
AM / FM STEREO TUNER

NT-850

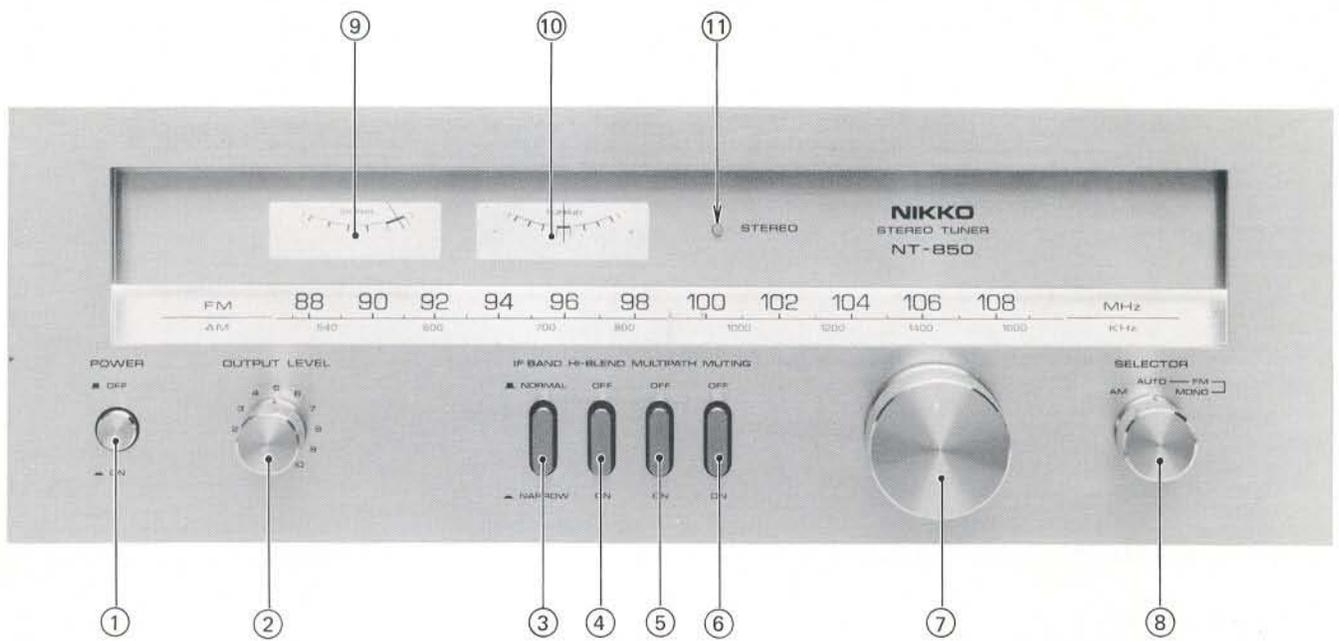


SERVICE MANUAL

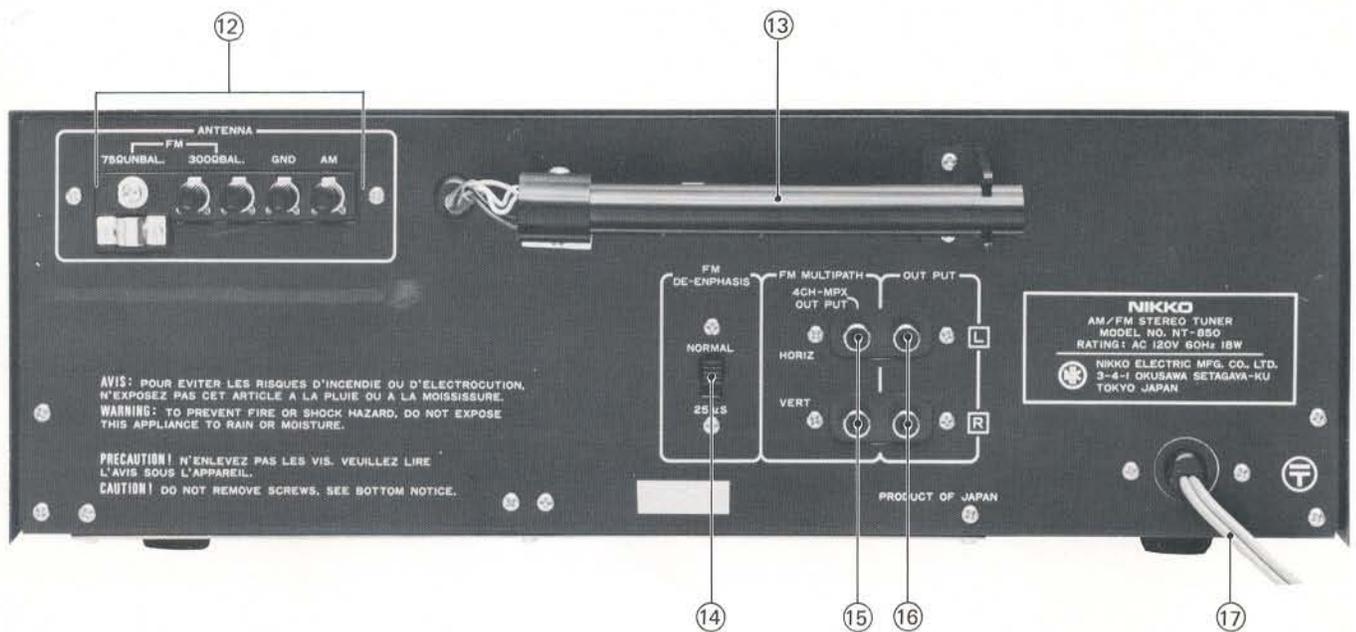
TYPE AND VOLTAGE

W-TYPE UL and CSA type	120V AC
E-TYPE NK standard type	220/240V AC
N-TYPE DEMKO and SEMKO type	

NIKKO



(W-TYPE)



(W-TYPE)

- | | |
|-------------------------|---|
| 1. POWER SWITCH | 10. SIGNAL STRENGTH METER |
| 2. OUTPUT LEVEL CONTROL | 11. STEREO INDICATOR |
| 3. IF BAND SWITCH | 12. ANTENNA TERMINALS |
| 4. HI-BLEND SWITCH | 13. AM LOOPSTICK ANTENNA |
| 5. MULTIPATH SWITCH | 14. DE-EMPHASIS SWITCH |
| 6. MUTING SWITCH | 15. MULTIPATH TERMINALS
(OSCILLOSCOPE JACKS) |
| 7. TUNING KNOB | 16. OUTPUT TERMINALS |
| 8. SELECTOR SWITCH | 17. AC POWER SUPPLY CORD |
| 9. TUNING METER | |

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SPECIFICATIONS

		UNIT	NOM. (NOR.)	LIMIT (NOR.)	NOM. (NARROW)	LIMIT (NARROW)
FM TUNER SECTION						
Usable Sensitivity		dBf (μ V)	9.31 (1.6)	15.3 (3.2)	9.31 (1.6)	15.3 (3.2)
50 dB Quieting Sensitivity		dBf (μ V)	11.2 (2.0)	20.2 (5.6)	11.2 (2.0)	20.2 (5.6)
Hum and Noise	MONO	dB @ 65 dBf.	70	65	70	65
	STEREO	dB @ 65 dBf.	70	65	70	65
T. H. Distortion	MONO	%	0.08	0.3	0.1	0.5
	STEREO(L=-R)	%	0.12	0.3	0.2	0.5
Capture Ratio		dB	1.5	3	2	4
Alternate Channel Selectivity		dB	60	50	80	70
Spurious Response Ratio		dB	100	80	100	80
Image Response Ratio (98 MHz)		dB	80	70	80	70
IF Response Ratio (98 MHz)		dB	85	70	85	70
AM Suppression Ratio		dB	60	40	65	40
Separation	(100 Hz) STEREO	dB	45	35	35	25
	(1 kHz) STEREO	dB	55	40	45	30
	(10 kHz) STEREO	dB	40	30	30	20
Separation, Hi-Blend						
	(1 kHz) STEREO	dB	22	22 \pm 5	22	22 \pm 5
Subcarrier Product Ratio	STEREO	dB	65	50	65	50
Meter Sensitivity @65 dBf			4.5	4.5 \pm 0.3	4.5	4.5 \pm 0.5
Output Level		Volts	1	0.8	1	0.8
FM Receiving Frequency		MHz	87.4-109	87.9-108.5	87.4-109	87.9-108.5
Antenna Impedance			300 ohms balanced & 75 ohms coaxial			

		UNIT	NOM.	LIMIT
AM TUNER SECTION				
Usable Sensitivity	Loopstick antenna	μ V/m	300	1000
Signal-to-Noise Ratio		dB	45	35
Image Rejection	(1000 kHz)	dB	75	60
IF Rejection	(1000 kHz)	dB	60	40
IHF Selectivity	(\pm 10 kHz)	dB	40	30
AM Receiving Frequency		kHz-kHz	520 - 1650	525 - 1635
Output Level		mV	400	400 \pm 3 dB

DISASSEMBLY

Note: Three digit numbers circled in this chapter (○) are represented by a (★) in the parts listing.

Cabinet Cover Removal

Remove seven tapping screws from the top and both sides of the metal cover as shown in Photo 1.



Photo 1

Bottom Plate Removal

Remove eight tapping screws from the bottom of the unit and lift away.

Front Panel Removal

1. Using hexagonal wrench, remove TUNING knob from the front of the unit.
 2. Remove SELECTOR knob and OUTPUT LEVEL knob from the front of the unit by pulling them forward.
 3. Remove two nuts (1, 2) (Photo 2).
Remove two tapping screws (1, 2) (Photo 3).
 4. Lift front panel away from the unit.
- * To reassemble, reverse the procedure.

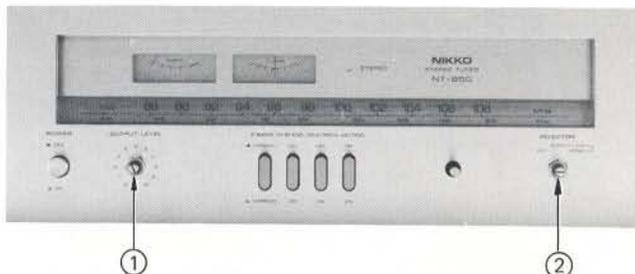


Photo 2

Power Transformer Removal

1. Disconnect all the power transformer cables.
 2. Remove two tapping screws (3, 4) (Photo 3).
 3. Lift the power transformer up and out of chassis.
- * To reassemble, reverse the procedure.

