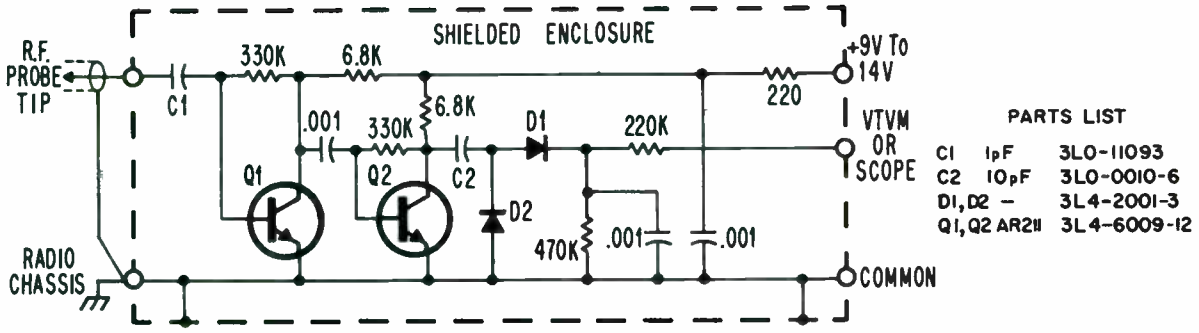


DIAGRAM A. RF DETECTOR PROBE SCHEMATIC

COMPLETE FM ALIGNMENT PROCEDURE

STEP	PROCEDURE
1	Connect VTVM or scope to test point J201 or P401 for indication of FM audio output.
2	Connect RF voltmeter or RF detector to input (pin 1) of IC201 (junction of F202 and R221. (If RF voltmeter is not available, use detector probe suggested in Diagram A.) See Note:
3	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.
4	Set generator to 108 MHz and adjust C226 for max. output.
5	Set generator to 104 MHz and adjust antenna trimmer C203, and RF trimmer C208 for max. output on scope or meter. Adjust generator output as needed to prevent limiting in IC201.
6	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.
7	Set generator to 88 MHz and adjust L207 for max. output.
8	Set generator to 92 MHz and adjust antenna coil L201, and RF coil L204 for max. output on scope or meter.
9	Repeat steps 4,5,7 & 8. 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 4 through 8 until output is within the limit.
10	Align FM detector at 98 MHz as follows: a. Ground AFC line at junction of R231, R232, C229, and R224. b. Adjust generator frequency for max. output at pin 1 of IC201. c. Set generator to 75 KHz deviation, 400 Hz 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. g. Adjust T201 for max. output on scope or meter.

Note: This terminal will become accessible when the shield over F202 is bent slightly away from the IC toward R217.

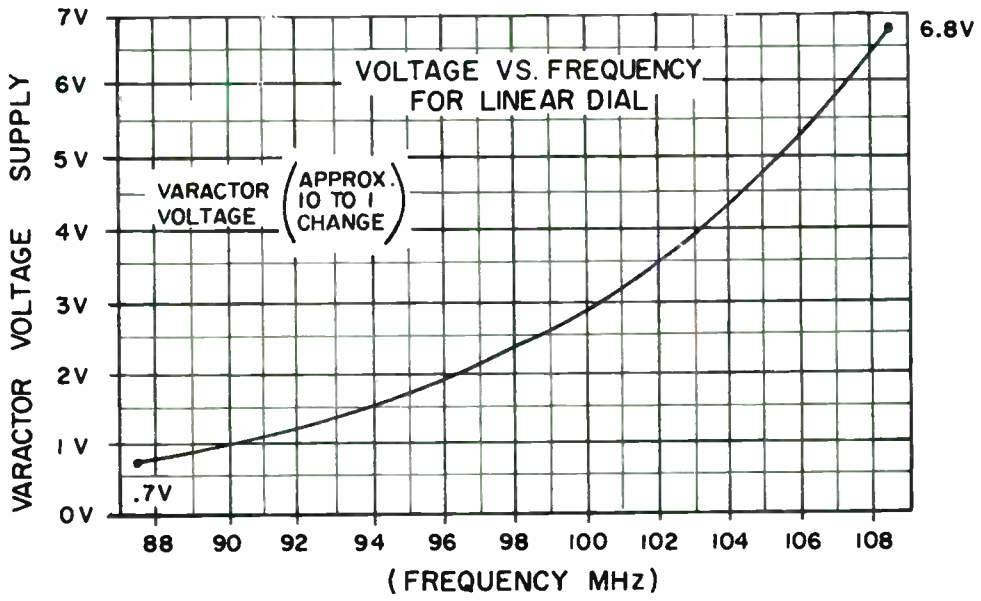


DIAGRAM B. FM VOLTAGE TUNING CHART

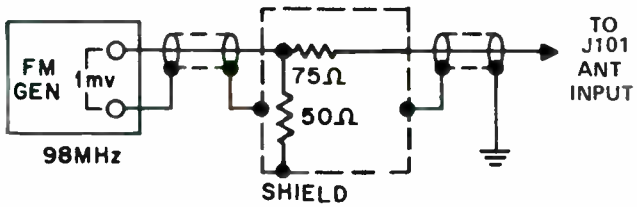


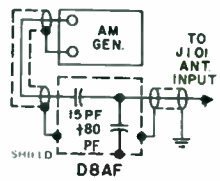
DIAGRAM C. FM DUMMY ANTENNA

AM ALIGNMENT
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF D8VF, D9AF AND D9VF

PRELIMINARY INFORMATION

1. Disassemble radia as required. (See Disassembly Instructions.)
2. Connect +14 VDC output from power supply ta A+ cable lead, and negative lead af power supply ta chassis ground.
3. Cannect VTVM ar scope to AM audia output on AM panel.
4. Cannect AM signal generatar as directed in AM ALIGNMENT PROCEDURE.
5. Set AM-FM mode switch far AM operation.

AM ALIGNMENT PROCEDURE

STEP	SPECIAL INSTRUCTIONS	SIGNAL GENERATOR		RECEIVER	
		CONNECTION TO RECEIVER	DIAL SETTING	DIAL SETTING	ADJUST
1	Follaw preliminary instructions.	Ta Q102 base (converter) thru .1 MF capacitor.	262.5 KHz	1000 KHz	T102 (black care) far max.
2	Same as step 1.	Same as step 1.	262.5 KHz	1000 KHz	T102 (blue care) for max.
3	Same as step 1.	Same as step 1.	262.5 KHz	1000 KHz	T101 (black care) far max.
4	Same as step 1.	Same as step 1.	262.5 KHz	1000 KHz	T101 (red care) far max.
5	Re-assemble radia with exceptian af caver. Connect +14 VDC ta A+ cable lead af radia. Connect a 3.2 ohm laad resistar acrass the output socket P2. Connect VTVM ar scape across load resistar. Set val. cantral ta max. and adjust generatar output far 1.8V RMS acrass load resistar.	Thru dummy antenna (Diagram D) ta antenna input.  D8AF †48pf D8EF 73.5pf D8TF 187pf D8VF 187pf D9VF 108.5pf D9AF DIAGRAM D. AM DUMMY ANTENNA	1610 KHz	1610 KHz	1. C109 (OSC.) max. 2. C105 (RF) max. 3. C101 (ANT.) max. (Repeat)
6	Install completely assembled radio in car with antenna fully extended. Tune in a weak station above 1400 KHz and readjust antenna trimmer C101 far maximum valume.				

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 abave.				
5	Remove bezel and sub dial. Ratate screw port of all three AM cares caunterclackwise as much as possible. Then follow step 5 abave except da not re-assemble bezel and sub dial.**	Thru dummy antenna ta antenna input. (Refer to Diagram D far dummy antenna.)	1610 KHz	1610 KHz	1. C109 (OSC.) max. 2. C105 (RF) max. 3. C101 (ANT.) max. (Repeat)

**CAUTION: Avoid scratching sub dial on removal. (See disassembly instructions.)

AM ALIGNMENT PROCEDURE (Cont'd)

STEP	SPECIAL INSTRUCTIONS	SIGNAL GENERATOR		RECEIVER	
		CONNECTION TO RECEIVER	DIAL SETTING	DIAL SETTING	ADJUST
6	Tune coils by adjusting screw part of each core.	Same as step 5.	1000 KHz	1000 KHz	1. L105 (OSC.) max. 2. L103 (RF) max. 3. L102 (ANT.) max. (Repeat)
7	Repeat adjustments in steps 5 and 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-assemble sub dial, bezel, and cover.				
9	Install completely assembled radio in car with antenna fully extended. Tune in a weak station above 1400 KHz and readjust antenna trimmer C101 for maximum volume.				

VARACTOR POWER SUPPLY ALIGNMENT
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

SERVICE NOTES

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

The FM voltage tuning chart in Diagram B can be used as a visual aid to determine whether complete alignment is required.

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 J203 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 0.68 to 0.72 VDC.

COMPLETE VARACTOR ALIGNMENT PROCEDURE
(For models with variable resistor VR401)

STEP	PROCEDURE
1	Disassemble radio as required. (See Disassembly Instructions.)
2	Rotate core of L104 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 VR401 for 6.8 ± 0.05 VDC on VTVM at P403.
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 L104 for 1.5 ± 0.05 VDC on VTVM at P403.
5	Repeat steps 3 and 4 until desired voltages are obtained. End alignment with adjustment of VR401 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 for 0.7 ± 0.02 VDC on VTVM at P403. If voltage is not correct, proceed with step 7A or 7B.
7A	If voltage at low end is greater than 0.72 VDC, adjust L104 at 94 MHz for a voltage slightly greater than 1.5 VDC. Recheck and adjust VR401 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.
7B	If voltage at low end is less than 0.68 VDC, adjust L104 at 94 MHz for a voltage slightly less than 1.5 VDC. Re-check and adjust VR401 for 6.8 VDC at high end; then re-check voltage at low end. Repeat, as required, until voltage at low end is greater than 0.68 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.

Continued on next page

VARACTOR ALIGNMENT continued -

Those models with a fixed resistor instead of a variable resistor will use the following alignment procedure:

STEP	PROCEDURES
1	Dissassemble radio as required (see disassembly instructions).
2	Set pointer to 94 MHz (lightly press a push button to release clutch). Adjust core of L104 for 1.50 VDC on VTVM at P403.
3	Check voltages at extreme ends of tuner travel. These voltages should be 0.72 VDC, or less at low end, and 6.6 VDC, or greater at the high end.
4	Adjustment of the core can be made at 98 MHz to meet this minimum tuning voltage range or to center the tuning voltage range.

NOTES

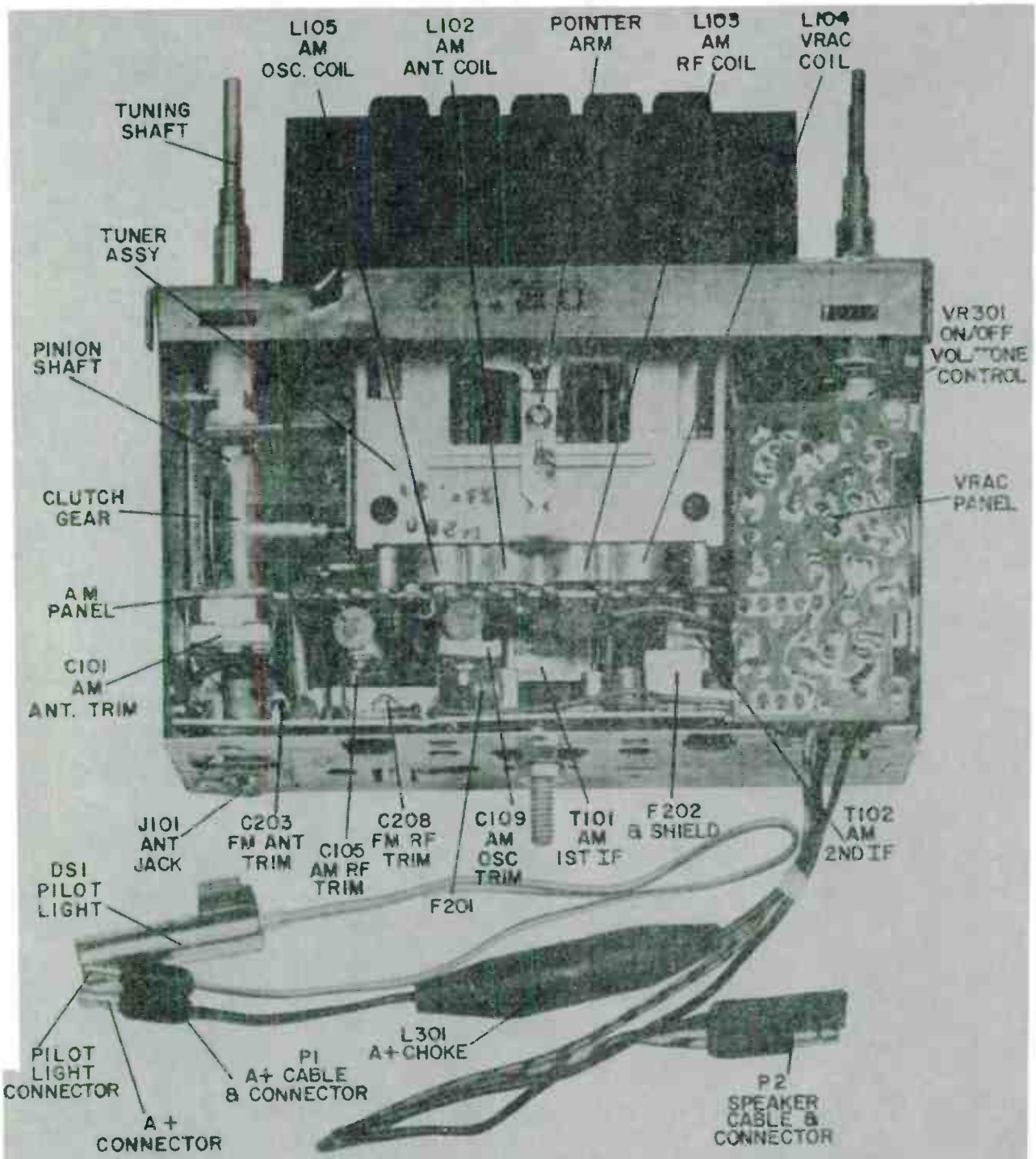


FIGURE 6-1. TOP CHASSIS VIEW - ALIGNMENT AND COMPONENT LOCATION
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF,
D8VF, D9AF AND D9VF

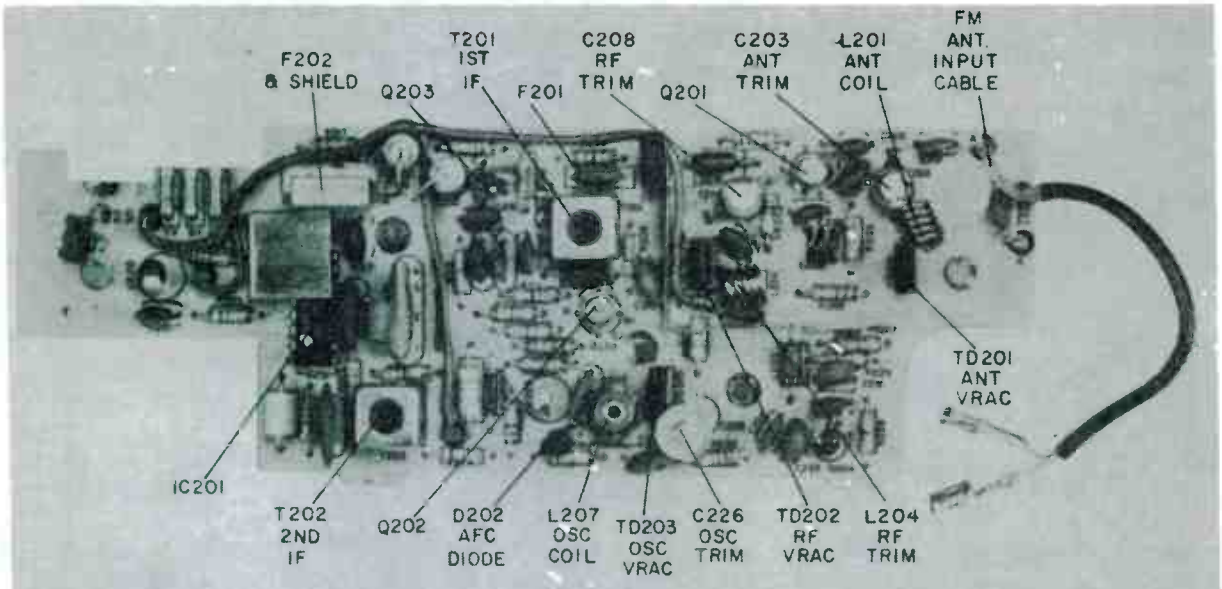


FIGURE 6-2. FM TUNER PANEL
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF,
D8VF, D9AF AND D9VF

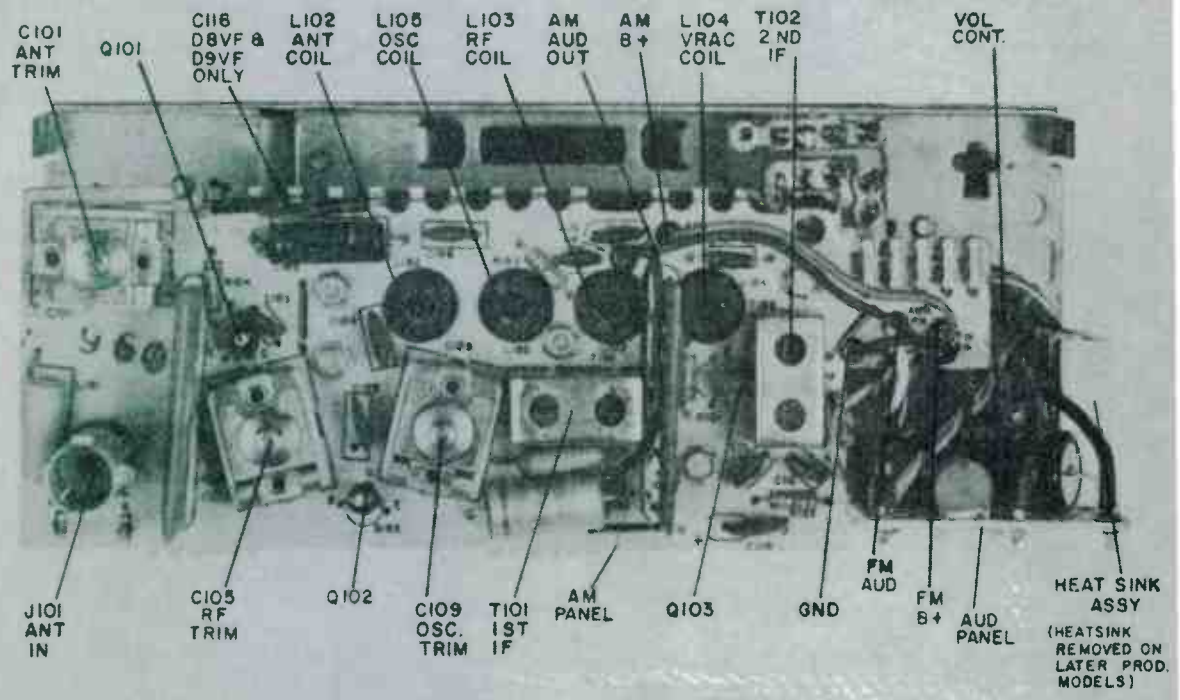


FIGURE 6-3. AM TUNER AND AUDIO PANEL
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF,
D8VF, D9AF AND D9VF

TROUBLESHOOTING PROCEDURES
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

LOCATING THE FAULTY PANEL

Because of the modular construction and the ease of disconnecting the 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 panels will operate satisfactorily. 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 6-8 . For example: the FM tuner panel, or the AM tuner panel, can supply a signal for servicing the audio section of the audio panel; the varactor supply voltage can supply tuning voltage when servicing the FM tuner panel, etc.

The General Troubleshooting Chart below will help in determining the probable panel requiring service from the various trouble symptoms given. The test point and adjustment locations given in Diagram E should also be helpful in localizing 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. Use Ford Aerospace 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.
4. When the audio panel is operated separately from the chassis, provide an additional external heat sink for the output transistors on the panel. The normal heat sink assembly provided for the output transistors may get quite hot if this precaution is not followed.

GENERAL TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE FAULTY PANEL				
	VARAC	SW	AM	FM	AUDIO
AM Dead — FM OK		X	X		
FM Dead — AM OK — Varactor tuning voltage to FM tuner panel OK				X	
FM Dead — AM OK — No varactor tuning voltage from varactor supply panel	X	X			
Distorted or weak on AM — FM OK			X		
Distorted output on FM — AM OK				X	
Distorted output on both AM and FM reception					X
FM weak — AM OK				X	
FM stations too far off calibration with dial scale — AM OK	X				
FM Microphonic — AM OK				X	
Blows fuses					X
Dial pointer will not move on manual tuning			X		

FM TUNER PANEL TROUBLESHOOTING — AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

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 6-8 or by a separate 14 volt B+ source to J201 and as 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
Low audio output on station. Critical AFC. No noise between stations.	1. Q203 IC201 T202	1a. Check Q203, IC201, and associated circuitry for faulty components. 1b. Replace faulty transistor or IC if voltage or resistance measurements indicate a defective unit. 1c. FM detector transformer alignment.
No AFC	1. D202 or C228 open or shorted, or D201 bias voltage incorrect. 2. Defective IC201.	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 varactor voltage at J203. Refer to varactor power supply section troubleshooting chart in AM tuner panel troubleshooting. 1b. J203 and P303 connection open and power off J203 to GND should measure well over 100 megohms. If not, check for a shorted varactor or C225. 1c. Check for broken or defective connection from varactor tuning voltage source to J203.
No FM station or sound — AM OK	1. No FM B+	1a. No voltage on FM B+ line. Refer to AM-FM B+ switch section of audio panel troubleshooting. 1b. Check for broken or defective connection in FM B+ line.
No FM station. Some background sound - AM OK	1. Defective I.F. stage. 2. VRAC OSC. circuit dead (Q401). DC bias OK	1. Check IC201 and associated circuitry and replace any defective component. 2. Check for open or partially shorted capacitors C402, C403, and C404.
Poor sensitivity and/or selectivity	1. Defective antenna socket 2. Defective C202, C201, C203, L201, C205, C207, C208, C209, TD201, TD202. 3. Defective F201 or F202 4. Varactor or bias voltage incorrect	1. Check and replace, as required. 2. Check circuit and replace defective component. 3. Check dB loss through ceramic filter (−3dB 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 following chart.

FM TUNER PANEL TRANSISTOR D-C RESISTANCE CHART

TRANSISTOR	* RESISTANCE (OHMS)			
	E OR S	B OR G1	G2	C OR D
Q201	85	** 15K	** 30K	200
Q202	250	** 10K	** 20K	320
Q203	1K	250		800
Q203	900	1.2K		320

* ALL READINGS RX100 SCALE UNLESS OTHERWISE NOTED
** RX1000 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 following 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.

Observe physical position and polarity of component before removal to assure replacement is installed correctly. This applies particularly 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 IC + NETWORK D-C RESISTANCE CHART

IC OR NETWORK (PIN NO.)	* RESISTANCE (OHMS)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC 201	5K	3.7K	5K	0	6K	1K	** 20K	** 13K	** 13K	** 13K	330		** 75K	0
N 201	300	** 80K		** 13K										

* ALL READINGS RX100 UNLESS OTHERWISE NOTED
** RX 1000 SCALE

AM TUNER PANEL TROUBLESHOOTING — AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

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 way.

AM Radio Section — B+ supply and AM audio output through audio panel; AM input signal through J101.

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 J101.
Poor sensitivity.	1. Misalignment. 2. Defective L102, L103, C101, and C105.	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 C102, R102, N102 and replace.
Dead AM reception-air check or signal generator.	Open C101 or L102 primary.	Replace.
Dead air check. Generator sens 4-5Kμv.	Shorted C103.	Replace.
Dead air check. Generator sens 10-15Kμv.	L101A secondary open L102.	Replace.

VARACTOR POWER SUPPLY PANEL TROUBLESHOOTING — AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

After a trouble has been localized to the varactor power supply panel, follow systematic troubleshooting procedures using the following troubleshooting chart for assistance in locating the problem. The varactor panel can be powered by use of the wiring harness as shown in Figure 6-10.

VARACTOR POWER SUPPLY PANEL 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 toward the oscillator.
Incorrect range on calibration	1. Out of alignment on calibration. 2. L402 or core of L104 defective.	1. Perform alignment procedure for varactor power supply. 2. Repair or replace faulty component.
Cannot align for proper calibration.	1. Improper alignment. 2. R411 or R413 changed value 3. Low DC voltage at cathode of D401.	1. Repeat alignment before suspecting a faulty component. 2. Replace R411 or R413. 3. Replace defective D401 or C406.

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
Q 101	330	1K	3.5K
Q 102	1.5K	2K	2.2K
Q 103	5.6	750	4 K

*ALL READINGS RX 100 SCALE UNLESS OTHERWISE NOTED

VARACTOR POWER SUPPLY 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.

VARACTOR PANEL TRANSISTORS
D-C RESISTANCE CHART

TRANSISTOR	* RESISTANCE (OHMS)		
	E	B	C
Q401	100	850	800
Q402	0	700	850

*ALL READINGS RX 100 SCALE UNLESS OTHERWISE NOTED

AUDIO PANEL TROUBLESHOOTING — AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

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

For servicing, all panels can be interconnected using the wiring harness shown in Figure 6-10, or the AM and audio panels may be powered as a unit without the other panels.

AUDIO 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 next. It is very unlikely that the problem will occur inside the packaged network as the transistors in the network 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 both

output transistors 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 one another, 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.

AUDIO PANEL AUDIO SECTION TROUBLESHOOTING CHART

TROUBLE SYMPTOM	PROBABLE CAUSE
More than 6.5 volts at output transistor emitters.	1. Driver shorted. 2. R303 (100 OHMS) or speaker lead open. 3. NPN output transistor Q302 shorted. 4. Pin 2, 6, 7, 9 of network N301 shorted to ground.
Less than 6.5 volts at output transistor emitters.	1. Driver transistor Q301 open. 2. Shorted PNP output transistor Q303. 3. Shorted pin 4 of network N301.
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 D301 or D302.
Excessive current or glowing P.T.C.	Speaker lead shorted.
Blown PNP output transistor.	Short at base of PNP output transistor.

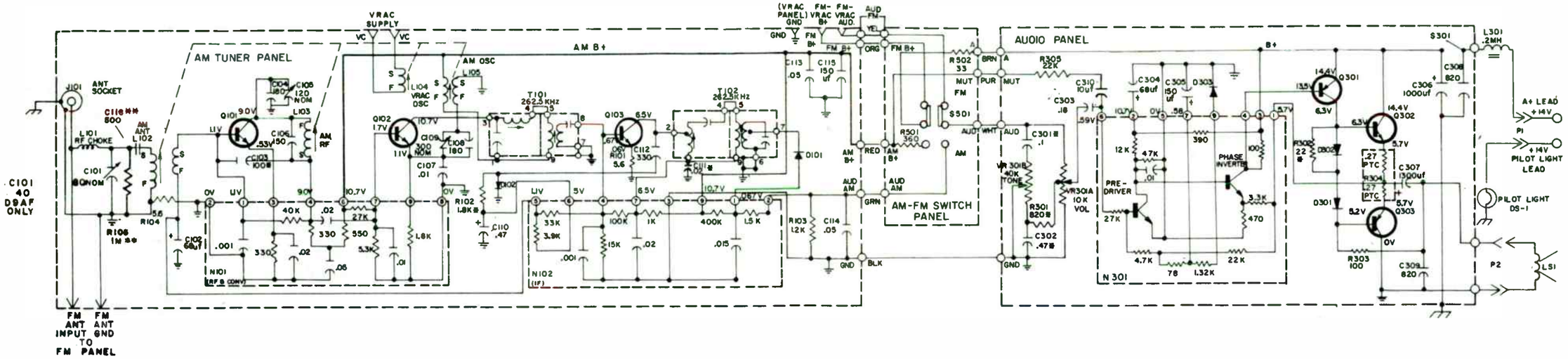
AUDIO PANEL TRANSISTORS VOLTAGE AND RESISTANCE CHECKS

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.

