

Service Manual

Stereo Synthesizer Tuner

Tuner
ST-GT650

Colour

(K) Black Type

**Areas**

Suffix for Model No.	Area	Colour
(E)	Europe	(K)
(EB)	Great Britain	
(EG)	Germany and Italy	

SPECIFICATIONS \ ТЕХНИЧЕСКИЕ ХАРАКТЕРИСТИКИ
SCHEMATIC DIAGRAMS \ ПРИНЦИПИАЛЬНЫЕ СХЕМЫ
WIRING CONNECTION DIAGRAM \ СХЕМА СОЕДИНЕНИЯ
MEASUREMENTS AND ADJUSTMENTS \ ИЗМЕРЕНИЯ И РЕГУЛИРОВКИ
FUNCTIONS OF IC TERMINALS \ НАЗНАЧЕНИЕ ВЫВОДОВ ИНТЕГРАЛЬНЫХ
МИКРОСХЕМ
BLOCK DIAGRAM \ БЛОК-СХЕМА
REPLACEMENT PARTS LIST \ СПИСОК ЗАПАСНЫХ ЧАСТЕЙ
CABINET PARTS LOCATION \ РАСПОЛОЖЕНИЕ ЧАСТЕЙ КОРПУСА

Technics

SPECIFICATIONS (DIN 45 500)

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz (0.05-MHz steps)
Sensitivity	1.5 μ V (IHF, usable)
S/N 30 dB	1.3 μ V (75 Ω)
S/N 26 dB	1.2 μ V (75 Ω)
S/N 20 dB	0.9 μ V (75 Ω)
IHF 46 dB stereo quieting sensitivity	28 μ V (75 Ω)
Total harmonic distortion	
MONO (NORMAL)	0.05%
STEREO (NORMAL)	0.1%
S/N	
MONO	75 dB (80 dB, IHF)
STEREO	66 dB (72 dB, IHF)
Frequency response	10 Hz~15 kHz, +0.5 dB to - 1.0 dB
Alternate channel selectivity	
NORMAL \pm 400 kHz	70 dB
SUPER NARROW \pm 200 kHz	25 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	100 dB
IF rejection at 98 MHz	95 dB
Spurious response rejection at 98 MHz	100 dB
AM suppression	55 dB
Stereo separation	
1 kHz	45 dB
Carrier leak	
19 kHz	-66 dB (-72 dB, IHF)
38 kHz	-72 dB (-78 dB, IHF)
Channel balance (250 Hz~6.3 kHz)	\pm 1.0 dB
Limiting point	0.85 μ V
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	75 Ω (unbalanced)

■ GENERAL

Output voltage	
for (E) (EB) areas	0.3 V (0.6 V, IHF)
for (EG) area	0.6 V (1.2 V, IHF)
Power consumption	9 W
Power supply	AC 50 Hz/60 Hz, 230 V~240 V
Dimensions (W×H×D)	430×91.5×308 mm
Weight	2.9 kg

■ AM TUNER SECTION

Frequency range	
for (E) (EB) areas	
MW	522 kHz~1611 kHz (9-kHz steps)
LW	530 kHz~1620 kHz (10-kHz steps)
for (EG) area	
AM	144 kHz~288 kHz (9-kHz steps)
AM	522 kHz~1611 kHz (9-kHz steps)
AM	530 kHz~1620 kHz (10-kHz steps)
Sensitivity (S/N 20 dB)	
for (E) (EB) areas	
MW (at 999 kHz)	20 μ V, 600 μ V/m
LW (at 216 kHz)	150 μ V
for (EG) area	
AM (at 999 kHz)	20 μ V, 600 μ V/m
Selectivity (\pm 9 kHz)	
for (E) (EB) areas	
MW (at 999 kHz)	40 dB
LW (at 216 kHz)	40 dB
for (EG) area	
AM (at 999 kHz)	40 dB
Image rejection	
for (E) (EB) areas	
MW (at 999 kHz)	40 dB
LW (at 216 kHz)	40 dB
for (EG) area	
AM (at 999 kHz)	40 dB
IF rejection	
for (E) (EB) areas	
MW (at 999 kHz)	50 dB
LW (at 216 kHz)	50 dB
for (EG) area	
AM (at 999 kHz)	50 dB

Notes:

1. Specifications are subject to change without notice. Weight and dimensions are approximate.
2. Total harmonic distortion is measured by the digital spectrum analyzer.

SCHEMATIC DIAGRAM • FL/Switch circuit (Parts list on pages 35, 36, 39, 40)

