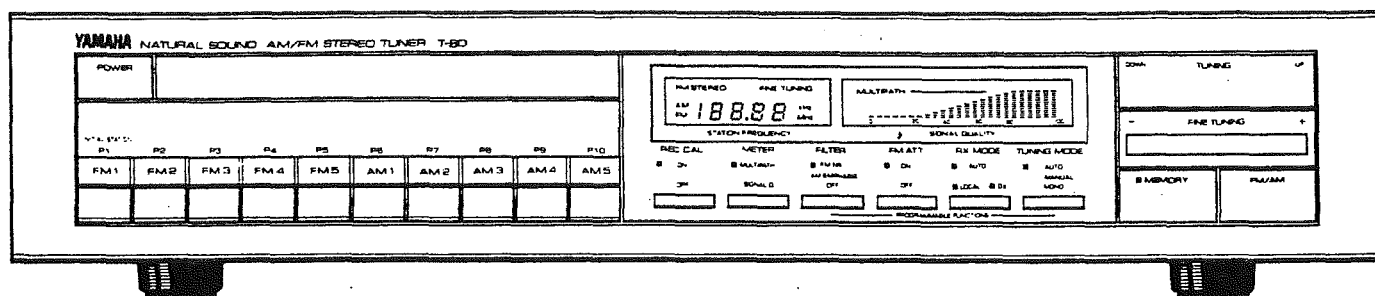


STEREO TUNER

T-80

SERVICE MANUAL



FRONT PANEL

CONTENTS

TO SERVICE PERSONAL	1
SPECIFICATIONS	1
REAR PANELS	2
DISASSEMBLY PROCEDURES	3
INTERNAL VIEW	4
ADJUSTMENT	4 19
BLOCK DIAGRAM	10
PRINTED CIRCUIT BOARD	11 13
WIRING DIAGRAM	14, 15
SCHEMATIC DIAGRAM	16, 17
EXPLODED VIEW	18
PARTS LIST	19 27

SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN
2 15K-201 (1) Printed in Japan

004545

■ TO SERVICE PERSONAL

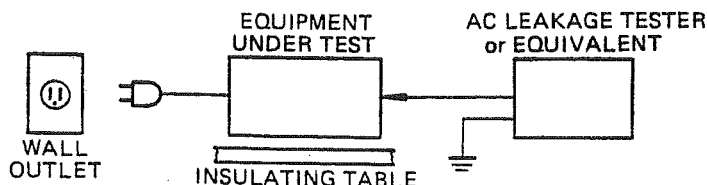
1. Critical Components Information.

Components having special characteristics are marked $\triangle$ and must be replaced with parts having specifications equal to those originally installed.

2. Leakage Current Measurement (For 120V 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 $0.15\mu\text{F}$.
- 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 87.6 ~ 108.0MHz
50 dB Quieting Sensitivity

Mono (DX) $1.6\mu\text{V}$ (15.3dBf)
(NR ON) $1.2\mu\text{V}$ (12.8dBf)
Stereo (DX) $20\mu\text{V}$ (37.2dBf)
(NR ON) $10\mu\text{V}$ (31.2dBf)

Usable Sensitivity

(IHF Mono) 75 Ω $0.9\mu\text{V}$ (10.3dBf)

Usable Sensitivity (DIN)

Mono (S/N 26dB) $1.0\mu\text{V}$ (E)
Stereo (S/N 46dB) $3.0\mu\text{V}$ (E)

Image Response Ratio

IF Response Ratio 115dB

Spurious Response Ratio 110dB

AM Suppression Ratio 70dB

Capture Ratio

Local 1.2dB

Alternate Channel Selectivity

DX 85dB (U,C,R,A)

Selectivity (two Signals) (DIN 40kHz Dev.)

DX 70dB (E)

Adjacent Channel Selectivity

DX 20dB (U,C,R,A)

Signal to Noise Ratio (IHF)

Mono 94dB (U,C,R,A)

Stereo 86dB (U,C,R,A)

Signal to Noise Ratio

(DIN-Weighted) Mono 88dB (E)

Stereo 80dB (E)

Harmonic Distortion

Mono 100Hz . . DX0.03%, Local 0.02% (U,C,R,A)

1kHz . . DX0.15%, Local 0.03% (U,C,R,A)

6kHz . . DX0.4%, Local 0.06% (U,C,R,A)

Stereo 100Hz . . DX0.5%, Local 0.04% (U,C,R,A)

1kHz . . DX0.5%, Local 0.03% (U,C,R,A)

6kHz . . DX0.8%, Local 0.07% (U,C,R,A)

(40kHz Dev)

Stereo 100Hz DX 0.5%, Local 0.05% (E)

1kHz DX 0.5%, Local 0.04% (E)

6.3kHz DX 0.5%, Local 0.08% (E)

Stereo Separation (1kHz)(Local)

50kHz 65dB

1kHz 65dB (U,C,R,A)

60dB (E)

10kHz 50dB (U,C,R,A)

40dB (E)

Frequency Response

50Hz to 10kHz 0 +0.2
-0.3 dB

20Hz to 15kHz 0 +0.2
-0.5 dB

Subcarrier Product Ratio 65dB
Meter Saturation Level 3mV (75dBf)

■ AM SECTION

Tuning Range 510 ~ 1620kHz (U,C,R)
513 ~ 1620kHz (E,A,R)

Usable Sensitivity $250\mu\text{V}$

Selectivity 30dB

Signal to Noise Ratio 55dB

Image Response Ratio 40dB

Spurious Response Ratio 50dB

Distortion (400Hz) 0.2%

■ AUDIO SECTION

Output Level/Impedance (HIGH)

FM (100% MOD, 1kHz) 1V/2k Ω (U,C,R,A)

1.6V/2k Ω (E)

FM (30% MOD, 400Hz) 0.3V/2k Ω

REC CAL (50% MOD, 333Hz) 0.5V/2k Ω

Output Level/Impedance (LOW)

FM (100% MOD, 1kHz) 0.5V/2.5k Ω (U,C,R,A)

0.8V/2.5k Ω (E)

AM (100% MOD, 1kHz) 0.15V/2.5k Ω

REC CAL (50% MOD, 333Hz) 0.25V/2.5k Ω

■ GENERAL

Power Supply

U.S. & Canadian Models 120V, 60Hz

General Model 110/120V, 50/60Hz

220/240V, 50/60Hz

European Model 220V, 50Hz

240V, 50Hz

Australian Model 240V, 50Hz

Power Consumption

U.S. & Canadian Models 13W

General Model 13W

European Model 13W

Australian Model 12W

Dimension (WxHxD)

435 x 93.5 x 357mm (U,C,R,A)

(17-1/8" x 3-1/32" x 14-1/16")

435 x 93.7 x 357mm (E)

(17-1/8" x 3-1/32" x 14-1/16")

Weight 5kg

(11lbs)