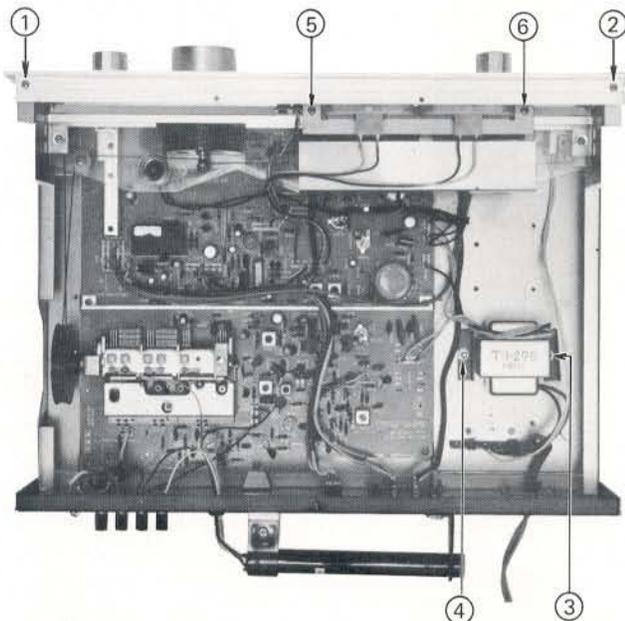


Photo 3

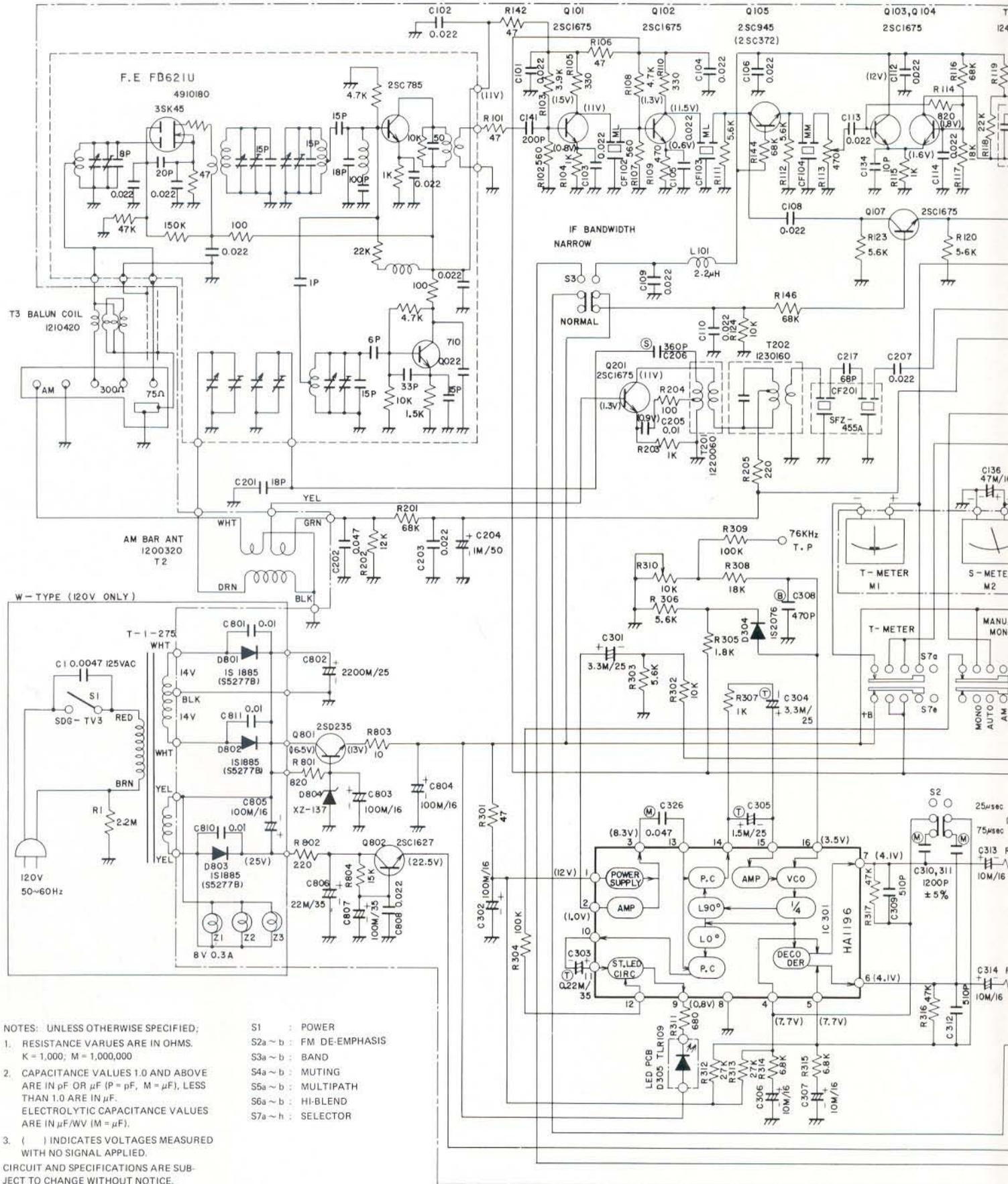
Meters Removal

1. Disconnect cables to meters.
 2. Remove two tapping screws (5, 6) (Photo 3).
 3. Remove the meters by lifting the meter bracket up and out of the front plate.
- * To reassemble, reverse the procedure.

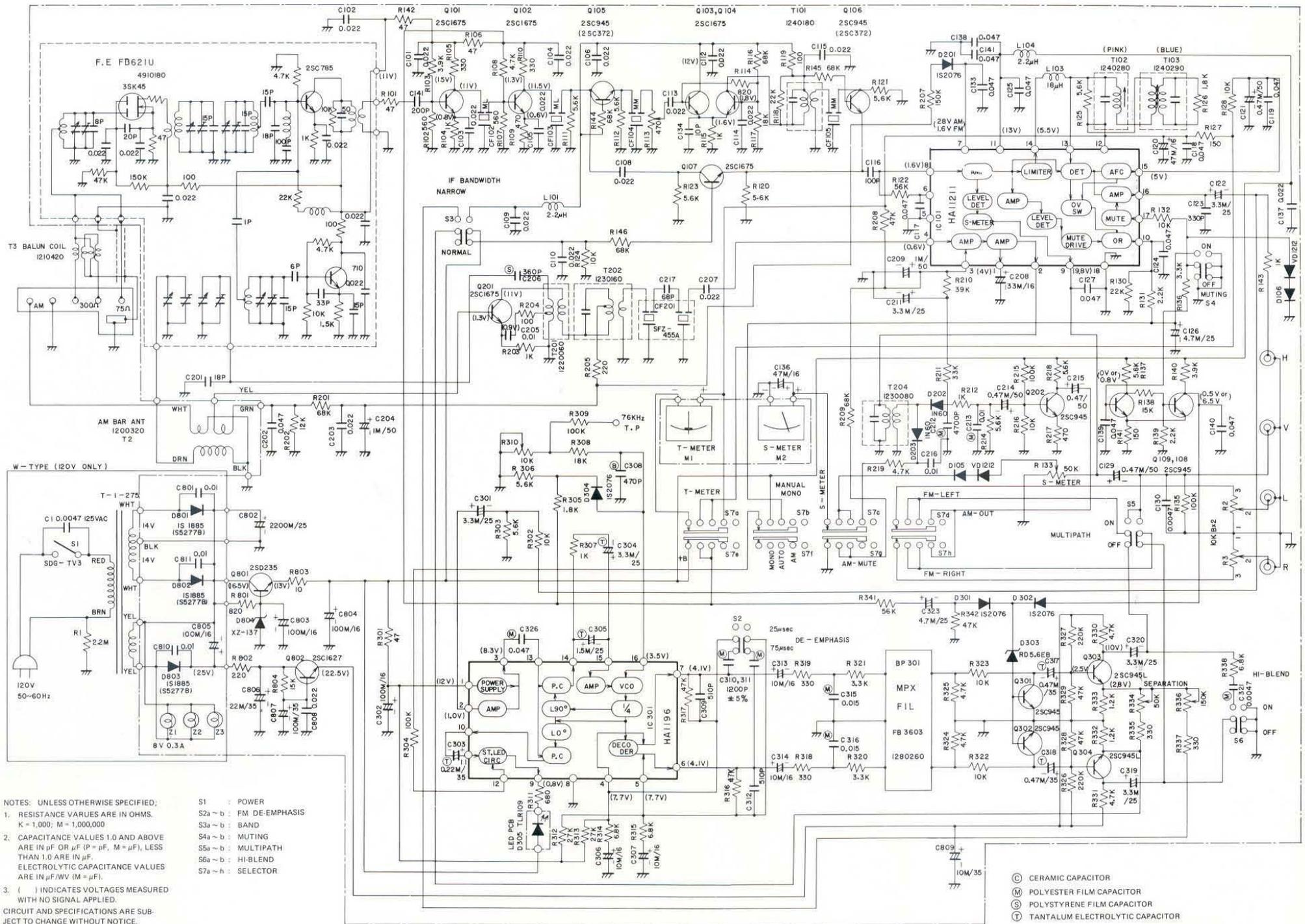
Lamps Removal

1. Pull lamps out from the bottom of the REFLEX PLT (light guide acrylic resin plate).
- * To reassemble, reverse the procedure.

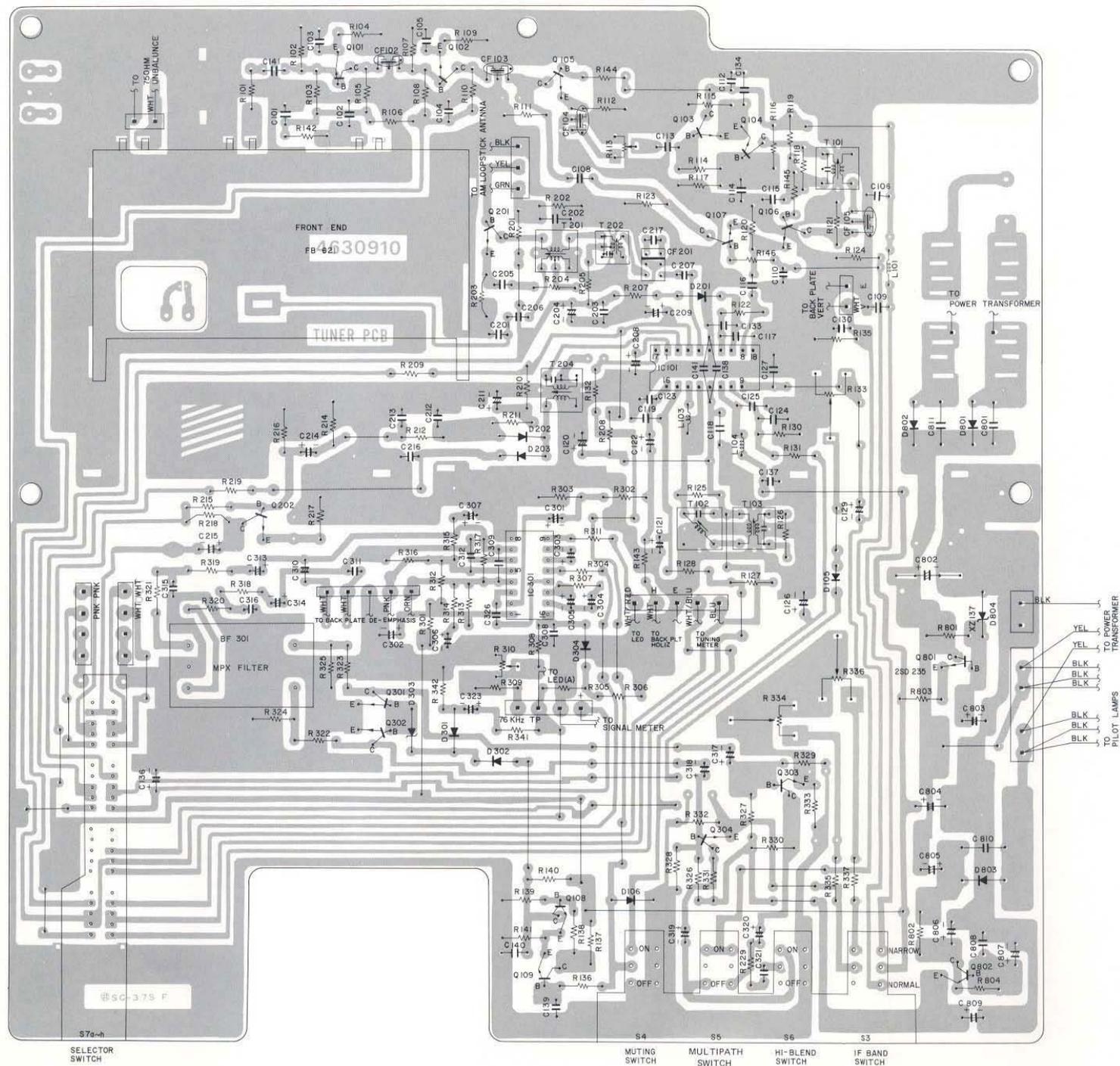
SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM



TUNER CIRCUIT BOARD (BOTTOM VIEW) (W-TYPE)



