

# Service Manual

QUARTZ Synthesizer FM/AM Stereo Receiver

Receiver

## SA-350



### Color

(K)... Black Type  
(S)... Silver Type

Color	Area
(K) (S)	[EX]... Switzerland and Scandinavia.
(K) (S)	[EH]... Holland.
(S)	[XL]... Australia.
(S)	[XA]... Asia, Latin America, Africa, Middle Near East and Oceania.

## SPECIFICATION (DIN 45 500)

### ■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output both channels driven	2 × 45W (4Ω) 2 × 37W (8Ω)
1 kHz continuous power output both channels driven	2 × 55W (4Ω) 2 × 47W (8Ω)
Total harmonic distortion rated power at 20 Hz~20 kHz	0.02% (4Ω) 0.007% (8Ω)
rated power at 1 kHz	0.001% (8Ω)
Intermodulation distortion rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.02%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.01%
Power bandwidth both channels driven, -3 dB	5 Hz~40 kHz (4Ω)
Damping factor	20 (4Ω), 40 (8Ω)
Input sensitivity and impedance	
PHONO	2.5 mV/47kΩ
CD/AUX 1, VIDEO/AUX 2, TAPE/EXT	150 mV/22kΩ
PHONO maximum input voltage (1 kHz, RMS)	160 mV
S/N	
rated power (4Ω)	
PHONO	72 dB (IHF, A: 80 dB)
CD/AUX 1, VIDEO/AUX 2, TAPE/EXT	88 dB (IHF, A: 95 dB)
Frequency response	
PHONO	RIAA standard curve ±0.8 dB (30 Hz~15 kHz)
CD/AUX 1, VIDEO/AUX 2, TAPE/EXT	5 Hz~70 kHz (-3 dB)
Tone controls	
BASS	50 Hz, +10 dB~-10 dB
TREBLE	20 kHz, +10 dB~-10 dB
Loudness control (volume at -30 dB)	50 Hz, +9 dB
Output voltage	
TAPE, REC OUT	150 mV
Channel balance, 250 Hz~6,300 Hz	±1 dB
Channel separation	55 dB

Headphones output level and impedance	440 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω

### ■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz 87.525~108.025 MHz (+25 kHz shift)
Sensitivity	
S/N 30 dB	1.9 μV (300Ω), 1.3 μV (75Ω)
S/N 26 dB	1.7 μV (300Ω), 1.2 μV (75Ω)
S/N 20 dB	1.5 μV (300Ω), 0.9 μV (75Ω)
IHF usable sensitivity	1.9 μV (IHF '58)
IHF 46 dB stereo quieting sensitivity	22 μV/75Ω
Total harmonic distortion	
MONO	0.15%
STEREO	0.3%
S/N	
MONO	60 dB (77 dB, IHF)
STEREO	58 dB (71 dB, IHF)
Frequency response	20 Hz~15 kHz, +1 dB~-2 dB
Alternate channel selectivity ±400 kHz	70 dB
Capture ratio	1 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	80 dB
Spurious response rejection at 98 MHz	82 dB
AM suppression	50 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.5 dB
Limiting point	1.2 μV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	300Ω (balanced) 75Ω (unbalanced)

# Technics

Matsushita Electric Trading Co., Ltd.  
P.O. Box 288, Central Osaka Japan

## ■ AM TUNER SECTION

Frequency range	522~1629 kHz (9 kHz step)
Sensitivity (S/N 20 dB)	20 $\mu$ V, 300 $\mu$ V/m
Selectivity	55 dB
Image rejection at 999 kHz	40 dB
IF rejection at 999 kHz	60 dB

## ■ GENERAL

Power consumption	330W
Power supply	
For Australia	AC 50 Hz/60 Hz, 240V
For continental Europe	AC 50 Hz/60 Hz, 220V
For others	AC 50 Hz/60 Hz, 110V/120V/220V/240V

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Dimensions (W×H×D)	430 × 97 × 283 mm (16-15/16" × 3-13/16" × 11-5/32")
Weight	6.6 kg (14.6 lb.)

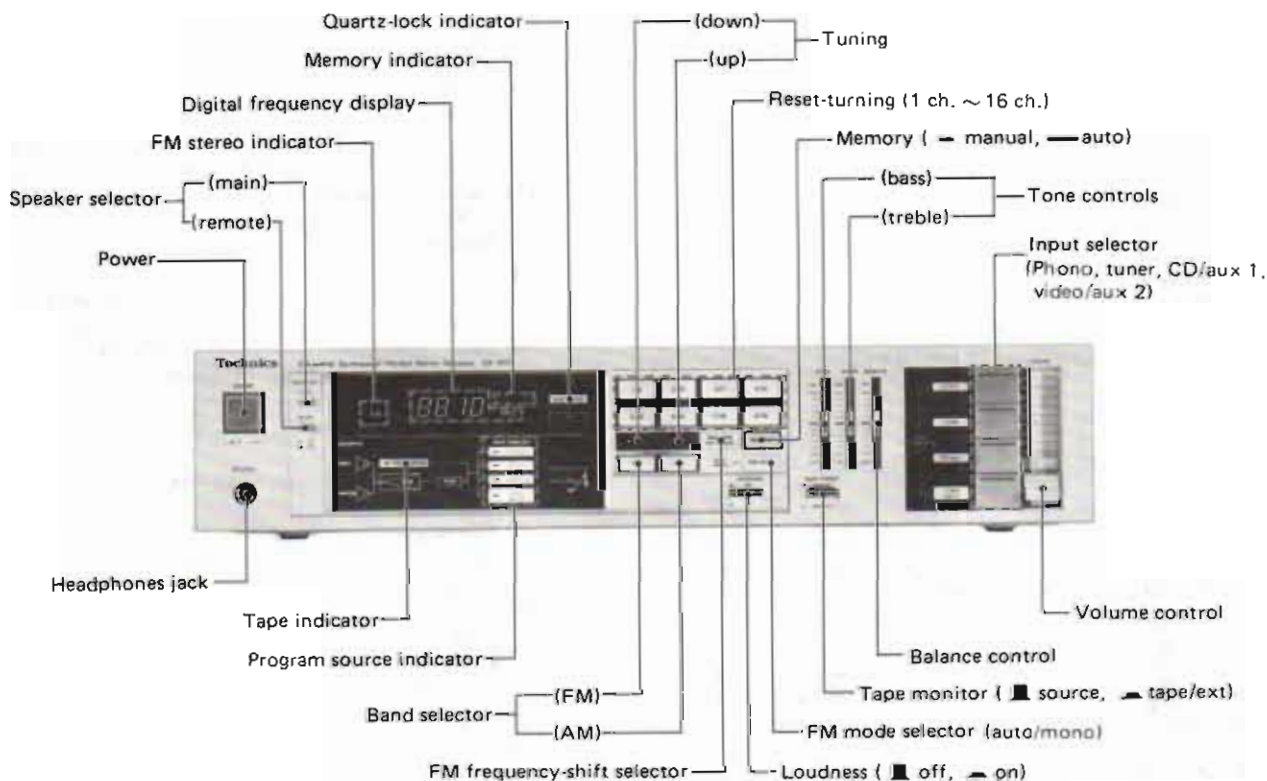
### Note:

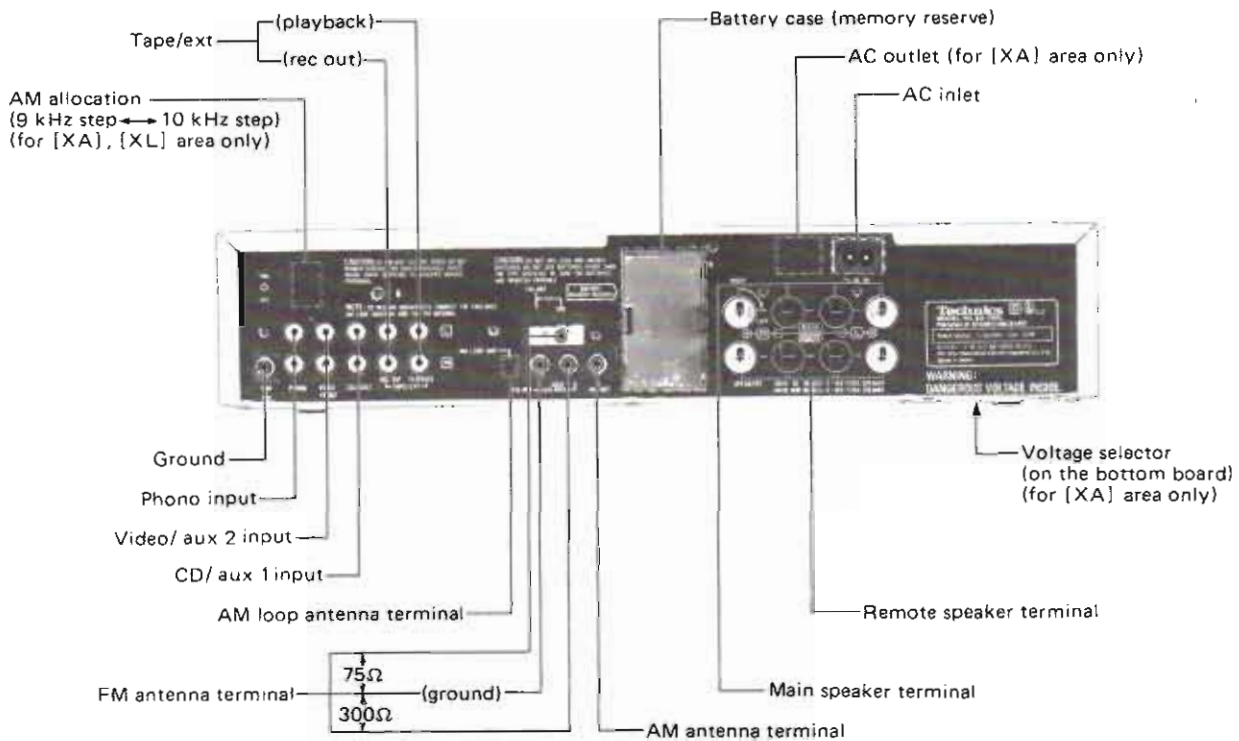
Total harmonic distortion is measured by the digital spectrum analyzer (H.P. 3045 system).

Specifications are subject to change without notice for further improvement.

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## ■ LOCATION OF CONTROLS





- The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different. So, refer to the circuit diagram and the replacement parts list.
  - ★ 220V (50/60 Hz) for Continental Europe.
  - ★ 240V (50/60 Hz) for Australia ([XL] area).
  - ★ 110V/120V/220V/240V (50/60 Hz) for [XA] area (For [XA] area is provided with voltage selector)
  - ★ [XA] and [XL] areas are provided with AM allocation switch.
- Phono input capacitance is about 150pF.

## ■ PROTECTION CIRCUITRY

The protection circuitry may have operated if either of the following conditions is noticed:

- No sound is heard when the power is turned on.
- Sound stops during performance.

The function of this circuitry is to prevent circuitry damage if, for example, the positive and negative speaker connection wires are "shorted", or if speaker systems with an impedance less than the indicated rated impedance of the amplifier are used.

If this occurs, follow the procedure outlined below:

1. Turn off the power.
2. Determine the cause of the problem and correct it.
3. Turn on the power once again.

### **Note:**

When the protection circuitry functions the unit will not operate unless the power is first turned off and then on again.

## HOW TO PRESET RADIO BROADCAST FREQUENCIES

This unit is used to preset as many as 16 radio broadcast frequencies: FM/AM random presetting. After broadcast frequencies have been preset as described below, any desired station can be quickly and easily selected by simply touching one button.

### • Memory presetting

There are two types of memory presetting: automatic and manual. Select whichever is preferred.

#### 1. Automatic presetting:

Beginning at the frequency indicated by the digital display, the next consecutive FM broadcasting stations and AM broadcasting stations will be automatically preset to "channels" 1 through 8 for FM and 9 through 16 for AM, respectively.

### • Automatic memory presetting

Note that in mountainous or remote areas, broadcasting stations which have weak broadcasting signals cannot be automatically preset into the memory.

#### 2. Manual presetting:

Stations can be freely preset to any desired channel.

#### ■ Before memory presetting

Each button is used to preset two stations.

Presetting front channels (CH 1~8)



Press momentarily.

Presetting back channels (CH 9~16)



Press slightly longer.

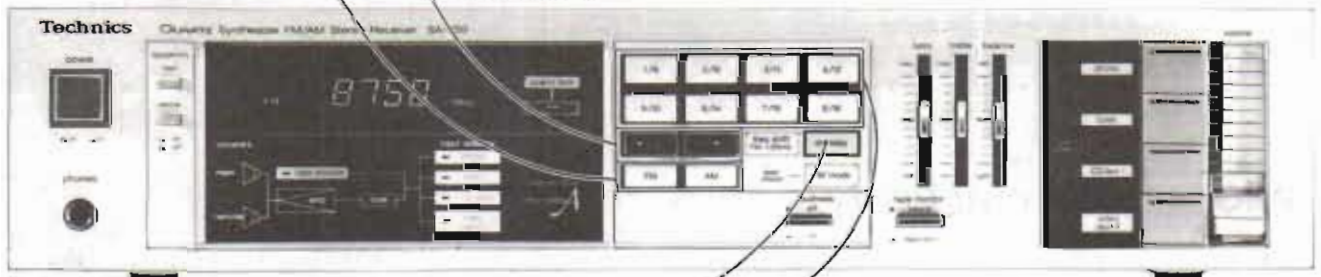
- 1 • To preset an FM station: press the "FM" button.  
• To preset an AM station: press the "AM" button.
  - 2 • To preset FM broadcasting stations: Set to 87.50 MHz.  
• To preset AM broadcasting stations: Set to 522 kHz.
- ① Press the button and hold slightly (frequency will change continuously).
  - ② Release it at 87.50 MHz for FM or 522 kHz for AM, and then press the button again momentarily (frequency change will stop).
  - ③ Press the button momentarily (frequency will change each time the button is pressed), and tune to one of the above frequencies.



(frequency will change continuously).



(frequency change will stop).