Specifications subject to change without notice

MARKET

U: U.S. Model

C: Canadian Model

R: General Model

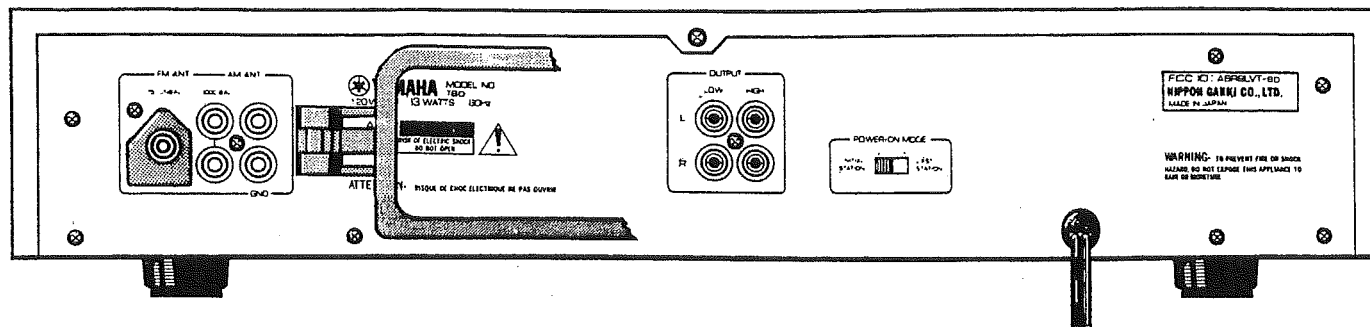
E: European Model

A: Australian Model

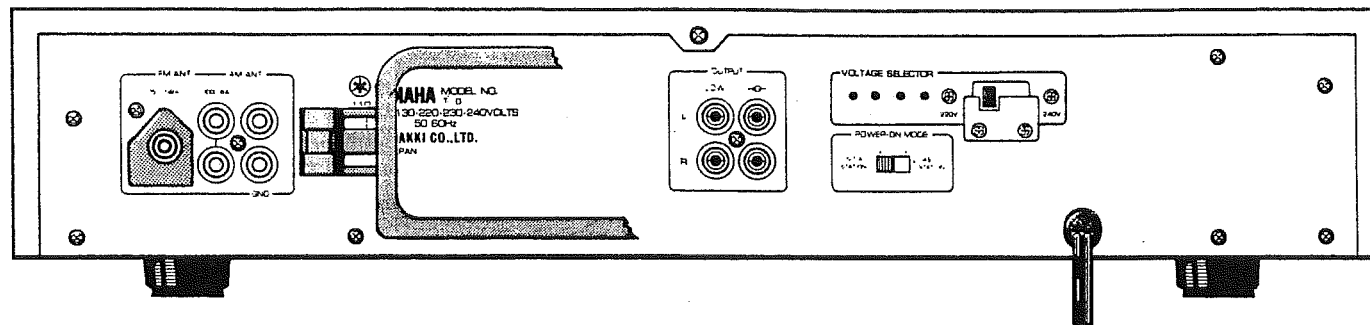
J: Japanese Model

REAR PANELS

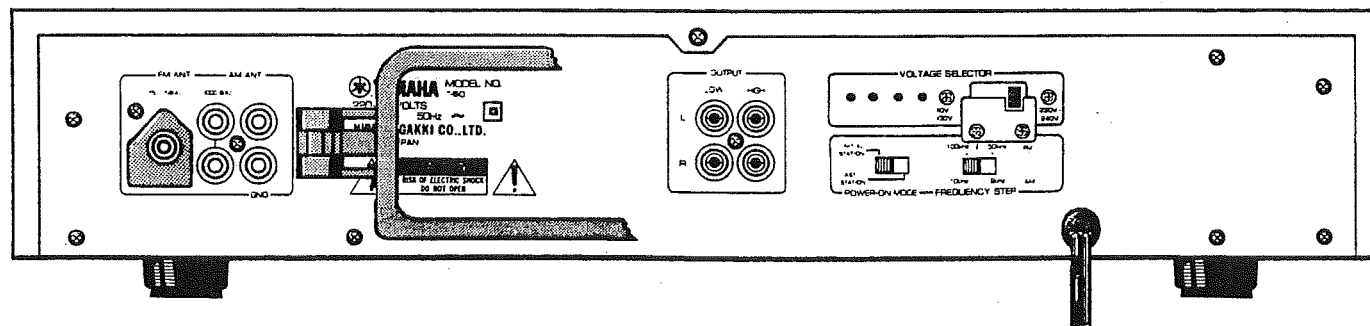
U.S. & CANADIAN MODEL



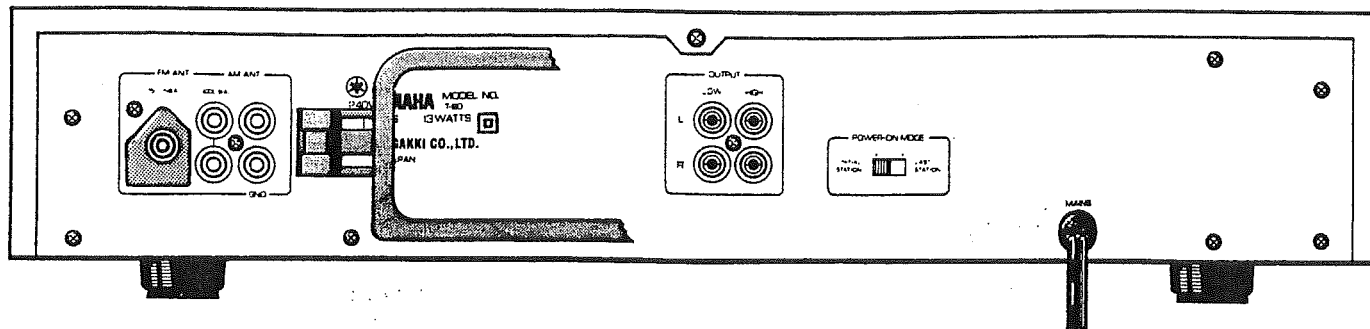
EUROPEAN MODEL



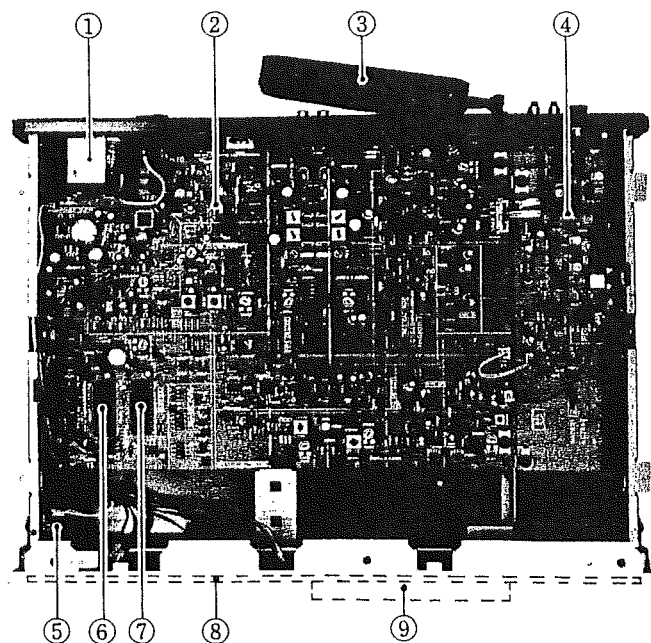
GENERAL MODEL



AUSTRALIAN MODEL



INTERNAL VIEW



1. POWER TRANSFORMER
U. S. & Canadian models: GA67130
European model: GA67140
General model: GA67120
Australian model: GA67150
2. TUNER CIRCUIT BOARD
3. AM LOOP ANTENNA
4. FRONT END CIRCUIT BOARD
5. POWER SWITCH (SW203)
6. IC114: LC6502C-638
7. IC113: LC7210
8. KEYBOARD UNIT CIRCUIT BOARD
9. LED FREQUENCY & SIGNAL INDICATOR

ADJUSTMENT

1. Before Adjustment

- 1) Start adjustment approximately 5 minutes after the power switch is pushed on in order to stabilize the operation of circuit.
- 2) Adjust the OSC coil and IFT using high-frequency or nonferrous screwdriver.
- 3) Adjust the FM section first. After that, adjust the AM section.
- 4) Set the switches to the following positions unless otherwise specified.
TUNING MODE AUTO
REC CAL OFF
- 5) Be sure to make adjustment after installing the bottom cover.
- 6) For connection with OUT PUT, use HIGH terminal.

< Line Voltage Checkup >

Check to see if the specified voltage is provided across each terminal and E in the tuner circuit board.

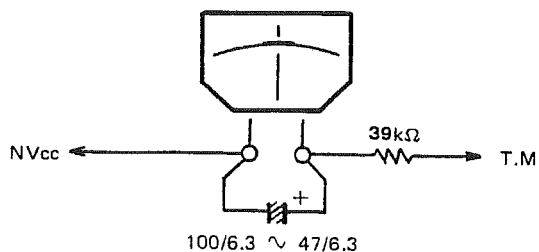
Terminal	Voltage	Measuring Instrument
+30	$+30 \pm 3V$	DCVM
B1 (+7)	$+7 \pm 1V$	
+5	$+5.5 \pm 0.5V$	
B2 (+12)	$+12.5 \pm 0.5V$	
B2 -12	$-12.5 \pm 0.5V$	
B2 +7	$+7 \pm 0.5V$	
B2 -7	$-7 \pm 0.5V$	
FB	FM mode $+12 \pm 1V$	DCVM
	AM mode $+1V$ or lower	
AB	FM mode $+1V$ or lower	
	AM mode $+12 \pm 1V$	

2. Measuring Instruments Abbreviation

FM SG	FM signal generator
SSG	Stereo signal generator
AM SG	AM signal generator
OSC	Oscilloscope
DIST M	Distortion meter
FC	Frequency counter
ACVM	AC voltmeter
Center meter	Ji00036 or equivalent
DCVM	DC voltmeter

< FM Tuner Section >

- Use 19kHz L.P.F for OUTPUT L and R terminals and make auditory compensation. Then connect the oscilloscope, AC voltmeter and distortion meter.
- To check the optimum tuning point during adjustment, connect the auxiliary center meter (Ji00036 or equivalent, current sensitivity: $250\mu A$) as shown in the figure.
- The accuracy of FM SG should be within $\pm 1kHz$.



