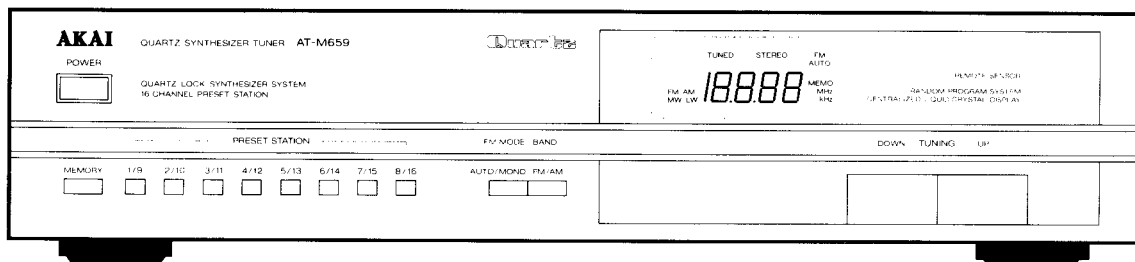


AKAI SERVICE MANUAL



QUARTZ SYNTHESIZER TUNER

MODEL AT-M459/L MODEL AT-M659/L

SPECIFICATIONS

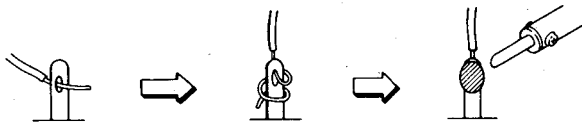
<p>FM TUNER SECTION Tuning frequency range.....87.5 MHz~108 MHz Usable sensitivity.....18.0 dBf Quieting sensitivity Mono21.0 dBf Stereo42.0 dBf Capture ratio.....2.0 dB Selectivity.....65 dB Image rejection.....45 dB IF rejection.....75 dB Spurious rejection80 dB AM suppression.....53 dB S/N (IHF) Mono70 dB Stereo65 dB T.H.D. Mono0.2% Stereo0.5% Stereo separation (1 kHz).....35 dB Frequency response30 Hz~15 kHz \pm1.0 dB Output level730 mV/2 k ohms (100% Mod.)</p> <p>AM TUNER SECTION Tuning frequency range MW (for US & Canada).....530 kHz~1,610kHz (for others).....531 kHz~1,602 kHz Usable sensitivity.....400 μV/m Selectivity.....35 dB Image rejection.....30 dB IF rejection.....45 dB S/N30 dB Output level220 mV/2 k ohms (30% Mod.)</p>	<p>LW SECTION (AT-M459L, M659L only) Tuning frequency range (for US & Canada)— (for others)144 kHz~351 kHz Usable sensitivity800 μV/m Selectivity.....30 dB Image rejection.....30 dB IF rejection30 dB S/N30 dB Output level220 mV/2 kohms (30% Mod.) Power requirements220 V, 50 Hz for Europe except UK 240 V, 50 Hz for UK and Australia 110 V-120 V/220 V-240 V, 50 Hz/60 Hz Convertible for other countries</p> <p>Dimensions AT-M459/L.....350 (W) \times 81 (H) \times 360 (D) mm (13.8 \times 3.2 \times 14.0 inches) AT-M659/L.....350 (W) \times 82 (H) \times 360 (D) mm (13.8 \times 3.2 \times 14.0 inches)</p> <p>Weight AT-M459/L2.7 kg (5.9 lbs) AT-M659/L2.8 kg (6.2 lbs)</p> <p>Standard accessories Connection cordRCA pin cord \times 1 FM Dipole antenna\times 1 FM Plug adaptor\times 1 AM Loop antenna\times 1</p>
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* For improvement purposes, specifications and design are subject to change without notice.

★ SAFETY INSTRUCTIONS

PRECAUTIONS DURING SERVICING

- Parts identified by the Δ (*) symbol parts are critical for safety. Replace **only** with parts number specified.
- In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation.
These must also be replaced only with specified replacements.
Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
- Use specified internal wiring. Note especially:
 - Wires covered with PVC tubing
 - Double insulated wires
 - High voltage leads
- Use specified insulating materials for hazardous live parts. Note especially:
 - Insulation Tape
 - PVC tubing
 - Spacers (Insulating Barriers)
 - Insulation sheets for transistors
 - Plastic screws for fixing microswitch (especially in turntable)
- When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



- Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).

- Check that replaced wires do not contact sharp edged or pointed parts.
- Also check areas surrounding repaired locations.
- Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

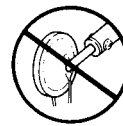
SAFETY CHECK AFTER SERVICING

Confirm the specified insulation resistance between power cord plug prongs and externally exposed parts of the set is greater than 10 M ohms. but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for \square C or \square A, specified insulation resistance should be headphone jacks line-in-out jacks etc. more than 2.2 M ohms (ground terminals, microphone jacks).

PRECAUTIONS FOR LITHIUM BATTERY

The lithium battery may explode when heated excessively. [OBSERVE THE FOLLOWING WHEN REPLACING]

- Replace with the same make and type only.
- Use soldering iron in "recommended way" only.
- Place battery in correct polarity.
- Do not short the terminals.
- Do not recharge battery.
- Do not dispose of battery in fire.



[DANGER]



[RECOMMENDED WAY]

★ INFORMATION

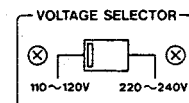
SYMBOLS FOR PRIMARY DESTINATION

Alphabet indicates the destination of the units as listed below.

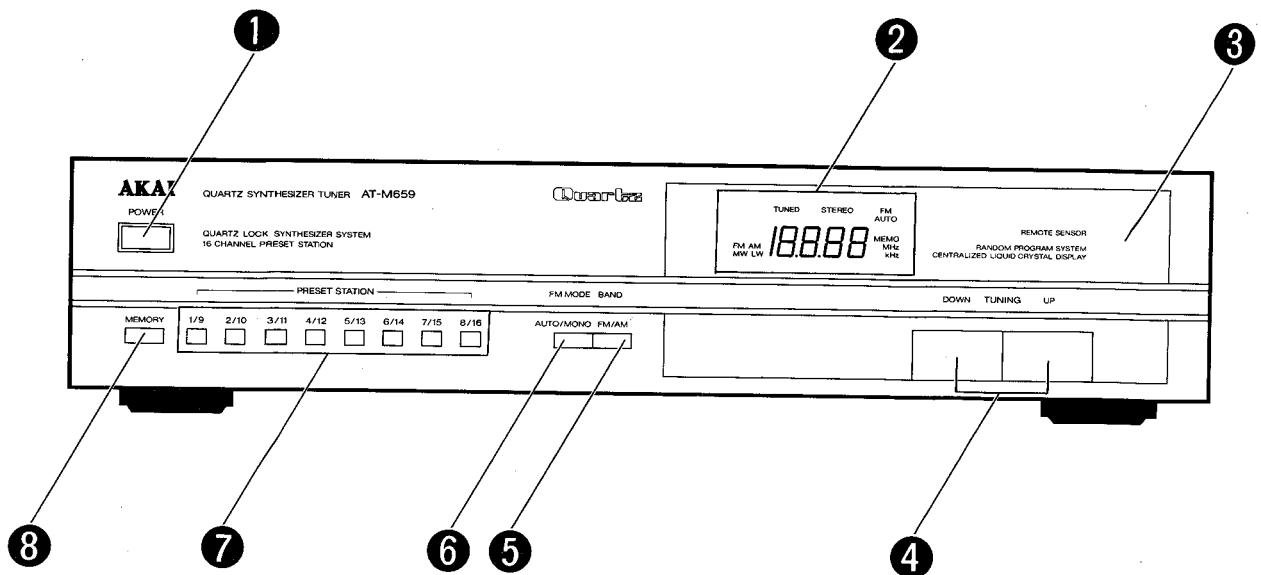
Symbols	Principal Destinations
\square A	USA
\square B	UK
\square C	Canada
\square E	Europe (except UK)
\square J	Japan
\square S	Australia
\square V	W. Germany only
\square U	Universal Area
\square Y*	Custom version

VOLTAGE CONVERSION (U Model only)

Before connecting the power cord. SET the VOLTAGE SELECTOR located on the rear panel with a screwdriver so that the correct voltage is indicated.



I. CONTROLS



- 1 POWER Button**
To turn the power on and off.
- 2 LC (Liquid Crystal) Display**
Indicates the tuner mode.
- 3 REMOTE SENSOR Window**
Receives the signals from the RC-S659 remote control unit (Included with the AM-M659).
- 4 TUNING UP and DOWN Buttons**
For tuning in stations manually.
- 5 BAND Button**
To select the band (FM/AM).
- 6 FM MODE Button**
To select between stereo and monaural reception when tuning in FM stations.
- 7 PRESET STATION Buttons (1-8/9-16)**
For memorizing stations and recalling memorized stations.
- 8 MEMORY Button**
Stores stations in the preset memory. Press the button once to preset stations at numbers 1 to 8, and twice to preset stations at numbers 9 to 16.

On the LC Display

TUNED Indicator

Tells you a station is properly tuned in.

STEREO Indicator

Tells you the tuned in FM station is being broadcast in stereo.

FM AUTO Indicator

Tells you the FM MODE button is set to AUTO.



Band Indicator (AM/FM for AT-M659, LW/MW/FM for AT-M659L)

Tells you which band is selected.

Digital display

Tells you the tuned in frequency or the preset station number.

Frequency Indicators (kHz/MHz)

Tells you the unit of the tuning frequency.

MEMO Indicator

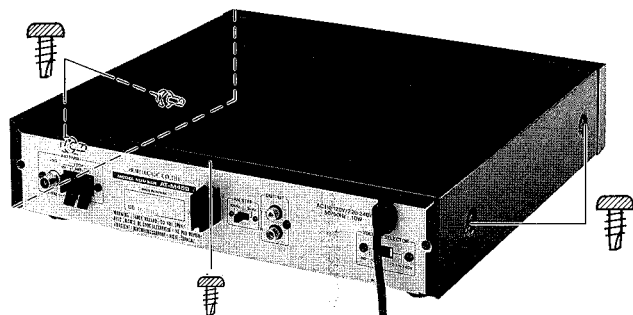
Tells you the tuner is ready to store a station in the memory.

II. DISASSEMBLY

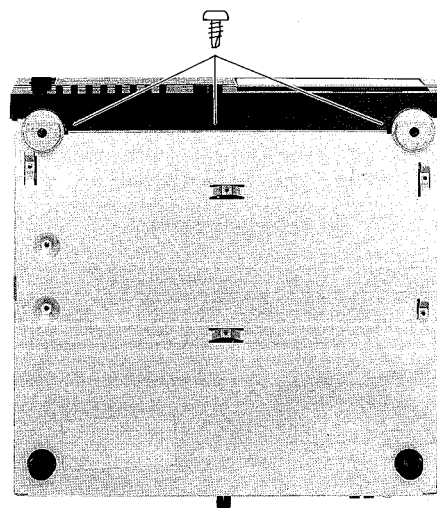
In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.

* Photographs employed in this paragraphs are model AT-M459.

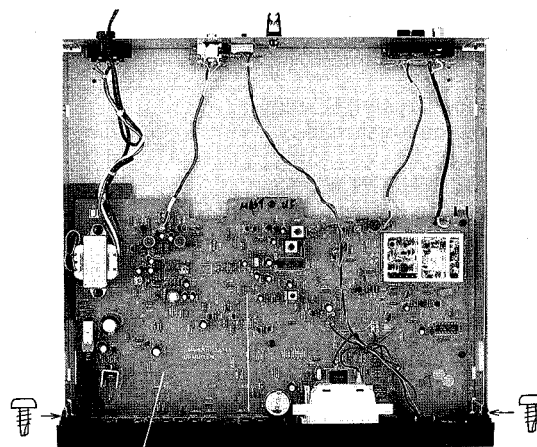
1. Removal of UPPER COVER



2. Removal of FRONT PANEL



3.

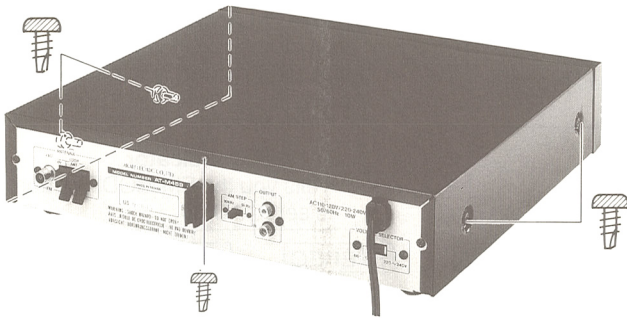


II. DISASSEMBLY

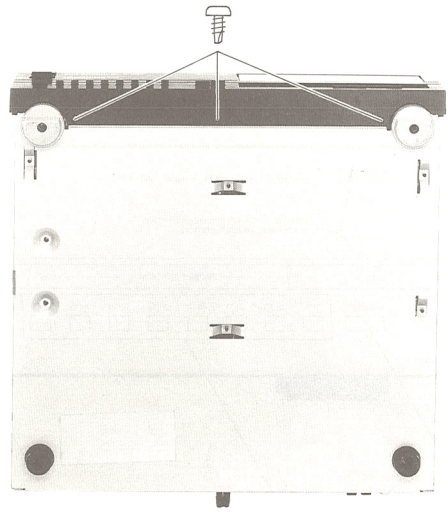
In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.

* Photographs employed in this paragraphs are model AT-M459.