1 2 3 4 5

A

B

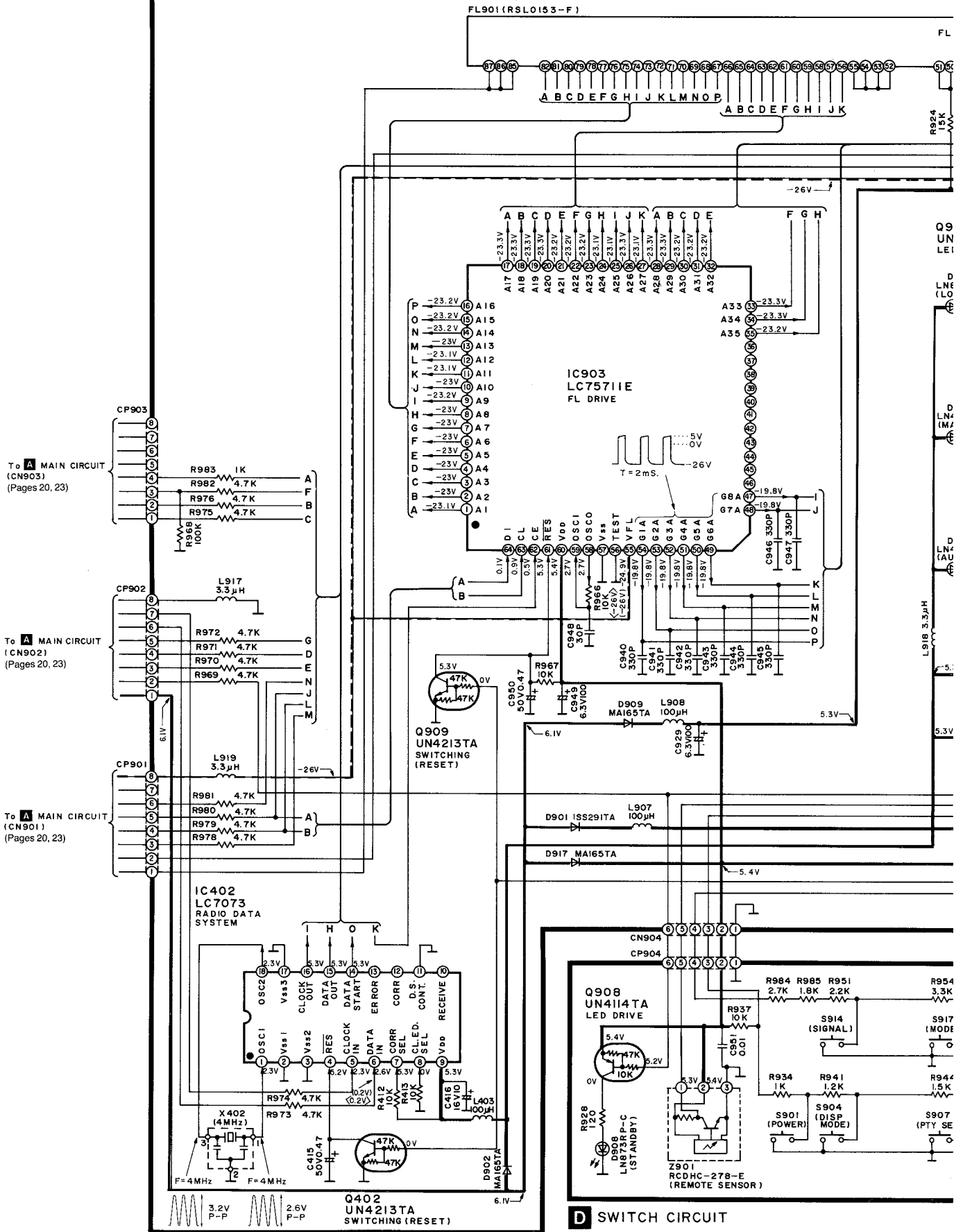
C

D

E

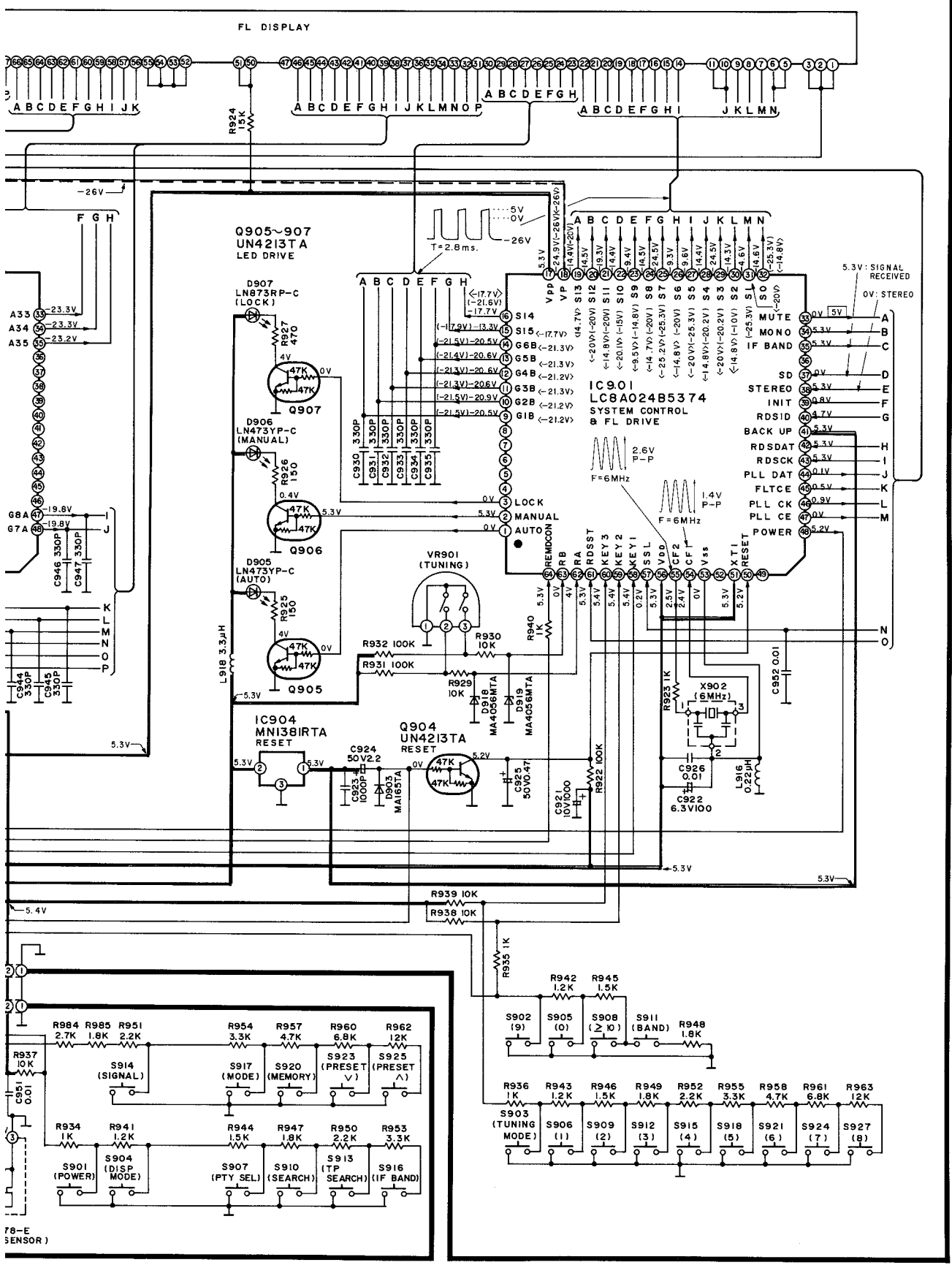
F

C FL CIRCUIT

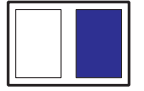


D SWITCH CIRCUIT





78-E SENSOR)



Notes:

- S901: Power “(⏻)STANDBY/ON” switch. (POWER, (⏻)STANDBY/ON)
- S902: Preset-tuning switch. (9)
- S903: Tuning mode select switch. (TUNING MODE)
- S904: Display mode select switch. (DISP MODE)
- S905: Preset-tuning switch. (0)
- S906: Preset-tuning switch. (1)
- S907: PTY select switch. (PTY SEL)
- S908: Preset-tuning switch. (≥ 10)
- S909: Preset-tuning switch. (2)
- S910: AF/PTY search switch. (SEARCH)
- S911: Band select switch. (-BAND, -ALLOCATION)
- S912: Preset-tuning switch. (3)
- S913: TP search switch. (TP SEARCH)
- S914: FM signal-strength indication switch. (SIGNAL)
- S915: Preset-tuning switch. (4)
- S916: FM IF band select switch. (IF BAND)
- S917: FM mode select switch. (MODE)
- S918: Preset-tuning switch. (5)
- S920: Memory switch. (MEMORY)
- S921: Preset-tuning switch. (6)
- S923: Preset channel switch. (✓PRESET)
- S924: Preset-tuning switch. (7)
- S925: Preset channel switch. (PRESET^)
- S927: Preset-tuning switch. (8)

●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.
 No mark: FM () : MW... for (E, EB) areas/AM... for (EG) area < >: LW Muting

●Important safety notice

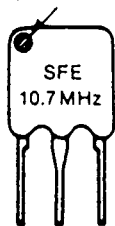
Components identified by Δ mark have special characteristics important for safety. Furthermore, special parts which have purposes of fire-retardant (resistors), high-quality sound (capacitors), low-noise (resistors), etc. are used.

●Use of ceramic filters in pairs

The ceramic filters (CF101~CF104) for FM-IF circuit are available in three ranks. For this circuit, be sure to use the ceramics of the same rank in a pair.

At repairing and replacement, pay close attention to the diodes (D911, D912) for use as different diodes must be used depending on each rank of the ceramic filters.

Color marking
(Red, Blue or Orange)



RANK (Color)	D911	D912	CENTER FREQUENCY
Orange	×	○	10.72 MHz
Red	○	○	10.70 MHz
Blue	○	×	10.67 MHz

Note: ○ mark: Diode is used.
 × mark: Diode is not used.

•Caution!

- IC and LSI are sensitive to static electricity. Secondary trouble can be prevented by taking care during repair.
- Cover the parts boxes made of plastics with aluminum foil.
- Ground the soldering iron.
- Put a conductive mat on the work table.
- Do not touch the legs of IC or LSI with the fingers directly.

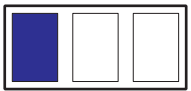
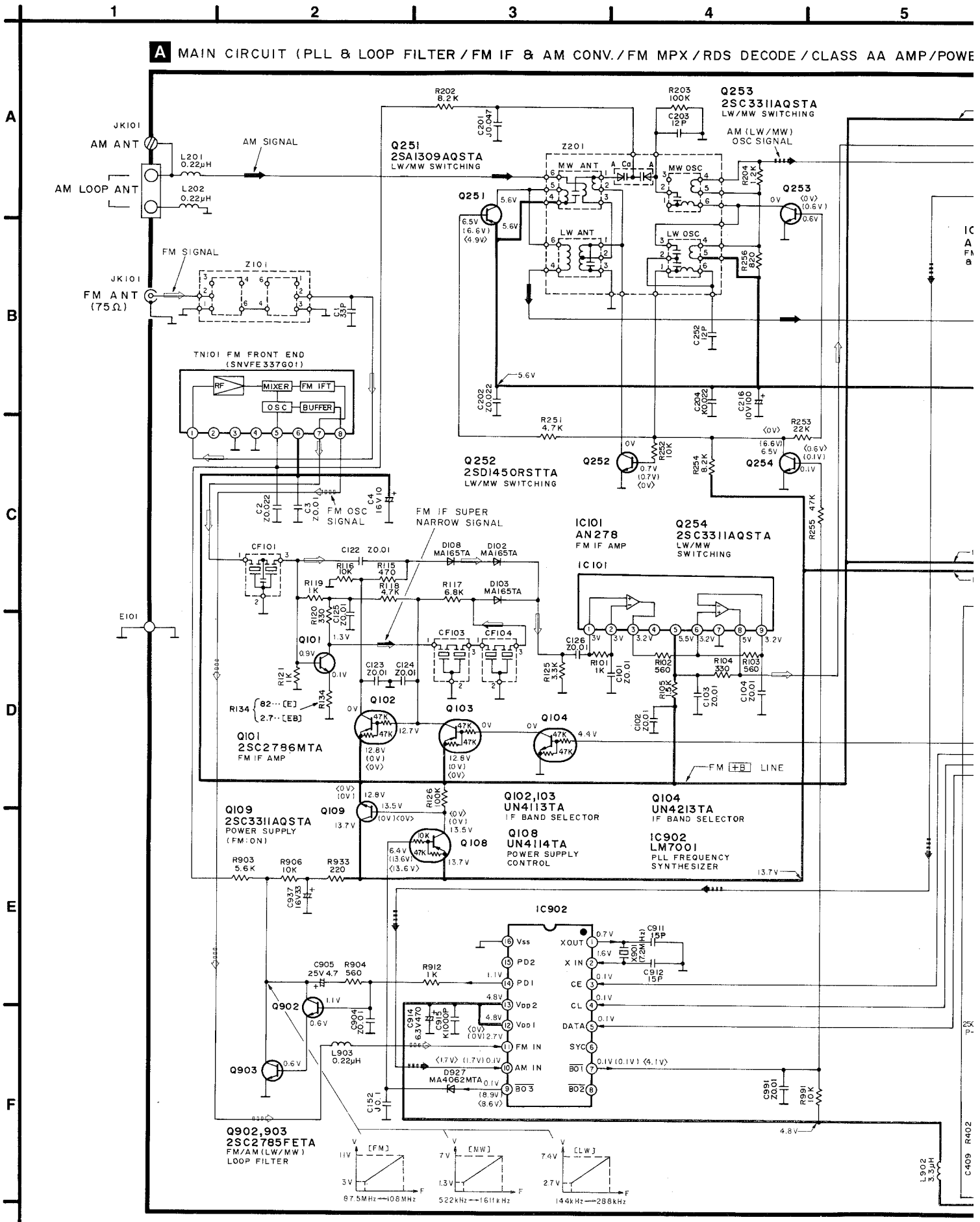
●The supply part number is described alone in the replacement parts list.