Step	Adjustment item	Test point	Instrument (signal)	Adjustment location	Adjustment method	Rating or standard	Remarks
1	Discriminator balance adjustment	Across NVcc and TM	Auxiliary center meter	T203	In detuning state, adjust until the pointer of auxiliary center meter is positioned at zero (center).		After adjustment of steps 1 to 10, to check again. If the pointer is positioned outside the range of ± 1 mm, re-adjust from step 1.
2	Tuning point set confirmation	300 Ω FM ANT Across NVcc and TM	FM SG (98MHz $\pm$ 1kHz 70dB μ Monaural 1kHz 100% modulation) Auxiliary center meter	TUNING button UP, DOWN	Make sure that reception is made with the pointer of auxiliary center meter positioned at zero (center)		Tuning mode SW $\rightarrow$ AUTO
3	Monaural distortion adjustment	300 Ω FM ANT OUTPUT L, R	FM SG (98MHz $\pm$ 1kHz 70dB μ Monaural 100Hz 100% modulation) DIST M, OSC L, P. F.	VC202 VR203 (MONO)	Reduce distortion to minimum.	-66dB or lower	Reception should be made in LOCAL mode.
4	VCO adjustment	300 Ω FM ANT 19KM (R197) + 12 (J150) 19K (C169)	FM SG (98MHz $\pm$ 1kHz 70dB μ Nonmodulation) 2.2M Ω FC	VR207 (VCO)	1. Connect 2.2M Ω resistor across R197 and J150 to force stereo mode. 2. Adjust until the frequency across terminals C169 and E becomes 19kHz $\pm$ 10Hz.	19kHz $\pm$ 10Hz	Stereo indicator light should come on.
5	PLL input phase adjustment	300 Ω FM ANT OUTPUT L, R	FM SG (98MHz $\pm$ 1kHz 70dB μ Stereo (L-R) 1kHz 100% non-modulation) OSC	T211 (SUB)	Increase output to maximum.		Remove FC and 2.2M Ω resistor.
6	Stereo distortion adjustment	300 Ω FM ANT OUTPUT L, R	FM SG, SSG (98MHz $\pm$ 1kHz 60dB μ Stereo L, R 1kHz 100% modulation) DISTM, OSC, LPF	L T201 VR201 R T202 VR202	Reduce distortion to minimum.	-56dB or lower	Reception should be made in LOCAL mode.
7	DX distortion adjustment	As above	60dB μ	VC201	Reduce distortion to minimum.		Forced DX
8	Monaural distortion confirmation	As above	FM SG (98MHz $\pm$ 1kHz 70dB μ Monaural 1kHz 100% modulation)		Confirm that monaural distortion is minimum.	-50dB or lower	Reception should be made in LOCAL mode.

*NOTE: 70dB μ = 75.4dBf, 60dB μ = 65.4dBf.

Step	Adjustment item	Test point	Instrument (signal)	Adjustment location	Adjustment method	Rating or standard	Remarks
9	Separation adjustment	300Ω FM ANT OUTPUT L, R	FM SG, SSG (98MHz ± 1kHz) 70dBμ Stereo, L, R 1kHz 100% modulation OSC, ACVM LPF	L VR205 R VR206	Provide stereo signal for R and L channels individually. • R channel alone: adjust OUTPUT Rch VR104 until output is increased to maximum. • R channel alone: adjust OUTPUT Lch VR103 until output is increased to maximum.	Separation: 40dB or higher	
10	Pilot cancel adjustment	300Ω FM ANT OUTPUT L, R	FM SG, SSG (98MHz ± 1kHz) 70dBμ Pilot signal 9% modulation only Remove LPF. OSC, ACVM	T212 VR208	Observe with oscilloscope and reduce 19kHz carrier leak level to minimum.	−56dB or lower	
11	Full-scale signal level indicator adjustment	300Ω FM ANT	FM SG, SSG (98MHz ± 1kHz) 70dBμ Stereo L, R 1kHz 30% modulation	VR210	Adjust so that all signal indicators light up.		Signal indicators should go off when detuned. Reception should be made in LOCAL mode. FMATT → OFF
12	Signal indicator/multipath switching confirmation	300Ω FM ANT	FM SG, SSG (98MHz ± 1kHz) 70dBμ Stereo L, R 1kHz 30% modulation	Signal indicator/multipath select switch	Make sure that when the select switch is pressed in the state of step 10, the MULTI-PATH LED comes on and the indicator displays zero.		
13	Frequency display adjustment (FM IF offset adjustment)	300Ω FM ANT TP(K4) TP(T6)	FM SG, SSG (98MHz ± 1kHz) 70dBμ Stereo L, R 1kHz 30% modulation Short circuit	VR209	By shorting across terminals TP(K4) and TP(T6) the frequency display shifts 1 digit. Therefore, adjust so that 10kHz becomes 9 or 0.		After adjustment, open across TP(K4) and TP(T6).
14	Auto search reception confirmation	300Ω FM ANT	FM SG, SSG (98MHz ± 1kHz) 20dBμ Monaural 1kHz 100% modulation	TUNING UP, DOWN	Make sure that auto search reception is possible with the TUNING button.	Band edge: 76.0 – 90.0 MHz	TUNING MODE → AUTO During auto search, muting should be made.
15	FM ANT operation confirmation	As above	As above	FM ATT SW	Confirm by output waves that reception sensitivity is deteriorated with FM ATT on.		
16	FM noise filter operation confirmation	300Ω FM ANT	FM SG, SSG (98MHz ± 1kHz) 20dBμ Stereo L, R 10kHz 100% modulation	FM NR SW	Make sure that 10kHz output differs between when the FM NR switch is at ON and OFF position.		FM ATT → OFF

< AM Tuner Section >

- Connect the AM loop antenna to the AM ANT terminals.
- Connect the AM dummy used for adjustment to AM SG.
- The accuracy of AM SG should be within ± 0.1 kHz.

Step	Adjustment item	Test point	Instrument (signal)	Adjustment location	Adjustment method	Rating or standard	Remarks
0				By shorting across the terminals TP(K4) and TP(T6) in FM mode, AM 1,080kHz, FM 92.6 MHz and FM 98.0MHz are automatically stored into preset memories 8 to 10 respectively.			
1	Sensitivity confirmation	AM ANT OUTPUT L or R	AM SG 630kHz ± 0.1 kHz 1440kHz ± 0.1 kHz 1080kHz ± 0.1 kHz (400Hz 30% modulation) OSC, DISTM		Confirm sensitivity by checking to see if tuning is made at the standard values.	58dB μ or lower 58dB μ or lower 58dB μ or lower	When sensitivity is improper, adjust as described in steps (1) to (5).
2	Full-scale signal level indicator adjustment	AM ANT	AM SG (1080kHz ± 0.1 kHz) 90dB μ 400Hz 30% modulation	VR204	Adjust so that all signal indicators light up when tuned.		When VR210 has been turned after adjustment, re-adjust VR204.
3	Auto research reception confirmation	AM ANT	AM SG (1080kHz ± 0.1 kHz) 60dB μ 400Hz 30% modulation	TUNING button UP, DOWN	Make sure that auto search reception can be made with the TUNING button for both UP and DOWN operations.		TUNING MODE SW $\rightarrow$ AUTO