- 3 Press. When the frequency indication begins to change, release.



(The frequency will change upward, and the automatic presetting will begin with the broadcasting station of the lowest frequency and will continue in order.)

- 4 Confirm the names (call signs, etc.) of the broadcasting stations which are preset to each channel, and enter them on the file sheet

To check the front channels (CH 1~8):

Press momentarily.	Channel number is displayed.	Frequency stored in the memory is displayed.
--------------------	------------------------------	--



To check the back channels (CH 9~16):

Press slightly longer.	Release the button when the channel number is displayed.	Frequency stored in the memory is displayed.
------------------------	--	--



#### Notes:

1. In areas where there are less than 8 FM stations, the remaining channels (through channel 8) will be left empty. The empty channels can be filled by using manual memory presetting.
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

Manual memory presetting

**1 To preset an FM station: press the "FM" button.  
To preset an AM station: press the "AM" button.**

**2 Press the appropriate tuning button to tune to the desired broadcast.**

- **Auto tuning**  
Press the button. When the frequency indication begins to change, release the button (a broadcasting station will be selected automatically). Repeat this operation until the desired station is found.
- **Manual tuning**  
Press the button momentarily and tune to the desired station (the frequency will change each time the button is pressed).

**3 Press momentarily, and then release.**

(The memory indicator will illuminate for approximately 5 seconds.)

**Note:**  
If the button is pressed continuously, the frequency will begin to change, and the memory will be preset automatically. To stop the automatic memory presetting, once again press either the "up" button or the "down" button.

**4 While the memory indicator is illuminated, press the button of the desired channel.**

- **To preset channels 1 through 8:**  
Press the button momentarily, and then release.
- **To preset channels 9 through 16:**  
Press the button slightly longer, and then release.

**Note:**

1. If the memory indication illumination stops before you press the button, once again repeat step (3) and then step (4).
2. If a new broadcasting station is preset into a channel, the broadcasting station which was previously entered in that channel will be automatically erased.

**5 Enter the name (call sign, etc.) of the preset broadcasting station on the file sheet.**

This completes the procedures for presetting radio broadcast frequencies. The other preset-tuning buttons can be preset in the same way by following steps (1) through (4).

BEFORE REPAIR AND ADJUSTMENT

1. Disconnect AC power, Discharge both Power Supply Capacitors C703 and C704 (8200μF) through a 10Ω, 5W resistor to ground.  
DO NOT SHORT-CIRCUIT DIRECTLY (with a screwdriver blade, for instance), as this may destroy solid state devices.
2. After repairs are completed, restore power gradually using a variac, to avoid overcurrent.  
Current consumption at 50/60Hz in NO SIGNAL mode should be shown below with respect to supply voltage 110/120V/ 220V/240V.

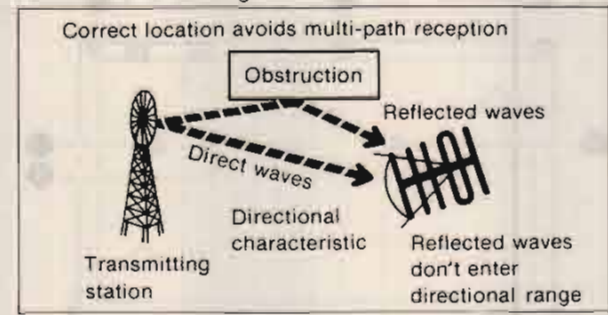
Power supply voltage		AC 110V	AC 120V	AC 220V	AC 240V
Consumed current	50 Hz	170 ~ 510mA	150 ~ 450mA	90 ~ 260mA	80 ~ 250mA
	60 Hz	160 ~ 500mA	140 ~ 440mA	80 ~ 250mA	70 ~ 240mA

FM ANTENNA

For best reception of FM broadcasts, select an FM antenna with the best characteristics for the area in which the unit is used.

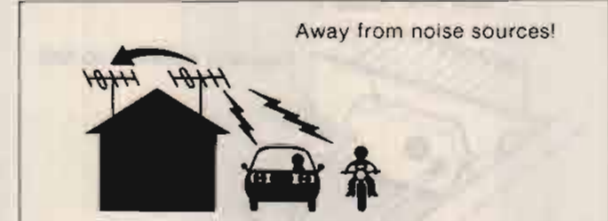
Location of antenna

- Install the antenna:
1. Where it will receive FM broadcast signals directly; not in the "shadow" of a building.

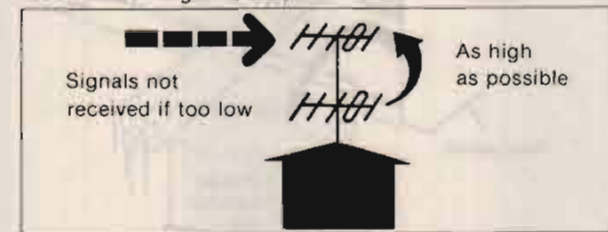


**Note:**  
Multi-path distortion is the distortion which results from the reception of two types of signals: those reflected from nearby buildings, mountains, etc., and those received directly from the broadcasting station.

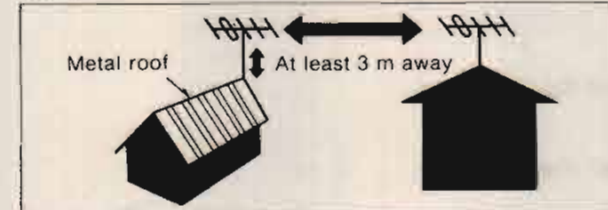
2. Away from busy roads, and away from neon signs.



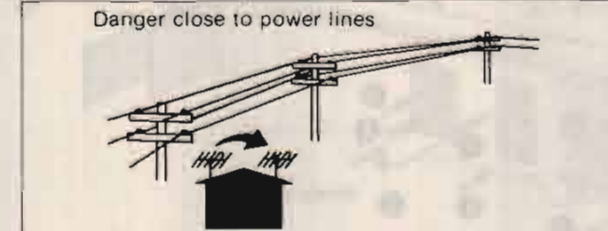
3. At least 4 meters (13 feet) above the ground (except in mountainous regions, etc.)



4. At least 3 meters (10 feet) away from a metal roof or other antennas.



5. To avoid danger, away from electric power lines.



**Note:**  
An outdoor antenna should be installed by a competent technician only.

AM ANTENNA

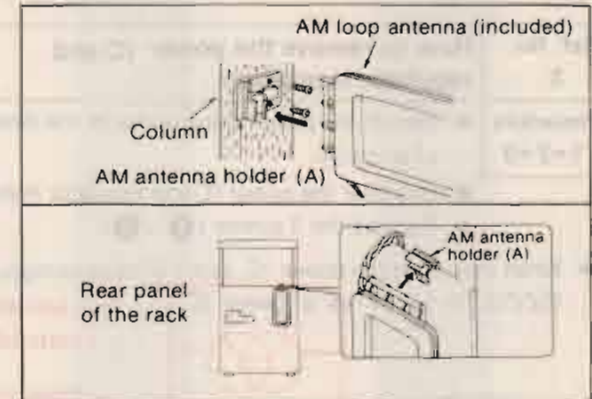
This unit includes an AM loop antenna. No outdoor antenna is necessary unless the broadcast signals in your area are especially weak. (Connect the loop antenna even if an outdoor antenna is used; if it is not connected, AM reception will not be possible.)

How to use the AM loop antenna

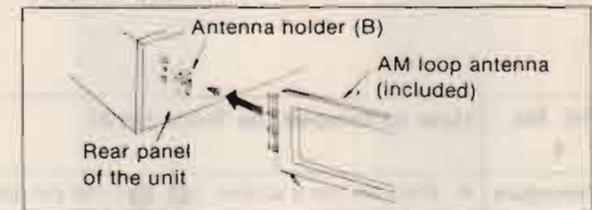
Pay attention to the following points when attaching the antenna.

- 1) Do not attach it horizontally (to do so would impair reception).
- 2) Do not attach it close to metal surfaces (to do so would result in noise).
- 3) Do not attach it close to power cords, speaker wires, etc. (to do so would result in noise).
- 4) Do not attach it close to a tape deck (when the tape deck is being used, chirping or beeping sounds may be received).

1. Connect the AM loop antenna to the AM antenna terminals located on the rear panel of the unit.
2. Find the height and direction of the antenna where reception is best and then fix it vertically to the wall, rack, etc.
  - 1) When attaching the antenna to a wall, column or rack.



- 2) When attaching the antenna to the unit.  
This type of installation may cause impaired reception or result in signal noise. If possible, attach the antenna to the rack, a wall, or a column.



3. Move the antenna toward the right or left to find the point of best reception.



Connection of an outdoor antenna

If an outside AM antenna is installed (in mountainous regions or between reinforced-concrete buildings), install it in a location away from utility poles, high-voltage power lines, high buildings and busy roads.

**Note:**  
An outdoor antenna should be installed by a competent technician only.

DISASSEMBLY INSTRUCTIONS

Ref. No. 1	How to remove the cabinet	Ref. No. 2	How to remove the bottom board
Procedure 1	<ul style="list-style-type: none"> <li>Remove the 5 screws (1 ~ 5).</li> </ul>	Procedure 2	<ul style="list-style-type: none"> <li>Remove the 9 screws (6 ~ 14).</li> </ul>
Ref. No. 3	How to remove the power IC and regulator transistor		
Procedure 1→2→3	<ul style="list-style-type: none"> <li>Detach the power transformer in the direction of arrow (A).</li> <li>Unsolder the power IC and regulator transistor.</li> <li>Remove the 3 screws (1 ~ 3).</li> </ul> <p>When mounting the power IC, apply silicone compound (SZZ0L15) to the rear of power IC.</p>		
Ref. No. 4	How to remove the front panel		
Procedure 1→2→4	<ul style="list-style-type: none"> <li>Remove the 2 screws (1, 2) and pin socket (J3) of the front panel.</li> <li>Remove the 7 rivets (3 ~ 9) of the front panel.</li> </ul> <p><b>Note:</b> When remove the shield plate, remove the 1 screw 10 and rivet (A). When remove the rivet (A), cut it by nippers. Rivet (A) is unnecessary to fix again.</p>		

MEASUREMENTS AND ADJUSTMENTS

Note: AM OSC coil (L202) and AM IFT (T203) have been already adjusted, and require no adjustment.

AM ADJUSTMENT

**\* Setting and Equipment used**

- AC electronic voltmeters (EVM).
- AM signal generator (AM-SG).
- Set band selector to "AM" position.
- Set AM allocation selector to "9 kHz stop" position. (Product for [XA] and [XL] areas only).
- Output of signal generator should be no higher than necessary to obtain an output reading.
- Use a non-metal screwdriver for the adjustment.
- Maintain line voltage at rated voltage.

Step No.	AM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	CONNECTION	FREQUENCY				
<b>AM-RF ADJUSTMENT</b>						
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input) (Refer to Fig. 1)	612 kHz (30% Mod. with 400 Hz)	612 kHz	Connect AC EVM or scope to "speaker" terminal of the set.	L201 (ANT Coil)	1. Adjust for maximum output. 2. Adjust cord of L201 by screwdriver.
2		1503 kHz (30% Mod. with 400 Hz)	1503 kHz		CT201 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2) until the frequency correctly matches the frequency display.

FM ADJUSTMENT

**\* Setting and Equipment used**

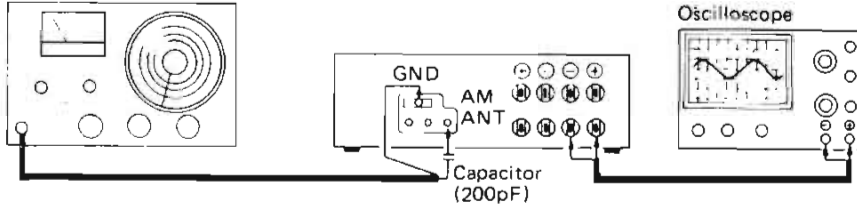
- FM signal generator (FM-SG).
- Distortion analyser.
- Oscilloscope.
- DC electronic voltmeters (EVM).
- Frequency counter (19 kHz and 108 MHz measurable).
- Set band selector to "FM" position.
- Set FM mode selector to "mono" position.

**\* Preparation of FM signal generator (FM-SG)**

- Apply SG output to antenna terminal of the set through 75Ω FM dummy antenna.
- The standard input of the set is 60 dB (1 mV), 400 Hz, 100% modulation (Because of using dummy antenna, SG output must be 12 dB (4μV) plus (IHF). That is, when input 60 dB (1 mV), SG output is to be 72 dB (4 mV)).
- Connect stereo modulator to FM-SG.

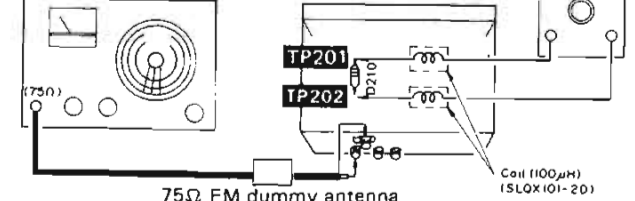
Step No.	FM SIGNAL GENERATOR		DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	CONNECTION	FREQUENCY				
<b>FM-IF ADJUSTMENT</b>						
3	Connect FM-SG to FM antenna terminal through 75Ω FM dummy antenna. (Apply 60 dB (1 mV) to antenna terminal)	100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect DC EVM between TP201 (-) and TP202 (+) through choke coil. (Refer to Fig. 2)	T201 (Discri. IFT)	1. Adjust T201 core so that voltage measured in signal mode is 0 mV in 300 mV range.
<b>FM MONO DISTORTION ADJUSTMENT</b>						
4	Connect FM-SG to FM antenna terminal through 75Ω FM dummy antenna. (Apply 60 dB (1 mV) to antenna terminal)	100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect distortion analyser to "speaker" terminals of the set.	T202 (Discri IFT)	1. Check step (3). 2. If it is deflected, readjust of T201. 3. Adjust T202 core so that distortion of right and left channels are minimized.
<b>FM MPX V.C.O. ADJUSTMENT</b>						
<b>USING A FREQUENCY COUNTER</b>				<b>USING ALTERNATE SYSTEM</b>		
5	1. 100.1 MHz, 60 dB Non-modulated mono signal applied to set. 2. FM mode switch to "auto" position. 3. Connect frequency counter to TP301 through resistor (100kΩ) referring to Fig. 3. 4. Adjust VR301 to 19 kHz ± 30 Hz.			1. Apply stereo signal from generator or stereo station to tuner. 2. Adjust VR301 until stereo indicator lights up. Cement arm of VR301 as shown in Fig. 4.		