Part No.	Production Part No.	Supply Part No.
Z901	RCDHC-278-E	RCDHC-278

●This schematic diagram may be modified at any time with the development of new technology.

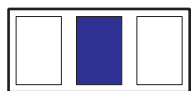
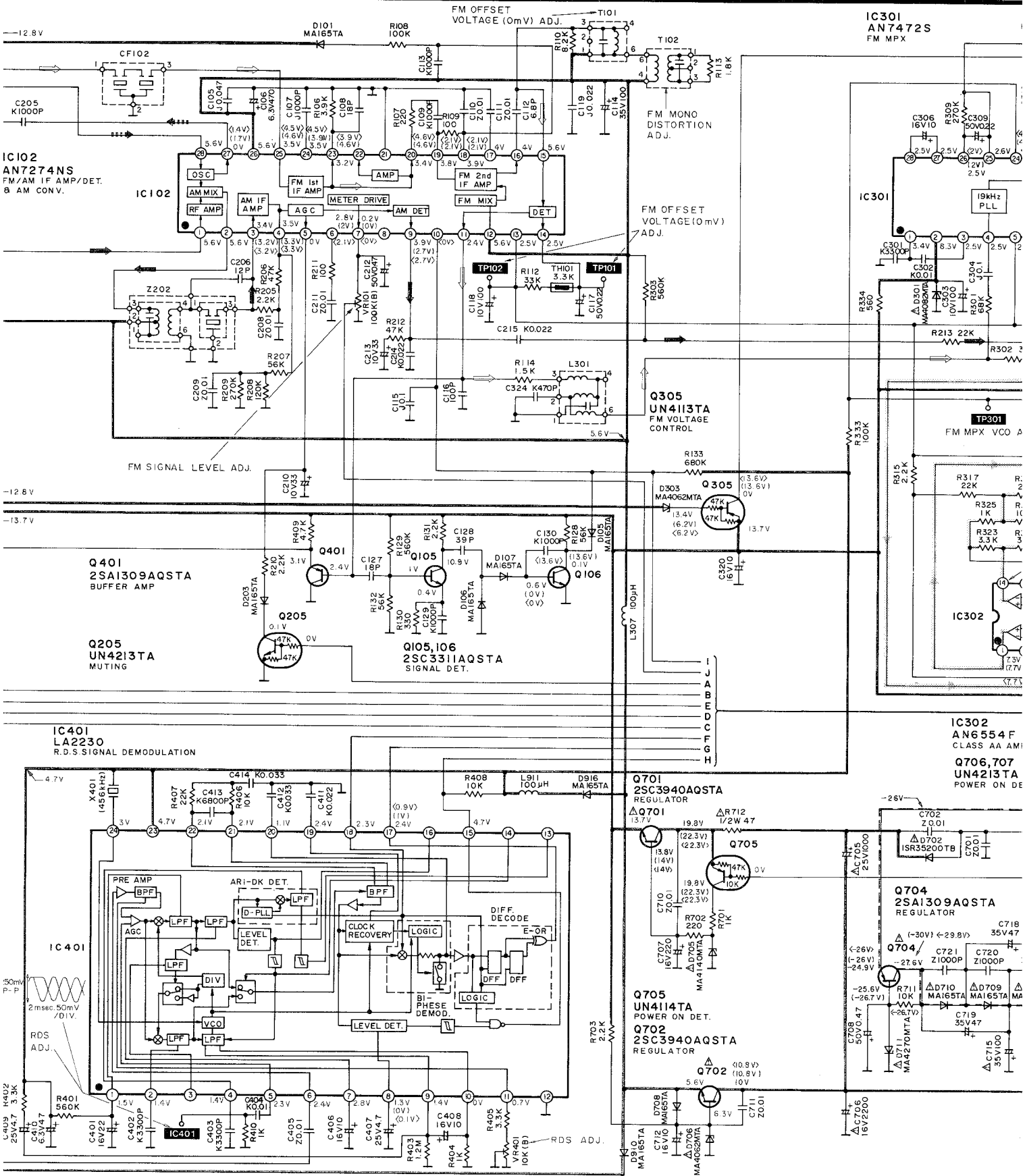
- Positive voltage lines (+)
- - - - - Negative voltage lines (-)

■ SCHEMATIC DIAGRAM • Main/Power supply circuit for (E), (EB) areas (Parts list on pag





ER SUPPLY) For [E,EB] areas



lines (+)
lines (-)

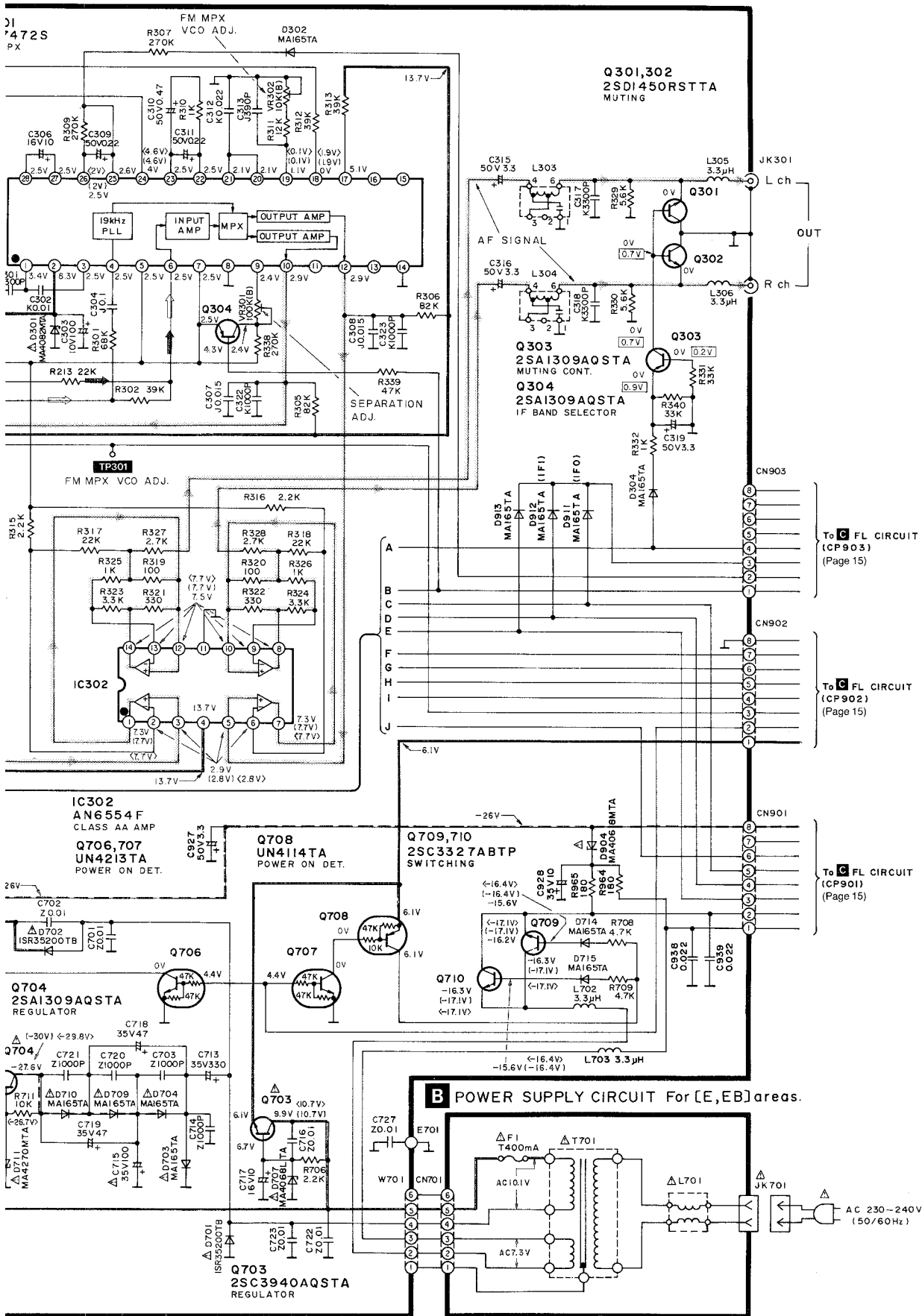
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11

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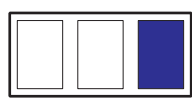


To **C** FL CIRCUIT
(CP903)
(Page 15)