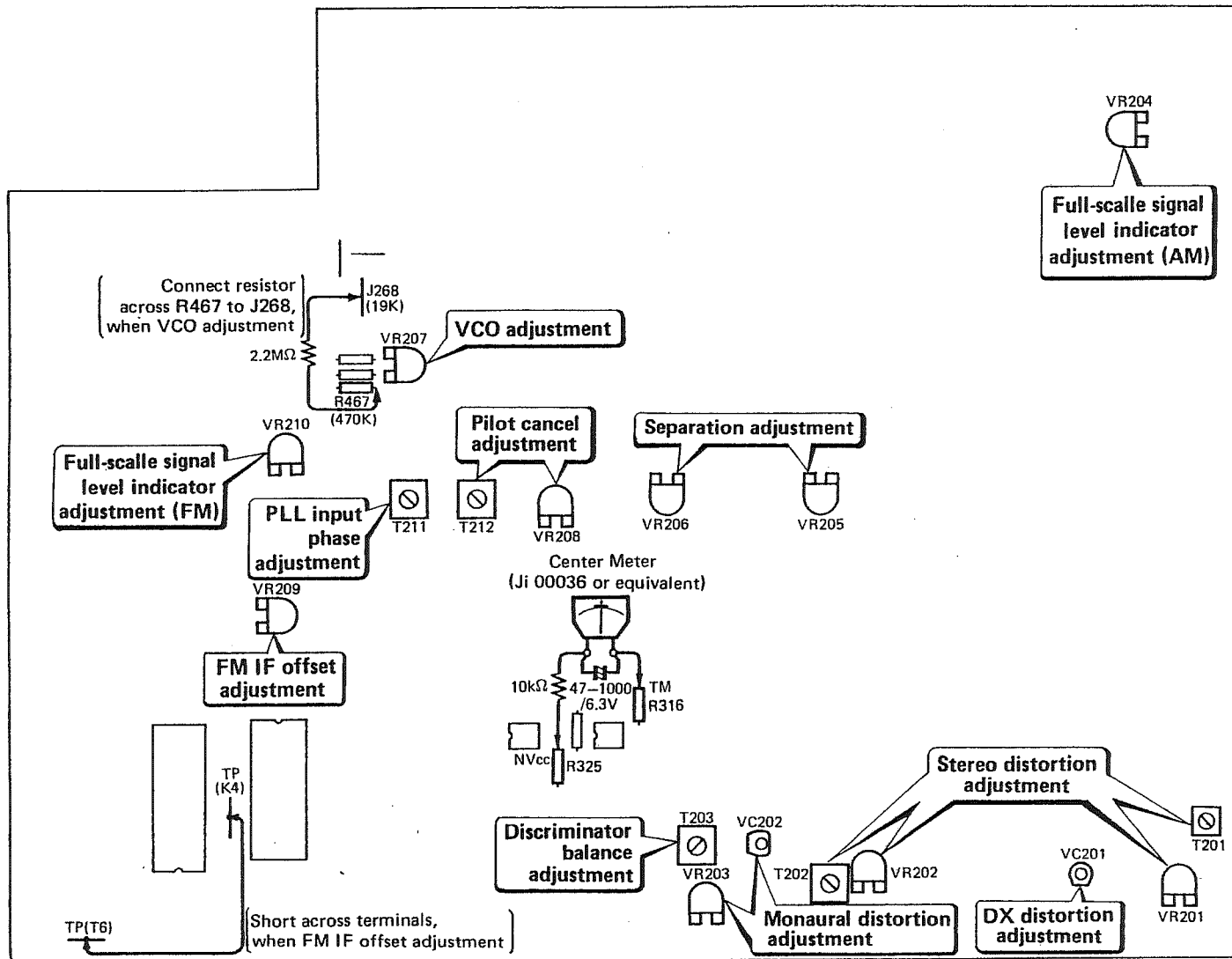
< Digital Control Section >

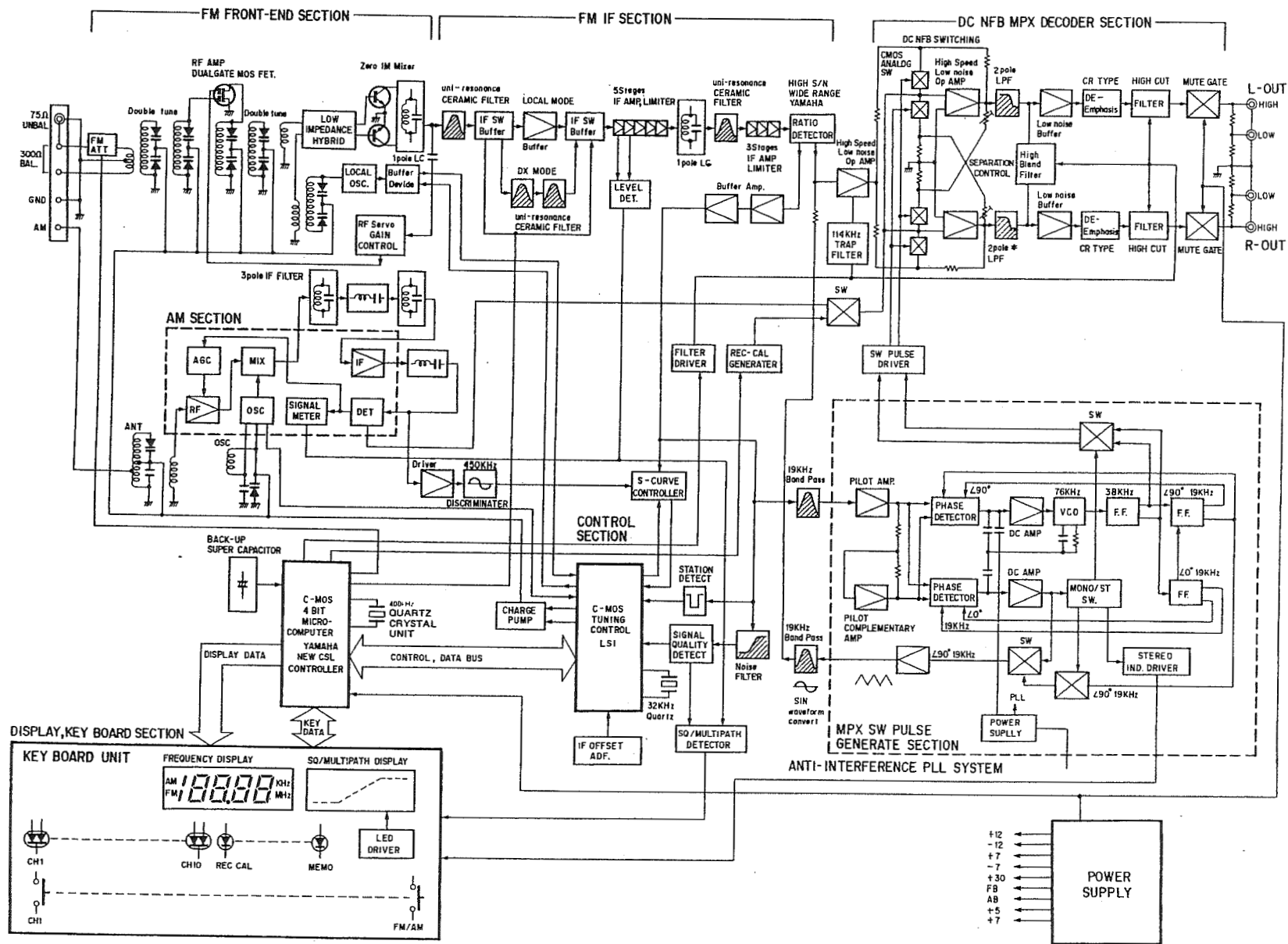
Step	Adjustment item	Test point	Instrument (signal)	Adjustment location	Adjustment method	Rating or standard	Remarks
1	Preset memory confirmation	300 Ω FM ANT AM ANT	FM SG (98MHz ± 1 kHz) 70dB μ AM SG (1080kHz ± 0.1 kHz) 400Hz 30% modulation	FM, AM SW TUNING MODE SW $\rightarrow$ AUTO UP, DOWN SW CH SW	1. Receive FM98MHz and store into CH1. 2. Receive AM1080kHz and store into CH2. 3. Press CH1 and CH2 switches and confirm that 98MHz and 1080kHz are displayed, respectively.	1. After tuning, press the MEMORY button, and while the MEMORY indicator is on, press the PRESET button P1. The MEMORY indicator goes off, and when the indicator above the PRESET button P1 lights up, the FM frequency is stored. 2. In the same way, store the AM frequency.	
2	TUNING mode manual/mono operation confirmation			FM AM SW TUNING MODE SW UP, DOWN SW	1. Move the TUNING MODE switch to MAN'L/MONO position. 2. Confirm that manual search reception can be made with the TUNING button for UP and DOWN operations. Also confirm that when FM is received, forced monaural is selected.	The TUNING MODE LED turns off. The FM STEREO LED turns off.	

Step	Adjustment item	Test point	Instrument (signal)	Adjustment location	Adjustment method	Rating or standard	Remarks
3	Fine tuning operation confirmation			FINE, TUNING +, -SW	1. Display the frequencies in P1 and P2. 2. Press either of the FINE TUNING "+" or "-" switch. 3. Then, press the FINE TUNING "+" or "-" switch again.		The FINE TUNING LED turns on. At this time, "D" is displayed at the 10kHz area of frequency indicator. (When FM is received). Confirm that search is made with 10kHz steps on P1 (in case of FM) and with 1kHz steps on P2 (in case of AM).
4	RM mode operation confirmation			FUNCTION FM RX MODE SW	Press the RX MODE switch.		This switch function only when FM is received. Make sure that each time the switch is pressed, the following 3 states are switched and each LED lights up. (AUTO DX → Forced DX → Forced LOCAL →)
5	REC CAL operation confirmation			REC CAL SW	Press the REC CAL switch.		* Oscillating output 333Hz $\pm$ 66Hz 0.5V $\pm$ 3dB * The REC CAL LED should flicker.
6	Last channel memory operation confirmation			POWER SW POWER ON MODE SW → LAST STATION	1. Display the frequencies in P2. 2. Turn off the POWER switch. 3. After 5 or more seconds have passed, turn on the POWER switch.		In the aforementioned state, the frequency in P2 is displayed and the P2 LED turns on.
7	Initial station set function confirmation			POWER SW MEMORY SW	1. POWER switch. 2. Move the POWER ON MODE switch to INITIAL STATION position. 3. After 5 or more seconds have passed, turn on the POWER switch		→ When the POWER switch is turned on, the frequency in P1 is displayed without respect to the frequency which is displayed before the POWER switch is turned off. Therefore, before turning off the POWER switch, display a frequency which has been set in other than P1. At this time, confirm that the frequency in P1 is displayed and also the P1 LED turns on.

TEST POINTS

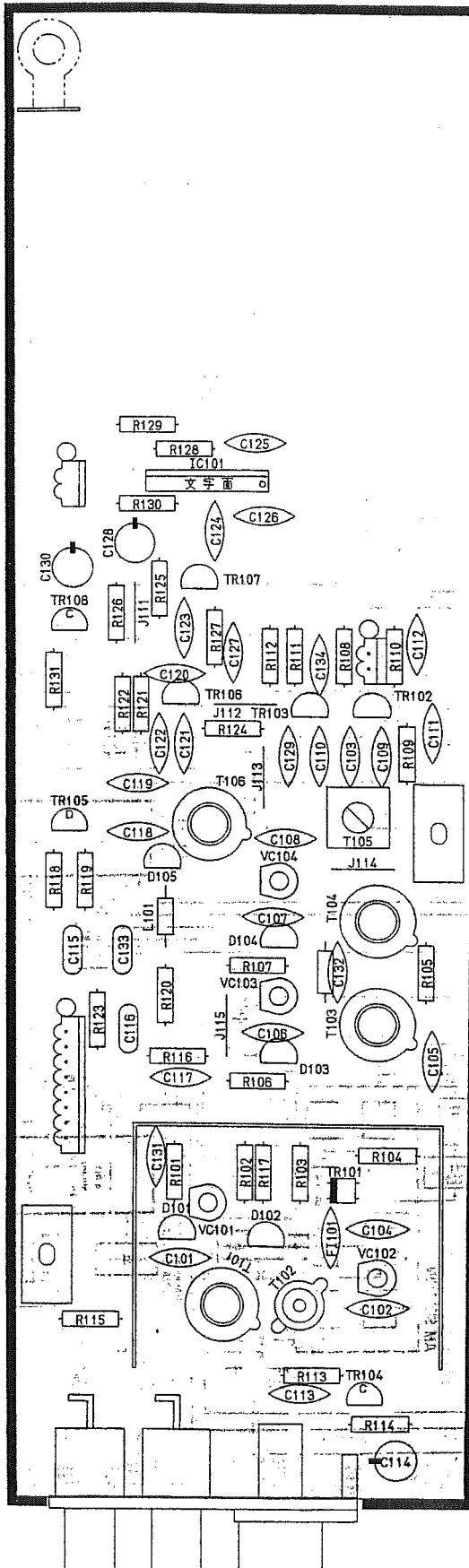
TUNER CIRCUIT BOARD





PRINTED CIRCUIT BOARD (Pattern Side)