PARTS LOCATION

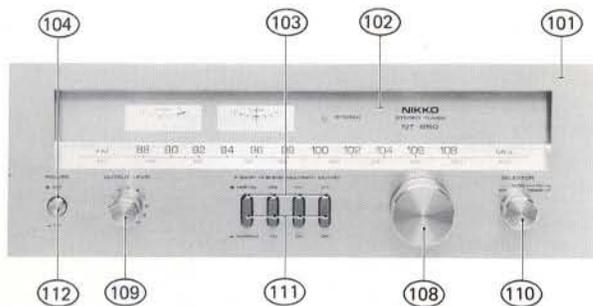


Photo 4

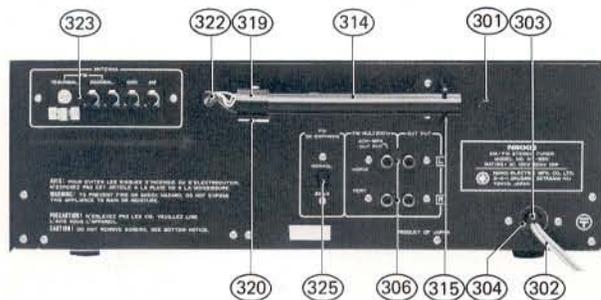


Photo 5

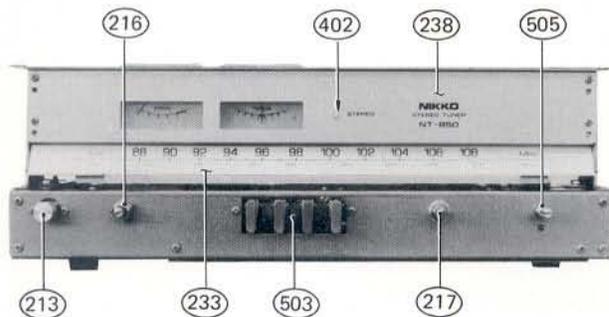


Photo 6

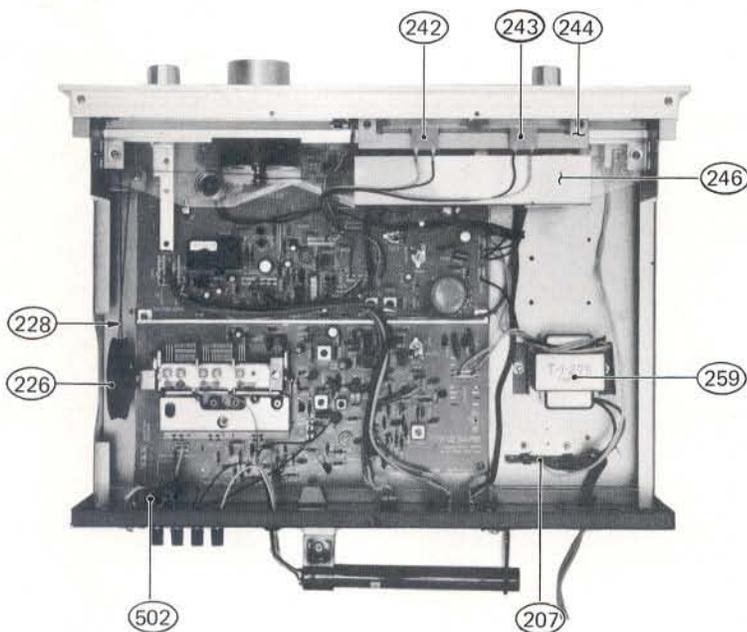


Photo 7

PARTS LIST

NOTES:

- ★ The KEY NUMBER (#) marked with a (*) on parts list relate to numbers of three digits with a (○). (Photo 1 - 8)
- + Numerals in file indicate the quantity of a parts used in one type.
- ++ TR : Transistor
 FET : Field effect transistor
 IC : Integrated circuit
 VR : Volume control (Variable resistor)
 POT : Potentiometer (Semifixed variable resistor)
 RES : Carbon film fixed resistor
 MORES : Metal oxide film fixed resistor
 CEMRES : Cemented wirewound fixed resistor
 NF : Nonflamable
 C-CAP : Ceramic capacitor
 E-CAP : Aluminium electrolytic capacitor

- M-CAP : Polyester film capacitor
 S-CAP : Polystyrene film capacitor
 T-CAP : Tantalum electrolytic capacitor
 BP-CAP : Bipolar electrolytic capacitor

E-CAP, T-CAP and BP-CAP values (1 x 10 uF) are in (1) uF, (10) V.

4. Assemblies and parts are subject to charge without notice.

5. Parts ordering procedure:

Include in any order

- Part number.
- Part description.
- Model number.

(Any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE* W-type-u N-type-u N-type-d	DESCRIPTION**	PART NO.
PACKING MATERIALS & ACCESSORIES				
001		111	CARTON BOX	9825240
002		222	STYROL PAD	9840640
003		111	POLI SACK - (polyethylene cloth)	9640550
004		111	POLI SACK #13 - (polyethylene cloth)	9640320
005a		111	INSTRUCTION MANUAL E	960186E
005b			INSTRUCTION MANUAL F	960213F
005c		- 11	INSTRUCTION MANUAL K	960198K
006		1 - -	WARRANTY CARD (N)	967004A
007		111	POLISHING CLOTH	9690040
008		111	SILICA GEL - dryer	9690010
009		111	Q-MATCH ANT(EX) - FM antenna	4581360
010		111	PIN PLUG CORD RED	962003C
011		111	PIN PLUG CORD YEL	962003E
CABINET ASSEMBLY				
*101		111	PNL NT-850 - front panel	7883610
*102	↑	111	DIAL WINDOW GLASS	7802210
*103	↑	222	BUTTON GUIDE (2)	7401210
*104	↑	111	BUTTON GUIDE 12B	7400630
105	↑	222	PTS 3φ x 6 - screw	814306S
106	↑	222	SN 9φ - nut	892249S
107	↑	222	W 9φ - washer	893109S
*108		111	KNOB R15GL-32 (tuning)	7841060
*109		111	KNOB R15GL-19D (output level)	7851540
*110		111	KNOB R15GL-22D (selector)	7851610
*111		444	PUSHBUTTON (IF band, hi-blend, multipath, muting)	7851560
*112		111	PUSHBUTTON M12-3.3SQ (power)	7850620
*113		111	COV - metal cover	7820710
114	↑	333	PTS 3φ x 6 BLK - screw	814306W
115	↑	444	TFTS 4φ x 10 BLK - screw	887410W
116	↑	444	W 4φ BLK - washer	893104W
117		111	BTM PLT - bottom plate	7324630
118	↑	888	PTS 3φ x 6 - screw	814312S
119	↑	444	FOOT 23φ x 12	7401080
120	↑	444	PTS 3φ x 12 - screw	814306S
CHASSIS ASSEMBLY				
201		111	SIDE ANGLE (L)	7226170
202		111	SIDE ANGLE (R)	7226180

KEY NO.	SYMBOL NO.	TYPE* W-type-u N-type-u N-type-d	DESCRIPTION**	PART NO.
203		111	FRONT ANGLE	7226220
204	↑	666	PTS 3φ x 6 - screw	814306S
300			(BACK PLATE ASSEMBLY)	
205	↑	666	PTS 3φ x 6 - screw	814306S
			(TUNER CIRCUIT BOARD)	
206	↑	555	PTS 3φ x 6 - screw	814306S
*207		111	EARTH LUG 4P	4400080
208	↑	111	TW(I) 3φ - washer	893403U
209		111	TUNER PCB HOLDER	7031140
210		222	PTS 3φ x 6 - screw	814306S
211		222	PMS 3φ x 6 - screw	810306S
212		222	SPACER 765	7152210
*213a		1 - -	PUSHBUTTON SWITCH SDG TV-3 (power)	4040890
213b		- 11	PUSHBUTTON SWITCH SDG 2P TV-3(power)	
214	↑	222	PMS 3φ x 6 - screw	810306S
215a		1 - -	C-CAP 0.0047uF AC125V	239472C
215b			C-CAP 0.0047uF AC250V	239472E
*216	R2~R3	111	VR V16L4G3N25KC 10Kohm x 2	4320730
*217		111	DIAL SHAFT & FLYWHEEL	7152320
218	↑	111	SN 9φ - nut	892249S
219	↑	111	TW (I) 9φ - washer	893409S
220	↑	111	W 9φ - washer	893109S
221		444	PULLEY 9φ	7400790
222		444	PULLEY SHAFT 4L	7120980
223		111	PULLEY BRACKET (A)	7031580
224		111	PULLEY BRACKET (B)	7031590
225		444	PMS 3φ x 6 - screw	814306S
*226		111	DIAL DLUM 50φ	7401020
227	↑	111	SPRING (J)	7440290
*228		111	DIAL CORD	4580430
229		111	NEEDLE - dial pointer	7860540
230		111	SIDE PLATE (L)	7226190
231		111	SIDE PLATE (R)	7226200
232	↑	444	PTS 3φ x 6 - screw	814306S
*233		111	DIAL SCALE	7883630
234	↑	777	PTS 3φ x 6 - screw	814306S
235		111	BLIND PLATE	7280290
236		111	METER HOLD PLATE	7226210
237		111	METER PANEL	7883640
238		111	DIAL BLIND (L) (ABS resin)	7401290
239		111	DIAL BLIND (R) (ABS resin)	7401300
240		444	PTS 3φ x 6 - screw	814306S
241		444	PTS 3φ x 8 - screw	814308S
*242		111	METER C-85C (tuning)	4581960
*243		111	METER C-85C (signal)	4581970
*244		111	METER BRACKET	7031170
245	↑	222	PTS 3φ x 6 - screw	814306S
246		111	METER REFLEX PLATE	7031240
247	↑	222	PMS 3φ x 12 - screw	810312S
248	↑	222	IN 3φ - nut	892013S
249	↑	222	TW 3φ - washer	893404U
250		111	REFLEX PLT (acrylic resin) - light guide plate	7870330
251		111	LAMP 8V 0.3A 300mm	5808120
252		111	LAMP 8V 0.3A 200mm	5808140