AUDIO PANEL TRANSISTOR D-C RESISTANCE CHART

TRANSISTOR	* RESISTANCE (OHMS)		
	E	B	C
Q 301	1.8K	1.8K	680
Q 302	470	680	1.8K
Q 303	470	100	0

* ALL READINGS RX 100 SCALE UNLESS OTHERWISE NOTED



NOTES

1. ALL VOLTAGES MEASURED WITH HIGH-IMPEDANCE VTVM UNDER NO SIGNAL CONDITIONS WITH VOLUME CONTROL SET TO MINIMUM
2. ALL RESISTANCES IN OHMS (K=1000, M=MEGOHMS)
3. CAPACITANCE (UNLESS OTHERWISE SPECIFIED) VALUES LESS THAN ONE = MICROFARADS (uf). VALUES GREATER THAN ONE = PICOFARADS
4. TUNING RANGES 540 KHZ TO 1610 KHZ (IF = 262.5 KHZ)
5. L3 IS LOCATED IN EXTERNAL A+ LEAD

⏚ GROUND, RADIO CHASSIS OR HOUSING

⏚ GROUND, PW PANEL

6. VALUES SUBJECT TO CHANGE WITH PRODUCTION CENTERING OF TOLERANCE

40 D8VF & D9VF ONLY

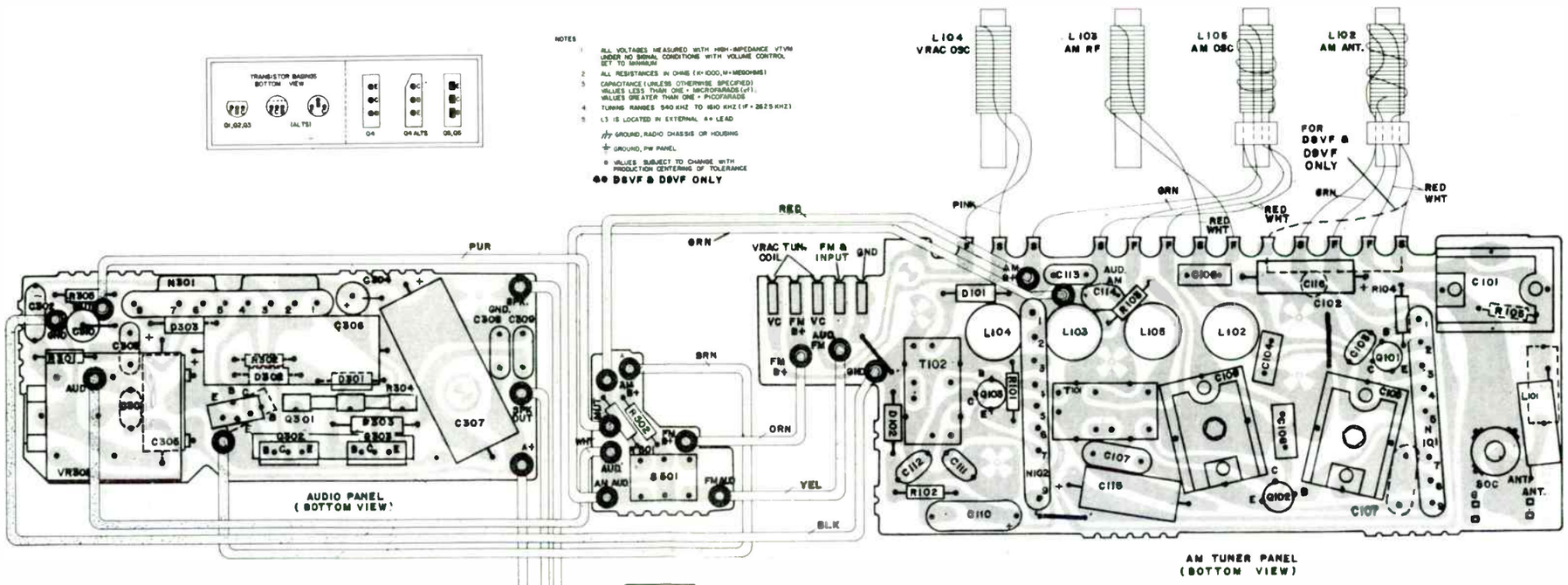
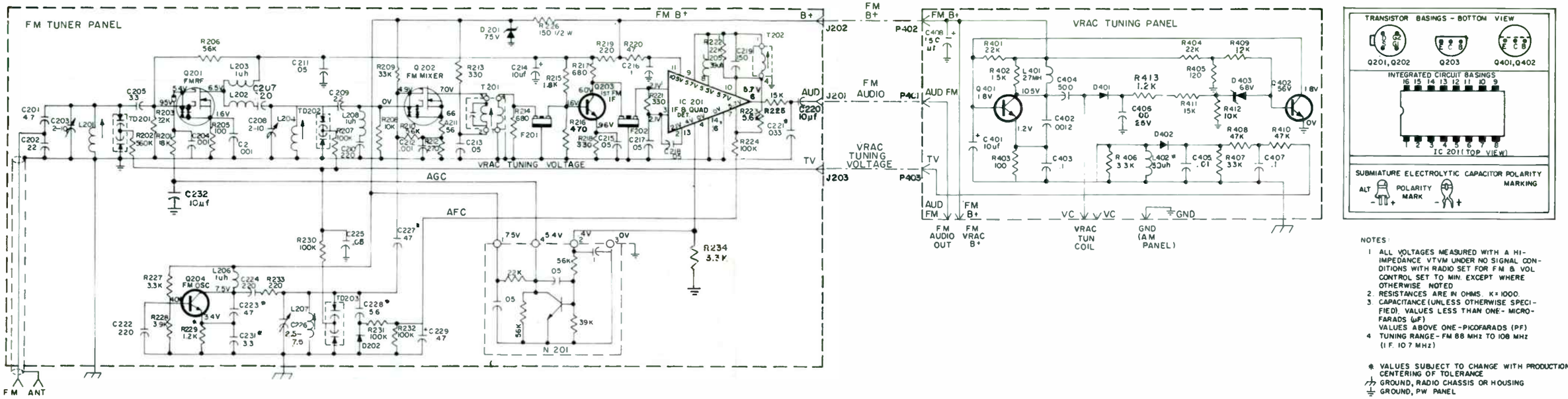


FIGURE 6-6. AM TUNER PANEL- AUDIO PANEL (BOTTOM VIEW) SCHEMATIC DIAGRAM AND PARTS LOCATION – AM-FM MONAURAL RADIO MODELS D8AF, D8EF, D8TF, D8VF, D9AF & D9VF

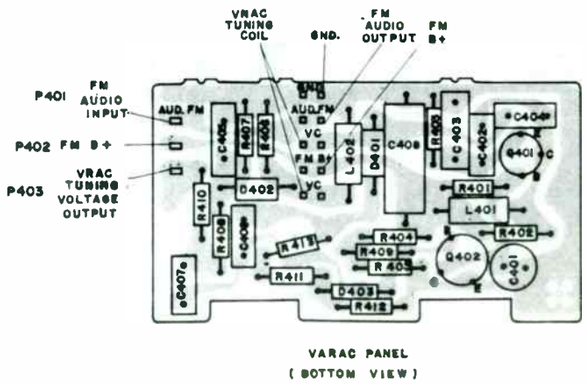
Ford D8AF19A171AB,D8EF19A171AB, D8TF19A171AA,D8VF19A171AA, D9AF19A171AA,D9VF19A171AA



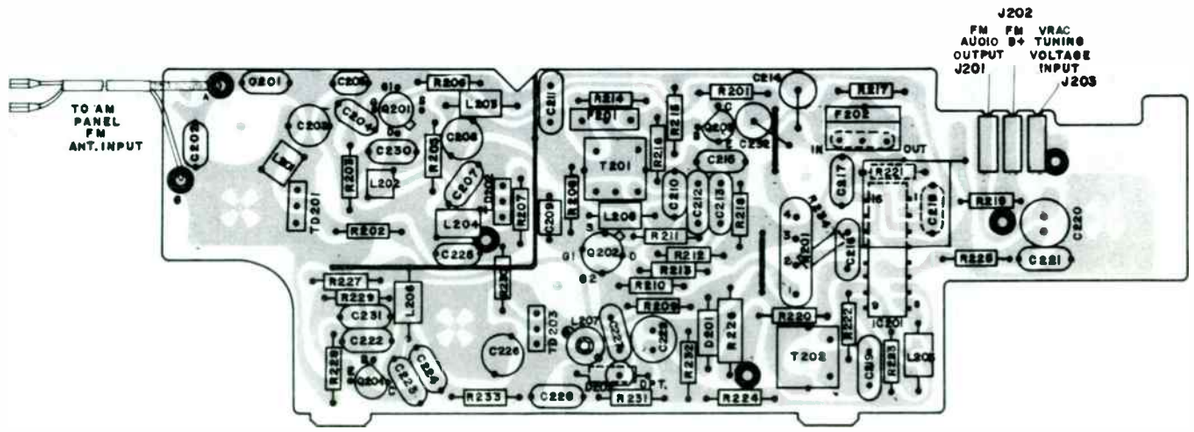
NOTES:

1. ALL VOLTAGES MEASURED WITH A HI-IMPEDANCE VTVM UNDER NO SIGNAL CONDITIONS WITH RADIO SET FOR FM & VOL CONTROL SET TO MIN. EXCEPT WHERE OTHERWISE NOTED
2. 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 - FM 88 MHz TO 108 MHz (I.F. 10.7 MHz)

* VALUES SUBJECT TO CHANGE WITH PRODUCTION CENTERING OF TOLERANCE
⏚ GROUND, RADIO CHASSIS OR HOUSING
⏚ GROUND, PW PANEL



VARAC PANEL
(BOTTOM VIEW)



FM PANEL
(BOTTOM VIEW)

FIGURE 6-8. FM TUNER AND VRAC TUNING PANEL (BOTTOM VIEW) SCHEMATIC DIAGRAM AND PARTS LOCATION - AM-FM MONAURAL RADIO MODELS D8AF, D8EF, D8TF, D8VF, D9AF & D9VF

Ford D8AF19A171AB,D8EF19A171AB, D8TF19A171AA,D8VF19A171AA, D9AF19A171AA,D9VF19A171AA

ELECTRICAL PARTS LIST
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

Parts listed are for all models unless otherwise noted.
New parts not previously carried are indicated by the symbol "#" following the number.

SYM-BOL	*WARR.	DESCRIPTION	SERVICE PART NO.
		CAPACITORS	
C101	C	80 nom.,ant. trim.	3L1-0005-5
C101	C	40 nom.,ant. trim. D9AF only	3L1-0005-6
C102	C	68 µf/16V, AGC	3L0-0009-26
C103	C	100 pf ±10%/50V, RF neut.	3L0-0007-19
C104	C	180 pf ±20%/50V, N750, RF coil temp. comp.	3L0-0006-25
C105	C	120 pf nom., RF trimmer	3L1-0005-1
C106	C	150 pf ±10%/50V, N750, RF coil temp. comp.	3L0-0006-28
C107	C	.01 µf ±10%, Q102 emitter bypass	3L0-1001-8
C108	C	180 pf ±20/50V, N750, osc. coil temp. comp.	3L0-0006-25
C109	C	300 pf nom., osc. trimmer	3L1-0005-3
C110	C	.47 µf +30%/3V, AGC	3L0-0008-14
C111	C	.02 µf +80 -20%/16V, I.F. B+	3L0-0008-17
C112	C	330 pf ±10%/500V, AGC	3L0-0007-1
C113	C	.05 µf +80 -20%/16V, AM B+	3L0-0008-24
C114	C	.05 µf +80 -20%/10V, AM audio output	3L0-0008-10
C115	C	150 µf/16V, AM B+	3L0-0009-45
C116	C	500pf 10%/150V ant.tuning(D8VF & D9VF)	3L0-0006-24
C201	C	4.7 pf ±.5 pf/500V, NPO, ant. divider	3L0-0006-17
C202	C	22 pf ±10%/500V, ant. divider	3L0-0007-13
C203	C	2-10 pf var., ant. trimmer	3L1-0004-1
C204	C	.001 µf ±20%/50V, AGC bypass	3L0-0007-37
C205	C	3.3 pf ±.5 pf/500V, RF gate #1 coup.	3L0-0006-13
C207	C	220 pf ±10%/500V, RF DC blacking	3L0-0007-15
C208	C	2-10 pf var., RF trimmer	3L1-0004-1
C209	C	2.2 pf ±.5 pf/500V, mixer gate #1 coup.	3L0-0006-34
C210	C	220 pf ±10%/500V, mixer I.F. trap	3L0-0007-15
C211	C	.05 µf +80 -20%/16V, RF B+	3L0-0008-24
C212	C	.001 µf ±20%/50V, mixer bypass	3L0-0007-37
C213	C	.05 µf +80 -20%/10V, I.F. bypass	3L0-0008-10
C214	C	10 µf/16V, I.F. B+	3L0-0024-1
C215	C	.05 µf +80 -20%/10V, Q203 emitter bypass	3L0-0008-10
C216	C	.1 µf +80 -20%/16V, IC201 B+	3L0-0008-38
C217	C	.05 µf +80 -20%/10V, IC201 bypass	3L0-0008-10
C218	C	.05 µf +80 - 20%/10V, IC201 bypass	3L0-0008-10
C219	C	150 pf ±5%/100V. N-470 det. tuning	3L0-0006-58
C220	C	10 µf ±20%/20V, audio coup.	3L0-0011-4
C221	C	.033 µf ±20%/12V, de-emphasis	3L0-0008-32
C222	C	220 pf ±10%/500V, osc. base	3L0-0007-15
C223	C	4.7pf ±.5 pf/150V, N330, osc. feedback div.	3L0-0006-44
C224	C	220 pf ±10%/500V, decoup.	3L0-0007-15
C225	C	.05µf+80-20%/25V, VRAC supply	3L0-0008-39
C226	C	2.5-7.5pf var., osc. trimmer	3L1-0004-5
C227	C	47 pf ±10%/500V, NPO, osc. to mix. coup.	3L0-0006-15
C228	C	5.6 pf ±.5 pf/150V, N750, AFC divider	3L0-0006-59
C229	C	.47 µf ±20%/10V, AFC bypass	3L0-0011-7
C230	C	.001 µf ±20%/50V, RF bypass	3L0-0007-37
C231	C	3.3 pf ±.5 pf/500V, N330, osc. feedback div.	3L0-0006-43
C232	C	10 µf/16V, AGC bypass	3L0-0024-1
C301	C	.1 µf +30%/3V, hi cut	3L0-0008-12
C302	C	.47 µf ±30%/3V, bass boost	3L0-0008-03
C303	C	.18 µf ±20%/3V, audio coupling	3L0-0008-50
C304	C	68 µf/16V, audio B+	3L0-0009-26
C305	C	150 µf/6V, DC feedback	3L0-0009-50
C306	C	1000 µf/16V, A+ line bypass	3L0-0009-44
C307	C	1300 µf/16V, output coup. spk.	3L0-0009-51
C308	C	820 pf ±10%/500V, A+ line bypass	3L0-0007-25
C309	C	820 pf ±10%/500V, output bypass	3L0-0007-25
C310	C	10 µf/16V, switch pop filter	3L0-0024-1
C401	C	10 µf ±20%/20V, Q401 base bypass	3L0-0011-04
C402	C	.0012 µf ±10%/500V, VRAC osc. F.B. div.	3L0-0007-20
C403	C	.1 µf ±10%/50V, VRAC osc. F.B. div.	3L0-1001-15
C404	C	500 pf ±10%/150V, N4700, VRAC osc. coup.	3L0-0006-23
C405	C	.01 µf ±20%/16V, VRAC VRAC rect. filter	3L0-0008-21
C406	C	.05 µf +80-20%/25v.rectifier filter	3L0-0008-39
C407	C	.1 µf+80-20%/10V, output filter	3L0-0008-11
C408	C	150µf/16V, VRAC B+ filter	3L0-0009-45

*Warranty Component Category

SYM-BOL	*WAR R.	DESCRIPTION	SERVICE PART NO.
		DIODES	
D101	P	AM detector	3L4-2003-1
D102	P	AM AGC detector	3L4-2003-1
D201	P	7.5V zener	3L4-3506-3
D202	P	AFC	3L4-3503-5
D202	P	AFC (opt.)	3L4-3503-6
D301	P	Output temp. comp. (silicon)	3L4-3002-10
D302	P	Output temp. comp. (germanium)	3L4-2003-4
D303	P	Pre-driver bias and comp.	3L4-2003-4
D401	P	Varactor osc. rectifier	3L4-3002-33
D402	P	Varactor osc. rectifier	3L4-3002-33
D403	P	6.8V zener	3L4-3506-43
		PILOT LAMPS	
DS301	K	1893 pilot lamp	3L4-0001-6
		VARACTORS	
TD201	P	Ant. tuning (blue)	3L4-3504-2
TD202	P	RF tuning (blue)	3L4-3504-2
TD203	P	Osc. tuning (white)	3L4-3504-3
		CAUTION: Varactors are used together in combinations listed above or below. Replace with same color dot.	
TD201	P	Ant. tuning (red)	3L4-3504-4
TD202	P	RF tuning (green)	3L4-3504-1
TD203	P	Osc. tuning (white)	3L4-3504-3
		NETWORKS	
F201	B	I.F. filter, 10.7 MHz	3L5-5003-1
F201	B	I.F. filter, 10.7 MHz (opt.)	3L5-5004-1
F202	B	I.F. filter, 10.7 MHz	3L5-5003-1
F202	B	I.F. filter, 10.7 MHz (opt.) 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 and Part Number.	3L5-5004-1
N101	B	RF conv.	3L5-1002-4
N102	B	I.F. filter	3L5-1002-6
N201	B	AGC amp.	3L5-0017-1
N301	B	Audio pre-amp.	3L5-0016-2
		COILS	
L101	D	Ant. RF choke	3L2-0034-4
L102	D	AM ant. tuning	3L2-0007-17
L103	D	AM RF tuning	3L2-0007-19
L104	D	AM VRAC tuning	3L2-0027-2
L105	D	Osc. tuning	3L2-0002-9
L201	D	FM ant. tuning	3L2-0037-5
L202	D	Spurious response RF choke	3L2-0037-2
L203	D	1 μH RF decoup. choke	3L2-0023-11
L204	D	FM RF tuning	3L2-0037-3
L205	D	38 μH IC201 decoupling	3L2-0023-10
L206	D	1 μH osc. decoup. choke	3L2-0023-11
L207	D	FM osc. tuning	3L2-0044-01
L208	D	1 μH I.F. filter choke	3L2-0023-11
L301		Part of A+ cable assy.	
L401	D	2.7 MH ± 5%, RF choke	3L2-0023-5
L402	D	30 μH ± 5%, osc. tank	3L2-0023-12

SYM-BOL	*WAR R.	DESCRIPTION	SERVICE PART NO.
		TRANSFORMERS	
T101	E	AM 1st I.F.	3L2-0019-1
T102	E	AM 2nd I.F.	3L2-0019-2
T201	E	FM 1st I.F.	3L2-0022-1
T202	E	FM quad detector	3L2-0030-2
		TRANSISTORS	
Q101	A	AR200 AM RF amp. (white dot)	3L4-6007-1
Q102	A	AR201 AM conv. (yellow dot)	3L4-6007-2
Q103	A	AR202 AM I.F. amp. (green dot)	3L4-6007-3
Q201	A	AR501 FM RF amp.	3L4-6503-1
Q202	A	AR502 FM I.F. mix.	3L4-6503-2
Q203	A	AR221 FM I.F. amp. (red-yellow)	3L4-6007-22
Q204	A	AR222 FM osc. (blue-yellow)	3L4-6007-23
Q301	A	AR44 audio driver	3L4-6011-9
	A	Audio driver (option)	3L4-6011-12
	A	Audio driver (option)	3L4-6011-14
Q302**	A	NPN output amp. (order assy. no. includes Q302, Q303, and heatsink)	7L6-0531-1
Q303**	A	PNP output amp. (order assy. no. includes Q302, Q303, and heatsink)	7L6-0531-1
Q302**	A	AR24 NPN output	3L4-6012-5
Q302**	A	AR28 NPN output (opt.)	3L4-6012-6
Q302**	A	AR38 NPN output (opt.)	3L4-6012-8
Q303**	A	AR25 PNP output	3L4-6013-5
Q303**	A	AR27 PNP output (opt.)	3L4-6013-6
Q303**	A	AR37 PNP output (opt.)	3L4-6013-8
Q401	A	AR213 FM varactor osc. (violet dot)	3L4-6007-14
Q402	A	AR218 FM VRAC volt. cont. (red dot)	3L4-6007-41#
		INTEGRATED CIRCUITS	
IC201	S	AE 914 FM I.F. amp. and det.	3L4-9014-1
		RESISTORS (ohms)	
		All resistors are 5% 1/4W, unless specified otherwise.	
R101	G	5.6, Q103 emitter	
R102	G	1.8K, AGC	
R103	G	1.2K, tone comp.	
R104	G	5.6, ground	
R105	G	1 meg, ant. (D8VF & D9VF)	
R201	G	18K, AGC (gate #2, RF stage)	
R202	G	560K, ant. VRAC bias	
R203	G	22K, Q201 gate #1	
R205	G	100, Q201 source	
R206	G	56K, Q201 bias	
R207	G	100K, RF VRAC bias	
R208	G	10K, Q202 gate #1	
R209	G	33K, Q202 gate #2 bias	
R210	G	56K, Q202 gate #2 div.	
R211	G	56, Q202 source	
R212	G	270, Q202 source	
R213	G	330, Q202 B+	

*Warranty Component Category

**NOTE: Early production models use Heatsink Assembly 7L6-0531-1 (Q302 and Q303) with Heatsink Clip 2L8-0527-1 and Housing 2L8-0616-1.
Models D9AF, D9VF and later production of models D8AF, D8EF, D8TF and D8VF use individual output transistors with Heatsink Clip 2L8-0770-1, Spacer 2L7-0519-1 and Housing 2L8-0616-2.

ELECTRICAL PARTS LIST (Cont'd)
AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

SYM-BOL	*WARR.	DESCRIPTION	SERVICE PART NO.
R214	G	680, T201 load	
R215	G	1.8K, Q203 bias	
R216	G	470, Q203 bias	
R217	G	680, Q203 collector	
R218	G	330, Q203 emitter	
R219	G	220, I.F. B+	
R220	G	47, I.F. B+	
R221	G	330, DC feedback	
R222	G	22K, T202 load	
R223	G	5.6K, AFC	
R224	G	100K, AFC	
R225	G	15K, de-emphasis	
R226	G	150 ± 5%, 1/2W, osc. and I.F. B+	
R227	G	3.3K, Q204 bias	
R228	G	3.9K, Q204 bias	
R229	G	1.2K, Q204 emitter	
R230	G	100K, VRAC bias	
R231	G	100K, AFC divide	
R232	G	100K, AFC divide	
R233	G	220, isolation	
R234	G	33K, AGC	
R301	G	820, bass comp.	
R302	G	22, output bias	
R303	G	100 ± 5%, 1/2W, AC feed-back	
R304	G	.27-.27, P.T.C.	3L3-0004-06
R305	G	22K, switch — pop filter	
R401	G	22K ± 10%, 1/4W, Q401 base bias	
R402	G	1.5K, Q401 coll. load	
R403	G	100, Q401 emitter	
R404	G	22K, VRAC B+ volt. div.	
R405	G	120, VRAC B+ volt. div.	
R406	G	3.3K, L402 loading	
R407	G	33K, VRAC sup. load	
R408	G	47, supply filter	
R409	G	12K, Q402 base	
R410	G	47K, supply filter	
R411	G	15K, ref. bias div.	
R412	G	12K, ref. bias div.	
R413	G	1.2K, VRAC volt. (opt. for VR401)	
R501	G	360, AM B+	
R502	G	33, switch A+ line	
		CONTROLS	
VR301 (A, B, SI)	H, I	10K vol./40K tone, on/off	
		D8AF, D8VF, D9AF, D9VF	3L3-0021-47#
		D8AF, D8VF, D9AF, D9VF (opt.)	3L3-0021-48#
		D8EF	3L3-0021-15
		D8EF (opt.)	3L3-0021-31#
		D77J	3L3-0021-21
		D77J (opt.)	3L3-0021-33#
		D8TF	3L3-0021-24
		D8TF (opt.)	3L3-0021-36#
VR401	H	10K, VRAC adj. (option with R413)	3L3-0018-10
		SWITCHES	
S501	I	FM-AM slide switch	4L2-0020-2
S501	I	FM-AM slide switch (opt.)	4L2-0020-1

*Warranty Component Category

TUNER REPLACEMENT PARTS LIST

AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

New parts not previously carried are indicated by the symbol "#" following the number.
All parts are Warranty Component Category F.

DESCRIPTION	SERVICE PART NO.	
Tuner assy. (mechanical)	7L6-0390-6	7L6-0394-8
Ball bearing, paddle bar (2)	7L6-0150-7	—
Bracket, clutch	7L6-0150-76	2L8-0707-1
Clutch, drive assy.	7L6-0150-77	7L6-0402-3
"E" ring, pointer arm	7L6-0150-25	IW60971FA3
Gate, clutch release (cam)	7L6-0150-17	2L8-0213-2
Nut, paddle bar	7L6-0150-11	—
Pointer arm	7L6-0150-82	2L8-0740-1
Screw, paddle bar	7L6-0150-10	—
Screw and nut assy., paddle bar	7L6-0150-9	—
Spring, backlash	—	2L8-0344-1
Spring, gate	7L6-0150-48	2L8-0719-1
Spring, pointer arm	7L6-0150-52	2L8-0216-1

MECHANICAL AND ELECTRICAL MISCELLANEOUS PARTS LIST

AM-FM MONAURAL MODELS D8AF, D8EF, D8TF, D8VF, D9AF AND D9VF

New parts not previously carried are indicated by the symbol "#" following the number.

*WARR.	DESCRIPTION	SERVICE PART NO.
Z	Barrier, light	2L7-0019-2
D	Bead, ferrite, Q201	2L8-0134-3
L	Bezel, D8AF, D8TF, D8VF, D9AF, D9VF	2L7-0394-5#
	D8EF	2L7-0394-6#
Z	Bolt, mounting	2L8-0060-6
Z	Bracket, chassis mtg. (rear) (D8EF only)	2L8-0639-1
Z	Bracket assy., pilot light	7L6-0215-2
Z	Bushing, tuning shaft	
	D8AF, D8VF, D9AF, D9VF	2L8-0222-5
	D8EF	2L8-0222-7
	D8TF	2L8-0222-2
O	Button, push (5)	2L7-0145-2
N	Cable, A+ lead, choke and pilot light assy.	
	D8AF, D8EF, D8VF, D9AF, D9VF	4L1-0115-1
	D8TF	4L1-0115-2
N	Cable assy., speaker	
	D8AF, D8VF, D9AF, D9VF	4L1-0116-1
	D8EF	4L1-0116-2
	D8TF	4L1-0116-4
Z	Clamp, strain relief	2L8-0226-1
Z	Clip, ant. socket	2L8-0545-2
Z	Clip, heatsink (early prod.)	2L8-0527-1
Z	Clip, heatsink (later prod.)	2L8-0770-1#
Z	Connectors, panel, 2L8-0641-1 (male), 2L8-0640-1 (female), 2L8-0649-1 (female)	424-9698
D	Core, ant. and RF	2L8-0069-4
D	Core, ant. and RF (optional)	2L8-0069-5
D	Core, ant. and RF (optional)	2L8-0069-6
D	Core, osc.	2L8-0045-6
D	Core, VRAC	2L8-0069-17
Z	Cover, housing	2L8-0617-1
L	Filter, color	2L7-0147-3
L	Filter, color, D8EF only	2L7-0147-4
Z	Grommet, coil mtg.	2L7-0022-1
Z	Housing (early prod.)	2L8-0616-1
** Z	Housing (later prod.)	2L8-0616-2#
Z	Insulator, FM board	2L7-0418-1
Z	Insulator, pilot light	2L7-0064-1
Z	Liner, slide bar	2L7-0416-1

*WARR.	DESCRIPTION	SERVICE PART NO.
Z	Nut, tuning shaft and Vol.	28-14686-1
Z	Nut, mounting	2L8-0061-1
Z	Pointer, dial	2L8-0077-19
M	P.W. assy., FM w/comp.	7L6-0573-1
M	P.W. assy., AM, AUDIO w/comp.	
	D8AF	7L6-0570-1
	D8EF	7L6-0571-1
	D8TF	7L6-0643-1
	D8VF, D9VF	7L6-0646-1
	D9AF	7L6-0570-2#
Z	Retainer, slide bar	2L8-0393-1
Z	Ring, retaining (tun. shaft)	E1W61043FE5
Z	Screw, special (shuttle mtg.) (2)	LW-0046-1
Z	Shaft, tuning	
	D8AF, D8VF	2L7-0056-14
	D8EF	2L7-0056-15
	D8TF	2L7-0056-11
Q	Shaft, pinion	2L7-0030-20
Z	Shield, I.F. filter (F202)	2L8-0660-1
Z	Shield (IC201)	2L8-0643
Z	Shield, FM (D8VF only)	2L8-0733-1
Z	Shield, pilot light	2L8-0225-1
Z	Shuttle, slide bar	2L8-0615-1
D	Sleeve, paper	5L4-0002-1
D	Sleeve, pwdr. iron (ant., RF, osc.)	2L8-0138-1
D	Sleeve, varactor osc.	2L8-0138-10#
Z	Slide bar, AM-FM (Kit)	424-9707
Z	Socket, ant.	2L8-0544-1
Z	Spacer, Q302 & Q303	2L7-0519-1#
Z	Spacer, tuning shaft	
	D8EF	2L8-0177-6
	D8TF	2L8-0177-4
Z	Spacer, Vol. control	
	D8AF, D8VF, D9AF, D9VF	2L8-0177-3
	D8EF	2L8-0177-6
	D8TF	2L8-0177-4
Z	Spring, toggle	2L8-0638-1
Z	Spring, pilot light	2L8-0067-1
L	Sub dial	2L7-0395-1
F	Tuner assy.	7L6-0394-8
F	Tuner assy. (option)	7L6-0390-6
Z	Washer, spring (tun. shaft)	2L8-0223-1

*Warranty Component Category

**NOTE: Early production models use Heatsink Assembly 7L6-0531-1 (Q302 and Q303) with Heatsink Clip 2L8-0527-1 and Housing 2L8-0616-1.
Models D9AF, D9VF and later production of models D8AF, D8EF, D8TF, and D8VF use individual output transistors with Heatsink Clip 2L8-0770-1, Spacer 2L7-0519-1 and Housing 2L8-0616-2.

Ford *D8AF19A171AB,D8EF19A171AB,*
D8TF19A171AA,D8VF19A171AA,
D9AF19A171AA,D9VF19A171AA

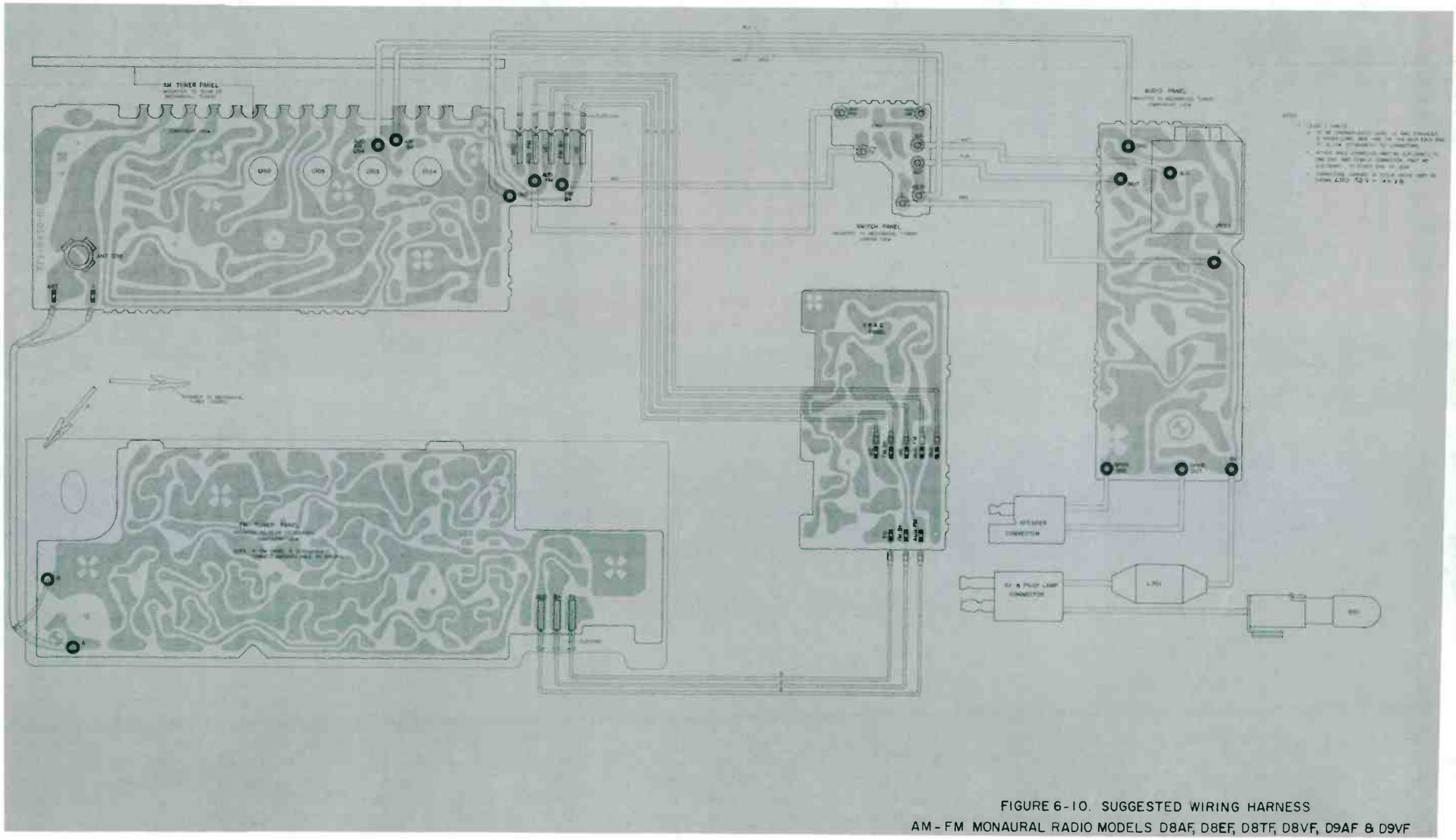


FIGURE 6-10. SUGGESTED WIRING HARNESS
AM-FM MONAURAL RADIO MODELS D8AF, D8EF, D8TF, D8VF, D9AF & D9VF

ELECTRICAL ALIGNMENT

ALIGNMENT PROCEDURES

1. EQUIPMENT REQUIRED

1. Regulated DC power supply: 0 - 20V, 8A or higher, adjust to 13.8V ± 1%
2. VTVM: 1 mV measurable
3. Digital Voltmeter: 10 mV measurable, input impedance - 1000 ohm/V or higher.
4. Oscilloscope: 0 - 20 MHz, High sensitivity and high input impedance
5. Frequency Counter: 0 - 20 MHz, High sensitivity and high input impedance
6. Standard Signal Generator: 100 kHz - 150 MHz, -10 dB - 100 dB, 50 ohms unbalanced. Frequency accuracy, ±50 Hz (AM) ±500 Hz (FM)
7. Speaker Dummy Resistor: 8 ohms, 50 watts
8. Circuit Tester: DC 20 k ohm/V

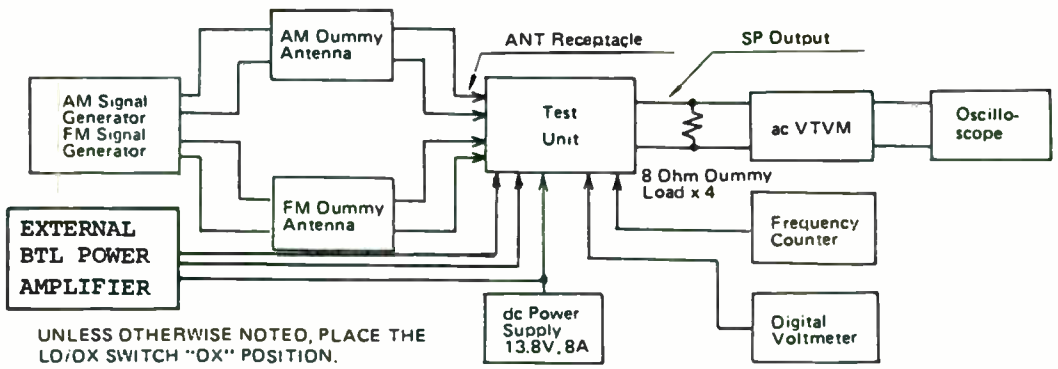
All test equipment should be properly calibrated.