AM Signal generator (AM-SG)



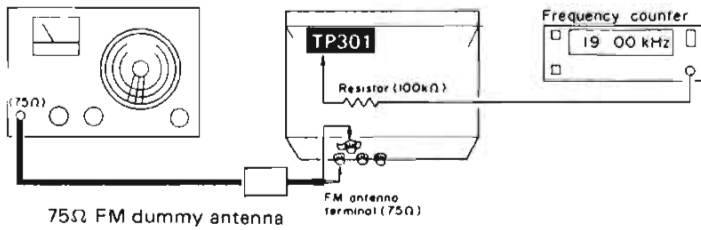
[Fig. 1]  
AM-RF adjustment

FM Signal generator (FM-SG)

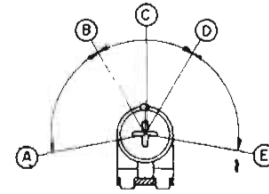


75Ω FM dummy antenna  
[Fig. 2]

FM-IF adjustment



[Fig. 3]  
FM MPX PILOT (VCO) adjustment

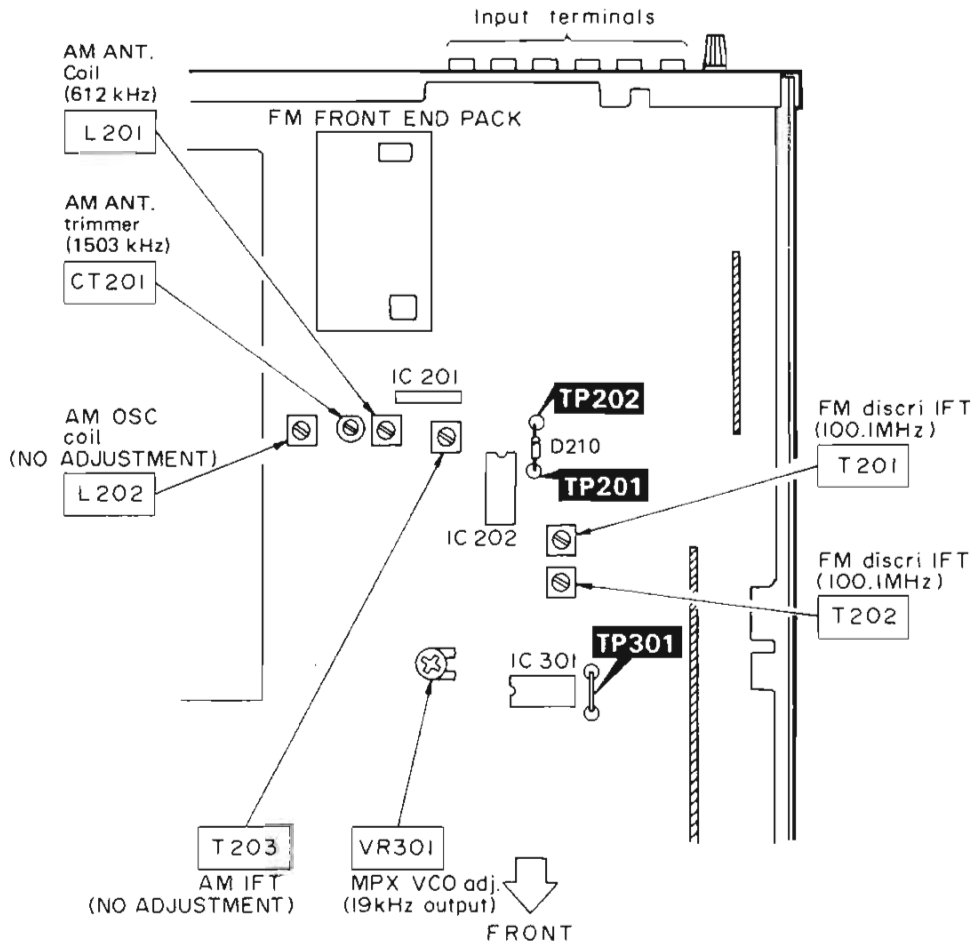


VR301 (5kΩ)

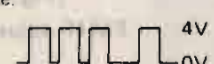
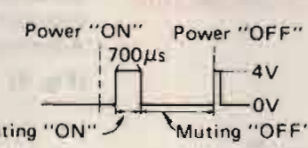
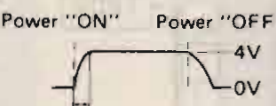
- A - B, D - E : Stereo OFF position.
- B, C : Stereo ON position.  
(indicator lighting)
- C : Adjustment point of pilot circuit

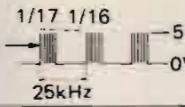
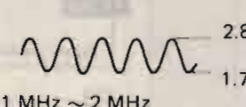
[Fig. 4]

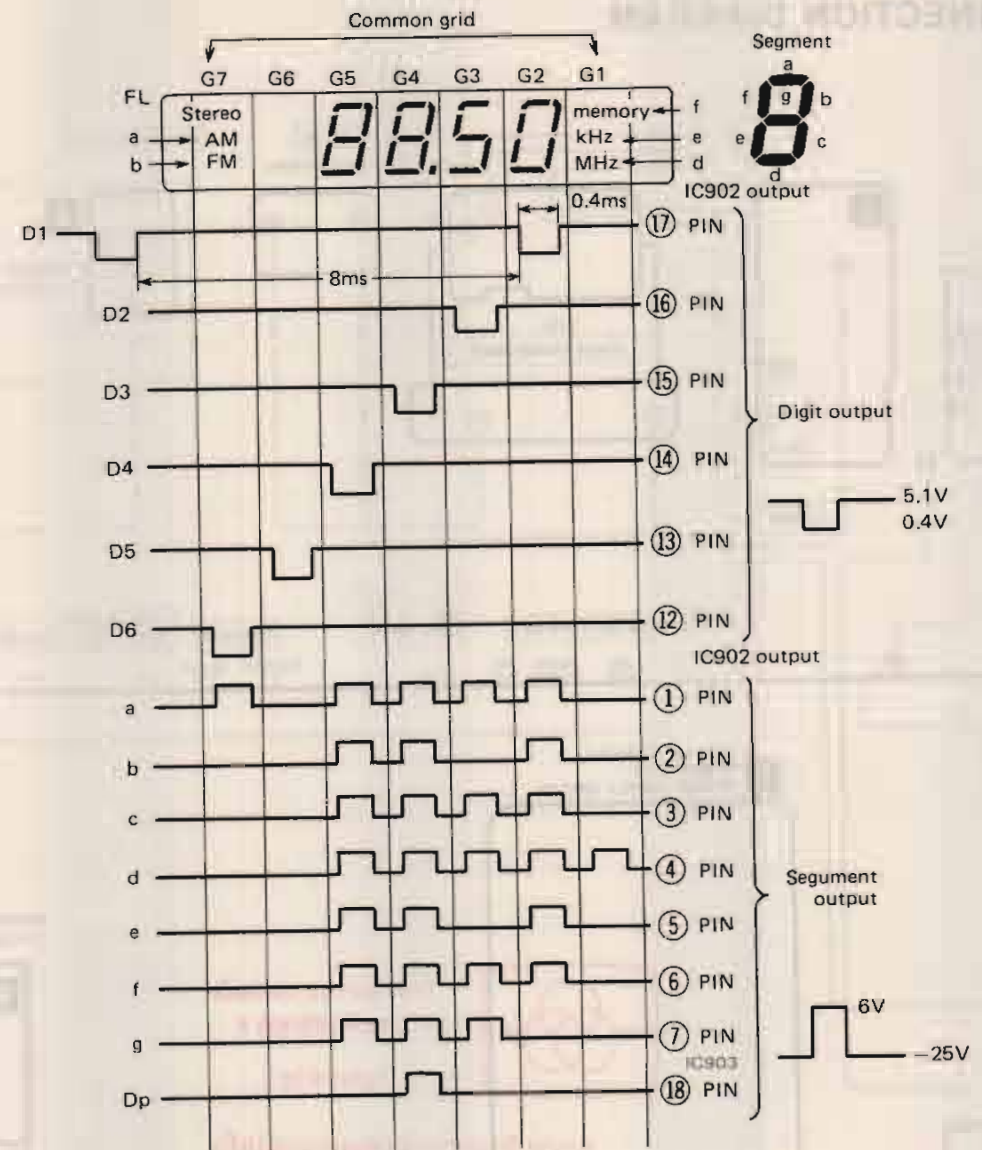
Adjustment points



FUNCTION OF TERMINAL (PLL CONTROLLER IC902)

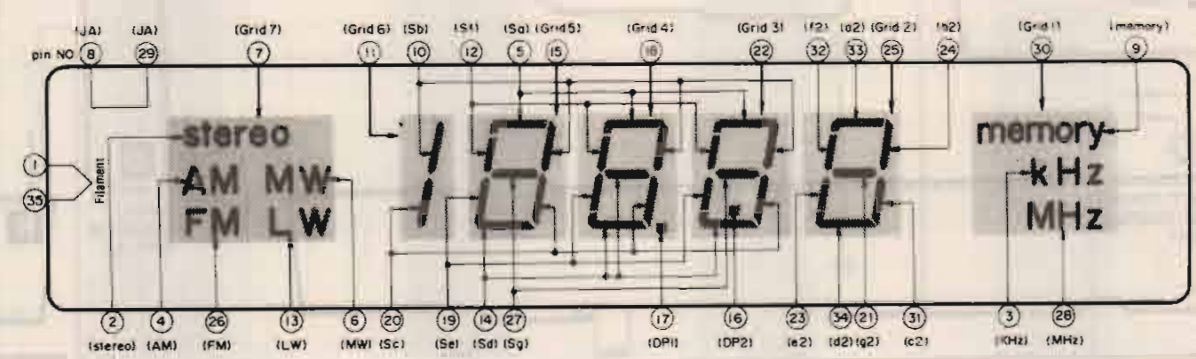
Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. <b>(Refer to Fig. 5)</b>
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source. 
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. <b>(Refer to Fig. 5)</b>  This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. 
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	
18	MT	
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	Not used in this unit.
25	CE	This is the selected signal input terminal of the device. When operating, the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.  The device does not operate during this period.
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.

Pin No.	Mark	Description of terminal
28	PSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. The frequency dividing ratio of pre-scaler is 1/17. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16.  Pulse two times larger than the value that cannot be divided by VCO/16.
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output.  1 MHz ~ 2 MHz
31	Dp	2-bit input/output. Dp (31) is decimal point indication output terminal for digital indication. Lamp (32) is not used in this unit.
32	Lamp	
33	IF	4-Bit output port. FM (35) is FM/AM output terminal; 5V in FM and 0V in AM. IF (33), LW (34) and AM (36) are not used in this unit.
34	LW	
35	FM	
36	AM	
37	TV	This is 4-bit input/output port. MONO terminal (38) is the auto/mono changeover output terminal, which is 5V in auto, and 0V in mono. SDC terminal (39) is the auto scan/manual scan changeover output terminal, which is 5V in auto scan, and 0V in manual scan. TV (37) and D(40) are not used in this unit.
38	MONO	
39	SDC	
40	D	
41	COMP	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. (Not used in this unit.)



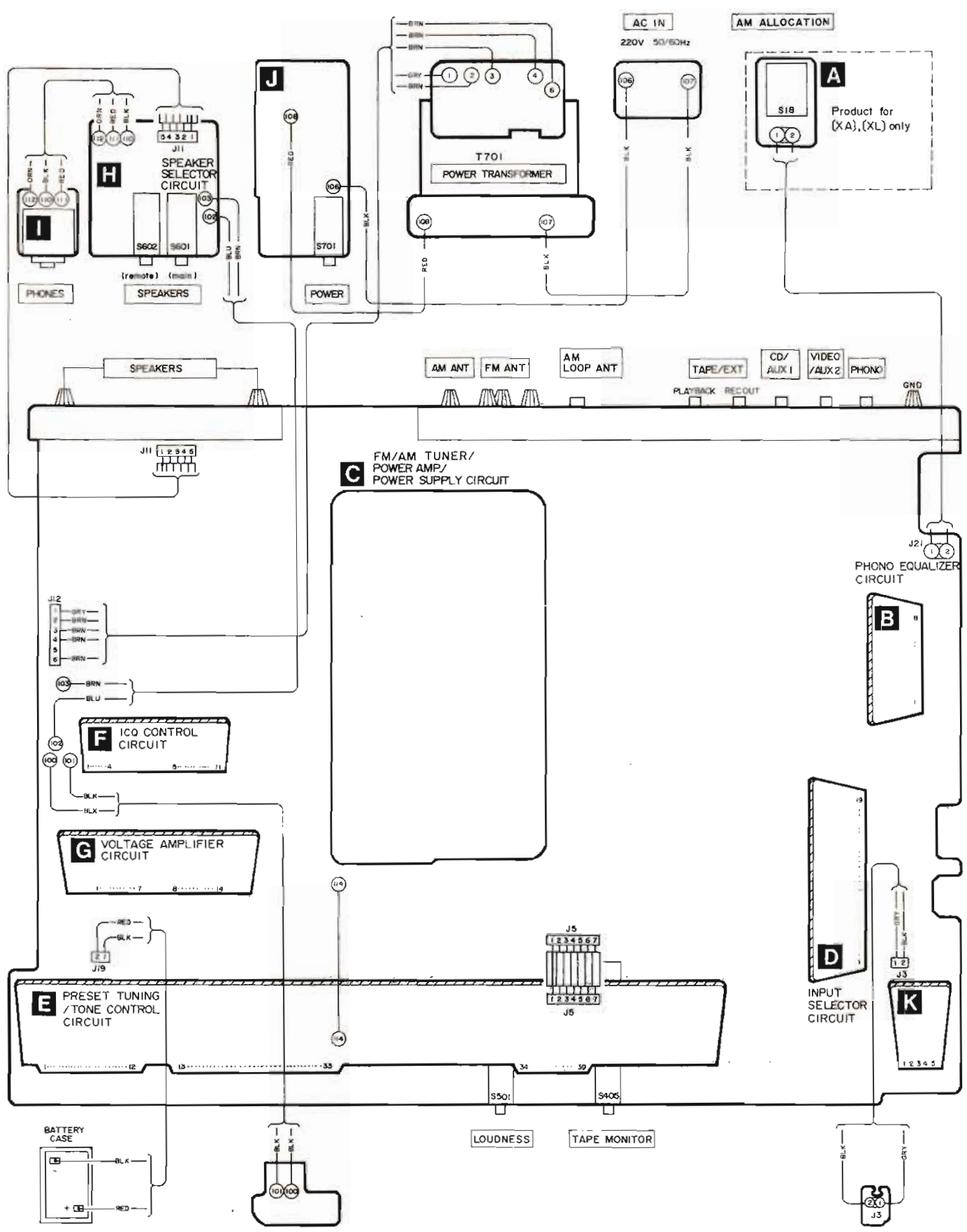
[Fig. 5]