FRONT END CIRCUIT BOARD



•

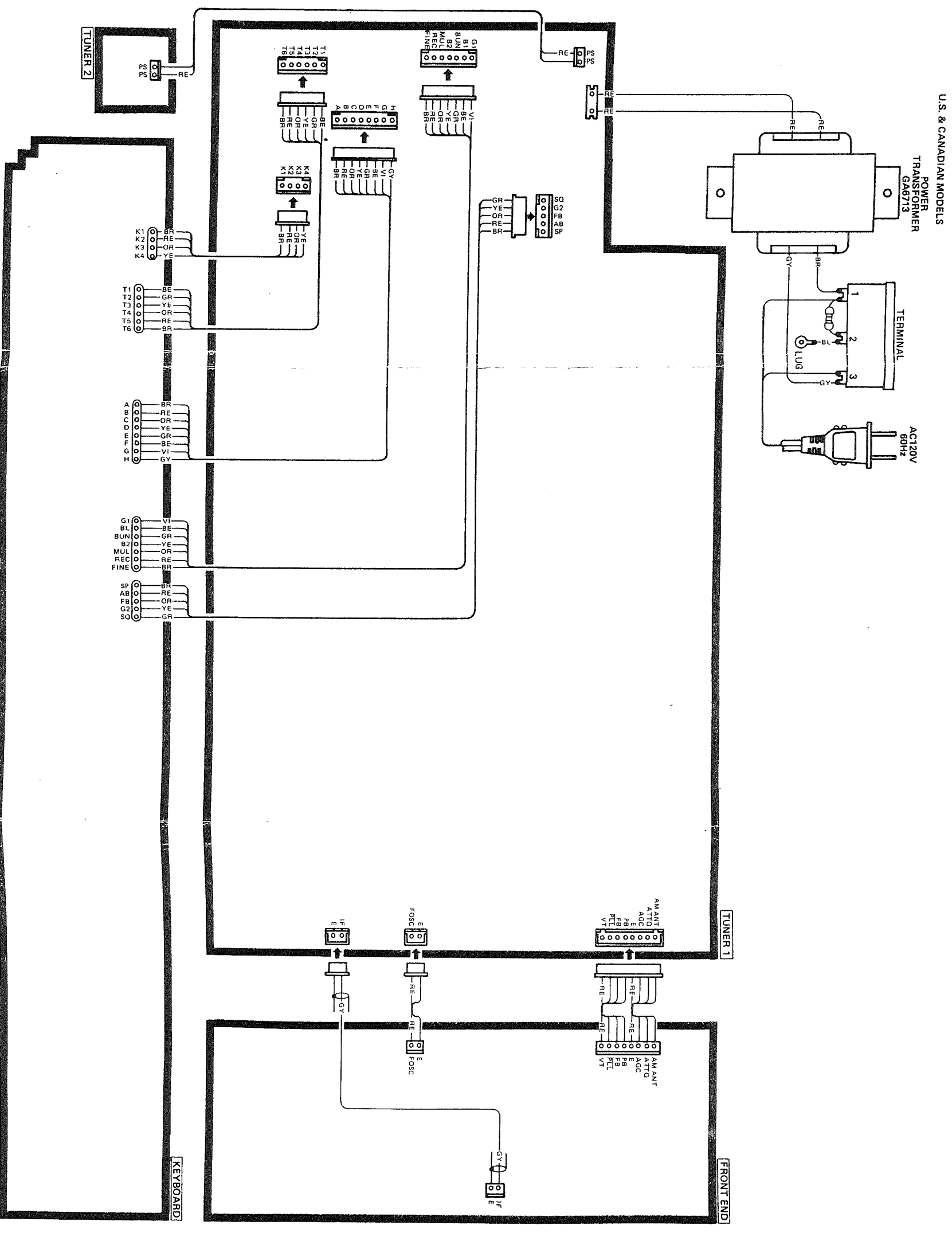
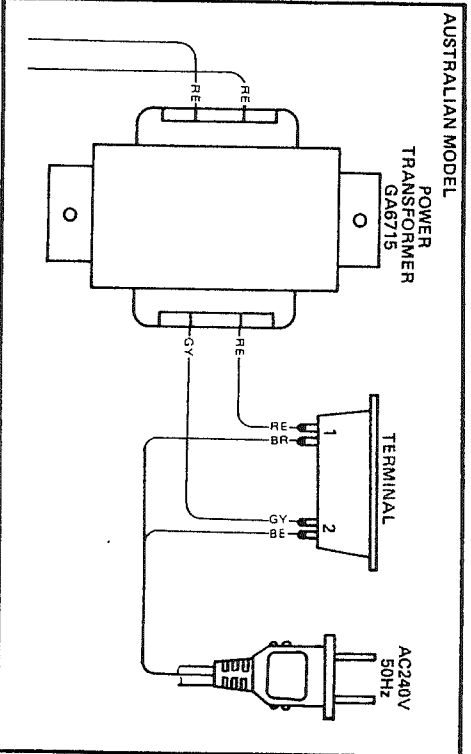
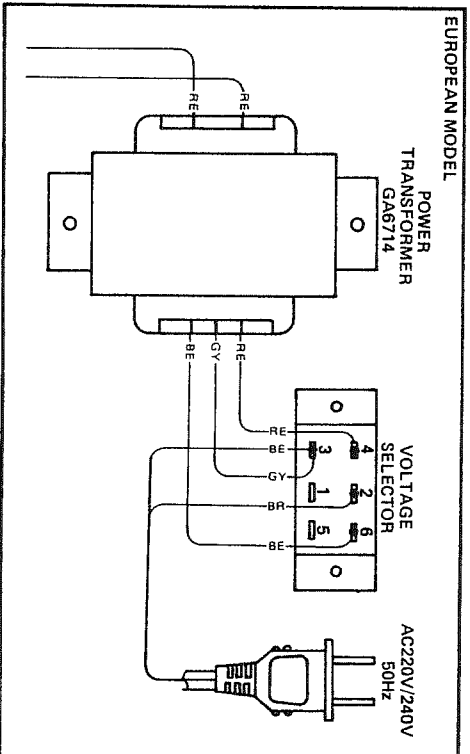
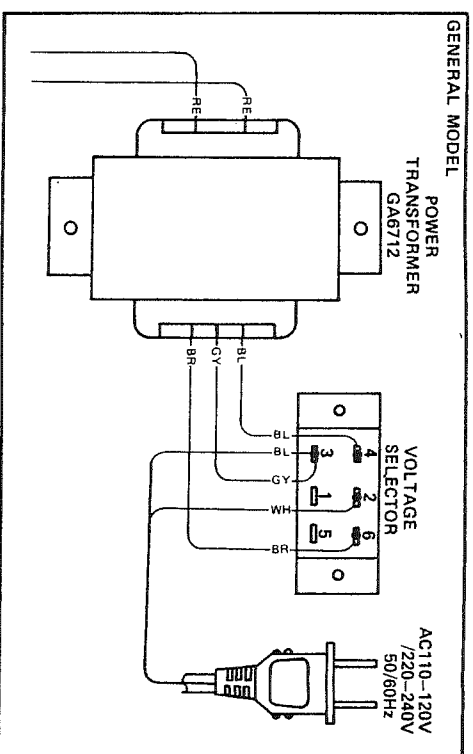
TUNER CIRCUIT BOARD

