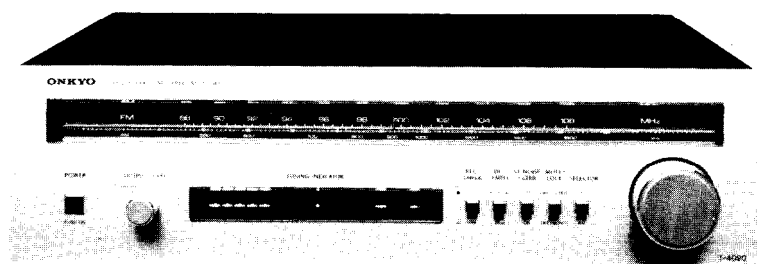


**ONKYO® SERVICE MANUAL****QUARTZ LOCKED  
STEREO TUNER  
MODEL T-4090****TABLE OF CONTENTS**

Item	Page
Specifications	2
Block diagram	3
Component location	4
Exploded view	5
Service procedures	6
Stringing diagram	6
Packing procedures	7
Circuit description	8
Alignment procedures	9
P.c.b. parts list (120V model)	11
Schematic diagram (120V model)	13
P.c.b. view (120V model)	15
P.c.b. view (Universal model)	17
Schematic diagram (Universal model)	19
P.c.b. parts list (Universal model)	21

**ONKYO®**  
**AUDIO COMPONENTS**

## SPECIFICATIONS

### 120V model

#### FM Section

Tuning Range: 88 ~ 108 MHz  
Usable Sensitivity: mono: 9.8 dBf, 1.7  $\mu$ V  
stereo: 17.2 dBf, 4 $\mu$ V

50 dB Quieting sensitivity: mono: 14.7 dBf, 3 $\mu$ V  
stereo: 36 dBf, 35 $\mu$ V

Intermediate Frequency: 10.7 MHz  
Capture Ratio: 1.3 dB  
Image Rejection Ratio: 90 dB  
IF Rejection Ratio: 100 dB  
Spurious Rejection Ratio: 95 dB  
Signal-to-Noise Ratio: mono: 76 dB  
stereo: 68 dB

Alternate channel att: 70 dB  
AM Suppression Ratio: 55 dB  
Harmonic Distortion: mono: 0.1%  
stereo: 0.25%

Stereo Separation: 40 dB at 1 kHz  
35 dB at 70 ~ 10,000 Hz

Subcarrier Suppression: 60 dB  
Muting Level: 17.2 dBf, 4  $\mu$ V  
Stereo Threshold: 17.2 dBf, 4  $\mu$ V  
Quartz Lock Level: 17.2 dBf, 4  $\mu$ V  
Frequency Response: 30 ~ 15,000 Hz + 0.5 -1.5 dB

#### AM Section

Tuning Range: 525 ~ 1605 kHz  
Usable Sensitivity: 25  $\mu$ V  
Intermediate Frequency: 455 kHz  
Image Rejection Ratio: 50 dB  
IF Rejection Ratio: 40 dB  
Signal-to-Noise Ratio: 45 dB  
Harmonic Distortion: 0.7%

#### GENERAL

Power Supply Rating: AC 120 volts 60 Hz  
Output Voltage: FM: 0 ~ 1.5 volts  
AM: 0 ~ 0.5 volts  
Outputs: OUTPUT (variable)  
Inputs: FM and AM Antenna  
Antennas: FM: 300 ohms balanced and  
75 ohms unbalanced  
AM: built-in ferrite core  
antenna and external terminal

Semiconductors: 1 FET, 9 ICs, 28 transistors,  
25 diodes

Dimensions: 418(W) x 124 (H) x 399(D) mm  
16-1/2" x 4-15/16" x 15-3/4"

Weight: 5.9 kg (13 lbs.)

In the interest of further product improvements, specifications are subject to change without notice.

### Universal model

#### FM Section

Tuning Range: 87.5 ~ 108 MHz  
Usable Sensitivity: mono: 1.3  $\mu$ V DIN  
(S/N 26 dB,  
40 kHz devi.)  
1.7  $\mu$ V, 9.8 dBf IHF  
stereo: 45  $\mu$ V DIN  
(S/N 46 dB,  
40 kHz devi.)  
4  $\mu$ V, 17.2 dBf IHF

50 dB Quieting sensitivity: mono: 3  $\mu$ V, 14.7 dBf  
stereo: 35  $\mu$ V, 36 dBf

Intermediate Frequency: 10.7 MHz  
Capture Ratio: 1.3 dB  
Image Rejection Ratio: 90 dB  
IF Rejection Ratio: 100 dB  
Spurious Rejection Ratio: 95 dB  
Signal-to-Noise Ratio: mono: 76 dB  
stereo: 68 dB

Alternate channel att.: 80 dB (IHF)  
Selectivity: 70 dB (DIN)  
( $\pm$ 300 kHz, 40 kHz devi.)

AM Suppression Ratio: 55 dB  
Harmonic Distortion: mono: 0.1%  
stereo: 0.25%

Stereo Separation: 40 dB at 1 kHz  
35 dB at 70 ~ 10,000 Hz

Subcarrier Suppression: 60 dB  
Muting Level: 4  $\mu$ V  
Stereo Threshold: 4  $\mu$ V  
Quartz Lock Level: 4  $\mu$ V  
Frequency Response: 30 ~ 15,000 Hz + 0.5, -1.5 dB

#### AM Section

Tuning Range: 525 ~ 1605 kHz  
Usable Sensitivity: 25  $\mu$ V  
Intermediate Frequency: 455 kHz  
Image Rejection Ratio: 50 dB  
IF Rejection Ratio: 40 dB  
Signal-to-Noise Ratio: 45 dB  
Harmonic Distortion: 0.7%

#### GENERAL

Power Supply Rating: AC: 110/120/220/240 volts  
50/60 Hz

Output Voltage: FM: 0 ~ 1.5 volts  
AM: 0 ~ 0.5 volts

Outputs: OUTPUT (variable)  
Inputs: FM and AM Antenna

Antennas: FM: 300 ohms balanced and  
75 ohms unbalanced  
AM: built-in ferrite core  
antenna and external terminal

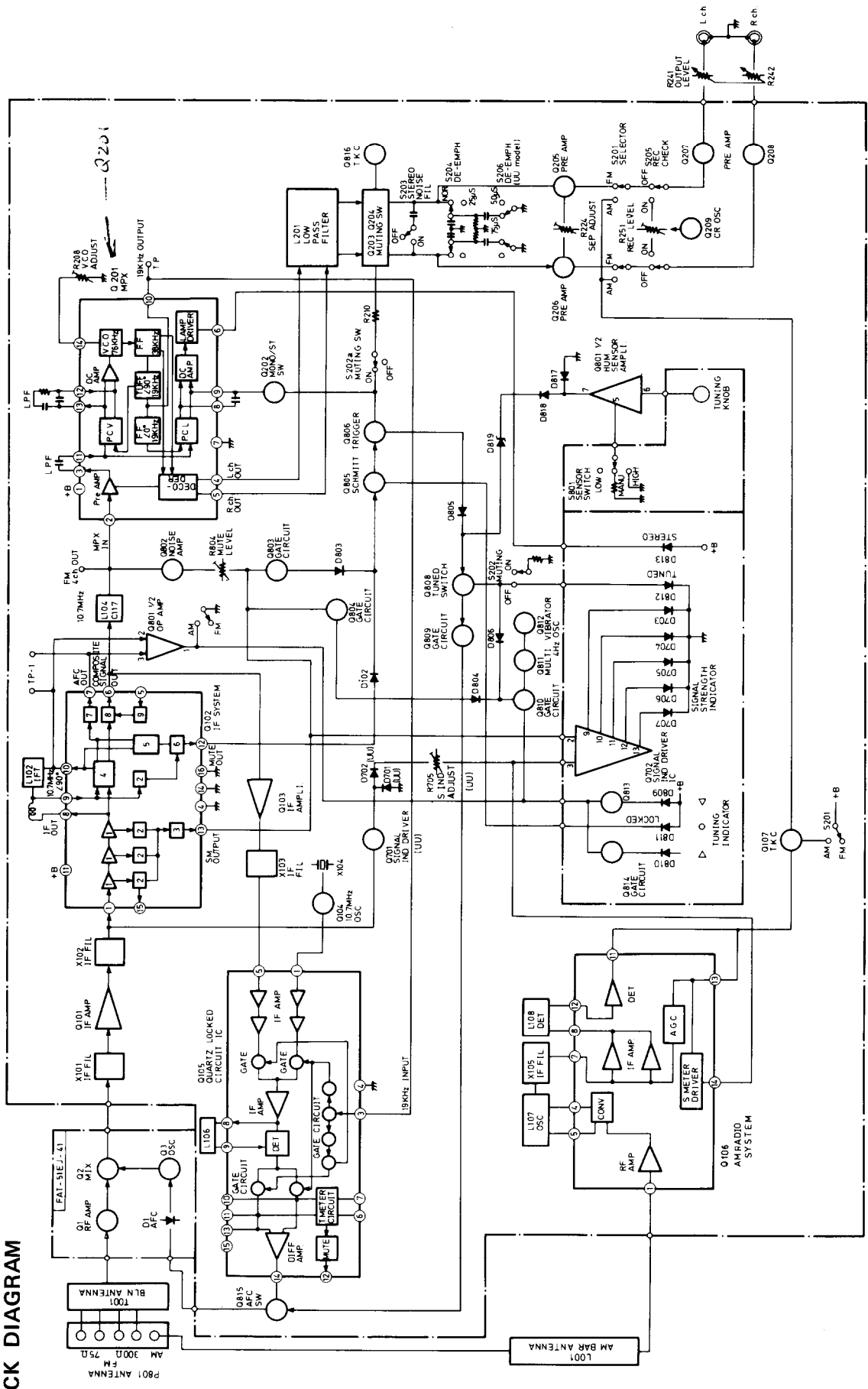
Semiconductors: 1 FET, 9 IC's, 29 transistors,  
27 diodes

