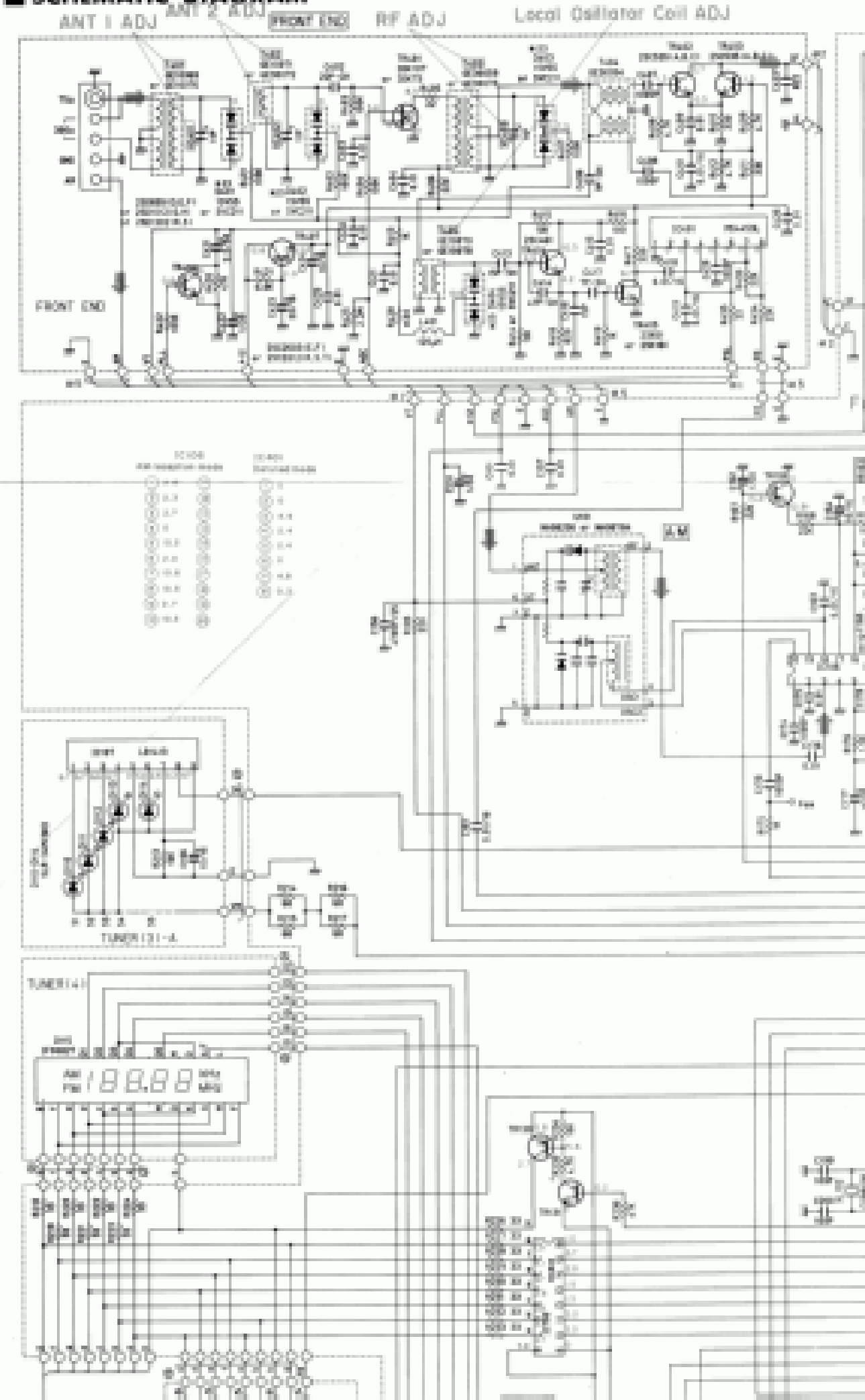
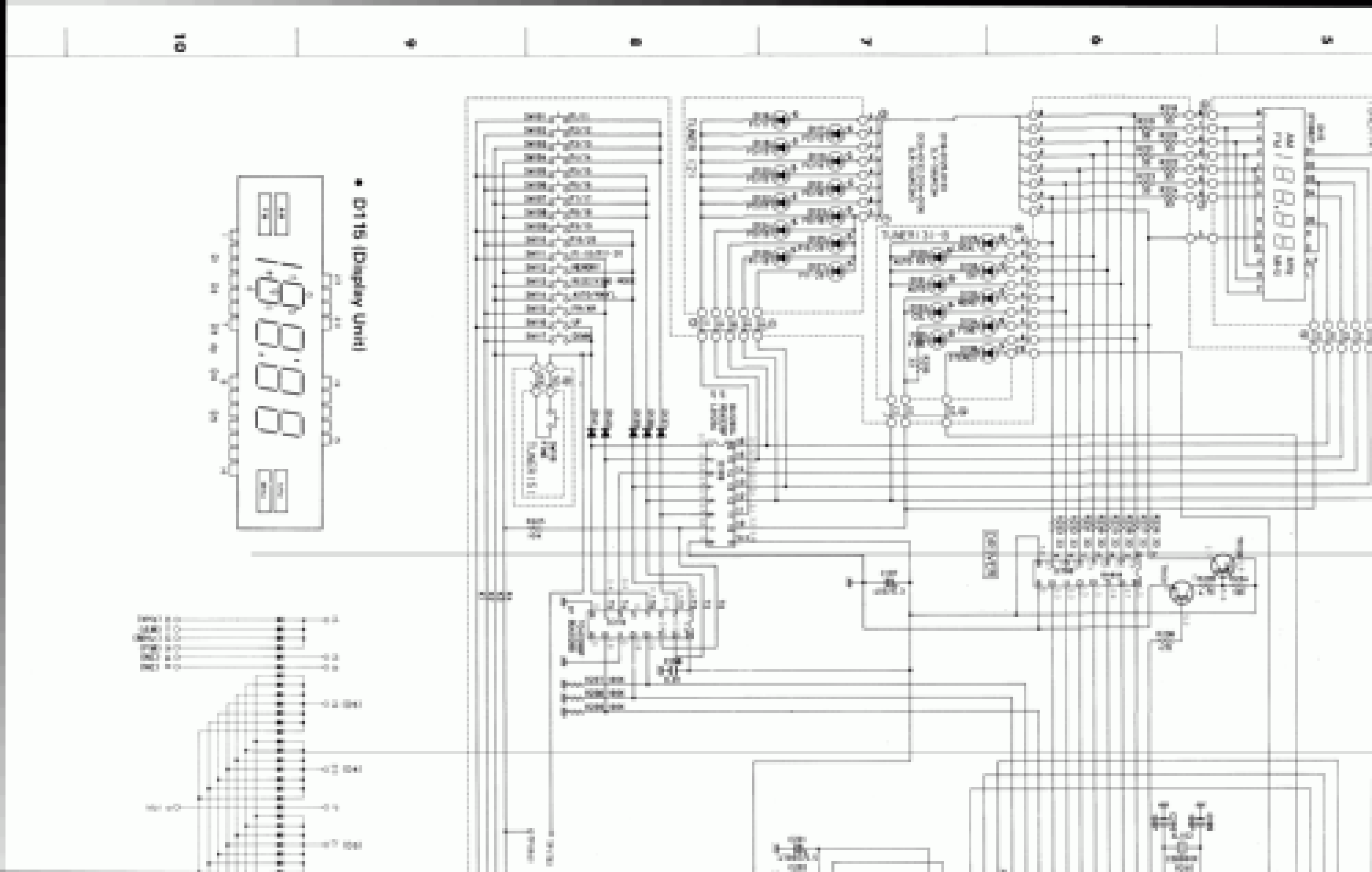