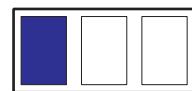
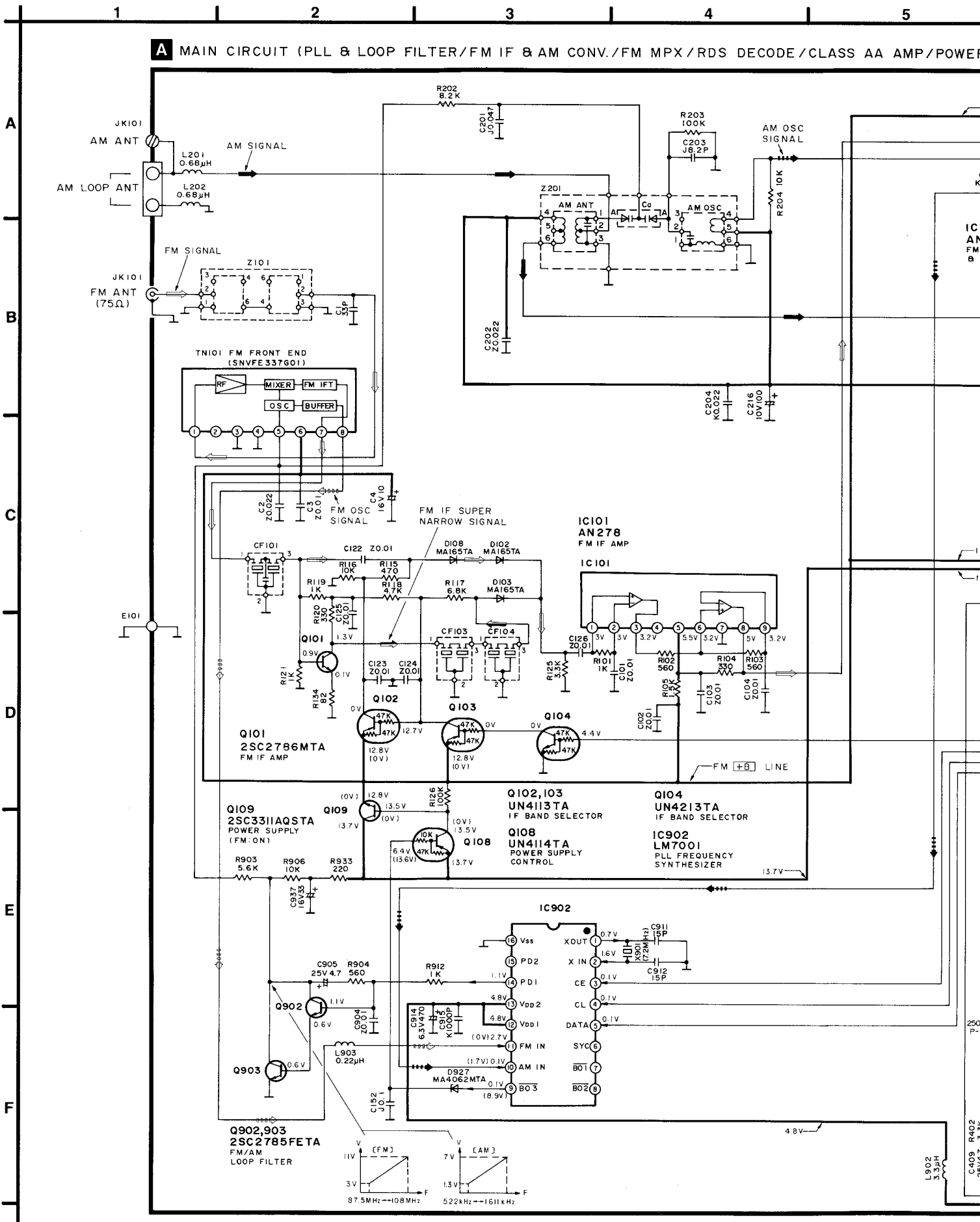
To **C** FL CIRCUIT
(CP902)
(Page 15)

To **C** FL CIRCUIT
(CP901)
(Page 15)

B POWER SUPPLY CIRCUIT For [E,EB] areas.



■ SCHEMATIC DIAGRAM • Main/Power supply circuit for (EG) area (Parts list on pages 35, 36,



• Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with t
 on pages 35, 36, 39, 40) Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
 No mark: FM (): MW...for (E, EB) areas/AM...for (EG) area <>: LW : Muting

5

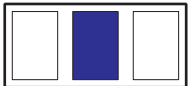
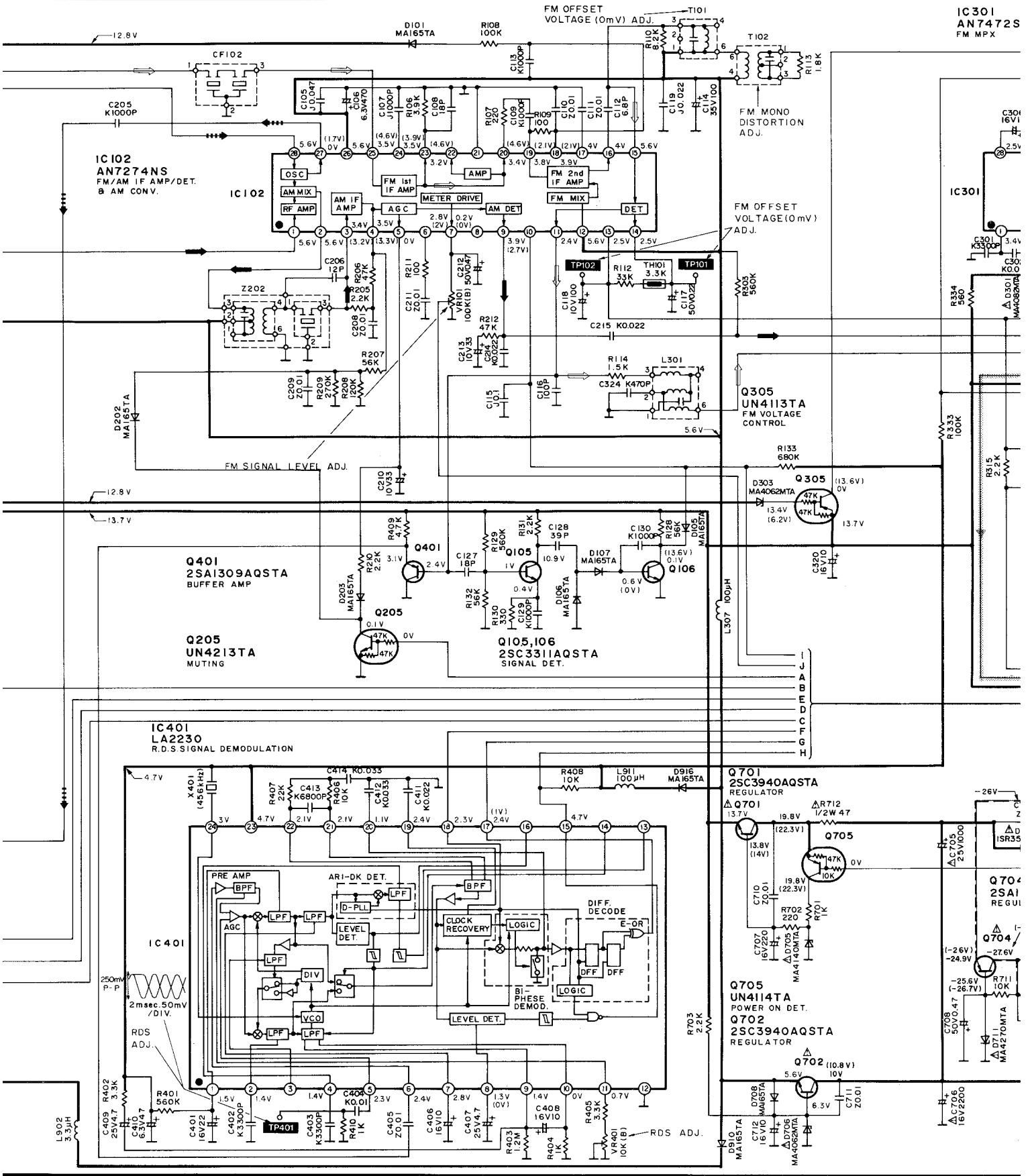
6