Dimensions: 418(W) x 124(H) x 399(D) mm  
16-1/2" x 4-15/16" x 15-3/4"

Weight: 5.9 kg (13 lbs.)

In the interest of further product improvements, specifications are subject to change without notice.

**BLOCK DIAGRAM**



**MPX DECODER IC**

- P.C.V.: Phase comparator for V.C.O
- P.C.L.: Phase comparator for lamp
- TUFF: Direct coupled type flip-flop
- V.C.O: Voltage controlled oscillator
- L.P.F: Low pass filter

**IF SYSTEM IC**

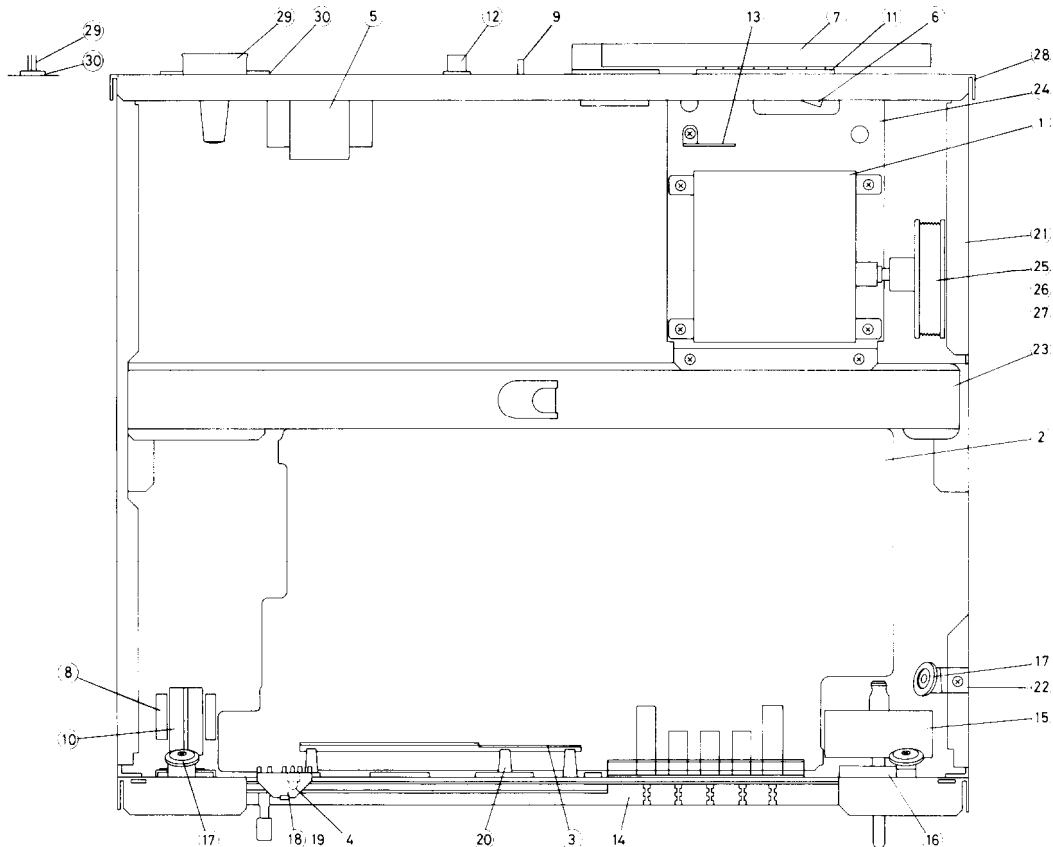
- 1. IF amplifier
- 2. Level detector
- 3. Signal meter circuit
- 4. Quadrature detector
- 5. OV switch

**6. Muting drive circuit**

- 7. AFC amplifier
- 8. Audio amplifier
- 9. Audio muting circuit

NOTE: (UU): Only Universal model

COMPONENT LOCATION



PARTS LIST

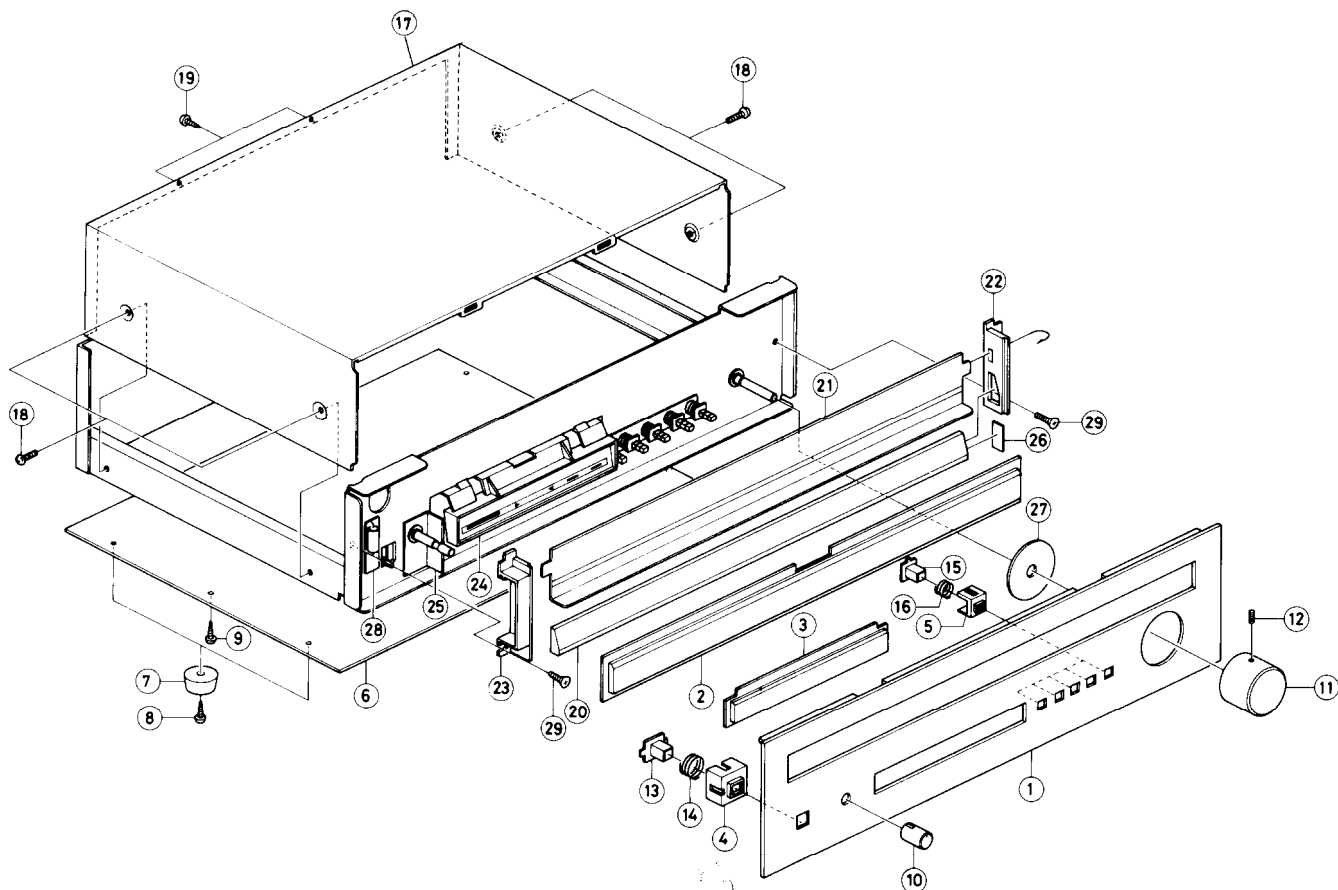
120V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	240038	FAT-51UJ-41, FM front end
2	U2	13639536	NARF-636, FM/AM tuner p.c.b.
3	U3	13639537	NADIS-637, Indicator p.c.b.
4	PL802, PL803	210057	PL6.3V, 0.15AW 1.5, Indicator light
5	T901	230284A	NPT-669D, Power transformer
6	T001	233026	NBLN-1, Balun transformer
7	L001	232066	NMA-3012, AM bar antenna
8	C901	3504012	UL125V103M, UL capacitor
9	S801	25065016	NSS-2327, Hum sensor selector switch
10	S901	25035135	NPS-111-L100P, Power switch
11	P801	25060021B	NTM-3PUM1, Antenna terminal
12	P802	25045026	NPJ-2PRBL04, Output terminal
13	P803	251070	LG-2L, Terminal
14	A001	27110080	Front bracket
15	A002	27205017	Drive shaft
16	A003	27300071	Bearing
17		27185002A	Dial pulley
18	A005	27220011	Slider, pointer
19	A006	28165047	Pointer
20	A012	27190045	Holder, indicator p.c.b.
21	A030	27115043A	Side bracket
22	A031	27140269	Bracket, pulley
23	A032	27130149A	Bracket, AM/FM tuner p.c.b.
24	A033	27130150	Bracket
25	A034	270760A	250mm, Dial drum
26	A035	273803	SP-14A, Spring, dial drum
27	A036	273903	155cm, Stringing
28	A049	27120159	Back panel
29	W901	253099	AS-UC-3, Power supply cord
30	W901a	270025	3R-3P-4, Strainrelief