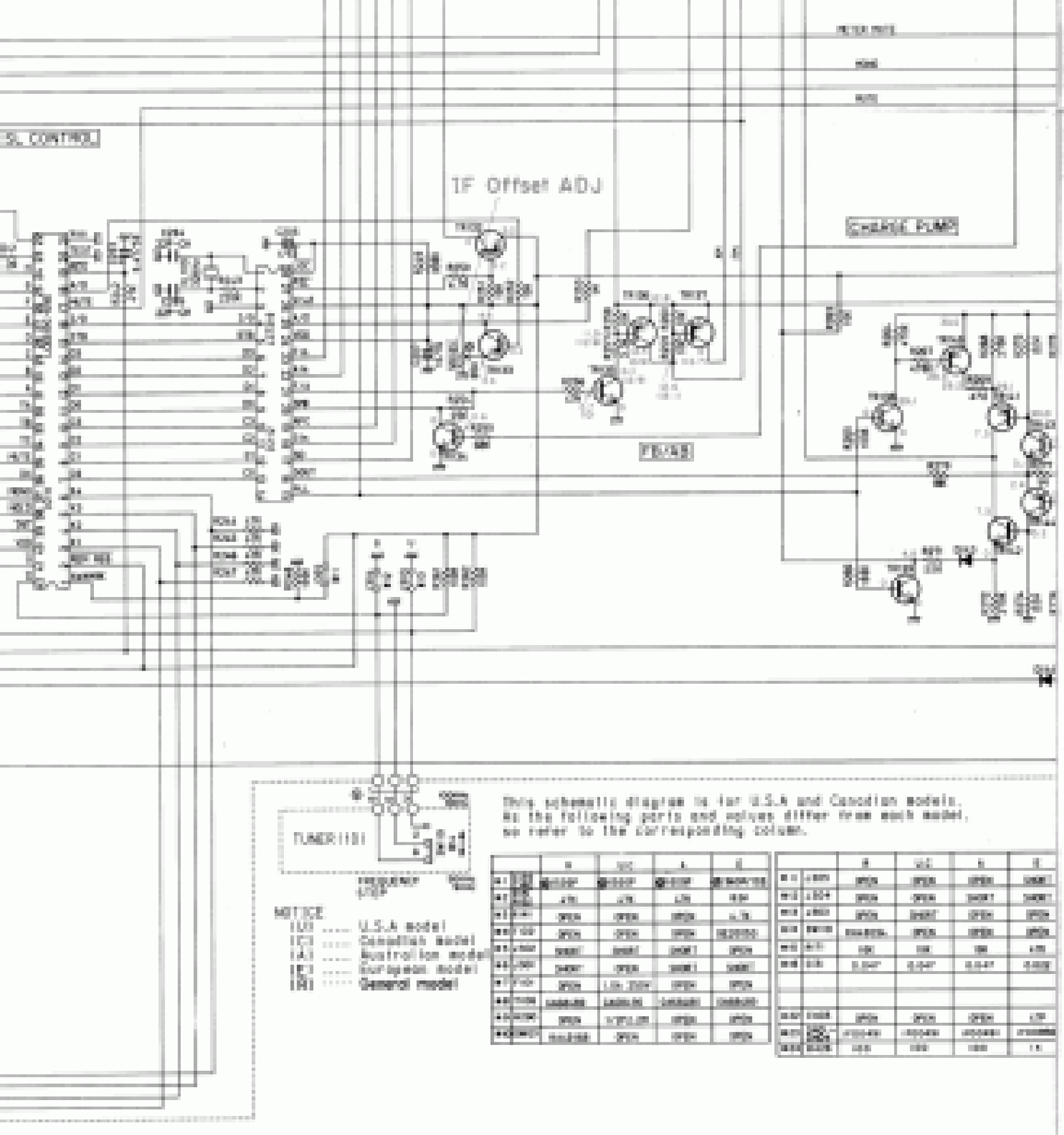
■ SCHEMATIC DIAGRAM