2. GENERAL

Test Conditions:
Signal Generator Output : Modulation Frequency - 400 Hz
Modulation Percentage - 30% (AM)
Signal Generator Output : Modulation Frequency - 400 Hz
Modulation Percentage - 30%/100%
Sweep Frequency - 22.5 kHz (FM)
Signal Application : Antenna Receptacle through a dummy load
Output Meter Connection : Across the speaker or dummy load
Setting of Radio Controls : Volume control at maximum,
Balance control at its center.
Power Supply : 13.8V DC

3. DIGITAL TUNING CAR RADIO ALIGNMENT TEST SET-UP

Connect all test equipment as shown below.



AM/FM FRONT END ALIGNMENT TEST SET-UP

3.1 PRELIMINARY

1. Before performing any adjustments, check visually all jacks, plugs and solder joints for good connection. Shown in the schematic diagrams are nominal test voltage values for the transistors. In addition, certain other pertinent voltages are shown in the schematic diagrams.
2. Before adjustment or alignment of this unit, temporarily set VR1 through VR3 on Multiplex Unit PC Board to their center position.
3. Turn each trimmer TC1, TC2, TC3, TC4 on Digital Tuner PC Board and CT1 on Digital Control Unit PC Board to their center position.

3.2 POWER AMPLIFIER ALIGNMENT

There are no adjustments provided in the power amplifier circuits. First check for correct voltage distribution, refering to the voltage values shown in the schematic diagram.

3.3 DIGITAL SYNTHESIZER (PLL) CIRCUIT ALIGNMENT

Connect frequency counter to PLL LSI (IC2) on Control Unit, pin No. 19 (TP) through its probe and adjust the trimming capacitor CT1 to obtain a frequency reading of: 5.12000 MHz ± 10 Hz

NOTE: This alignment must be carefully done with frequency counter's gate placed in 1 sec. position because the oscillator frequency is used as a reference signal for digital clock.

3.4 AM LOCAL OSCILLATOR ALIGNMENT

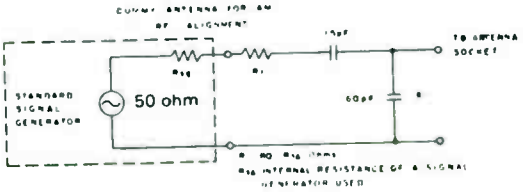
1. First, verify that both trimmer TC3 and TC4 on Digital Tuner Unit PC Board are placed as illustrated.

2. Release AM/FM switch in AM.
3. Tune the radio to 1610 kHz.
4. Connect digital voltmeter between LPF OUT pin 14 on Digital Tuner Unit PC Board and ground.
5. Adjust core of T9 on Digital Tuner Unit PC Board to obtain 8.5V ± 0.05V, starting from top to bottom when tuning core.
6. Tune the radio to 530 kHz and verify that the reading is within 8.8V - 2.0V.

NOTE: Use the high input impedance digital voltmeter (1000 ohm/V or higher) in step 4.

3.5 AM TUNER ALIGNMENT

1. Connect AM signal generator to antenna receptacle through the dummy antenna (See below).



2. Adjust AM signal generator to 600 kHz, 30% modulation at 400 Hz, with radio tuner set to the same frequency.
3. Increase AM signal generator output until a sine wave begins to appear on the scope display.
4. Then, adjust T7 and T8 for maximum audio output across the 8 ohm dummy load resistor.
5. Set AM signal generator frequency to 1400 kHz, 30% modulation at 400 Hz, with radio tuner set to the same frequency.
6. Adjust TC3 and TC4 for maximum output.
7. Repeat step 4 and 6 (at 600 kHz and 1400 kHz).
8. Next, adjust AM signal generator frequency to 1000 kHz, 30% modulation at 400 Hz, with radio tuner set to the same frequency.
9. Adjust T10 and T11 for maximum output.

NOTE: During alignment, the audio output level may rapidly increase and VTVM pointer may go off scale. In this case always decrease the signal generator output.

3.6 AM AUTO SCAN STOP CIRCUIT ALIGNMENT

1. Connect a digital voltmeter between TP1 and TP2 on Digital Tuner Unit PC Board.
2. Set AM signal generator frequency to 1000 kHz with radio tuner set to the same frequency.
3. Turn on AM signal generator and increase signal output level (74 dB). Verify that audio level begins to appear at the audio stage.
4. Connect a jumper lead between terminal pin 48 (8V) and pin 31 (scan mute) on Multiplex Unit PC Board.
5. Adjust T6 so that the meter reading becomes OV on VTVM.
6. Then, set the radio into AM auto scan stop mode. Verify that the auto scan stop action operates correctly.

NOTE: The operation of auto scan stop is adjusted by T6 transformer. Since the position of VR3 depends upon gain of IC2, IC3, the VR3 should be left in its center position unless otherwise noted. To adjust the circuit, connect 8V DC output line from terminal pin 48 to pin 31 (scan mute), using jumper lead, because the circuit cannot be adjusted without supplying 8V. If DC supply voltage is more than 8V (using an external power supply), the integrated circuit may be damaged. Therefore, always use terminal pin 48 in this alignment. Do not forget to remove the jumper lead after alignment.

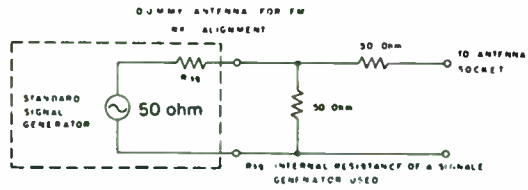
3.7 FM LOCAL OSCILLATOR ALIGNMENT

1. Depress AM/FM switch in FM.
2. Tune radio to 107.9 MHz.
3. Connect a digital voltmeter between LPF OUT pin 14 on Digital Tuner Unit PC Board and ground.
4. Adjust T3 (Local OSC Coil) to obtain 8V±0.05V, starting from top to bottom when tuning core.
5. Tune the radio to 88.1 MHz and verify that the reading is more than 1.5V at minimum and less than 3.0V at maximum.

NOTE: Use the high input impedance digital voltmeter (1000 ohm/V or higher) in step 3 above.

3.8 IF DETECTOR ALIGNMENT

1. Connect FM signal generator to antenna receptacle through the dummy antenna (shown below).



2. Connect digital voltmeter between TP1 and TP2 on Digital Tuner Unit PC Board.
3. Adjust FM signal generator frequency to 98.1 MHz with radio tuning set to the same frequency.
4. Increase signal generator output level to provide 1 mV or higher.
5. Adjust T5 for OV on the meter.

NOTE: This alignment should be repeated twice, because the initial alignment influences the radio's distortion and scan stop action.

3.9 FM FRONT END ALIGNMENT

1. Set the ST/MO switch to stereo.
2. Adjust FM signal generator frequency to 90.1 MHz with 30% modulation at 400 Hz (22.5 kHz deviation) and tune the radio to the same frequency. Refer to the AM/FM Front End Alignment Test Set-Up.
3. Increase signal generator output until a sine wave appears on scope display.
4. Alternately adjust T1 and T2 for maximum amplitude on scope display.
5. Readjust signal generator frequency to 106.1 MHz with 30% modulation at 400 Hz (22.5 kHz deviation) and tune the radio to the same frequency.
6. Adjust TC1 and TC2 for maximum audio output across the 8 ohm dummy load resistor.
7. Repeat step 3 and 5 above (at 90.1 MHz and 106.1 MHz) until no further improvement is obtained.
8. Adjust signal generator frequency to 98.1 MHz with 30% modulation at 400 Hz (22.5 kHz deviation) and tune the radio to the same frequency.
9. Adjust T4 for maximum audio output.

NOTE: During alignment, the audio output level may rapidly increase and VTVM pointer may go off scale. In this case always decrease signal generator output.

3.10 19 kHz PILOT SIGNAL ADJUSTMENT

1. Set FM signal generator frequency to 98.1 MHz without modulation and tune radio to the same frequency.
2. Reduce signal generator output level to just display audio output on scope.
3. Connect frequency counter between TP1 and ground on Multiplex Unit PC Board and read frequency.

It should read 19.00 kHz ± 100 Hz. If not, adjust VR2 to obtain that reading.

3.11 SEPARATION ALIGNMENT

1. Modulate FM signal generator (stereo signal modulator (SSM) with stereo composite signal (F = 98.1 MHz, 400 Hz, 100% modulation).
2. Tune radio exactly to signal generator frequency.
3. Increase signal generator output up to about 1 mV.
4. Modulate signal generator with the normal left channel composite signal and observe the output signal of right channel. Adjust VR1 for minimum output.
5. Modulate signal generator with the normal right channel composite signal and observe the output of the left channel, which should be minimal.

The voltage should have the same level as that of the right channel. If not, readjust VR1 for equal and minimum leakage at both outputs. The normal leakage (separation) is approximately 32 dB.

3.12 FM AUTO SCAN STOP ALIGNMENT

There are no adjustments provided in the FM Auto Scan Stop Circuit.

3.13 APC CIRCUIT ALIGNMENT

1. Adjust FM signal generator to 98.1 MHz for 100% modulation at 400 Hz to provide an output signal of 60 dB and tune the radio to the same frequency.
2. Set the APC control switch to APC "OFF" position. Decrease the signal generator output level until the AF output level lowers by 0.5 dB from the output level at the 60 dB input.
3. Next, set the APC control to APC "ON" position. Adjust VR1 until the AF output level further lowers by 20 dB (10 uV).

MECHANICAL ALIGNMENT (8-TRACK PLAYER)

1. TAPE HEAD CLEANING

Head faces should be cleaned with head cleaner to remove dust and accumulated oxide. Use a long Q-tip moistened with denatured alcohol to perform this function. Do not use a screwdriver or any metallic object near the head faces.
CAUTION: Avoid getting head cleaner on any plastic surface. Clean capstan, 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.

2. EQUIPMENT REQUIRED

1. AC VTVM : Preferably with a one-volt full scale or VOM meter with 20,000 ohms/volt sensitivity.
2. Oscilloscope : 0 - 20 MHz, high sensitivity and high input impedance.
3. Tape Head Demagnetizer
4. Head cleaner, alcohol, lubricants, etc.
5. Cotton swabs, tweezers, hand tools, etc.
6. Regulated DC power supply : 0 - 20V, 8A or higher, adjusted to 13.8V±1%
7. 8-Track Test Tape Cartridge or equivalent :
   Head Azimuth Alignment - RCA 1-326, 8 kHz
   Full track, -6 dB
   Head Cross Talk Alignment - RCA 1-327

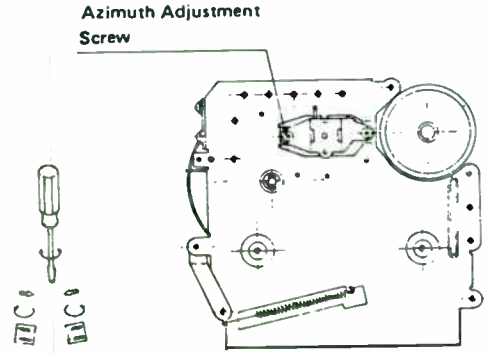
3.1 HEAD AZIMUTH ADJUSTMENT

1. Connect two VTVM's to the output of the left and right channels.
2. Insert the Head Azimuth Alignment Tape, (RCA #326) into the tape slot and play back the tape.
3. Adjust Volume Control so that audio output level obtained is 0.5 - 1.0V on VTVM while Balance and Tone (Treble and Bass) controls are each at center position.
4. Adjust the head azimuth adjustment screw (numbered "156" on the exploded view of Tape Mechanism Unit) to obtain maximum and equal audio output for both channels.
5. Repeat all steps if necessary for best results.

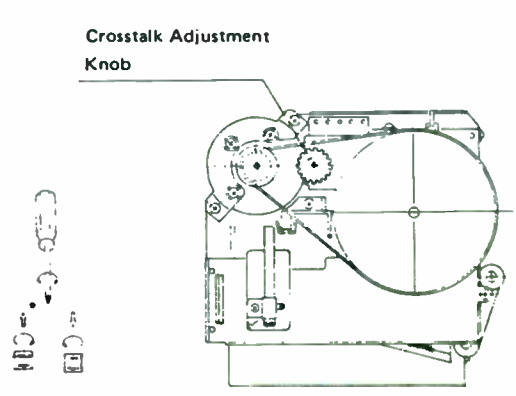
3.2 HEAD HEIGHT AND CROSS TALK ADJUSTMENT

1. Connect two VTVM's to the output of the left and right channels. (If two VTVM's are not available, use one VTVM alternately.)
2. Insert the Cross-Talk Alignment Tape, (RCA #327) into the tape slot and play back the tape.
3. Verify that the left and right signals recorded on various tracks on the test tape are obtained on the two VTVM's.
4. Adjust Head Height Adjustment knob (numbered "111" on the exploded view of Tape Mechanism Unit) for minimum and equal residual noises (cross-talk) on VTVM's.
5. Repeat steps 2, 3 and 4 above, if necessary.

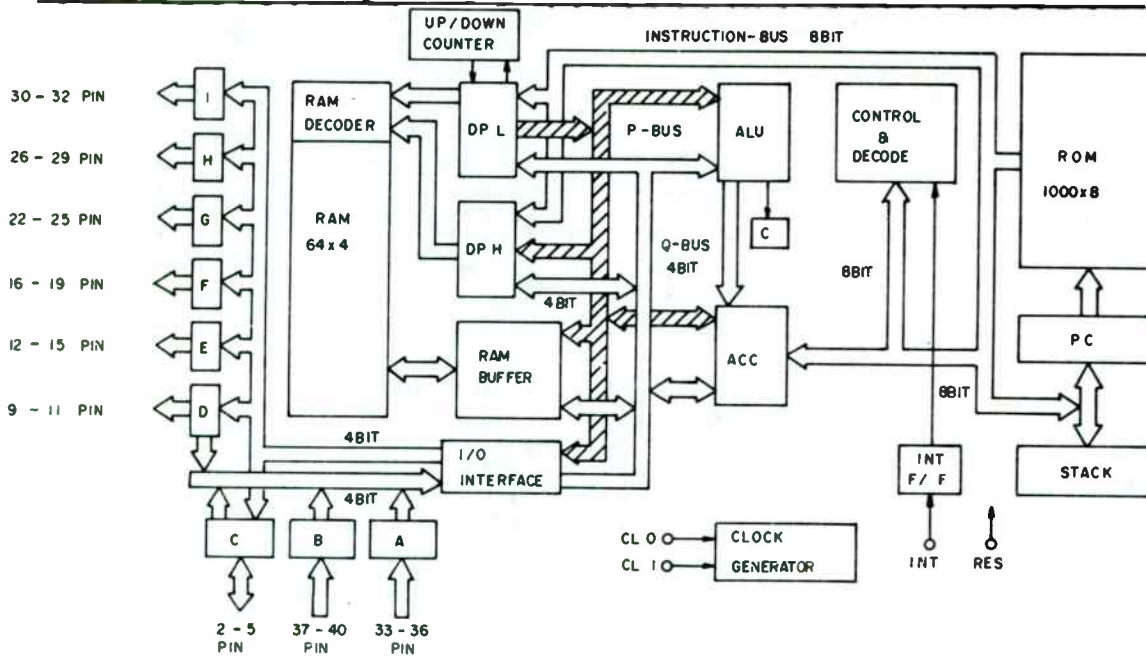
Azimuth Adjustment Location



Crosstalk (Head Height) Adjustment Location



CONTROLLER EQUIVALENT CIRCUIT BLOCK DIAGRAM



ALU: ARITHMETIC LOGIC UNIT, ACC: ACCUMULATOR,
PC : PROGRM COUNTER, DP : DATA POINTER,

PLL CIRCUIT BLOCK DIAGRAM

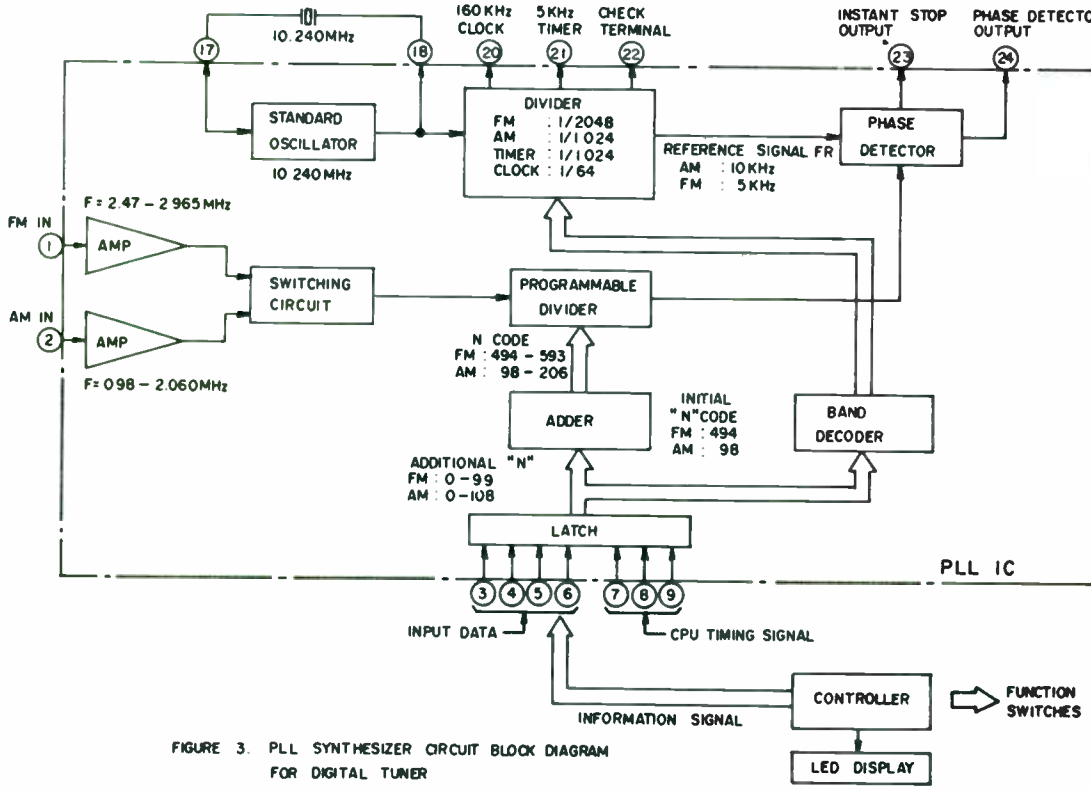
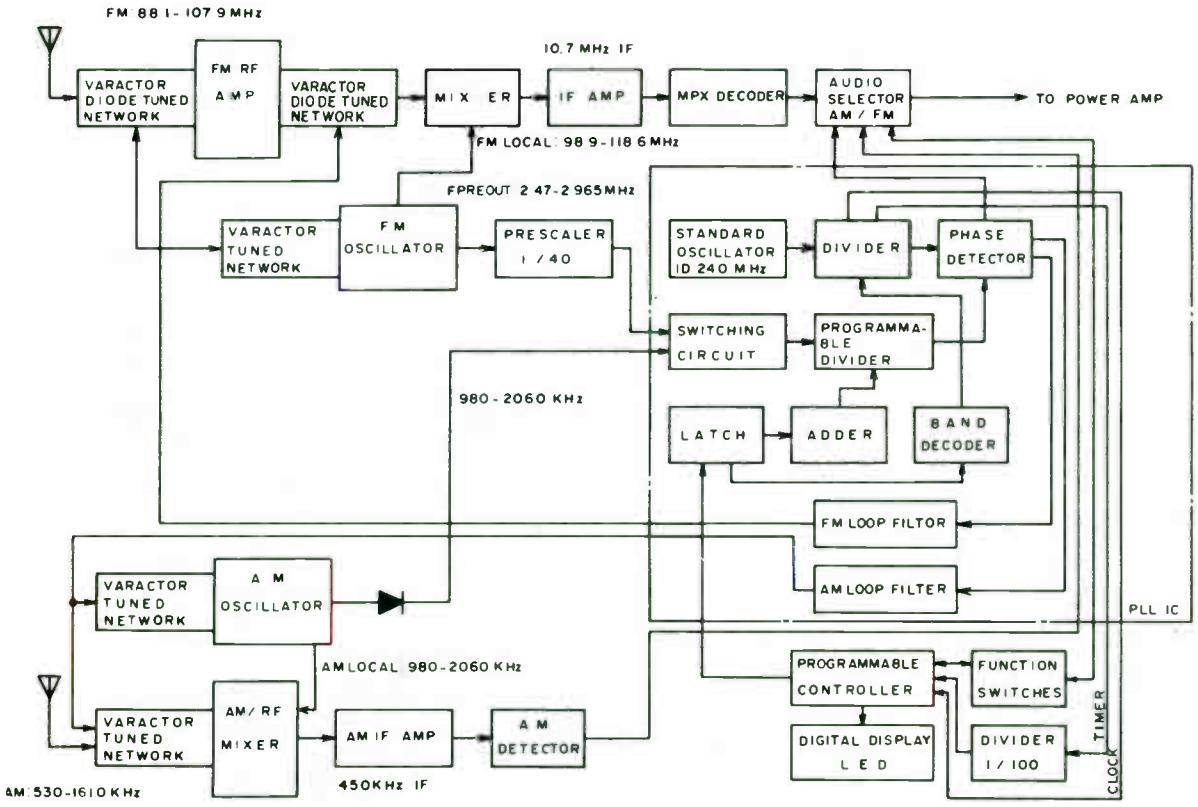
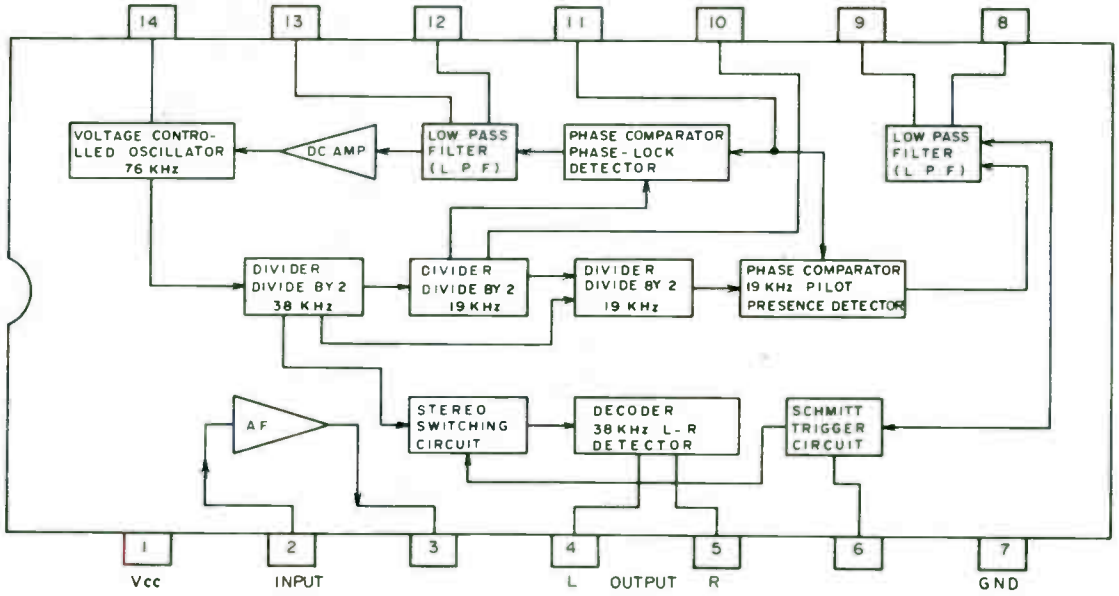