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(Any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE* W (Type U) N (Type D)	DESCRIPTION**	PART NO.	KEY NO.	SYMBOL NO.	TYPE* W (Type U) N (Type D)	DESCRIPTION**	PART NO.
253		111	LAMP 8V 0.3A 200mm	5808140	TUNER CIRCUIT BOARD				
254		222	PTS 3φ x 12 - screw	814312S	501		111	FM FRONT END FB621U	4910080
255		222	PMS 3φ x 12 - screw	810312S	*502	T3	111	BALUN COIL (S)	1210420
256		444	TW 3φ - washer	893404U	*503	S3-S6	111	TETRA PUSH SW SUE42 (IF band, muting, multipath, hi-brend) - quadruple pushbutton switch	4040880
257		222	IN 3φ - nut	892013S	504	†	111	STUD SCREW	7121000
258	†	111	PUSH RIVET 3 x 3.5	7401190	*505	S7	111	ROTRY SW SRZ-V08 (selector) - rotary switch 8p, 3pst	4055070
*259a		1--	POWER TRANSFORMER T-1-275 120V	1102750	(FM I-F SECTION)				
259b		- 11	POWER TRANSFORMER T-1-279 230V	1102790	C101		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
260	†	222	P.T. STOP PLATE	7031290	C102		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
261	†	222	PMS 4φ x 15 - screw	810415S	C103		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
262		1--	T-LUG 2L-4P	442241W	C104		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
263		-- 1	T-LUG 2L-5P	442251W	C105		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
264	†	2-2	PMS 3φ x 10 - screw	810310S	C106		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
265	†	2-2	IN 3φ - nut	892013S	C107			Out of use	
266	†	2-2	TW (I) 3φ - washer	893404U	C108		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
267		1--	RES 2.2Mohm 10% 1/2W	325225K	C109		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
BACK PLATE ASSEMBLY					C110		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
300a		1--	BACK PLATE ASSEMBLY Wu	9512790	C111			Out of use	
300b		- 1-	BACK PLATE ASSEMBLY Eu	9512800	C112		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
300c		-- 1	BACK PLATE ASSEMBLY Nd	9512810	C113		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
*301a		1--	BACK PLATE NT-850W	7324640	C114		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
301b		- 1-	BACK PLATE NT-850E		C115		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
301c		-- 1	BACK PLATE NT-850N		C116		111	C-CAP 100pF 10% 50V SL	232101K
*302a		1--	PLUG CORD KP-2	606002J	C117		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
302b		- 11	PLUG CORD CEE-2T	600506J	C118		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
302c			PLUG CORD CEE-3T	601808J	C119		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
*303a		1--	CORD STOPPER SR-3P-4	7400620	C120		111	E-CAP 16R47uF	2112250
303b		- 11	CORD STOPPER SR-4N-4	7400690	C121		111	E-CAP 50R0.47uF	2115050
303c			CORD STOPPER SR-6W-1	7400740	C122		111	E-CAP 25R3.3uF	2113130
*304a		1--	CORD BRACKET (UL)	7029350	C123		111	C-CAP 330pF 10% 50V SL	232331K
304b		- 11	CORD BRACKET (EH)	7029800	C124		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
305	†	222	PTS 3φ x 6 - screw	814306S	C125		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
*306		111	US PIN TERMINAL 2P x 2	4440470	C126		111	E-CAP 25R4.7uF	2113150
307	†	444	PMS 3φ x 8 - screw	810308S	C127		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
308	†	444	IN 3φ - nut	892013S	C128			Out of use	
309	†	444	TW (I) 3φ - washer	893403U	C129		111	E-CAP 50R0.47uF	2115050
310		111	EARTH TERMINAL	4581580	C130		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
311	†	111	PMS 3φ x 6 - screw	810306S	C131			Out of use	
312	†	111	IN 3φ - nut	892013S	C132			Out of use	
313	†	111	TW (I) 3φ - washer	893403U	C133		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
*314		111	AM BAR ANT - AM loopstick antenna	1200320	C134		111	C-CAP 10pF 10% 50V SL	232100K
*315		111	ANTENNA STOPPER		C135			Out of use	
316	†	111	PMS 4φ x 20 - screw	810420S	C136		111	E-CAP 10R47uF	2111250
317	†	111	IN 4φ - nut	892014S	C137		111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
318	†	111	TW (I) 4φ - washer	893404U	C138		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
*319		111	ANTENNA SUPPORTER		C139		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
*320		111	ANTENNA BLACKET (L)	7080940	C140		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
321	†	222	PTS 3φ x 8 - screw	814308S	C141		111	C-CAP 0.047uF 80, -20% 50V YG	231473Z
*322		111	CORD STOPPER SR-3P-4	7400620	CF102				
*323		111	ANTENNA TERMINAL	4450520	~CF105	111		CERAMIC FILTER KMFC97-M	1280420
324	†	222	PMS 3φ x 6 - screw	810306S	D105		111	DIODE VD1212	505016S
*325		1	SLIDE SWITCH SL-13 (FM de-emphasis)	4020440	D106		111	DIODE VD1212	505016S
326	†	2	PMS 3φ x 6 - screw	810306S	IC101		111	IC HA11211	518052S
LED CIRCUIT BOARD					L101		111	INDUCTOR 2.2uH 20%	1210840
401		111	LED PCB		L103		111	INDUCTOR 18uH 5%	1210850
*402	D305	111	LED TLR109	5060030	L104		111	INDUCTOR 2.2uH 20%	1210840
403	†	111	LED SPACER	7903100	Q101		111	TR 2SC1675 (L, M)	515082S
					Q102		111	TR 2SC1675 (L, M)	515082S
					Q103		111	TR 2SC1675 (L, M)	515082S
					Q104		111	TR 2SC1675 (L, M)	515082S

PART ORDERING PROCEDURE ----- Include in any order: A. Part number, B. Part description, C. Model number.
(Any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE*	DESCRIPTION**	PART NO.
Q105	111	TR 2SC945 (L) (P, Q)		515077S
Q106	111	TR 2SC945 (L) (P, Q)		515077S
Q107	111	TR 2SC1675 (L, M)		515082S
Q108	111	TR 2SC945 (L) (P, Q)		515077S
Q109	111	TR 2SC945 (L) (P, Q)		515077S
R101	111	RES 47 ohm 5% 1/4W		328470J
R102	111	RES 560 ohm 5% 1/4W		328561J
R103	111	RES 3.9 Kohm 5% 1/4W		328392J
R104	111	RES 1 Kohm 5% 1/4W		328102J
R105	111	RES 330 ohm 5% 1/4W		328331J
R106	111	RES 47 ohm 5% 1/4W		328470J
R107	111	RES 560 ohm 5% 1/4W		328561J
R108	111	RES 4.7 Kohm 5% 1/4W		328472J
R109	111	RES 470 ohm 5% 1/4W		328471J
R110	111	RES 330 ohm 5% 1/4W		328331J
R111	111	RES 5.6 Kohm 5% 1/4W		328562J
R112	111	RES 5.6 Kohm 5% 1/4W		328562J
R113	111	SR19R B470 ohm - potentiometer		4300640
R114	111	RES 820 ohm 5% 1/4W		328821J
R115	111	RES 1 Kohm 5% 1/4W		328102J
R116	111	RES 68 Kohm 5% 1/4W		328683J
R117	111	RES 18 Kohm 5% 1/4W		328183J
R118	111	RES 22 Kohm 5% 1/4W		328223J
R119	111	RES 100 ohm 5% 1/4W		328101J
R120	111	RES 5.6 Kohm 5% 1/4W		328562J
R121	111	RES 5.6 Kohm 5% 1/4W		328562J
R122	111	RES 56 Kohm 5% 1/4W		328563J
R123	111	RES 5.6 Kohm 5% 1/4W		328562J
R124	111	RES 10 Kohm 5% 1/4W		328103J
R125	111	RES 5.6 Kohm 5% 1/4W		328562J
R126	111	RES 1.8 Kohm 5% 1/4W		328182J
R127	111	RES 150 ohm 5% 1/4W		328151J
R128	111	RES 10 Kohm 5% 1/4W		328103J
R129		Out of use		
R130	111	RES 22 Kohm 5% 1/4W		328223J
R131	111	RES 2.2 Kohm 5% 1/4W		328222J
R132	111	RES 10 Kohm 5% 1/4W		328103J
R133	111	HVR KVSF 1.0-7SNF B50 Kohm - potentiometer		4300480
R134		Out of use		
R135	111	RES 100 Kohm 5% 1/4W		328104J
R136	111	RES 3.3 K ohm 5% 1/4W		328332J
R137	111	RES 5.6 Kohm 5% 1/4W		328562J
R138	111	RES 15 Kohm 5% 1/4W		328153J
R139	111	RES 2.2 Kohm 5% 1/4W		328222J
R140	111	RES 3.9 Kohm 5% 1/4W		328392J
R141	111	RES 150 ohm 5% 1/4W		328151J
R142		Out of use		
R143	111	RES 1 Kohm 5% 1/4W		328102J
R144	111	RES 68 Kohm 5% 1/4W		328683J
R145	111	RES 68 Kohm 5% 1/4W		328683J
R146	111	RES 68 Kohm 5% 1/4W		328683J
T101	111	FM I-F TRANSFORMER		1240180
T102	111	FM DET (1) SNY1719 S10G PINK - FM discriminator transformer		1240280
T103	111	FM DET (2) SNY1720 S10G BLUE - FM discriminator transformer		1240290
(AM SECTION)				
C201	111	C-CAP 18pF 10% 50V SL		232180K
C202	111	C-CAP 0.047uF 80, -20% 50V YG		231473Z
C203	111	C-CAP 0.022uF 80, -20% 50V YG		231223Z
C204	111	E-CAP 50R1uF		211510Q
C205	111	C-CAP 0.01uF 100, -0% 50V		231103Z
C206	111	S-CAP 360pF 5%		223361V
C207	111	C-CAP 0.022uF 80, -20% 50V YG		231223Z
C208	111	E-CAP 16R33uF		211223Q
C209	111	E-CAP 50R1uF		211510Q

KEY NO.	SYMBOL NO.	TYPE*	DESCRIPTION**	PART NO.
C210			Out of use	
C211	111	E-CAP 25R3.3uF		211313Q
C212	111	M-CAP 0.0047uF 10% 50V		222472K
C213	111	M-CAP 0.01uF 10% 50V		222103K
C214	111	E-CAP 50R0.47uF		211505Q
C215	111	E-CAP 50R0.47uF		211505Q
C216	111	C-CAP 0.01uF 100, -0% 50V YG		231103Z
C217	111	C-CAP 68pF 10% 50V SL		232680K
CF201	111	CERAMIC FILTER SFZ455A		1280310
D201	111	DIODE 1S2076		501019S
D202	111	DIODE 1N60		500001G
D203	111	DIODE 1N60		500001G
Q201	111	2SC1675 (L, M)		515082S
Q202	111	TR 2SC945 (L) (P, Q)		515077S
R201	111	RES 68 Kohm 5% 1/4W		328683J
R202	111	RES 12 Kohm 5% 1/4W		328123J
R203	111	RES 1 Kohm 5% 1/4W		328102J
R204	111	RES 100 ohm 5% 1/4W		328101J
R205	111	RES 220 ohm 5% 1/4W		328221J
R206		Out of use		
R207	111	RES 150 Kohm 5% 1/4W		328154J
R208	111	RES 47 Kohm 5% 1/4W		328473J
R209	111	RES 68 Kohm 5% 1/4W		328683J
R210	111	RES 39 Kohm 5% 1/4W		328393J
R211	111	RES 33 Kohm 5% 1/4W		328333J
R212	111	RES 1 Kohm 5% 1/4W		328102J
R213		Out of use		
R214	111	RES 5.6 Kohm 5% 1/4W		328562J
R215	111	RES 100 Kohm 5% 1/4W		328104J
R216	111	RES 10 Kohm 5% 1/4W		328103J
R217	111	RES 470 ohm 5% 1/4W		328471J
R218	111	RES 5.6 Kohm 5% 1/4W		328562J
R219	111	RES 4.7 Kohm 5% 1/4W		328472J
T201	111	AM OSC COIL RED		1220060
T202	111	AM I-F TRANSFORMER		1280160
T204	111	AM DET COIL - AM discriminator transformer		1230080
(MPX SECTION)				
C301	111	E-CAP 25R3.3uF		211313Q
C302	111	E-CAP 16R100uF		211230Q
C303	111	T-CAP 35D0.22uF		252402M
C304	111	T-CAP 25D3.3uF		252313M
C305	111	T-CAP 25D1.5uF		252311M
C306	111	E-CAP 16R10uF		211220Q
C307	111	E-CAP 16R10uF		211220Q
C308	111	S-CAP 470pF 5% 50V		223471V
C309	111	C-CAP 510pF 5% 50V SL		232511J
C310	1--	M-CAP 0.0012uF 5% 50V		222122J
C311	1--	M-CAP 0.0012uF 5% 50V		222122J
C312	111	C-CAP 510pF 5% 50V SL		232511J
C313	111	E-CAP 16R10uF		211220Q
C314	111	E-CAP 16R10uF		211220Q
C315	111	M-CAP 0.015uF 5% 50V		222153J
C316	111	M-CAP 0.015uF 5% 50V		222153J
C317	111	T-CAP 35D0.47uF		252405M
C318	111	T-CAP 35D0.47uF		252405M
C319	111	E-CAP 25R3.3uF		211313Q
C320	111	E-CAP 25R3.3uF		211313Q
C321	111	M-CAP 0.0047uF 10% 50V		222472K
C322		Out of use		
C323	111	E-CAP 25R4.7uF		211315Q
C324		Out of use		
C325		Out of use		
C326	111	M-CAP 0.047uF 10% 50V		222473K

PART ORDERING PROCEDURE ----- Include in any order: A. Part number, B. Part description, C. Model number.
(Any of the above lacking from an order may delay shipment of that order.)