AM IFT ADJ
Stereo Distortion ADJ
Monaural Distortion ADJ
Discriminator



This schematic diagram is for U.S.A and Canadian models. As the following parts and values differ from each model, so refer to the corresponding column.

NOTICE
(U) ..... U.S.A model
(C) ..... Canadian model
(A) ..... Australian model
(E) ..... European model
(G) ..... General model

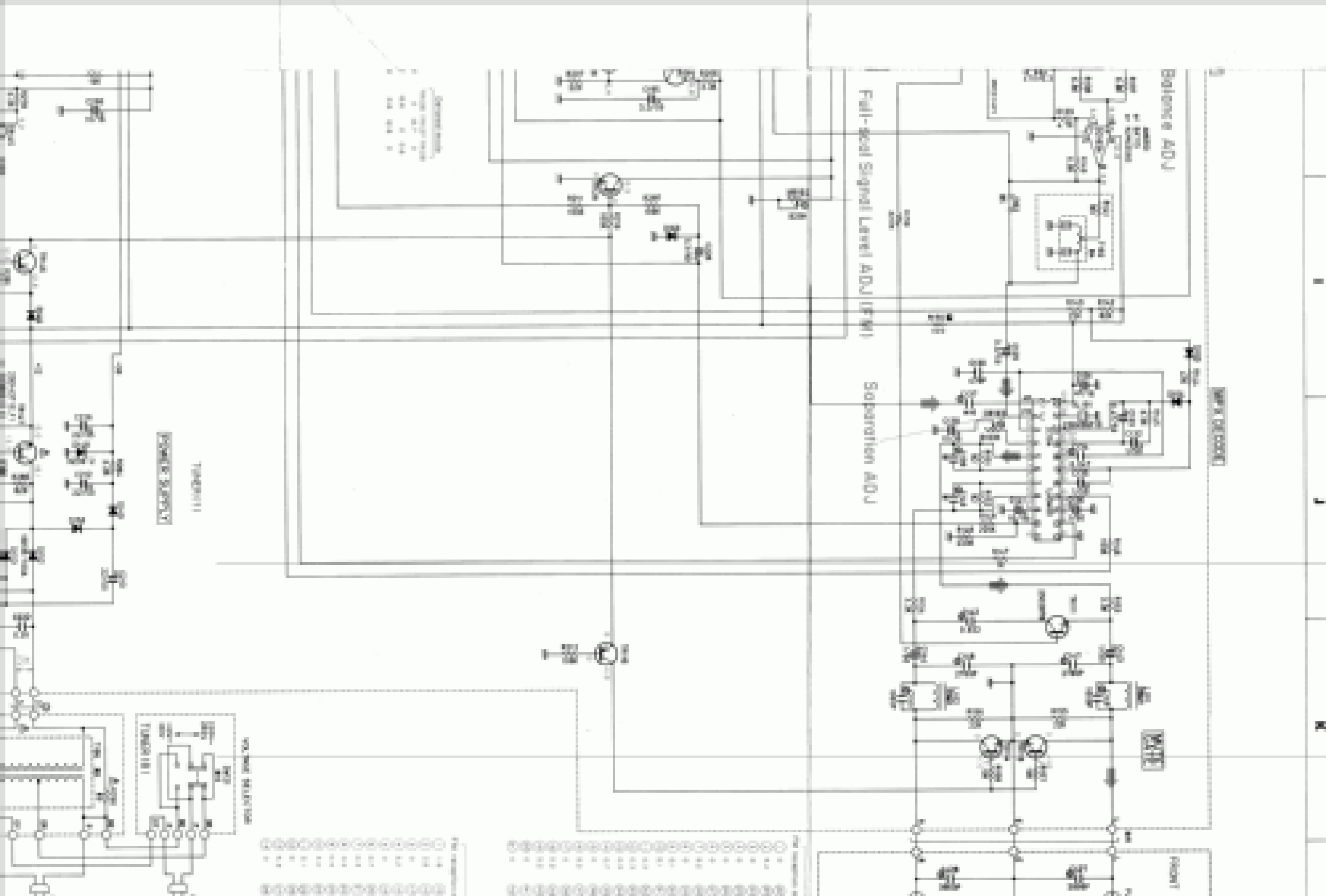
	A	B	C	D
R1	0 Ω	0 Ω	0 Ω	0 Ω
R2	470 Ω	470 Ω	470 Ω	0 Ω
R3	OPEN	OPEN	OPEN	4.7k Ω
R4	OPEN	OPEN	OPEN	10k Ω
R5	330Ω	330Ω	330Ω	OPEN
R6	240Ω	OPEN	240Ω	240Ω
R7	OPEN	1.5k Ω	OPEN	OPEN
R8	4.7k Ω	4.7k Ω	4.7k Ω	OPEN
R9	OPEN	2.2k Ω	OPEN	OPEN
R10	OPEN	OPEN	OPEN	0 Ω

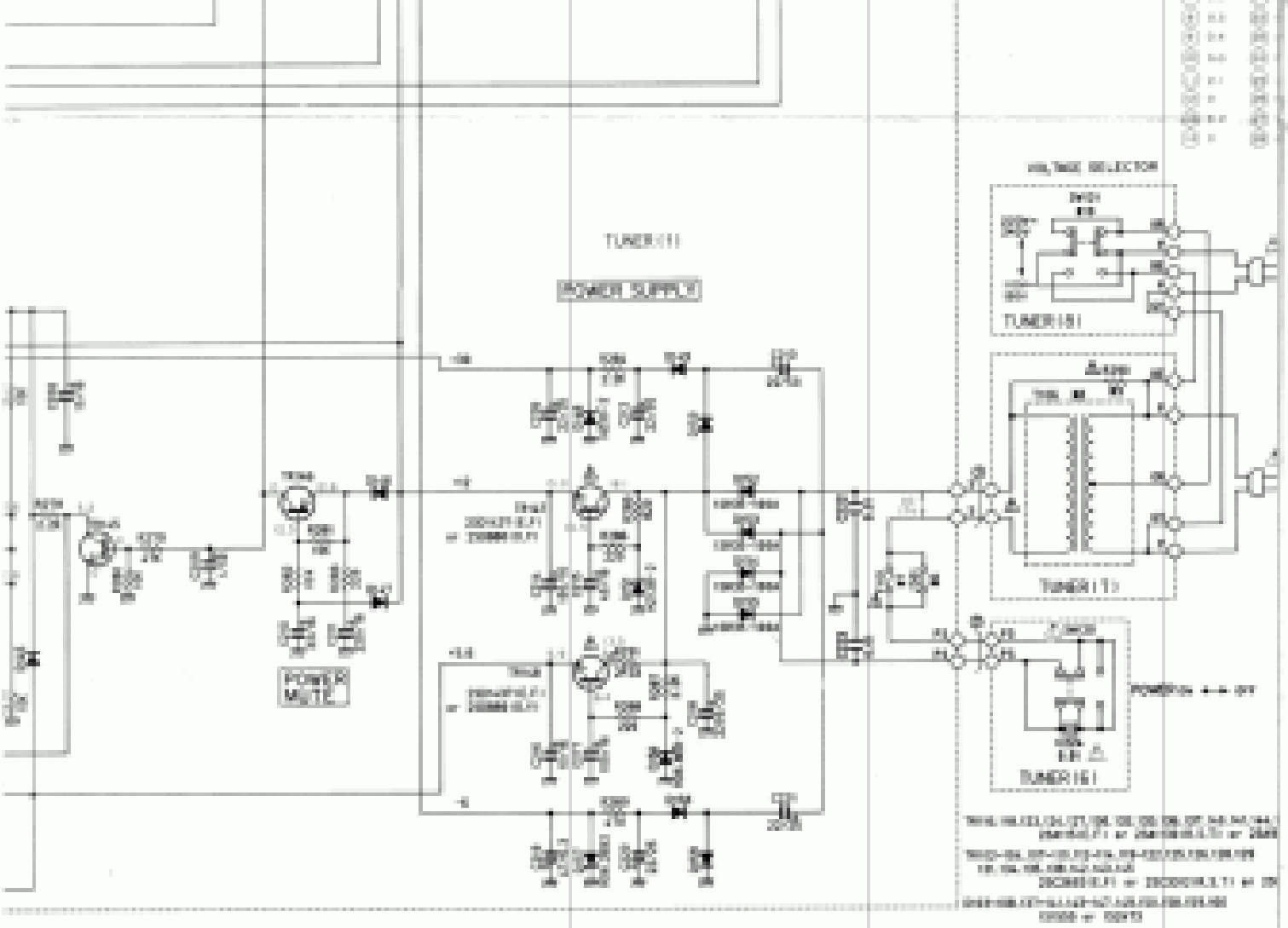
	A	B	C	D
R11	4.7k Ω	OPEN	OPEN	10kΩ
R12	2.2k Ω	OPEN	3k Ω	3k Ω
R13	2.2k Ω	OPEN	3k Ω	OPEN
R14	33k Ω	33k Ω	OPEN	OPEN
R15	4.7k Ω	OPEN	OPEN	OPEN
R16	0 Ω	0 Ω	0 Ω	4.7k Ω
R17	0.047 μF	0.047 μF	0.047 μF	0.022 μF
R19	100Ω	OPEN	OPEN	47k Ω
R20	470 Ω	470 Ω	470 Ω	470 Ω
R21	0 Ω	0 Ω	0 Ω	4.7k Ω