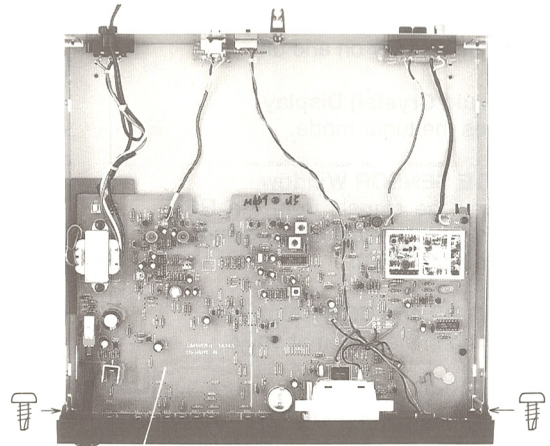
1. Removal of UPPER COVER



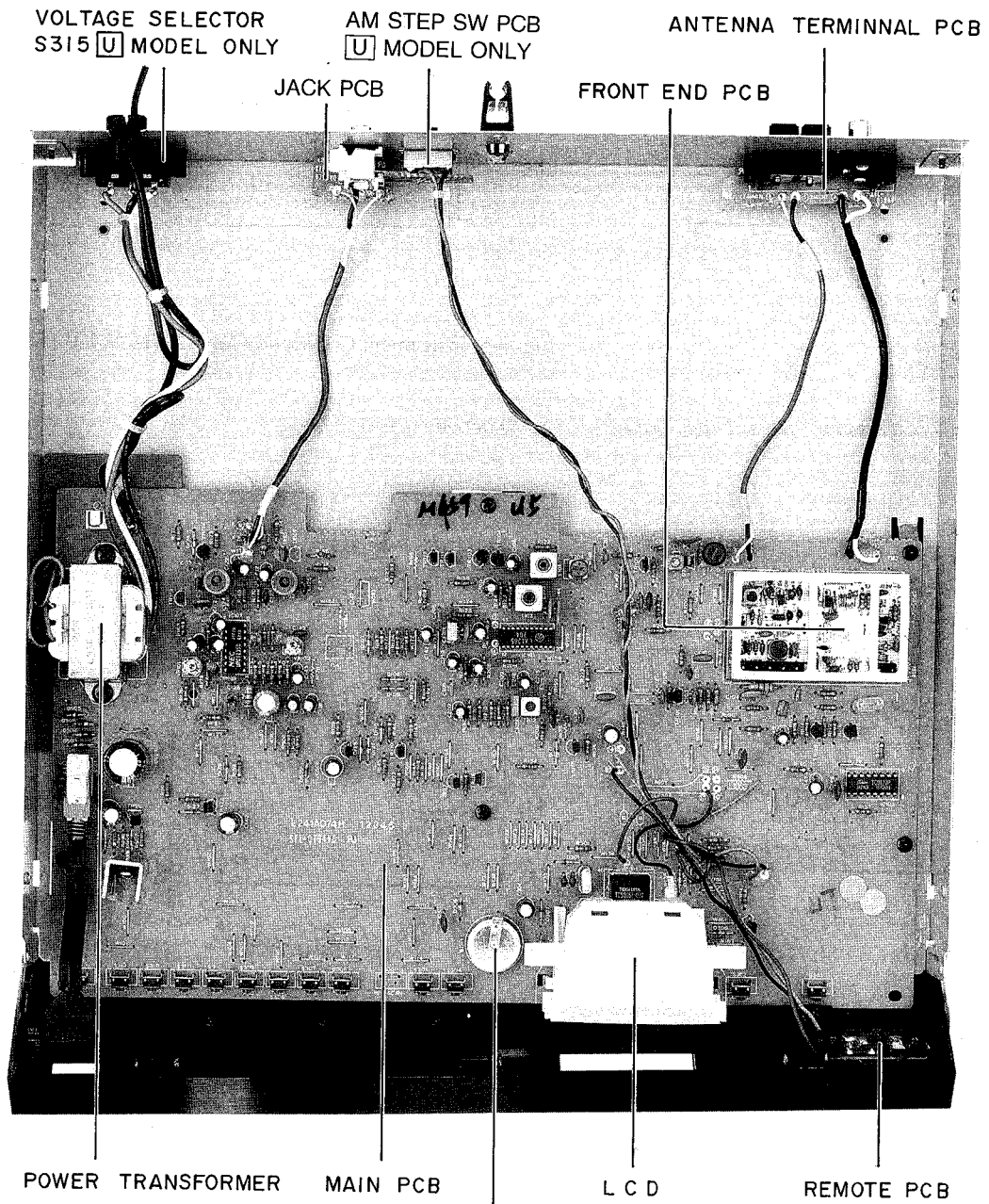
2. Removal of FRONT PANEL



3.



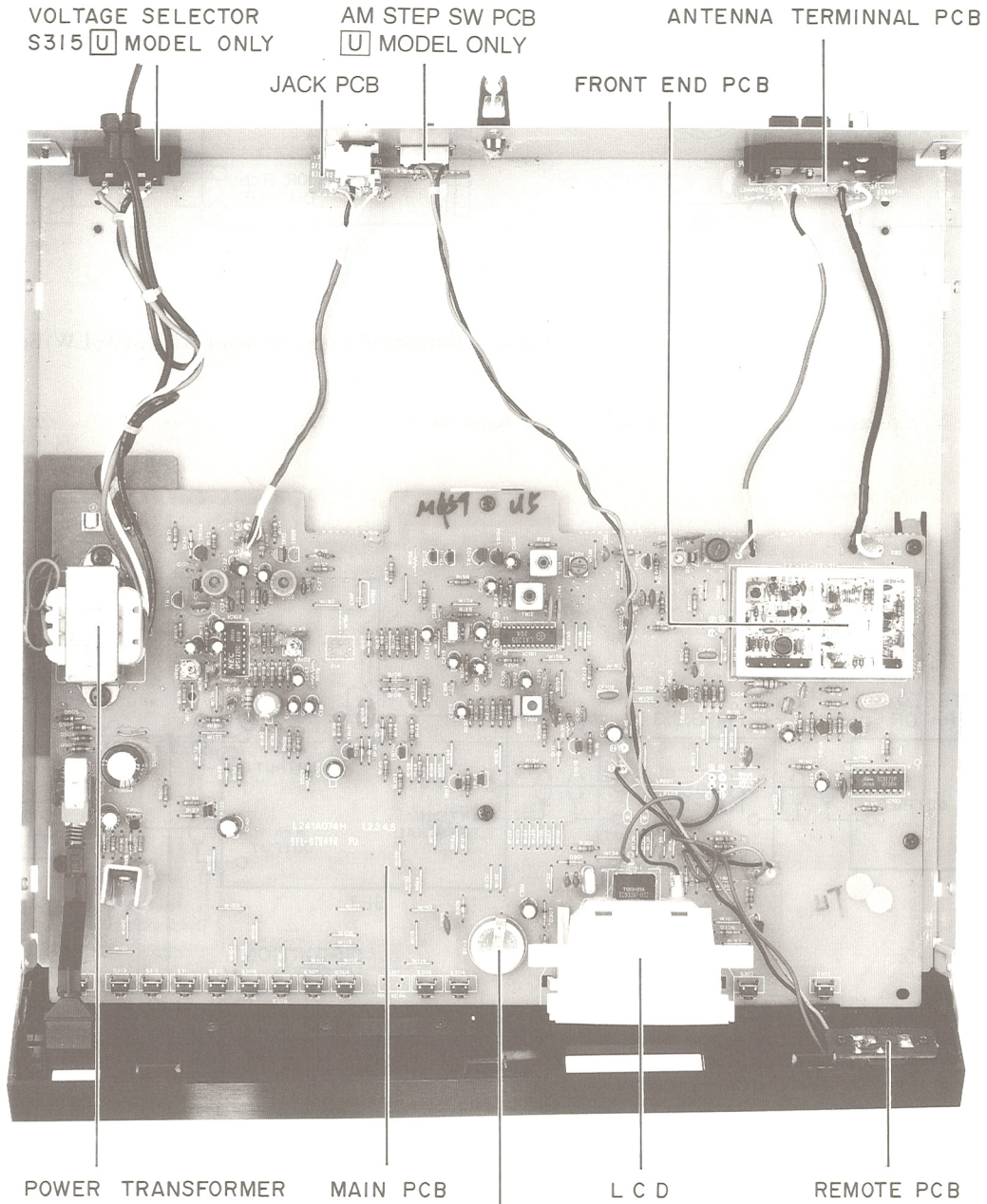
III. PRINCIPAL PARTS LOCATION



* LITHIUM BATTERY

* WHEN REPLACEMENT IS NEEDED
SEE SAFETY INSTRUCTIONS.

III. PRINCIPAL PARTS LOCATION



* LITHIUM BATTERY

* WHEN REPLACEMENT IS NEEDED
SEE SAFETY INSTRUCTIONS.

IV. ADJUSTMENT

4-1. INSTRUMENT CONNECTIONS

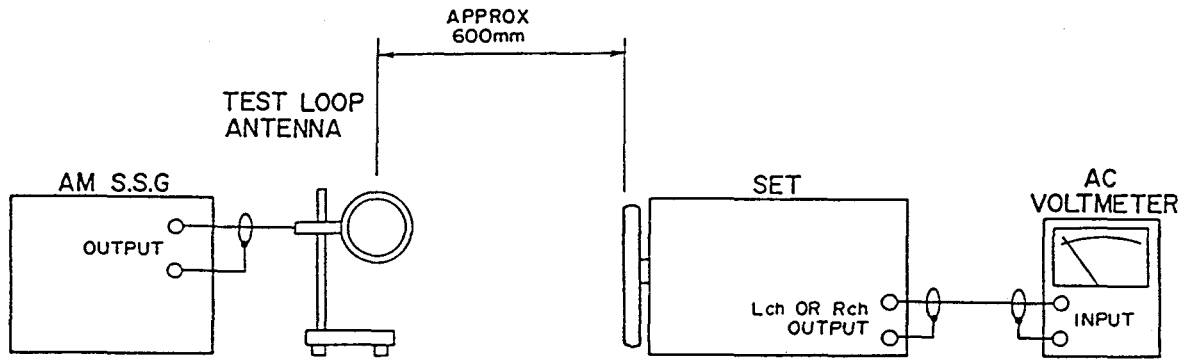


Fig. 4-1 Instrument Connection for AM (MW, LW) Section Adjustment

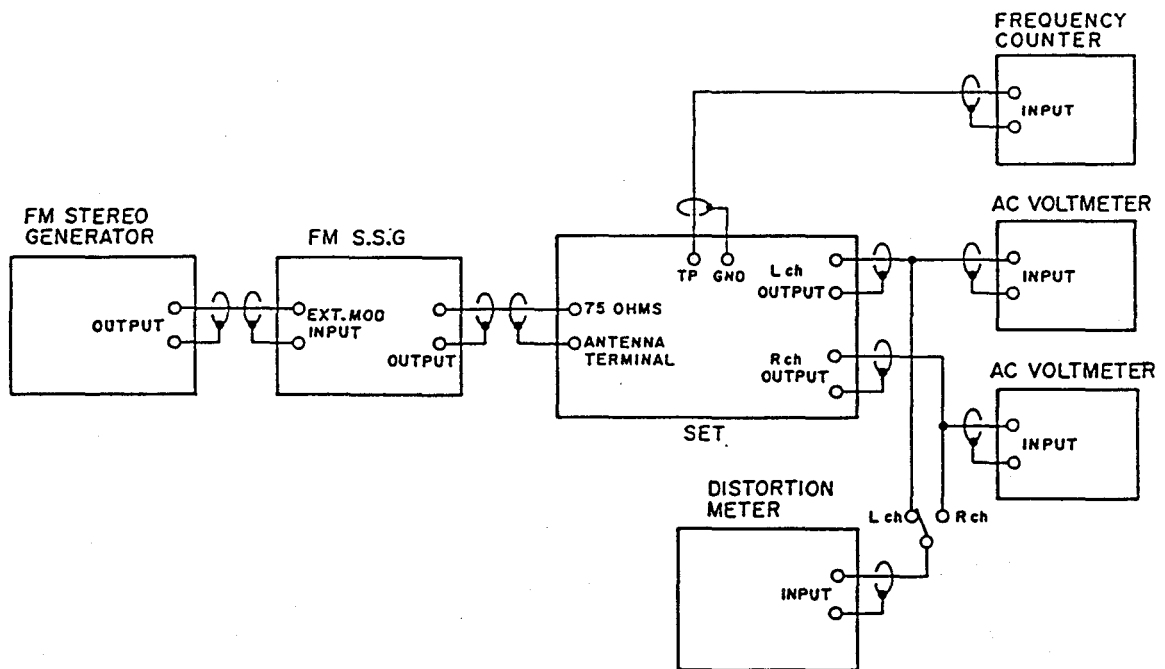


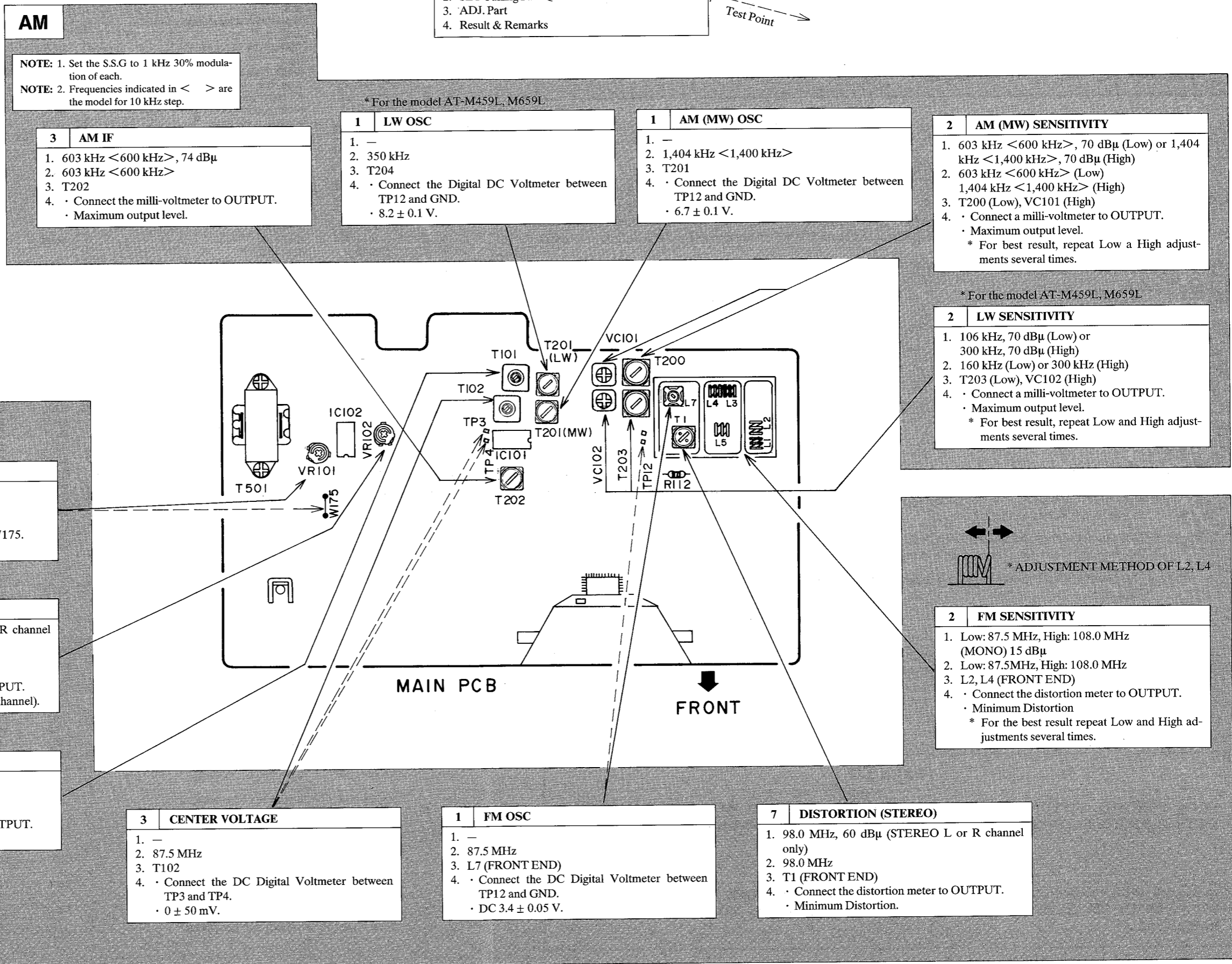
Fig. 4-2 Instrument Connection for FM Section Adjustment