Fluorescent Display Tube (FL)

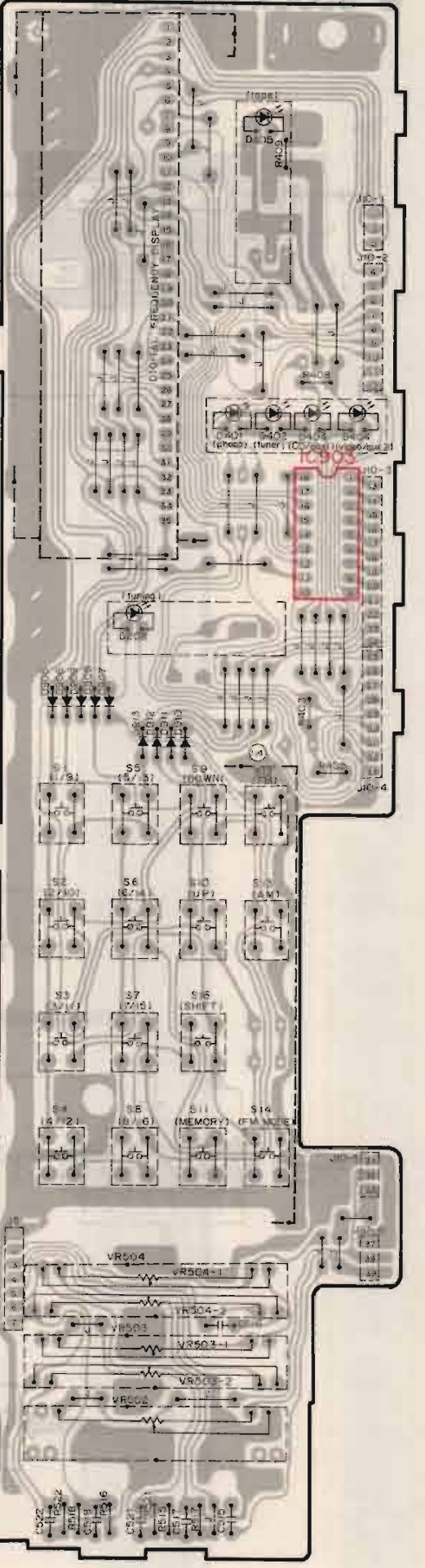
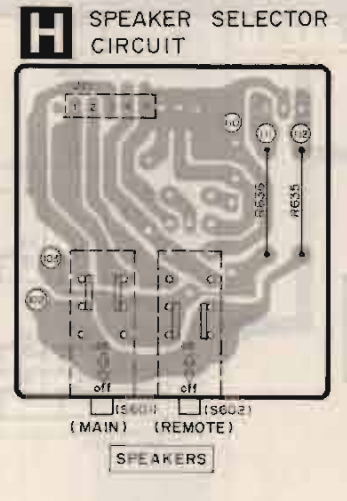
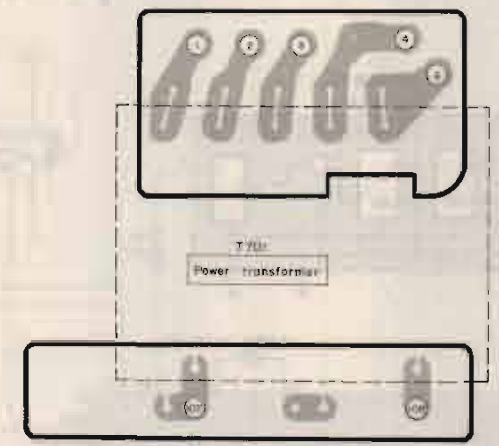
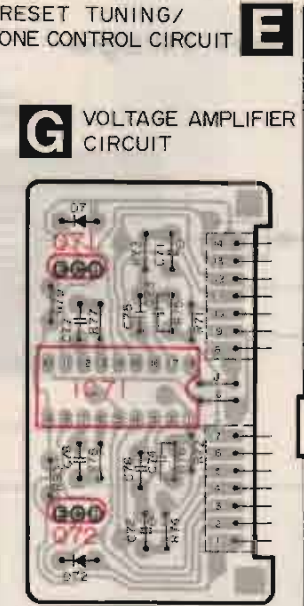
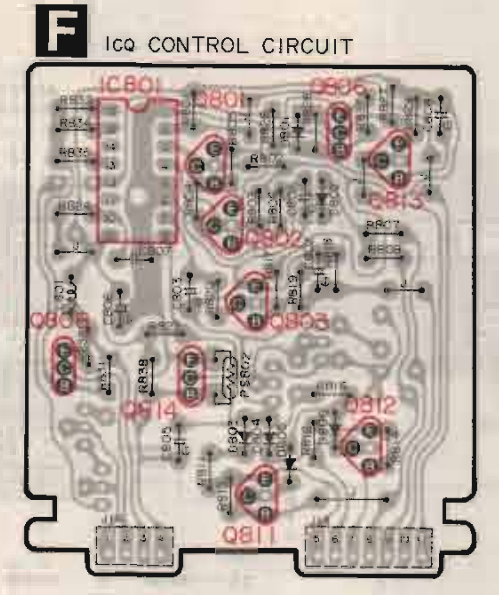
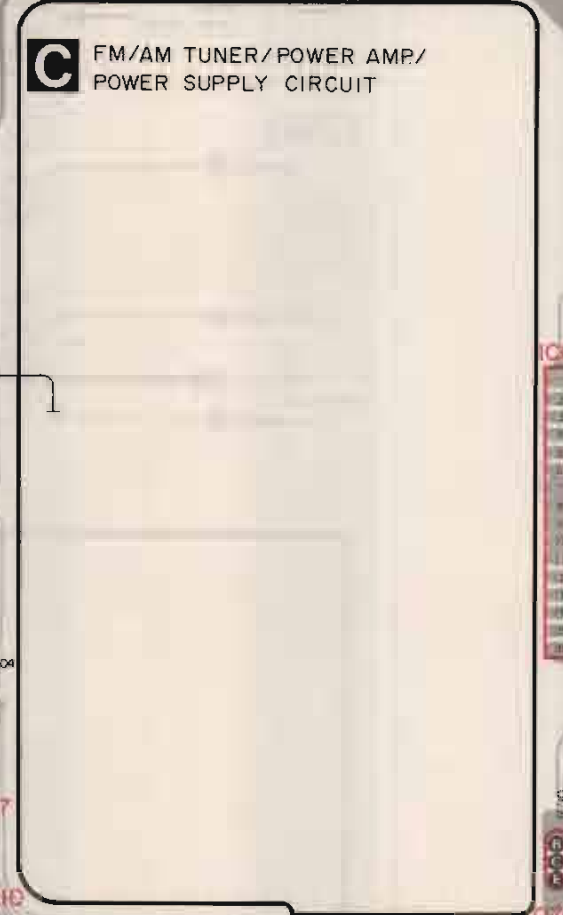
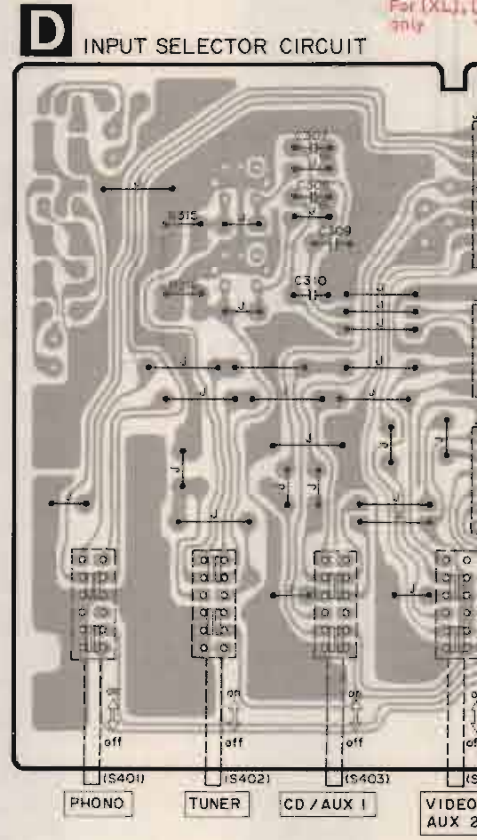
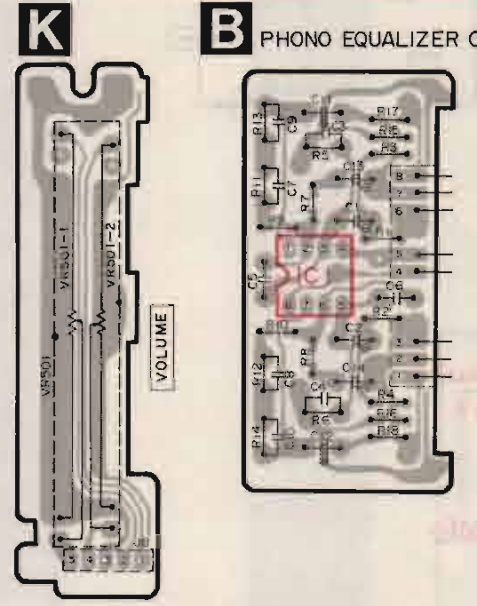
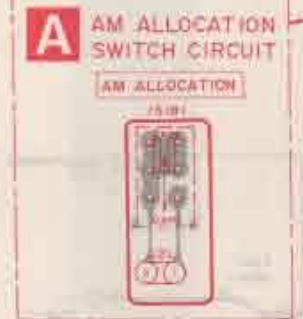
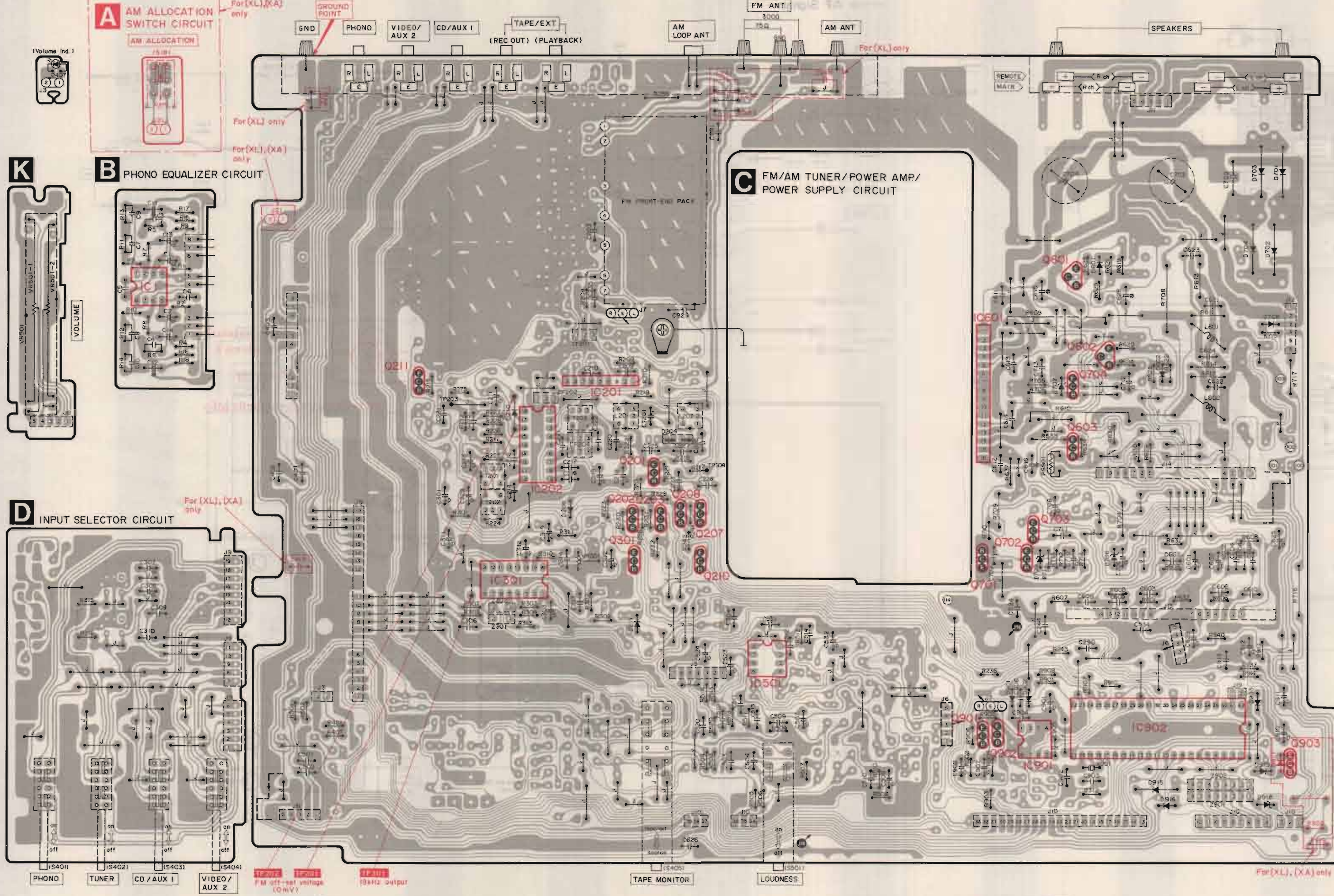