Pin No.	Function		Pin No.	Function	
1	segment "g"	Anode	13	"FM"	Anode
2	segment "f"	Anode	14	NOT USED	
3	segment "a"	Anode	15	NOT USED	
4	segment "d"	Anode	16	"AM" "FM" "kHz" "MHz"	Cathode
5	segment "c"	Anode			
6	segment "b"	Anode	17	decimal point	Cathode
7	segment "e"	Anode	18	NOT USED	
8	NOT USED		19	digit "5"	Cathode
9	decimal point	Anode	20	digit "4"	Cathode
10	"kHz"	Anode	21	digit "3"	Cathode
11	"AM"	Anode	22	digit "2"	Cathode
12	"MHz"	Anode	23	digit "1"	Cathode

● MATRIX OF DISPLA

IC111 / IC110	A (35 Pin)	B (36 Pin)
T6 (4 Pin)	D5 a	D5 b
T5 (7 Pin)	D4 a	D4 b
T4 (8 Pin)	D3 a	D3 b
T3 (1 Pin)	D2 a	D2 b
T2 (10 Pin)	LOCAL (D128)	D1 b
T1 (2 Pin)	F-1/11 (D116)	F-2/12 (D117)
T0 (14 Pin)	MEMO (D132)	CSL (D133)


Balance ADJ
Foil-Seal Signal Level ADJ (4 ea)
Separation ADJ



• IC110 DATA TABLE

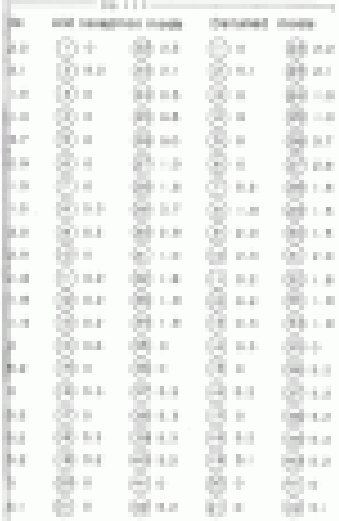
INPUT			
TC [12 Pin]	TB [13 Pin]	TA [10 Pin]	[1
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

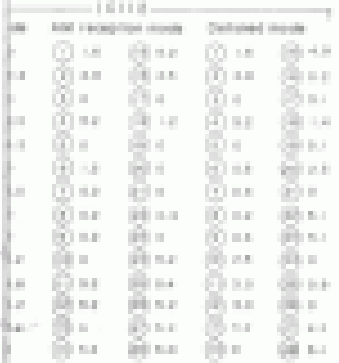
Y (D115, D116 ~ D135)

	C [29 Pin]	D [28 Pin]	E [27 Pin]	F [26 Pin]	G [25 Pin]	H [24 Pin]
	D5 c	D5 d	D5 e	D5 f	D5 g	P-10/20 (D125)
	D4 c	D4 d	D4 e	D4 f	D4 g	P-9/19 (D134)
	D3 c	D3 d	D3 e	D3 f	D3 g	FM DIGIT
	D2 c	D2 d	D2 e	D2 f	D2 g	P11-20 (D127)
	D1 c	AUTO RX (D132)	DX (D133)	AUTO (D131)		P1-10 (D126)
	P-3/13 (D118)	P-4/14 (D119)	P-5/15 (D128)	P-6/16 (D121)	P-7/17 (D122)	P-8/18 (D123)
	KHz	AM	MHz	FM	FINE (D129)	FINE (D124)

• MATRIX OF INPUT KEY

IC110 / IC111	T1 [2 Pin]	T2 [15 Pin]	T3 [1 Pin]	T5 [7 Pin]	
K1 [3 Pin]	P1/11	P5/15	P9/19	P1-10/ P11-20	
K2 [4 Pin]	P2/12	P6/16	P10/20	FM/AM	
K3 [5 Pin]	P3/13	P7/17	AUTO/ MAN'L	RECEIVING MODE	
K4 [6 Pin]	P4/14	P8/18	MEMORY		IC



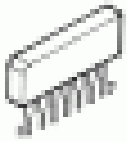


CAPACITOR

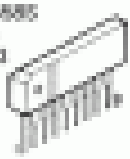
REMARKS	PARTS NAME	
NO MARK	ELECTROLYTIC CAPACITOR	⊕
NO MARK	CERAMIC CAPACITOR	
⊕	POLYESTER FILM CAPACITOR	
○	POLYSTYRENE FILM CAPACITOR(Mylar)		
◎	MICA CAPACITOR	
⊕	POLYPROPYLENE FILM CAPACITOR	
●	SEMICONDUCTIVE CERAMIC CAPACITOR	

LA3409

μPC577H (E, F)

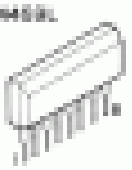


AN6551
MM6686
BA715
LB1613



TC4028BP
BU4028B
BA618
M54628P
LB1234
BA12804

MS4459L

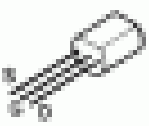


LA1245

LC7210

(014770V4.8
(LC651(C-605)

2SA51
2SK161



2SK73
2SK197

2SA1115 (E, F)
2SA1310 (R, S, T)

CAPACITOR

REMARKS	PARTS NAME	
NO MARK	ELECTROLYTIC CAPACITOR	※
NO MARK	CERAMIC CAPACITOR	
※	POLYESTER FILM CAPACITOR	
○	POLYSTYRENE FILM CAPACITOR (Mylar)	※
◎	MICA CAPACITOR	
◎	POLYPROPYLENE FILM CAPACITOR	
●	SEMICONDUCTOR CERAMIC CAPACITOR	

RESISTOR

REMARKS	PARTS NAME
NO MARK	CARBON FILM RESISTOR
※	CARBON FILM RESISTOR (1/2W)
△	METAL OXIDE FILM RESISTOR
▲	METAL FILM RESISTOR
※	METAL PLATE RESISTOR
■	FUSE PROOF CARBON FILM RESISTOR
□	SHUNT (SOLDER) RESISTOR
※	SEMI VARIABLE RESISTOR