4-2. ADJUSTMENT

NOTE: 1. Set the S.S.G. to 1 kHz, 75 kHz deviation for [U], [S] model, 1 kHz 40 kHz deviation for [B], [E] or [V] model.
2. Confirm that the Sensitivity margin between Low and High range sensitivities is within 3 dB, otherwise readjust Low and High range sensitivity.

STEP	ADJUSTMENT ITEM
1.	SSG FREQ. & OUTPUT LEVEL
2.	SET Tuning FREQ.
3.	ADJ. Part
4.	Result & Remarks

Adjustment Part
Test Point



AM

NOTE: 1. Set the S.S.G to 1 kHz 30% modulation of each.
NOTE: 2. Frequencies indicated in < > are the model for 10 kHz step.

3	AM IF
1.	603 kHz <600 kHz>, 74 dBμ
2.	603 kHz <600 kHz>
3.	T202
4.	• Connect the milli-voltmeter to OUTPUT. • Maximum output level.

* For the model AT-M459L, M659L

1	LW OSC
1.	—
2.	350 kHz
3.	T204
4.	• Connect the Digital DC Voltmeter between TP12 and GND. • 8.2 ± 0.1 V.

1	AM (MW) OSC
1.	—
2.	1,404 kHz <1,400 kHz>
3.	T201
4.	• Connect the Digital DC Voltmeter between TP12 and GND. • 6.7 ± 0.1 V.

2	AM (MW) SENSITIVITY
1.	603 kHz <600 kHz>, 70 dBμ (Low) or 1,404 kHz <1,400 kHz>, 70 dBμ (High)
2.	603 kHz <600 kHz> (Low) 1,404 kHz <1,400 kHz> (High)
3.	T200 (Low), VC101 (High)
4.	• Connect a milli-voltmeter to OUTPUT. • Maximum output level. * For best result, repeat Low a High adjustments several times.

* For the model AT-M459L, M659L

2	LW SENSITIVITY
1.	106 kHz, 70 dBμ (Low) or 300 kHz, 70 dBμ (High)
2.	160 kHz (Low) or 300 kHz (High)
3.	T203 (Low), VC102 (High)
4.	• Connect a milli-voltmeter to OUTPUT. • Maximum output level. * For best result, repeat Low and High adjustments several times.

ADJUSTMENT METHOD OF L2, L4

2	FM SENSITIVITY
1.	Low: 87.5 MHz, High: 108.0 MHz (MONO) 15 dBμ
2.	Low: 87.5MHz, High: 108.0 MHz
3.	L2, L4 (FRONT END)
4.	• Connect the distortion meter to OUTPUT. • Minimum Distortion * For the best result repeat Low and High adjustments several times.

FM

5	MPX FREE RUNNING
1.	—
2.	—
3.	VR101 & W175
4.	• Connect the Frequency counter to W175. • $19 \text{ kHz} \pm 50 \text{ Hz}$

6	STEREO SEPARATION
1.	98.0 MHz, 60 dBμ (STEREO L or R channel only)
2.	98.0 MHz
3.	VR102
4.	• Connect the milli-voltmeter to OUTPUT. • Minimum output level for opposite channel).

4	DISTORTION (MONO)
1.	87.5 MHz, 60 dBμ (MONO)
2.	87.5 MHz
3.	T101
4.	• Connect the distortion meter to OUTPUT. • Minimum Distortion.

3	CENTER VOLTAGE
1.	—
2.	87.5 MHz
3.	T102
4.	• Connect the DC Digital Voltmeter between TP3 and TP4. • 0 ± 50 mV.

1	FM OSC
1.	—
2.	87.5 MHz
3.	L7 (FRONT END)
4.	• Connect the DC Digital Voltmeter between TP12 and GND. • $DC 3.4 \pm 0.05$ V.

7	DISTORTION (STEREO)
1.	98.0 MHz, 60 dBμ (STEREO L or R channel only)
2.	98.0 MHz
3.	T1 (FRONT END)
4.	• Connect the distortion meter to OUTPUT. • Minimum Distortion.

V. PARTS LIST

ATTENTION

- When placing an order for parts, be sure to list Part No., Model No. and the description of each part. Otherwise, the non-delivery of the part or the delivery of a wrong part may result.
- Please make sure that Part No. is correct when ordering. If not, a part different from the one you ordered may be delivered.
- Since the parts shown in Parts List of Preliminary Service Manual may have been the subject of changes, please use this Parts List for all future reference.

HOW TO USE THIS PARTS LIST

- This Parts List lists those parts which are considered necessary for repairs. Other common parts, such as resistors and capacitors, are listed in the "Common List for Service Parts" from which these parts should be selected and stocked.
- The Recommended Spare Parts List shows those parts in the Parts List which are considered particularly important for service.
- Parts not shown in the Parts List and "Common List for Service Parts" will not in principle be supplied.
- How to read the Parts List.

a) Mechanism Block

b) PC Board

2. HEAD BASE BLOCK

REF. NO.	PART NO.	DESCRIPTION
2-1x	BH-T2023A320A	HEAD BASE BLOCK
2-2	HP-H2206A010A	HEAD R/P PR4-8FU C
2-3	ZS-477876	PAN20x03STL CMT
2-4	ZS-536488	BID20x08STL CMT
2-5	ZG-402895	SP CS ANGLE ADJUST

SP (Service Parts) Classification

A small "x" indicates that this part is not shown in the Photo or Illustration.

This number corresponds with the individual parts index number in that figure.

This number corresponds with the Figure Number.

6. MAIN PC BOARD

REF. NO.	PART NO.	DESCRIPTION
6-IC1	EI-324536	IC HD14049BP
6-IC2	EI-336801	IC MB8841-564M
6-C1A	EC-338399	C MMY V 223M 250AC [U,E,B,S]
6-C1B	EC-350949	C MMY V 223M 250DC [J]
6-C1C	EC-338397	C MMY V 223M 125AC [C,A]
6-X1	EI-318384	OSC X'TAL NC-18C

Symbols for primary destination

[A]: AAL(U.S.A.) [S]: SAA (Australia)
 [B]: BEAB(England) [U]: U/T(Universal Area)
 [C]: CSA(Canada) [V]: VDE(W. Germany)
 [E]: CEE(Europe) [Y]: Custom Version
 [J]: JPN(Japan)

SP (Service Parts) Classification

These reference symbols correspond with component symbols in the Schematic Diagrams.

The available PC Board Blocks are listed separately.

- When Part No. is known, Parts Index at end of Parts List can be used to locate where that part is shown in Parts List by its Reference No. listed at right of Part No.

WARNING

△ (*) INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURE'S RECOMMENDED PARTS.

AVERTISSEMENT

△ (*) IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

1. RECOMMENDED SPARE PARTS

Ref. No.	Part No.	Description
1	*BT-725479T	TRANS POW AT-M459(B,S) [B,S]
2	*BT-725478T	TRANS POW AT-M459(E,V) [E,V]
3	*BT-725480T	TRANS POW AT-M459(U) [U]
4	ED-301911	D SILICON H DS448
5	*ED-570295	D SILICON 1N4003 200/1.0A
6	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
7	ED-349448	D VARACTOR 1SV147
8	*ED-381066J	D ZENER H HZ15E-B1
9	*ED-381065J	D ZENER H HZ15E-B3
10	ED-381064J	D ZENER H HZ5.6E-B3
11	EH-344434	FILTER CE BFU450C4N 0.450MHZ
12	EH-715258	FILTER CE CFM2-450BL
13	EH-725490T	FILTER CE SK10.7M2
14	EH-724646T	FILTER LC LP L351Y016(FB-7DG) [V]
15	EI-383530J	IC BX-1407
16	EI-361624	IC LA1265
17	EI-332203	IC TC4528BP
18	EI-363289	IC TC9172P
19	EI-383733J	IC TC9306F-022
20	EI-351849	IC UPC1235C
21	EI-344422	OSC X'TAL HC-18/U 7.200MHZ
22	EM-382120J	IND LCD 9437MJP
23	*ES-725487T	SW PUSH [POWER SW]
24	*ES-725477T	SW SLIDE [U] [S502][VOLTAGE SELECTOR] SW SLIDE J-S5029#01 02-02N [U] [AM STEP SW]
25	ES-724644T	[U] [S502][VOLTAGE SELECTOR] SW SLIDE J-S5029#01 02-02N [U] [AM STEP SW]
26	ES-720639	SW TACT SKHHLH1520-CL [TUNING DOWN]
27	ET-353734	TR FET 2SJ103 GR,BL
28	ET-349449	TR FET 2SK161 O,Y
29	ET-349458	TR FET 2SK192A Y
30	ET-337759	TR FET 2SK246 GR
31	ET-353899	TR 2SA1317 S,T,U
32	ET-308141	TR 2SC2603 G F05
33	ET-338410	TR 2SC2878 A,B [L ONLY]
34	ET-336869	TR 2SC2999 C,D
35	ET-349081	TR 2SC3383 S,T
36	ET-356437	TR 2SC930 D2,E,F
37	ET-328265	TR 2SC930 F
38	*ET-349459	TR 2SD1406 O,Y,GR
39	*EZ-358816	BATTERY LITHIUM BR2032-1HF

2. P.C BOARD BLOCK

Ref. No.	Part No.	Description
1A	BA-725644T	PC MAIN BLK AT-M459(U) [U]
1B	BA-725642T	PC MAIN BLK AT-M459(E) [E]
1C	BA-725641T	PC MAIN BLK AT-M459(V) [V]
1D	BA-725643T	PC MAIN BLK AT-M459(S) [S]
1E	BA-725603T	PC MAIN BLK AT-M459(L) [E]
1F	BA-725602T	PC MAIN BLK AT-M459(L) [B]
2A	BA-F0131A010A	PC FRONTENDBLKFE31(U,C,A,S,E,B) [U,E,B,S]
2B	BA-F0141A010B	PC FRONT END BLK FE41(V) [V]

3. MAIN P.C BOARD

Ref. No.	Part No.	Description
BT1	*EZ-358816	BATTERY LITHIUM BR2032-1HF
CF101	EH-725490T	FILTER CE SK10.7M2
CF102	EH-725490T	FILTER CE SK10.7M2
CF200	EH-715258	FILTER CE CFM2-450BL
CF201	EH-344434	FILTER CE BFU450C4N 0.450MHZ
D108	ED-301911	D SILICON H DS448
D109	ED-301911	D SILICON H DS448
D111	ED-301911	D SILICON H DS448
D121	ED-301911	D SILICON H DS448
D124	ED-301911	D SILICON H DS448
D125	ED-301911	D SILICON H DS448
D126	ED-301911	D SILICON H DS448
D127	ED-301911	D SILICON H DS448
D201	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
D202	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
D203	ED-301911	D SILICON H DS448 [L ONLY]
D204	ED-301911	D SILICON H DS448 [L ONLY]
D205	ED-301911	D SILICON H DS448 [L ONLY]
D206	ED-301911	D SILICON H DS448 [L ONLY]
D301	ED-301911	D SILICON H DS448
D302	ED-301911	D SILICON H DS448 [L ONLY]
D303	ED-301911	D SILICON H DS448
D304	ED-301911	D SILICON H DS448
D305	ED-301911	D SILICON H DS448
D306	ED-301911	D SILICON H DS448
D307	ED-301911	D SILICON H DS448
D308	ED-301911	D SILICON H DS448
D309	ED-301911	D SILICON H DS448
D310	ED-301911	D SILICON H DS448
D311	ED-301911	D SILICON H DS448
D312	ED-301911	D SILICON H DS448
D313	ED-301911	D SILICON H DS448
D314	ED-301911	D SILICON H DS448
D315	ED-301911	D SILICON H DS448
D316	ED-301911	D SILICON H DS448
D503	*ED-570295	D SILICON 1N4003 200/1.0A
D504	*ED-570295	D SILICON 1N4003 200/1.0A
D505	*ED-570295	D SILICON 1N4003 200/1.0A
D506	*ED-570295	D SILICON 1N4003 200/1.0A
D507	*ED-381066J	D ZENER H HZ15E-B1
D508	*ED-381065J	D ZENER H HZ15E-B3
D509	ED-381064J	D ZENER H HZ5.6E-B3
FL301	EM-382120J	IND LCD 9437MJP
FL4	EH-724646T	FILTER LC LP L351Y016(FB-7DG) [V]
IC101	EI-361624	IC LA1265
IC102	EI-351849	IC UPC1235C
IC103	EI-363289	IC TC9172P
IC301	EI-383733J	IC TC9306F-022
IC302	EI-332203	IC TC4528BP
LP501	EL-725774T	PL CORD 12.0V 150MA
L101	EO-337523	COIL FIX 1 TL-8 223J
L102	EO-337523	COIL FIX 1 TL-8 223J
L103	EO-336934	COIL FIX 1 LAL03KH 2R2M
R107	ER-306805	R CB H S15 FS RDS 1/2W 101J
R150	ER-306805	R CB H S15 FS RDS 1/2W 101J
S301	ES-720639	SW TACT SKHHLH1520-CL [PRE SCAN][L ONLY]
S302	ES-720639	SW TACT SKHHLH1520-CL [TUNING DOWN]
S303	ES-720639	SW TACT SKHHLH1520-CL [TUNING UP]
S304	ES-720639	SW TACT SKHHLH1520-CL [FM/AM]
S305	ES-720639	SW TACT SKHHLH1520-CL [AUTO/MONO]
S306	ES-720639	SW TACT SKHHLH1520-CL [8/16]
S307	ES-720639	SW TACT SKHHLH1520-CL [7/15]