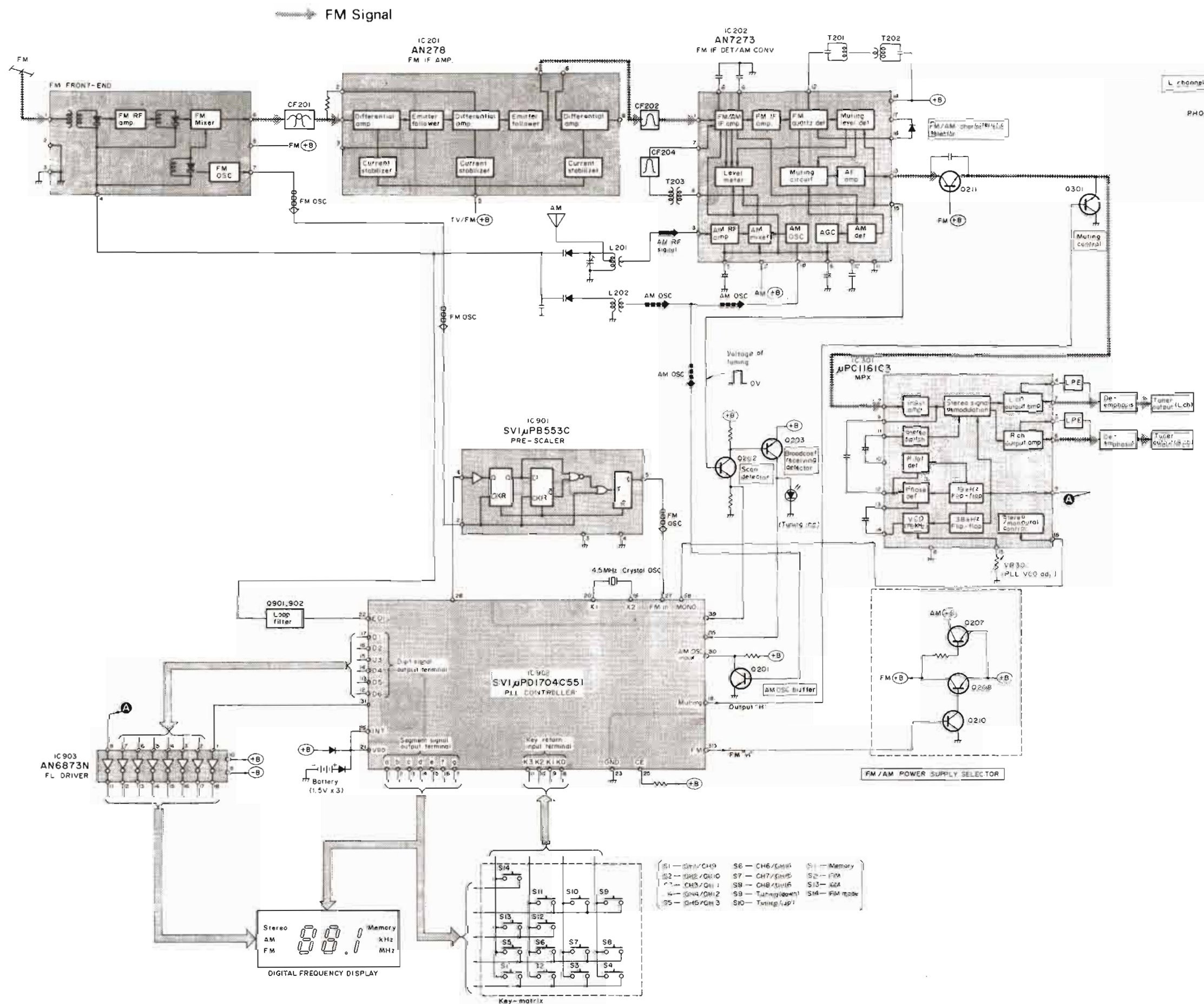
## WIRING CONNECTION DIAGRAM



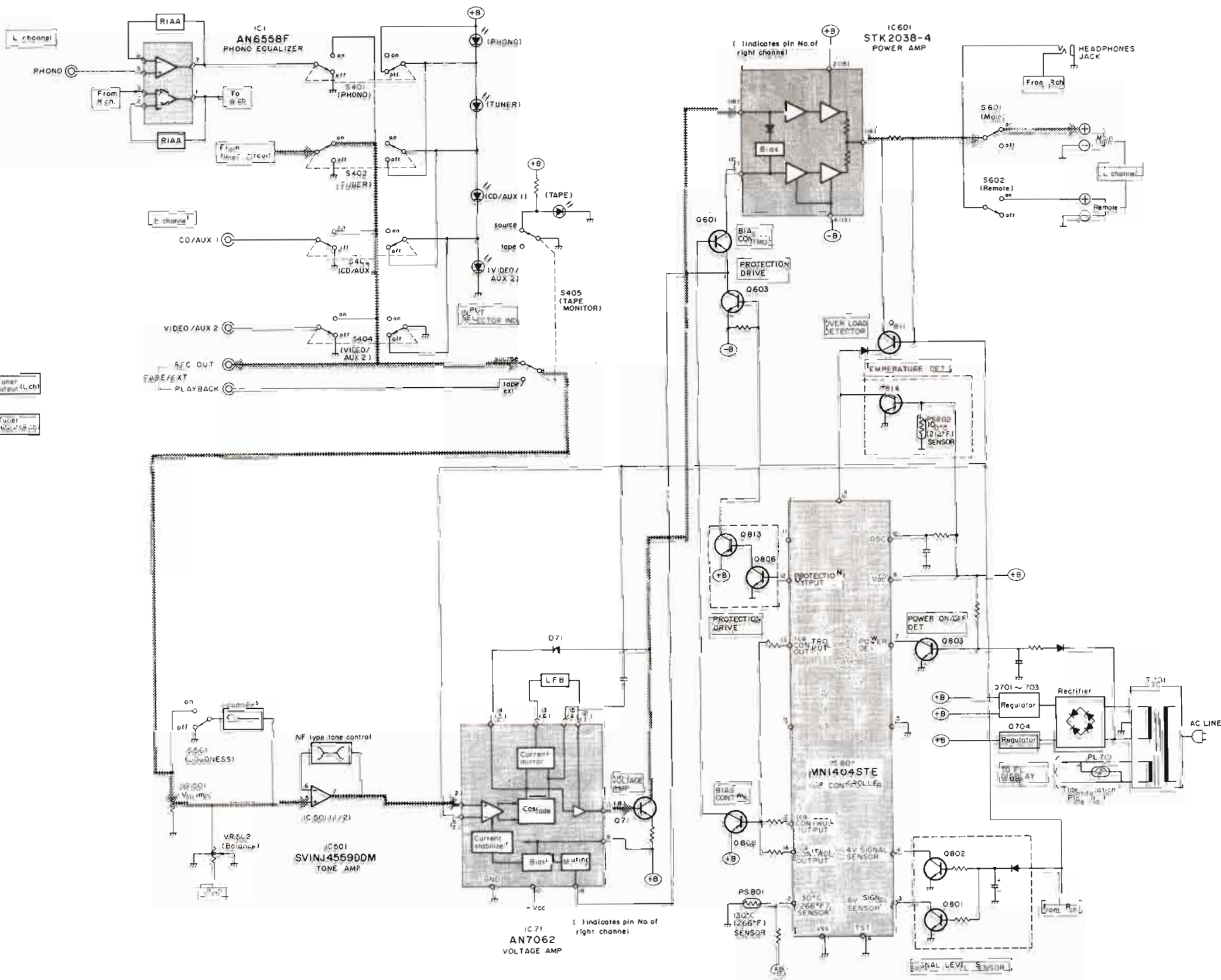
PRINTED CIRCUIT BOARDS



■ BLOCK DIAGRAM



AF Signal



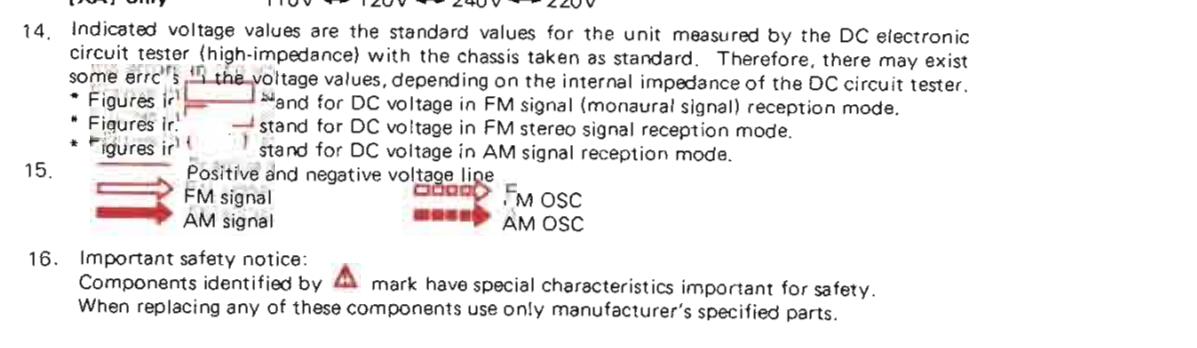
SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with a circled mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

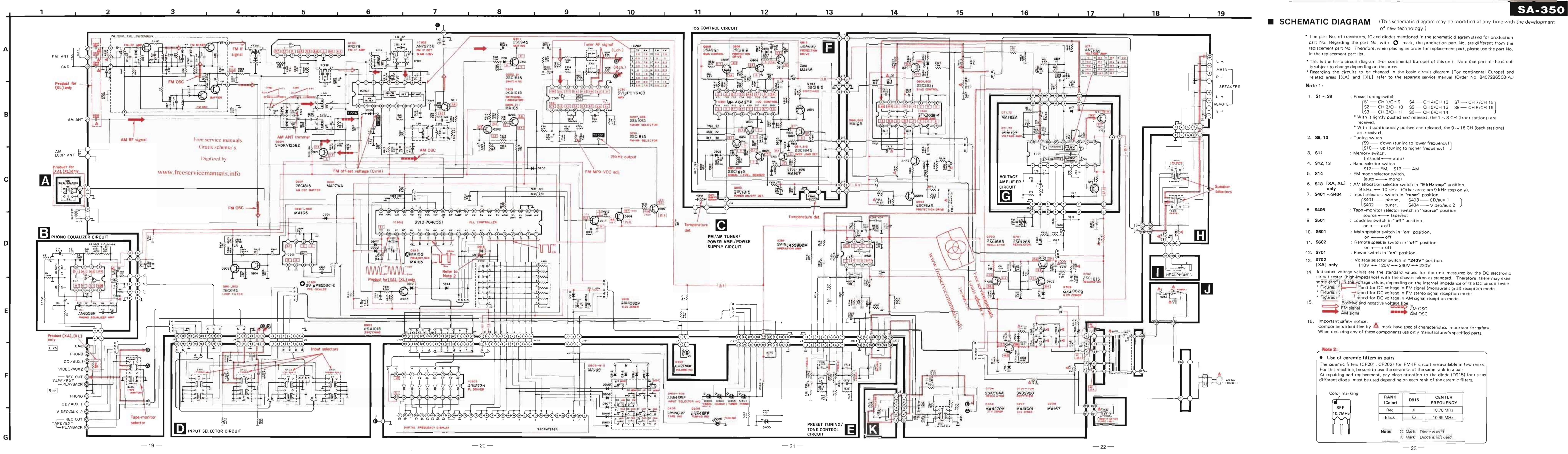
This is the basic circuit diagram (For continental Europe) of this unit. Note that part of the circuit is subject to change depending on the areas. Regarding the circuits to be changed in the basic circuit diagram (For continental Europe) and related areas [XA] and [XL] refer to the separate service manual (Order No. 84072865C8-A).