KEY NO.	SYMBOL NO.	TYPE ⁺ W-type-u E-type-u N-type-d	DESCRIPTION**	PART NO.
	D301	111	DIODE 1S2076	501019S
	D302	111	DIODE 1S2076	501019S
	D303	111	ZENER DIODE RD5.6EB	502042S
	D304	111	DIODE 1S2076	501019S
	IC301	111	IC HA1196	518043S
	Q301	111	TR 2SC945 (L) (P, Q)	515077S
	Q302	111	TR 2SC945 (L) (P, Q)	515077S
	Q303	111	TR 2SC945 (L) (P, Q)	515077S
	Q304	111	TR 2SC945 (L) (P, Q)	515077S
	R301	111	RES 47 ohm 5% 1/4W	328470J
	R302	111	RES 10 Kohm 5% 1/4W	328103J
	R303	111	RES 5.6 Kohm 5% 1/4W	328562J
	R304	111	RES 100 Kohm 5% 1/4W	328104J
	R305	111	RES 1.8 Kohm 5% 1/4W	328182J
	R306	111	RES 5.6 Kohm 5% 1/4W	328562J
	R307	111	RES 1 Kohm 5% 1/4W	328102J
	R308	111	RES 18 Kohm 5% 1/4W	328183J
	R309	111	RES 100 Kohm 5% 1/4W	328104J
	R310	111	SR19R B10 Kohm — potentiometer	4300510
	R311	111	RES 680 ohm 5% 1/4W	328681J
	R312	111	RES 27 Kohm 5% 1/4W	328273J
	R313	111	RES 27 Kohm 5% 1/4W	328273J
	R314	111	RES 6.8 Kohm 5% 1/4W	328682J
	R315	111	RES 6.8 Kohm 5% 1/4W	328682J
	R316	111	RES 47 Kohm 5% 1/4W	328473J
	R317	111	RES 47 Kohm 5% 1/4W	328473J
	R318	111	RES 330 ohm 5% 1/4W	328331J
	R319	111	RES 330 ohm 5% 1/4W	328331J
	R320	111	RES 3.3 Kohm 5% 1/4W	328332J
	R321	111	RES 3.3 Kohm 5% 1/4W	328332J
	R322	111	RES 10 Kohm 5% 1/4W	328103J
	R323	111	RES 10 Kohm 5% 1/4W	328103J
	R324	111	RES 4.7 Kohm 5% 1/4W	328472J
	R325	111	RES 4.7 Kohm 5% 1/4W	328472J
	R326	111	RES 220 Kohm 5% 1/4W	328224J
	R327	111	RES 220 Kohm 5% 1/4W	328224J
	R328	111	RES 47 Kohm 5% 1/4W	328473J
	R329	111	RES 47 Kohm 5% 1/4W	328473J
	R330	111	RES 4.7 Kohm 5% 1/4W	328472J
	R331	111	RES 4.7 Kohm 5% 1/4W	328472J

KEY NO.	SYMBOL NO.	TYPE ⁺ W-type-u E-type-u N-type-d	DESCRIPTION**	PART NO.
	R332	111	RES 1.2 Kohm 5% 1/4W	328122J
	R333	111	RES 1.2 Kohm 5% 1/4W	328122J
	R334	111	HVR KVVSF 10-7SNF B50 Kohm — potentiometer	4300480
	R335	111	RES 330 ohm 5% 1/4W	328331J
	R336	111	HVR KVVSF 10-7SNF B150 Kohm — potentiometer	4300490
	R337	111	RES 330 ohm 5% 1/4W	328331J
	R338	111	RES 6.8 Kohm 5% 1/4W	328682J
	R339	111	Out of use	
	R340	111	Out of use	
	R341	111	RES 56 Kohm 5% 1/4W	328563J
	R342	111	RES 47 Kohm 5% 1/4W	328473J
(REGULATOR SECTION)				
	C801	111	C-CAP 0.01uF 100, -0% 500V	238103P
	C802	111	E-CAP 25R2200uF	212342Q
	C803	111	E-CAP 16R100uF	211230Q
	C804	111	E-CAP 16R1000uF	211240Q
	C805	111	E-CAP 16R100uF	211230Q
	C806	111	E-CAP 35R22uF	211422Q
	C807	111	E-CAP 35R100uF	211430Q
	C808	111	C-CAP 0.022uF 80, -20% 50V YG	231223Z
	C809	111	E-CAP 35R10uF	211420Q
	C810	111	C-CAP 0.01uF 100, -0% 500V	238103P
	C811	111	C-CAP 0.01uF 100, -0% 500V	238103P
	D801	111	DIODE 1S1885	560032S
	D802	111	DIODE 1S1885	560032S
	D803	111	DIODE 1S1885	560032S
	D804	111	ZENER DIODE XZ137	502037S
	Q801	111	TR 2SD235 (O)	513056S
	Q802	111	TR 2SC1627 (O, Y)	511017S
	R801	111	RES 820 ohm 5% 1/4W	328821J
	R802	111	MO-RES 220 ohm 1/4W	360221F
	R803	111	MO-RES 10 ohm 1/4W	360100F
	R804	111	RES 15 Kohm 1/4W	328153J

DIAL CORD INSTALLATION

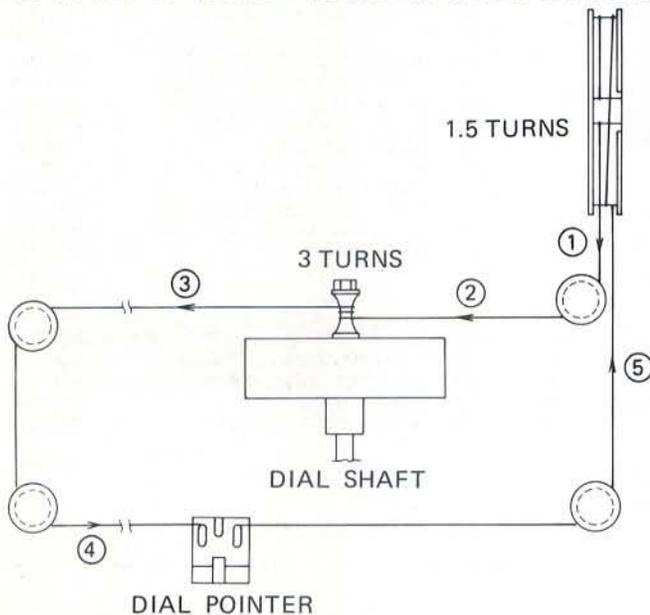
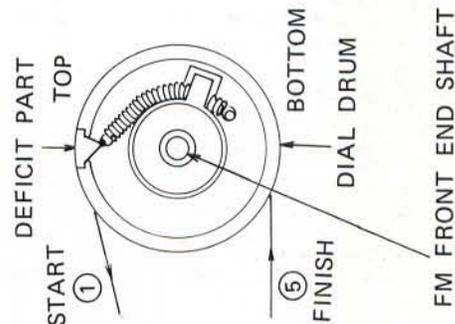


Figure 1



1. Turn the FM front end shaft to the left until the rotor of the variable capacitor is completely out of the stator. Locate the deficit part on the dial drum in line with the FM front end shaft on vertical as shown in Figure 1.
2. String the dial drum and pulleys in the direction of arrows. (In circled number order.)
3. Turn the FM front end shaft to the right until the rotor of the variable capacitor is fully rotated in the stator. Fix the dial pointer to the string at a reading of 87 MHz on the dial scale.

ALIGNMENT

Test Equipment

Allow a minimum of 10 minutes warm-up for test equipment and the tuner to be tested.

Maintain rated line voltage.

FM Stereo/Mono Signal Generator

Vacuum Tube Voltmeter (VTVM)

Oscilloscope

Distortion Meter

Frequency Counter

AM Sweep Generator

FM Section Alignment

Connect test equipment as shown in Figure 2.

Connect FM Stereo/Mono signal generator through standard dummy antenna to FM antenna terminals of the tuner.

Connect VTVM, oscilloscope and distortion meter to OUTPUT terminals of the tuner with shielded cable.

Note: Adjust FM signal generator output level so that the waveform on the oscilloscope is uniform.

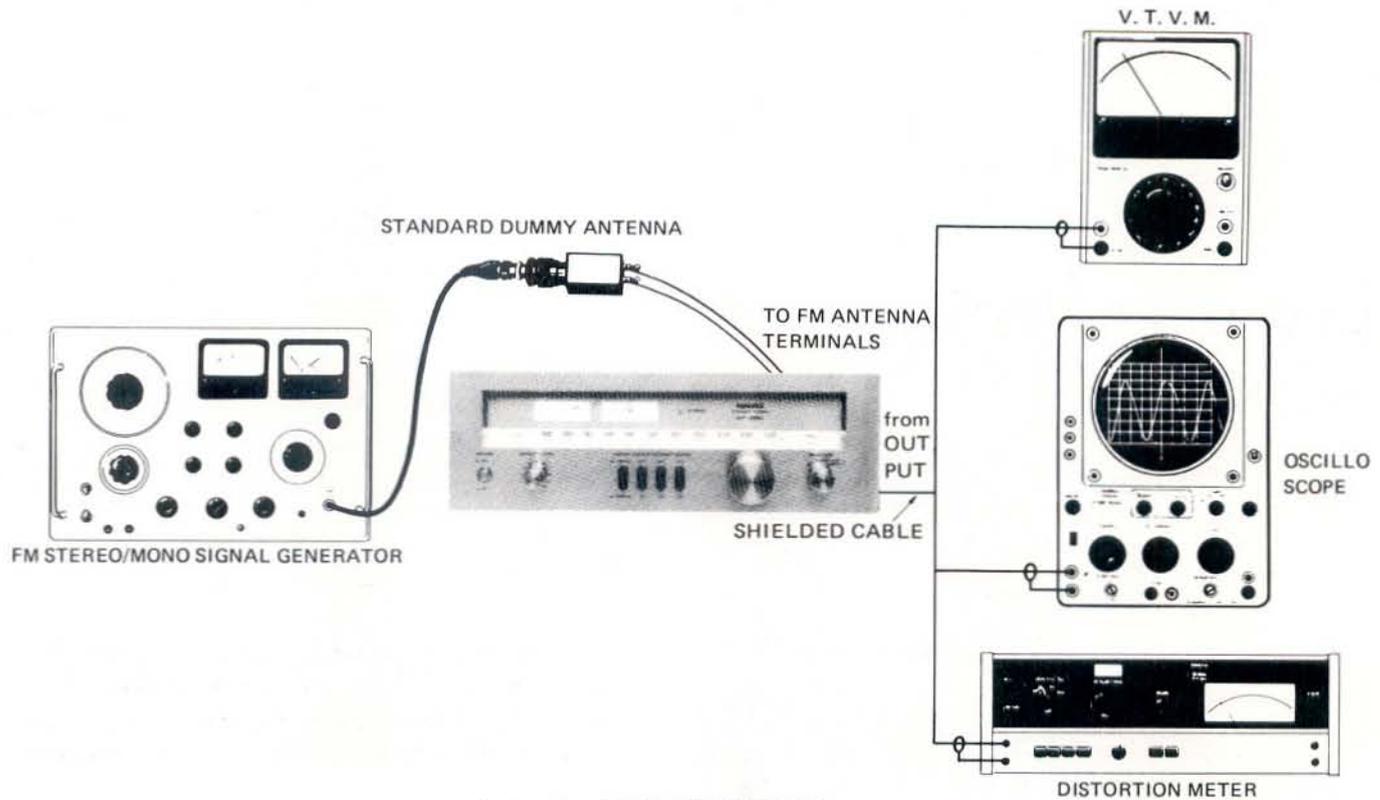


Figure 2 TEST EQUIPMENT

FM IF Alignment (Photo 8)

1. Set FM signal generator for 98 MHz.
2. Adjust the generator to ± 75 kHz deviation at 1000 Hz.
3. Switch:
 - a. IF BAND to "NORMAL" position.
 - b. HI-BLEND to "OFF" position.
 - c. MULTIPATH to "OFF" position.
 - d. MUTING to "OFF" position.
4. Tune the unit for outside of the FM bandwidth, then adjust T102 until M1 (Center-of-the Channel Tuning Meter) indicates mid-scale.
5. Tune the unit for 98 MHz modulated signal, then adjust T103 for minimum distortion.
6. Tune the unit for outside the FM bandwidth again. If M1 does not indicate mid-scale, repeat steps 4 and 5.
7. Tune the unit for 98 MHz modulated signal, then adjust T103 for minimum distortion. Attenuate generator output level until M2 (Signal-Strength Meter) indicates a "one (1)" meter reading.
8. Adjust "IF" transformer located in FM front end (Red Core) until M2 indicates maximum deflection.
9. Attenuate generator output for 60 dB. Adjust R133 until M2 indicates a "four and a half (4½)" meter reading.
10. Set IF BAND switch to "NARROW" position.
11. Turn R113 fully counterclockwise. Attenuate generator output level until M2 indicates a "one (1)" meter reading. Adjust T101 until M2 indicates maximum deflection.
12. Set IF BAND switch to "NORMAL" position.
13. Attenuate generator output level until M2 indicates a "one (1)" meter reading.
14. Set IF BAND switch to "NARROW" position.
15. Adjust R113 until M2 indicates a "one and a half (1½)" meter reading.