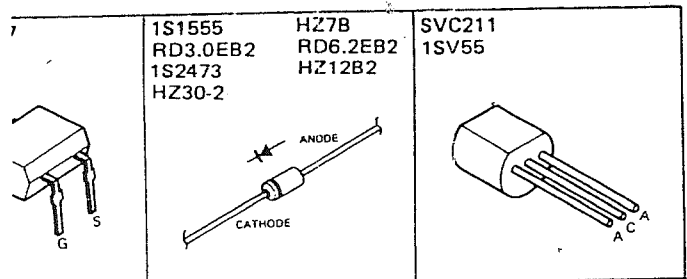


TUNER 2

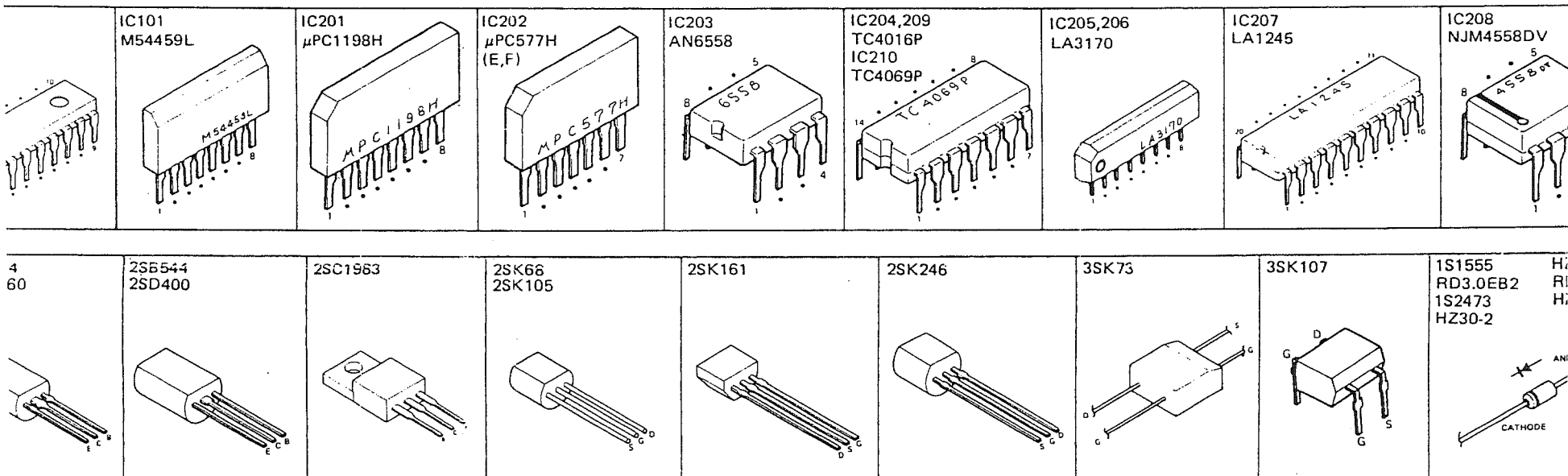
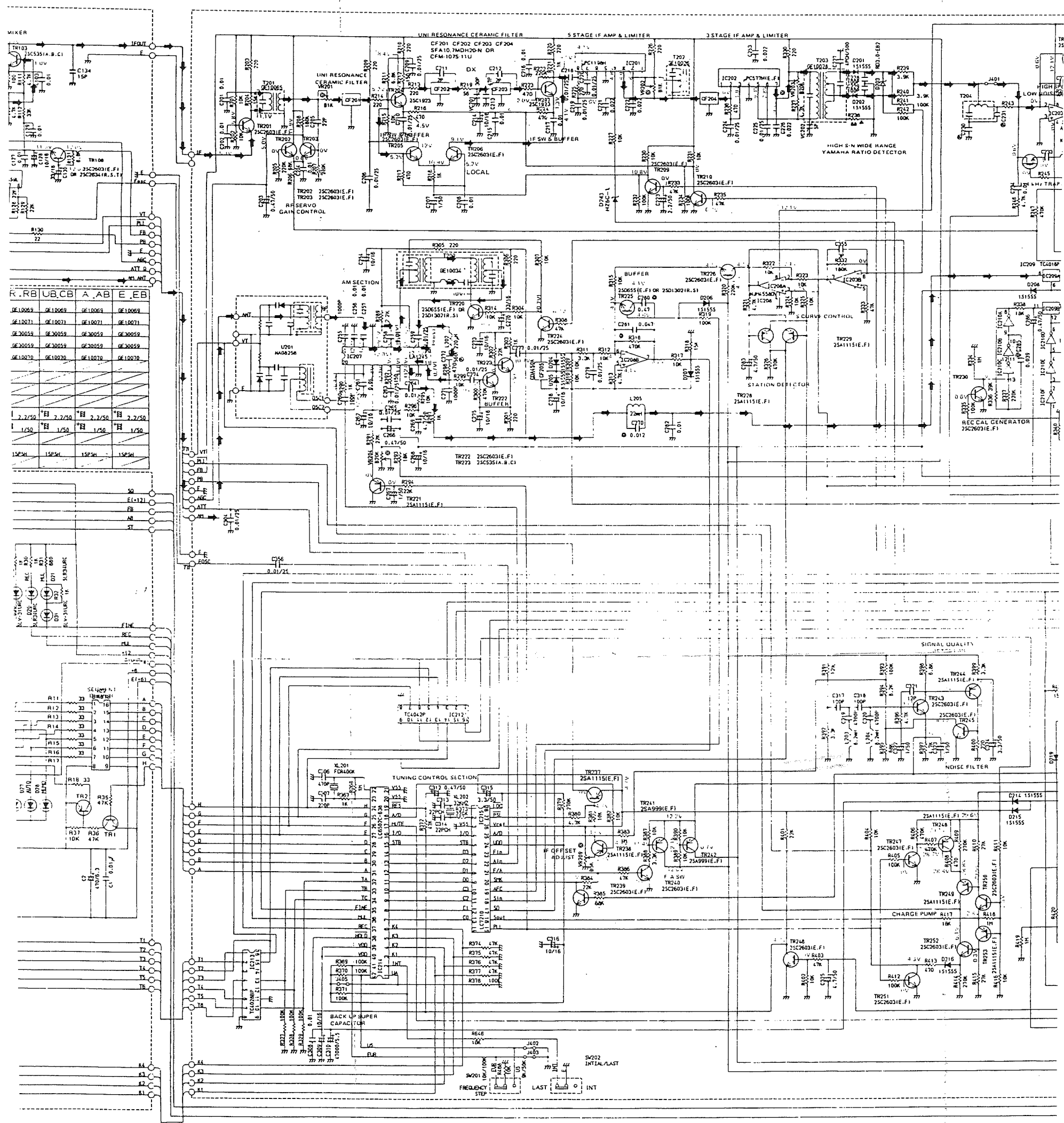


■ WIRING DIAGRAM





C D E F G H



A

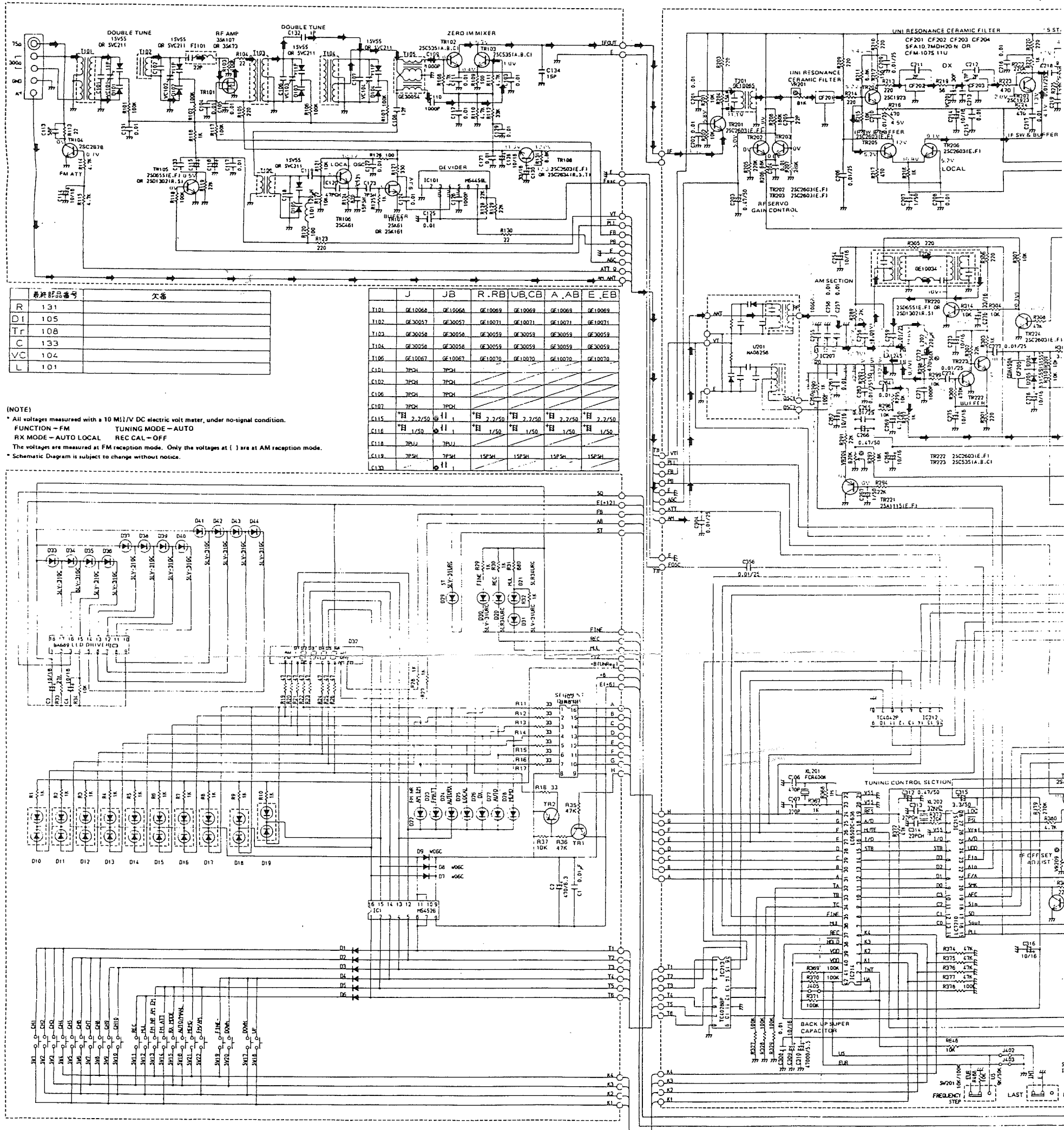
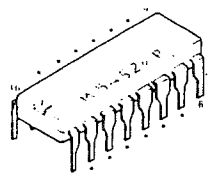
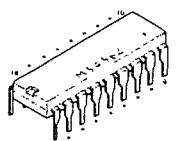
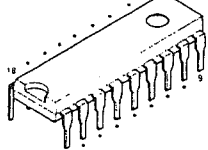
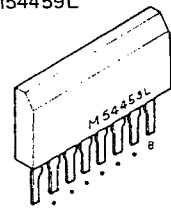
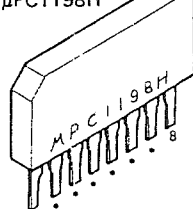
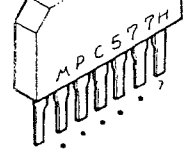
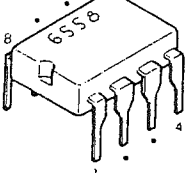
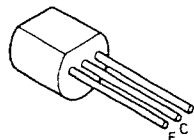
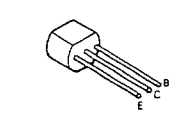
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C