Universal model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	240038	FAT-51UJ-41, FM front end
2	U2	13640536A	NARF-636a, FM/AM tuner p.c.b.
3	U3	13639537	NADIS-637, Indicator p.c.b.
4	PL802, PL803	210057	PL6.3V, 0.15AW 1.5, Indicator light
5	T901	230285	NPT-669ADGQ, Power transformer
6	T001	233036	NBLN-1, Balun transformer
7	L001	232066	NMA-3012, AM bar antenna
8	C901, C902	3500052	PME271Y510CEE, IS capacitor
9	S801	25065016	NSS-2327, Hum sensor selector switch
10	S901	25035136	NPS-121-101P, Power switch
11	P801	25060021B	NTM-3PUM1, Antenna terminal
12	P802	25045026	NPJ-2PRBL04, Output terminal
13	P803	251070	LG-2L, Terminal
14	A001	27110080	Front bracket
15	A002	27205017	Drive shaft
16	A003	27300071	Bearing
17		27185002A	Dial pulley
18	A005	27220011	Slider, point
19	A006	28165047	Pointer
20	A012	27190045	Holder, indicator p.c.b.
21	A030	27115043A	Side bracket
22	A031	27140269	Bracket, pulley
23	A032	27130149A	Bracket, AM/FM tuner p.c.b.
24	A033	27130150	Bracket
25	A034	270760A	250mm, Dial drum
26	A035	273803	SP-14A, Spring, dial drum
27	A036	273903	155cm, Stringing
28	A049	27120160	Back panel
29	F901	252023	0.5A-T, Fuse
30	F901a	25050021	X-17240, Voltage selector
	P901	25050018	PA-125, 3P inlet

## EXPLODED VIEW



## EXPLODED VIEW – PARTS LIST

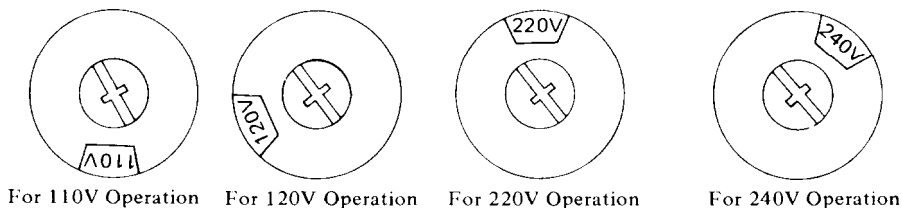
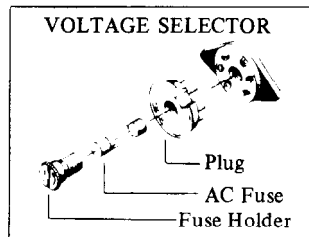
REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
	13639121-1	Front panel ass'y (1, 2, 3)	15	28320318	Push switch knob
1	27210123	Front panel	16	27180037	Spring
2	28191038	Dial glass	17	28184052	Top cover
3	28191037	Indicator glass		28140020	4t x 10 x 40, Cushion
4	27267048	Guide, power switch	18	838440109	4TTB+10C(BC), screw
5	27267049	Guide, push switch	19	834430062	3STS+6BQ(BC), screw
6	27170055	Bottom board	20	28130076A	Dial plate
7	27175009	Leg	21	28133014	Back plate
8	831130162	3STW+16BQ, Tapping screw	22	27250026	Lamp case (R)
9	831130082	3STW+8BQ, Tapping screw	23	27250027	Lamp case (L)
10	28320316	Output level control knob	24	27190045	Holder
11	28320309	Tuning knob	25	27240019	Illumination bracket
12	801146	4 x 6, Screw	26	262003	Tape
13	13639125	Power switch knob ass'y (4, 13, 14)	27	28140126	Cushion
13	28320319	Power switch knob	28	13639539	Dial illumination lamp p.c.b.
14	27180038	Spring		210064	250mA, 6.3V, Dial illumination lamp
15	13639126	Push switch knob ass'y (5, 15, 16)	29	831130082	3STW+8BQ, Tapping screw

## SERVICE PROCEDURES

### 1. REPLACING THE AC FUSE Universal Model

This models is equipped with a universal power transformer to permit operation at either power source of 110, 120, 220 or 240V AC 50/60Hz.

To convert the unit to a different power souce voltage, change the plug as illustrated in the drawing below.



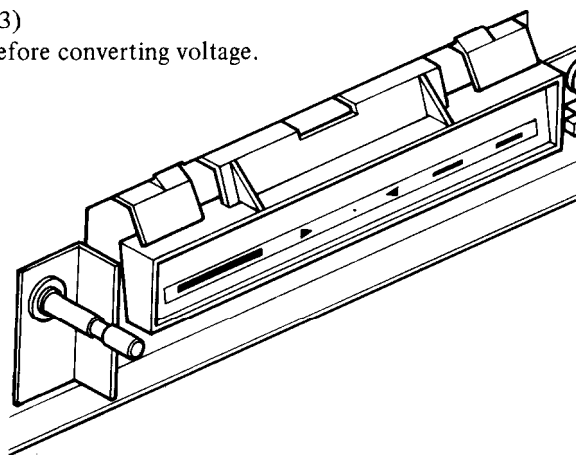
CAUTIONS: 1. For continued protection against fire hazard, replace only with same type and same rating fuse.

110/120V model    1A-T (Parts No. 252001)  
220/240V model    0.5A-T (Parts No. 252023)

2. Disconnect power supply cord from AC outlet before converting voltage.

### 2. REPLACING THE HOLDER OF INDICATOR

1. Remove the two screws holding the top cover and back panel.
2. Remove the four screws holding the top cover and side brackets.
3. Pull out the output level knob.
4. Remove the five screws holding the front panel and front bracket.
5. Disconnect the holder of indicator by pressing against the nails of holder from front side.