FIGURE 3. PLL SYNTHESIZER CIRCUIT BLOCK DIAGRAM FOR DIGITAL TUNER

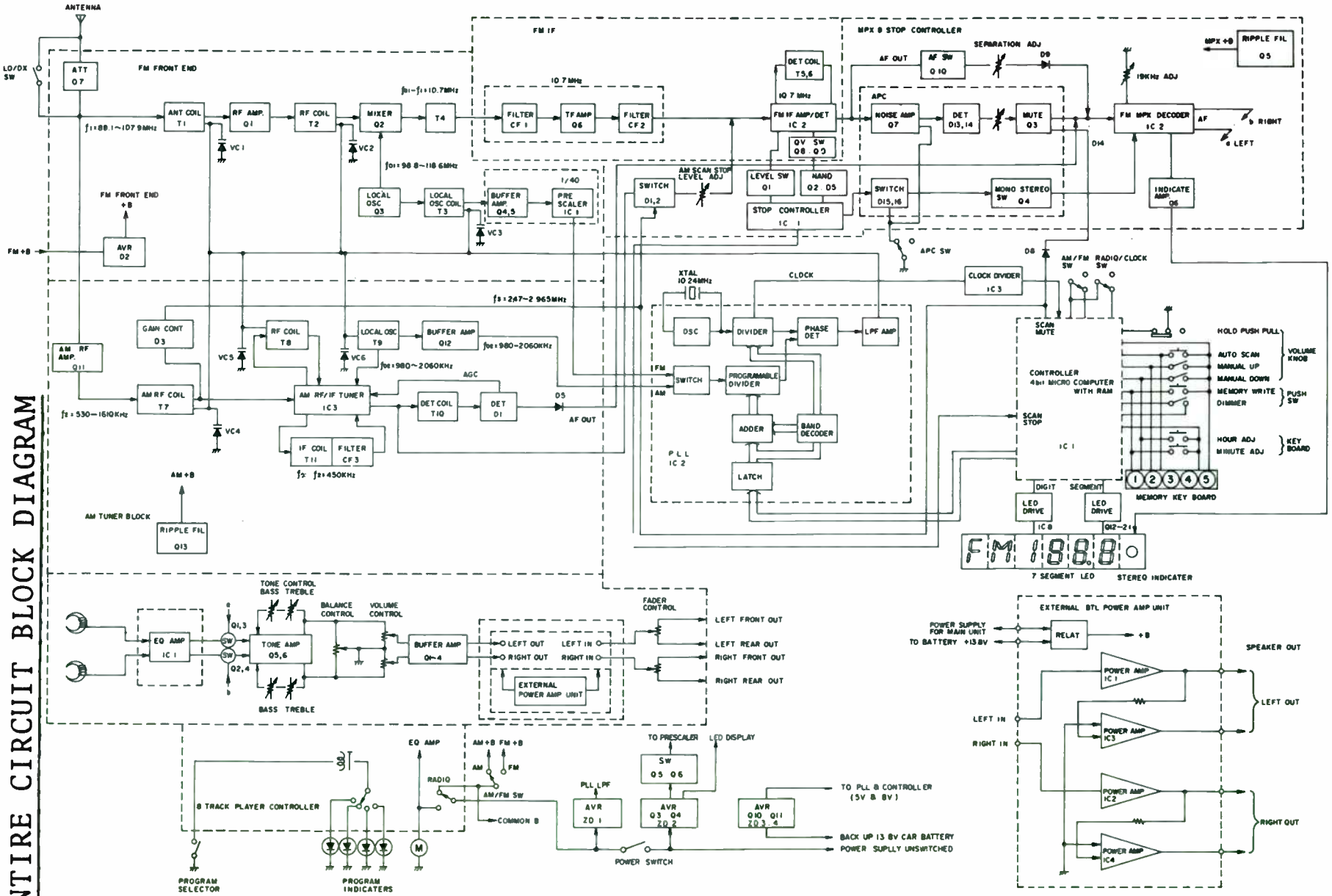
AM/FM DIGITAL TUNER BLOCK DIAGRAM



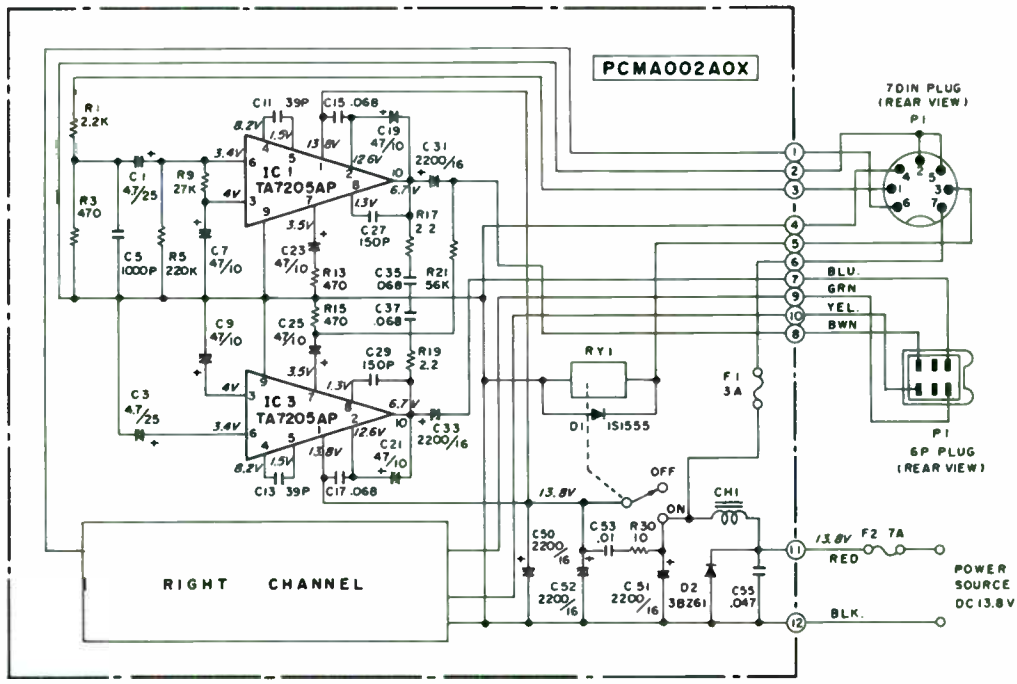
STEREO MPX DECODER (PLL) CIRCUIT BLOCK DIAGRAM

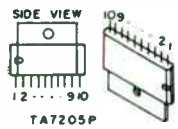


ENTIRE CIRCUIT BLOCK DIAGRAM



MODEL 67-550 AM/FM MPX RADIO
WITH 8 TRACK PLAYER

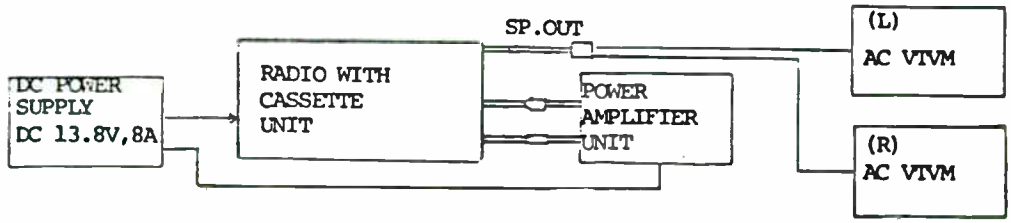


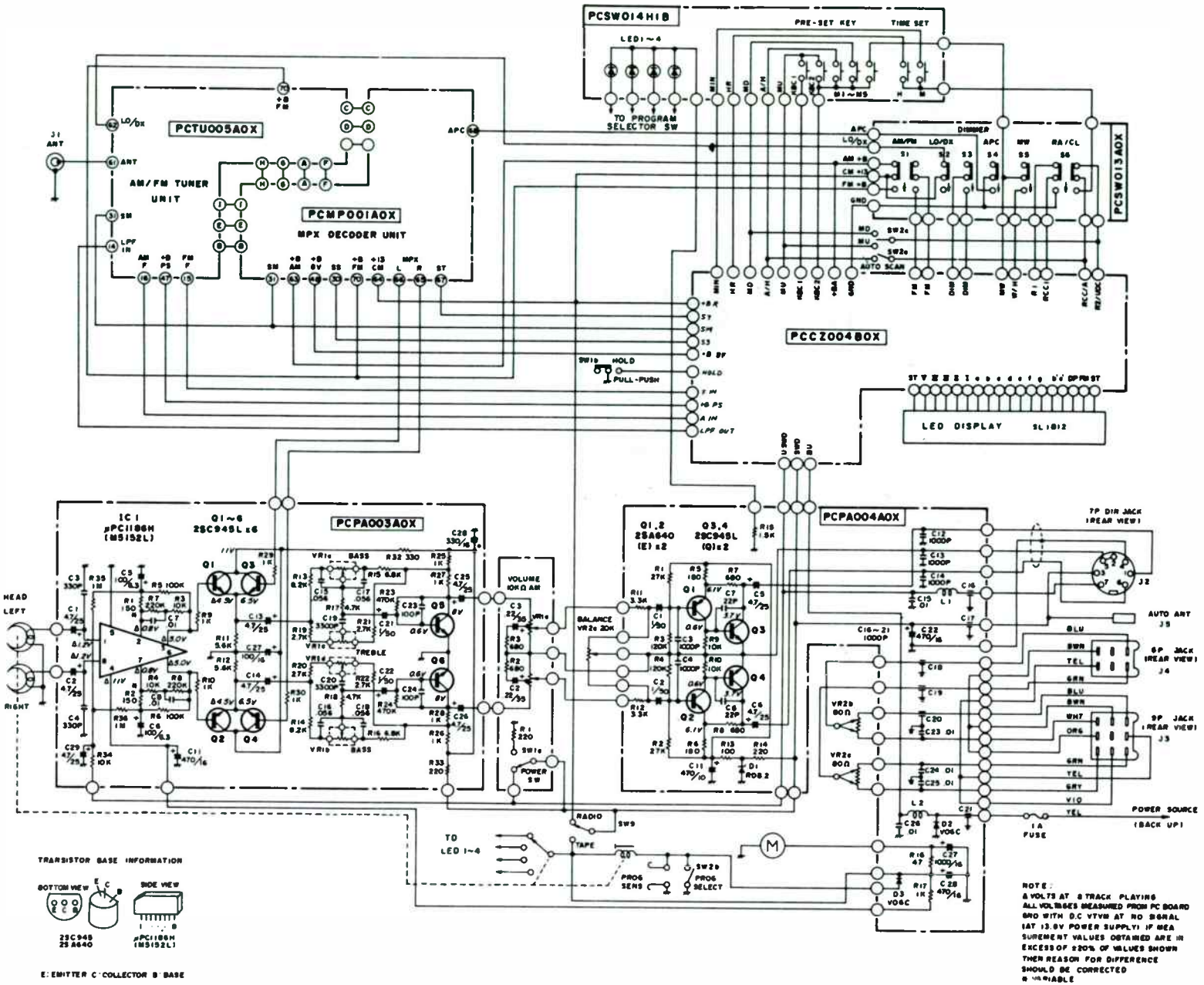


NOTE.
ALL VOLTAGES MEASURED FROM PC BOARD GND WITH DC VTVM AT NO SIGNAL (AT 13.8V POWER SUPPLY) IF MEASUREMENT VALUES OBTAINED ARE IN EXCESS OF ±20% OF VALUES SHOWN THEN REASON FOR DIFFERENCE SHOULD BE CORRECTED

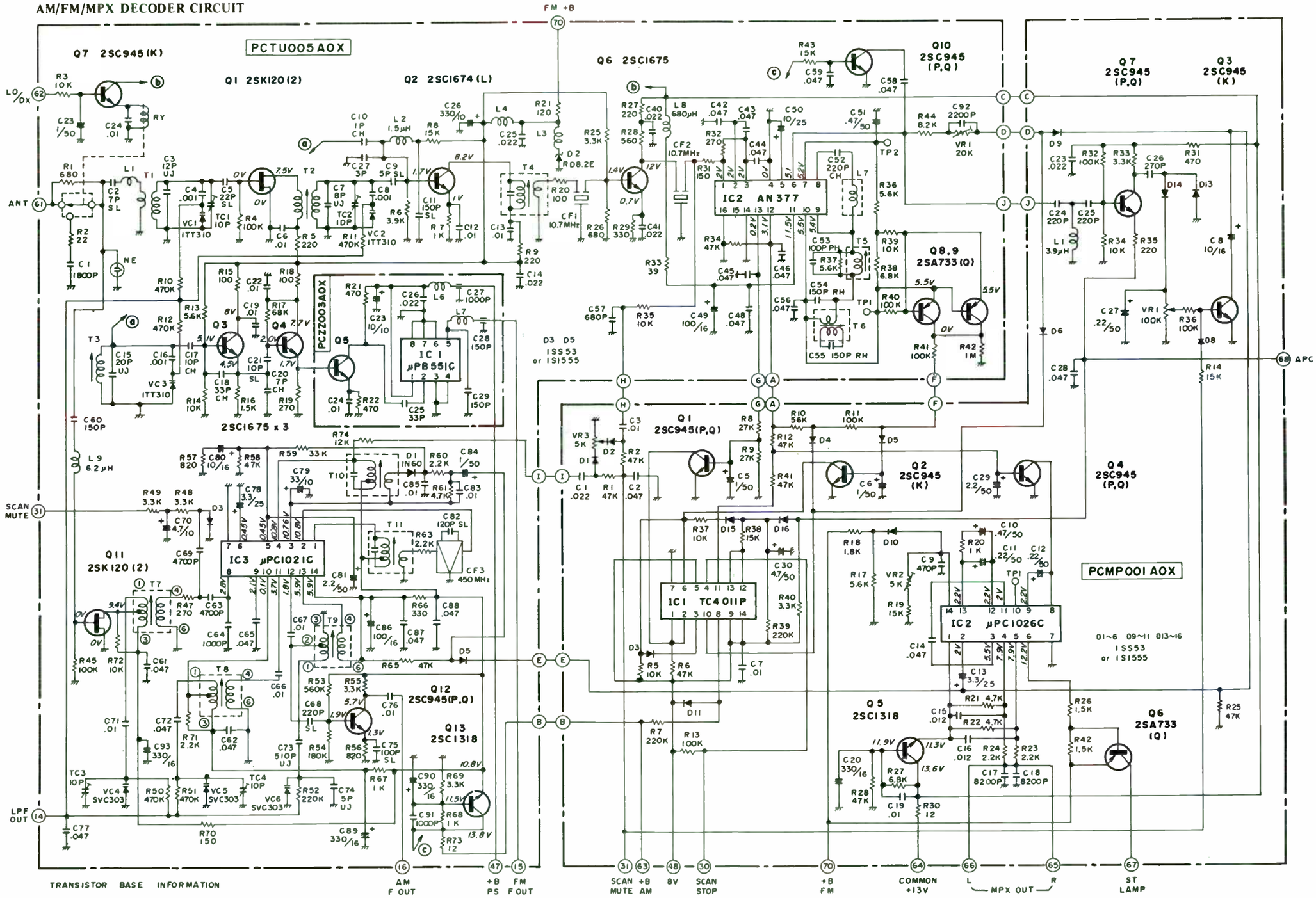
8 TRACK PLAYER ALIGNMENT TEST SETUP

Connect all test equipment as shown below;

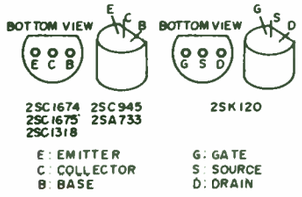




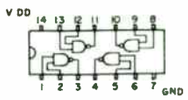
AM/FM/MPX DECODER CIRCUIT



TRANSISTOR BASE INFORMATION



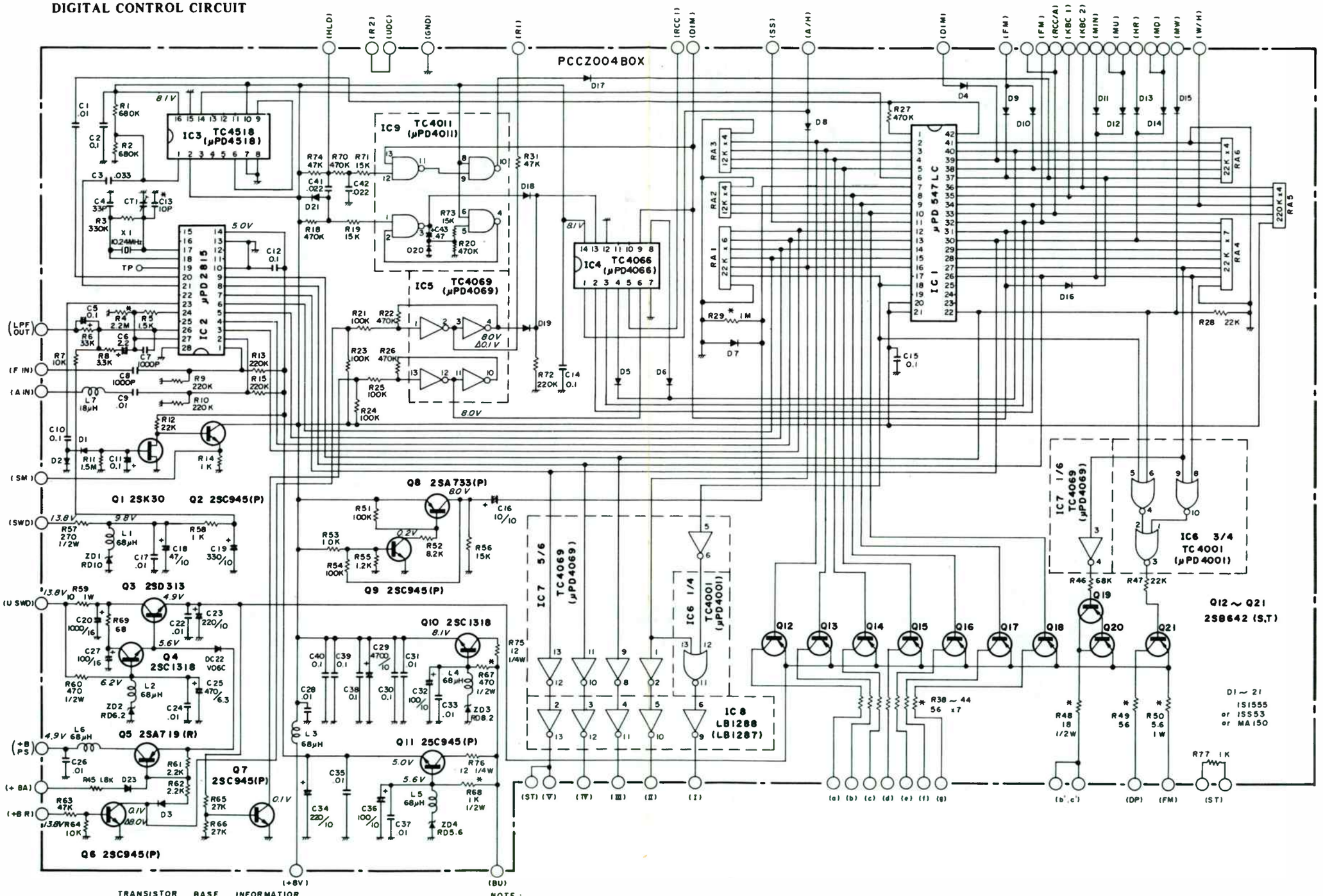
GATE IC



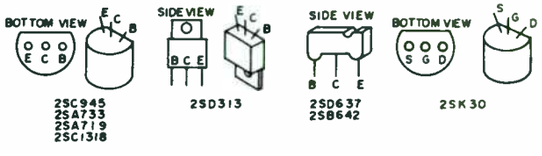
TRANSFORMER TERMINATION INFORMATION (BOTTOM VIEW)

NOTE,
ALL VOLTAGES MEASURED FROM PC BOARD GND WITH D.C VTVM AT NO SIGNAL (AT 13.8V POWER SUPPLY) IF MEASUREMENT VALUES OBTAINED ARE IN EXCESS OF ±20% OF VALUES SHOWN THEN REASON FOR DIFFERENCE SHOULD BE CORRECTED.

DIGITAL CONTROL CIRCUIT

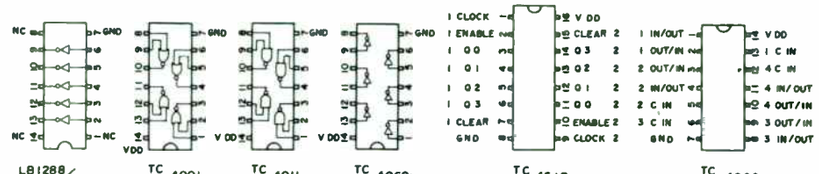


TRANSISTOR BASE INFORMATION



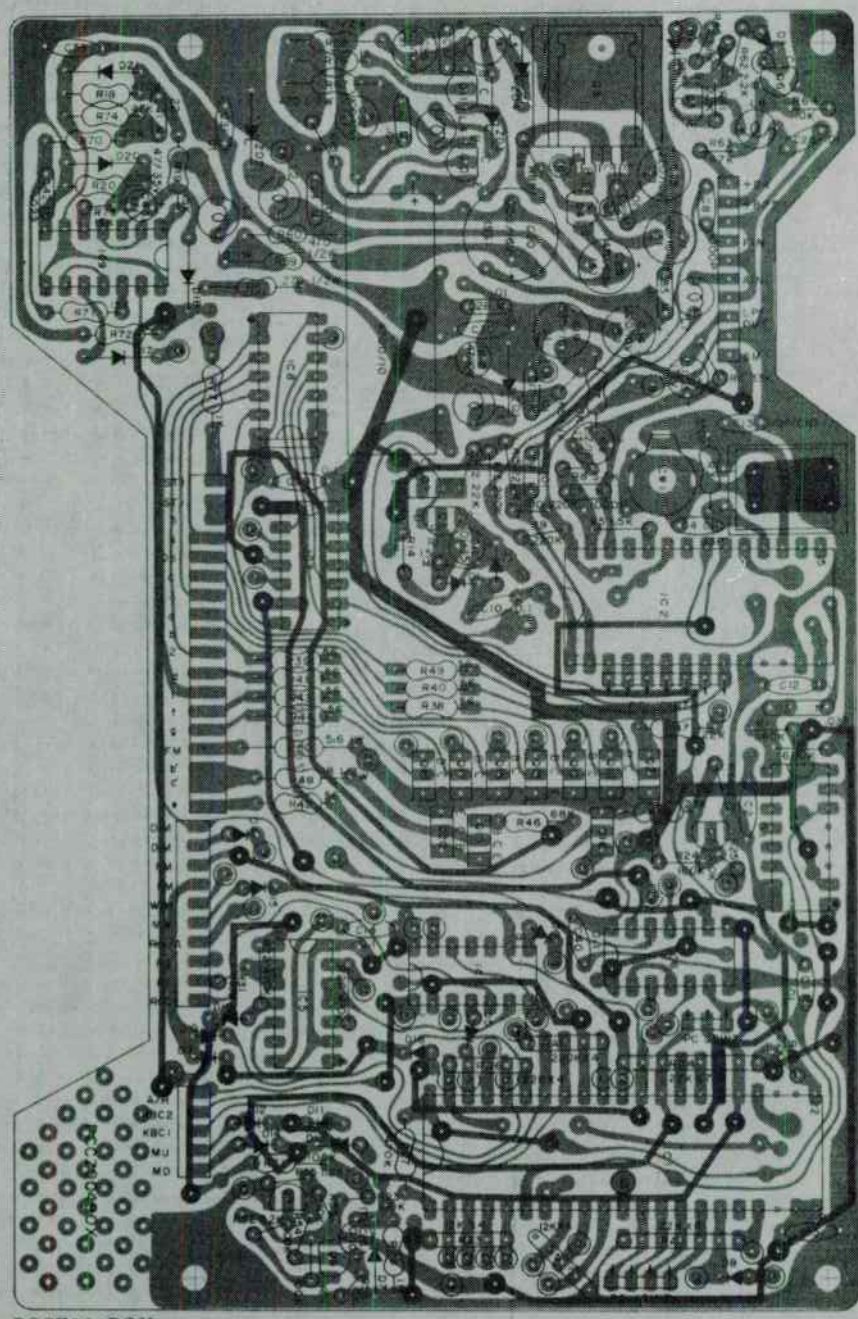
E : EMITTER C : COLLECTOR B : BASE S SOURCE G : GATE D : DRAIN

NOTE :
Δ VOLTS AT CLOCK DISPLAY CONDITION
ALL VOLTAGES MEASURED FROM PC BOARD GND WITH D.C VTVM AT NO SIGNAL (AT 13.8V POWER SUPPLY) IF MEASUREMENT VALUES OBTAINED ARE IN EXCESS OF ±20% OF VALUES SHOWN THEN REASON FOR DIFFERENCE SHOULD BE CORRECTED
* VARIABLE