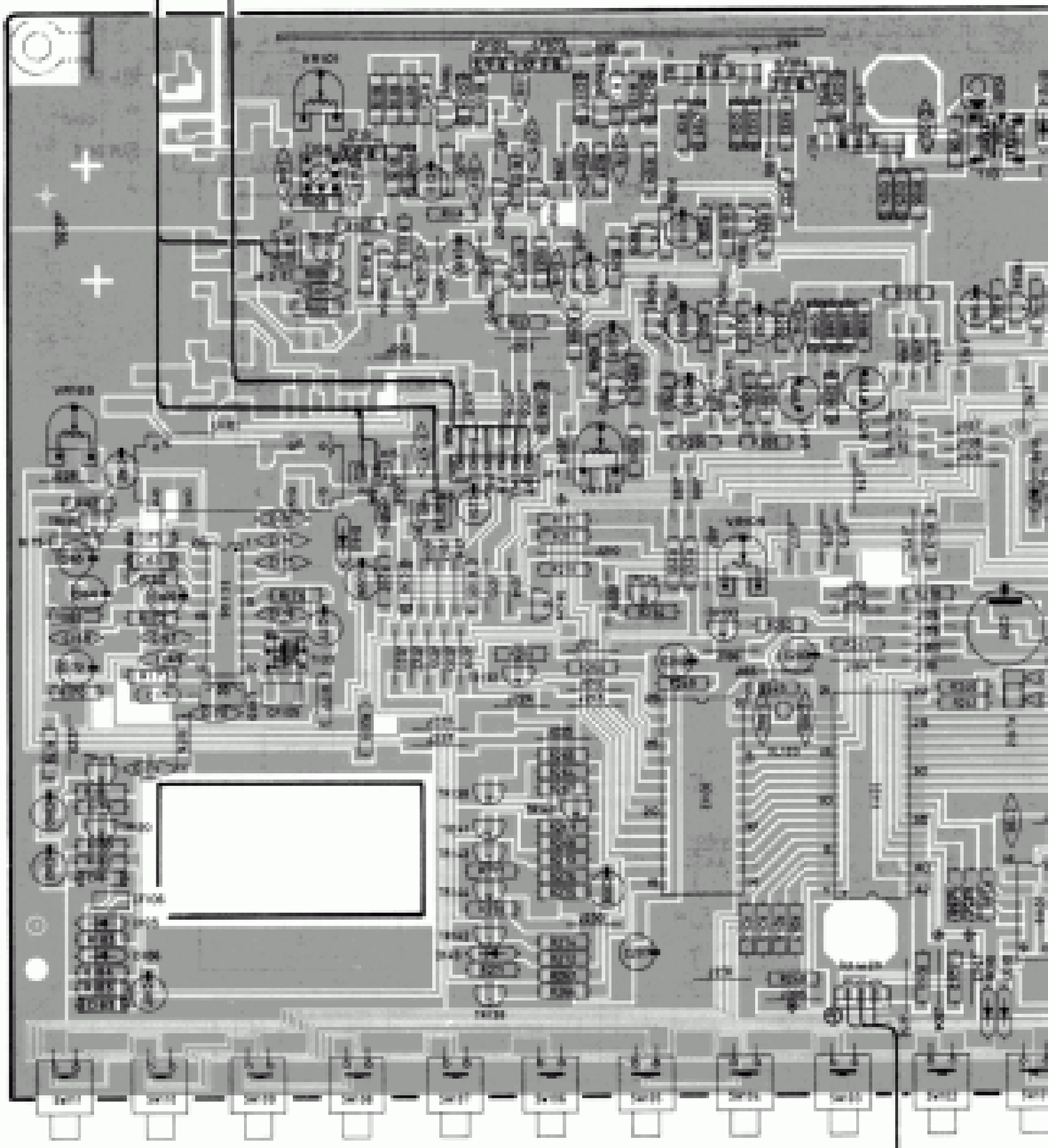
2SB1116
2SB1218
2SB1219
2SB1240
2SB1260
2SB1386
2SB1412
2SB1424
2SB1462
2SB1463
2SB1464
2SB1465
2SB1466
2SB1467
2SB1468
2SB1469
2SB1470
2SB1471
2SB1472
2SB1473
2SB1474
2SB1475
2SB1476
2SB1477
2SB1478
2SB1479
2SB1480
2SB1481
2SB1482
2SB1483
2SB1484
2SB1485
2SB1486
2SB1487
2SB1488
2SB1489
2SB1490
2SB1491
2SB1492
2SB1493
2SB1494
2SB1495
2SB1496
2SB1497
2SB1498
2SB1499
2SB1500
2SB1501

■ PRINTED CIRCUIT BOARD (Pattern side)

FROM : FRONT END C. BOARD

TO : FRONT END C. BOARD

Tuner Circuit B

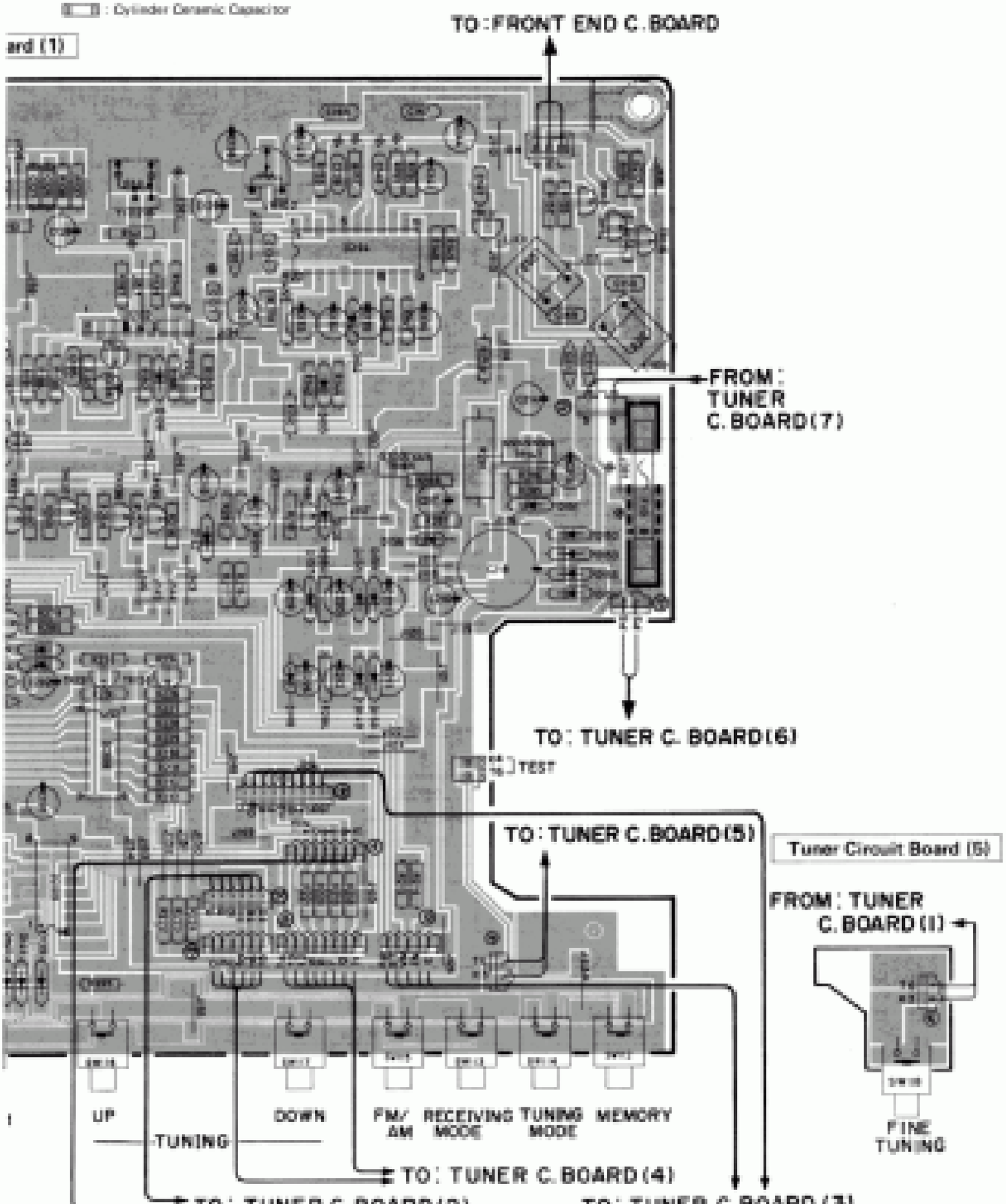


P1 P10 P10 / P20 P9 / P19 P8 / P18 P7 / P17 P6 / P16 P5 / P15 P4 / P14 P3 / P13 P2 / P12 P1 /
P11 P20

TO : TUNER C. BOARD (I
(R) MODEL ONLY

Note)
大平面 : Letter side
[ ] : Cylinder Ceramic Capacitor

ard (1)