### 3. DE-EMPHASIS SWITCH

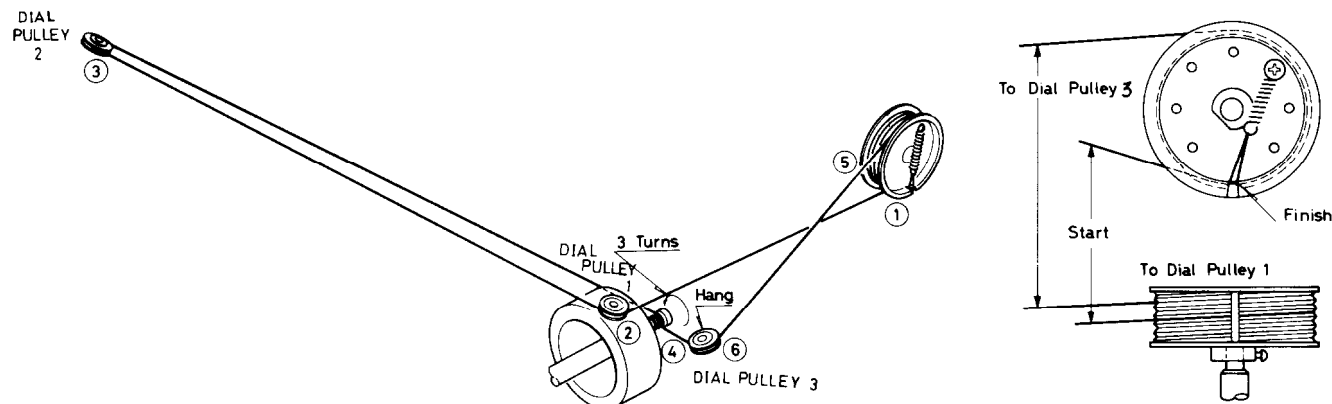
The 25 $\mu$ sec/Normal selector switch for Dolby FM broadcasts is located on the front panel. The 50 $\mu$ sec/75 $\mu$ sec selector switch employed in the Universal Type is located on the bottom board. When shipped from the factory, this bottom board switch is set to the 50 $\mu$ sec position. For use in 75 $\mu$ sec regions, switch over to the 75 $\mu$ sec position.



### 4. SENSOR SWITCH

For matching the automatic FM tuning servo locked system to the various operating conditions. Set to LOW initially and switch to NORMAL or HIGH if the TUNED lamp does not turn off as soon as the tuning knob is touched.

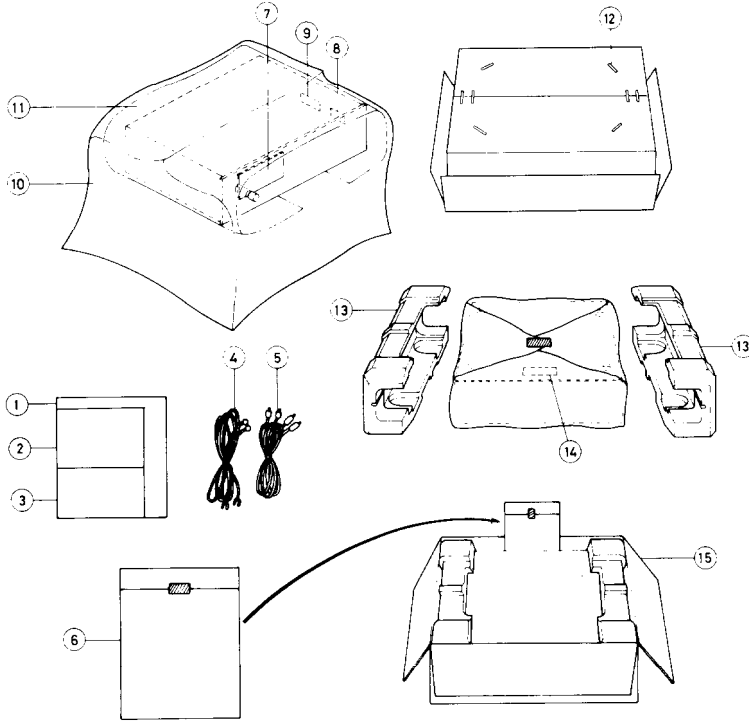
### STRINGING DIAGRAM



1. Close the variable capacitor complete and tie the dial cord to the spring of the drum.
2. Thread the dial cord in the direction of arrow from (1) to (3) and wind the dial cord three turns around the tuning shaft clockwise.
3. Wind the dial cord 1½ turns around the dial drum.
4. Thread the dial cord to the dial pulley 3.

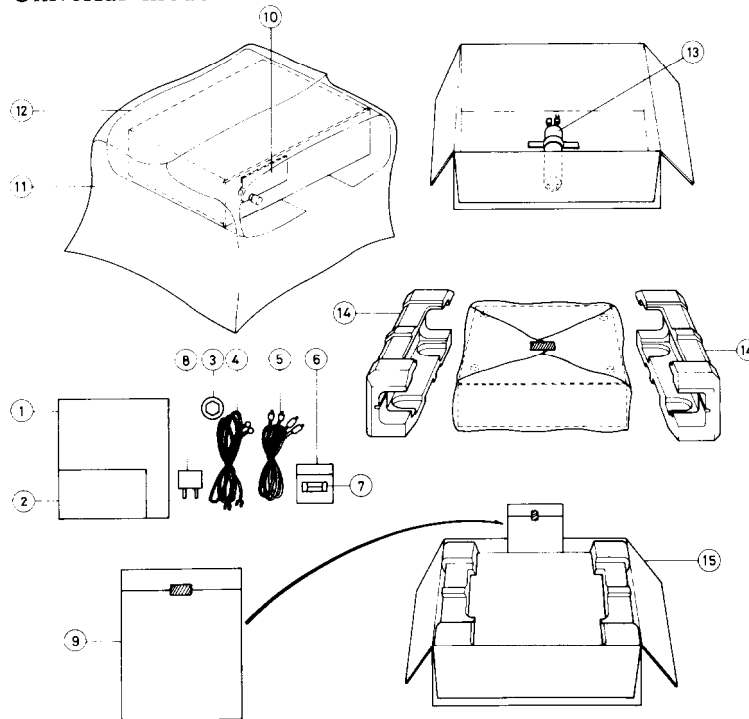
**PACKING PROCEDURES**

**120V model**



1. All printed material and accessory items are placed in the poly bag.
2. The sensor tag is attached to the output level volume shaft.

**Universal model**



**PARTS LIST**  
**120V model**

REF. NO.	PARTS NO.	DESCRIPTION
1	29340321	Instruction manual
2	29358002	Service station list
3	29365006	Warranty card
4	292064	5059-01, FM antenna
5	253074	Connection cord
6	29100006	250 x 350mm, Poly bag
7	29355045	Sensor tag
8	29380040	Cabinet composite label
9	282969	Caution label A
10	29095012	500 x 800mm, Protection sheet
11	29100036	850 x 550mm, Poly bag
12	282301	Sealing hook
13	29090398	Pad
14	293041	Caution label
15	29050266	Carton box

**Universal model**

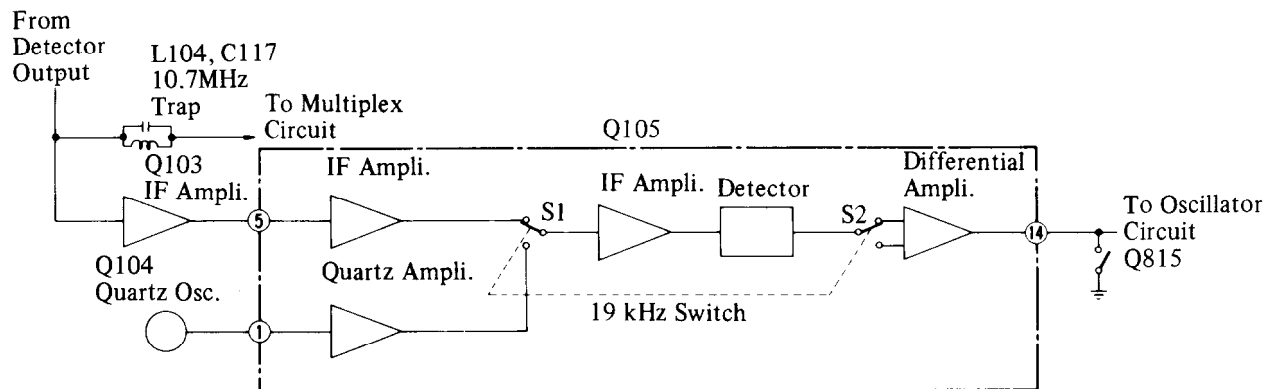
REF. NO.	PARTS NO.	DESCRIPTION
1	29340320	Instruction manual
2	29365005-1	Warranty card (G)
3	292075	Metal, "LOCKED"
4	292064	5059-01, FM antenna
5	253074	Connection cord
6		
7	252001	1A-T, AC fuse (U)
8	25055018	CV-K-1, Conversion plug (U)
9	29100006	250 x 350mm, Poly bag
10	29355045	Sensor tag
11	29100036	850 x 550mm, Poly bag
12	29095012	500 x 800mm, Protection sheet
13	253089	Power supply cord (G)
	13876801	Power supply cord (U)
	29380038	Voltage tag
14	29090398	Pad
15	29050266	Carton box

NOTE: (U): Universal model  
(G): only Germany model

1. All printed material and accessory items are placed in the poly bag.
2. The sensor tag is attached to the output level volume shaft.