7

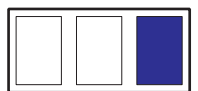
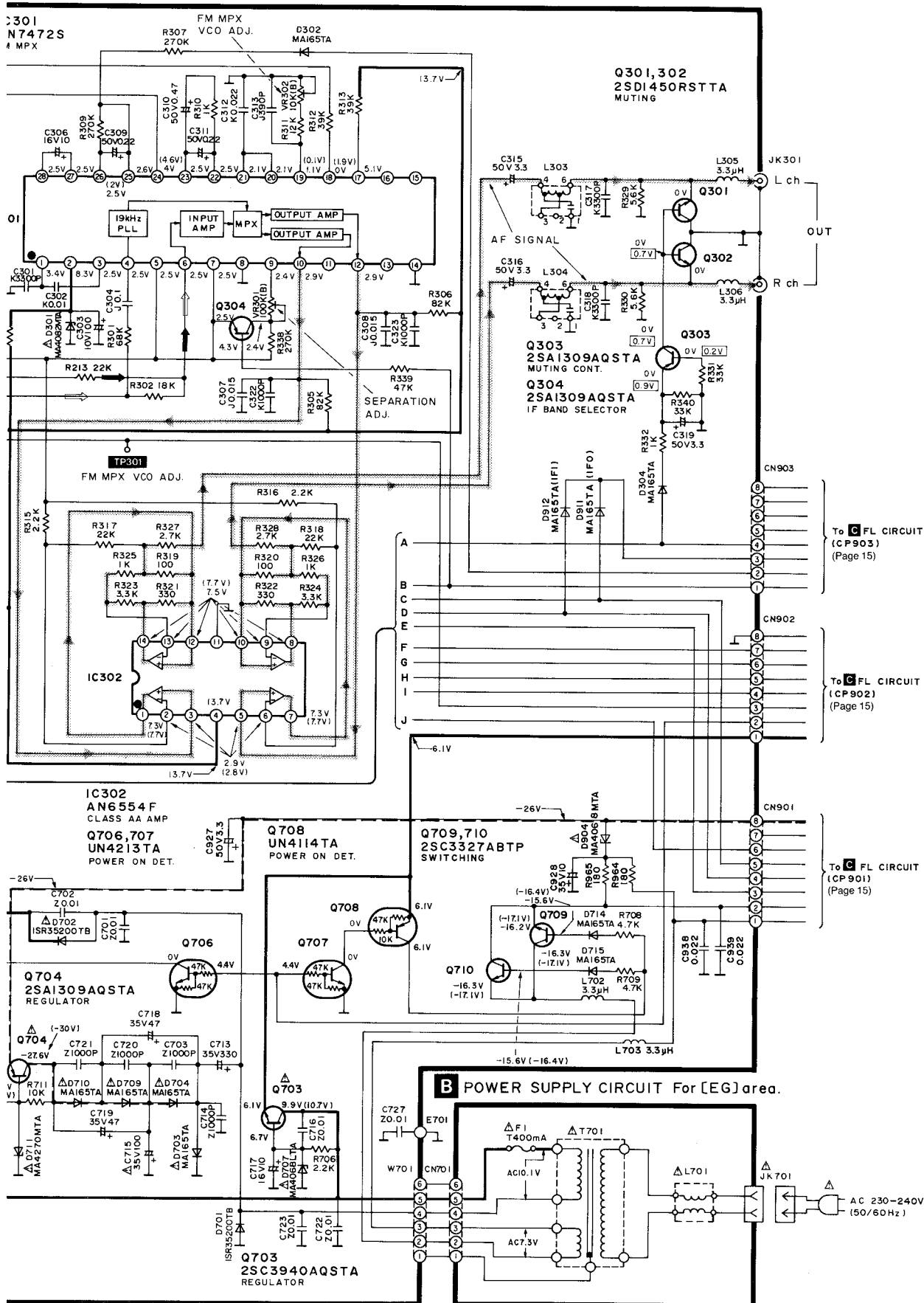
8

9

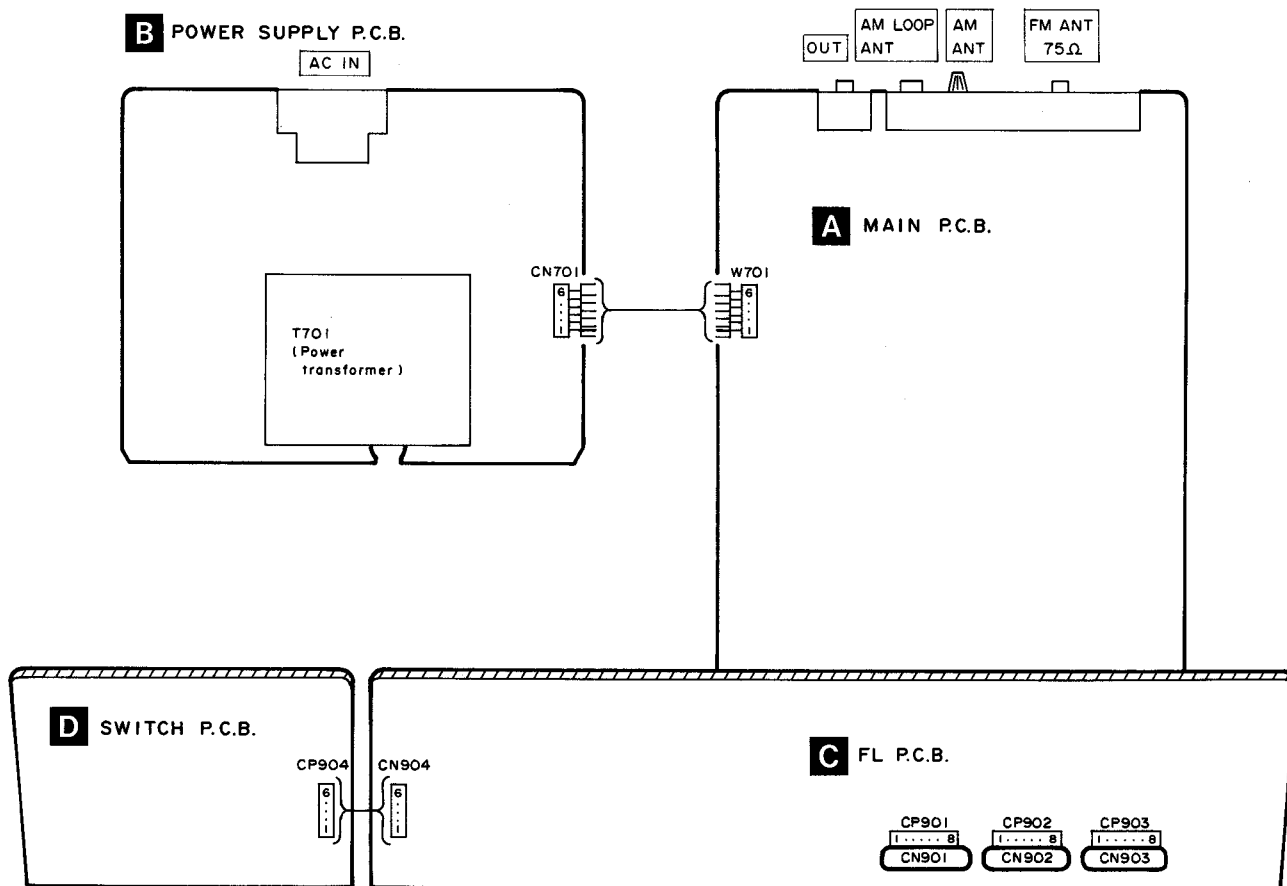
A AMP/POWER SUPPLY) For [EG] area



ice) with the chassis taken as standard.
ter.



WIRING CONNECTION DIAGRAM



Terminal guide of IC's, transistors and diodes

<p>AN7274NS AN7472S</p>	<p>LC7073</p>	<p>LA2230</p>	<table border="1"> <tr> <td>AN6554F</td> <td>14Pin</td> </tr> <tr> <td>LM7001</td> <td>16Pin</td> </tr> </table>	AN6554F	14Pin	LM7001	16Pin	<p>LC8A024B5374 LC75711E</p>
AN6554F	14Pin							
LM7001	16Pin							
<p>AN278</p>	<p>MN1381RTA</p>	<p>2SC3940AQSTA</p>	<p>2SC3327ABTP</p>	<p>2SA1309AQSTA 2SC2785FETA 2SC2786MTA 2SC3311AQSTA 2SD1450RSTTA UN4113TA UN4114TA UN4213TA</p>				
<p>Ca Cathode Anode</p>	<p>MA165TA 1SS291TA 1SR35200TB</p>	<p>MA4140MTA MA4270MTA</p> <p>Ca Cathode Anode</p>	<p>Ca Cathode Anode</p>	<p>MA4056MTA MA4062MTA MA4068MTA MA4082MTA MA4068LTA</p>				
				<p>LN473YP-C LN873RP-C</p> <p>Anode Cathode Ca</p>				

MEASUREMENTS AND ADJUSTMENTS

Equipment used

- FM signal generator (FM-SG)
- AM signal generator (AM-SG)
- Stereo modulator
- Distortion analyser
- RDS modulator
- Resistor (100 k Ω)
- Oscilloscope
- Choke coil (100 μ H)
- Frequency counter
- AC and DC electronic voltmeter (EVM)
- 75 Ω coaxial cable

Note: for Z101, Z202, L301, L303 and L304, they are supplied as adjusted parts, So, do not turn the cores of the parts.

MW RF ADJUSTMENT [for (E) (EB) areas]

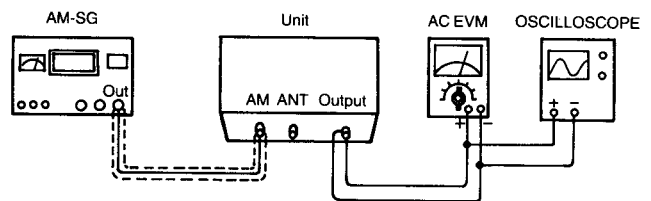
1. Test equipment connection is shown in figure.
2. Set the unit to "MW" mode.
3. Set the radio frequency display and signal generator to 612 kHz.
4. Adjust Z201-1 so that the output terminal is maximized.

AM SIGNAL GENERATOR CONDITION

Modulation 30%
Modulation frequency 400 Hz

Note:

Adjust the output from AM signal generator to a low level.