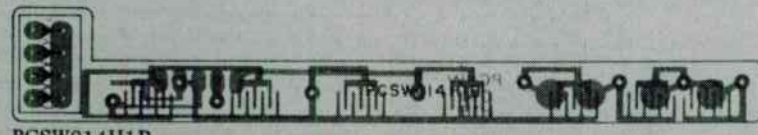


PC BOARD LAYOUT

COMPONENT SIDE

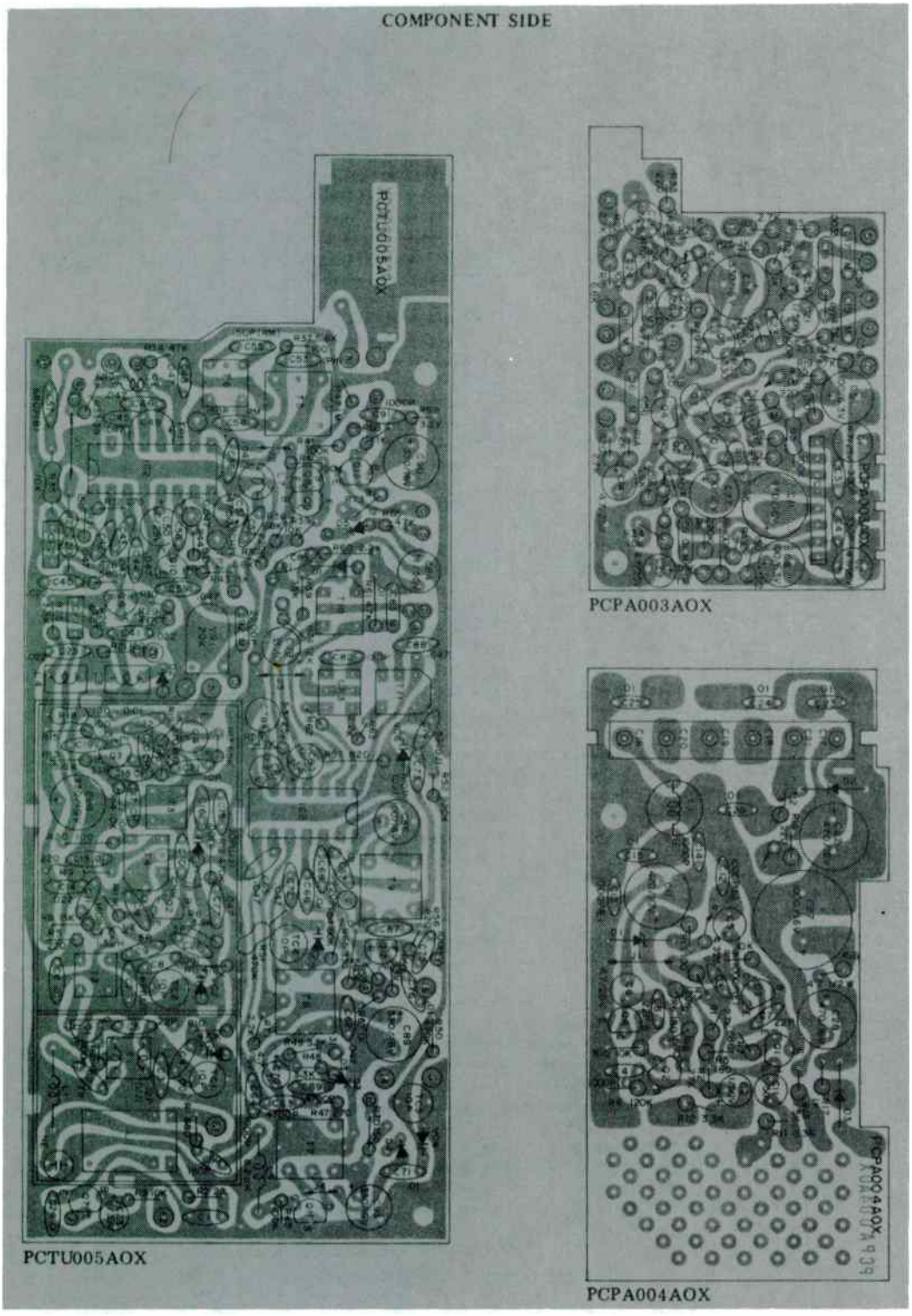


PCCZ004BOX



PCSW014H1B

COMPONENT SIDE

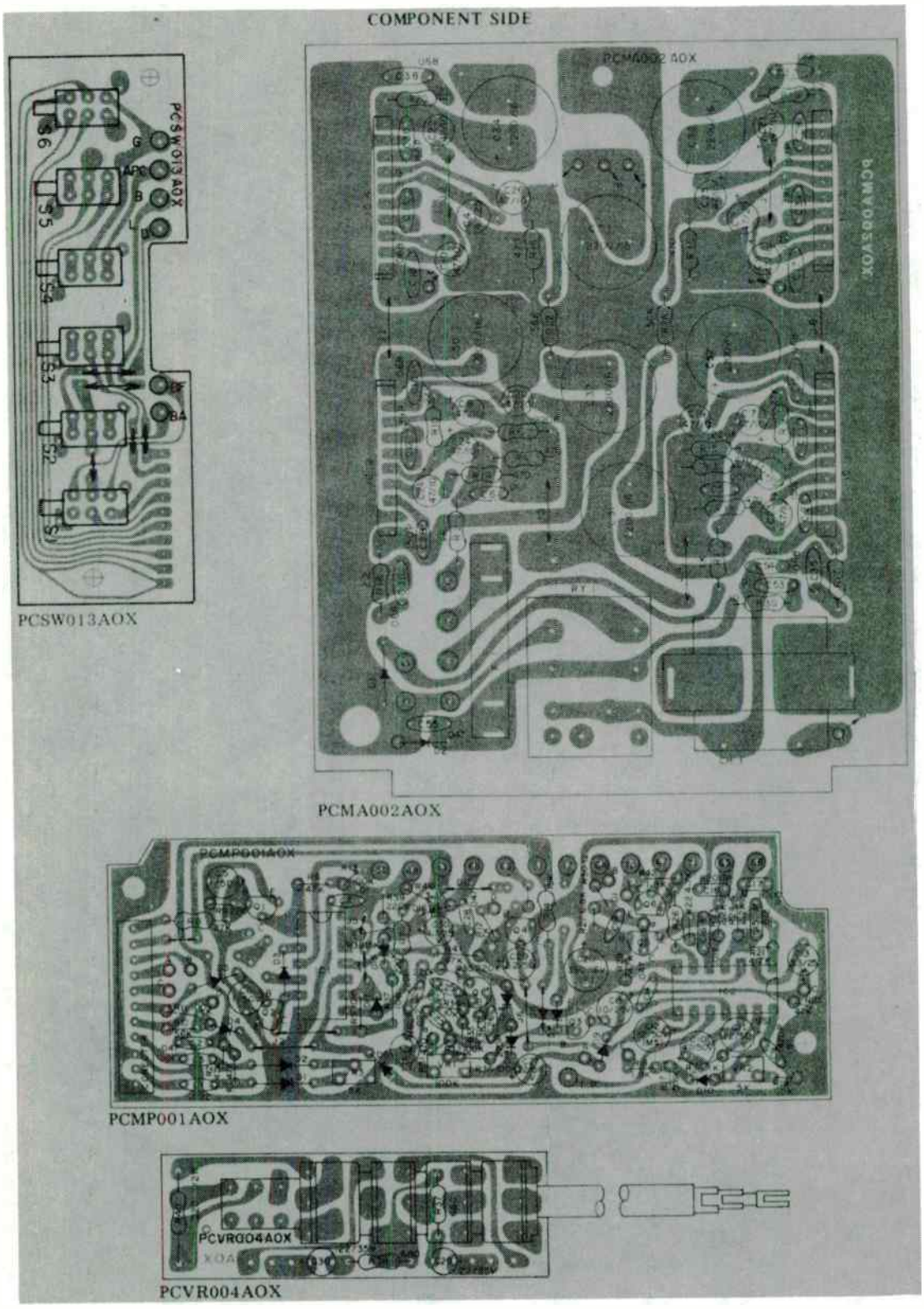


PCTU005AOX

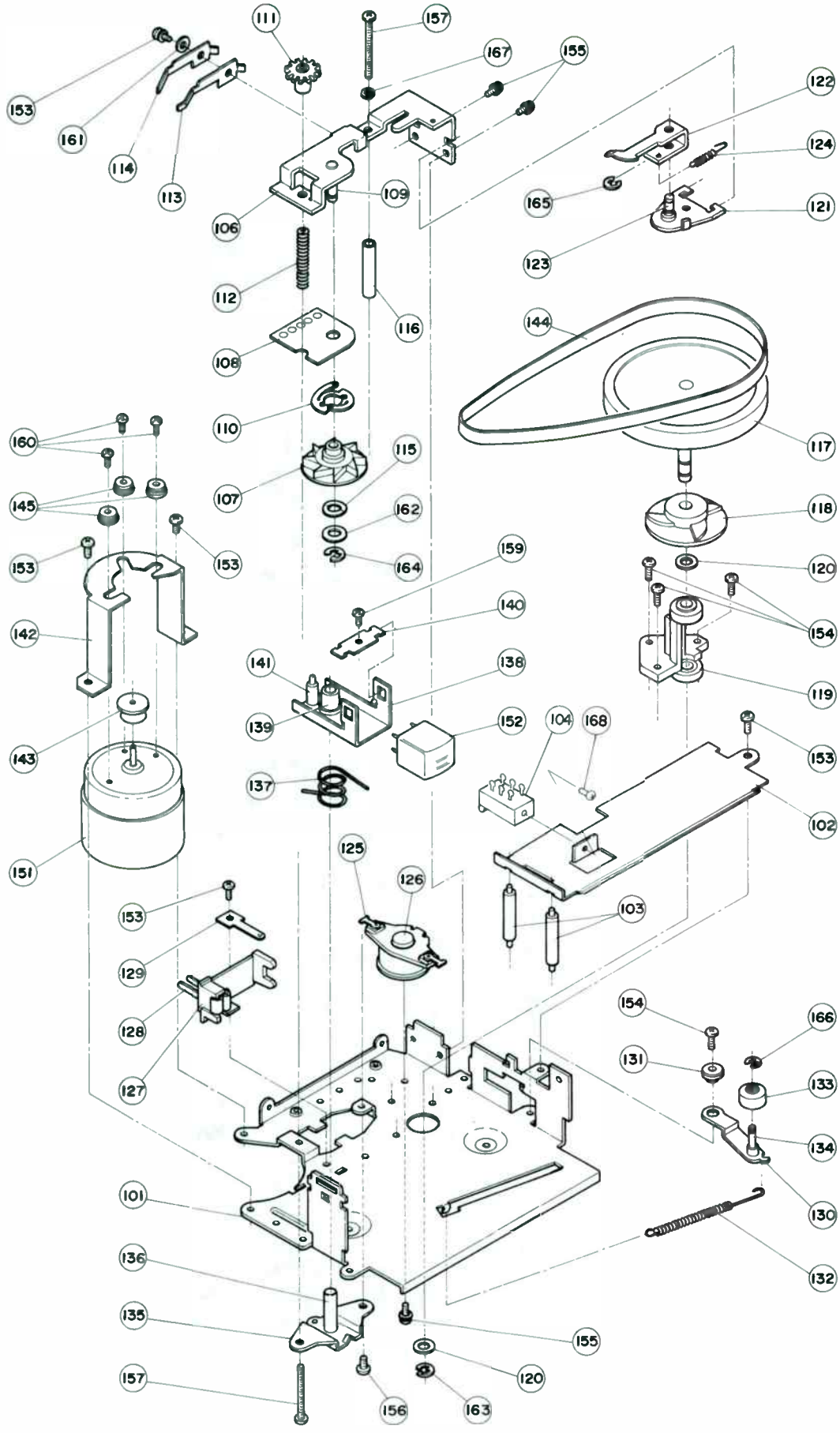
PCPA003AOX

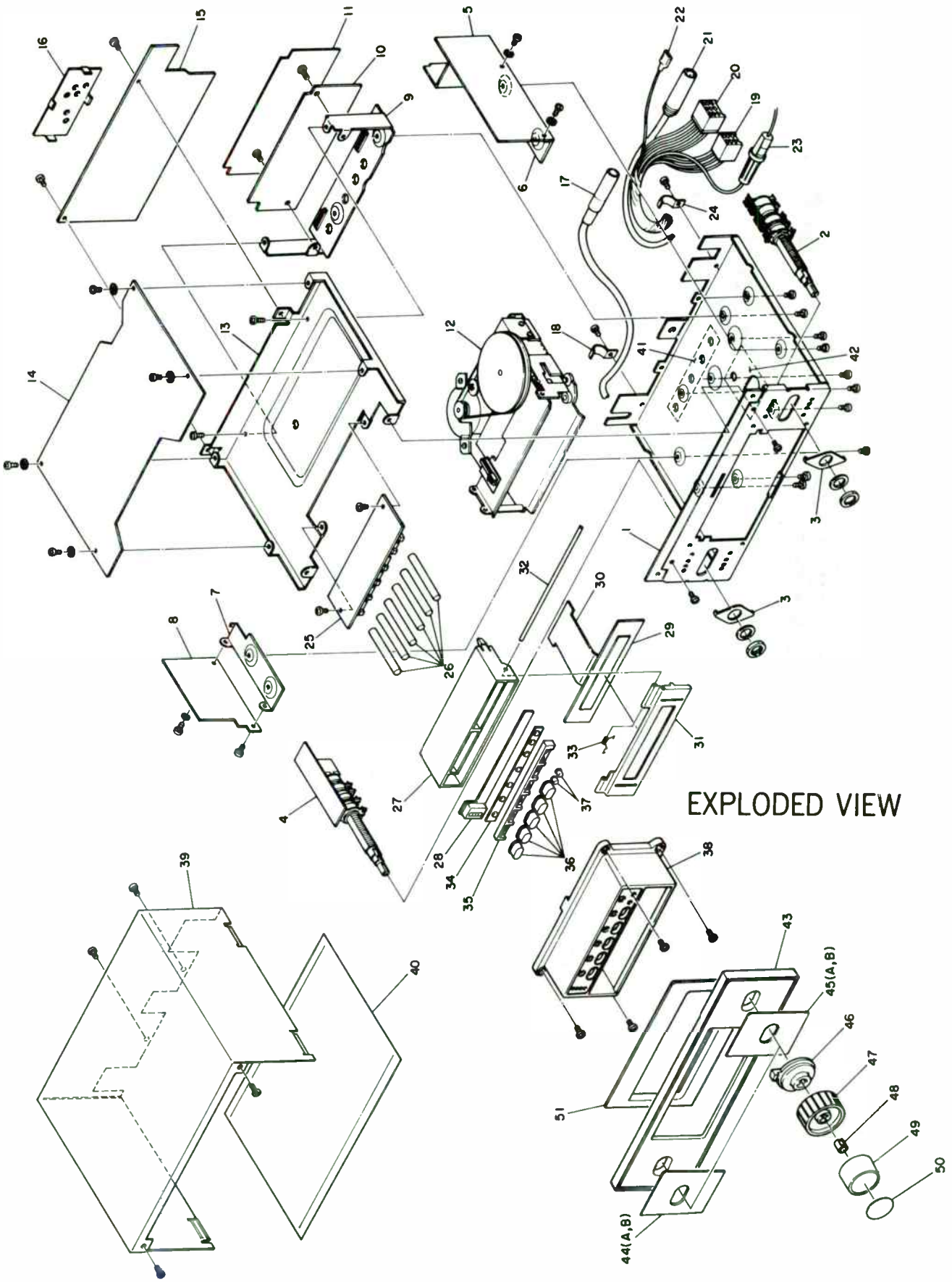
PCPA004AOX

COMPONENT SIDE



Tape Deck Exploded Mechanical View





PARTS LIST

MODEL NO. 67-550

REF. NO.	DESCRIPTION	PART NO.
	CASE PARTS (EXPLODED VIEW)	
3	Positioner, Volume Control	67-151001
6	Bracket, PC Board	67-158034
7	Bracket, Tone Board	67-158035
9	Bracket, Tuner	67-158036
11	Shield, PC Board	67-089020
16	Shield, Tuner	67-089021
18	Clamp, Cable	67-158003
24	Clamp, Cable	67-15800
26	Push Button	67-115018
27	Escutcheon, Inner	67-010006
31	Door, Tape Insert	67-018002
32	Shaft, Tape Door	67-156014
33	Spring, Tape Door Shaft	67-152027
34	Cushion, Push Button	67-157012
35	Spacer, Push Button	67-157018
36	Knob, Push Button	67-115016
37	Knob, Time Set	67-115017
38	Escutcheon, Outer	67-010007
39	Case, Top	67-011004
40	Insulator, Case Top	67-157013
41	Insulator, Chassis	67-157014
42	Insulator, Chassis	67-157015
43	Plate, Front	67-020011
44-B	Plate, Trim (Left)	67-020002
44-A	Plate, Trim (Left)	67-020004
45-B	Plate, Trim (Right)	67-020003
45-A	Plate, Trim (Right)	67-020005
46	Knob, Bass/Bal	67-115007
47	Knob, Treble/Fader	67-115008
48	Spring, Knob	67-158006
49	Knob, On/Off	67-115009
50	Plate, Knob	67-020006
51	Gasket, Front Plate (Rubber)	67-010003
	CASE PARTS (POWER AMPLIFIER)	
66	Heatsink, Case Sides	67-089003
72	Case, Bottom	67-016001
73	Case, Rear	67-013002
74	Clamp, Audio Cord	67-158007
75.	Case, Top	67-011001
76	Case, Front	67-010003
	MISCELLANEOUS	
2 (VR2)	Control, Fader	67-162001
29	LED, Readout	67-202004
30	Board, PC, Flexible	67-070011
	Bracket, Mobile Mount (Strap)	67-158008
	COMPLETE ASSEMBLIES	
	Power Amplifier, W/Case	67-075024
12	Tape Deck	67-075025
	PC BOARDS (COMPLETE WITH COMPONENTS)	
4	Board, PC, Volume Control	67-075026
5	Board, PC, Buffer	67-075027
8	Board, PC, Tone	67-075028
10	Board, PC, MPX	67-075029
14	Board, PC, Control	67-075030
15	Board, PC, Tuner	67-075031
25	Board, PC, Push Button	67-075032
28	Board, PC, Key Board	67-075033
	Board, PC, Pre-Scaler	67-075013
68	Board, Power Amplifier	67-075010
	CORDS	
17	Lead, Antenna	67-034004
19	Cord, Audio Output	67-034017
20	Cord, Speaker Output	67-034018
21	Cord, Din, Audio Input	67-034019
23	Cord, DC Power (Main Unit)	67-034006
69	Cord, DC Power (Power Supply)	67-034014
70	Cord, W/6 P Plug (Power Supply)	67-034020
71	Cord, Din Plug (Power Supply)	67-034007
19-A	Cord, Audio, Male to Unit	67-034011
20-A	Cord, Speaker Out, Male to Unit	67-034012
	RESISTORS	

ALL RESISTORS NOT SHOWN ON THIS PARTS LIST ARE CARBON TYPE, 1/4 WATT. REFER TO SCHEMATIC FOR SPECIFIC VALUES.

CAPACITORS

ALL CAPACITORS NOT SHOWN ON THIS PARTS LIST ARE CERAMIC DISC TYPE, 50 VOLT. REFER TO SCHEMATIC FOR SPECIFIC VALUES.

REF. NO.	DESCRIPTION	PART NO.
4	**VOLUME CONTROL BOARD (PCVR004A0X)**	
	CONTROL	
VR	Control, Volume/Tone	67-160001
	CAPACITORS	
C29,30	Tantalum, .22 uF, 35V	03-003030
	RESISTORS	
R40	Metal Oxide, 220 Ohm, 1/2 W	04-992210
5	**BUFFER BOARD (PCPA004A0X)**	
	COILS	
L1	Coil, Choke, 1.15 uH	79-176033
L2	Coil, RF	77-178003
	TRANSISTORS	
Q1,2	2SA640	01-010640
Q3,4	2SC945L	01-030945
	DIODES	
D1	RD8.2EB Zener	05-540082
D2,3	V06C	05-90006
	CAPACITORS	
	ELECTROLYTIC	
C1,2	1 uF, 50V	00-132055
C5,6	.7 uF, 25V	00-132800
C11	470 uF, 10V	00-132665
C22,28	470 uF, 16V	00-132675
C27	1000 uF, 16V	00-132210
8	**TONE BOARD (PCPA003A0X)**	
	TRANSISTORS	
Q1,2,3,4,5,6	2SC945L	01-030945
	INTEGRATED CIRCUITS	
IC1	UPC1186H	02-301186
	CAPACITORS	
	MYLAR	
C7,8	.01 uF, 50V	03-000205
C15,16,17,18	.056 uF, 50V	03-000350
C19,20	3300 PF, 50V	03-000381
	ELECTROLYTIC	
C1,2,13,14, 25,26,29	4.7 uF, 25V	00-132600
C5,6	100 uF, 6.3V	00-132160
C11	470 uF, 16V	00-132675
C21,22	1 uF, 50V	00-132055
C27	100 uF, 16V	00-132175
C28	330 uF, 16V	00-132540
10	**MPX BOARD (PCMP001A0X)**	
	MISCELLANEOUS	
	Terminal, PC Board	67-159005
	Plug, PC Board, 10 Pin	67-159006
	COILS AND TRANSFORMERS	
L1	Coil, Choke	67-176013
	CONTROLS	
VR1	Control, Sensitivity	67-164004
VR2	Control, Sensitivity, 5K Ohm	77-164008
	INTEGRATED CIRCUITS	
IC1	TC4011C	02-264011
IC2	UPC1026C	02-301026

PARTS LIST

MODEL NO. 67-550 PAGE 2

REF. NO.	DESCRIPTION	PART NO.
	TRANSISTORS	
Q1,2,3,4,7	2SC945A	01-030945
Q5	2SC1318	01-031318
Q6	2SA733	01-010733
	DIODES	
D1,2,3,4,5,6, 8,9,10,11, 13,14,15,16	1SS53	05-180053
	CAPACITORS	
	MYLAR	
C15,16	.012 uF, 50V	03-000331
C17	8200 PF, 50V	03-000388
	STYROL	
C9	470 PF, 100V	03-009065
	ELECTROLYTIC	
C5,6	1 uF, 50V	00-132055
C8	10 uF, 25V	00-132120
C11,12,27	.22 uF, 50V	00-132255
C13	3.3 uF, 25V	00-132465
C10	.47 uF, 50V	00-132575
C20	330 uF, 16V	00-132540
C29	2.2 uF, 50V	00-132280
C30	4.7 uF, 25V	00-132600
14	CONTROL BOARD (PCC2004B0X)	
	MISCELLANEOUS	
	Heatsink, 2SD313	67-089004
	Connector, PC Board, Flexible	67-070012
	Connector, PC Board, Flexible	67-070015
	Plug, PC Board Connector	67-159007
	Insulator, PC Board	67-157004
	Insulator, Shield	67-157016
	TRIMMER CAPACITOR	
CT1	Capacitor, Trimmer, 30 PFd	67-123002
	COILS AND TRANSFORMERS	
L1,2,3,4,5,6	Coil, Choke, 68 uH	67-178003
L7	Coil, RF	67-176021
	CRYSTAL	
X1	Crystal, 10.240 MHz	67-128001
	INTEGRATED CIRCUITS	
IC1	UPD547LC	02-390547
IC2	UPD2815C	02-392815
IC3	UPD4518	02-394518
IC4	UPD4066C	02-394066
IC5,7	UPD4069C	02-394069
IC6	UPD4001C	02-394001
IC8	HA1288	02-151288
IC9	UPD4011C	02-394011
	TRANSISTORS	
Q1	2SK30 FET	01-070030
Q2,6,7,9,11	2SC945	01-030945
Q3	2SD313	01-040313
Q4,10	2SC1318	01-031318
Q5	2SA719R	01-010719
Q8	2SA733P	01-010733
Q12,13,14,15, 16,17,18,19, 20,21	2SB642	01-020642
	DIODES	
D1,2,3,4,5,6, 7,8,9,10,11, 12,13,14,15, 16,17,18,19, 20,21,23	1SS53	05-180053
D22	V06C	05-900006
ZD1	RD10EB Zener	05-540010
ZD2	RD6.2EB Zener	05-540062
ZD3	RD8.2EC Zener	05-540082
ZD4	RD5.6EB Zener	05-540056

REF. NO.	DESCRIPTION	PART NO.
	RESISTOR MODULES	
RA1	Module, Resistor, 22K Ohm	67-130007
RA2,3	Module, Resistor, 12K Ohm	67-130002
RA4	Module, Resistor, 22K Ohm	67-130008
RA5	Module, Resistor, 220K Ohm	67-130009
RA6	Module, Resistor, 22K Ohm	67-130010
	RESISTORS	
	METAL OXIDE	
R48	18 Ohm, 1/2 W	04-991800
R50	5.6 Ohm, 1 W	04-015640
R57	270 Ohm, 1/2 W	04-992710
R59	10 Ohm, 1 W	04-011100
R60,67	470 Ohm, 1/2 W	04-994710
R68	1K Ohm, 1/2 W	04-990130
	CAPACITORS	
	MYLAR	
C1,9,17,22,24, 28,33,35,37	.01 uF, 50V	03-000205
C7	1000 PF, 50V	03-000369
C3	.033 uF, 50V	03-000266
C41,42	.022 uF, 50V	03-000240
	TANTALUM	
C5,11	.1 uF, 35V	03-003035
C6	2.2 uF, 16V	03-003043
C16	10 uF, 10V	03-003055
C43	.47 uF, 35V	03-003026
	ELECTROLYTIC	
C18	47 uF, 10V	00-132625
C19	330 uF, 10V	00-132535
C20	1000 uF, 16V	00-132210
C23,34	220 uF, 10V	00-132370
C25	470 uF, 6.3V	00-132660
C27	100 uF, 16V	00-132175
C29	4700 uF, 10V	00-132688
C32,36	100 uF, 10V	00-132165
15	TUNER BOARD (PCTU005A0X)	
	MISCELLANEOUS	
	Cord, Connector, Ass'y.	67-034021
	Shield, Tuner, #1	67-089022
	Shield, Tuner, #3	67-089023
NE	Lamp	67-201001
RY	Relay	67-105001
	COILS AND TRANSFORMERS	
L1	Coil, RF	67-176017
L2	Coil, RF, 1.5 uH	67-176011
L3,4	Coil, RF, 68 uH	13-178210
L7	Coil, RF, 22 uH	67-176012
L8	Coil, RF, 680 uH	67-176015
L9	Coil, RF, 6.2 uH	67-176014
T1,2	Transformer, RF	67-176002
T3	Coil, FM Oscillator	67-176003
T4	IFT, FM	67-176004
T5	IFT, FM	67-176005
T6	IFT, AM	67-176010
T7,8	Transformer, AM RF	67-176006
T9	Transformer, AM Oscillator	67-176007
T10	IFT, AM	67-176009
T11	IFT, AM	67-176008
	TRANSISTORS	
Q1,11	2SK120 FET	01-070120
Q2	2SC1674	01-031674
Q3,4,6	2SC1675	01-031675
Q7	2SC945	01-030945
Q8,9	2SA733	01-010733
Q10,11	2SC945A	01-030945
Q13	2SC1318	01-031318
	INTEGRATED CIRCUITS	
IC2	HA1137	02-091137
IC3	UPC1021C	02-301021

PARTS LIST

MODEL NO. 67-550

REF. NO.	DESCRIPTION	PART NO.
	DIODES	
D1	1N60	05-170060
D2	RD8.2EB	05-540082
D3,5	1SS53	05-180053
	VARICAP DIODES	
VC1,2,3	ITT310	05-200310
VC4,5,6	SVC303	05-780303
	CERAMIC FILTERS	
CF1,2	Filter, Ceramic, 10.7 Mhz	67-179001
CF3	Filter, Ceramic, 450 KHz	67-179002
	CONTROLS	
VR1	Control, Sensitivity, 20K Ohm	13-164134
	TRIMMER CAPACITORS	
TC1,2,3,4	Capacitor, Trimmer, 10 PF	67-123001
	CAPACITORS	
	TANTALUM	
C23	1 uF, 35V	03-003039
C70	4.7 uF, 16V	03-003020
	MYLAR	
C1	1800 PF, 50V	03-000371
C83	.01 uF, 50V	03-000205
C92	2200 PF, 50V	03-000374
	ELECTROLYTIC	
C26	330 uF, 10V	00-132535
C50,80	10 uF, 25V	00-132120
C49	100 uF, 16V	00-132175
C51	.47 uF, 50V	00-132575
C78	3.3 uF, 25V	00-132465
C79	33 uF, 10V	00-132505
C81	2.2 uF, 50V	00-132280
C84	1 uF, 50V	00-132055
C86	100 uF, 16V	00-132175
C89,90,93	330 uF, 16V	00-132540
25	**PUSH BUTTON SWITCH BOARD (PSCW013A0X)**	
	SWITCHES	
S1,2,3,4,6	Switch, AM/FM, LO/DX, DIM, APC, RA/CL	67-183005
S5	Switch, MW	67-183006
28	**KEY BOARD (PCSW014H1B)**	
	LED, Tape Indicator	67-202005
	Spacer, LED	67-157017
	Connector, PC Board	67-159008
68	**POWER AMPLIFIER BOARD (PCMA002A0X)**	
	MISCELLANEOUS	
RY1	Relay	67-105002
CH1	Coil, Choke	67-178001
F1	Fuse, 3A, 250V	13-204017
	INTEGRATED CIRCUITS	
IC1,2,3,4	TA7205	02-257205
	DIODES	
D1	1SS53	05-180053
D2	3BZ61	05-060361
	CAPACITORS	
	MYLAR	
C53	.01 uF, 50V	03-000205
C54	.047 uF, 50V	03-000300
C15,16,17,18, 35,36,37,38	.068 uF, 50V	03-000356
C5,6	1000 PF, 50V	03-000369
C10,19,20,21, 22,23,24,25, 26,7,8,9	47 uF, 10V	00-132625
C31,32,33,34, 50,51,52	2200 uF, 16V	00-132345
C1,2,3,4	4.7 uF, 25V	00-132600
	PRE-SCALER BOARD (PCZZ003A0X)	
	MISCELLANEOUS	
	Shield, Trimmer Ass'y.	67-089013
	Shield, Pre-Scaler I	67-089014
	Shield, Pre-Scaler II	67-089015
	COILS	
L6,7	Coil, Peaking	67-176016
	TRANSISTOR	
Q5	2SC1675	01-031675
	INTEGRATED CIRCUIT	
IC1	UPD551C	02-390551
	CAPACITORS	
C23	10 uF, 6.3V, Tantalum	03-003059

TAPE DECK (EXPLODED VIEW)

104	Switch, Slide	67-183011
111	Cam, Adjustment	67-156015
112	Spring, Adjustment	67-152028
113	Spring, Leaf	67-152031
117	Flywheel	67-199013
118	Cam, Channel Change	67-156016
122	Lever, Select	67-155012
124	Spring, Change Lever	67-152029
125	Solenoid	67-105005
128	Switch, Tape Sensing	67-183012
132	Spring, Pressure	67-152030
133	Roller, Capstan	67-199012
130	Arm, Capstan Pressure Roller	67-155013
137	Spring, Head Support	67-152032
138	Bracket, Head Holder	67-158038
144	Belt, Drive	67-198003
151	Motor	67-190003
152	Head	67-193003

HOW AND WHERE TO ORDER REPLACEMENT PARTS

NOTE: To eliminate error and speed delivery of replacement parts, always include the following information on your order:

1. Complete identification of merchandise for which the part is wanted.
   - A. Model Number
   - B. Serial Number
2. Best possible identification of the part itself.
   - A. Part Number
   - B. Schematic Reference Number
   - C. Part Description
   - D. Quantity Requested
   - E. If necessary, return old part as sample.
3. Customer should use address listed below when ordering replacement parts.

MIDLAND
CUSTOMER SERVICE (PARTS DEPT.)
1690 NORTH TOPPING AVENUE
KANSAS CITY, MISSOURI 64120

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 & 2.
- Indicator: Output meter (AC voltmeter)
  VTVM
  Oscilloscope
  Frequency Counter
- Power Source Voltage: DC 13.8 V (standard voltage for measurement)

AM I-F & FM I-F ALIGNMENT USING SWEEP GENERATOR

- Set Volume Control at maximum, and Bass & Treble Control in the maximum position.
- Set Balance Control in center.
- Set Fader Control in center.
- Set RADIO/CLOCK Selector Switch in the RADIO position.
- Set DX/LOCAL Selector Switch in the DX position.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1 & 2)
- Keep the signal generator output low enough to prevent overloading the circuit.

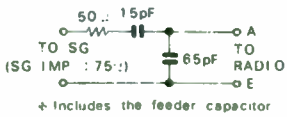


Fig. 1 Antenna Pad

Fig. 2 Antenna Pad

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	RADIO DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
AM I-F	❶ ~ ❹	450 kHz (Unmodulated or 400 Hz Mod.)	AM	Point of non-interference (on/about 600 kHz)	Through pad (Fig. 1) to antenna receptacle	VTVM between Test Point ⑨ and ground	IFT104 ~ IFT101	Adjust for maximum
FM I-F	❺ ~ ❼	10.7 MHz (Unmodulated or 400 Hz Mod.)	FM	Point of non-interference (on/about 90 MHz)	Through pad (Fig. 2) to antenna receptacle	VTVM between Test Point ④ and ground	IFT51 IFT151 IFT152	Adjust for maximum amplitude and proper linearity between ±100 kHz markers.
	❽ ~ ❾	〃	〃	〃	〃	VTVM between Test Point ⑤ and ground	IFT51 IFT151	

- Repeat steps, two or three times.

AM VARACTOR & FM VARACTOR ALIGNMENT USING VTVM

- Volume, Bass, Treble, Balance and Fader Control may be left in any positon.
- Set RADIO/CLOCK Selector Switch in the RADIO position.

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	INDICATOR CONNECTION	RADIO DIAL SETTING	ADJUST	REMARKS
AM Var.	❿	no signal input	AM	VTVM between Test Point ⑪ and ground	530 kHz	RFT103	Adjust to 1.0 V.
	⓫				1610 kHz	C118	Adjust to 27.0 V.
FM Var.	⓬	no signal input	FM	VTVM between Test Point ⑪ and ground	88.1 MHz	L52	Adjust to 2.3 V.
	⓭				107.9 MHz	C71	Adjust to 20.0 V.

- Repeat steps, two or three times.

AM RF & FM RF ALIGNMENT USING SIGNAL GENERATOR

- Set Volume Control at maximum, and Bass & Treble Control in the maximum position.
- Set Balance Control in center.
- Set RADIO/CKOCK Selector Switch in the RADIO position.
- Set DX/LOCAL Selector Switch in the DX position.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1 & 2)
- Keep the signal generator output low enough to prevent overloading the circuit.

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	RADIO DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
AM RF	⑬ ~ ⑭	1400 kHz [400 Hz Mod.]	AM	Tune to signal	Through pad (Fig. 1) to antenna receptacike	Output meter across speaker terminals	C114 C108	Adjust for maximum
	⑮ ~ ⑯	600 kHz [400 Hz Mod.]		,,		,,	RFT102 RFT101	
FM RF	⑰ ~ ⑱	107.9 MHz [400 Hz Mod.]	FM	,,	Through pad (Fig. 2) to antenna receptacle	,,	C60 C55	Adjust for maximum
	⑲ ~ ⑳	88.1 MHz [400 Hz Mod.]		,,		,,	RFT52 RFT51	

- Repeat steps, two or three times.

AM TRIGGER & FM TRIGGER ALIGNMENT USING SWEEP GENERATOR

- Volume, Bass, Treble, Balance and Fader Control may be left in any position.
- Set RADIO/CLOCK Selector Switch in the RADIO position.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1 & 2)
- Keep the signal generator output low enough to prevent overloading the circuit.

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	RADIO DIAL SETTING	SIGNAL FEED POINT	INDICATOR CONNECTION	ADJUST	REMARKS
AM Tri.	㉑	450 kHz [Unmodulated or 400 Hz Mod.]	AM	Point of non-interference	Through pad (Fig. 1) to antenna receptacle	VTVM between Test Point ③ (TP3) and ground	IFT602	Adjust for maximum
FM Tri.	㉒ ~ ㉓	10.7 MHz [Unmodulated or 400 Hz Mod.]	FM	Point of non-interference	Through pad (Fig. 2) to antenna receptacle	VTVM between Test Point ③ (TP3) and ground	IFT604 IFT603 IFT601	Adjust for maximum

AM SEARCH & FM SEARCH ALIGNMENT USING SIGNAL GENERATOR

- Volume, Bass, Treble, Balance and Fader Control may be left in any position.
- Set RADIO/CLOCK Selector Switch in the RADIO position.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 1 & 2)

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	SIGNAL FEED POINT	ADJUST	REMARKS
AM Sea.	㉔	1000 kHz [400 Hz Mod.] 20 dB/μV input	AM	Through pad (Fig. 1) to antenna receptacle	VR601	Adjust VR601 to search the input signal.
FM Sea.	㉕	98.1 MHz [400 Hz Mod.] 18 dB/μV input	FM	Through pad (Fig. 2) to antenna receptacle	C162	Adjust C162 to search the input signal.

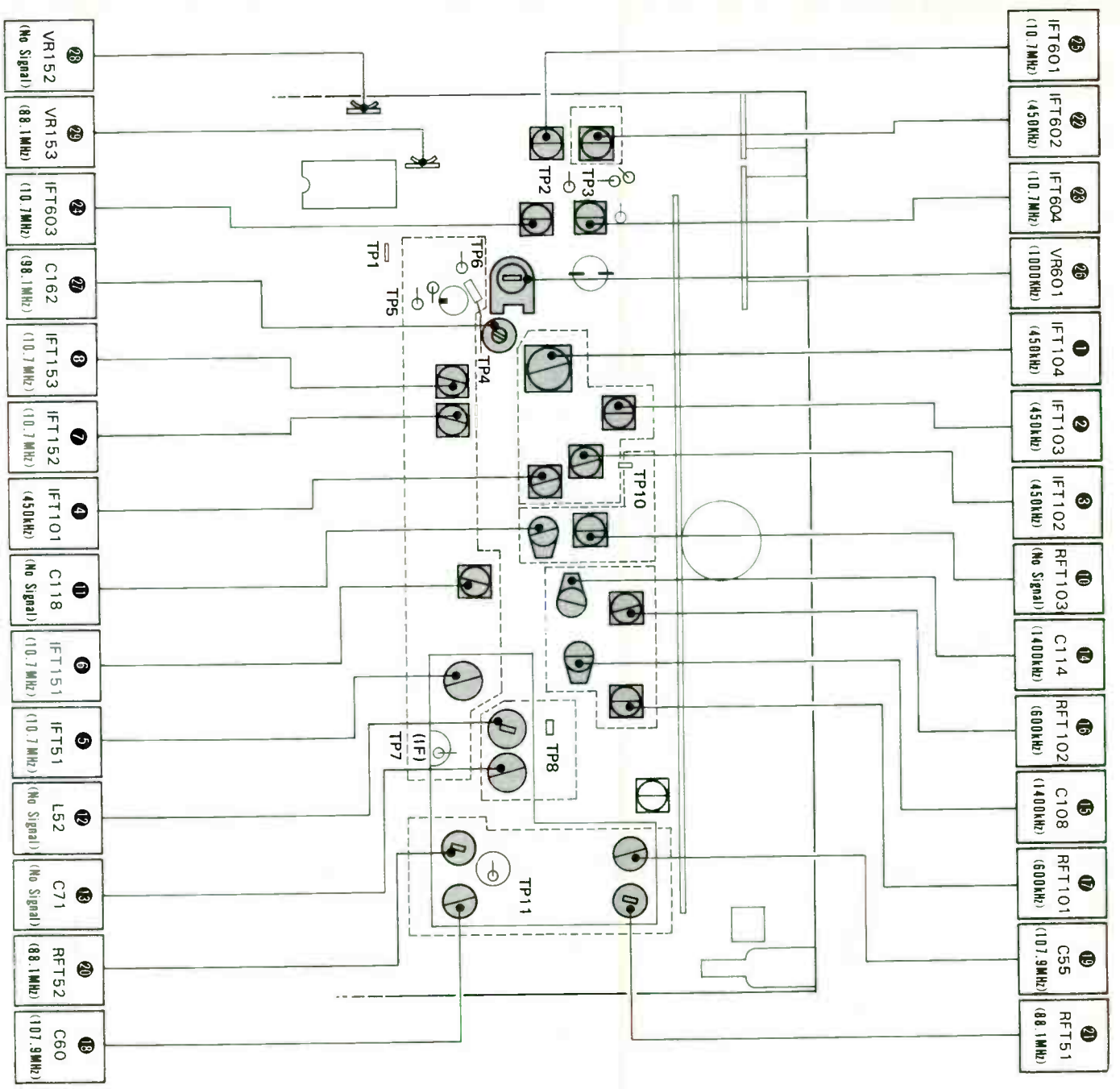
- Repeat steps, two or three times.

FM MPX ALIGNMENT USING SIGNAL GENERATOR & STEREO SIGNAL GENERATOR

- Set Volume Control at maximum, and Bass & Treble Control in the maximum position.
- Set Balance Control in center.
- Set RADIO/CLOCK Selector Switch in the RADIO position.
- Set DX/LOCAL Selector Switch in the DX position.
- Connect the signal generator to the antenna receptacle through the antenna pad. (Fig. 2)

	STEP	GENERATOR FREQUENCY	RADIO SELECTOR SETTING	INDICATOR CONNECTION	ADJUST	REMARKS
FM MPX	㉖	no signal input	FM	Frequency counter to Test Point ① and ground.	VR152	Adjust to 19 kHz ±30 Hz.
	㉗	88.1 MHz [400 Hz Mod. Left Ch] 60 dB/μV input	,,	Output meter across right speaker terminals.	VR153	Adjust for minimum.
		88.1 MHz [400 Hz Mod. Right Ch] 60 dB/μV input		Output meter across left speaker terminals.		Adjust for minimum.

- Repeat steps, two or three times.



■ Numbers in ● are indicated ALIGNMENT STEPS.