## CIRCUIT DESCRIPTION

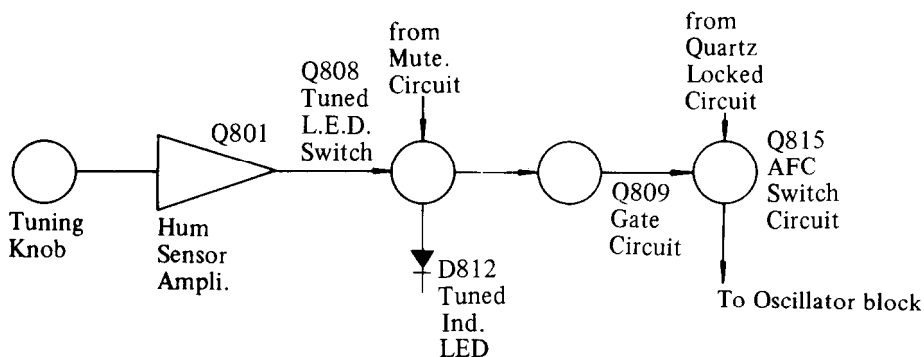
### 1. QUARTZ LOCKED CIRCUIT



The quartz locked circuit compares the frequency difference between the 10.7MHz reference signal and the IF signal, the difference being used to subsequently drive the AFC circuit.

A 10.7MHz component is extracted from the quadrature detector output by the L104 and C117 trap, amplified by the Q103 IC, and applied to pin no. 5 of the Q105 IC. An accurate 10.7MHz reference signal is generated by the quartz oscillator, and applied to pin no. 1 of the same IC. A 19kHz square wave is obtained from pin no. 10 of the PLL IC, and applied to pin no. 3 of Q105. The IF signal and the quartz oscillator reference signal are switched back and forth in a 19kHz cycle, and passed on to the detector and amplification stages. When S1 and S2 are both connected to the IF signal line, the IF frequency is detected, resulting in the generation of a voltage whose level corresponds to the IF frequency. This voltage is then applied to one of the differential amplifier inputs. When S1 and S2 are then both switched across to the quartz oscillator signal line, the quartz oscillator reference signal is detected, converted into the corresponding voltage, and applied to the other input of the differential amplifier. The difference between the IF detector DC component and quartz oscillator detector component is then amplified, appearing at pin no. 14 of the IC. This voltage serves as the AFC circuit control voltage. Any slight drift or deviation in the detector transformer will therefore result in the same amount of drift in both lines, thereby maintaining a constant difference. Precise local oscillator frequency will thus be kept at all times.

### 2. AFC SWITCHING CIRCUIT



In order to ensure accurate tuning, the AFC circuit is turned off automatically once the tuning knob is touched, and also when the muting circuit is switched off.

When a station is tuned, Q808 will turn off and Q809 turn on (since Q805 will already be off and Q806 on), resulting in the LOCKED lamp turning on. And since Q815 will turn off when Q809 turns on, the AFC circuit will also begin to operate.

When the tuning knob is touched, a certain amount of hum is induced. This hum is amplified by Q801, rectified (full-wave) by D817 and D818 into a DC signal, and applied to Q808 is consequently turned on, resulting in the AFC circuit being switched off. If, however, the hum level is rather low, the LOCKED lamp might not turn on even when the tuning knob is touched. If this happens, reset the rear panel sensor switch to either the Normal or High positions.



### 3. SIGNAL INDICATOR DRIVER CIRCUIT

The signal indicator driver circuit is activated by the detector of three or two point. Three point detector is used the Universal model and two point detector is used the 120V model. Q702 is the signal strength indicator driver IC. The IF signal is rectified by the IF level detector circuits and changed the DC component. The DC component applied to pin no. 2 and no. 3 of Q702 is amplified. The signal strength indicator LEDs connected to the IC output terminals pin nos. 9–13 are lit up in succession depending on the input level.

### ALIGNMENT PROCEDURES

#### INSTRUMENTS REQUIRED

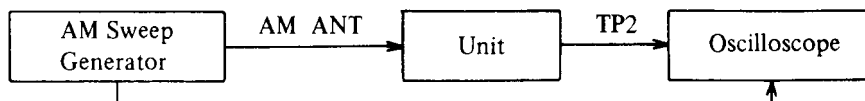
1. DC Voltmeter
2. AM Sweep Generator
3. AM/FM Signal Cenerator
4. AC VTVM
5. Oscilloscope
6. Monitorscope
7. Distortion Analyzer
8. Stereo Modulator
9. Frequency Counter

#### GENERAL ALIGNMENT CONDITIONS

1. Signal input should be kept as low as possible.
  2. Standard modulation is 400Hz 30% (AM), 1kHz 100% (FM MONO), pilot 9% sub and main 91% (FM STREO).
  3. Standard knob position
- De-emphasis . . . . . Normal  
 Muting/Lock . . . . . Off  
 Mode . . . . . Stereo  
 Rec. check . . . . . Off

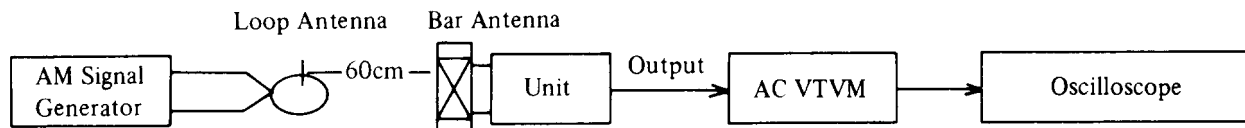
#### (1) AM IF ALIGNMENT

1. Set SELECTOR switch to AM.
2. Set radio dial to quiet point.



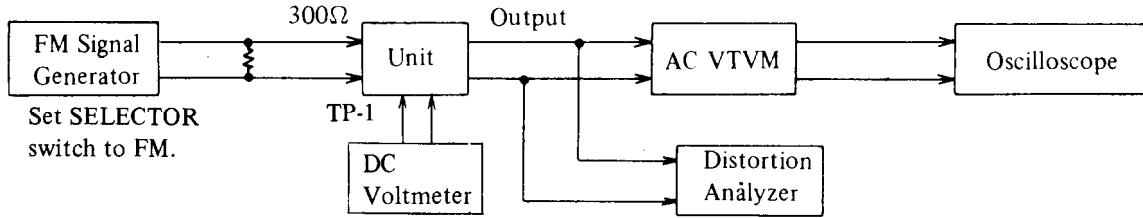
Set signal	Adjust	Oscilloscope	Remarks
455kHz	X105	Maximum Symmetrical Response	Usually not necessary to adjust

#### (2) AM RF ALIGNMENT

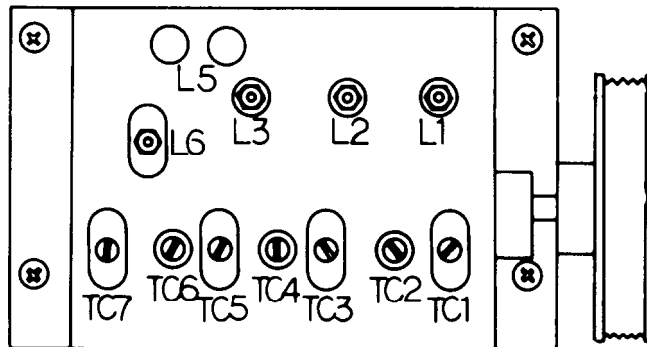


Step	Set Signal	Set Radio Dial	Adjust	VTVM reading	Remarks
1	515kHz 400Hz 30%	Lower end (515kHz)	L107	Maximum	Repeat steps 1 and 2 as necessary
2	1680kHz 400Hz 30%	Upper end (1680kHz)	TC5	Maximum	
3	600kHz 400Hz 30%	600kHz	L001	Maximum	Repeat steps 3 and 4 as necessary
4	1400kHz 400Hz 30%	1400kHz	TC2	Maximum	