Ref. No.	Part No.	Description
S308	ES-720639	SW TACT SKHHLH1520-CL [6/14]
S309	ES-720639	SW TACT SKHHLH1520-CL [5/13]
S310	ES-720639	SW TACT SKHHLH1520-CL [4/12]
S311	ES-720639	SW TACT SKHHLH1520-CL [3/11]
S312	ES-720639	SW TACT SKHHLH1520-CL [2/10]
S313	ES-720639	SW TACT SKHHLH1520-CL [1/9]
S314	ES-720639	SW TACT SKHHLH1520-CL [MEMORY]
S501	*ES-725487T	SW PUSH [POWER SW]
TR101	ET-356437	TR 2SC930 D2,E,F
TR102	ET-338410	TR 2SC2878 A,B [L ONLY]
TR103	ET-349081	TR 2SC3383 S,T
TR104	ET-349081	TR 2SC3383 S,T
TR105	ET-349458	TR FET 2SK192A Y
TR106	ET-308141	TR 2SC2603 G F05 [L ONLY]
TR107	ET-308141	TR 2SC2603 G F05 [L ONLY]
TR109	ET-353734	TR FET 2SJ103 GR,BL
TR113	ET-353899	TR 2SA1317 S,T,U
TR114	ET-349081	TR 2SC3383 S,T
TR115	ET-349081	TR 2SC3383 S,T
TR116	ET-353899	TR 2SA1317 S,T,U
TR117	ET-308141	TR 2SC2603 G F05
TR118	ET-353899	TR 2SA1317 S,T,U
TR119	ET-349081	TR 2SC3383 S,T
TR120	ET-337759	TR FET 2SK246 GR
TR121	ET-308141	TR 2SC2603 G F05
TR122	ET-353899	TR 2SA1317 S,T,U
TR301	ET-353899	TR 2SA1317 S,T,U [U]
TR302	ET-353899	TR 2SA1317 S,T,U
TR501	*ET-308141	TR 2SC2603 G F05
TR502	*ET-349459	TR 2SD1406 O,Y,GR
T101	EO-725494T	COIL FM
T102	EO-725495T	COIL FM
T200A	EO-725498T	COIL ANT MW
T200B	EO-725612T	COIL MW [L ONLY]
T201	EO-725610T	COIL OSC MW
T202	EO-725496T	COIL IFT AM
T203	EO-725613T	COIL LW [L ONLY]
T204	EO-725611T	COIL OSC LW [L ONLY]
T501A	*BT-725480T	TRANS POW AT-M459(U) [U]
T501B	*BT-725478T	TRANS POW AT-M459(E,V) [E,V]
T501C	*BT-725479T	TRANS POW AT-M459(B,S) [B,S]
VC101	EC-363331	C S-FIX H CTC-6U-030 5.5-30
VC102	EC-363331	C S-FIX H CTC-6U-030 5.5-30 [L ONLY]
VR101	EV-371281	R S-FIX H VM6CKPVB 0.30W 502
VR102	EV-351189	R S-FIX H VM6CKPVB 0.30W 504
X301	EI-344422	OSC X'TAL HC-18/U 7.200MHZ

4. FRONT END P.C BOARD

Ref. No.	Part No.	Description
D1	ED-349448	D VARACTOR 1SV147
D2	ED-349448	D VARACTOR 1SV147
D3	ED-349448	D VARACTOR 1SV147 [V]
D4	ED-349448	D VARACTOR 1SV147
L1	EO-349461	COIL FIX 2 LINK
L2	EO-349462	COIL FIX 2 U147
L3	EO-349461	COIL FIX 2 LINK
L4	EO-349462	COIL FIX 2 U147
L5	EO-349462	COIL FIX 2 U147 [V]
L6	EO-359056	COIL FIX 1 LAL03NA 2R2M
L7	EO-353687	COIL OSC 2 E525HN-110003
T1	EO-337640	COIL IFT 119AC-15533X 10.7MHZ
TR1	ET-349449	TR FET 2SK161 O,Y
TR2	ET-336869	TR 2SC2999 C,D
TR3	ET-328265	TR 2SC930 F
TR4	ET-349449	TR FET 2SK161 O,Y

5. ANTENNA TERMINAL P.C BOARD

Ref. No.	Part No.	Description
JM100	EJ-359031	TERMINAL LEVER YKD31-0215 P 2P [ANTENNA TERNINAL]

6. AM STEP SW P.C BOARD

Ref. No.	Part No.	Description
S315	ES-724644T	SW SLIDE J-S5029#01 02-02N [U] [AM STEP SW]

7. JACK P.C BOARD

Ref. No.	Part No.	Description
JM101	EJ-725461T	PIN J 2P [LINE OUT]

8. REMOTE P.C BOARD

Ref. No.	Part No.	Description
IC1	EI-383530J	IC BX-1407

9. FINAL ASSEMBLY BLOCK

Ref. No.	Part No.	Description
1	SP-725660J	COVER UPPER AT (S.P)
2	ZS-322580	ST BID40X08STL BNI
3	ZS-305827	ST BID30X06STL BNI
4A	*EW-374894	AC CORD 2C VM-0129A,VFF U/T [U]
4B	*EW-347897	AC CORD 2 CORES VM0364,LCFL EV [E,V]
4C	*EW-346249	AC CORD 2 CORES LCFL2X0.75 B [B]
4D	*EW-347898	AC CORD 2 CORES VM-0436,LCFL S [S]
5	*EZ-371605	BUSH CORD 2271
6	SZ-720585	HOLDER ANTENNA
7	ZS-305827	ST BID30X06STL BNI
8	ZS-354403	ST BR30X08STL BNI
9	ZS-539741	PAN20X04STL BNI
10	*ES-725477T	SW SLIDE [U] [S502][VOLTAGE SELECTOR]
11	MZ-725615T	JOINT POWER
12	SA-725458T	FOOT (ABS)
13	SA-725452T	CUSHION FOOT (GUM)
14	ZS-305827	ST BID30X06STL BNI
15A	BD-725638T	PANEL FRONT BLK AT-M459-B
15B	BD-725601T	PANEL FRONT BLK AT-M459L-B
15C	BD-725617T	PANEL FRONT BLK AT-M659-B
15D	BD-725616T	PANEL FRONT BLK AT-M659L-B
16	SK-725482T	KNOB POWER-B
17	SK-725639T	KNOB PRE-SET-B
18	SK-725640T	KNOB TUNING-B

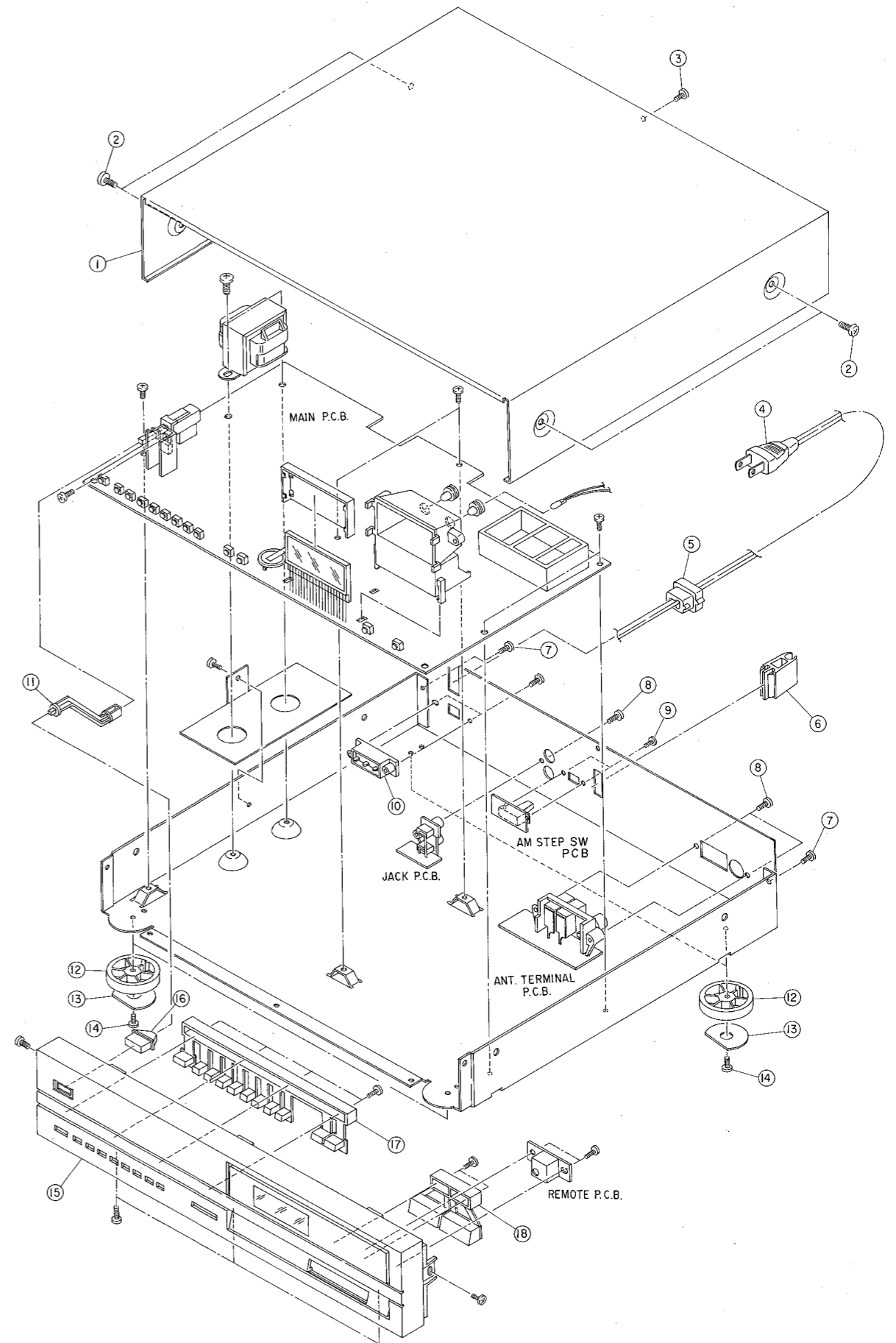
NOTE:

Parts will not be supplied if they are not listed in the parts list, even if they appear on the assembling illustrations with reference No.

10. ACCESSORY

Ref. No.	Part No.	Description
1	EW-336757	CORD SAE-020 PINX2
2	EE-359265	ANT LOOP LA-200A-A
3	EE-315329	ANT DIPOLE SAE-010
4	EJ-352118	SOCKET COAX PAL B2-714P-900

FINAL ASSEMBLY BLOCK



AKAI

MODEL AT-M459/L

MODEL AT-M659/L

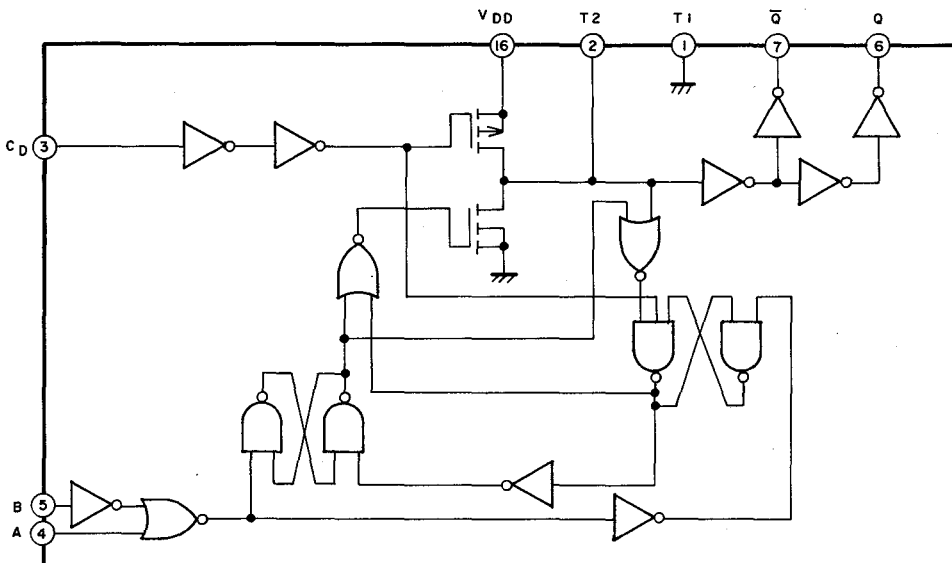
SCHEMATIC DIAGRAM AND PC BOARDS

TABLE OF CONTENTS

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2. BLOCK DIAGRAM.....	3
3. AT-M459/M659 MAIN PC BOARD AND OTHERS PC BOARD	4
4. AT-M459/M659 CONNECTION DIAGRAM.....	5
5. AT-M459L/M659L CONNECTION DIAGRAM.....	6
6. AT-M459L/M659L MAIN PC BOARD AND OTHERS PC BOARD..	7