SERVICING NOTICE

C MOS LSI

- When the LSI is not in the circuit, all terminals should be connected to a common conductor.
- Ground repairman, all tools and test equipments.
- Do not remove or replace the LSI when the power is on.

DIGITRON

- Do not drop or strike the digitoron.

DC-DC CONVERTER

- Do not short the output terminal.
- Do not turn the power on when a capacitor is not connector at the output terminal.

TRANSISTOR ARRAY

- Do not short the circuit between base and power line.

DISCRET STABILIZER

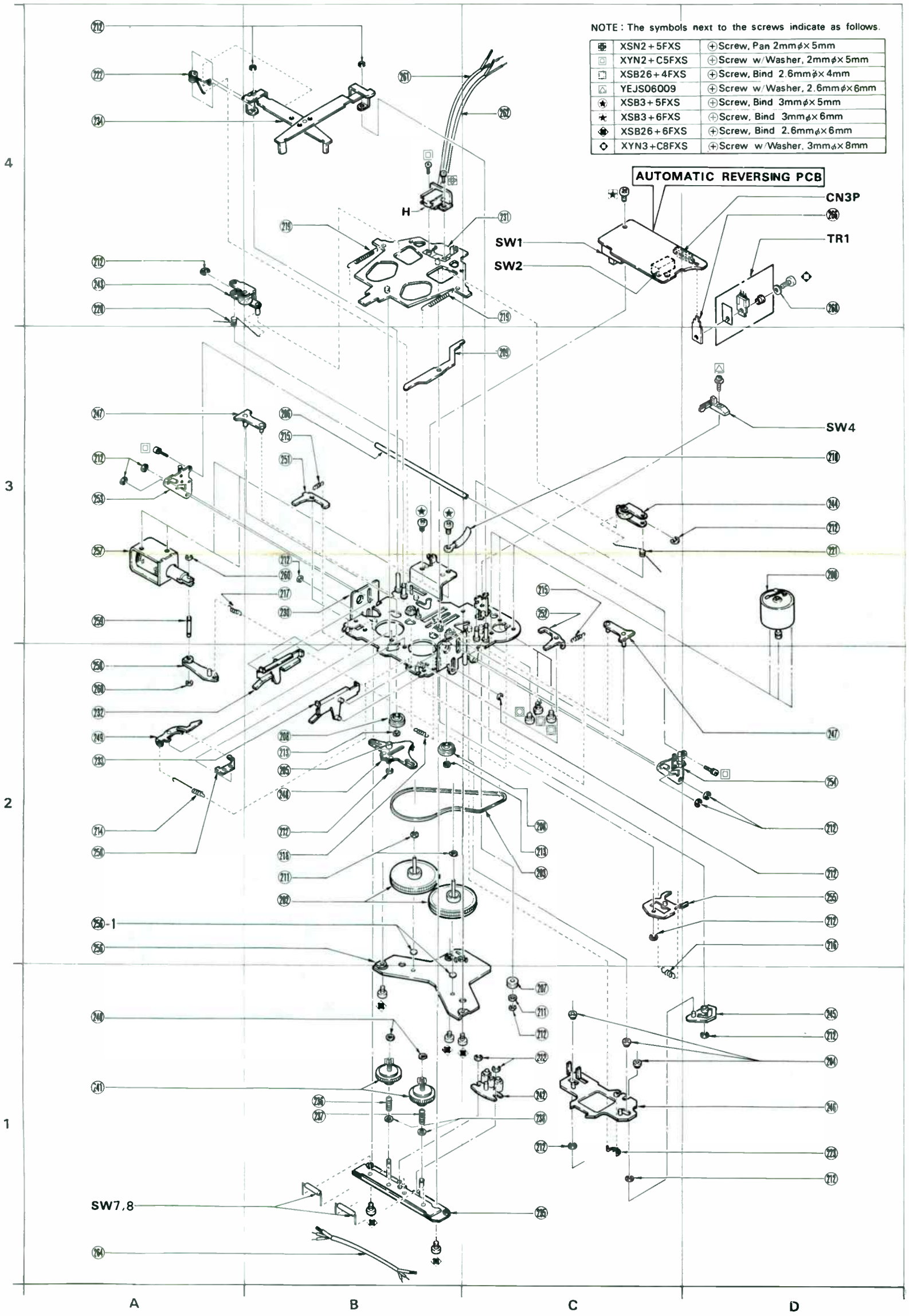
- Do not short the load.

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
TAPE DECK PARTS				
HEAD				
H (4-B)	WY478AN	Playback Head	1	
MECHANICAL PARTS				
CN3P (4-O)	EMCS0901	9P Plug	1	
M200 (3-C)	**YASAK01034**	**Motor Ass'y (w/Pulley)**	**1**	
M202 (2-B)	YEFX213120	Flywheel	2	
M203 (2-B)	YEFR03023	Flywheel Drive Belt	1	
M204 (1-C)	YEFX218126	Selector Plate Shaft Roller	3	
M205 (2-B)	YEFX218131	Head Chassis Guide Shaft Roller	1	
M206 (3-B)	YEFW06237	Cassette Link Bar	1	
M207 (2-B)	YEFX026044	Idler Pulley	1	
M208 (2-B)	YEFX046180	Idler	2	
M209 (3-B)	YEFX046141	FR Release Lever	1	
M210 (3-B)	YAFX033035	Clamper	1	
M211 (2-B)	YEJW05013	Polyslider 2.5mmø	3	
M212	YEJE01004	E-Ring	18	
M213 (2-B)	YEFX014008	Stop Ring	2	
M214 (2-A)	YEFX005251	FR Lock Spring	1	
M215 (3-B, C)	YEFX005252	FR Stop Ring	2	
M216 (2-C)	YEFX005255A	Idler Spring	1	
M217 (3-A)	YEFX005256A	Solenoid Spring	1	
M218 (2-B)	YEFX005254	Pressure Spring	1	
M219 (4-B)	YEFX005253A	Head Chassis Spring	2	
M220 (4-A)	YEFX00524B	Pinch Roller Return Spring (L)	1	
M221 (3-C)	YEFX005249	Pinch Roller Return Spring (R)	1	
M222 (4-A)	YEFX005247	Eject Arm Return Spring	1	
M223 (1-C)	YEFX005245A	Retaining Spring	1	
M224	XSN2 + 5FXS	⊕ Screw, Pan 2mmø x 5mm	1	
M225	XYN2 + C5FXS	⊕ Screw w/Washer, 2mmø x 5mm	3	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
M226	XSB26 + 4FXS	⊕ Screw, Bind 2.6mmø x 4mm	3	
M228	YEJS06009	⊕ Screw w/Washer	2	
M229	XSB3 + 5FXS	⊕ Screw, Bind 3mmø x 5mm	2	
M230 (3-B)	YEFA01203A	Chassis Ass'y	1	
M231 (4-B)	YEFA01204	Head Chassis Ass'y	1	
M232 (2-A)	YEFX239138	Cassette Guide Ass'y (L)	1	
M233 (2-A)	YEFX239139	Cassette Guide Ass'y (R)	1	
M234 (4-A)	YEFX046150A	Eject Lever Ass'y	1	
M235 (1-B)	YEFX021515A	Reel Holder Ass'y	1	
M236 (1-B)	YEFX005317	Back Tension Spring (L)	1	
M237 (1-B)	YEFX005318	Back Tension Spring (R)	1	
M238 (1-B)	YAJW05010	Polyslider 2mmø	2	
M240 (1-B)	YEFX014007	Stop Ring	2	
M241 (1-B)	YEFX209114B	Reel Base Ass'y	2	
M242 (1-C)	YEFX218132	FR Roller Ass'y	1	
M243 (4-A)	YEFX218133	Pinch Roller Ass'y (L)	1	
M244 (3-C)	YEFX218134	Pinch Roller Ass'y (R)	1	
M245 (1-C)	YEFX234105	Selector Cam Ass'y	1	
M246 (1-C)	YEFX04617B	Selector Plate Ass'y	1	
M247 (3-B, C)	YEFX046154	Idler Plate Ass'y	2	
M24B (2-B)	YEFX021444	FF Plate Ass'y	1	
M249 (2-A)	YEFX046156	FR Lock Plate Ass'y (L)	1	
M250 (2-A)	YEFX046157	FR Lock Plate Ass'y (R)	1	
M251 (3-B)	YEFX030015	FR Stop Plate Ass'y (L)	1	
M252 (3-C)	YEFX030016	FR Stop Plate Ass'y (R)	1	
M253 (3-A)	YEFX046158A	Cassette Guide Link Ass'y (L)	1	
M254 (2-C)	YEFX046159A	Cassette Guide Link Ass'y (R)	1	
M255 (2-C)	YEFX046155	Idler Release Plate Ass'y	1	
M256 (2-B)	YEFX021622	Flywheel Holder Ass'y	1	
M256-1 (2-B)	YAFX019007	Thrust Sheet	1	
M257 (3-A)	**YEAX01013A**	**Plunger Solenoid**	**1**	
M258 (3-A)	YEFX046160	Solenoid Lever Ass'y	1	
M259 (3-A)	YEFW06227	Solenoid Lever Shaft	1	
M260 (3-A)	XUC15FX	E-Ring 1.5mmø	2	

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
M261 (4-8)	YEAJ18112	Head Shield Wire (Red)	1	
M262 (4-8)	YEAJ18113	Head Shield Wire (Black)	1	
M263 (4-8)	YEFX024050	Tube, Head Shield Wire	1	
M264 (1-B)	YEAJ18098	Lead Switch Shield Wire	1	
M266 (4-D)	YEFF01140	Heat Sink	1	
M267 (4-D)	YEFV03055	Shield Plate	1	
M268	XWE3FX	E-Ring 3mmø	1	
M269	XYN3 + C8FXS	⊕ Screw w/Washer, 3mmø x 8mm	1	
M270	XS826 + 6FXS	⊕ Screw, Bind 2.6mmø x 6mm	5	

SWITCHES

SW1	YEAS07040A	Reverse Switch	1	
SW2	YEAS07041	Tape/Radio Selector Switch	1	
SW3	YEAS23112	Muting Switch	1	
SW5, 6	YEAS07039	Tape End Detecting Switch	2	

ICs AND TRANSISTOR

IC1	EHM013D01	Automatic Reversing	1	
IC201	YEAMM5152L	Pre Amp	1	
TR1	2SD389	Solenoid Control	1	

DIODES

D1, 2	YAAD018	Automatic Reversing	2	
D3	YEAD030	Spark Suppression	1	

CAPACITORS

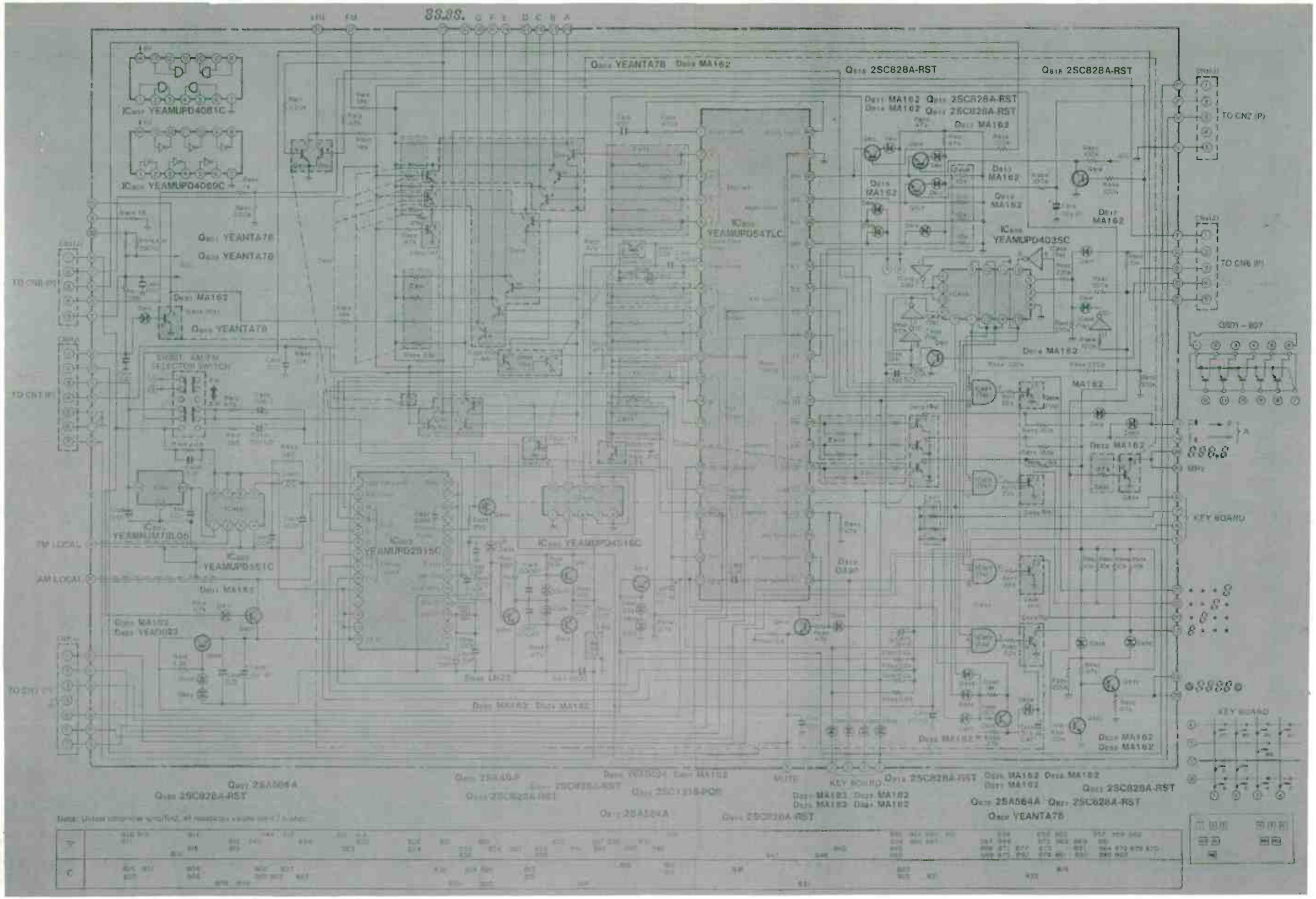
C1 ~ 3	ECEA16V10L	10 MFD	16WV		Electrolytic	3
C4	ECEA50V1L	1 MFD	50WV		Electrolytic	1
C200	YECQN1H102K	0.001 MFD	50WV	±10%	Polyester	1
C201	ECEA16V10L	10 MFD	16WV		Electrolytic	1
C202	ECEA6V100L	100 MFD	6WV		Electrolytic	1
C203	YECQN1H392K	0.0039 MFD	50WV	±10%	Polyester	1
C204	ECEA16V10L	10 MFD	16WV		Electrolytic	1
C300	YECQN1H102K	0.001 MFD	50WV	±10%	Polyester	1
C301	ECEA16V10L	10 MFD	16WV		Electrolytic	1
C302	ECEA6V100L	100 MFD	6WV		Electrolytic	1
C303	YECQN1H392K	0.0039 MFD	50WV	±10%	Polyester	1
C304	ECEA16V10L	10 MFD	16WV		Electrolytic	1
C750	ECEA16V100L	100 MFD	16WV		Electrolytic	1

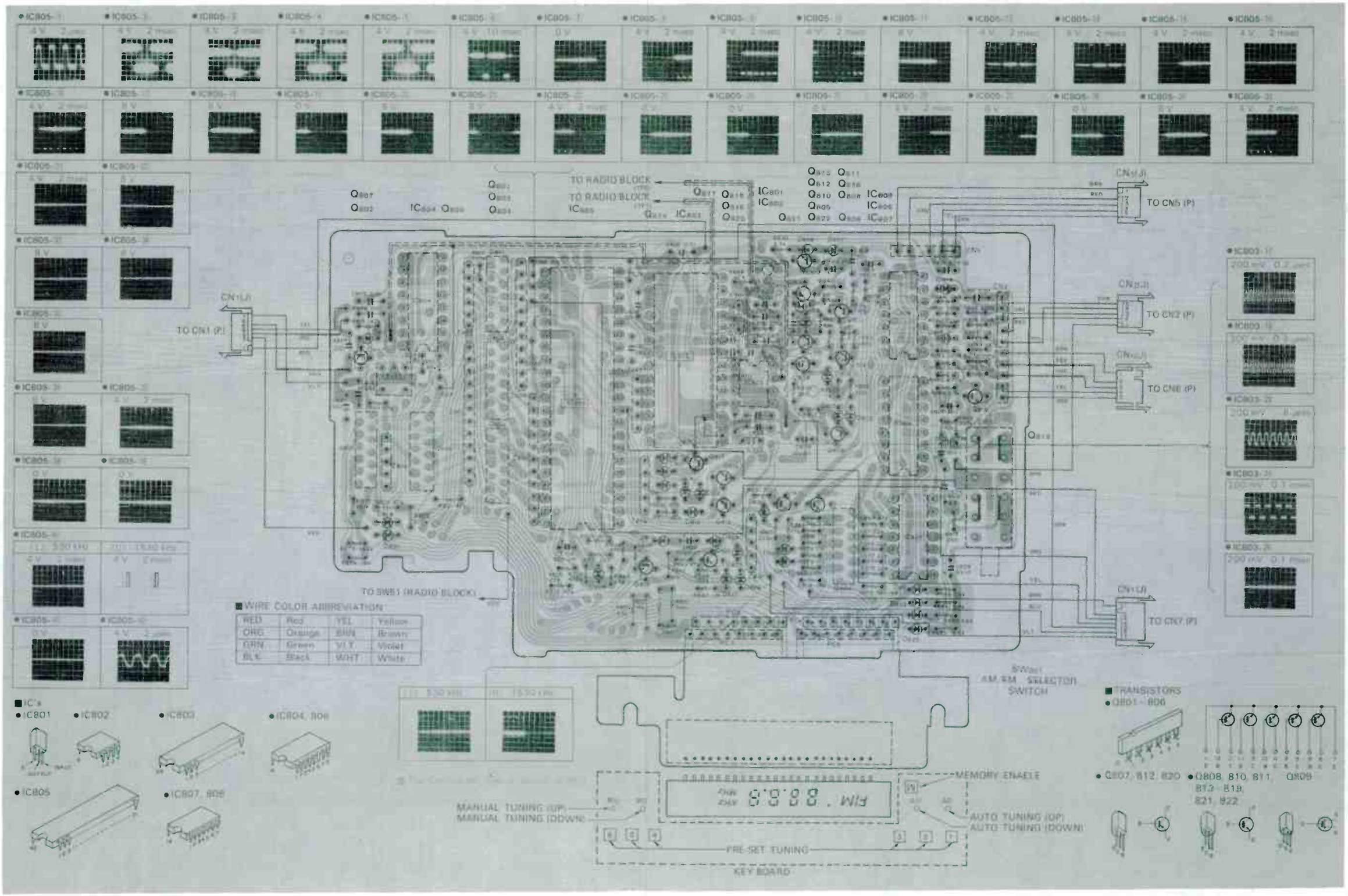
RESISTORS

R200	ERD18TJ221	220 OHM	1/8W	±5%	Carbon	1
R201	ERD18TJ333	33k OHM	1/8W	±5%	Carbon	1
R202	ERD18TJ563	56k OHM	1/8W	±5%	Carbon	1
R203	ERD18TJ394	390k OHM	1/8W	±5%	Carbon	1
R204	ERD18TJ333	33k OHM	1/8W	±5%	Carbon	1
R205	ERD18TJ332	3.3k OHM	1/8W	±5%	Carbon	1
R206	ERD18TJ333	33k OHM	1/8W	±5%	Carbon	1
R300	ERD18VJ221	220 OHM	1/8W	±5%	Carbon	1
R301	ERD18VJ333	33k OHM	1/8W	±5%	Carbon	1
R302	ERD18VJ563	56k OHM	1/8W	±5%	Carbon	1
R303	ERD18VJ394	390k OHM	1/8W	±5%	Carbon	1
R304	ERD18VJ333	33k OHM	1/8W	±5%	Carbon	1
R305	ERD18VJ332	3.3k OHM	1/8W	±5%	Carbon	1
R306	ERD18TJ333	33k OHM	1/8W	±5%	Carbon	1
R750	ERD18TJ271	270 OHM	1/8W	±5%	Carbon	1
R751	ERD18TJ181	180 OHM	1/8W	±5%	Carbon	1

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
M139 (4-D)	YEFA13183	Shield Case, IC	1	
M140 (2-D)	YEJS05004	⊕Screw	4	
M141 (1-B)	YEJN01041	Nut, Hexagon	2	
M142 (1-C)	YEFM01351A	Main Seal	1	
M143	XSB26 + 10FX	⊕Screw, Bind 2.6mmø x 10mm	2	
M144	XYN3 + F6FXS	⊕Screw w/Washer, 3mmø x 6mm	2	
M145	XTB3 + 6FFXS	⊕Screw, Taptite 3mmø x 6mm	19	
M146	XSB3 + 6FXS	⊕Screw, Bind 3mmø x 6mm	3	
M147	XYN26 + C5FX	⊕Screw w/Washer, 2.6mmø x 5mm	1	
M148	XYN3 + F8FXS	⊕Screw w/Washer, 3mmø x 8mm	2	
M149	XSB3 + 4FXS	⊕Screw, Bind 3mmø x 4mm	3	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
COMPONENT COMBINATIONS				
Z151	EXBS84472K	Resistor Block, 4.7k OHM x 4	1	
Z152	EXF3SM03	Capacitor Block, 0.01 MFD x 3	1	
Z601	EXAF203Z271R	C: 0.01 MFD x 2, R: 270 OHM x 1	1	
Z801	EXBP810473K	Resistor Block, 47k OHM x 10	1	
Z802	EXBP84473K	Resistor Block, 47k OHM x 4	1	
Z803	EXBD810473K	Resistor Block, 47k OHM x 10	1	
Z804	EXBD810473K	Resistor Block, 47k OHM x 10	1	
Z805	EXBP84473K	Resistor Block, 47k OHM x 4	1	
Z806	EXBD84473K	Resistor Block, 47k OHM x 4	1	
Z807	EXBP84473K	Resistor Block, 47k OHM x 4	1	
Z808	EXBP84103K	Resistor Block, 10k OHM x 4	1	
SWITCHES				
SW51	YEAS07065	DX/LOCAL Selector Switch	1	
SW801	YEAS09075	AM/FM Selector Switch	1	
CRYSTAL				
X801	YEXLHC18U015	Crystal, 10.24 MHz	1	





ICs

RADIO BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
IC151	YEAMUPC577H	FM IF Amp	1	
IC152	AN362	FM MPX Amp	1	
IC153	AN101	FM EIA	1	
IC201, 301	YEAMSTK430	AF Power Amp	2	

TUNER CONTROL BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
IC801	YEAMNJM78L05	Voltage Stabilizer	1	
IC802	YEAMUPB551C	Pre-Scaler, 150 MHz	1	
IC803	YEAMUPD2815C	Clock Generator	1	
IC804	YEAMUPD4518C	Dual BCD Up-Counter	1	
IC805	YEAMUPD547LC	Microcomputer	1	
IC806	YEAMUPD4035C	4-Bit Shift Register	1	
IC807	YEAMUPD4081C	Quad 2-Input AND	1	
IC808	YEAMUPD4069C	Hex. Inverter	1	

POWER BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
IC701	YEAMTC468	DC-DC Converter	1	

DIGITRON

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
DIG	YEAL997ST03	24-Pin Digitron	1	

TRANSISTORS

RADIO BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
Q51, 104, 110 201, 202, 301	2SC828	FM AGC, AM AGC, AF Amp	11	
302, 601, 603 604, 602		Search Amp		
Q52	3SK49	FM RF Amp	1	
Q53, 55	2SC1047	FM Mix, FM AFC	2	
Q54, 101, 103 107, 151	2SC829	FM OSC, AM RF Amp, Pre Scaler, FM IF Amp	5	
Q102	2SK49	AM RF Amp	1	
Q105, 106, 108 109, 605	2SA564	AM IF Amp, Search Amp	5	

TUNER CONTROL BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
Q801, 802, 803 804, 805, 806	YEANTA78	Transistor Array	6	
Q807, 812, 820	2SA564A	DC Switching	3	
Q808, 810, 811 814, 815, 816 817, 818, 819 821, 822	2SC828A	Voltage Stabilizer	11	
Q809	2SK49F	Varactor Drive	1	
Q813	2SC1318	Voltage Stabilizer	1	

FADER BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
Q823, 825	2SC828	DC-DC Converter	2	
Q824	2SA564	DC-DC Converter	1	

DIODES

RADIO BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
D51, 105, 151 152	OA90	FM AGC, AM Det, FM Limitter	4	
D52, 53, 54	YEADB8104	FM AGC	3	
D101, 103, 106 107, 109, 110 111	MA150	AM AGC	7	
D104	YEADB8113	AM AGC	1	
D108	YEAD025	Voltage Stabilizer	1	
D153, 201	YEAD024	Voltage Stabilizer	2	
D154, 155	YEAD032	FM Disc	2	

TUNER CONTROL BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
D801, 803, 804 805, 807, 809 811, 812, 813 814, 815, 816 817, 818, 819 820, 821, 822 823, 824, 825 826, 827, 828 829, 830, 831	MA162	Switching	27	
D802	YEAD023	Voltage Stabilizer	1	
D806	LN23	Indicator	1	
D808	YEAD024	Voltage Stabilizer	1	
D810	OA90	Muting	1	

FADER BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
D830, 831	MA162	Switching	2	

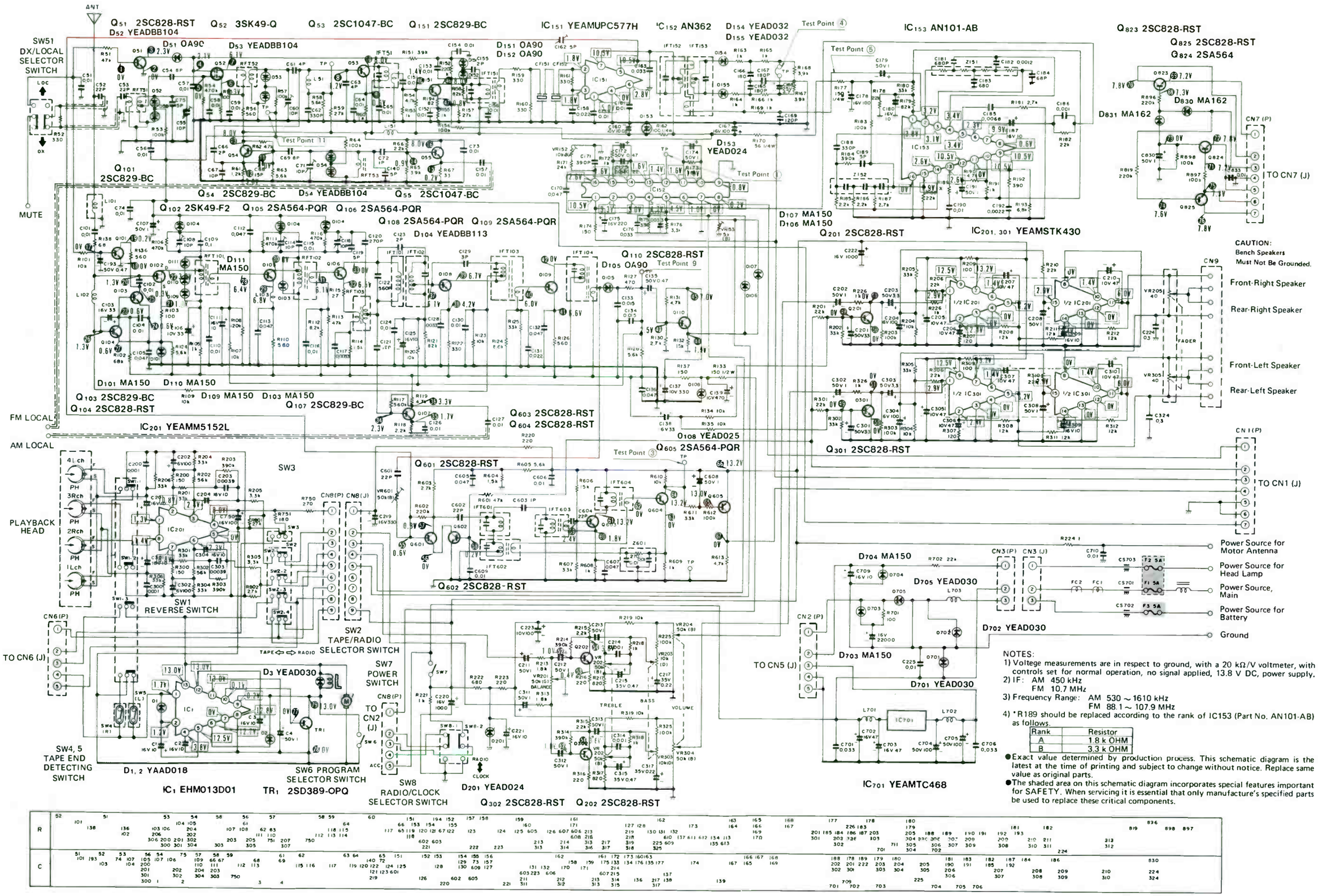
POWER BLOCK

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
D701, 702, 705	YEAD030	Voltage Stabilizer	3	
D703, 704	MA150	Spark Suppression	2	

CAPACITORS

RADIO BLOCK

Ref. No.	Part No.	Part Name & Description				Pcs Set	Remarks
C51	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C52	YECCD1H220KM	22 PF	50WV	±10%	Ceramic	1	
C53	YECCD1H220KM	22 PF	50WV	±10%	Ceramic	1	
C54	YECCD1H080DM	8 PF	50WV	±0.5 PF	Ceramic	1	
C56	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C57	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C58	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C59	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C61	YECCD1H040DM	4 PF	50WV	±0.5 PF	Ceramic	1	
C62	YECCD1H331KM	330 PF	50WV	±10%	Ceramic	1	
C63	YECCD1H040DM	4 PF	50WV	±0.5 PF	Ceramic	1	
C64	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C65	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C66	YECCD1H020CM	2 PF	50WV	±0.25 PF	Ceramic	1	
C67	YECCD1H100FM	10 PF	50WV	±1 PF	Ceramic	1	
C68	YECCD1H150KM	15 PF	50WV	±10%	Ceramic	1	
C69	YECCD1H080DM	8 PF	50WV	±0.5 PF	Ceramic	1	
C72	YECCD1H010CM	1 PF	50WV	±0.25 PF	Ceramic	1	
C73	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C74	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C75	YECCD1H050DM	5 PF	50WV	±0.5 PF	Ceramic	1	
C101	YECKD05103Z	0.01 MFD	50WV	+80, −20%	Ceramic	1	
C102	YECQN1H103M	0.01 MFD	50WV	±20%	Polyester	1	
C103	ECEA16V33L	33 MFD	16WV		Electrolytic	1	
C104	YECQN1H103M	0.01 MFD	50WV	±20%	Polyester	1	
C105	YECQN1H473M	0.047 MFD	50WV	±20%	Polyester	1	
C106	ECEA10V33L	33 MFD	10WV		Electrolytic	1	
C107	ECSF50E1	1 MFD	50WV		Tantalum	1	
C109	YECCD12104M	0.1 MFD	12WV	±20%	Polyester	1	
C110	YECQN1H103M	0.01 MFD	50WV	±20%	Polyester	1	



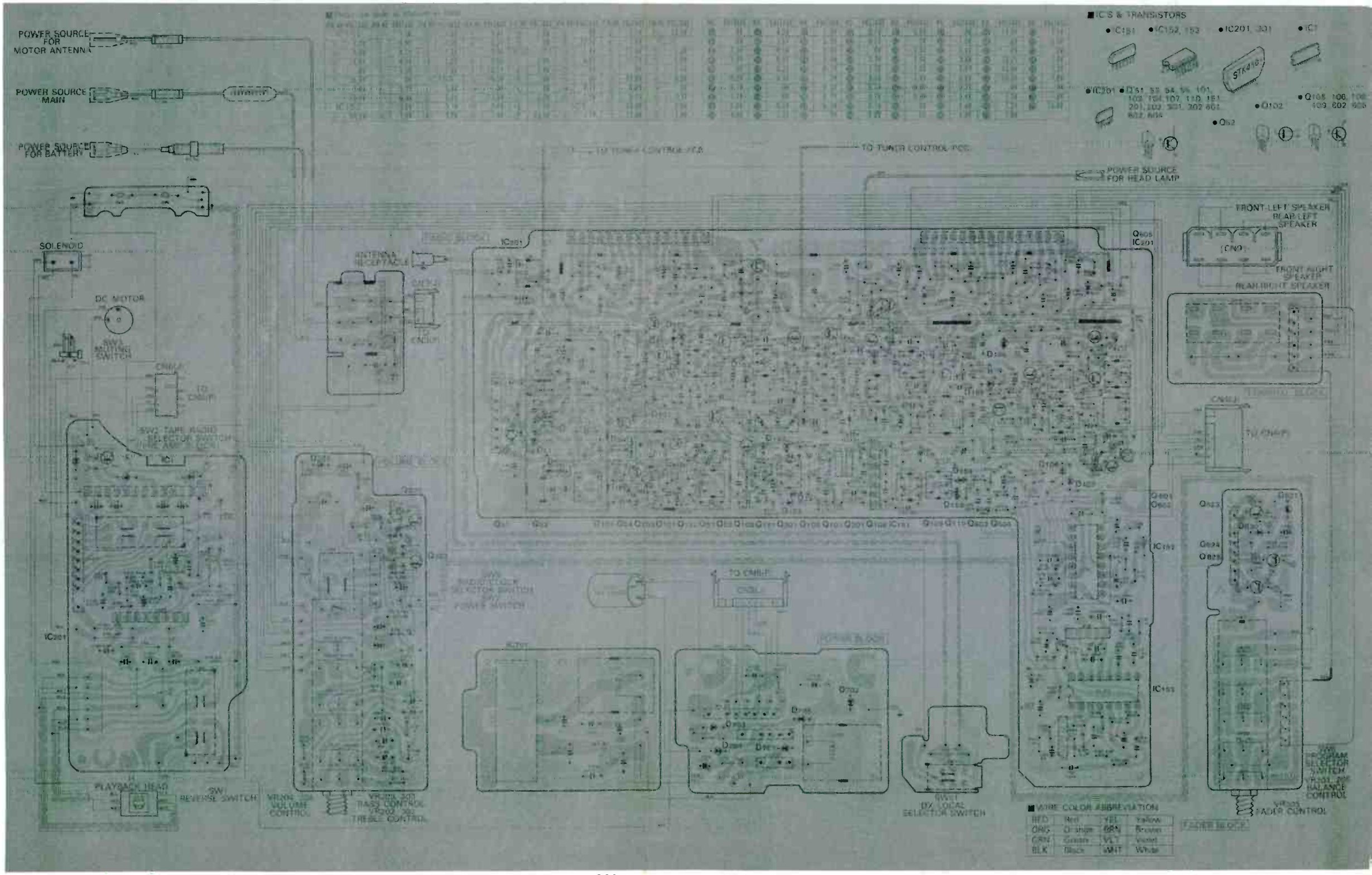
NOTES:

1) Voltage measurements are in 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) IF: AM 450 kHz
   FM 10.7 MHz
3) Frequency Range: AM 530 ~ 1610 kHz
   FM 88.1 ~ 107.9 MHz
4) *R189 should be replaced according to the rank of IC153 (Part No. AN101-AB) as follows.