(3). FM FRONT END ALIGNMENT

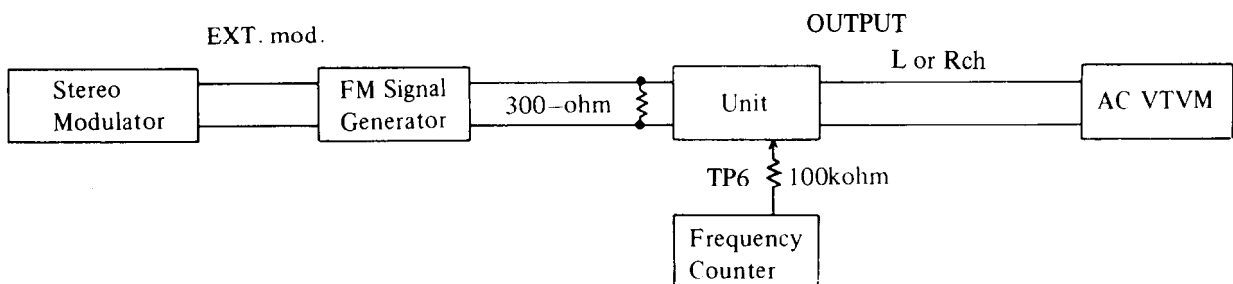


Step	FM Signal Generator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	No signal	Quiet Point	T101 Bottom	DC Voltmeter	OV	Repeat Steps 1 and 2 as necessary
2	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	T101 Top	Distortion Analyzer	Minimum	
3	90MHz 65dBf(60dB) 1kHz 75kHz devi.	90MHz	L6	DC Voltmeter	OV	Repeat Steps 3 and 4 as necessary
4	106MHz 65dBf(60dB) 1kHz 75kHz devi.	106MHz	TC7		OV	
5	90MHz 20dBf(15dB) 1kHz 75kHz devi.	90MHz	L1 L2 L3	AC VTVM or Oscilloscope	Maximum	Repeat Steps 5 and 6 as necessary
6	106MHz 20dBf(15dB) 1kHz 75kHz devi.	106MHz	TC1 TC3 TC5		Maximum	
7	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	L5	Distortion Analyzer	Minimum	



Front End Top View

(4). MULTIPLEX ALIGNMENT



Step	FM Signal Generator	Stereo Modulator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	98MHz no mod. 65dBf (60dB)	—————	98MHz	R208	Frequency Counter	19,000±19Hz	
2	STEREO INDICATOR should light up when stereo program is being received.						
3	98MHz EXT. Mod. 65dBf (60dB)	Pilot Sig. 9% Main & Sub Sig. 1KHz Lch	98MHz	R224	AC VTVM Right ch.	Minimum	Repeat Steps 3 & 4 as necessary Same separation
4	Same as above	Pilot Sig. 9% Main & Sub Sig. 1KHz Rch	98MHz	R224	AC VTVM Left ch.	Minimum	

### (5). QUARTZ LOCKED CIRCUIT ADJUSTMENT

1. Connect the signal generator to the 300ohm antenna terminals and the DC voltmeter to the detector output (pin nos. 10)
2. Set the SG output to 98MHz, 1kHz 75kHz devi., 65dBf (60dB).
3. Turn the tuner to 98MHz.
4. Adjust the voltage to 3.5V with a detector coil of L106.
5. Then connect the DC voltmeter to the AFC output terminal of TP-5.
6. Place the short circuit across TP-4 (pin nos. 10 and 11).
7. Adjust the semi-fixed resistor of R137 to bring the AFC output voltage to zero.
8. Remove the short circuit across TP-4.
9. Adjust the semi-fixed resistor of R130 to bring the AFC output voltage to zero.

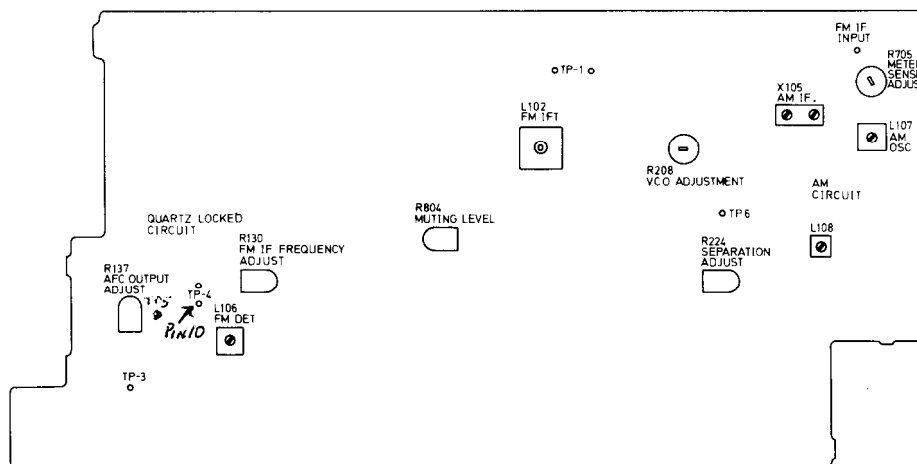
### (6). RECORDING CHECK LEVEL ADJUSTMENT

1. Connect the signal generator to the 300 ohm antenna terminals and the AC voltmeter to the output terminals.
2. Set the SG output to 98MHz, 400 Hz 75kHz devi., 65dBf (60dB).
3. Turn the tuner to 98MHz.
4. Adjust the output level control to bring the output level to 300mV.
5. Push the RECORDING CHECK switch to ON.
6. Adjust the semi-fixed resistor of R251 to bring the output voltage to 150mV.

### (7). SIGNAL STRENGTH INDICATOR ADJUSTMENT

1. Connect the signal generator to the 300ohm antenna terminals.
2. Set the SG output to 98MHz, 1kHz 75kHz devi. 65dBf (60 dB).
3. Turn the tuner to 98MHz.
4. Adjust the semi-fixed resistor of R705 to light up the 5th L. E.D.

NOTE: Only Universal model.



Adjustment Point

## AM/FM TUNER PC BOARD (NARF-636) – PARTS LIST (120V model)

CIRCUIT NO. PARTS NO. DESCRIPTION

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>	
Q101	222452	TA-7302P
Q102	222540	HA-11225
Q103	222468	BA-402
Q105	222469	BA-661
Q106	222418	HA-1151
Q201	222419	HA-1156W
Q801	222465	NJM-4558D
Q901	222542	FS-7812M
	<b>Transistors</b>	
Q104	2210123	2SC380(0)
Q107, Q202	2210746 or 2211255	2SC945(A)P or 2SC1815(GR)
Q203, Q204	2210746	2SC945(A)P
Q205-Q208	2211733	2SC1845(E)
Q209, Q815	2210746	2SC945(A)P
Q802-Q812		
Q816	2210746 or 2211255	2SC945(A)P or 2SC1815(GR)
Q902	2211454	2SA1015(Y)
	<b>Diodes</b>	
D101, D102	223105	1S1555
D103	4000022	VD-1212
D104, D106	223105	1S1555
D201, D202		
D801, D802	223103	1N60
D803-D807	223105	1S1555
D814-D816		
D817, D818	223103	1N60
D819	223943 or 224011	RD-4.7EB or YZ-047
D901	223862	WL-01
D902	223924	WZ-130
D903	223858 or 223802	GP-08D or 1S1885
	<b>Coils</b>	
L101	233144	NCH-1020
L103, L105	233105 or 233024	NCH-1005 or NCCH-1501
L104	233121	NCH-3012
L107	232065	NMO-2002
L201	233032A	NMC-8-7
L801	233122	NCH-3013
L802	233031	NMC-9-1
	<b>Transformers</b>	
L102	233143	NFIF-6008
L106	233120	NFIF-6006
L108	232041	NIT-0509
	<b>Ceramic filters</b>	
X101	3010018	SFJ-10.7MA
X102	3010024	SFE-10.7ML-A
X103	3010006	SFE10.7MA(RED)
X105	3010012	CFT-455B
	<b>X'tal</b>	
X104	3010015	XTL-10.7M
	<b>Capacitors</b>	
C107	352750471	4.7 $\mu$ F, 25V, Elect.
C108, C239	352784791	0.47 $\mu$ F, 50V, Elect.
C110	352721011	100 $\mu$ F, 6.3V, Elect.
C114, C147	352780101	1 $\mu$ F, 50V, Elect.
C116, C119	352741001	10 $\mu$ F, 16V, Elect.
C129	352744701	47 $\mu$ F, 16V, Elect.
C133, C146	352741001	10 $\mu$ F, 16V, Elect.
C142	352742201	22 $\mu$ F, 16V, Elect.
C150	352741011	100 $\mu$ F, 16V, Elect.
C151	352741021	1,000 $\mu$ F, 16V, Elect.
C173	372323614	360pF $\pm$ 5%, 50V, ST
C178, C240	352741001	10 $\mu$ F, 16V, Elect.
C179	352741011	100 $\mu$ F, 16V, Elect.
C182	352780101	1 $\mu$ F, 50V, Elect.
C183	352780331	3.3 $\mu$ F, 50V, Elect.
C185	374124737	0.047 $\mu$ F $\pm$ 20%, 50V, DE
C187	352741001	10 $\mu$ F, 16V, Elect.
C201	352741001	10 $\mu$ F, 16V, Elect.
C202	352741021	1,000 $\mu$ F, 16V, Elect.
C203	374124737	0.047 $\mu$ F $\pm$ 20%, 50V, DE
C204, C205	392884797	0.47 $\mu$ F, 50V, LL
C206	392880107	1 $\mu$ F, 50V, LL
C207	372325114	510pF $\pm$ 5%, 50V, ST
C209	352742211	220 $\mu$ F, 16V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C211, C212	352780221	2.2 $\mu$ F, 50V, Elect.
C219, C220	352780101	1 $\mu$ F, 50V, Elect.
C223, C224	392880107	1 $\mu$ F, 50V, LL
C226	352743311	330 $\mu$ F, 16V, Elect.
C227, C228	352784791	0.47 $\mu$ F, 50V, Elect.
C231, C232	352780101	1 $\mu$ F, 50V, Elect.
C234	352743311	330 $\mu$ F, 16V, Elect.
C705	352741001	10 $\mu$ F, 16V, Elect.
C803	392883397	0.33 $\mu$ F, 50V, LL
C805	352780221	2.2 $\mu$ F, 50V, Elect.
C807	352780101	1 $\mu$ F, 50V, Elect.
C808	352721011	100 $\mu$ F, 6.3V, Elect.
C811	352780101	1 $\mu$ F, 50V, Elect.
C812, C813	352743311	330 $\mu$ F, 16V, Elect.
C815	352742201	22 $\mu$ F, 16V, Elect.
C816	352784791	0.47 $\mu$ F, 50V, Elect.
C817, C823	352741001	10 $\mu$ F, 16V, Elect.
C818	352722211	220 $\mu$ F, 6.3V, Elect.
C819, C820	392880227	2.2 $\mu$ F, 50V, LL
C821	352721011	100 $\mu$ F, 6.3V, Elect.
C905	352764711	470 $\mu$ F, 35V, Elect.
C906	352754711	470 $\mu$ F, 25V, Elect.
C907, C822	352742211	220 $\mu$ F, 16V, Elect.
C909	352764711	470 $\mu$ F, 35V, Elect.
C910	352762211	220 $\mu$ F, 35V, Elect.
C911, C912	352742211	220 $\mu$ F, 16V, Elect.
C914	352734711	470 $\mu$ F, 10V, Elect.
	<b>Resistors</b>	
R130	5225089	N10HR30KBC, Semi-fixed
R137	5225056	N10HR5KBC, Semi-fixed
R208	5225019	N10HR4.7KBD, Semi-fixed
R224	5225055	N10HR2KBC, Semi-fixed
R241, R242	5148012	N16RG10KB35, Output level control
R251	5225017	N10HR10KBC, Semi-fixed
R804	5225058	N10HR50KBC, Semi-fixed
R902	441724304	43 $\Omega$ , 2W, Metal oxide film
	<b>Switch</b>	
S201-S205	25035112	NPS-322-242-L77, Selector/ Muting/Noise filter/De-empha. Rec. check
	<b>Shielded plate</b>	
	27150103	
	<b>Radiator</b>	
	27160029	RAD-07