PIN. NO.	NAME	I/O	DESCRIPTION
1 to 17	S7 to S23	O	LCD Segment data Output
18 to 19	S24 to S27	O	Not used
22	COM1	O	Output of LCD Segment for <COM1>
23	VDD	—	Not used
24 to 27	K0 to K3	I	KEY Input
28 to 32	T0 to T4	O	KEY MATRIX STROB Output
33	T5	—	Not used
34	T6	O	Switch Matrix Output
35	<TUNED>	I	Tuned Mode Input (When tuned mode: L)
36	<STEREO>	I	Stereo Mode Input (When stereo mode: L)
37	<MUTE>	O	MUTE Control (L: MUTE)
38	<REMOCON>	I	REMOCON Control Input
39	<SW1>	O	Not used
40	<F/R>	O	Not used
41	MONO	O	Forced MONO Control Output
42	STB	O	STROB Pulse Output
43	CK	O	Serial Clock Output
44	SO	O	Serial Data Output
45	SI	I	Not used
46	REF	I	REFERENCE Signal Output
47	INT	I	
48	INH	I	
49	TEST	—	Not used
50	XT		} Terminals for X'tal
51	X̄T		
52	GND		GND
53	VDD		+5V
54	COM 2	O	Output of LCD Segment for <COM2>
55 to 60	S1 ~ S6	O	LCD Segment data Output

μPD4528 (Dual Monostable Multiribrator)

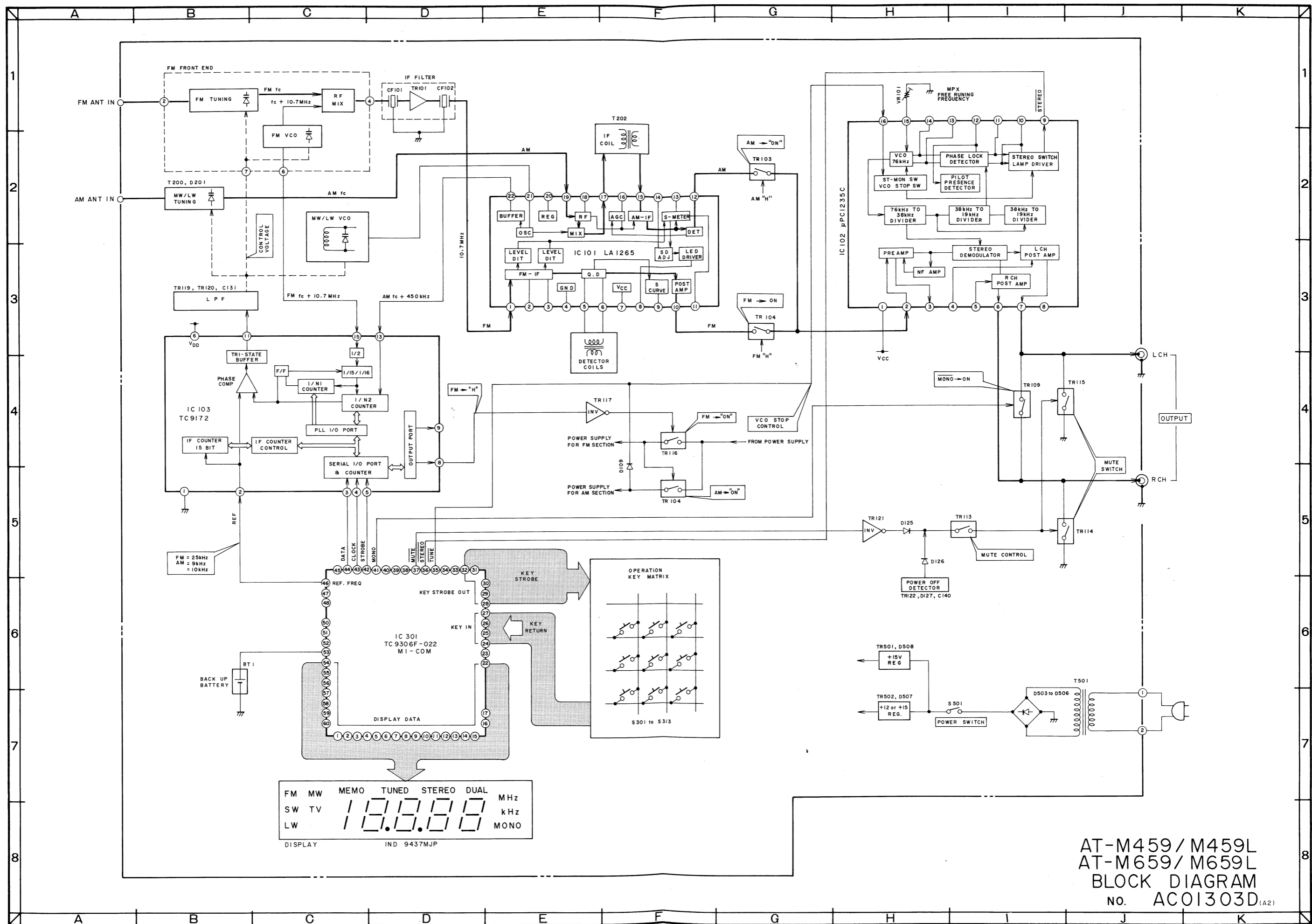


(1/2 DEVICE)

TRUTH TABLE

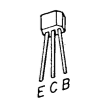
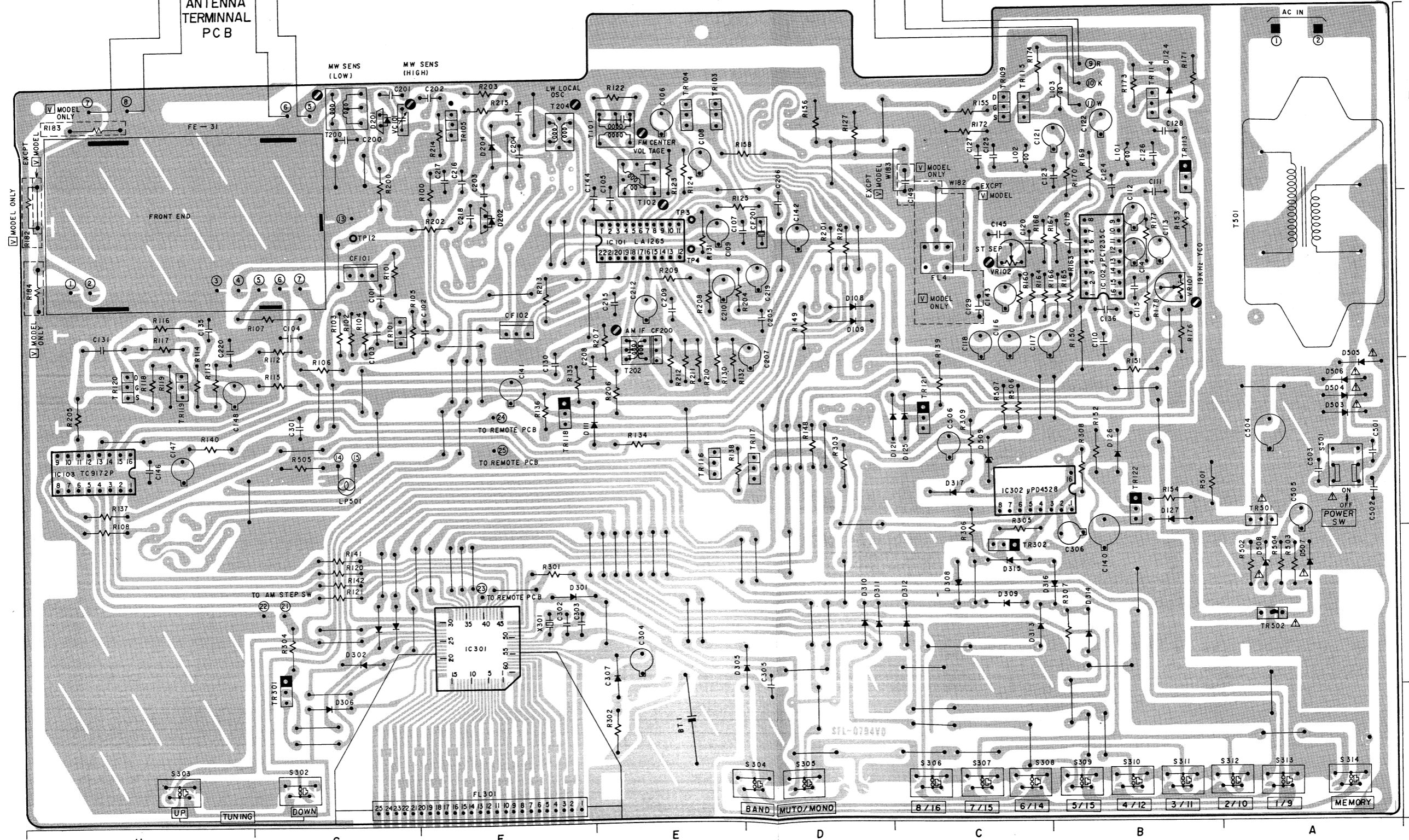
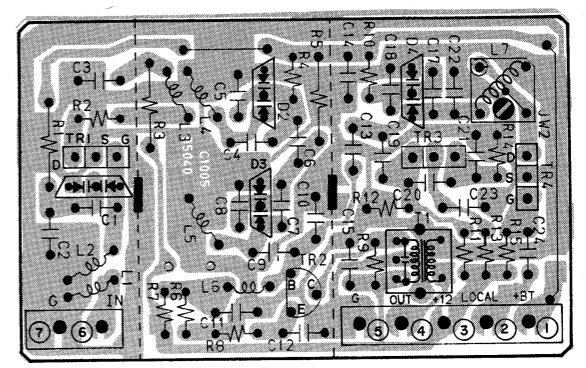
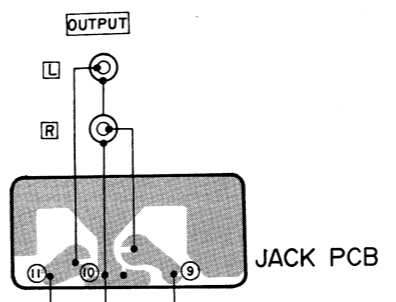
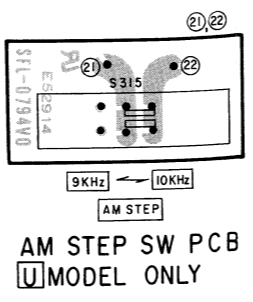
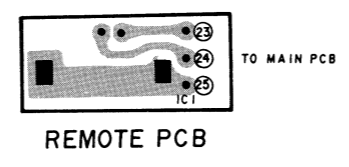
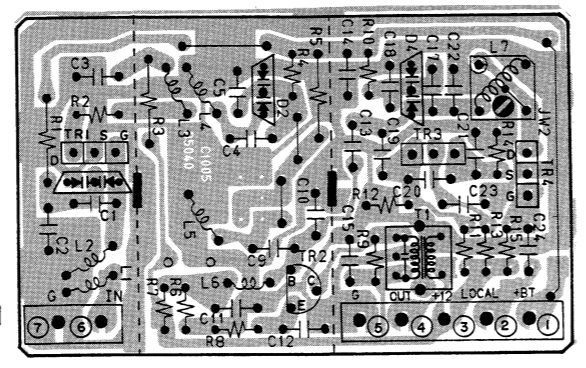
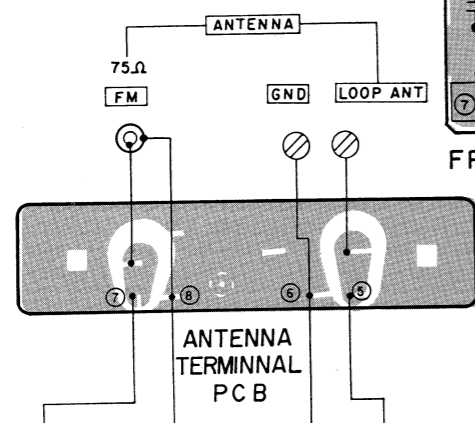
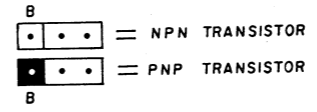
INPUT			OUTPUT	
A	B	CD	Q	Q̄
↗	H	H	⏏	⏏
↗	L	H	Q	Q̄
H	↘	H	Q	Q̄
L	↘	H	⏏	⏏
X	X	L	L	H

X: H or L

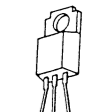


AT-M459 / M459L
 AT-M659 / M659L
 BLOCK DIAGRAM
 NO. ACO1303D (A2)

WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.