Note 1:

- 1. S1 ~ S8 : Preset tuning switch. (S1 - CH 1/CH 9, S2 - CH 2/CH 10, S3 - CH 3/CH 11, S4 - CH 4/CH 12, S5 - CH 5/CH 13, S6 - CH 6/CH 14, S7 - CH 7/CH 15, S8 - CH 8/CH 16)
2. S9, 10 : Tuning switch (S9 - down (tuning to lower frequency), S10 - up (tuning to higher frequency))
3. S11 : Memory switch (manual -> auto)
4. S12, 13 : Band selector switch (S12 - FM, S13 - AM)
5. S14 : FM mode selector switch (auto -> mono)
6. S18 [XA, XL] : AM allocation selector switch in '9 kHz step' position. (9 kHz -> 10 kHz (Other areas are 9 kHz step only))
7. S401 ~ S404 : Input selectors switch in 'tuner' position. (S401 - phono, S402 - CD/aux 1, S403 - tuner, S404 - Video/aux 2)
8. S405 : Tape-monitor selector switch in 'source' position. (source -> tape/ext)
9. S501 : Loudness switch in 'off' position. (on -> off)
10. S601 : Main speaker switch in 'on' position. (on -> off)
11. S602 : Remote speaker switch in 'off' position. (on -> off)
12. S701 : Power switch in 'on' position.
13. S702 : Voltage selector switch in '240V' position. (110V -> 120V -> 240V -> 220V)
14. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
15. Figures in red stand for DC voltage in FM stereo signal reception mode.
16. Figures in black stand for DC voltage in AM signal reception mode.
17. Positive and negative voltage line
18. FM signal
19. FM OSC
20. AM signal
21. AM OSC

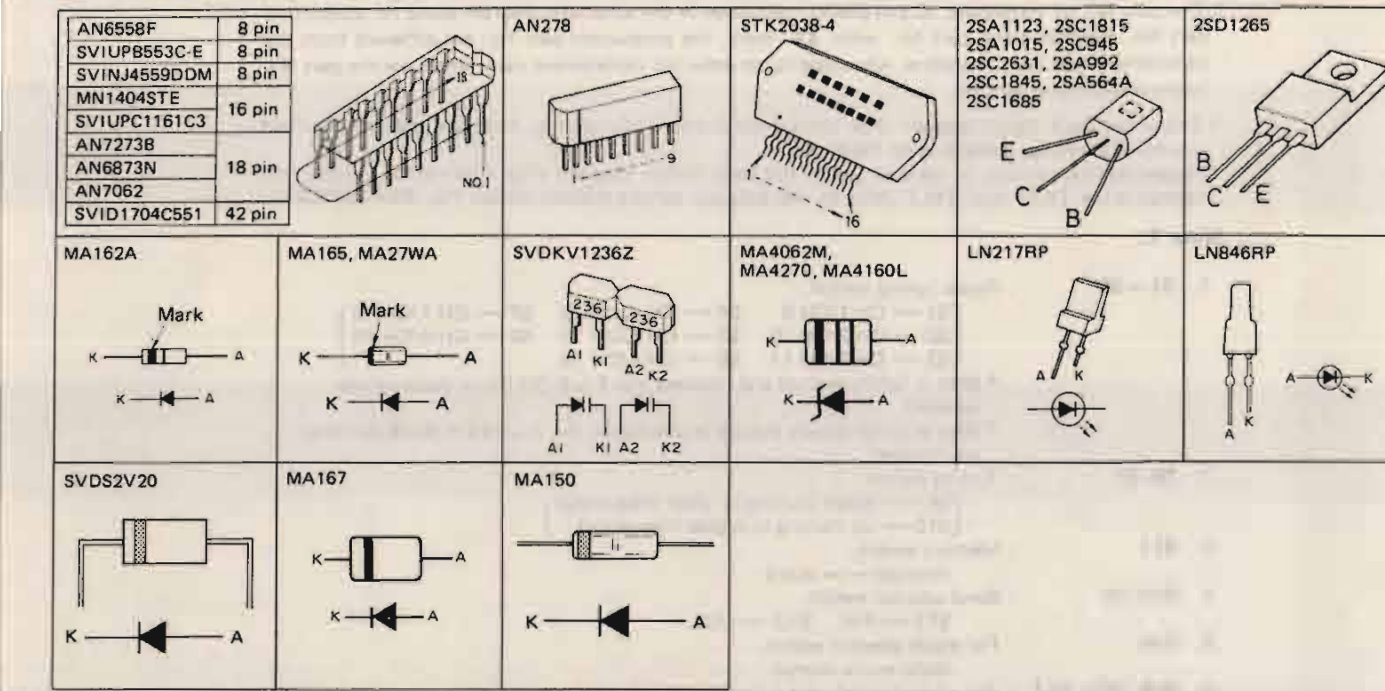


Note 2: Use of ceramic filters in pairs. The ceramic filters (CF201, CF202) for FM-IF circuit are available in two ranks. For this machine, be sure to use the ceramics of the same rank in a pair. At repairing and replacement, pay close attention to the diode (D915) for use as different diode must be used depending on each rank of the ceramic filters. Color marking table with RANK (Color), D915, and CENTER FREQUENCY (10.70 MHz, 10.65 MHz).



Free service manuals (gratis schema's) Digitized by www.freeservicemanuals.info

TERMINAL GUIDE OF TRANSISTORS, DIODES AND IC'S



RESISTORS AND CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders. 2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. 3. The "S" mark is service standard parts and may differ from production parts. 4. The unit of resistance is Ω, (ohm). K = 1000Ω, M = 1000kΩ. 5. The unit of capacitance is μF. (microfarad). P = 10^-6 μF. 6. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all area.

Numbering System of Resistor

Table with columns: Resistor Type, Wattage, Tolerance. Includes examples like ERD 25 F J 101 and ERG 2 AN J 2R2.

Numbering System of Capacitor

Table with columns: Capacitor Type, Voltage, Tolerance. Includes examples like ECKD 1H 102 Z F and ECEA 50 M R47 R.

RESISTORS

Table with columns: Ref. No., Part No., Value. Lists various resistor part numbers and their values.

RESISTORS

Table with columns: Ref. No., Part No., Value. Lists various resistor part numbers and their values.

CAPACITORS

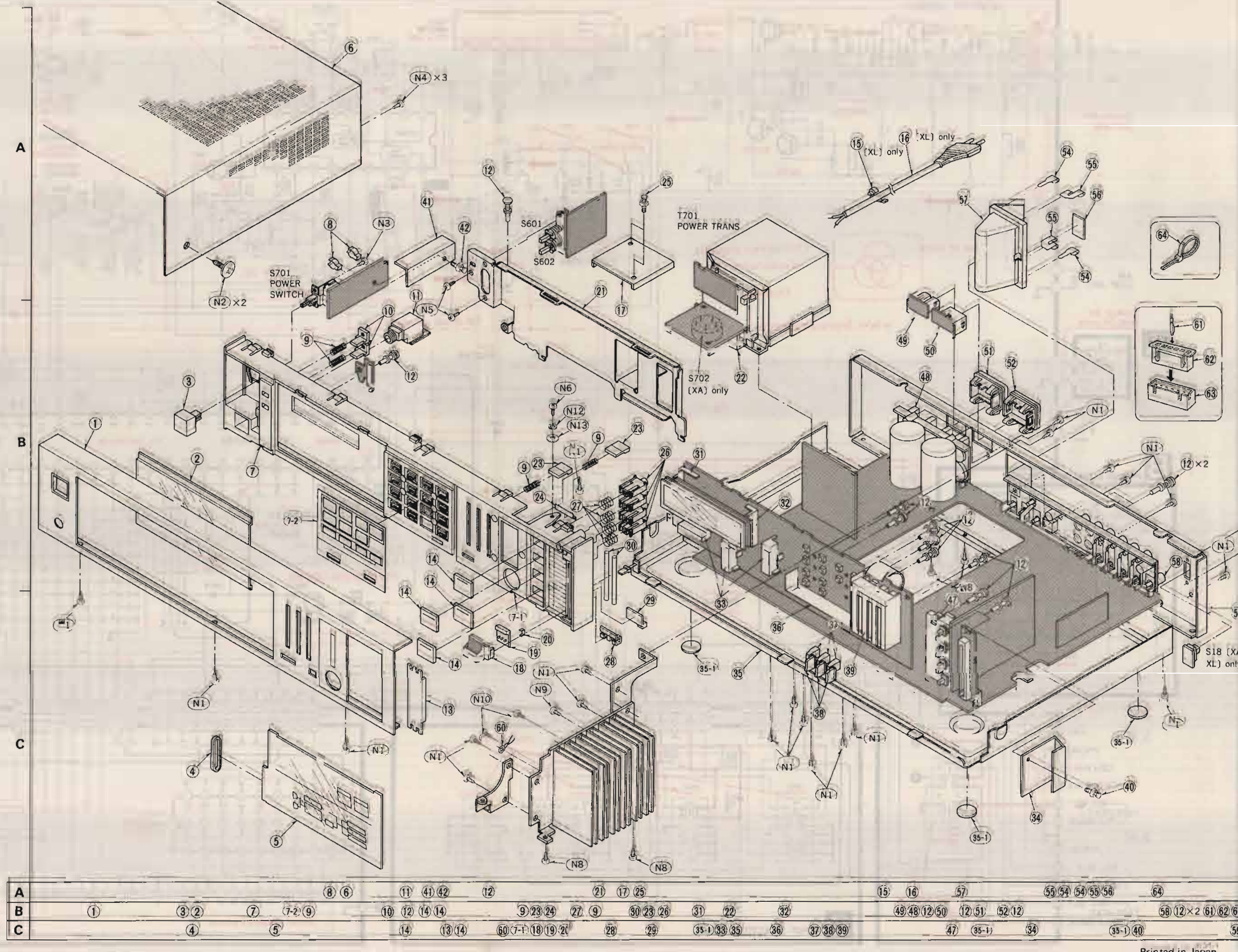
Table with columns: Ref. No., Part No., Value. Lists various capacitor part numbers and their values.

REPLACEMENT PARTS LIST

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders. 2. Important safety notice: Components identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. 3. The "S" mark is service standard parts and may differ from production parts. 4. Bracketed indications in Ref. No. columns specify the area. 5. The parenthesized number in the column of description stand for the quantity per set.

Main replacement parts list table with columns: Ref. No., Part No., Description. Includes sections for Integrated Circuits, Variable Resistors, Transistors, Diodes, Switches, Lamps, Fuses, Component Combinations, Fluorescent Display Tube, Thermal Detector, FM Frontend, Cabinet and Chassis Parts, Coils, Transformers, Ceramic Filters, Variable Capacitors, Variable Resistors, Transistors, Diodes, Switches, Lamps, Fuses, Component Combinations, Fluorescent Display Tube, Thermal Detector, FM Frontend, Cabinet and Chassis Parts, Coils, Transformers, Ceramic Filters.

EXPLODED VIEW



# QUARTZ Synthesizer

## FM/AM Stereo Receiver

# SA-350

**DEUTSCH**

- This booklet includes the specifications and adjustment of Model SA-350 (Order No. HAD84072865C8) written in German, French and Spanish.
- File this booklet together with the service manual of Model SA-350.
- Dieses Büchlein umfaßt die technischen Daten und Justierungsanleitungen von Modell SA-350 (Bestell Nr. HAD84072865C8) in den Sprachen Deutsch, Französisch und Spanisch.
- Bewahren Sie dieses Büchlein zusammen mit dem Service-Handbuch von Modell SA-350 auf.
- Cette brochure comprend les spécifications et la mise au point du Modèle SA-350 (N° d'Ordre HAD84072865C8) écrites en allemand, en français et en espagnol.
- Classer cette brochure en même temps qu'avec le manuel de service du Modèle SA-350.
- Este librito incluye las especificaciones y ajuste de Modelo SA-350 (Pedido N° HAD84072865C8) escritas en alemán, francés y español.
- Guardar este librito juntamente con el manual servicio de Modelo SA-350.

## DEUTSCH

### ■ TECHNISCHE DATEN

#### (DIN 45 500)

##### ■ VERSTÄRKERTEIL

<b>Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz</b>	
beide Kanäle ausgesteuert	2 × 45W (4 Ω) 2 × 37W (8 Ω)
<b>Dauerton-Ausgangsleistung bei 1 kHz</b>	
beide Kanäle ausgesteuert	2 × 55W (4 Ω) 2 × 47W (8 Ω)
<b>Gesamtklirrfaktor</b>	
Nennleistung bei 20 Hz ~ 20 kHz	0,02% (4 Ω) 0,007% (8 Ω)
Nennleistung bei 1 kHz	0,001% (8 Ω)
<b>Intermodulationsfaktor</b>	
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω	0,02%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω	0,01%
<b>Leistungsbandbreite</b>	
beide Kanäle ausgesteuert bei -3 dB	5 Hz ~ 40 kHz (4 Ω) 20 (4 Ω), 40 (8 Ω)
<b>Dämpfungsfaktor</b>	
<b>Eingangsempfindlichkeit und -impedanz</b>	
Phono	2,5 mV/47 kΩ
CD/AUX1, VIDEO/AUX2, TAPE/EXT	150 mV/22 kΩ
<b>Maximale TA-Eingangsspannung (1 kHz, eff.)</b>	160 mV
<b>Geräuschabstand</b>	
Nennleistung (4 Ω)	
Phono	72 dB (nach IHF, A: 80 dB)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	88 dB (nach IHF, A: 95 dB)
<b>Frequenzgang</b>	
Phono	RIAA-Standardkurve ±0,8 dB (30 Hz ~ 15 kHz)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	5 Hz ~ 70 kHz (-3 dB)
<b>Klangregler</b>	
Baßregler (BASS)	50 Hz, +10 dB ~ -10 dB
Höhenregler (TREBLE)	20 kHz, +10 dB ~ -10 dB
<b>Gehörriichtige Lautstärkekorrektur (Loudness)</b>	
(bei -30 dB Ausgangsleistung)	50 Hz, +9 dB
<b>Ausgangsspannung</b>	
Tape, Aufnahme (TAPE, REC OUT)	150 mV
<b>Kanalabweichung (250 Hz ~ 6300 Hz)</b>	±1 dB

<b>Übersprechdämpfung</b>	55 dB
<b>Kopfhörerpegel und -impedanz</b>	440 mV/330 Ω
<b>Lautsprecherimpedanz</b>	
<b>MAIN oder REMOTE</b>	4 Ω ~ 16 Ω
<b>MAIN und REMOTE</b>	8 Ω ~ 16 Ω

##### ■ UKW-TUNERTEIL

<b>Wellenbereich</b>	87,50 ~ 108,00 MHz 87,525~108,025 MHz (+25 kHz shift)
<b>Eingangsempfindlichkeit</b>	
<b>S/R 30 dB</b>	1,9 μV (300 Ω), 1,3 μV (75 Ω)
<b>S/R 26 dB</b>	1,7 μV (300 Ω), 1,2 μV (75 Ω)
<b>S/R 20 dB</b>	1,5 μV (300 Ω), 0,9 μV (75 Ω)
<b>Nutzempfindlichkeit nach IHF</b>	1,9 μV (nach IHF '58)
<b>Stereoumschaltsschwelle bei 46 dB nach IHF</b>	22 μV/75 Ω
<b>Gesamtklirrfaktor</b>	
<b>Mono</b>	0,15%
<b>Stereo</b>	0,3%
<b>Geräuschabstand</b>	
<b>Mono</b>	60 dB (77 dB nach IHF)
<b>Stereo</b>	58 dB (71 dB nach IHF)
<b>Frequenzgang</b>	20 Hz ~ 15 kHz (+1 dB ~ -2 dB)
<b>Trennschärfe bei Störsender ±400 kHz</b>	70 dB
<b>Einfangverhältnis</b>	1 dB
<b>Spiegelfrequenz-Dämpfung bei 98 MHz</b>	55 dB
<b>ZF-Dämpfung bei 98 MHz</b>	80 dB
<b>Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz</b>	82 dB
<b>MW-Unterdrückung</b>	50 dB
<b>Übersprechdämpfung</b>	
<b>1 kHz</b>	40 dB
<b>10 kHz</b>	30 dB
<b>Trägerrest</b>	
<b>19 kHz</b>	-33 dB (-35 dB nach IHF)
<b>38 kHz</b>	-50 dB (-50 dB nach IHF)
<b>Kanalabweichung (250 Hz ~ 6300 Hz)</b>	±1,5 dB
<b>Begrenzereinsatz</b>	1,2 μV
<b>Bandbreite</b>	
<b>ZF-Verstärker</b>	180 kHz
<b>UKW-Demodulator</b>	1000 kHz
<b>Antennenanschluß</b>	300 Ω (symmetrisch) 75 Ω (unsymmetrisch)