AM RF ADJUSTMENT [for (EG) area]

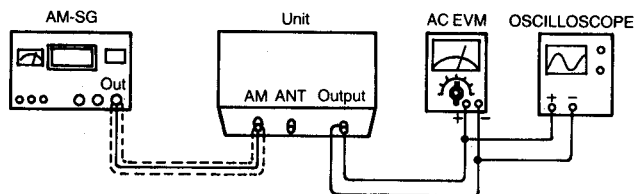
1. Test equipment connection is shown in figure.
2. Set the unit to "AM" mode.
3. Set the radio frequency display and signal generator to 612 kHz.
4. Adjust Z201 so that the output terminal is maximized.

AM SIGNAL GENERATOR CONDITION

Modulation 30%
Modulation frequency 400 Hz

Note:

Adjust the output from AM signal generator to a low level.



LW RF ADJUSTMENT [for (E) (EB) areas]

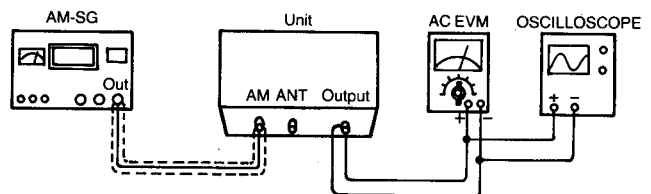
1. Test equipment connection is shown in figure.
2. Set the unit to "LW" mode.
3. Set the radio frequency display and signal generator to 144 kHz.
4. Adjust Z201-2 so that the output terminal is maximized.

AM SIGNAL GENERATOR CONDITION

Modulation 30%
Modulation frequency 400 Hz

Note:

Adjust the output from AM signal generator to a low level.

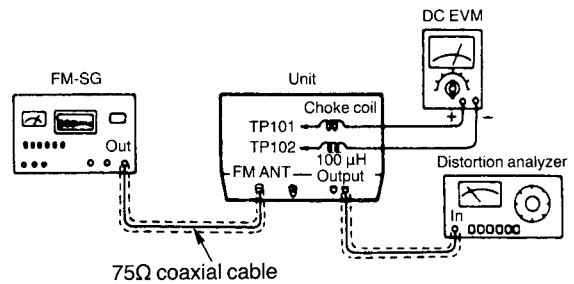


FM MONO DISTORTION/FM OFFSET VOLTAGE ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" and "IF normal" mode.
3. Set the radio frequency display and signal generator to **100.10 MHz**.
4. Adjust the core of **T101** so that the voltage measured in signal mode is **0 mV** (0 ± 20 mV) in 300 mV range.
5. Adjust **T102** so that the distortion factor of L-CH is minimized.
6. Repeat steps 4 and 5.
7. Make sure that the distortion factors of L-CH and R-CH are nearly the same and minimum.

Note: The adjusting screwdriver used should be made of resin.

FM SIGNAL GENERATOR CONDITION
 Modulation 100%
 Modulation frequency 1 kHz
 Output level 66 dB



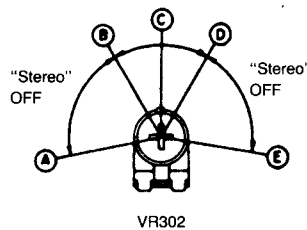
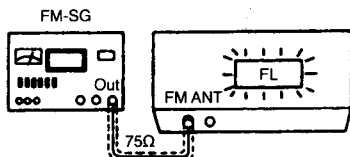
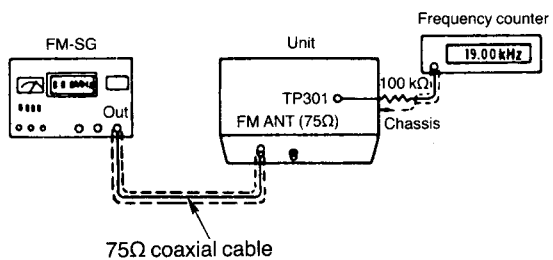
FM MPX VCO ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" and "IF normal" mode.
3. Set the radio frequency display and signal generator to **100.50 MHz**.
4. Adjust **VR302** for **19 kHz ± 30 Hz** on frequency counter reading.

•USING ALTERNATE SYSTEM

1. Apply stereo signal from generator or receive the stereo broadcast.
2. Adjust **VR302** until stereo indicator lights up. Fix the arm of **VR302** as shown in figure.

FM SIGNAL GENERATOR CONDITION
 Modulation 0%
 Modulation frequency 0 kHz
 Output level 66 dB

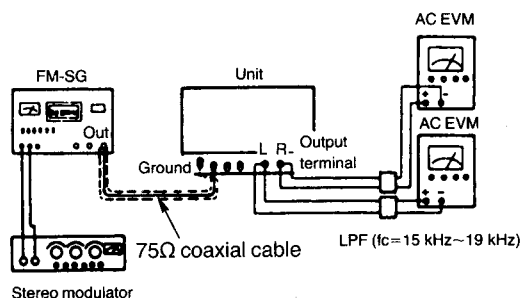


- (A)~(B), (D)~(E) "Stereo" OFF position
- (B)~(D) "Stereo" ON position (Indicator lighting)
- (C) Adjust point of pilot circuit

FM STEREO SEPARATION ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" mode.
3. Set the radio frequency display and signal generator to **100.20 MHz**.
4. Adjust **VR301** so that the R-CH output is minimized when stereo modulator is in "L" (L-CH modulation) mode.

FM SIGNAL GENERATOR CONDITION
 Modulation Stereo "L" mode or "R" mode 90%, Pilot 10%
 Modulation frequency 1 kHz (Pilot 19 kHz)
 Output level 66 dB

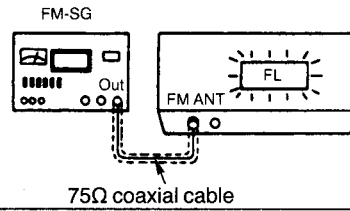


FM SIGNAL STRENGTH LEVEL ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" and "IF normal" mode.
3. Set the radio frequency display and signal generator to **100.50 MHz**.
4. Change FL display from "frequency" to "dB" by pressing the FM signal button.
5. Adjust **VR101** so that **54 dB** is indicated. "54 dB" is indicated on the FL display.
6. Repeat steps 4, 5.

FM SIGNAL GENERATOR CONDITION

Modulation 30%
 Modulation frequency 1 kHz
 Output level 60 dB



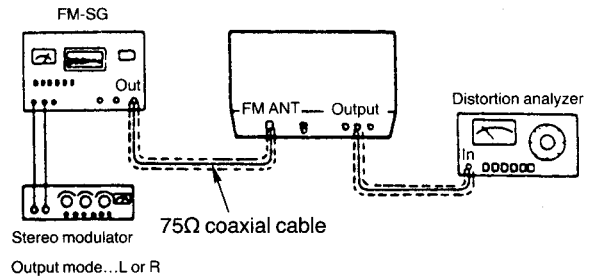
FM STEREO DISTORTION ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" mode.
3. Set the radio frequency display and signal generator to **100.10 MHz**.
4. Adjust **TN101** so that the distortion factor of L-CH is minimized.
5. Make sure that the distortion factors of L-CH and R-CH are nearly the same and minimum.

Note: The adjusting screwdriver used should be made of resin.

FM SIGNAL GENERATOR CONDITION

Modulation "L" mode or "R" mode 90%,
 Pilot 10%
 Modulation frequency 1 kHz (Pilot 19 kHz)
 Output level 66 dB

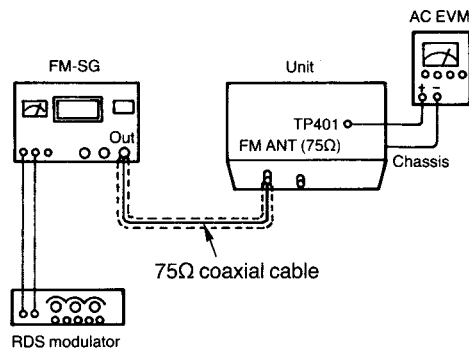


RDS (Radio data system) BPF ADJUSTMENT

1. Test equipment connection is shown in figure.
2. Set the unit to "FM" mode.
3. Set the radio frequency display and signal generator to **100.10 MHz**.
4. Adjust **VR401** so that the **TP401** output is maximized.