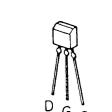
- 2SA1317
- 2SC930
- 2SC2603
- 2SC3383



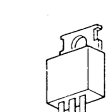
- 2SD1406



- 2SK246



- 2SK192



- 2SJ109

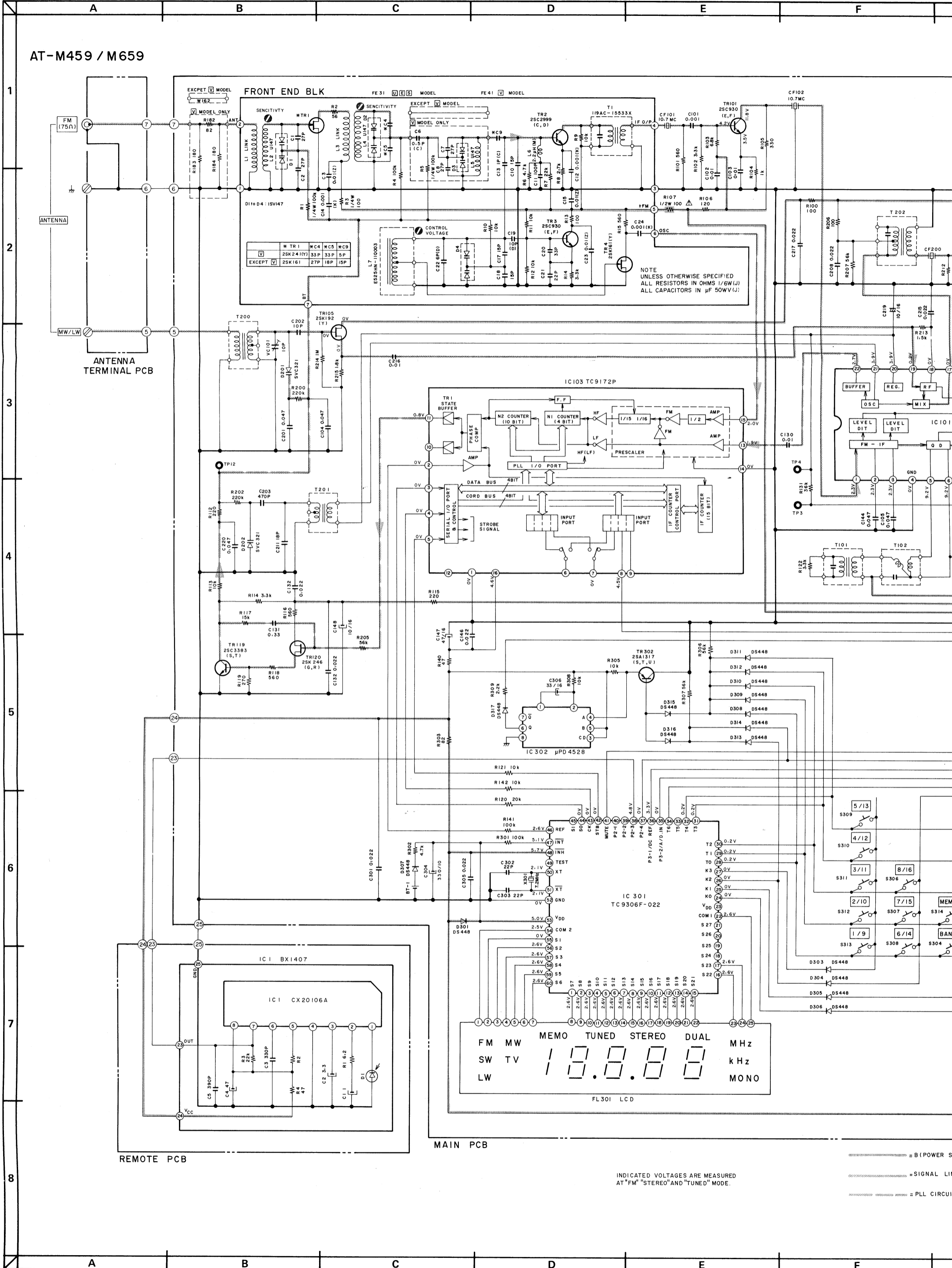
LOCATION OF COMPONENTS

- TRANSISTORS
 TR101 G2
 TR103 E1
 TR104 E1
 TR105 F1

- TR109 C1
 TR113 B1
 TR115 B, C1
 TR116 E3
 TR117 D3
 TR118 H3
 TR119 H3
 TR120 B3
 TR121 C3
 TR122 B3, 4
 TR301 G4, 5
 TR302 C4
 TR501 A3, 4
 TR502 A4

- IC'S
 IC1 E2
 IC101 B2
 IC301 F4
 IC302 B, C3

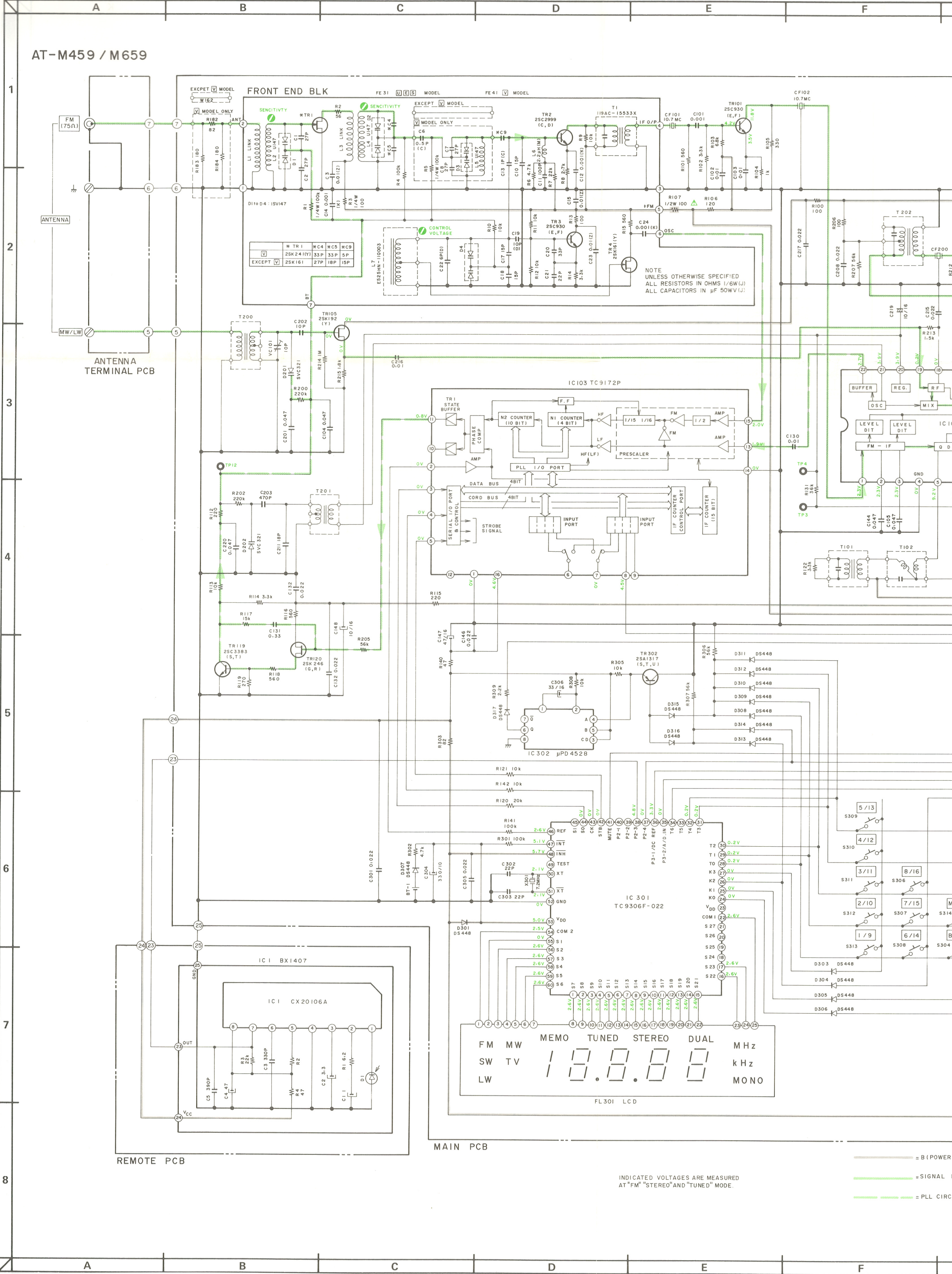
AT-M459 / M659



INDICATED VOLTAGES ARE MEASURED AT "FM" "STEREO" AND "TUNED" MODE.

Legend:
 - - - - - = B (POWER SUPPLY)
 - - - - - = SIGNAL LINE
 - - - - - = PLL CIRCUIT LINE

AT-M459 / M659



FRONT END BLK

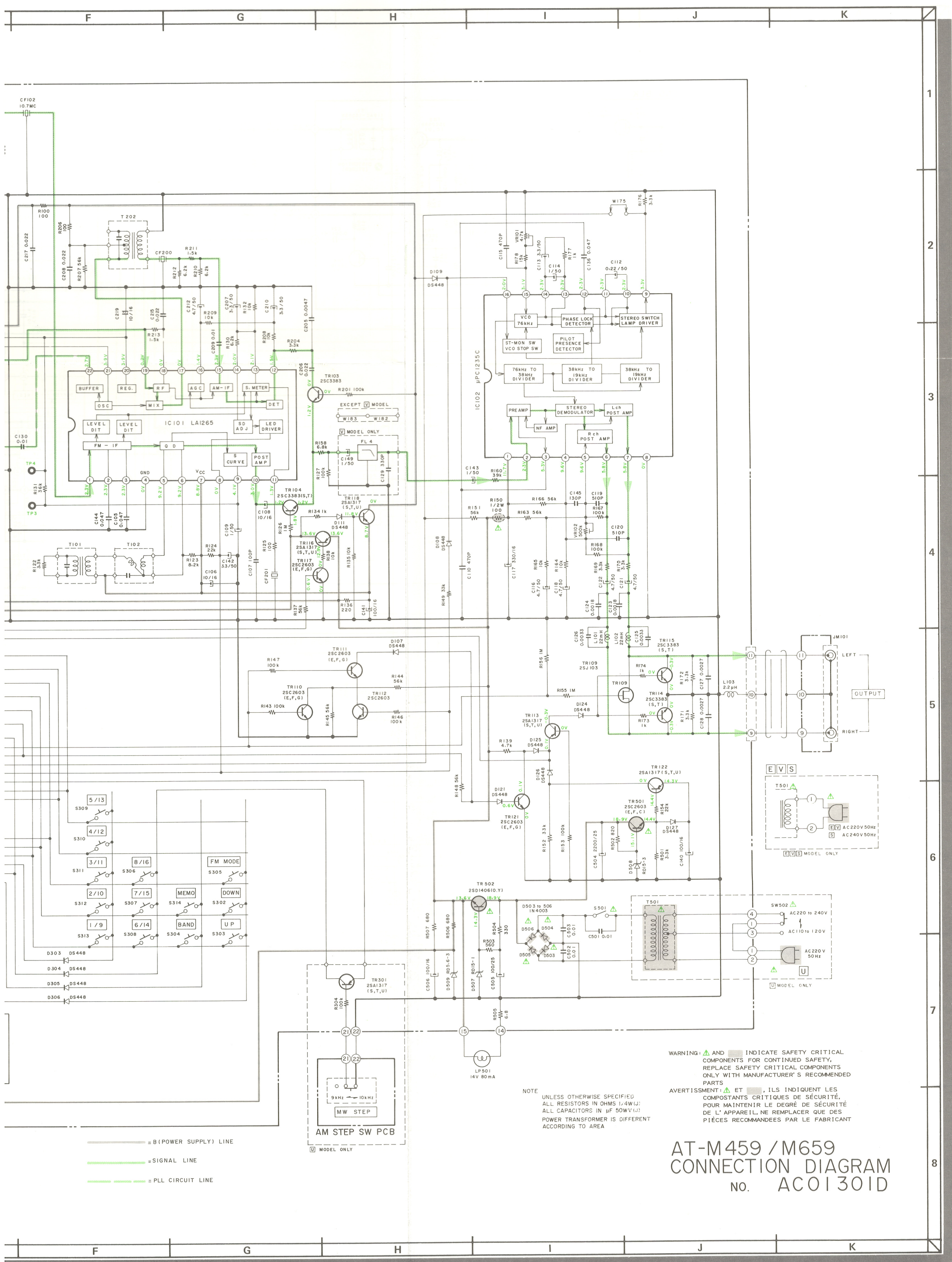
* TR1	KC4	KC5	KC9
25K241(Y)	33P	33P	5P
EXCEPT 25K161	27P	18P	15P

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN µF 50WV(J)



— = B (POWER SU)
— = SIGNAL LINE
— = PLL CIRCUIT

INDICATED VOLTAGES ARE MEASURED AT 'FM' 'STEREO' AND 'TUNED' MODE.

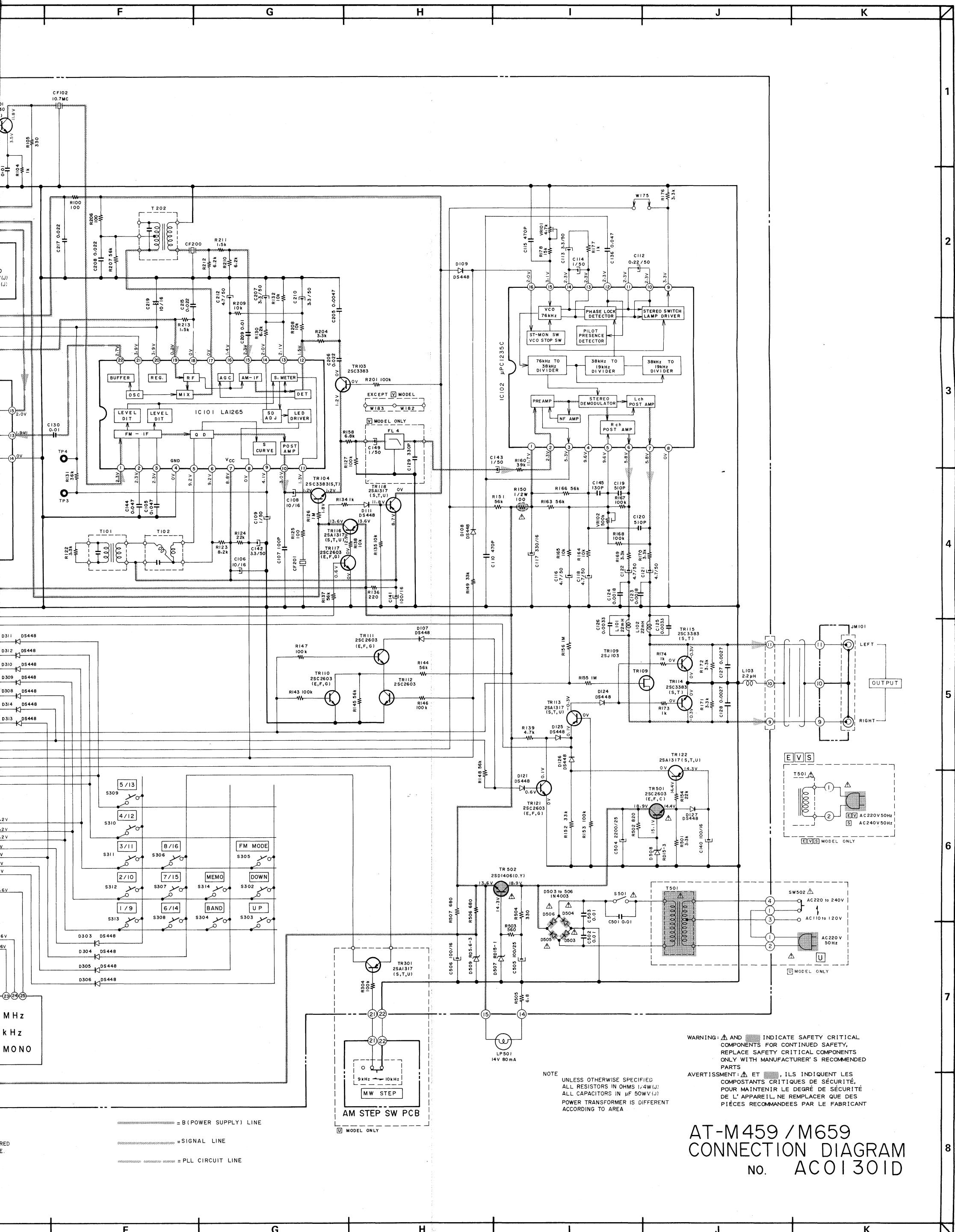


— = B (POWER SUPPLY) LINE
 - - - = SIGNAL LINE
 ····· = PLL CIRCUIT LINE

WARNING: ⚠ AND ■ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: ⚠ ET ■ ILS INDIQUENT LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