**MW-TUNERTEIL**

Wellenbereiche	522 ~ 1629 kHz (9-kHz-Schritte)
Eingangsempfindlichkeit (S/R 20 dB)	20 µV, 300 µV/m
Trennschärfe	55 dB
Spiegelfrequenz-Dämpfung bei 999 kHz	40 dB
ZF-Dämpfung bei 999 kHz	60 dB

**ALLGEMEINE DATEN**

Leistungsaufnahme 330 W

**Netzspannung**

Für Kontinentaleuropa Wechselstrom 50 Hz/60 Hz, 220V  
 Für andere Länder Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V

**Abmessungen (B×H×T)** 430 × 97 × 283 mm  
 (16-15/16" × 3-13/16" × 11-5/32")  
**Gewicht** 6,6 kg (14,6 lb.)

**Bemerkung:**  
 Der Gesamtklirrfaktor wurde mit einem digitalen Rauschspektrometer (Anlage H.P. 3045) gemessen.  
 (Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

**MESSUNGEN UND JUSTIERUNGEN**

**AM (MW)-EINSTELLUNG**

Anmerkung: Die AM OSC-Spule (L202) und AM ZFT (T203) sind bereits justiert und benötigen keine Justierung.

• Stellungen und zu benutzende Geräte						
1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)			5. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute ablesung.			
2. AM (MW)-Meßsender (AM-SG)			6. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.			
3. Bereichsschalter . . . . . AM			7. Die Netzspannung auf ihren Sollwert einstellen.			
4. AM (MW) Wellenverteilungs-Wahlschalter auf Position "9 kHz" stellen.						
Nr.	AM (MW)-MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICH-SVERFAHREN
	ANSCHLUSS	FREQUENZ				
MW-HF-ABGLEICH						
1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenneneingang verbinden.	612 kHz (400 Hz Modul., 30%)	612 kHz	Oszilloskop oder Wechselstrom-Voltmeter über den Lautsprecher schließen	L201 (Ant. Spule)	1. Auf max. Ausgang abgleichen 2. Den Ferritkern von L201 mit einem Schraubendreher justieren.
2	Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	1503 kHz (400Hz Modul., 30%)	1503 kHz		CT201 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (1) und (2) wiederholen, bis die Frequenz genau mit der Skalanzeige übereinstimmt.

**FM (UKW)-EINSTELLUNG**

• Stellungen und zu benutzenden Geräte			• Vorbereitung am UKW-Messender (FM-SG)			
1. UKW-Meßsender (FM-SG).			1. SG-Ausgang über 75-Ohm-UKW-Kunstantenne an den Antenneneingang des Gerätes anschließen.			
2. Elektronische Voltmeter für Wechsel- und Gleichstrom (EVM)			2. Der normale Eingang des Gerätes beträgt 60 dB (1 mV), 400 Hz, 100% Modulation. Wegen Verwendung der Kunstantenne muß bei Signalausgang 12 dB (4µV) plus (ZHF) sein: d.h. beim Eingang von 60 dB (1 mV) soll der Signalausgang 72 dB 4 mV sein.)			
3. Signalfrequenzmesser (meßbar für 19kHz und 108MHz)						
4. Bereichsschalter . . . . . FM						
5. Den UKW-Betriebsartenschalter auf die "mono"-position stellen.						
6. Die anderen Einstellungen sind gleich wie bei der MW-Justierung.						
7. Stereo-Modular (oder Trennmesser)						
Nr.	FM (UKW) MESSENDER		ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICH-SPUNKTE	ABGLEICH-SVERFAHREN
	ANSCHLUSS	FREQUENZ				
ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO						
3	Meßsender über eine 75Ω-UKW-Kunstantenne an den UKW-Antenneneingang anschließen. (60 dB (1 mV) in den Antenneneingang leiten.)	100.1 MHz (400Hz Modul., 100%)	100.1 MHz	Ein Gleichstromröhren-voltmeter zwischen TP201 (-) und TP202 (+) über eine Drosselspule verbinden. (Siehe Abb. 2)	T201 (Diskriminator FT)	1. Den Kern von T201 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
4		100.1 MHz (400Hz Modul., 100%)	100.1 MHz	Klirrfaktor-Meßbrücke über den Lautsprecher schließen	T202 (Diskriminator FT)	1. T202 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.
UKW-STEREO-DEKODER-ABGLEICH						
UNTER VERWENDUNG EINES ZAHLES				ALTERNATIV-MEB METHODE		
5	1. Unmoduliertes Mono-Signal 100.1MHz in das Gerät speisen. 2. FM muting/mode-Schalter auf "on/FM auto" stellen. 3. Zähler über einen Widerstand 100k ohm an TP301 schließen. 4. VR301 auf 19 kHz ± 30 Hz einstellen.			1. Stereosignal entweder von einem Stereogenerator. Oder einem Sender einspeisen. 2. VR301 so einstellen, bis die Stereolampe auf leuchtet. Schleifer von VR301 sichern, wie in Abb. 4 gezeigt.		

## FRANÇAIS

## ■ CARACTERISTIQUES

## (DIN 45 500)

## ■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 20 Hz~20 kHz, les deux canaux en circuit	2 × 45W (4Ω) 2 × 37W (8Ω)
Puissance de sortie continue à 1 kHz les deux canaux en circuit	2 × 55W (4Ω) 2 × 47W (8Ω)
Distorsion harmonique totale à puissance nominale (20 Hz~20 kHz)	0,02% (4Ω) 0,007% (8Ω)
à puissance nominale (1 kHz)	0,001% (8Ω)
Distorsion d'intermodulation à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω	0,02%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,01%
Réponse de fréquences les deux canaux en circuit, -3 dB	5 Hz~40 kHz (4Ω)
Coefficient d'amortissement	20 (4Ω), 40 (8Ω)
Sensibilité et impédance d'entrée	
PHONO	2,5 mV/47kΩ
CD/AUX1, VIDEO/AUX2, TAPE/EXT	150 mV/22kΩ
PHONO (tension d'entrée maximum, 1 kHz RMS)	160 mV
Signal/Bruit à puissance nominale (4Ω)	
PHONO	72 dB (IHF, A: 80 dB)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	88 dB (IHF, A: 95 dB)
Réponse de fréquence PHONO	Courbe nominale RIAA ±0,8 dB (30 Hz~15 kHz)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	5 Hz~70 kHz (-3 dB)
Réglage de la tonalité	
BASSES (BASS)	50 Hz, +10 dB~ -10 dB
AIGUS (TREBLE)	20 kHz, +10 dB~ -10 dB
Compensateur physiologique (volume à -30 dB)	50 Hz, +9 dB
Tension de sortie	
SORTIE ENREGISTREMENT/BANDE (TAPE, REC OUT)	150 mV
Equilibrage des canaux, 250 Hz~6,300 Hz	±1 dB
Séparation des canaux	55 dB
Niveau de sortie des casques et impédance	440 mV/330Ω
Impédance de charge	
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE)	4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE)	8Ω~16Ω

## ■ SECTION SYNTONISATEUR FM

Gamme de fréquence	87,50~108,00 MHz 87,525~108,025 MHz (+25 kHz shift)
Sensibilité	
S/B 30 dB	1,9 μV (300Ω), 1,3 μV (75Ω)
S/B 26 dB	1,7 μV (300Ω), 1,2 μV (75Ω)
S/B 20 dB	1,5 μV (300Ω), 0,9 μV (75Ω)
Sensibilité utilisable IHF	1,9 μV (IHF '58)
Sensibilité stéréo au seuil de 46 dB, IHF	22 μV/75Ω
Distorsion harmonique totale	
MONO	0,15%
STEREO	0,3%
Signal/Bruit	
MONO	60dB (77 dB, IHF)
STEREO	58 dB (71 dB, IHF)
Réponse de fréquence	20 Hz~15 kHz, +1 dB~ -2 dB
Sélectivité alternée par canal±	400 kHz 70 dB
Taux de capture	1 dB
Rejection d'image à 98 MHz	55 dB
Rejection FI à 98 MHz	80 dB
Rejection de réponse parasite à 98 MHz	82 dB
Suppression AM	50 dB
Séparation stéréophonique	
1 kHz	40 dB
10 kHz	30 dB
Fuite de porteuse	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Equilibrage de canaux (250 Hz~6,300 Hz)	±1,5 dB
Point de limite	1,2 μV
Largeur de bande	
Amplificateur FI	180 kHz
Démodulateur FM	1000 kHz
Bornes d'antenne	300Ω (symétrique) 75Ω (asymétrique)

## ■ SECTION SYNTONISATEUR AM

Gamme de fréquence	522~1629 kHz (par palier 9 kHz)
Sensibilité (S/B 20 dB)	20 μV, 300 μV/m
Sélectivité	55 dB
Réjection d'image à 999 kHz	40 dB
Réjection FI à 999 kHz	60 dB

## ■ DIVERS

Consommation	330W
Alimentation	
Pour l'Europe	CA 50 Hz/60 Hz, 220V
Autres	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L×H×Pr)	430 × 97 × 283 mm (16-15/16" × 3-13/16" × 11-5/32")
Poids	6,6 kg (14,6 lb.)

## Remarques:

On mesure la distorsion harmonique totale au moyen d'un analyseur de spectre digital (Système T.I.P. 3045).

(Sujet à changement sans préavis.)



## MESURAGES ET RÉGLAGES

### REGLAGE DE AM

**Nota:** La bobine de l'oscillateur de la modulation d'amplitude (L202) et le transformateur de fréquence intermédiaire de modulation d'amplitude (T203) ont déjà été ajustés et ne nécessitent plus de réglage.

● Réglage et équipement utilisé						
1. Voltmètres électronique de courant alternatif et de courant continu (VTVM)			5. Le signal du générateur ne doit pas être plus élevé qu'il n'est nécessaire à obtenir une lecture en sortie.			
2. Générateur du signal AM (AM-SG)			6. Utiliser un tournevis non-métallique pour la réglage.			
3. Sélecteur de gamme . . . . . AM			7. Conserver la tension du secteur à la tension nominale.			
4. Régler le sélecteur d'attribution AM sur la position "9 kHz step"						
AM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE	
BRANCHEMENT	FREQUENCE					
N° REGLAGE DE RF-AM						
1	Raccorder le générateur de signaux AM (modulation d'amplitude) à la borne d'antenne AM par l'intermédiaire d'un condensateur de 200 pF en se référant à la Fig. 1 (Entrée faible)	612 kHz (modulé à 30% par 400Hz)	612 kHz	Branchez un c.a. voltmètre électronique ou un oscilloscope sur les bornes de haut-parleur	L201 (Bobine Ant.)	1. Régler au maximum de signal de sortie. 2. Régler le noyau ferrite de L201 à l'aide d'un tournevis.
2		1503kHz (modulé à 30% par 400Hz)	1503 kHz		CT201 (Trimmer Ant.)	1. Régler au maximum de signal de sortie. 2. Refaire les étapes (1) et (2) jusqu'à ce que la fréquence s'aligne correctement avec l'affichage du cadran.

### REGLAGE DE FM

● Réglage et équipement, ent utilisé						
1. Générateur du signal FM (FM-SG)			● Préparatifs pour le générateur de signaux FM (FM-SG).			
2. Oscilloscope.			1. Alimenter la sortie du générateur de signaux à la borne de l'antenne de l'appareil, par l'antenne fictive FM de 75Ω.			
3. Voltmètres électronique de courant alternatif et de courant continu (EVM).			2. L'entrée standard de l'appareil est de 60 dB (1 mV), 400 Hz, 100% de modulation [à cause de l'utilisation de l'antenne fictive, la sortie du générateur de signaux doit être de plus 12 dB (4μV) (IHF). Ce qui signifie que quand l'entrée est de 60 dB (1 mV), la sortie du générateur de signaux doit être de 72 dB (4mV)].			
4. Compteur de fréquence (19kHz et 108MHz mesurable).						
5. Sélecteur d'entrée sur la position "FM".						
6. Placer le sélecteur de mode FM sur la position "mono".						
7. Les autres réglages sont les mêmes que pour la mise au point de l'amplitude modulée (AM).						
FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE	
BRANCHEMENT	FREQUENCE					
REGLAGE DE LA DISTORSION FM EN MONO						
3	Branchez le générateur de signaux à la borne d'antenne FM à travers une antenne fictive FM de 75Ω. (Appliquer 60 dB (1 mV) à la borne d'antenne.)	100.1 MHz (modulé à 100% par 400 Hz)	100.1 MHz	Brancher le voltmètre électronique a c.c. aux bornes <b>TP201</b> (-) et <b>TP202</b> (+). (Voir la Fig. 2)	T201 (Transfor FI discri.)	1. Régler en noyau T201 de telle sorte que le voltage mesuré dans le mode sans signal, soit de 0mV dans la gamme des 300mV.
4		100.1 MHz (modulé à 100% par 400Hz)	100.1 MHz	Branchez un distor-tion mètre sur les bornes de haut-parleur de appareil	T202 (Transfor FI discri.)	1. Régler le noyau T202 de telle sorte que la distor-tion des canaux droit et gauche soit la plus faible.
REGLAGE PILOTE MULTIPLEX FM						
AVEC UN ERÉQUENCÉMÈTRE			PAR UN OUTRE SYSTÈME			
5	1. Signal mono 100.1MHz non modulé appliqué à l'appareil. 2. Commutateur de silencieux sur "on/FM auto". 3. Branchez le fréquencermètre sur <b>TP301</b> à travers une. 4. Régler <b>VR301</b> sur 19kHz ±30Hz.			1. Appliquez à l'appareil un signal stéréo provenant d'un générateur ou de la réception d'un émetteur. 2. Régler <b>VR301</b> jusque à ce que l'indicateur de stéréo-phonie s'allume. Collez le curseur le <b>VR301</b> comme indiqué sur la fig. 4.		