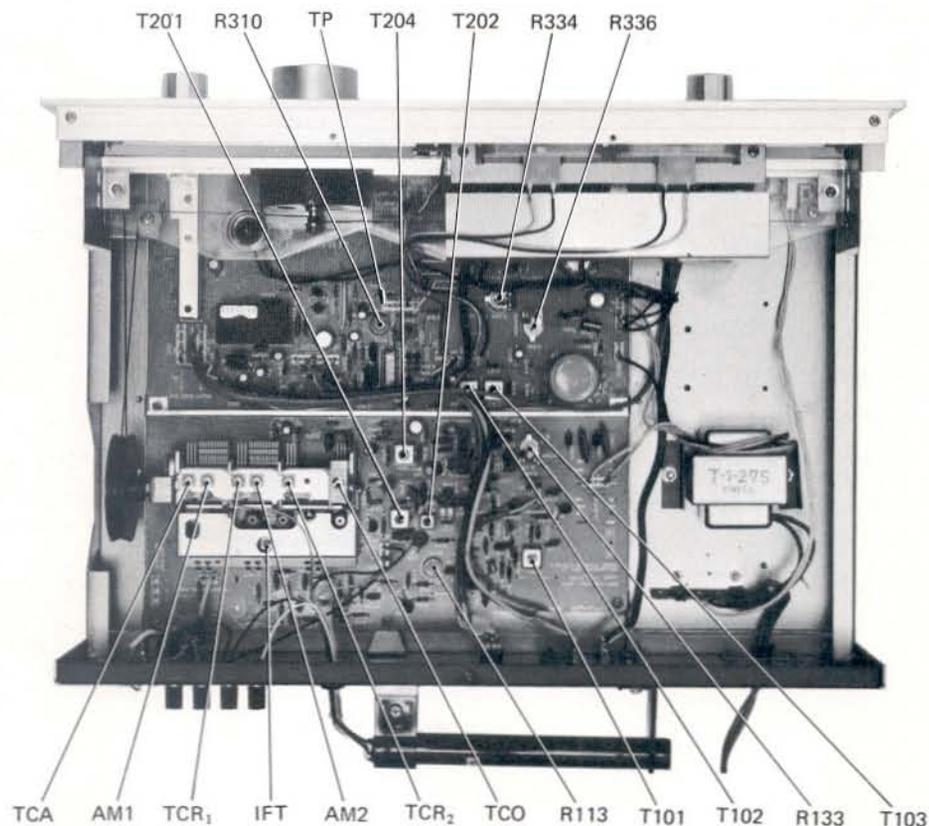


Photo 8. TUNER CIRCUIT BOARD

FM Frequency Coverage and FM Tracking Alignment

These adjustments are factory preset and normally need no further adjustment. However, if necessary proceed as follows:

1. Adjust FM signal generator to ± 75 kHz deviation at 1000 Hz.
2. Turn the tuning knob fully counterclockwise. If the dial pointer is not located on 87 MHz position of the dial scale, reset the dial pointer to this position.

STEP	GENERATOR	DIAL	ADJUSTMENT POINT	OSCILLOSCOPE	VTVM & M2
1	88 MHz	88 MHz	LO (Photo 8)	Maximum waveform	Maximum deflection
2	108 MHz	108 MHz	TCO (Photo 8)	Maximum waveform	Maximum deflection
3	88 MHz	88 MHz	LA (Photo 8) LR ₁ (Photo 8) LR ₂ (Photo 8)	Maximum waveform	Maximum deflection
4	108 MHz	108 MHz	TCA (Photo 8) TCR ₁ (Photo 8) TCR ₂ (Photo 8)	Maximum waveform	Maximum deflection

3. Repeat adjustment of steps 1 and 2 two or three times.
4. Repeat adjustment of steps 3 and 4 once or twice.
5. Repeat adjustment of steps 1 and 2 once or twice.

FM MPX and Stereo Separation Alignment (Photo 8)

1. Set FM signal generator for 108 MHz unmodulated signal.
2. Set IF BAND switch to "NORMAL" position.
3. Connect frequency counter to test point "TP".
4. Attenuate generator output for 60 dB.
5. Tune the unit for 108 MHz unmodulated signal, then adjust R310 for 76.2 to 76.5 kHz for correct VCO.
6. Adjust generator to ± 67.5 kHz deviation at 1000 Hz and to ± 7.5 kHz deviation for 19 kHz pilot signal.
7. Tune the unit for 108 MHz modulated signal, then adjust R334 for maximum separation.
8. Set IF BAND switch to "NARROW" position and adjust R336 for maximum separation.

AM Section Alignment

Connect test equipment as shown in Figure 3.

Connect AM sweep generator to loop antenna (or several turns of wire). Place the tuner near the loop antenna for inductive coupling. Connect the OUTPUT terminal (L or R) of the tuner to the oscilloscope and VTVM with shielded cable.

Note: Adjust AM sweep generator output level so that waveform on the oscilloscope is uniform.

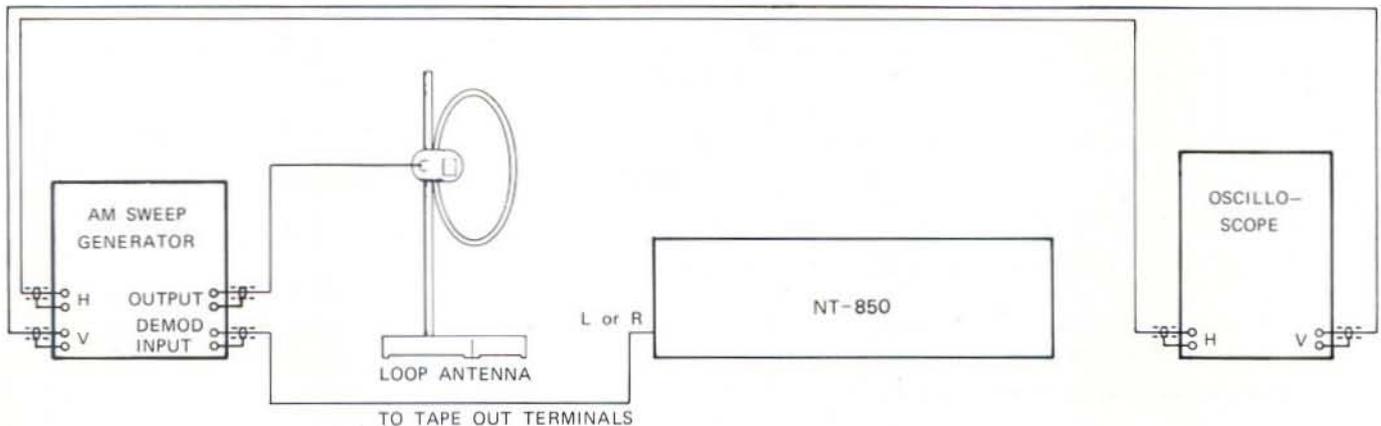


Figure 3 TEST EQUIPMENT

AM IF Alignment

1. Preset AM sweep generator switch to 455 kHz position.
2. Tune the unit to around 1,650 kHz (if adjustment is difficult because of interfering signals from outside, move it a little).
3. Adjust T201 (RED) for maximum waveform. (Photo 8, Figure 4)
4. Adjust T202 (BLU) for maximum waveform. (Photo 8, Figure 4)
5. Adjust T204 for maximum waveform. (Photo 8, Figure 4)
6. Repeat adjustment of T201, T202 and T204 two or three times.

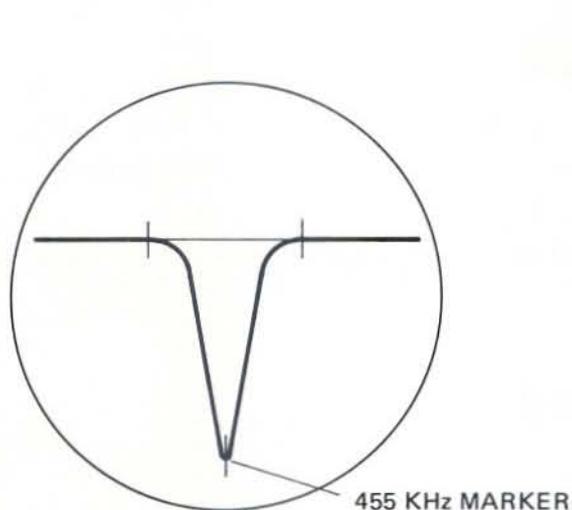


Figure 4 AM IF

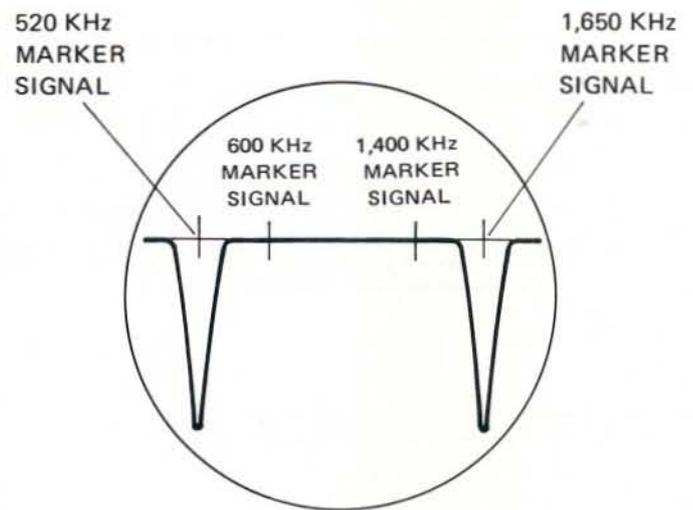


Figure 5 AM FREQUENCY COVERAGE

AM Frequency Coverage and AM Tracking Alignment

1. Preset AM sweep generator switch to RF position.

STEP	GENERATOR	DIAL	ADJUSTMENT POINT	OSCILLOSCOPE
1	520 KHz	Set tuning knob fully counterclockwise	T201 (Photo 8)	Maximum waveform (Figure 5)
2	1,650 KHz	Set tuning knob fully clockwise	AM2 (Photo 8)	Maximum waveform (Figure 5)
3	600 KHz	600 KHz	T2 (AM bar antenna coil)	Maximum waveform
4	1,400 KHz	1,400 KHz	AM1 (Photo 8)	Maximum waveform

2. Repeat adjustment of steps 1 and 2 two or three times for AM frequency coverage alignment.
3. Repeat adjustment of steps 3 and 4 once or twice for AM tracking alignment.
4. To check tracking errors, use an apparatus made of ferrite rod and copper wire. (Figure 6) Move it toward the AM bar antenna coil gradually and check waveform on oscilloscope becoming smaller. If the waveform becomes larger, repeat adjustment of steps 3 and 4. (Figure 7)
5. Repeat adjustment of steps 1 and 2 once or twice.