■ ADJUSTMENTS

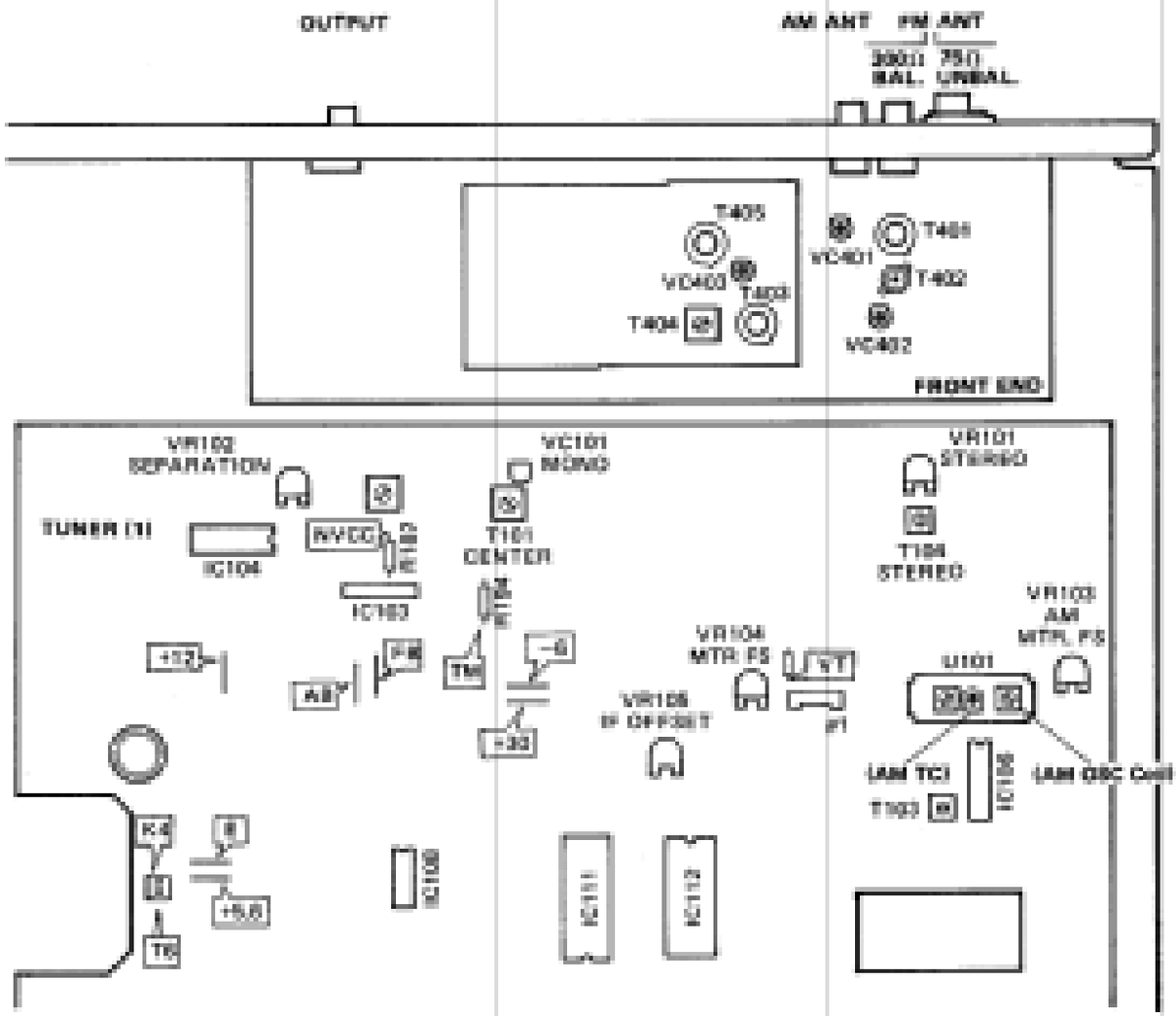
1. Before adjustment

1) After the power switch is pushed on, wait for 5 minutes before measuring, to be sure of the most stable operation.
2) Adjust the OSC coil and IFT with a nonferrous screw driver.
3) Set the switches to the following positions.
   TUNING MODE .... AUTO
   RECEIVING MODE .... AUTO
4) Proceed with the AM section adjustments after having finished the FM section adjustment.
5) 0dBμ = 1μV Ex: 60dBμ = 1mV

2. Measuring instruments abbreviation

FM SG	: FM signal generator
SSG	: Stereo signal generator
AM SG	: AM signal generator
DIST.M	: Distortion meter
FC	: Frequency counter
A.C.V.M.	: AC voltmeter
D.C.V.M.	: DC voltmeter

• TEST POINT



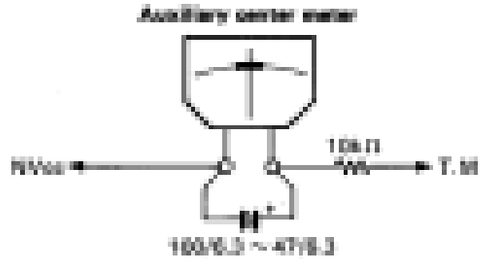
<POWER SUPPLY CHECK>

Check that the following voltages are obtained respectively across each test point and ground on tuner circuit.

Test Point	Rating or standard	Remark
+12	+12.5V ± 0.5V	Make sure that AC line voltage comes within Model's / AC line voltage U, C / 120V ± 10% E / 220V ± 10% A / 240V ± 10%
+5.6	+5.6V ± 0.8V	
+33	+33V ± 3V	
−8	−8.0V ± 0.5V	
FB	At FM reception mode +13V ± 1V	
	At AM reception mode 0V	
AB	At FM reception mode 0V	
	At AM reception mode +13V ± 1V	

< FM TUNER SECTION >

- Use 12kHz L.P.F. to measure the output.
- On step 1 and 2 connect the auxiliary center meter (J09036 or similar) to confirm the best tuned point.
- 100% modulation means that the Frequency Deviation is 75kHz.
- For the E model, install the Matching Transformer and connect FM SG.