LAMP PC BOARD (NAPL-639)  
– PARTS LIST

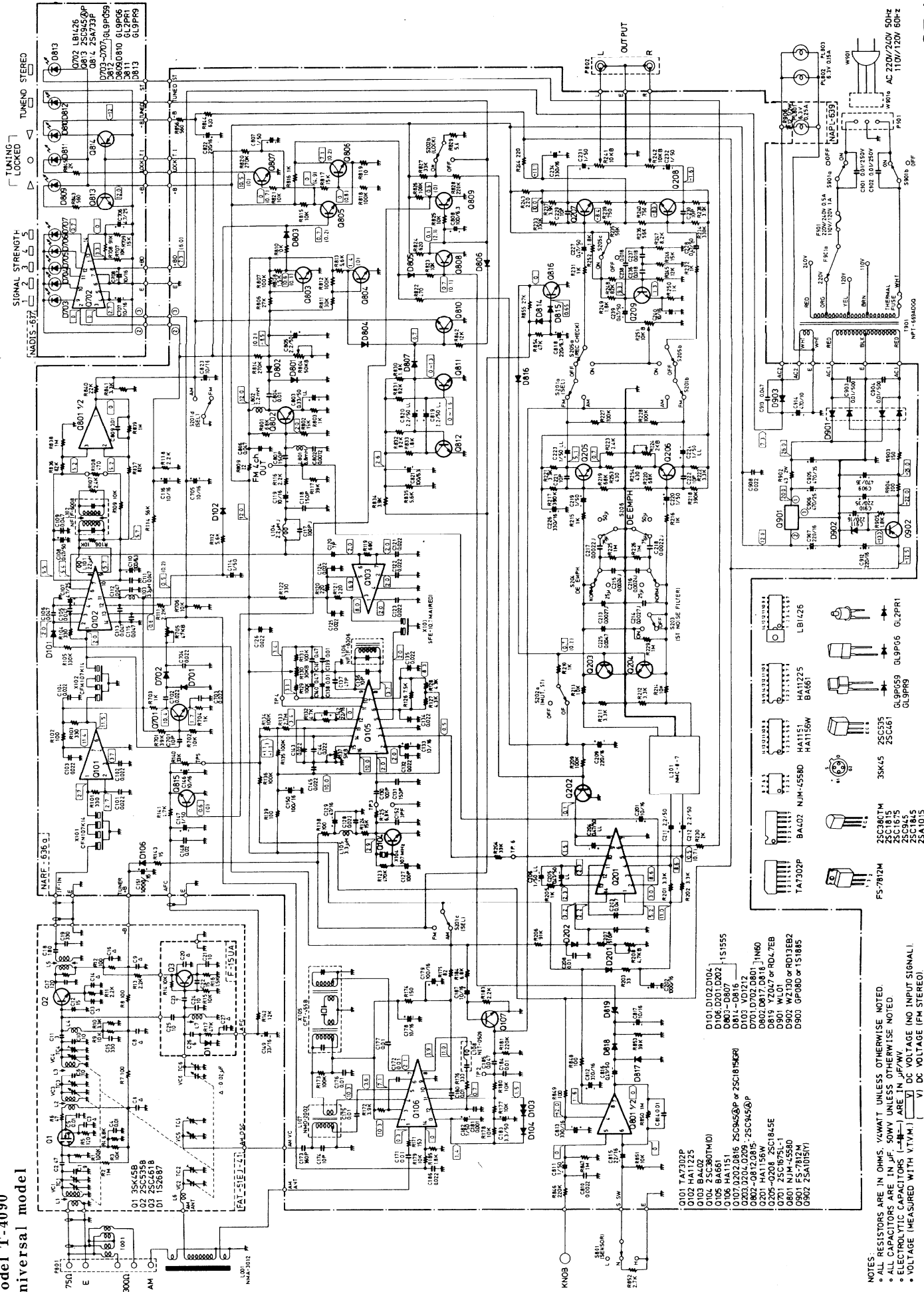
CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL801	211054	250mA, 6.3V, Pilot lamp

INDICATOR PC BOARD (NADIS-637)  
– PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>IC</b>	
Q702	222541	LB-1426
	<b>Transistors</b>	
Q813	2210746	2SC945A(P)
Q814	2210803	2SA733(P)
	<b>L.E.D.</b>	
D703-D707	225028	GL-9PG59, Green
D812		
D809, D810	225031	GL-9PG-6, Triangle
D811	225018	GL-2PR1, Red
D813	225029	GL-9PR9, Red
	<b>Capacitors</b>	
C706	352750471	4.7 $\mu$ F, 25V, Elect.
C707, C708	352741001	10 $\mu$ F, 16V, Elect.