# ESPAÑOL

## ■ ESPECIFICACIONES

(DIN 45 500)

### ■ SECCION AMPLIFICADOR

Potencia continua de 20 Hz~20 kHz en ambos canales	2 × 45W (4Ω) 2 × 37W (8Ω)
Potencia continua de 1 kHz en ambos canales	2 × 55W (4Ω) 2 × 47W (8Ω)
Distorsión armónica total	
potencia de régimen a 20 Hz~20 kHz	0,02% (4Ω) 0,007% (8Ω)
potencia de régimen a 1 kHz	0,001% (8Ω)
Distorsión por Intermodulación	
potencia de régimen a 250 Hz: 8 kHz=4:1, 4Ω	0,02%
potencia de régimen a 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0,01%
Ancho de banda de potencia con ambos canales, -3 dB	5 Hz~40 kHz (4Ω)
Factor de amortiguamiento	20 (4Ω), 40 (8Ω)
Sensibilidad e impedancia de entrada	
TOCADISC. (PHONO)	2,5 mV/47kΩ
CD/AUX1, VIDEO/AUX2, TAPE/EXT	150 mV/22kΩ
Voltaje máximo de entrada de PHONO (1 kHz, RMS)	160 mV
Relación de señal a ruido	
potencia de régimen (4Ω)	
TOCADISC. (PHONO)	72 dB (IHF, A: 80 dB)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	88 dB (IHF, A: 95 dB)
potencia de régimen (8Ω)	
TOCADISC. (PHONO)	72 dB (IHF, A: 80 dB)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	88 dB (IHF, A: 95 dB)
Respuesta de frecuencia	
TOCADISC. (PHONO)	curva RIAA estándar ±0,8 dB (30 Hz~15 kHz)
CD/AUX1, VIDEO/AUX2, TAPE/EXT	5 Hz~70 kHz (-3 dB)
Controles de tono	
BAJOS (BASS)	50 Hz, +10 dB~-10 dB
AGUDOS (TREBLE)	20 kHz, +10 dB~-10 dB
Control de sonoridad (volumen a -30 dB)	50 Hz, +9 dB
Voltaje de salida	
GRAB., SAL. GRAB. (TAPE, REC OUT)	150 mV
Equilibrio de canales, 250 Hz a 6,300 Hz	±1 dB
Separación de canales	55 dB
Impedancia y nivel de salida de los auriculares	440 mV/330Ω
Impedancia de carga	
MAIN o REMOTE	4Ω~16Ω
MAIN y REMOTE	8Ω~16Ω

### ■ SECCION PARA SINTONIZADOR FM

Gama de frecuencias	87,50~108,00 MHz 87,525~108,025 MHz (+25 kHz shift)
Sensibilidad	
Señal a ruido 30 dB	1,9 μV (300Ω), 1,3 μV (75Ω)
Señal a ruido 26 dB	1,7 μV (300Ω), 1,2 μV (75Ω)
Señal a ruido 20 dB	1,5 μV (300Ω), 0,9 μV (75Ω)

Sensibilidad utilizable IHF	1,9 μV (IHF '58)
Sensibilidad de acallamiento estéreo de 46 dB IHF	22 μV/75Ω
Distorsión armónica total	
MONO. (MONO)	0,15%
ESTEREO (STEREO)	0,3%
Relación de señal a ruido	
MONO. (MONO)	60 dB (77 dB, IHF)
ESTEREO (STEREO)	58 dB (71 dB, IHF)
Respuesta de frecuencia	20 Hz~15 kHz, +1 dB~-2 dB
Selectividad alternada de canal	±400 kHz 70 dB
Relación de captura	1 dB
Rechazo de Imagen a 98 MHz	55 dB
Rechazo de F.I. a 98 MHz	80 dB
Rechazo de respuesta espuria a 98 MHz	82 dB
Supresión AM	50 dB
Separación estereofónica	
1 kHz	40 dB
10 kHz	30 dB
Fuga de onda portadora	
19 kHz	-33 dB (-35 dB, IHF)
38 kHz	-50 dB (-50 dB, IHF)
Equilibrio de canales 250 Hz~6 300 Hz	±1,5 dB
Punto de limite	1,2 μV
Ancho de banda	
Amplificador FI	180 kHz
Demodulador FM	1000 kHz
Bornes de antena	300Ω (equilibrado) 75Ω (no equilibrado)

### ■ SECCION PARA SINTONIZADOR AM

Gama de frecuencias	522~1629 kHz (9 kHz pasos)
Sensibilidad (Relación de señal a ruido de 20 dB)	20 μV, 300 μV/m
Selectividad	55 dB
Rechazo de imagen a 999 kHz	40 dB
Rechazo de F.I. a 999 kHz	60 dB

### ■ GENERAL

Consumo de energía	330W
Alimentación de energía	
Para Europa continental	CA 50 Hz/60 Hz, 220V
Para otros países	CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensiones (An.×Al.×Prof.)	430 × 97 × 283 mm (16-15/16" × 3-13/16" × 11-5/32")
Peso	6,6 kg (14,6 lb.)

#### Nota:

La distorsión armónica total se mide con el analizador de espectro digital (sistema H.P. 3045).

(Estas especificaciones están sujetas a cualquier cambio sin previo aviso.)

# MEDICIONES Y AJUSTES

## AJUSTE DE AM

Nota: Bobina AM OSC (L202) y AM IFT (T203) han sido ya ajustados.

• Puesta y Uso de equipo 1. Voltímetros electrónicos de CA y CC (EVM) 2. Generador de señales AM (AM-SG). 3. Poner selector FM-AM en posición "AM". 4. Poner selector de asignación AM en posición "9 kHz step". 5. La salida de generador de señales no debe ser mayor que la necesaria para obtener una lectura de salida. 6. Para el ajuste use un destornillador no metálico. 7. Mantener voltaje de línea a voltaje nominal.						
Nº.	AM GENERADOR DE SEÑALES		A FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE
	CONEXION	FRECUENCIA				
<b>AJUSTE RF-AM</b>						
1	Conector AM-SG a terminal de antena AM a través de capacitor 200pF. Cumún a chasis. (Entrada débil)	612kHz (Mod. 30% con 400Hz)	612kHz	Conectar EVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	L201 (Bobina ANT AM)	1. Ajustar para salida máxima. 2. Ajustar núcleo de ferrita de L201 con destornillador.
2		1503kHz (Mod. 30% con 400Hz)	1503kHz	Conectar EVM de CA u osciloscopio a terminales de "SPEAKER" (altavoz).	CT201 (Trimer de ANT AM)	1. Ajustar para salida máxima. 2. Repetir pasos (1) y (2) hasta que la frecuencia se adapte correctamente a la escala del cuadrante.

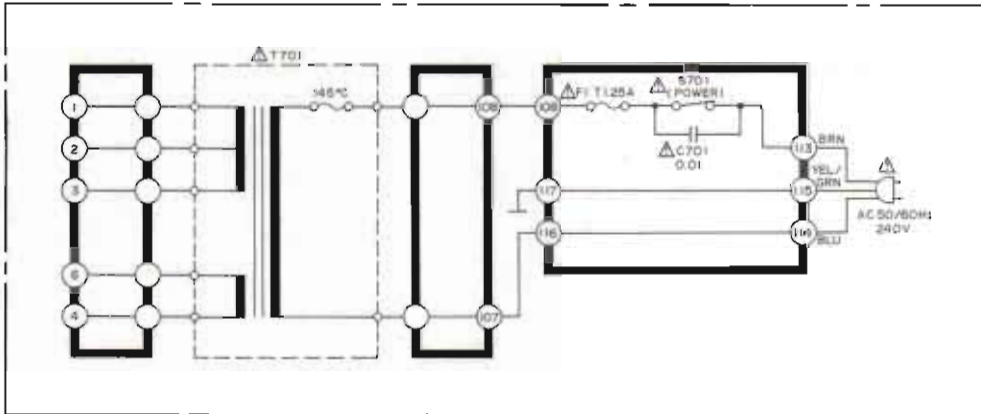
## AJUSTE DE FM

• Equipo usado 1. Generador de señales FM (FM-SG) 2. Osciloscopio. 3. Voltímetros electrónicos de CA y CC (EVM). 4. Frecuencímetro (19kHz y 108MHz medibles). 5. Poner selector FM-AM en posición "FM". 6. Poner el interruptor de modalidad FM en la posición "MONO". 7. Otras puestas son las mismas que en ajuste AM.						• Preparación de generador de señales FM (FM-SG) 1. Aplicar salida SG a terminal de antena del aparato a través de antena ficticia de FM de 75Ω. 2. La entrada standard del aparato es 60 dB (1 mV), modulación 100%, 400 Hz (Por el uso de antena ficticia, la salida de SG ha de ser 12 dB (4μV) más (IHF). Es decir, cuando entrada es 60 dB (1 mV), salida de SG ha de ser 72 dB (4 mV). 3. Conectar el modulador estereofónico a FM-SG.					
Nº.	FM GENERADOR DE SEÑALES		A FRECUENCIA DE PRESENTACION	PREPARACIONES	PIEZAS AJUSTADAS	PROCEDIMIENTO DE AJUSTE					
	CONEXION	FRECUENCIA									
<b>AJUSTE DE DISTORSION FM MONO</b>											
3	Conectar FM-SG a terminal de antena FM a través de antena ficticia FM de 75Ω. (Aplicar 60 dB (1 mV) a terminal de antena).	100.1 MHz (Mod. 100% con 400Hz)	100.1 MHz	Conectar EVM CC entre terminal TP201 (-) y TP202 (+) a través de bobina de choque. (Referir Fig. 2)	T201 (Discr. IFT)	1. Ajustar núcleo de T201 de manera que voltaje medido en modalidad de señal se 0mV en gama de 300mV.					
4		100.1 MHz (Mod. 100% con 400Hz)	100.1 MHz	Conectar osciloscopio a terminal "speaker" (altavoz)	T202 (Discr. IFT)	1. Ajustar núcleo de T202 de manera que distorsión de canales derecho e izquierdo se minimice.					
<b>AJUSTE DE V.C.O. MPX de FM</b>											
USANDO UN FRECUENCIMETRO				USANDO SISTEMA ALTERNATIVO							
5	1. Señal mono no modulada de 100.10MHz 60dB aplicada al aparato. 2. Interruptor de modalidad/silenciador FM a "auto FM". 3. Conectar frecuencímetro a TP301 a través de resistor (100kΩ). (Vea la Fig. 3) 4. Ajustar VR301 a 19kHz ±30Hz.			1. Aplicar una señal estereofónica al aparato o recibir una emisión estereofónica. 2. Ajustar VR301 y fijar el contacto deslizante de VR301 en el medio de la gama-ON del indicador estereofónico. (Vea la Fig. 4).							

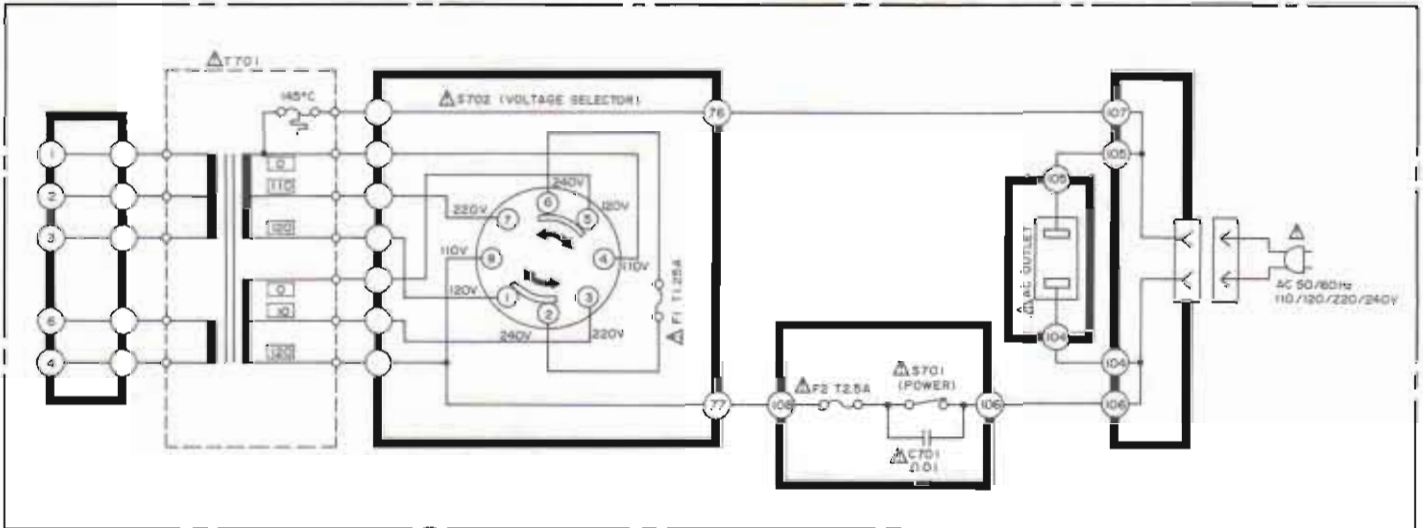
## ■ CIRCUITS TO BE CHANGED AND THE AREAS

### ● Power supply circuit

Product for Australia [XL] only



Product for [XA] only



[XA] is available in Asia, Latin America, Africa, Middle Near East and Oceania.