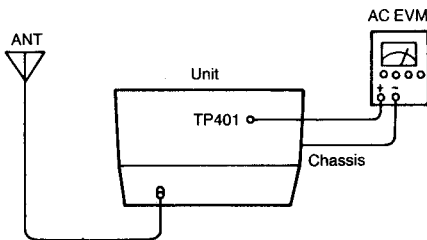
FM SIGNAL GENERATOR CONDITION

Modulation 100%
 Modulation frequency 1 kHz
 RDS modulation 2.7%
 Output level 66 dB

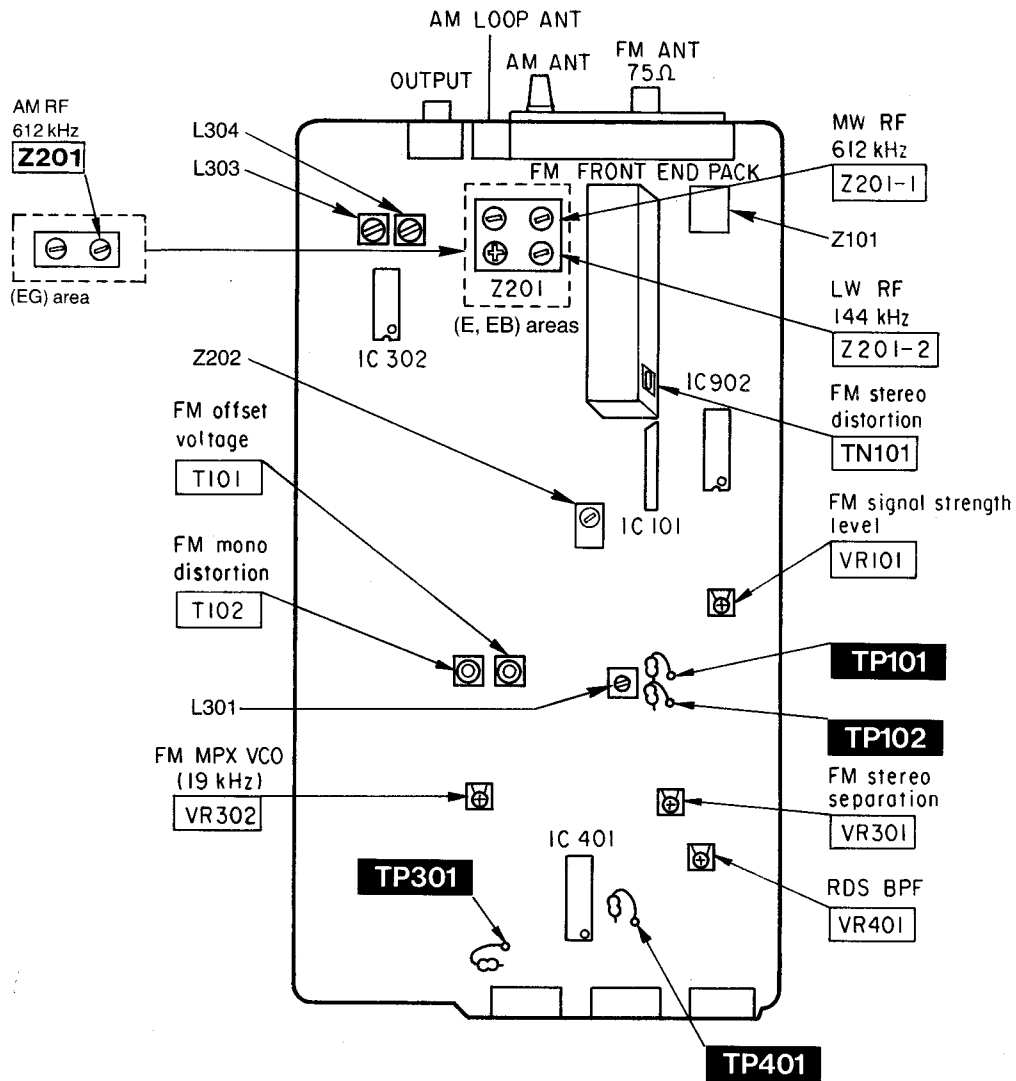


How to make simple adjustment without using a RDS modulator

1. Tune into a FM broadcast with a RDS signal transmitted from a FM station whose electric field intensity is more than **50 dB**.
2. Adjust **VR401** to increase a bi-phase signal to a maximum.



● Adjustment point



■ FUNCTIONS OF IC TERMINALS

● IC903 (LC75711E)

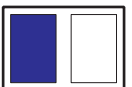
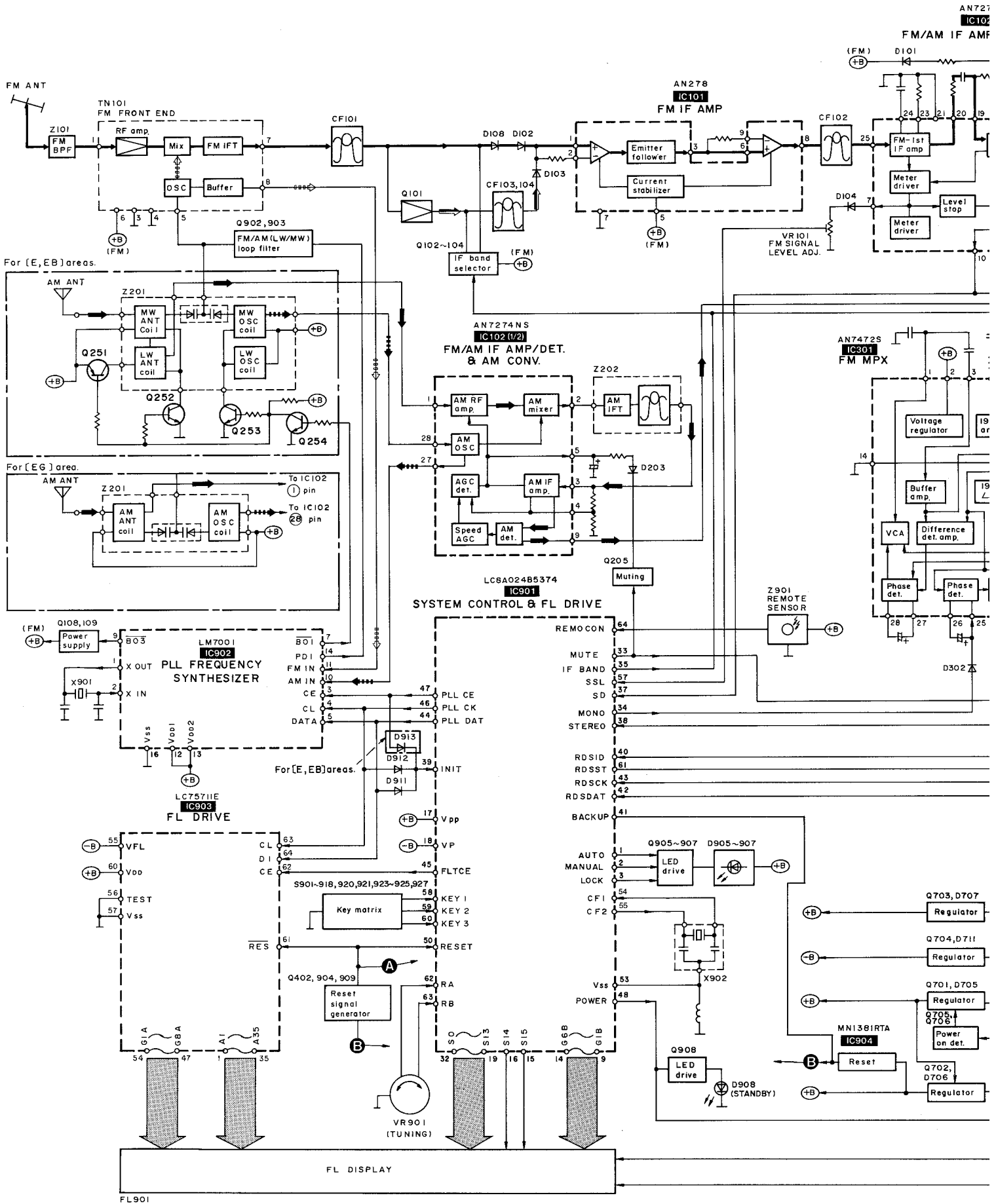
Pin No.	Terminal Name	I/O	Function
1 } 35	A1 } A35	O	FL segment signal output
36 } 38	No use	—	—
39 } 43	No use	—	—
44 } 46	No use	—	—
47 } 54	G8A } G1A	O	FL glide signal output