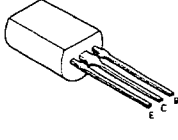
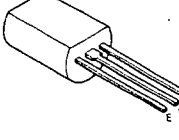
D

E

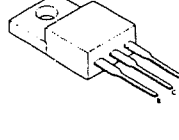
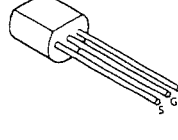
SCHEMATIC DIAGRAM

IC1
M54526IC2
M54562IC3
BA689IC101
M54459LIC201
μPC1198HIC202
μPC577H
(E,F)IC203
AN65582SA999
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2SC461
2SC19232SC2603
2SC2634
2SC2878
2SD655
2SD1302

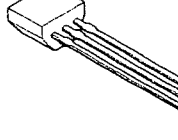
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2SC20602S6544
2SD400

2SC1953

2SK66
2SK105

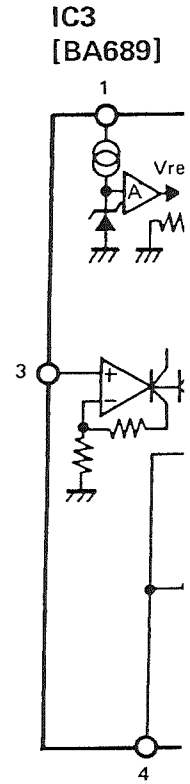
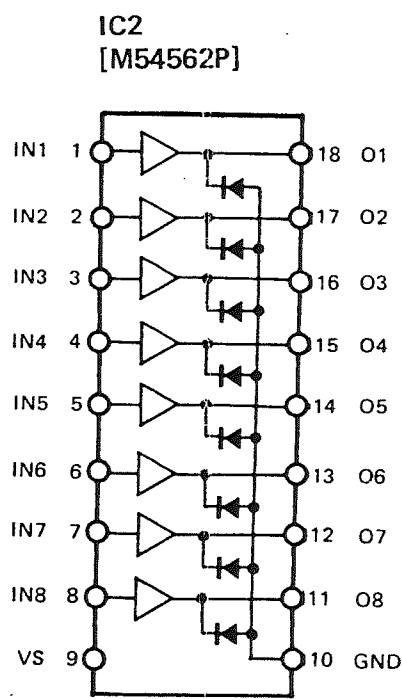
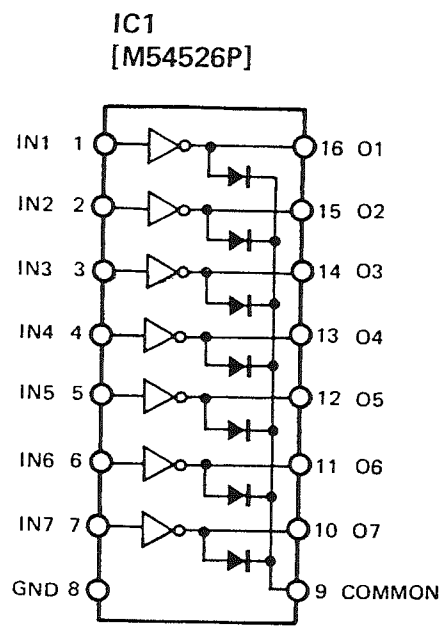
2SK161