Step	Item to be Adjusted	Connection terminal	Instrument required	Adjustment locations	Adjustment method	Rating or standard	Remarks
1	Discriminator balance	MVcc ~ T.M	Auxiliary center meter	T101 (CENTER)	Adjust the pointer of the auxiliary center meter point to "0" at tuned point.		After the adjustment of step 1 is 10, confirm it again.
2	Confirmation of station center set	300Ω FM ANT	FM SG [98MHz ± 1kHz 70dBμ (75.2dBf) MONO 1kHz 100% MOD]	TUNING key → UP or DOWN	Confirm that the auxiliary center meter deflects to "0" when tuned to signal of FM SG.		
		MVcc ~ T.M	Auxiliary center meter				
3	Local oscillator Coil	300Ω FM ANT	FM SG [108MHz ±1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]	T1605		VT ~ 20V ± 0.2V	TUNING MODE → MANUAL
		VT ~ GND	A.C.V.M.				
		300Ω FM ANT	FM SG [87.5MHz ± 1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]			VT > 2.5V	
		VT ~ GND	A.C.V.M.				
4	RF	300Ω FM ANT	FM SG [98MHz ± 1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]	T1603 SIGNAL QUALITY indicator	Adjust T403, VC403 until signal quality indicator light up.		TUNING MODE → MANUAL
		300Ω FM ANT	FM SG [108MHz ± 1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]	VC403 SIGNAL QUALITY indicator			
5	ANT 1	300Ω FM ANT	FM SG [98MHz ± 1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]	T1601 SIGNAL QUALITY indicator	Adjust T401, VC401 until signal quality indicator light up.		TUNING MODE → MANUAL
		300Ω FM ANT	FM SG [108MHz ± 1kHz 80dBμ (85.2dBf) MONO 1kHz 100% MODE]	VC401 SIGNAL QUALITY indicator			

Step	Item to be Adjusted	Connection terminal	Instrument required	Adjustment locations	Adjustment method	Rating or standard	Remarks
6	ANT 2	300Ω FM ANT	FM SG [98MHz ± 1kHz 60dBμ (65.2dBf) MONO 1kHz 100% MODE]	T402 SIGNAL QUALITY indicator	Adjust T402, VC402 until signal quality indicators light up.		TUNING MODE → MANU.
		300Ω FM ANT	FM SG [108MHz ± 1kHz 60dBμ (65.2dBf) MONO 1kHz 100% MODE]	VC402 SIGNAL QUALITY indicator			
7	ANT1 ANT2	Adjust by repeating steps 5 and 6.					
8	Monaural distortion	300Ω FM ANT	FM SG [98MHz ± 1kHz 70dBμ (75.2dBf) MONO 1kHz 100% MOD]	VC101 (MONO)	Reduce distortion to minimum.	Less than −55dB	Reception should be made in LOCAL mode
		OUTPUT L, R	DIST. M L.P.F.				
9	Stereo distortion	300Ω FM ANT	FM SG, SSG [98MHz ± 1kHz 70dBμ (75.2dBf) STEREO L, R 1kHz, 100% MOD.]	VR101 T104 (STEREO) STEREO indicator	Same as step 8	Less than −55dB	Confirm that stereo indicator lights up.
		OUTPUT L, R	DIST. M L.P.F.				
10	Separation	300Ω FM ANT	FM SG, SSG [98MHz ± 1kHz 70dBμ (75.2dBf) STEREO L, R 1kHz, 100% MOD.]	VR102 (SEPARATION)	Reduce output level to minimum.	Separation more than 40dB	
		OUTPUT L, R	A.C.V.M L.P.F.				
11	Full-scale signal quality level	300Ω FM ANT	FM SG, SSG [98MHz ± 1kHz 70dBμ (75.2dBf) STEREO L, R 1kHz, 100% MOD.]	VR104 (MTR FS) SIGNAL QUALITY indicator	Adjust VR104 until all signal quality indicators light up.		Confirm that all signal quality indicators goes out at detuned point.
12	IF Offset	300Ω FM ANT	FM SG [98MHz ± 1kHz 70dBμ (75.2dBf) STEREO L, R 1kHz 30% MOD]	VR105 (IF OFFSET) Frequency display	By shorting across terminals K4 and T8, the frequency display shifts 1 digit. Therefore, adjust VR105 until 10kHz digit becomes 9 or 0.		After adjustment open across K4 and T8.
		K4 — T8	Short				
13	Confirmation of auto-search reception	300Ω FM ANT	FM SG [98MHz ± 1kHz 15dBμ (20.2dBf) MONO 1kHz 100% MOD]	TUNING key UP or DOWN	Confirm that auto search reception is possible with the tuning key.		Confirm that tuning is performed at auto reception.

Note: X dBμ = X + 5.2dBf

T-1020

- Shorting K4 and T6 while set at FM will result in automatic memory of each preset from P1/P11 to P10/P20 as given in the right table. This is convenient when making an adjustment.

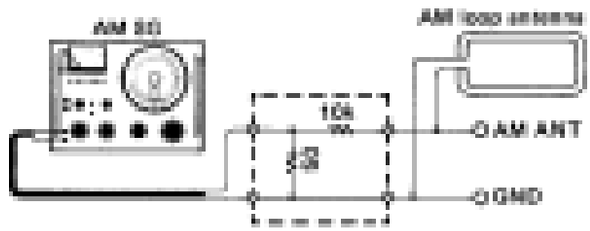
P1/P11	P2/P12	P3/P13	P4/P14	P5/P15
AM 630kHz	AM 1080kHz	AM 1440kHz	FM 87.9MHz	FM 89.1MHz

P6/P16	P7/P17	P8/P18	P9/P19	P10/P20
FM 98.1MHz	FM 101.9MHz	FM 108.0MHz	FM 80.0MHz	FM 106.0MHz

< AM TUNER SECTION >

- Connect the AM loop antenna to the AM ANT terminals.
- Connect the AM dummy antenna for adjustment.

AM DUMMY ANTENNA CONNECTION



Step	Item to be Adjusted	Connection terminal	Instrument required	Adjustment location	Adjustment method	Rating or standard
1	AM IFT	AM ANT	AM SG AM dummy antenna [630kHz ± 0.1kHz 50dBu 400Hz, 30% MOD]	T103	Adjust T103 to maximize detector output.	
		OUTPUT	A.C.V.M.			
2	Confirmation of sensitivity	AM ANT	AM SG AM dummy antenna [630kHz ± 0.1kHz 1080kHz ± 0.1kHz 1440kHz ± 0.1kHz 400Hz, 30% MOD]	PRESET STATION key P1/P11 P2/P12 P3/P13	Obtain AM SG output level where distortion becomes 10%.	Less than 58dBu
		OUTPUT	A.C.V.M. DIST. M.			
3	Full scale signal quality level	AM ANT	AM SG AM dummy antenna [1080kHz ± 0.1kHz 80dBu 400Hz, 30% MOD]	PRESET STATION key P2/P12 VR103 (AM MTR FS) SIGNAL QUALITY indicator	Adjust VR103 until all signal quality indicators light up.	
4	Confirmation of auto search reception	AM ANT	AM SG AM dummy antenna [1080kHz ± 0.1kHz 50dBu 400Hz, 30% MOD]	TUNING key UP or DOWN		Confirm the auto search reception with the tuning key