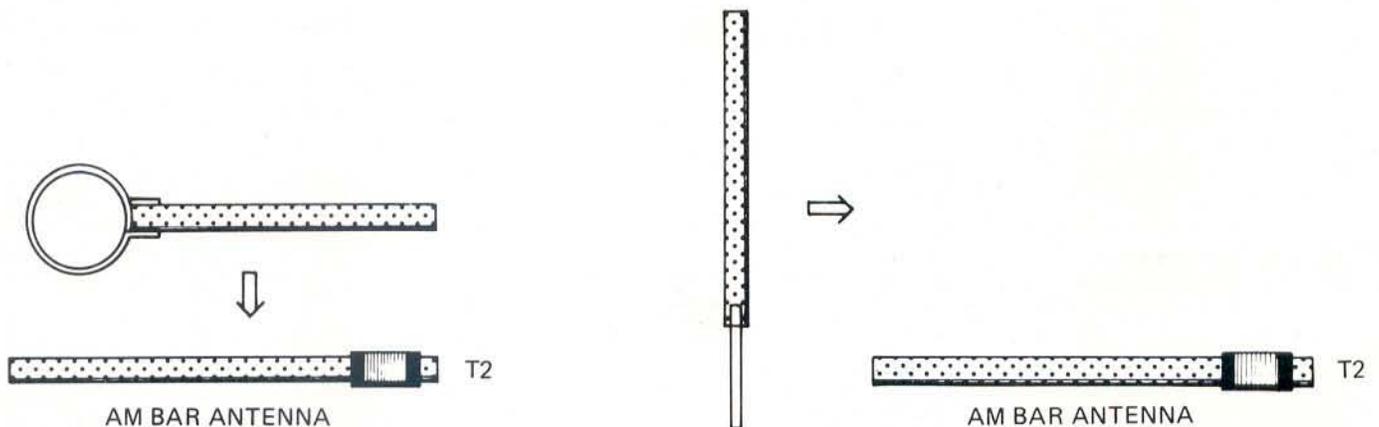
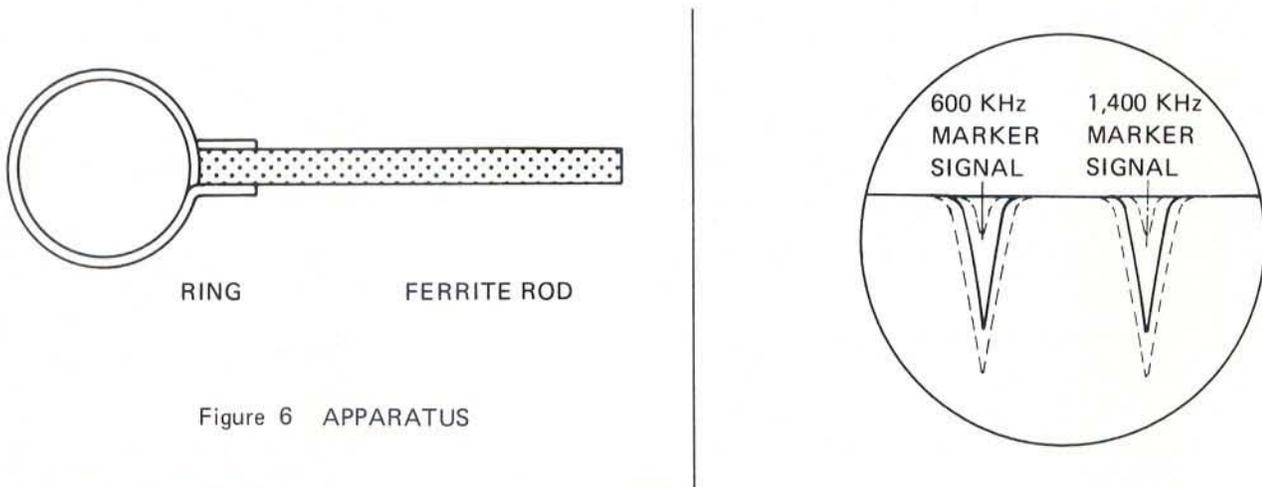


Figure 7 TRACKING ERRORS

SEMICONDUCTOR DATA

NOTE¹ Ge: Germanium A: Alloy Df: Drift-field M: Mesa
 B: Base E: Epitaxial P: Planar
 D: Diffused G: Grown Pt: Point-contact
 Dd: Double-diffused J: Junction Td: Triple-diffused

TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE ²	MAXIMUM RATINGS Absolute-Maximum Values: (T _A = 25°C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)												MANUFACTURER				
			Collector-to-Base Voltage V _{CB0} (V)	Emitter-to-Base Voltage V _{EB0} (V)	Collector Current I _C (mA)	Collector Dissipation P _C (mW)	Junction Temperature T _J (°C)	Collector Cutoff Current I _{CB0} (μA)	V _{CE0} (V)	Static F _T (MHz)	Forward Current Transfer Ratio I _C (mA)	V _{CE(sat)} (V)	I _C (mA)	I _B (mA)	Gain-Bandwidth Product f _t (MHz)	V _{CE} (V)	I _C (mA)	I _E (mA)	F _{bb} (dB)	V _{CE} (V)		I _E (mA)	Output Capacitance C _{out} (pF)		
2SA733 (Q, R)	AF	PNP Si-E	-50	-5	-100	250	125	-0.1	-40	90 ~ 270	-6	-1	-0.1	-30	-3	180	-6	10						12	NEC
2SA750 (I, IE)	AF, Low noise	PNP Si-E	-80	-5	-50	250	125	-0.05	-50	350 ~ 700	-3	-0.5	-0.82	-30	-3	100	-6	1						10	NEC
2SC372 (Y)	RF, Conv., Mix., Osc.	NPN Si-E	35	4	100	200	125	0.5	18	120 ~ 240	12	2	0.4	10	1	80	10	1						3.5	TOSHIBA
2SC385A	RF, Conv., Mix., Osc.	NPN Si-EP	30	3	20	300	125	0.5 max	15	20 min.	3	8				600 min.	10	-8	35	6	-2	1.5	TOSHIBA		
2SC416 (C)	RF, Conv., Mix., Osc.	NPN Si-P	30	5	100	200	125	0.5	18	100 ~ 200	12	2	0.6	10	1	230	12	2					1.8	HITACHI	
2SC785	RF, FM tuner	NPN Si-EP	40	4	20	100	125	0.5	18	25 ~ 140	6	1				500	6	-1	C _c f _{bb} = 10ps	6	-1	C _{re} = 0.65	1.5	TOSHIBA	
2SC945 L (Q, P)	AF	NPN Si-E	60	5	100	250	125	0.1	120	135 ~ 400	6	1	0.15	100	10	250	6	-10					3.5	NEC	
2SC1215	RF	NPN Si-EP	30	3	50	200	125	100	30	25 min.	10	2	0.1	10	1	1200	10	-10	C _c f _{bb} = 25ps max					2	MATSUSHITA
2SC1675 (L, M)	RF, Conv. Mix., Osc.	NPN Si-E	80	5	300	600	150	0.1	50	40 ~ 120	12	2	0.4 max.	10	1	250	10	-1	20	10	-1	2	TOSHIBA		
2SD235 (O)	AF, Power	NPN Si-DJ	50	10	3A	25W (T _C = 25°C)	150	100	20	70 ~ 140	5	0.3A	0.5	3A	0.3A	1	5	-0.5A					250	TOSHIBA	
2SD381 (L, M)	AF, Power	NPN Si-E	130	5	1.5A	30W (T _C = 25°C)	150	1	130	60 ~ 160	5	5	0.9	1A	0.1A	45	5	-0.1A					25	NEC	

FIELD EFFECT TRANSISTORS

DEVICE TYPE	APPLICATIONS	STRUCTURE ¹	MAXIMUM RATINGS Absolute-Maximum Values: (T _A = 25°C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)												MANUFACTURER		
			Gate-to-Drain Voltage V _{GD0} (V)	Gate-to-Source Voltage V _{GS0} (V)	Gate Current I _G (mA)	Drain Current I _D (mA)	Total Power Dissipation P _D (mW)	Channel Temperature T _J (°C)	Test Conditions	I _{DSS} (mA)	Test Conditions	V _{GS} (V)	Test Conditions	M _{eff} (mm)	Test Conditions	C _{rss} (pF)	Test Conditions	g _{fs} (dB)	Test Conditions	NF (dB)			
2SK49 (F, H)	FM tuner, VHF tuners	Si, N-channel J-FET	-20	10	10	72 (T _A = 60°C)	80	V _{GS} = -0.5V V _{DS} = 0	50 max.	V _{GS} = 0	V _{GS} = 5V I _D = 10μA	1.5 ~ 6	V _{GS} = 5V I _D = 10μA	-2.5 max.	V _{GS} = 5V I _D = 0.5mA f = 1 kHz	2.8	V _{GS} = 5V I _D = 1 MHz	0.07	V _{GS} = 5V I _D = 10mA Z _{in, out} = 50Ω f = 100MHz	18	V _{GS} = 5V I _D = 100MHz	60 max.	NEC
2SK61 (GR)	FM tuner, VHF tuners	Si, N-channel J-FET	-18	10	10	200	125	V _{GS} = -0.5V V _{DS} = 0	-10	V _{GS} = 10V V _{DS} = 0	5 ~ 10	V _{GS} = 10V I _D = 1 μA	-4 max.	V _{GS} = 10V I _D = 0.5mA f = 1 kHz	9	V _{GS} = 10V I _D = 1 MHz	0.15	V _{GS} = 10V I _D = 100MHz	3.5 max.	TOSHIBA			
3SK40	FM tuner, VHF tuners	Si, N-channel dual gate MOS-FET	V _{GS} = 17 V _{GS2} = 27	25	250	150	V _{GS} = 15V V _{DS} = 0 V _{GS2} = 15V V _{DS} = 0 V _{GS1} = 0	I _{DSS} = 100 I _{DSS2} = 300	V _{GS} = 10V V _{GS2} = 4V	4 ~ 25	V _{GS} = 15V I _D = 100μA	-4 max.	V _{GS} = 15V I _D = 5mA f = 1 kHz	10	V _{GS} = 15V I _D = 1 MHz	0.03	V _{GS} = 15V I _D = 200MHz	18 min.	V _{GS} = 15V I _D = 100MHz	4.5 min.	NEC		
3SK45	FM tuner, VHF tuners	Si, N-channel dual gate MOS-FET	V _{GS} = 17 V _{GS2} = 27	35	330	175	V _{GS} = 15V V _{DS} = 0 V _{GS2} = 17V V _{DS} = 0 V _{GS1} = 0	I _{DSS} = 20 I _{DSS2} = 20	V _{GS} = 16V V _{GS2} = 4V	4 ~ 30	V _{GS} = 15V I _D = 100μA	-3 max.	V _{GS} = 15V I _D = 10mA f = 1 kHz	14	V _{GS} = 15V I _D = 1 MHz	0.02	V _{GS} = 15V I _D = 200MHz	17 min.	V _{GS} = 15V I _D = 100MHz	3.3 max.	HITACHI		
3SK59	FM tuner, VHF tuners	Si, N-channel depletion dual gate MOS-FET	V _{GS} = 19 V _{GS2} = 29	30	300	150	V _{GS} = 15V V _{DS} = 0 V _{GS2} = 15V V _{DS} = 0 V _{GS1} = 0	I _{DSS} = 150 I _{DSS2} = 150	V _{GS} = 15V V _{GS2} = 4V	3 ~ 24	V _{GS} = 15V I _D = 100μA	-2.5 max.	V _{GS} = 15V I _D = 10mA f = 1 kHz	20	V _{GS} = 15V I _D = 1 MHz	0.03	V _{GS} = 15V I _D = 100MHz	18 min.	V _{GS} = 15V I _D = 100MHz	3.5 max.	TOSHIBA		

DIODES, LEDs

DEVICE TYPE	APPLICATION	STRUCTURE ¹	MAXIMUM RATINGS Absolute - Maximum Values: (T _A = 25°C unless otherwise specified)						ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)						MANUFACTURER			
			Reverse Surge Voltage V _{RS} (V)	Peak Reverse Voltage V _{RM} (V)	Reverse Voltage V _R (V)	Peak Forward Voltage V _{FM} (V)	Peak Forward Current I _{FM} (mA)	Average Rectified Current I _O (mA)	Forward Surge Current I _{F surge} (A)	Junction Temperature T _J (°C)	Total Power Dissipation P _D (mW)	Forward Current I _{F min} (mA)	Test Condition V _F (V)	Forward Voltage V _F (V)		Reverse Current I _{R max} (μA)	Test Condition V _R (V)	
VD1212							30			1.3A (T _A = 60°C)	60	150	1.2 max.	1.5A	400	200	γ _F = -3.6 mV/°C (I _F = 1.5 mA)	NEC
1D481	Rectifiers	Si-D Bridge		200														TOSHIBA
1N60	FM Detectors	Si-P		35	25		150	50	0.5	70		4	1		75	10		HITACHI
1S1885	Rectifiers	Si-A		100		70		1A (T _A = 65°C)	60					1.2	1.5A	10	100	TOSHIBA
1S2076	Detectors Modulators	Si-P		35	30	35	450	150	1	175	250			0.8	10	1	30	HITACHI
GD-4-203RD	LED							I _F = 50		100	100		1.5 min. 2.0 max.	20	100	3		STANLEY
TLR109	LED	GaP			4			I _F = 25		75	75		2.1 typ. 2.6 max.	20	5	4	TYP. 3.0 mcd. (I _F = 15 mA)	TOSHIBA