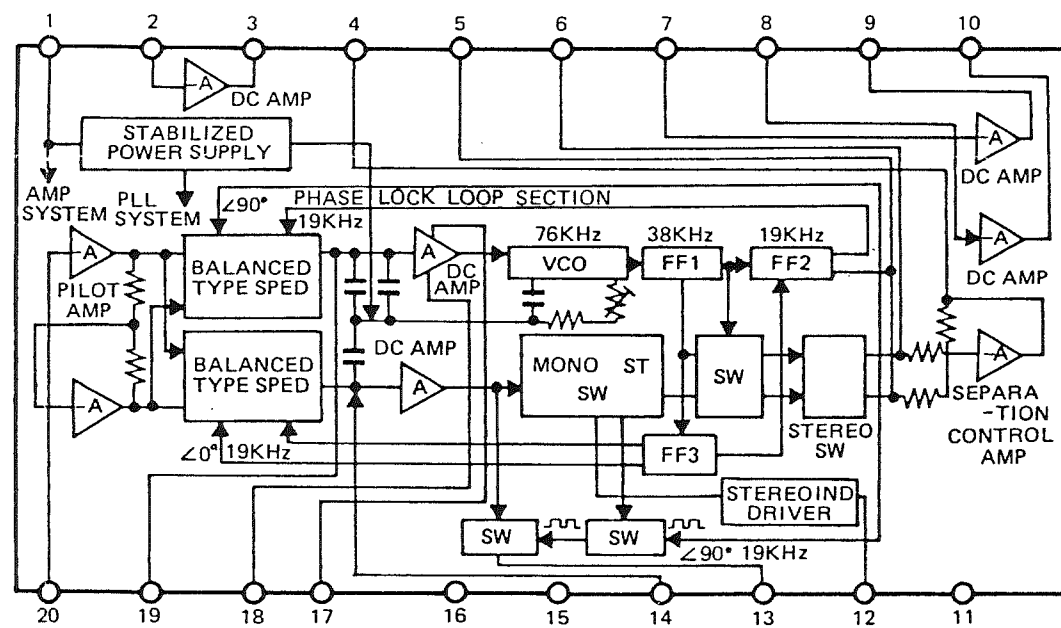
7

8

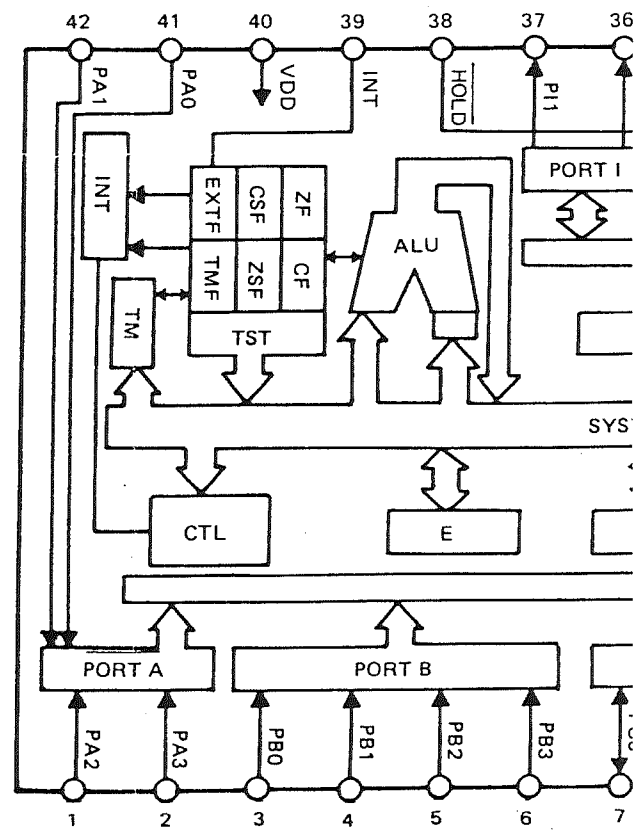
IC BLOCK DIAGRAM

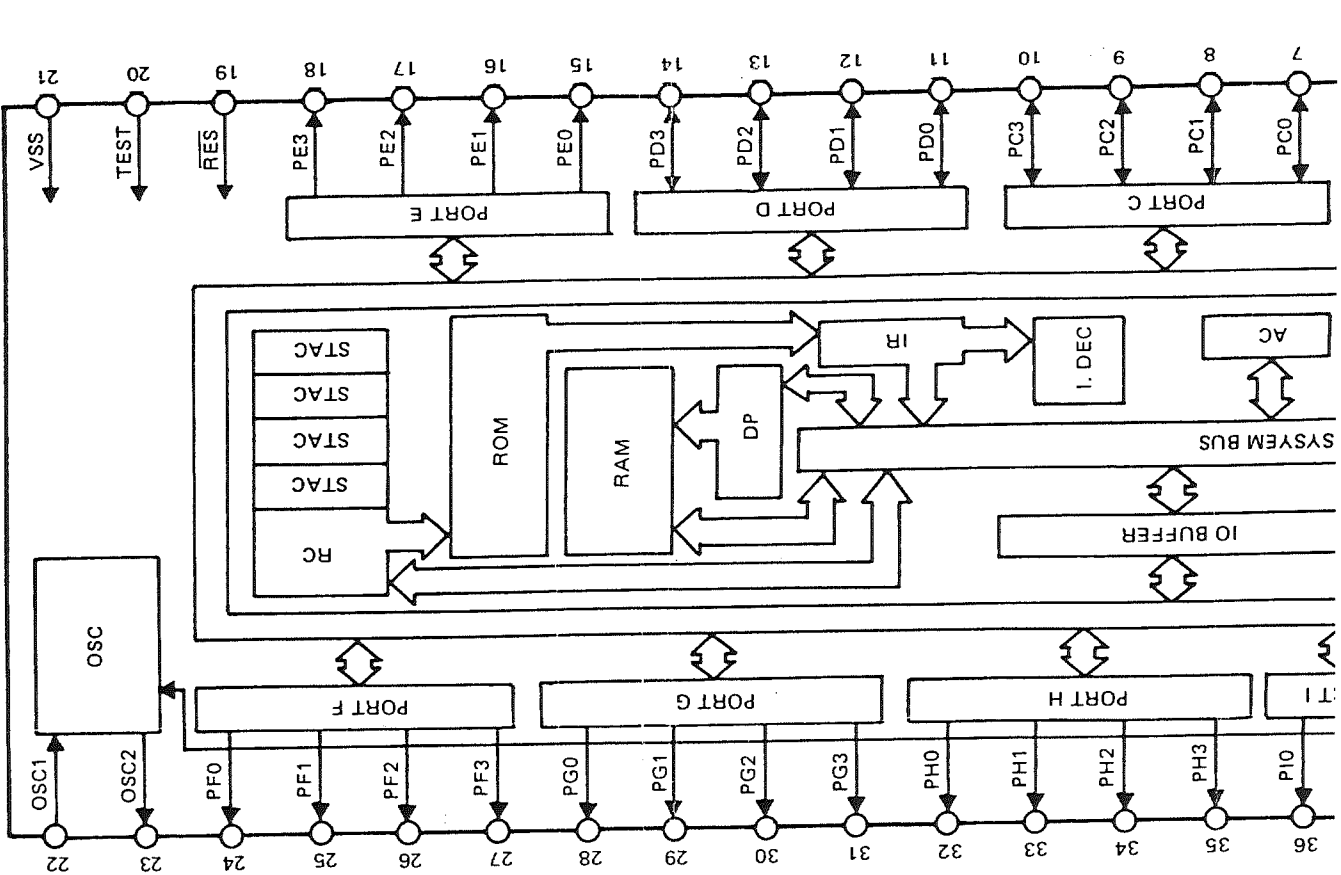


IC211
[LA3380]

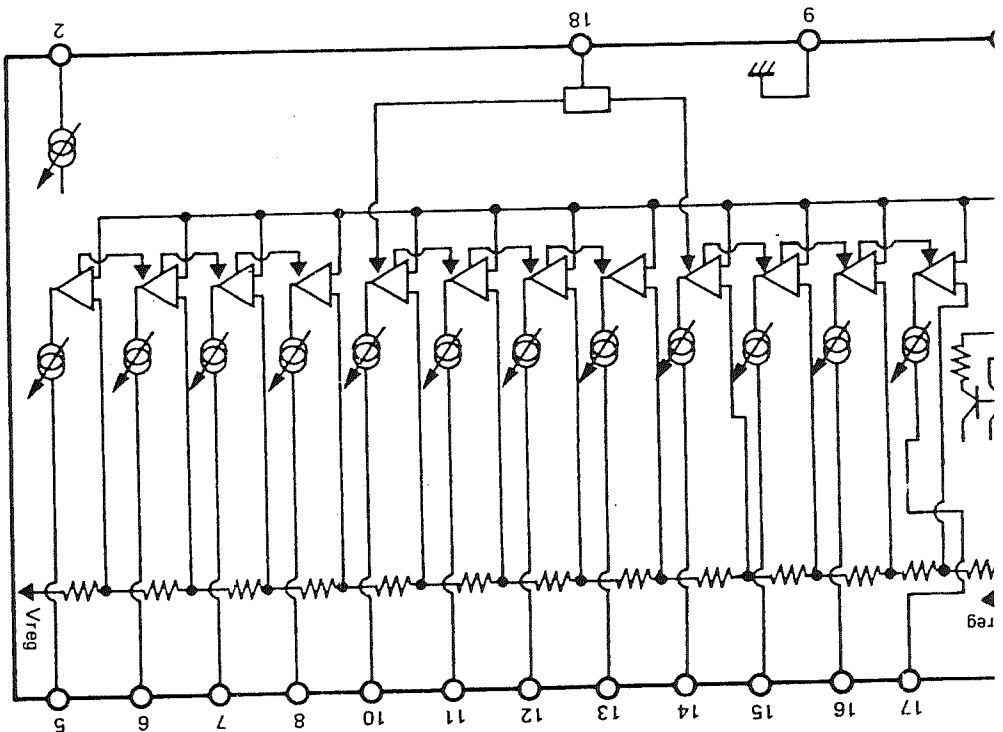
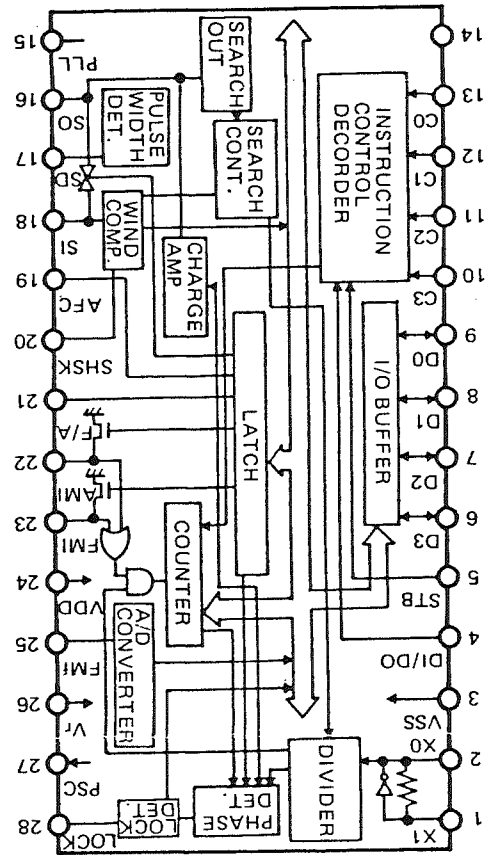


IC214
[LC6502C-638]

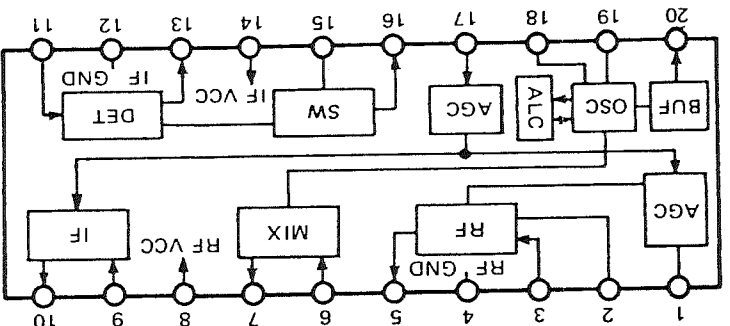




IC215 [LC7210]



IC207 [LA1245]



IC101 [M54459L]

A

B

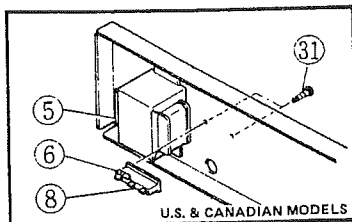
C

D

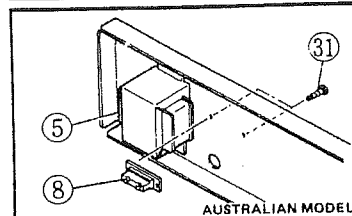
1-80

EXPLODED VIEW

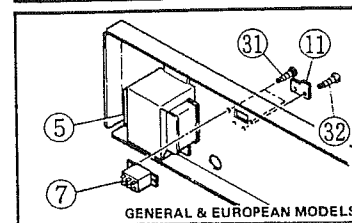
1



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