< DIGITAL CONTROL SECTION >

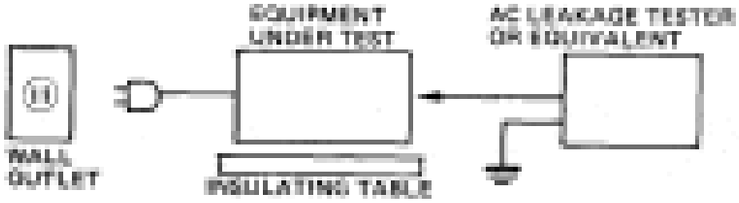
Step	Confirmation item	Connection terminal	Instrument required	Operation key	Confirmation method
1	Preset memory	300Ω FM ANT	FM SG, SSG 98MHz ± 1kHz 70dBμ (75.2 dBf) STEREO L, R 1kHz, 100% MOD	FUNCTION key TUNING MODE key TUNING key (UP or DOWN) MEMORY key PRESET STATION key P1-P10/P11-P20	① Receive FM 98MHz by means of auto search. ② Set P1-P10 → P1-P10 indicator lights. ③ Press MEMORY key → MEMORY indicator flashes about 5 seconds. ④ Press P1 → MEMORY indicator goes OFF. P1 of PRESET STATION indicator lights.
		AM ANT	AM SG AM dummy antenna 1080kHz ± 0.1kHz 80dBμ 400Hz, 30% MOD		⑤ Receive AM 1080kHz ⑥ Press MEMORY key → MEMORY indicator flashes about 5 seconds. ⑦ Press P2 → MEMORY indicator goes OFF. P2 of PRESET STATION indicator lights.
		300Ω FM ANT AM ANT	FM SG, SSG AM SG AM dummy antenna		⑧ Press P1 and P2 and check that content is read out. → P1 and P2 of PRESET STATION indicator lights.
					⑨ Set P11-P20 → P11-P20 indicator flashes. ⑩ Press MEMORY key → MEMORY indicator flashes. ⑪ Press P11 → MEMORY indicator goes OFF. P11-P20 indicator lights. P11 indicator lights.
					⑫ Press P11 and check that content is read out.
2	Tuning mod	Same as step 1	Same as step 1	FUNCTION key TUNING MODE key TUNING key (UP or DOWN) PRESET STATION key P1, P2	Tune to FM 98MHz and AM 1080kHz, and check that when receiving MAN'L/MONO, FM reception become forced mono. TUNING MODE indicator → Goes out FM STEREO indicator → Goes out
					Check that tuning operation stops when tuned while AUTO searching. TUNING MODE indicator → lights up FM STEREO indicator → lights up
3	Fine Tuning	Same as step 1	Same as step 1	PRESET STATION key P1, P2 FINE TUNING key TUNING key (UP or DOWN)	① Press P1 and content is read out (FM) ② Press FINE TUNING key → FINE TUNING indicator lights. ③ Press TUNING key and check that 10kHz step each. Note: E model → 10kHz digit becomes 0 ④ Press P2 and content is read out (AM) ⑤ Press TUNING key and check that 1kHz step each
4	Receiving Mode			PRESET STATION key P1 RECEIVING MODE key	① Press P1 and content is read out (FM) ② Press RECEIVING MODE key → The following 3 states are switched and each indicator lights up. AUTO → DX → LOCAL
5	Last channel memory			POWER key	① Read out P1. ② Turn OFF POWER Switch. ③ Turn ON POWER Switch after 5 seconds. ④ P1 content should come out. P1 of PRESET STATION indicator lights.

■ TO SERVICE PERSONNEL

1. Critical Components Information.
   Components having special characteristics are marked ! and must be replaced with parts having specifications equal to those originally installed.

2. Leakage Current Measurement (For 120 V Model Only).
   When service has been completed, it is imperative that you verify that all exposed conductive surfaces are properly insulated from supply circuits.

- Meter impedance should be equivalent to 1500 ohm shunted by 0.15μF.
- Leakage current must not exceed 0.5mA.
- Be sure to test for leakage with the AC plug in both polarities.



■ SPECIFICATIONS

• FM SECTION

Tuning Range	87.5MHz to 108MHz
50dB Quieting Sensitivity (IHF)	
Mono, 75Ω	1.8μV (15.3dBf)
Stereo, 75Ω	29μV (37.2dBf)
Usable Sensitivity	
30dB S/N Quieting 75Ω	0.9μV (10.3dBf)
Usable Sensitivity (DIN)	
Mono, 75Ω (S/N 26dB)	1.4μV (E)
Stereo, 75Ω (S/N 46dB)	35μV (E)
Image Response Ratio	85dB
IF Response Ratio	115dB
Spurious Response Ratio	110dB
AM Suppression Ratio	65dB
Capture Ratio	
Local	1.2dB
Alternate Channel Selectivity	
DX	65dB
Selectivity (two Signals)	
DX (DIN 400kHz DEV, ±300kHz)	70dB (E)
Adjacent Channel Selectivity	
DX	20dB (U)(C)(R)(A)
Signal to Noise Ratio (IHF)	
Mono	80dB (U)(C)(R)(A)
Stereo	64dB (U)(C)(R)(A)
Signal to Noise Ratio (DIN-Weighted)	
Mono	65dB (E)
Stereo	79dB (E)
Harmonic Distortion	
Mono, 100Hz DX	0.02%
Local	0.03%
1kHz DX	0.15%
Local	0.04%
6kHz DX	0.4%
Local	0.06%
Stereo, 100Hz DX	0.5%
Local	0.06%
1kHz DX	0.5%
Local	0.06%
6kHz DX	0.8%
Local	0.09%
(40kHz DEV.)	
Stereo, 100Hz	0.05% (E)
1kHz	0.05% (E)
6.3kHz	0.08% (E)
Stereo Separation	
Local, 50Hz	55dB
1kHz	55dB
10kHz	45dB (U)(C)(R)(A)/35dB (E)
Frequency Response	
30Hz to 12kHz	0 ± 0.5dB

• AM SECTION

Tuning Range	510kHz to 1630kHz (U)(C) 513kHz to 1629kHz (A)(E) 510kHz to 1630kHz or 513kHz to 1629kHz (R)
Usable Sensitivity	250μV/m
Selectivity	25dB
Signal to Noise Ratio	50dB
Image Response Ratio	40dB
Spurious Response Ratio	50dB
Harmonic Distortion	
400Hz	0.2%

• AUDIO SECTION

Output Level/Impedance (Fixed)	
FM 100% MOD, 1kHz	500mV/2.8kΩ
FM 40kHz DEV, 1kHz	400mV/2.8kΩ (E)
AM 30% MOD, 400Hz	150mV/2.8kΩ

• GENERAL

Power Supply	
U.S.A. & Canadian model	120V AC, 60Hz
General model	110–130V AC/220–240V AC, 60/50Hz
European model	220V AC/240V AC, 50Hz
Australian model	240V AC, 50Hz
Power Consumption	110W
Dimensions (W x H x D)	435 x 72 x 318 mm (17-1/8" x 2-7/8" x 12-1/2")
Weight	3.4kg (7 lbs 7 oz)

*Specifications subject to change without notice.

(U) ..... U.S.A. model
(C) ..... Canadian model
(R) ..... General model
(A) ..... Australian model
(E) ..... European model