ZENER DIODES

DEVICE TYPE	APPLICATION	STRUCTURE ¹	MAXIMUM RATINGS Absolute - Maximum Values: (T _A = 25°C unless otherwise specified)			ELECTRICAL CHARACTERISTICS Typical Values: (T _A = 25°C unless otherwise specified)												MANUFACTURER
			Total Power Dissipation P _D (mW)	Zener Current I _Z (A)	Junction Temperature T _J (°C)	Zener Voltage V _Z (V)	Test Condition I _Z (mA)	Differential Resistance r _d (Ω)	Test Condition I _Z (mA)	Temperature Coefficient γ _Z (%/°C)	Test Condition I _Z (mA)	Reverse Current I _R (μA)	Test Condition V _R (V)					
RD5.6E (B)		Si, P	400			5.3	6.3	20	25	20					5	1.5	NEC	
RD15E (B)		Si, P	400			13.8	15.6	10	30	10					2	11	NEC	
WZ146			500		175	13.9	14.5	15.1	5	15	5	0.076			1	11	J R C	
XZ137			500		175	13.3	13.7	14.1	5	15	5	0.073			1	11	J R C	

INTEGRATED CIRCUIT (HA11211)

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Item	Symbol	Ratings	Unit
Supply Voltage	V _{CC}	13	V
Power Dissipation	P _T *	730	mW
Operating Temperature	T _{OPR}	-20 to +70	°C
Storage Temperature	T _{STG}	-55 to +125	°C

* Value at Ta=60°C

■ ELECTRICAL CHARACTERISTICS (Ta=25°C)

DC CHARACTERISTICS (V_{CC}=12V, Non-signal)

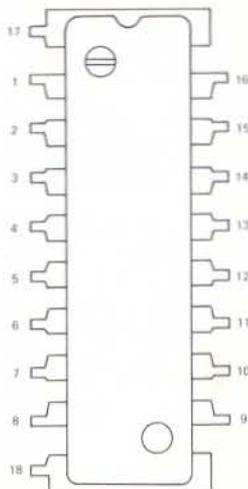
Item	Symbol	Typical Value	Unit
Pin 1 (AM IF Bypass)	V ₁	2.7	V
Pin 4 (AM IF Input)	V ₄	0.7	V
Pin 6 (FM IF Input DC Feedback)	V ₆	1.9	V
Pin 7 (FM IF Input DC Feedback)	V ₇	1.9	V
Pin 8 (FM IF Input)	V ₈	1.9	V
Pin 10 (Muting Control Voltage)	V ₁₀	5.4	V
Pin 12 (Reference)	V ₁₂	5.6	V
Pin 15 (AFC)	V ₁₅	5.6	V
Pin 16 (Audio Out.)	V ₁₆	5.6	V

AC CHARACTERISTICS (Notes 1)

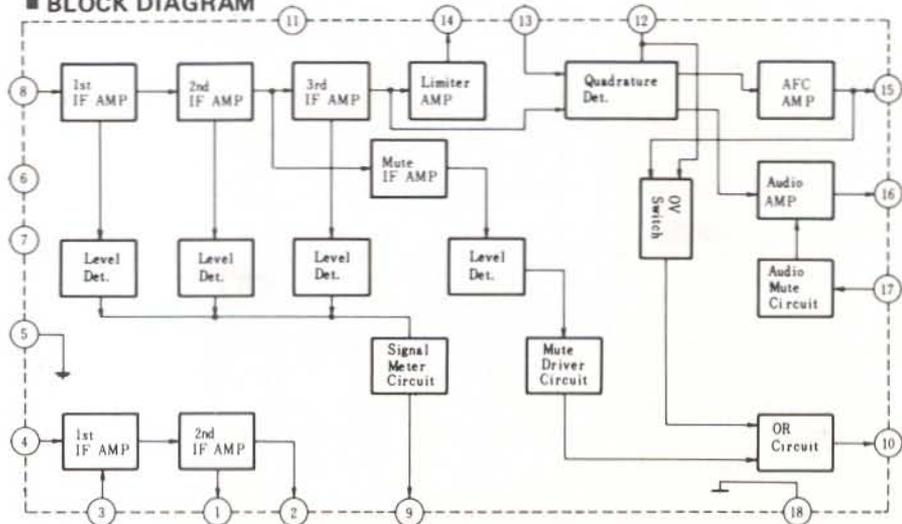
Item	Symbol	Test Condition	min	typ	max	Unit	
Total Current Drain	I ₁₁	V _{in} =100dBμ, M _{UTE} ; ON	—	38.5	56.2	mA	
FM	Limiting Sensitivity	V _{in(LIM)}	V _{in} = -3dB point from output voltage when 100dBμ input	—	31	37	dBμ
	Recovered AF Voltage	V _{O2 AF}		270	450	700	mVrms
	Total Harmonic Distortion	T.H.D. ₁		—	0.04	0.1	%
	Signal-to-noise Ratio	(S+N/N) ₁		73	79	—	dB
	AM Rejection Ratio	AMR	V _{in} =100dBμ, FM, 400Hz, Δf=75kHz, AM; 1kHz m=0.3	—	55	—	dB
	Muting Sensitivity	V _{in(MUTE)}	V ₁₀ =1.4V	43	48	53	dBμ
	Muting Attenuation	M _{UTE ATT}	V ₁₀ =2V	73	80	—	dB
	Muting Bandwidth	BW(MUTE)	V ₁₀ =1.4V (Note 3)	78	130	220	kHz
	Meter Swing	V _{9 70}	V _{in} =70dBμ	0.5	1.8	—	V
		V _{9 100}	V _{in} =100dBμ	3.0	4.4	—	V
AM	Recovered AF Voltage	V _{O2 AF}		55	82	125	mVrms
	Total Harmonic Distortion	T.H.D. ₂		—	0.5	2.0	%
	Signal-to-noise Ratio	(S+N/N) ₂		44	50	—	dB
	IF AGC Figure of Merit	AGC (FOM)	V _{in} =Voltage difference from 84dBμ input, when 10dB output down	—	48	—	dB
	Input Impedance	R _{in}		—	0.9	—	kΩ

Note 1: Unless otherwise specified, test conditions are: V_{CC}=12V
 FM: f_{IF}=10.7MHz, f_{RF}=400kHz, Δf=75kHz and V_{in}=100dBμ
 AM: f_{IF}=455kHz, f_{RF}=400kHz, m=0.3 and V_{in}=84dBμ
 Test circuit is shown below.
 2. Test point of Vin is:
 FM: point A in test circuit, so that the voltage between pin 8 and ground is a half of Vin at point A.
 AM: point B
 3. BW_{MUTE} is tested under sampling of AQL=1.0%

■ TERMINAL GUIDE (TOP VIEW)



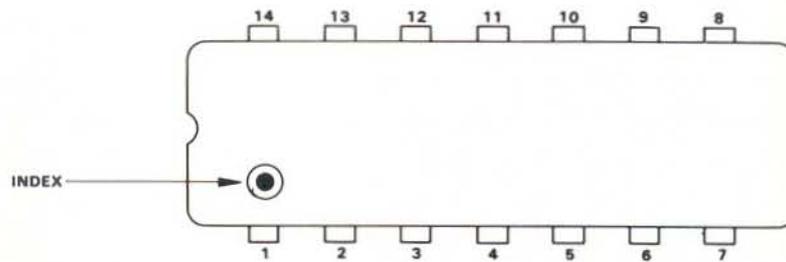
■ BLOCK DIAGRAM



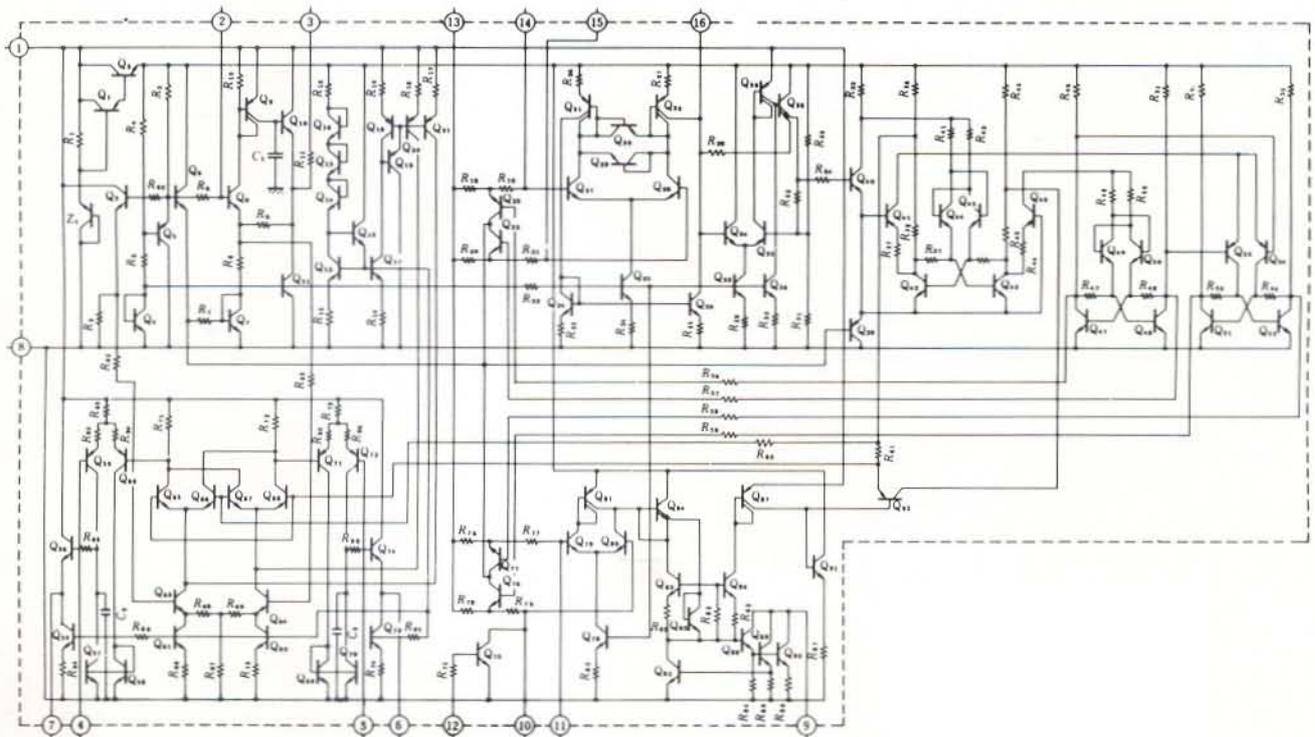
INTEGRATED CIRCUIT (HA1196)

DEVICE TYPE	APPLICATION	ABSOLUTE MAXIMUM RATINGS (T _A =25°C)					ELECTRICAL CHARACTERISTICS (T _A =25°C) Typical Values					MANUFACTURER	
		Supply Voltage (V)	Power Dissipation (mW)	Operating Temperature Range (°C)	Storage Temperature Range (°C)	Lamp Current (mA)	Input Impedance (KΩ)	Stereo Separation (dB)	Stereo Total Harmonic Distortion (%) (f=1kHz)	Output Voltage (V)	SCA Rejection (dB) (f _{SCA} =67kHz)		Signal to Noise ratio (dB)
HA1196	FM Stereo Demodulator	15	490	-20~+70	-55~+70	75	75	55	0.1	1.2	75	80	HITACHI

TERMINAL GUIDE (TOP VIEW)



SCHEMATIC DIAGRAM



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