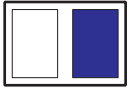
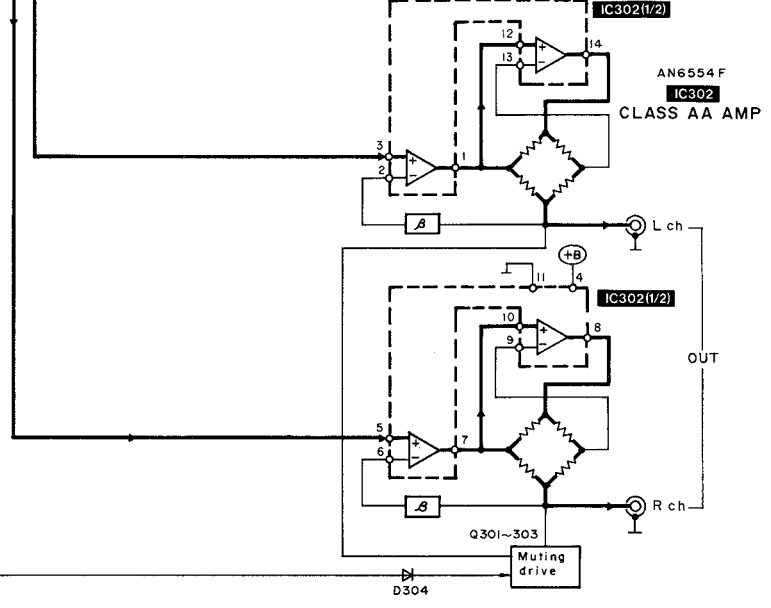
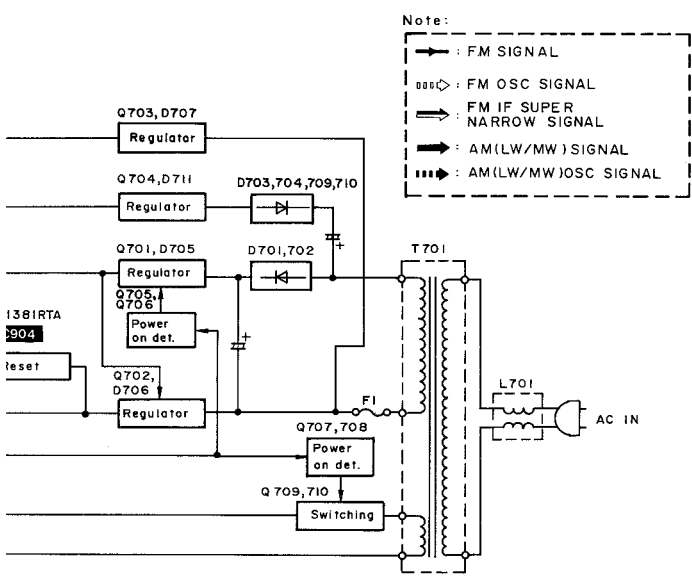
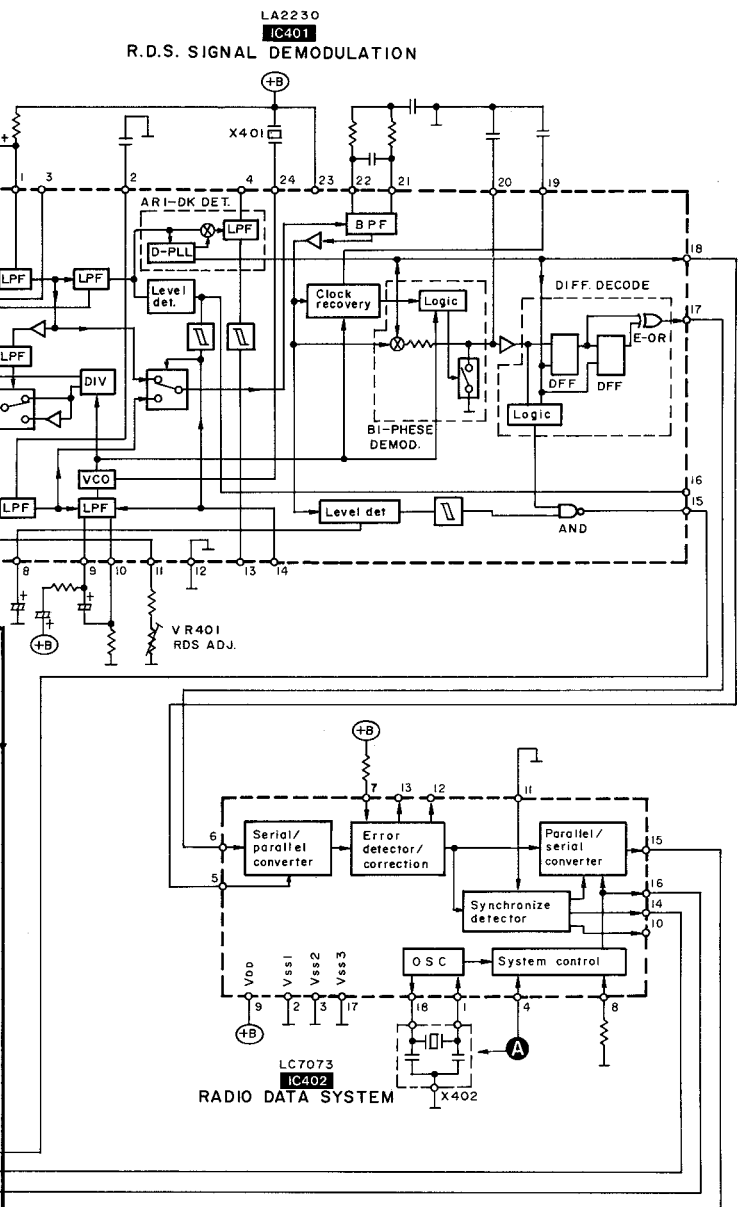
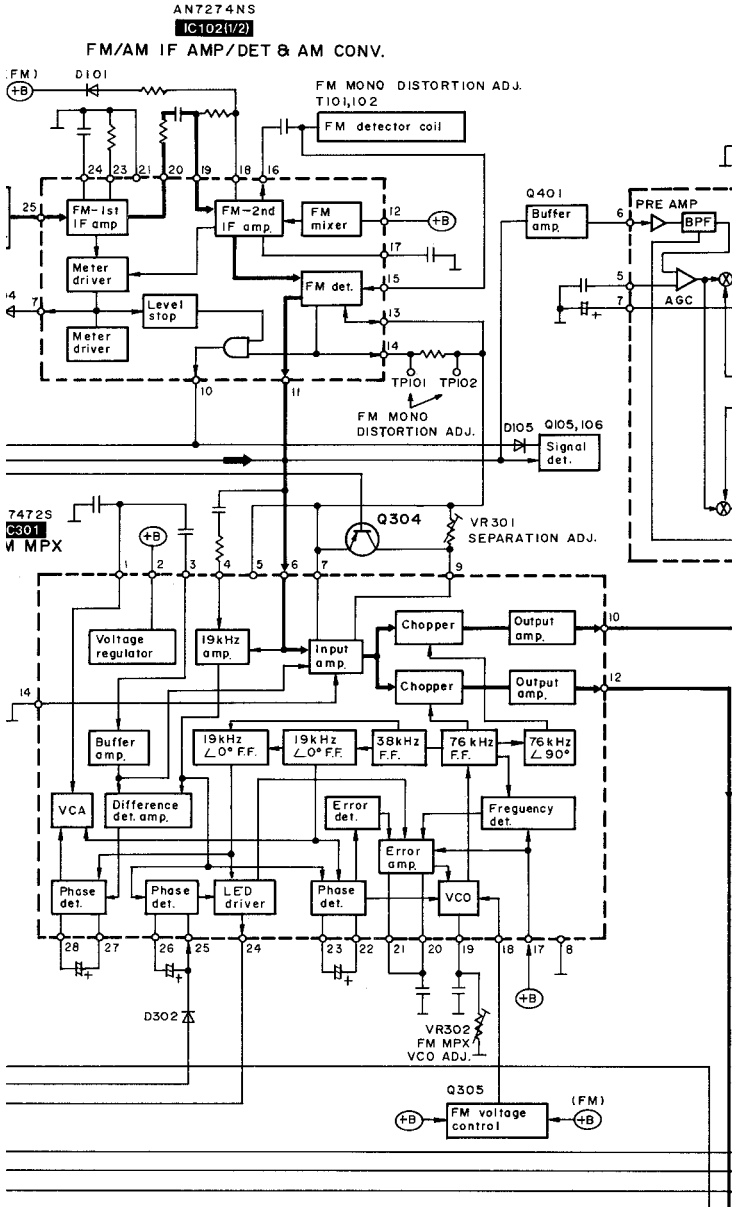
Pin No.	Terminal Name	I/O	Function
55	VFL	I	FL drive power input
56	TEST	—	GND
57	V _{SS}	—	
58	OSC O	O	Connecting terminal for resistor and capacitor
59	OSC I	I	
60	V _{DD}	I	Power supply
61	\overline{RES}	I	Reset signal input
62	CE	I	FLD control chip select signal input
63	CL	I	Serial clock input
64	DI	I	Serial data input

●IC901 (LC8A024B5374)

Pin No.	Terminal Name	I/O	Function	Pin No.	Terminal Name	I/O	Function
1	AUTO	O	Tuning mode LED drive signal output	42	RSDAT	I	RDS data input
2	MANUAL			43	RDSCK	I	RDS clock input
3	LOCK			44	PLL DAT	O	Serial data output
4 } 8	No use	—	—	45	FLTCE	O	FLTC chip enable signal output
9 } 14	G1B } G6B	O	Grid signal output	46	PLL CK	O	Serial clock signal output
15 • 16	S15 • S14	O	Segment signal output	47	PLL CE	O	LM7001 chip enable signal output
17	VPP	—	Power supply for FL (+5 V)	48	POWER	O	Power control signal output
18	VP	—	Power supply for FL (−VP)	49	No use	—	—
19 } 32	S13 } S0	O	Segment signal output	50	RESET	I	Reset signal input
33	MUTE	O	Muting signal output	51	XTI	I	Connected to V _{DD}
34	MONO	O	Forcible monaural select signal output	52	No use	—	—
35	IF BAND	O	IF BAND select signal output H: NARROW L: NORMAL	53	V _{SS}	—	GND
36	No use	—	—	54	CF1	I	Connecting terminal for ceramic filter
37	SD	I	Station detector signal input	55	CF2	O	
38	STEREO	I	Stereo signal input	56	V _{DD}	—	Power supply (+5 V)
39	INIT	I	Initial setting signal input	57	SSL	I	Tuning level signal input
40	RDSID	I	RDSID signal input	58 } 60	KEY 1 } KEY 3	I	Key matrix signal input
41	BACK UP	I	Power failure detect signal input	61	RDS ST	I	RDS data start signal input
				62	RA	I	Rotary encoda A signal input
				63	RB	I	Rotary encoda B signal input
				64	REMOCON	I	Remote control signal input

BLOCK DIAGRAM





■ CABINET PARTS LOCATION