NOTE
 UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS IN OHMS (Ω)
 ALL CAPACITORS IN μF (50V V(Ω))
 POWER TRANSFORMER IS DIFFERENT ACCORDING TO AREA

AT-M459 / M659
CONNECTION DIAGRAM
 NO. ACO1301D



WARNING: Δ AND \square INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

AVERTISSEMENT: Δ ET \square ILS INDIQUENT LES COMPOSTANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

NOTE
 UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS IN OHMS (1/4W (J))
 ALL CAPACITORS IN μ F (50WV (J))
 POWER TRANSFORMER IS DIFFERENT
 ACCORDING TO AREA

AT-M459 / M659
 CONNECTION DIAGRAM
 No. AC01301D

— = B (POWER SUPPLY) LINE
 - - - - - = SIGNAL LINE
 - · - · - · - = PLL CIRCUIT LINE

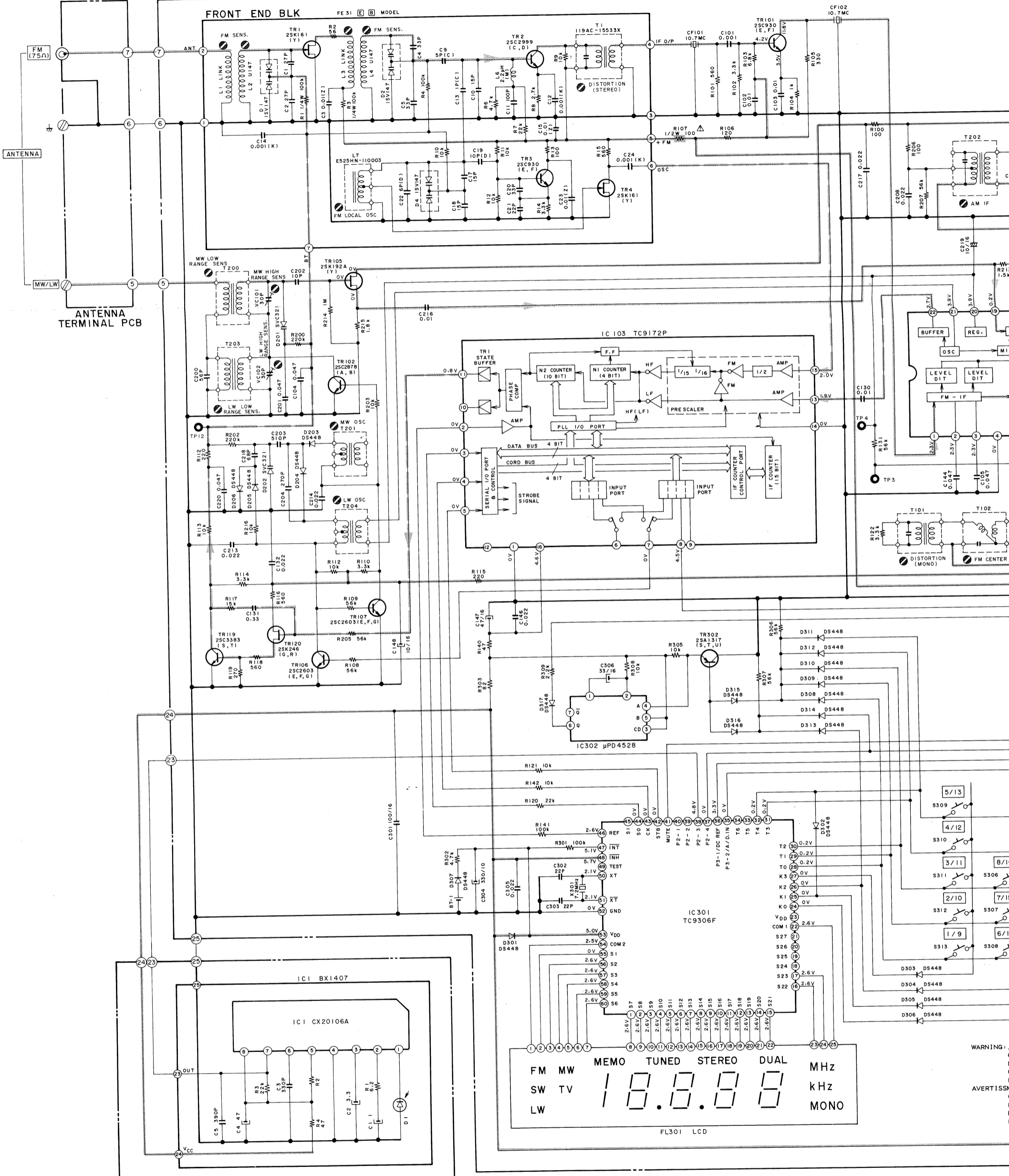
AM STEP SW PCB

\square MODEL ONLY

RED
E.

1
2
3
4
5
6
7
8

AT-M459L/M659L



MAIN PCB

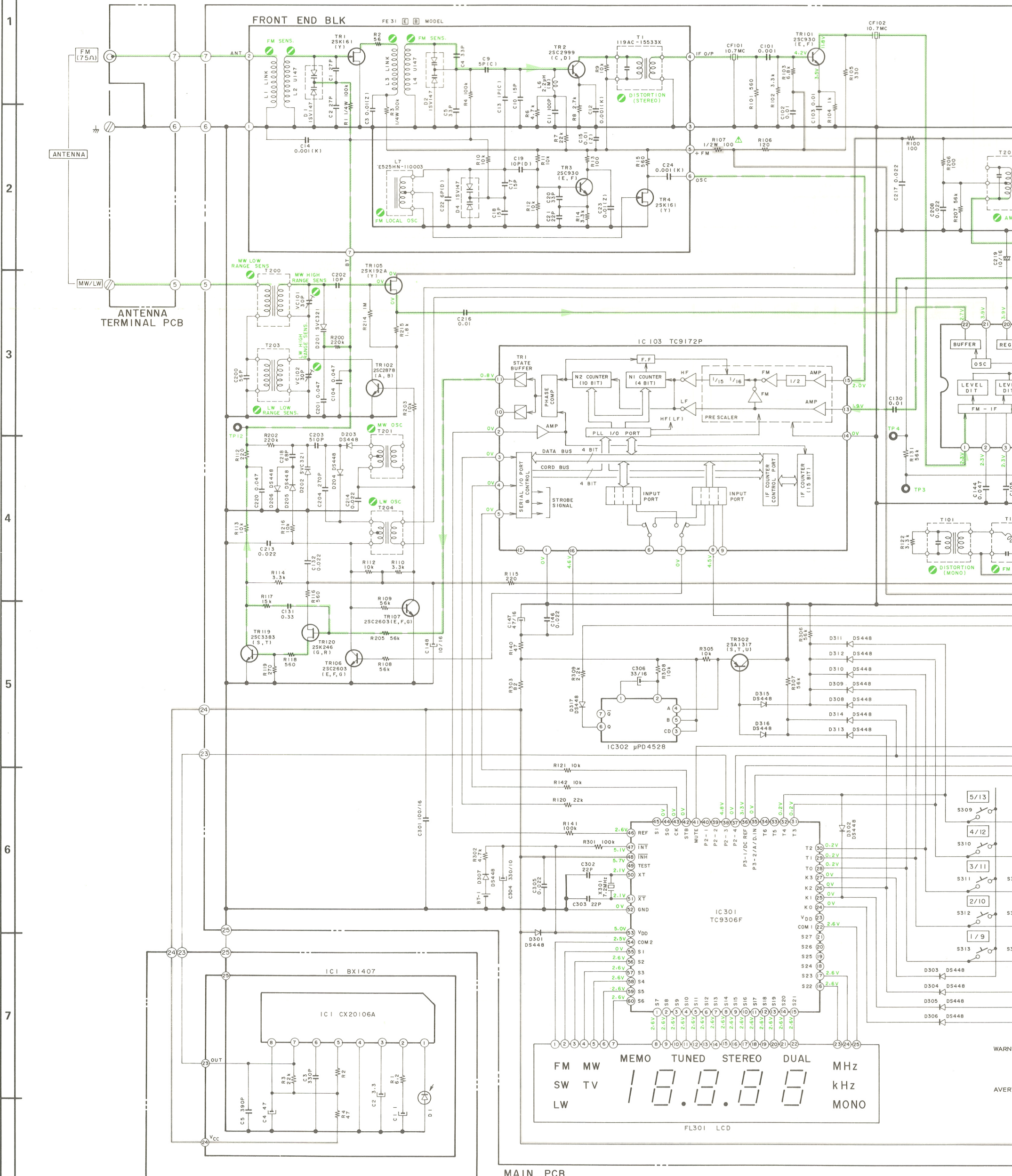
REMOTE PCB

INDICATED VOLTAGES ARE MEASURED AT "FM" "STEREO" AND "TUNED" MODE.

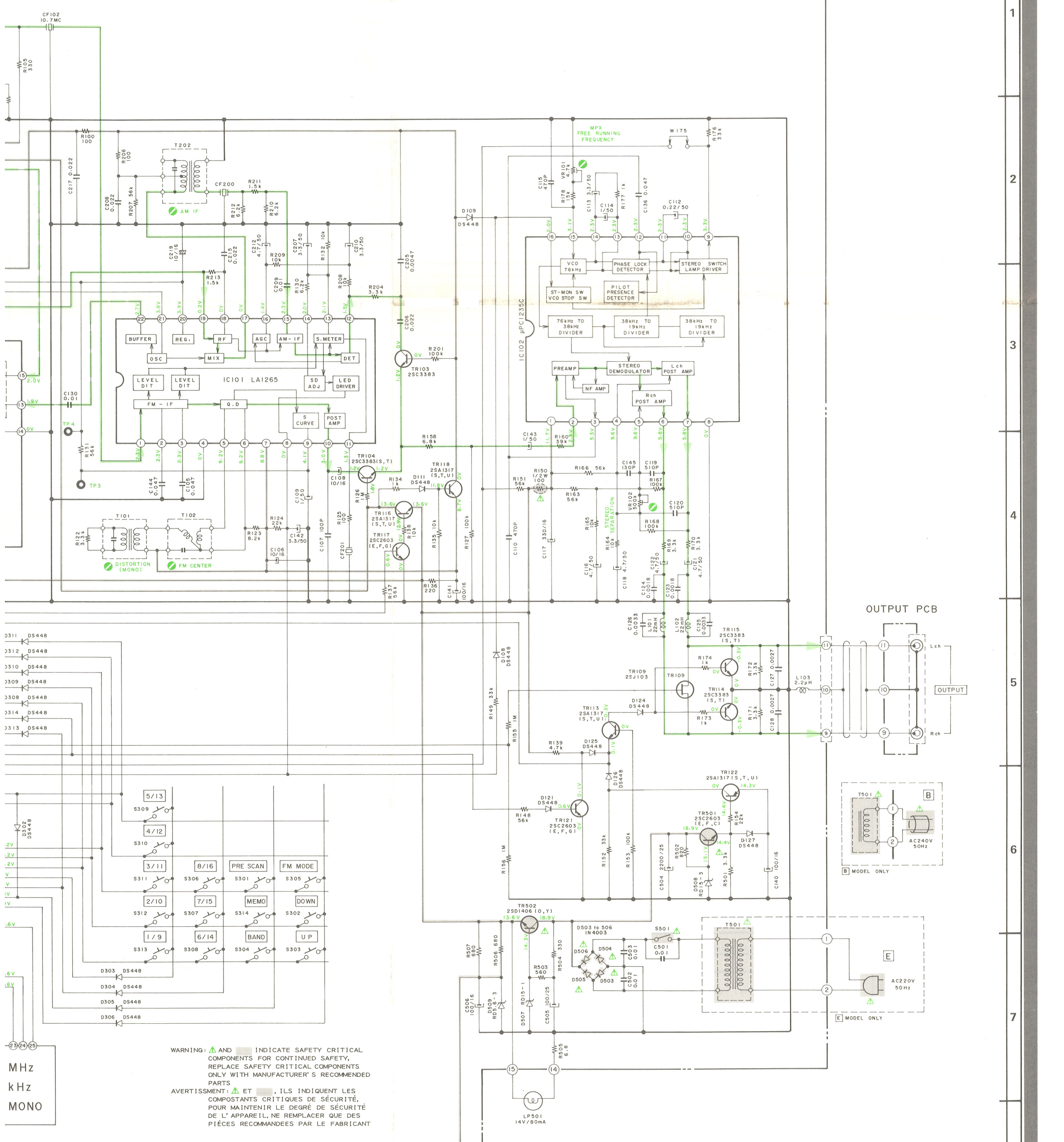
B (POWER SUPPLY)

WARNING: CAUTION: READ INSTRUCTIONS BEFORE USE. AVERTISSEMENT: LIREZ ATTENTION AUX INSTRUCTIONS D'UTILISATION AVANT D'UTILISER L'APPAREIL.