Rank	Resistor
A	1.8 k OHM
B	3.3 k 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 manufacture's specified parts be used to replace these critical components.

WIRING DIAGRAM MODEL CQ-8520EU (RADIO & TAPE BLOCK)



Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C111	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C112	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C113	YECQN1H473M	0.047 MFD 50WV ±10% Polyester	1	
C115	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C116	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C117	YECQN1H332K	0.0033 MFD 50WV ±10% Polyester	1	
C119	YECCD1H050DM	5 PF 50WV ±0.5 PF Ceramic	1	
C120	YECCD1H271JM	270 PF 50WV ±5% Ceramic	1	
C121	YECCD1H100FM	10 PF 50WV ±1 PF Ceramic	1	
C122	ECQS1561JZ	560 PF 125WV ±5% Polystyrene	1	
C123	YECCD1H020CM	2 PF 50WV ±0.25 PF Ceramic	1	
C124	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C125	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C126	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C127	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C128	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C129	YECCD1H030DM	3 PF 50WV ±0.5 PF Ceramic	1	
C130	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C131	YECQN1H223M	0.022 MFD 50WV ±20% Polyester	1	
C132	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C133	YECQN1H153M	0.015 MFD 50WV ±20% Polyester	1	
C134	YECQN1H153M	0.015 MFD 50W ±20% Polyester	1	
C135	ECEA50MR47	0.47 MFD 50WV Electrolytic	1	
C136	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C137	ECEA10V330L	330 MFD 10WV Electrolytic	1	
C138	ECEA16V33L	33 MFD 16WV Electrolytic	1	
C139	ECEA10V470L	470 MFD 10WV Electrolytic	1	
C140	YECCD1H050DC	5 PF 50WV ±0.5 PF Ceramic	1	
C151	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C152	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C153	YECKD05013Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C154	YECKD05013Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C155	YECCD1H020CM	2 PF 50WV ±0.25 PF Ceramic	1	
C156	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C157	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C158	YECQN1H223M	0.022 MFD 50WV ±20% Polyester	1	
C159	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C160	ECEA10V100L	100 MFD 10WV Electrolytic	1	
C161	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C163	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C164	ECEA16V100L	100 MFD 16WV Electrolytic	1	
C165	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C166	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C167	YECCD1H181KM	180 PF 50WV ±10% Ceramic	1	
C168	ECEA25V4R7L	4.7 MFD 25WV Electrolytic	1	
C169	YECCD1H121KM	120 PF 50WV ±10% Ceramc	1	
C170	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C171	ECQS1391JZ	390 PF 125WV ±5% Polystyrene	1	
C172	ECEA50MR47	0.47 MFD 50WV Electrolytic	1	
C173	ECEA50MR22	0.22 MFD 50WV Electrolytic	1	
C174	ECEA50V1L	1 MDF 50WV Electrolytic	1	
C175	ECEA16V220L	220 MFD 16WV Electrolytic	1	
C176	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C177	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C178	ECEA16V100L	100 MFD 16WV Electrolytic	1	
C179	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C180	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C181	ECQS1681JZ	680 PF 125WV ±5% Polystyrene	1	
C182	YECQN1H122K	0.0012 MFD 50WV ±10% Polyester	1	
C183	ECQS1681JZ	680 PF 125WV ±5% Polystyrene	1	
C184	YECCD1H680KM	68 PF 50WV ±10% Ceramic	1	
C185	YECQN1H682KM	0.0068 MFD 50WV ±10% Polyester	1	
C186	YECQN1H102K	0.001 MFD 50WV ±10% Polyester	1	
C187	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C188	YECCD1H331KM	330 PF 50WV ±10% Ceramic	1	
C189	YECCD1H050DM	5 PF 50WV ±0.5 PF Ceramic	1	
C190	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C191	ECEA50V1L	1 MFD 50WV Electrolytic	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C192	YECQN1H222K	0.0022 MFD 50WV ±10% Polyester	1	
C193	ECEA50MR47	0.47 MFD 50WV Electrolytic	1	
C201	ECEA50V3R3	3.3 MFD 50WV Electrolytic	1	
C202	ECEA50V1L	1 MFD 50WV Electrolytoc	1	
C203	ECEA50V3R3	3.3 MFD 50WV Electrolytic	1	
C204	ECEA6V100L	100 MFD 6WV Electrolytic	1	
C205	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C206	ECEA10V47L	47 MFD 10WV Electrolytoc	1	
C207	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C208	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C209	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C210	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C211	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C212	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C213	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C214	YECQN1H102K	0.001 MFD 50WV ±10% Polyester	1	
C215	ECSF35ER47	0.47 MFD 35WV Tantalum	1	
C217	ECSF35ER22	0.22 MFD 35WV Tantalum	1	
C220	ECEA16V1000Z	1000 MFD 16WV Electrolytic	1	
C221	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C222	ECEA16V1000Z	1000 MFD 16WV Electrolytic	1	
C223	ECEA10V100L	100 MFD 10WV Electrolytic	1	
C224	YECCD12304M	0.3 MFD 12WV ±20% Ceramic	1	
C225	YECKD05103Z	0.01 MFD 50WV ±20% Ceramic	1	
C301	ECEA50V3R3	3.3 MFD 50WV Electrolytic	1	
C302	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C303	ECEA50V3R3	3.3 MFD 50WV Electrolytic	1	
C304	ECEA6V100L	100 MFD 6WV Electrolytic	1	
C305	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C306	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C307	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C308	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C309	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C310	ECEA10V47L	47 MFD 10WV Electrolytic	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
C311	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C312	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C313	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C314	YECQN1H102K	0.001 MFD 50WV ±10% Ceramic	1	
C315	ECSZ35ER47	0.47 MFD 35WV Tantalum	1	
C317	ECSZ35ER22	0.22 MFD 35WV Tantalum	1	
C324	YECCD12304M	0.3 MFD 12WV ±20% Ceramic	1	
C601	YECCD1H220KM	22 PF 50WV ±10% Ceramic	1	
C602	YECCD1H220KM	22 PF 50WV ±10% Ceramic	1	
C603	YECCD1H010CM	1 PF 50WV ±0.25 PF Ceramic	1	
C604	YECCD1H220KM	22 PF 50WV ±10% Ceramic	1	
C605	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C606	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C607	YECQN1H473M	0.047 MFD 50WV ±20% Polyester	1	
C608	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C609	YECQN1H103M	0.01 MFD 50WV ±20% Polyester	1	
C710	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
CS701, 702, 703	YECCL510360	1000 PF x 3 Feedthrough	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		TUNER CONTROL BLOCK		
C801	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C802	ECSF50E1	1 MFD 50WV Tantalum	1	
C803	ECSF50E6R8	6.8 MFD 50WV Tantalum	1	
C804	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C805	YECKD05103Z	0.01 MFD 50W +80, −20% Ceramic	1	
C806	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C807	YECCD1H101KM	100 PF 50WV ±10% Ceramic	1	
C808	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C809	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C810	YECCD1H390KM	39 PF 50WV ±10% Ceramic	1	
C812	YECQN1H472K	0.0047 MFD 50WV ±10% Polyester	1	
C813	YECQN1H472K	0.0047 MFD 50WV ±10% Polyester	1	
C814	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C815	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C816	ECEA50MR47	0.47 MFD 50WV Electrolytic	1	
C817	ECEA10V47L	47 MFD 10WV Electrolytic	1	
C818	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C819	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C820	ECEA50V1L	1 MFD 50WV Electrolytic	1	
C821	ECEA50V10L	10 MFD 50WV Electrolytic	1	
C822	ECEA50MR47	0.47 MFD 50WV Electrolytic	1	
C823	YECCD1H101KM	100 PF 50WV ±10% Ceramic	1	
C824	YECQN1H102K	0.001 MFD 50WV ±10% Polyester	1	
C825	YECCD1H390KM	39 PF 50WV ±10% Ceramic	1	
C826	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C827	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C828	YECCD1H220KM	22 PF 50WV ±10% Ceramic	1	
C829	ECEA16V10L	10 MFD 16WV Electrolytic	1	
C831	YECKD05103Z	0.01 MFD 50WV +80, −20% Ceramic	1	
C832	YECQN1H183M	0.018 MFD 50WV ±20% Polyester	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		FADER BLOCK		
C830	ECEA50V1L	1 MFD 50WV Electrolytic	1	
		POWER BLOCK		
C219	ECEA16V330L	330 MFD 16WV Electrolytic	1	
C701	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C702	ECEA16V47L	47 MFD 16WV Electrolytic	1	
C703	ECEA16V47L	47 MFD 16WV Electrolytic	1	
C704	ECEA50V100L	100 MFD 50WV Electrolytic	1	
C705	ECEA50V100L	100 MFD 50WV Electrolytic	1	
C706	YECQN1H333M	0.033 MFD 50WV ±20% Polyester	1	
C708	ECEA16V1000Z	1000 MFD 16WV Electrolytic	1	
C709	ECEA16V10L	10 MFD 16WV Electrolytic	1	
		MAIN UNIT		
C711	ECET16R223L	22000 MFD 16WV Electrolytic	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		POWER BLOCK		
R220	ERD18VJ221	220 OHM 1/8W ±5% Carbon	1	
R701	ERG1ANJ101	100 OHM 1W ±5% Metal Film	1	
R702	ERD18VJ223	22k OHM 1/8W ±5% Carbon	1	
		MAIN UNIT		
R801	ERD18TJ272	2.7k OHM 1/8W ±5% Carbon	1	
R802	ERD18TJ272	2.7k OHM 1/8W ±5% Carbon	1	

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
		VARIABLE CAPACITORS		
C55, 60, 71, 108	ECV1ZW10P32	10 PF Trimmer	6	
114, 118				
C162	YECTAT1397	5 PF Trimmer	1	
		VARIABLE RESISTORS		
VR152	EVNJ0AA00B14	10k OHM (B) Semifixed	1	
VR153	EVNJ0AA00853	5k OHM (B) Semifixed	1	
VR601	EVNK4AA00854	50k OHM (B) Semifixed	1	
VR202, 203	EWKXW3S01913	50k OHM (B) Bass Control	1	
204, 302		10k OHM (D) Treble Control		
303, 304		50k OHM (B) Volume Control		
w/SW7		with Power Switch		
VR201, 205	EVM87RS44005	50k OHM (G) Balance Control	1	
305		40 OHM (G) Fader Control		
w/SW6		with Program Selector		

COILS, TRANSFORMERS AND CERAMIC FILTERS

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
L51	YELT03C011	FM RF Coil	1	
L52	YELL07N086	FM RF Coil	1	
L101	YELQ07S046	AM RF Coil	1	
L102	YELA07S069	AM RF Coil	1	
L103	YELT06N100K	AM RF Coil	1	
L151	YELT04C330K	FM RF Coil	1	
L801	YELA07S069	RF Choke Coil	1	
L802	YELT04C330K	RF Choke Coil	1	
L701	YETQ021F037	Choke Coil	1	
L702	YELT06N560K	Choke Coil	1	
L703	YETQ021F037	Choke Coil	1	
RFT51	YELA08N070	FM RF Transformer	1	
RFT52	YELT08N028	FM RF Transformer	1	
RFT101	YELT07S024	AM RF Transformer	1	
RFT102	YELT07S025	AM RF Transformer	1	
RFT103	YELT07S026	AM RF Transformer	1	
IFT51	YEIF07S7049	FM IF Transformer	1	
IFT101	YEIA07S7102	FM IF Transformer	1	
IFT102	YEIA07S7103	FM IF Transformer	1	
IFT103	YEIA07S7104	FM IF Transformer	1	
IFT104	YEIA10S7105	FM IF Transformer	1	
IFT151	YEIF07S7049	FM IF Transformer	1	
IFT152	YEIF07S7048	FM IF Transformer	1	
IFT153	YEIF07S7047	FM IF Transformer	1	
IFT601	YEIF07S7042	Search Transformer	1	
IFT602	YEIA07S7085	Search Transformer	1	
IFT603	YEIF07S7043	Search Transformer	1	
IFT604	YEIF07S7043	Search Transformer	1	
CF151, 152	YEIN09N5010	Ceramic Filter	2	
FC1, 2	YEAZQ58RH002	Ferrite Core	2	

ACCESSORIES

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
A101	YEJV08011	Mounting Screw	1	
A102	YEJN01059	Nut, Hexagon	1	
A103	YEJW02019FX	Washer, Flat	2	
A104	YEJT01009	Screw	1	
A105	YEJN03006	Nut, Spring	1	
A106	XWA5BFX	Washer, Spring 5mmø	1	
A107	YEJW02008AW	Washer, Flat	2	
A108	YEJN01041	Nut, Hexagon	2	
A109	YEJN01023FKC	Nut, Hexagon	2	
A110	YEFE07091	Knob, Balance & Volume Control with Power & Clock Switch	2	
A111	YEFE08080	Knob, Bass Control	1	
A112	YEFE08081	Knob, Treble Control	1	
A113	YEFE08082	Knob, Fader Control	1	
A114	YEFX999146	Gasket	1	
A115	YEFJ01099	Ornament Plate	1	
A116	YEFG04004	Supporting Strap	1	
A117	YEAJ03284	Speaker Cord	1	
A118	YEAJ03285	Speaker Cord	1	
A119	YEAT03152	Terminal	2	

PRINTINGS

Ref. No.	Part No.	Part Name & Description	Pcs Set	Remarks
A120	YEFM06649	Instruction Book	1	
A121	YEFM22732	Installation Book	1	
A122	YEFM22733	Installation Book	1	

Pages 111-121 Courtesy of SANYO ELECTRIC, INC.

TUNER ADJUSTMENT

The followings are radio alignment procedures for technicians reference.
Note:Use a screwdriver with plastic grip for all adjustments.

FM IF & RF ALIGNMENT

Step	Adjusting circuit	Connections		Frequency	Position of tuning dial	Adjustment	VTVM and Scope
		Input	Output				
1	IF	Connect sweep marker generator output to FM ANT terminal, Tuner Pack Case	Connect SMG input to test points R309. Chassis Ground.	10.7MHz (unmodulated)	Near maximum under no signal	T201 T301	
2	Detector		Connect SMG Input to test points R314. Chassis Ground.			T302	
3	Tuning Coverage and Dial Calibrator	Connect FM SG to FM ANT Terminals.	Connect VTVM to Speaker Terminals.	87MHz (400Hz 30% modulation)	Low End	CT203 (Tuner Pack)	Maximum reading on VTVM
4	Tracking			106MHz (400Hz 30% modulation)	106MHz	CT201,202 (Tuner Pack)	

FM MPX ALIGNMENT

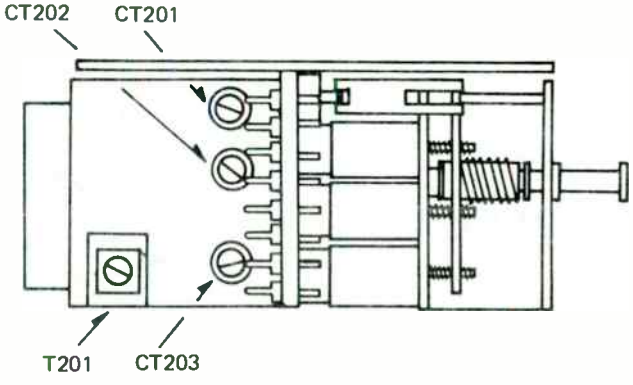
Adjusting circuit	Connections		Frequency	Position of tuning dial	Adjustment	Counter
	Input	Output				
MPX		IC302 No.12 Ground	98MHz (400Hz 30% modulation)	No signals	R330	19.0kHz

AM ALIGNMENT

Note: Before alignment, obtain a 230μA collector current on Q101 with the R318 (SVR) at no signals condition.

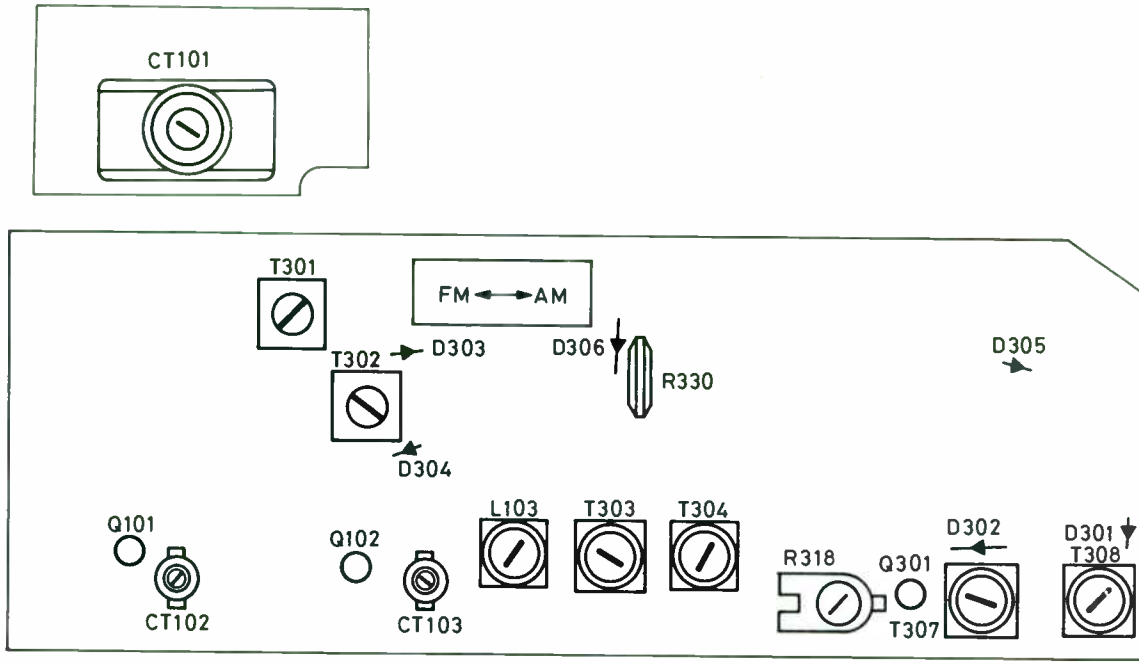
Step	Adjusting circuit	Connections		SG frequency	Position of tuning dial	Adjustment	VTVM
		Input	Output				
1	IF	Connect AM IF SWEEP to ANT Terminals.	Connect VTVM to Speaker Terminals	262.5kHz	Minimum	T303, T304 T307, T308	Maximum reading on VTVM
2	Covering	Connect AM SG to ANT Terminals.	Connect VTVM to Speaker Terminals.	1,680kHz 525kHz	Maximum Minimum	CT-103 OSC (L103)	Maximum reading on VTVM
3		Repeat steps 2 at 1,660kHz and 505kHz alternately.					
4	Tracking	Connect AM SG to ANT Terminals.	Connect VTVM to Speaker Terminals.	1,400kHz	1,400kHz	CT-101 CT-102	Maximum reading on VTVM
5		Repeat steps 4 at 600kHz and 1,400kHz alternately.					

FM TUNER PACK

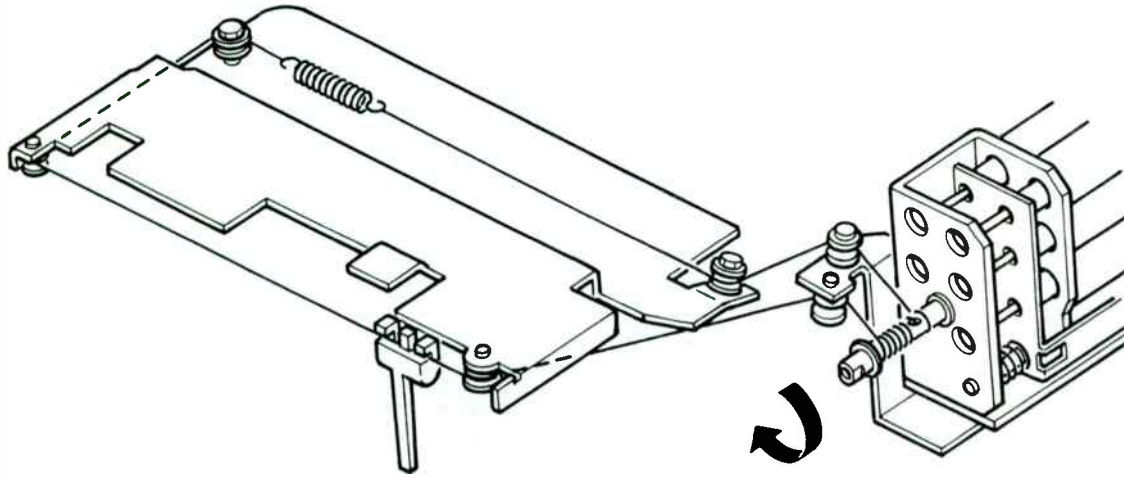


Note:
This tuner pack has been precision aligned at the factory and it seldom requires further adjustment.
Use special care not to temper with it.

PARTS LOCATION



DIAL CORD STRINGING



PARTS LIST

Key No.	Part No.	Description	Q'ty
PACKING & ACCESSORIES			
	141-6-132T-64800	Individual Carton	1
	147-6-144T-05700	Pad, Back	1
	147-6-144T-05800	Pad, Front	1
	147-2-351T-03400	Bracket Mounting, Set mtg.	1
	141-6-411T-74100	Instruction Book	1
	123-6-493R-10500	Customer Card	1
	147-6-478T-03500	Sticker, Head Azimuth	1
	147-6-478T-01200	Sticker, Head Height	1
	141-6-474T-02300	Fuse Label, 3A	1
	141-6-478T-08900	Sticker, EZ Label	1
	141-6-401T-00100	Guide Book	1
	141-6-478T-09100	Sticker, Radio/Tune/Balance	1
	141-6-478T-09200	Sticker, ON-OFF/Volume/Tone	1
		Pad, 220 x 250mm, Top	1
		Polyethylene Bag, 300 x 350mm, Set	1
	141-2-153T-24900	Escutcheon	1
		Polyethylene Bag, 100 x 250mm, Escutcheon	1
	141-2-351T-33600	Bracket Mounting, 182 x 65mm	1
	141-2-135T-40100	Cover	1
	141-2-163T-30100	Rotary Knob, TONE/BALANCE (with Lever)	2
	141-2-163T-30200	Rotary Knob, TONE/BALANCE	2
	141-0-163T-30391	Rotary Knob, VOLUME/TUNING	2
		Polyethylene Bag, 100 x 100mm, Knob	1
	141-2-415T-00500	Hexagon Nut	4
	141-2-421T-14400	Special Screw, 5 x 10mm	1
	141-2-421T-16500	Special Screw, Bracket mtg.	1
		Polyethylene Bag, 100 x 100mm Screw	1
	4-234T-00100	Fuse, 3A	1
	4-221T-00500	Resistor	1
	4-236T-053916	Plug Assembly	1
CABINET & CHASSIS			
1	141-0-125T-07591	Bottom Lid Assembly	1
2	141-2-129T-00800	Side Lid	2
3	141-0-124T-13391	Top Lid Assembly	1
4	141-2-221T-07200	Bracket Panel, Right	1
5	141-0-122T-14491	Front Panel Assembly	1
6	141-2-164T-14600	Slide Knob, Band Select	1
7	141-2-210T-01500	Bracket, Band Select	1
8	141-2-161T-28600	Push Button, DX/LOCAL	1
9	141-2-464T-18600	Fixer, Volume	2
10	141-2-368T-08402	Heat Sink	1
11	141-0-377T-17591	Bracket, P.C.B. Assembly, Tuner Pack mtg.	1
12	141-0-310T-01991	Bracket Assembly, Mechanism mtg.	1
13	141-2-253T-04600	Joint	1
14	141-2-253T-03701	Joint	1
15	141-2-253T-03801	Joint	1
16	141-0-133T-09191	Compartment Lid Assembly	1
17	141-2-511T-07200	Pointer	1
18	141-2-374T-10100	Bracket, Pilot Lamp, (right)	1
19	141-2-377T-17600	Bracket P.C.B., (Ref. No. 34 mtg.)	2
20	141-2-741T-88000	Lever, Band Select, small	1
21	141-2-741T-88100	Lever, Band Select, large	1
22	141-2-421F-17700	Special Screw	1
23	141-2-421T-17800	Special Screw, P.C.B. mtg.	2
24	147-2-851T-01000	Spring Coil, Dial Rope	1
25		Dial Rope, 0.3φx 450mm	1
26	141-2-851T-94700	Spring Coil	1
27	141-2-851T-95200	Spring Coil, Band Select	1
28	141-2-374T-10200	Bracket, Pilot Lamp, (left)	1
29	123-2-472R-00601	Lug, Lead mtg.	1
41	147-2-464T-03100	Fixer, Antenna Lead mtg.	1
46		Fiber Sheet, 10 x 10 x 0.3mm	1

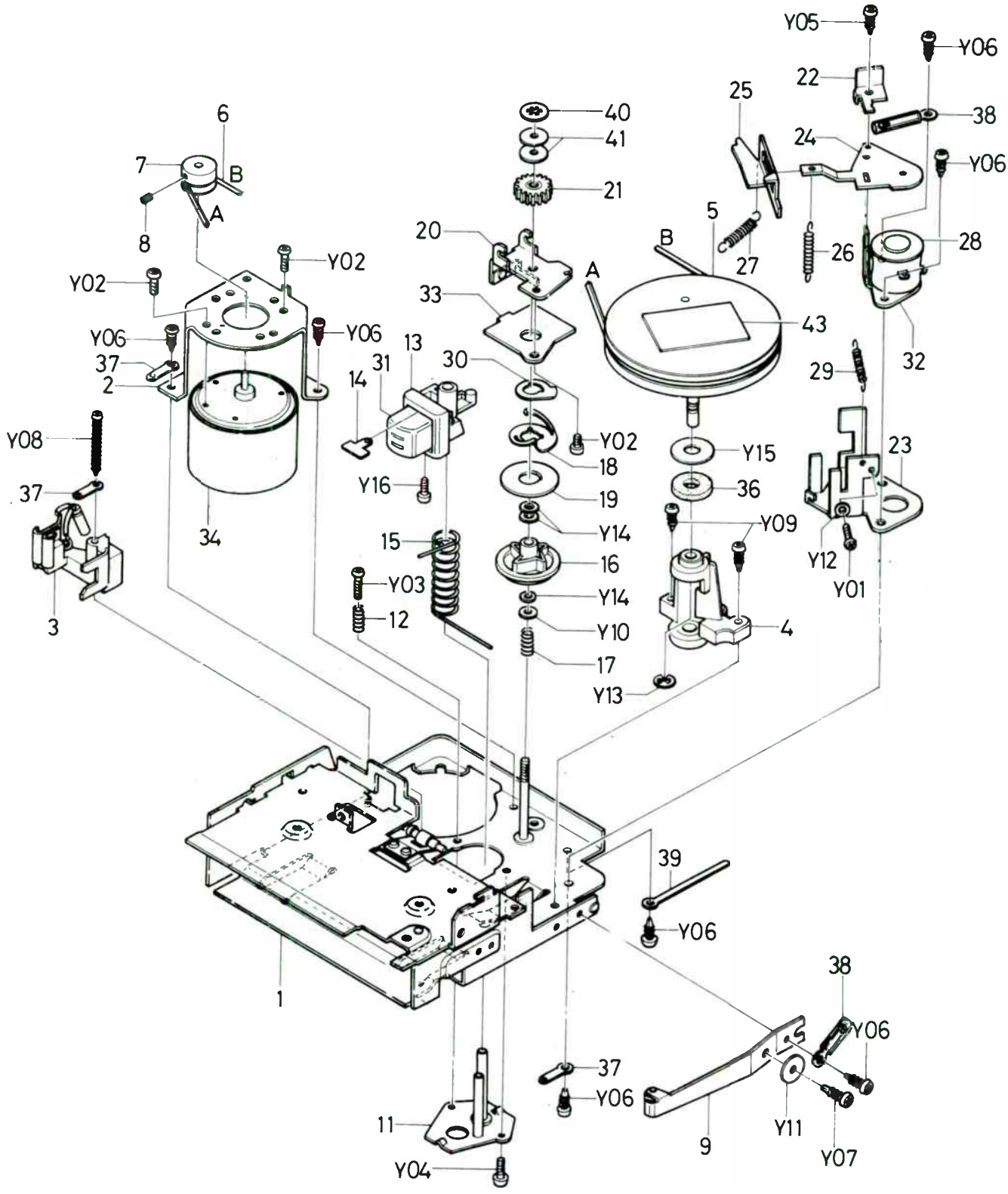
Key No.	Part No.	Description	Q'ty
MOUNTING PARTS			
Y01		Screw, Pan Hd., 2 x 8mm	1
Y02		Screw, Pan Hd., 2.6 x 4mm	2
Y03		Screw, Pan Hd., 3 x 4mm	7
Y04		Screw, Pan Hd., 3 x 5mm	2
Y05		Screw, Flat Hd., 2 x 4mm	1
Y06		Screw, Bind Hd., 2.6 x 6mm	2
Y07		Screw, Bind Hd., 3 x 5mm	2
Y08		Screw, Bind Hd., 3 x 8mm	1
Y09		Tapping Screw, Pan Hd., 2.3 x 4mm	1
Y10		Tapping Screw, Pan Hd., 2.6 x 12mm	1
Y11		Tapping Screw, Pan Hd., 3 x 6mm	22
Y12		Screw, Hd-less, 2.6 x 8mm	1
Y13		Nut, 3mm	2
Y14		Washer, 3 x 6 x 0.5mm	4
Y15		Washer, 3 x 10 x 0.5mm	2
Y16		External tooth lock Washer, 3mm	4
Y17		Screw, Pan Hd., 3 x 6mm	1
AMP PCB ASSY			
32	4-226T-765912	P.C.B. Assembly, AMP	1
Q701,751		Transistor, 2SC536	2
Q702,752		Transistor, 2SC536	2
Q703,753		Transistor, 2SC711	2
Q704,754		Transistor, 2SA696	2
Q705,755		Transistor, 2SD359 D1 or D2) a pair	2
Q706,756		Transistor, 2SB529 D1 or D2)	2
D701,751, 702,752		Diode, MA26	4
R702,652		Carbon, 8.2 ohm, ±10%, 1/4W	2
R712,762		Carbon, 39 ohm, ±10%, 1/4W	2
R792		Carbon, 100 ohm, ±10%, 1/4W	1
R718,768		Carbon, 330 ohm, ±10%, 1/4W	2
R704,754		Carbon, 1K ohm, ±10%, 1/4W	2
R791		Carbon, 2.2K ohm, ±10%, 1/4W	1
R713,763		Carbon, 1.8K ohm, ±10%, 1/4W	2
R707,757, 714,764		Carbon, 3.3K ohm, ±10%, 1/4W	4
R706,756		Carbon, 4.7K ohm, ±10%, 1/4W	2
R705,755		Carbon, 6.8K ohm, ±10%, 1/4W	2
R709,759		Carbon, 39K ohm, ±10%, 1/4W	2
R703,753, 708,758		Carbon, 68K ohm, ±10%, 1/4W	4
R701,751		Carbon, 100K ohm, ±10%, 1/4W	2
R716,766, 717,767		Metal Oxide, 0.22 ohm, ±10%, 1/2W	4
R715,765		Carbon, 47 ohm, ±5%, 1/4W	2
C710,760		Ceramic, 50pF, ±20%, 50WV	2
C704,754		Ceramic, 220pF, ±20%, 50WV	2
C701,751		Mylar, 0.001μF, ±20%, 50WV	2
C712,762, 713,763		Mylar, 0.022μF, ±20%, 50WV	4
C703,753		Mylar, 0.033μF, ±20%, 50WV	2
C702,752, 705,755, 708,758		Electrolytic, 4.7μF 10WV	6
C706,756		Electrolytic, 33μF, 6.3WV	2
C709,759		Electrolytic, 100μF, 6.3WV	2
C791,792		Electrolytic, 220μF, 16WV	2
C711,761		Electrolytic, 470μF, 10WV	2
C793		Electrolytic, 1000μF, 16WV	1
R/T SWITCH PCB ASSY			
33	4-226T-85591	P.C.B. Assembly, R/T Switch	1
S4	4-231T-51300	Switch, R/T	1
S2	4-231T-15600	Switch, DX/LOCAL	1
36	4-612T-06400	Lamp, 5V 60mA, Dial, Program	5
37		Diode, SLP24B, MPX Indicator, D307	1
18	141-2-374T-10100	Bracket, Pilot Lamp, (R)	1
28	141-2-374T-10200	Bracket, Pilot Lamp, (L)	1
R793,317		Metal Oxide, 150 ohm, ±10%, 1W	2
R341		Carbon, 3.3K ohm, ±10%, 1/4W	1

PARTS LIST

Key No.	Part No.	Description	Q'ty
POWER PCB ASSY			
34	4-226T-85691	P.C.B. Assembly, Power	1
C715,765, 795	4-223T-03800	Feed Through Capacitor, 1000pF	3
L701	4-252T-04430	Choke Coil	1
R401		Carbon, 5.6 ohm, ±10%, 1/2W	1
C403		Electrolytic, 4.7μF, 16WV	1
C402		Electrolytic, 470μF, 16WV	1
C794		Ceramic, 0.1μF, +80, −20%, 50WV	1
VOLUME PCB ASSY			
35	4-226T-87391	P.C.B. Assembly, Volume	1
30	4-222T-48400	Variable Resistor, 10K ohm "A", Volume (S3, S5, VR701,751, 702,752)	1
C714,764		Electrolytic, 0.1μF, 10WV	2
TUNER PCB ASSY			
42	4-226T-811911	P.C.B. Assembly, Tuner	1
IC301		Integrated Circuit, LA1201 B2	1
IC302		Integrated Circuit, LA3350 B	1
Q101,102		Transistor, 2SC941	2
Q301		Transistor, 2SC930	1
D301,302		Diode, 1S188 AM	2
D303,304		Diode, 1S188 FM	2
D305		Diode, WZ090	1
D306		Diode, DS442	1
R330	4-222R-61100	Semi-fixed Resistor, 5K ohm, MPX	1
R318	4-222T-42500	Semi-fixed Resistor, 250K ohm, AM AGC	1
CT102,103	4-224T-00100	Trimmer	2
L301	4-253T-01015	Choke Coil, 15mH	1
L102	4-253T-08600	Choke Coil, 3μH	1
L103	4-258T-10400	Oscillator Coil	1
CF301,302	4-256T-80400	Filter, 10.7MHz, Red/Blue/ Orange (a pair)	2
T301	4-256R-15130	Transformer, FM 2nd IF	1
T302	4-256R-02330	Transformer, FM 3rd IF	1
T303,307	4-256T-06700	Transformer, AM 1st IF, 3rd IF	2
T304	4-256T-06600	Transformer, AM 2nd IF	1
T308	4-256T-06800	Transformer, AM 4th IF	1
CR301	4-227R-11600	C.R. Pack	1
CR302	4-227T-01500	C.R. Pack	1
CR303,304	4-227T-01400 4-227T-01410	C.R. Pack, (a pair)	2
S1	4-231T-42173	Switch, Band Select	1
B101	123-2-471R-10400	Bead Core	1
	4-236T-09800	Plug, 6P	1
R309		Carbon, 270 ohm, ±10%, 1/4W	1
R103		Carbon, 330 ohm, ±10%, 1/4W	1
R320		Carbon, 560 ohm, ±10%, 1/4W	1
R329,337		Carbon, 680 ohm, ±10%, 1/4W	2
R112,306, 310,311, 314		Carbon, 1K ohm, ±10%, 1/4W	5
R307		Carbon, 1.5K ohm, ±10%, 1/4W	1
R305		Carbon, 2.2K ohm, ±10%, 1/4W	1
R104,106, 327,328, 326,339		Carbon, 3.3K ohm, ±10%, 1/4W	6
R323		Carbon, 6.8K ohm, ±10%, 1/4W	1
R331		Carbon, 8.2K ohm, ±10%, 1/4W	1
R101,301, 319		Carbon, 10K ohm, ±10%, 1/4W	3
R321		Carbon, 15K ohm, ±10%, 1/4W	1
R304		Carbon, 100K ohm, ±10%, 1/4W	1
R105,315		Carbon, 1M ohm, ±10%, 1/4W	2
R338		Carbon, 100 ohm, ±10%, 1/2W	1
R352		Cermic, 7pF, ±0.5pF, 50WV	1
R310		Cermic, 30pF, ±10%, 50WV	1
C353		Ceramic, 45pF, ±10%, 50WV	1
C311,315		Ceramic, 100pF, ±10%, 50WV	2
C106		Cermaic, 120pF, ±10%, 50WV	1
C107,301, 302,304, 305		Ceramic, 0.01μF, +80, −20%, 50WV	5

Key No.	Part No.	Description	Q'ty
TUNER PCB ASSY			
C104,111, 303,314, 318		Ceramic, 0.022μF, +80, −20%, 50WV	5
C105,354		Cermaic, 0.04μF, +80, −20%, 50WV	2
C108,120		Mylar, 0.001μF, ±20%, 50WV	2
C109		Mylar, 0.0047μF, ±20%, 50WV	1
C320,321		Mylar, 0.0082μF, ±20%, 50WV	2
C328,329		Mylar, 0.018μF, ±20%, 50WV	2
C306		Mylar, 0.022μF, ±20%, 50WV	1
C342		Mylar, 0.047μF, ±20%, 50WV	1
C110		Styrol, 270pF, ±5%, 125WV	1
C343		Styrol, 1500pF, ±5%, 125WV	1
C330		Electrolytic, 0.22μF, 10WV	1
C319		Electrolytic, 0.33μF, 10WV	1
C312,341		Electrolytic, 0.47μF, 10WV	2
C309,324		Electrolytic, 4.7μF, 16WV	2
C332		Electrolytic, 10μF, 16WV	1
C331		Electrolytic, 470μF, 10WV	1
TRIMMER PCB ASSY			
43	4-226T-85491	P.C.B. Assembly, Trimmer	1
CT101	4-224T-05200	Trimmer, 60pF	1
R114		Carbon, 68 ohm, ±10%, 1/8W	1
R115		Carbon, 2.2K ohm, ±10%, 1/8W	1
L101	4-253T-05800	Choke Coil, 6.5μH	1
C102		Ceramic, 20pF, ±10%, 50WV	1
C101		Ceramic, 220pF, ±10%, 50WV	1
ELECTRICAL PARTS			
31	4-222T-45800	Variable Resistor, 20K ohm "W", Balance (VR703)	1
38	4-235T-20200	Socket, 9P	1
39	4-125T-01502	Tuner Pack, FM	1
40	4-235T-33500	Socket, Antenna	1
R350		Carbon, 1M ohm, ±10%, 1/4W	1
	4-235T-32600	Socket, 6P	1
	4-234T-00100	Fuse, 3A	1
44	141-2-472T-01000	Lug, Antenna	1
45	141-2-472T-01001	Lug, Lead mtg.	1
MECHANISM			
1	141-0-311T-204911	Chassis Assembly	1
2	141-2-378T-07500	Bracket Motor	1
3	141-0-821T-00200	Tape Guide Assembly	1
4	141-0-571T-00700	Bearing Axies Assembly	1
5	141-0-521T-05600	Flywheel Assembly	1
6	141-2-564T-15300	Belt	1
7	141-2-661T-69100		
	141-2-661T-69101 or 141-2-661T-69102	Pulley, Motor	1
8		Screw, Hd. − less, 2.6 x 5mm	1
9	141-0-853T-41791	Spring Plate Assembly, Side Pressure	1
11	141-0-375T-06391	Bracket, Head Assembly	1
12	147-2-851T-00900	Spring Coil, Azimuth	1
13	141-2-375T-06200	Bracket, Head	1
14	141-2-352T-13901	Spacer, Head Earth	1
15	141-2-851T-89600	Spring Coil	1
16	141-2-671T-05000	Cam	1
17	141-2-851T-89500	Spring Coil	1
18	141-2-764T-01400	Brush, Channel	1
19	141-2-352T-14400	Spacer, Brush	1
20	141-0-351T-33491	Bracket Mounting, Assembly	1
21	141-2-581T-03500	Gear	1
22	141-2-310T-01300	Bracket, Channel	1
23	141-2-351T-33200	Bracket Mounting	1
24	141-2-741T-81200	Lever	1
25	141-2-741T-81100	Lever	1
26	141-2-851T-92600	Spring Coil, Bracket Mounting	1
27	141-2-851T-46200	Spring Coil, Lever mtg.	1
28	141-2-352T-16500	Spacer, Magnetic Coil mtg.	1
29	141-2-851T-61100	Spring Coil	1
30	141-2-352T-16700	Spacer, Cam	1
31	4-242T-19100	Magnetic Head	1
32	4-264T-06300	Magnetic Coil	1
33	4-226T-80300	P.C.B. Channel	1
34	4-527T-08900	Motor	1

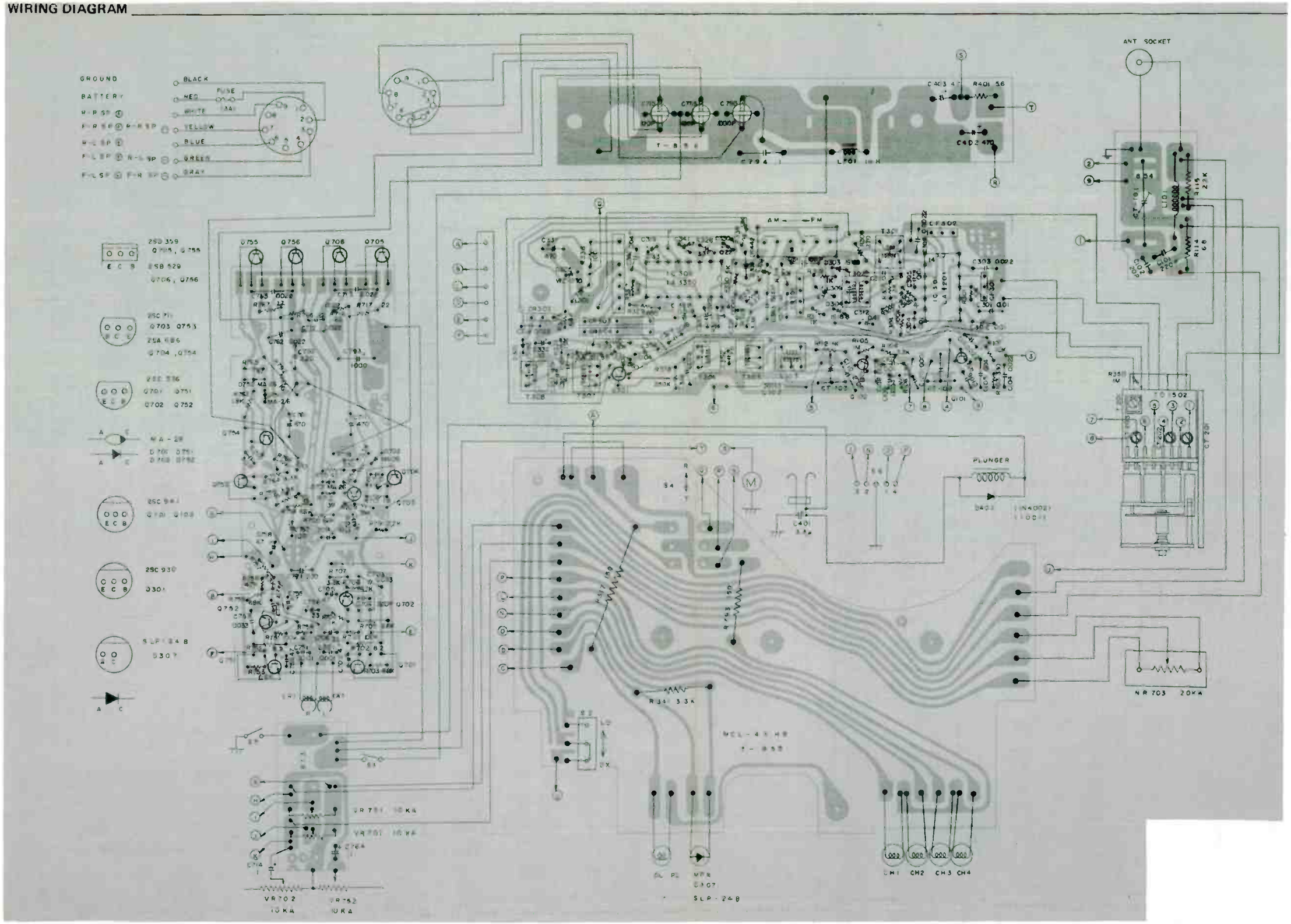
EXPLODED VIEW



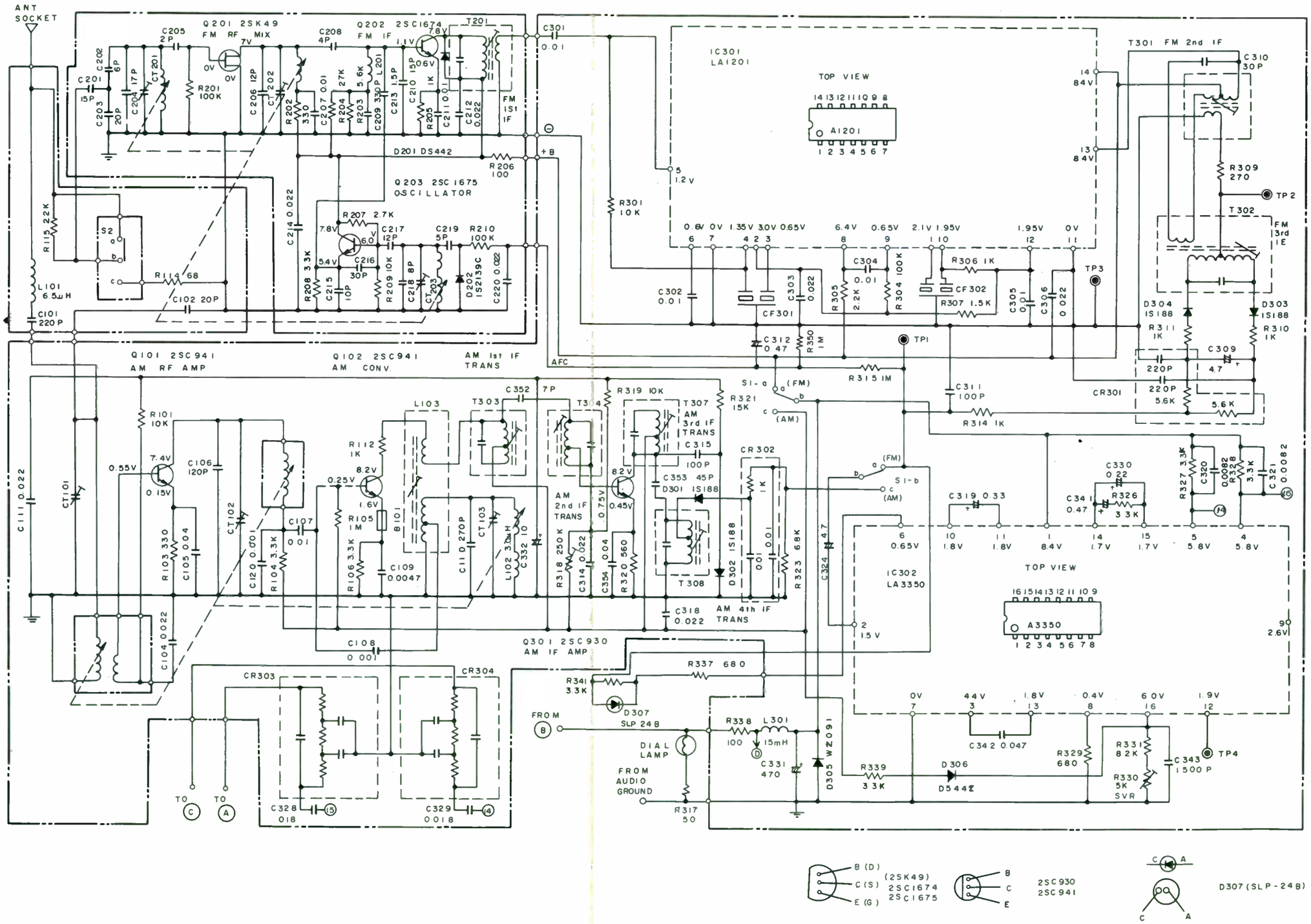
PARTS LIST

Key No.	Part No.	Description	Q'ty
MECHANISM			
36		Felt Washer, 9 x 13 x 2mm, Bearing Axis	1
37	123-2-472R-00400	Lug, Flywheel Earth, Head Earth	3
38	123-2-472R-00600	Lug, Head Lead mtg.	2
39	141-2-472T-01000	Lug, Magnetic Coil	1
40		Push Nut, 2.5 x 10 x 0.15mm, Gear	1
41	141-2-457T-09200	Special Washer, 4.5 x 9 x 1mm, Gear	2
43	141-6-474T-01200	Identification Label	1
C401		Electrolytic, 3.3μF, 16WV	1
D401		Diode, 1N4002 or 10D-1	1
MECHANISM MOUNTING PARTS			
Y01		Screw, Pan Hd., 2 x 6mm	1
Y02		Screw, Pan Hd., 2.6 x 4mm	3
Y03		Screw, Pan Hd., 2.6 x 10mm	1
Y04		Screw, Pan Hd., 3 x 8mm	1
Y05		Tapping Screw, Pan Hd., 2.3 x 6mm	1
Y06		Tapping Screw, Pan Hd., 3 x 6mm	7
Y07		Tapping Screw, Pan Hd., 3 x 8mm	1
Y08		Tapping Screw, Pan Hd., 3 x 20mm	1
Y09		Tapping Screw, Bind Hd., 3 x 10mm	2
Y10		Washer, 3 x 6 x 0.5mm	1
Y11		Washer, 3 x 8 x 0.5mm	1
Y12		Spring Washer, 2mm	1
Y13		"E" Ring, 4mm	1
Y14		Graphite Nylon Washer, 3 x 5.4 x 0.25mm	3
Y15		Graphite Nylon Washer, 6.5 x 13 x 1mm	1
Y16		Tapping Tight Screw, 2.5 x 6mm	1

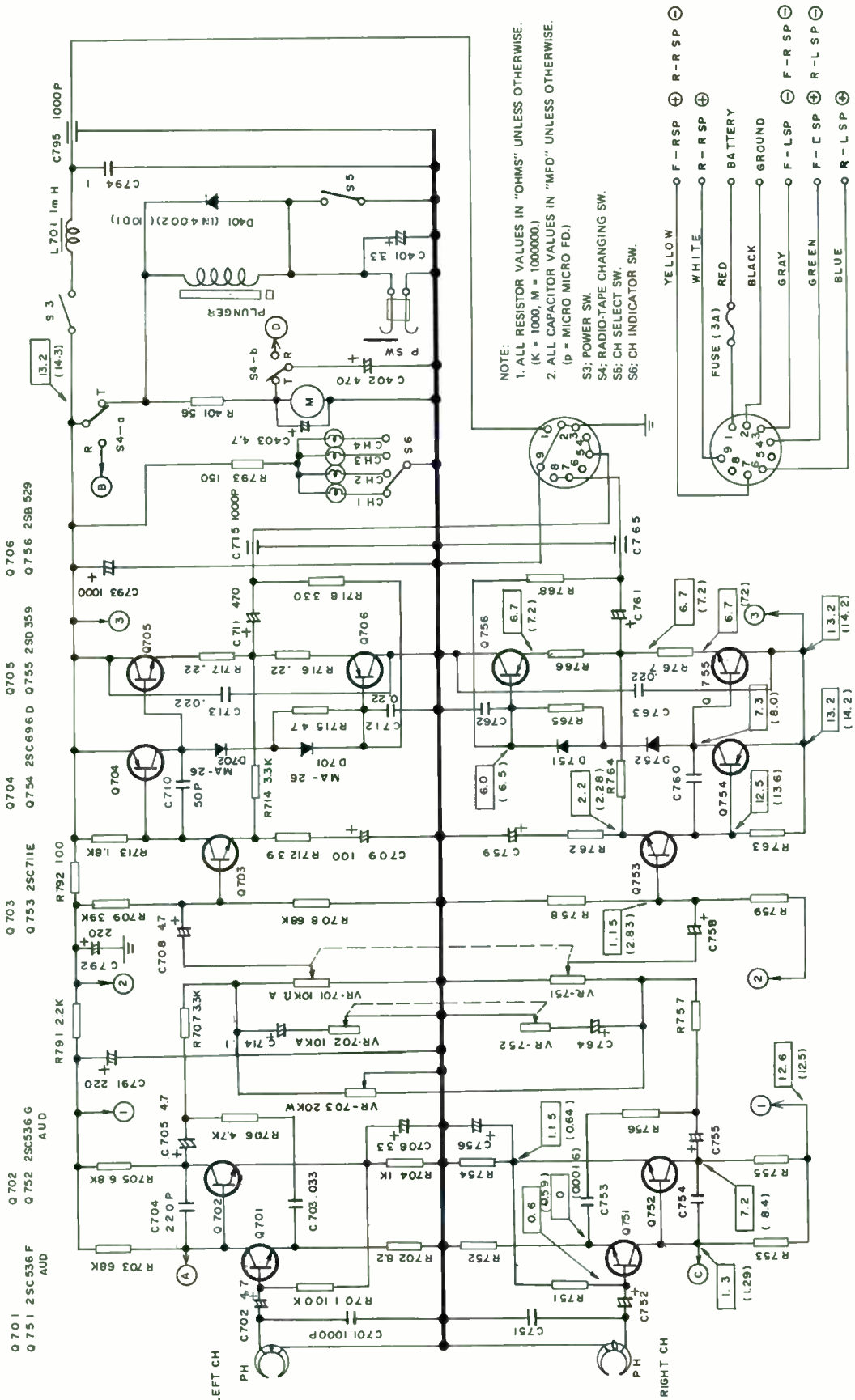
WIRING DIAGRAM



SCHEMATIC DIAGRAM (TUNER)



SCHEMATIC DIAGRAM (AMPLIFIER)



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For models covered before 1970, see the Annual Index.

# Denotes Sams Publication Out Of Print.

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D0LA19A241 ... AR-94
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#D0OA19A241 ... AR-79
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5FO2507 ... AR-200
5FD4510 ... AR-199
5FD4706(Sim.to Pg. 45) ... AR-228
5FD4802/3 ... AR-200
5FD4804(Sim.to Pg. 45) ... AR-228
5FD4804 ... AR-274
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5LN4805 ... AR-274
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6A D6DA18806,AA ... AR-221
6A D6EA19A171 ... AR-226
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01BFM1/2 ... AR-75
01BFP1/2 ... AR-74
01BFP3 ... AR-92
01BPB1/2 ... AR-70
01BPBT1/2 ... AR-74
#01BT411 ... AR-76
01BT412 ... AR-86
#01FFM1 ... AR-77
01FFMT1(Sim.To Pg. 19) ... AR-75
01FFP1 ... AR-92
#01FPB1 ... AR-97
01FPBT1(Sim.to Pg. 57) ... AR-74
01TFP3 ... AR-92
#01TPB1/2(Early Prod) ... AR-76
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01VFP1/2 ... AR-74
01VFP3 ... AR-92
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#02BFM1 ... AR-76
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#02BMF1 ... AR-76
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02BT412 ... AR-90
02FBPK2 ... AR-101
#02FFM1 ... AR-76
#02FFM2 ... AR-79
02FFP1/2 ... AR-94
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#03AFM1 ... AR-80
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03APB1(Early Prod) ... AR-84
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#03BFM1 ... AR-80
03BFM2 ... AR-88
03BPB1 ... AR-73
#03BT411 ... AR-78
#03BT412 ... AR-87
#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
04BFM1 ... 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
04CFPK2 ... AR-93
#04CFW1 ... AR-79
#04CMW1 ... AR-78
#04CMWK1 ... AR-78
04CT411 ... AR-83
04CT412 ... AR-94
04EFM1 ... AR-83
04EFM2 ... AR-88
04EFP1 ... AR-75
04EFP2 ... AR-88
#04EPB1 ... AR-77
04EPB2 ... AR-73
#04EPB4 ... AR-77
#04LPB1 ... AR-78
#05CFP1 ... AR-76
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#3ET412 ... AR-87
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#4AT412 ... AR-81
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4BT411 ... AR-82
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#11APB1 ... AR-96
11APBT1(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
11BFPK1/2 ... 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-93
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(1971) ... 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
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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
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#12GFM1 ... AR-106
#12GFP1(1971 1/2) ... AR-120
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12GFPK1(1971) ... AR-97
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14AFP1 ... AR-101
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14BFMT1 ... AR-98
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#14BFP1 ... AR-96
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14BPB1 ... AR-97
14BPBT1 ... AR-100
14BPBT2 ... AR-114
14BT411 ... AR-97
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#21APBK1(Early Prod.) ... AR-110
21APBK1(Late Prod.) ... AR-114
21APBK2(Late Prod.) ... AR-124
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21BFP1 ... AR-113
21BFP2(See Pg. 61) ... AR-113
21BFPK1 ... AR-113
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21BPB1 ... AR-112
#21BPB2 ... AR-120
21BPBK1 ... AR-112
#21BPBK2 ... AR-120
21BPBT1 ... AR-115
#21BPBT2 ... AR-125
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21TFP3 ... AR-127
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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
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#23BFM1 ... AR-110
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#24BFMT1 . . . . . AR-120
#24BFP1 . . . . . AR-110
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24BPB2 . . . . . AR-124
24BPBT1 . . . . . AR-114
#24BPBT2(1972 1/2) . . AR-128
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#24BPT2 . . . . . AR-128
24BT41 . . . . . AR-112
24LPB1 . . . . . AR-114
#24LPB2 . . . . . AR-126
24PPB1 . . . . . AR-112
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25CFMT1/2 . . . . . AR-114
25CFP1 . . . . . AR-112
#25CMW1/2 . . . . . AR-110
25CT41 . . . . . AR-112
26TCFP2/3 . . . . . AR-127
26TFP1 . . . . . AR-117
#26TRMP1 . . . . . AR-110
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