AT-M459L/M659L



INDICATED VOLTAGES ARE MEASURED AT "FM" "STEREO" AND "TUNED" MODE. B (POWER SUPP)



MHz
kHz
MONO

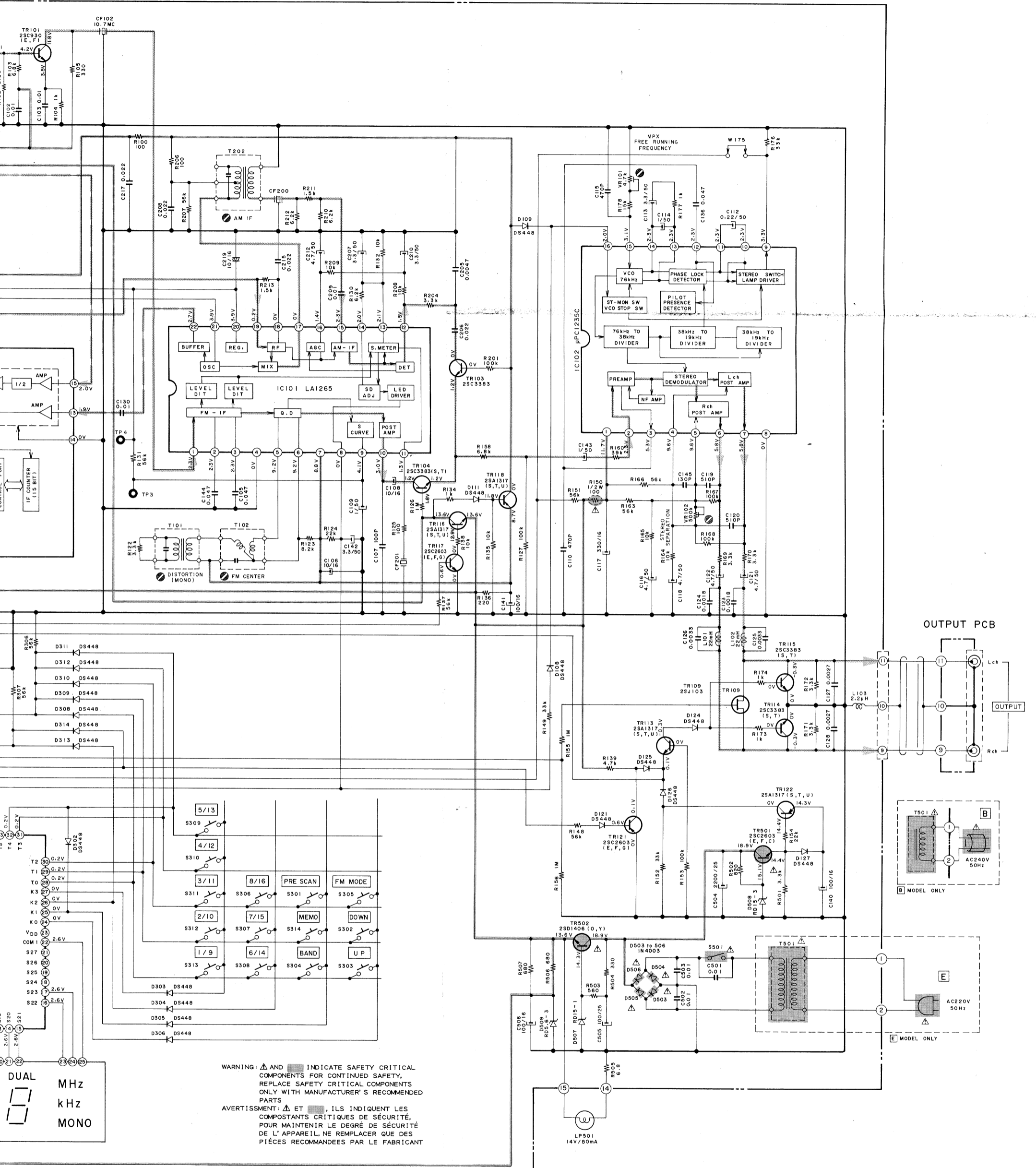
WARNING: AND INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: ET ILS INDIQUENT LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

NOTE
 UNLESS OTHERWISE SPECIFIED:
 ALL RESISTORS IN OHMS (1/6W, 1/2W)
 ALL CAPACITORS IN µF (50WV, 50V)
 POWER TRANSFORMER IS DIFFERENT ACCORDING TO AREA

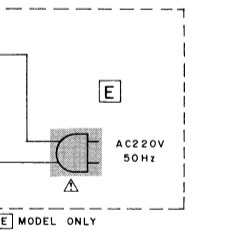
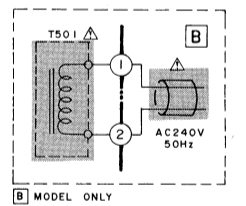
AT-M459L/M659L
 CONNECTION DIAGRAM
 No. AC01302D

— B (POWER SUPPLY) LINE — SIGNAL LINE —
 — PLL CIRCUIT LINE —

1
2
3
4
5
6
7
8



OUTPUT PCB



WARNING: ⚠ AND ■ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

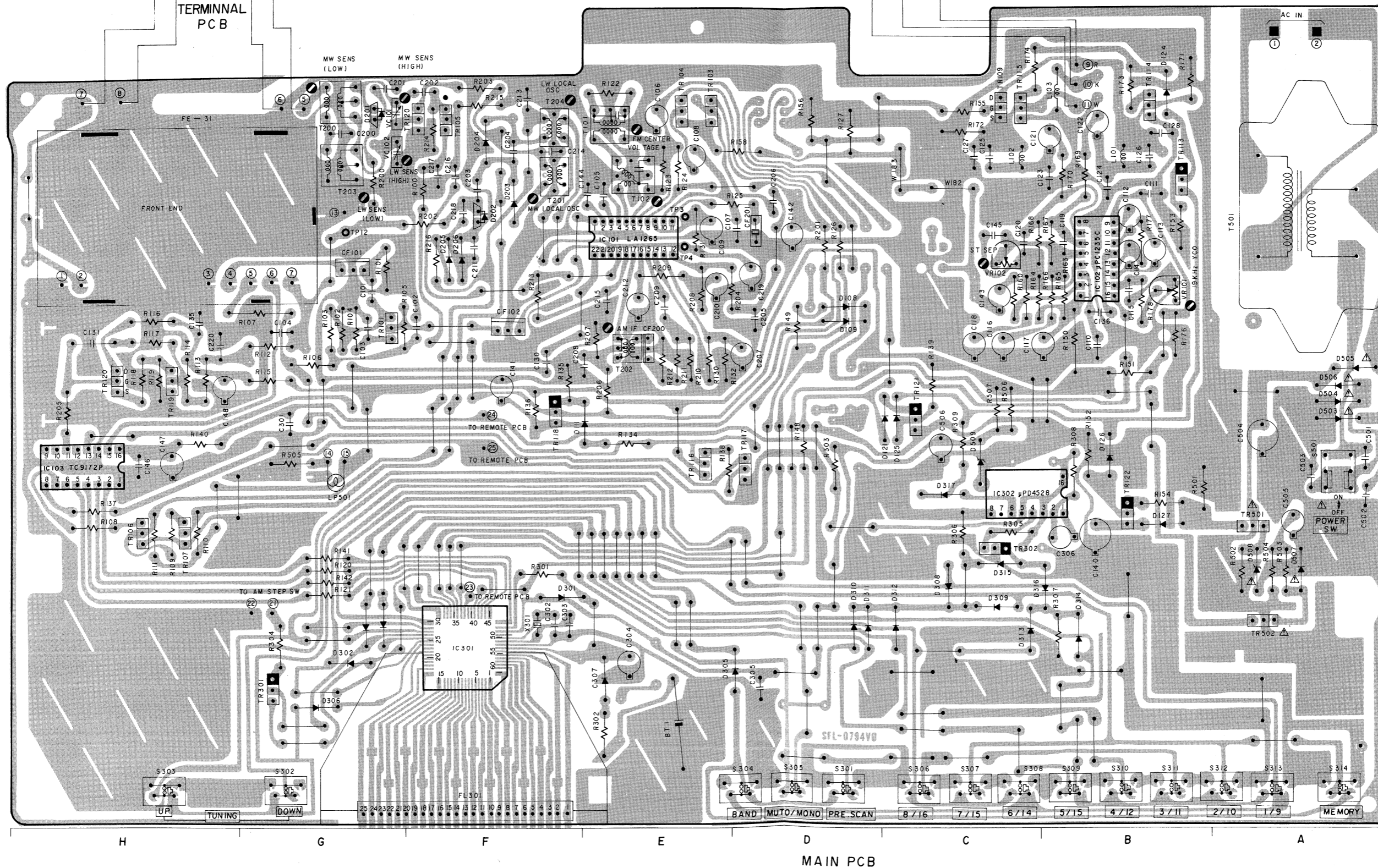
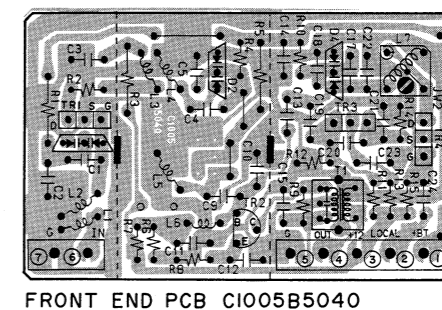
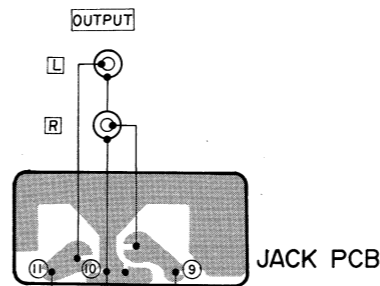
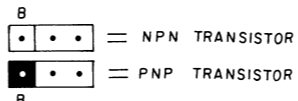
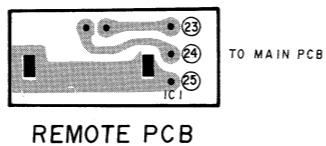
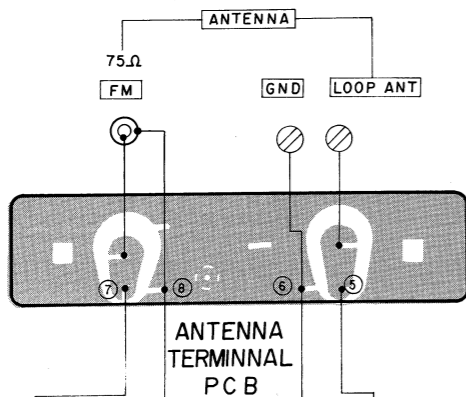
AVERTISSEMENT: ⚠ ET ■, ILS INDIQUENT LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS (1/6W, 1/2W)
ALL CAPACITORS IN μF (50WV)
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

AT-M459L/M659L
CONNECTION DIAGRAM
No. AC01302D

RE MEASURED UNLINED MODE. ——— B (POWER SUPPLY) LINE ——— SIGNAL LINE ——— PLL CIRCUIT LINE

WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: Δ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.



EG B
 2SA1317
 2SC930
 2SC2603
 2SC3383

BCE
 2SD1406

SG D
 2SK246

DGS
 2SK192

DGS
 2SJ109

LOCATION OF COMPONENTS

TRANSISTORS

TR101	G2
TR102	F1
TR103	E1
TR104	F1
TR105	F1
TR106	H3, 4
TR107	H3, 4
TR109	C1
TR113	B1
TR115	B, C1
TR116	E3
TR117	D3
TR118	F3
TR119	H3
TR120	H3
TR121	C3
TR122	B3, 4
TR301	G4, 5
TR302	C4
TR501	A3, 4
TR502	A4

IC'S

IC1	E2
IC101	B2
IC301	F4
IC302	B, C3

INDEX

Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.
BA-725602T	2-1F	EI-332203	3-IC302	ET-349081	3-TR119		
BA-725603T	2-1E	EI-344422	1-21	ET-349449	1-28		
BA-725641T	2-1C	EI-344422	3-X301	ET-349449	4-TR1		
BA-725642T	2-1B	EI-351849	1-20	ET-349449	4-TR4		
BA-725643T	2-1D	EI-351849	3-IC102	ET-349458	1-29		
BA-725644T	2-1A	EI-361624	1-16	ET-349458	3-TR105		
BA-F0131A010A	2-2A	EI-361624	3-IC101	ET-349459	1-38		
BA-F0141A010B	2-2B	EI-363289	1-18	ET-349459	3-TR502		
BD-725601T	9-15B	EI-363289	3-IC103	ET-353734	1-27		
BD-725616T	9-15D	EI-383530J	1-15	ET-353734	3-TR109		
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ABBREVIATIONS FOR SERVICE MANUAL

ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
AFC	Auto Frequency Control	MEMO	MEMOry
AGC	Auto Gain Control	MI-COM	MIcro-COMputer
ALC	Auto Level Control	MIN	MINimum
AM	Amplitude Modulation	MIX	MIXing
AMP	AMPlifier	MPX	MultiPleX
ANT	ANTenna	MW	Medium Wave (frequency)
BATT	BATTery	NC	No Connection
BLK	BLock	NFB	Negative Feed Back
BUFF	BUFFer	OSC	OSCillator
COMP	COMParator	PCB	Printed Circuit Board
DET	DETECT (DETECTOR)	PLL	Phase Locked Board
FLD		QD	Quadrature Detector
FM	Frequency Modulation	Rch	Right channel
FREQ	FREQuency	REF	REFeRence
GND	GrouND	REG	REGulator
H	High	RF	Radio Frequency
HPF	High Pass Filter	SEG	SEGment
IF	Intermediate Frequency	SELE	SELEctor
IHF	Institute of High Fidelity	SENS	SENSitivity
IND	INDicator	SIG	SIGNAL
I/O	In/Out	S/N	Signal to Noise Ratio
JW	Jumper Wire	SSG	Standard Signal Generator
L	Low	STD	STanDard
LCD	Liquid Crystal Display	SW	SWitch: Short Wave (frequency)
Lch	Left channel	THD	Total Harmonic Distortion
LED	Light Emitting Diode	TP	Test Point
LPF	Low Pass Filter	VCO	Voltage Controlled Oscillator
LW	Long Wave (Frequency)	VR	Variable Resistor
		X'TAL	Crystal

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