NOTE: Capacitor: ST: Polystyrene film capacitor  
DE: Non-inductive polyester film capacitor  
LL: Low leakage current type electrolytic capacitor

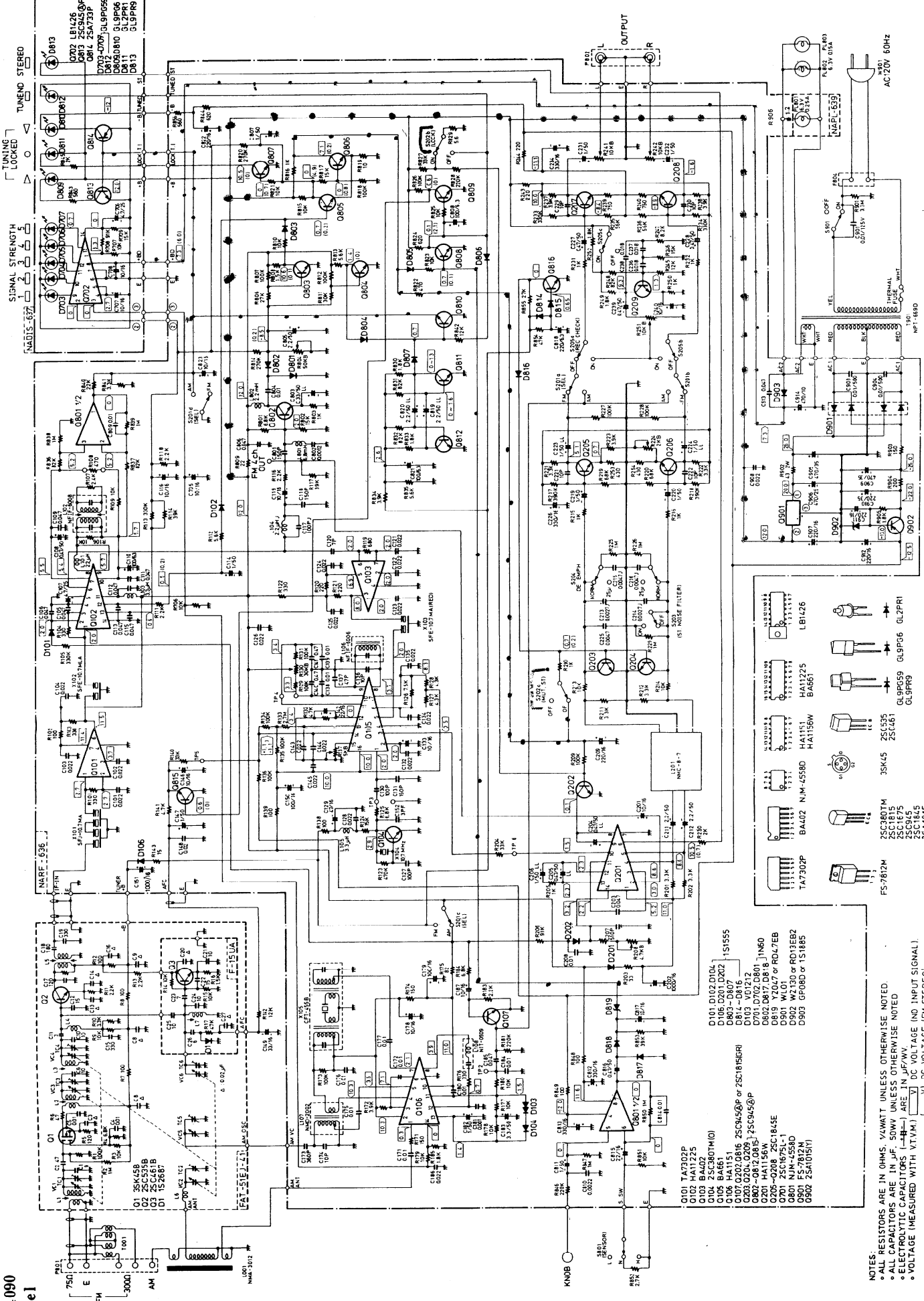
**SCHEMATIC DIAGRAM**  
**Model T-4090**  
**Universal model**



- 0101 TA7202P
- 0102 HA11225
- 0103 BA402
- 0104 2SC380TMD
- 0105 BA661
- 0106 HA1175
- 0107 HA1155
- 0108 HA1156
- 0109 HA1156W
- 0110 HA1156W
- 0111 HA1156W
- 0112 HA1156W
- 0113 HA1156W
- 0114 HA1156W
- 0115 HA1156W
- 0116 HA1156W
- 0117 HA1156W
- 0118 HA1156W
- 0119 HA1156W
- 0120 HA1156W
- 0121 HA1156W
- 0122 HA1156W
- 0123 HA1156W
- 0124 HA1156W
- 0125 HA1156W
- 0126 HA1156W
- 0127 HA1156W
- 0128 HA1156W
- 0129 HA1156W
- 0130 HA1156W
- 0131 HA1156W
- 0132 HA1156W
- 0133 HA1156W
- 0134 HA1156W
- 0135 HA1156W
- 0136 HA1156W
- 0137 HA1156W
- 0138 HA1156W
- 0139 HA1156W
- 0140 HA1156W
- 0141 HA1156W
- 0142 HA1156W
- 0143 HA1156W
- 0144 HA1156W
- 0145 HA1156W
- 0146 HA1156W
- 0147 HA1156W
- 0148 HA1156W
- 0149 HA1156W
- 0150 HA1156W
- 0151 HA1156W
- 0152 HA1156W
- 0153 HA1156W
- 0154 HA1156W
- 0155 HA1156W
- 0156 HA1156W
- 0157 HA1156W
- 0158 HA1156W
- 0159 HA1156W
- 0160 HA1156W
- 0161 HA1156W
- 0162 HA1156W
- 0163 HA1156W
- 0164 HA1156W
- 0165 HA1156W
- 0166 HA1156W
- 0167 HA1156W
- 0168 HA1156W
- 0169 HA1156W
- 0170 HA1156W
- 0171 HA1156W
- 0172 HA1156W
- 0173 HA1156W
- 0174 HA1156W
- 0175 HA1156W
- 0176 HA1156W
- 0177 HA1156W
- 0178 HA1156W
- 0179 HA1156W
- 0180 HA1156W
- 0181 HA1156W
- 0182 HA1156W
- 0183 HA1156W
- 0184 HA1156W
- 0185 HA1156W
- 0186 HA1156W
- 0187 HA1156W
- 0188 HA1156W
- 0189 HA1156W
- 0190 HA1156W
- 0191 HA1156W
- 0192 HA1156W
- 0193 HA1156W
- 0194 HA1156W
- 0195 HA1156W
- 0196 HA1156W
- 0197 HA1156W
- 0198 HA1156W
- 0199 HA1156W
- 0200 HA1156W
- 0201 HA1156W
- 0202 HA1156W
- 0203 HA1156W
- 0204 HA1156W
- 0205 HA1156W
- 0206 HA1156W
- 0207 HA1156W
- 0208 HA1156W
- 0209 HA1156W
- 0210 HA1156W
- 0211 HA1156W
- 0212 HA1156W
- 0213 HA1156W
- 0214 HA1156W
- 0215 HA1156W
- 0216 HA1156W
- 0217 HA1156W
- 0218 HA1156W
- 0219 HA1156W
- 0220 HA1156W
- 0221 HA1156W
- 0222 HA1156W
- 0223 HA1156W
- 0224 HA1156W
- 0225 HA1156W
- 0226 HA1156W
- 0227 HA1156W
- 0228 HA1156W
- 0229 HA1156W
- 0230 HA1156W
- 0231 HA1156W
- 0232 HA1156W
- 0233 HA1156W
- 0234 HA1156W
- 0235 HA1156W
- 0236 HA1156W
- 0237 HA1156W
- 0238 HA1156W
- 0239 HA1156W
- 0240 HA1156W
- 0241 HA1156W
- 0242 HA1156W
- 0243 HA1156W
- 0244 HA1156W
- 0245 HA1156W
- 0246 HA1156W
- 0247 HA1156W
- 0248 HA1156W
- 0249 HA1156W
- 0250 HA1156W
- 0251 HA1156W
- 0252 HA1156W
- 0253 HA1156W
- 0254 HA1156W
- 0255 HA1156W
- 0256 HA1156W
- 0257 HA1156W
- 0258 HA1156W
- 0259 HA1156W
- 0260 HA1156W
- 0261 HA1156W
- 0262 HA1156W
- 0263 HA1156W
- 0264 HA1156W
- 0265 HA1156W
- 0266 HA1156W
- 0267 HA1156W
- 0268 HA1156W
- 0269 HA1156W
- 0270 HA1156W
- 0271 HA1156W
- 0272 HA1156W
- 0273 HA1156W
- 0274 HA1156W
- 0275 HA1156W
- 0276 HA1156W
- 0277 HA1156W
- 0278 HA1156W
- 0279 HA1156W
- 0280 HA1156W
- 0281 HA1156W
- 0282 HA1156W
- 0283 HA1156W
- 0284 HA1156W
- 0285 HA1156W
- 0286 HA1156W
- 0287 HA1156W
- 0288 HA1156W
- 0289 HA1156W
- 0290 HA1156W
- 0291 HA1156W
- 0292 HA1156W
- 0293 HA1156W
- 0294 HA1156W
- 0295 HA1156W
- 0296 HA1156W
- 0297 HA1156W
- 0298 HA1156W
- 0299 HA1156W
- 0300 HA1156W

NOTES:  
 • ALL RESISTORS ARE IN OHMS,  $\mu$ WATT UNLESS OTHERWISE NOTED.  
 • ALL CAPACITORS ARE IN  $\mu$ F, 500V UNLESS OTHERWISE NOTED.  
 • ELECTROLYTIC CAPACITORS (—E—) ARE IN  $\mu$ F/WV.  
 • VOLTAGE (MEASURED WITH VTVM) (—V—) DC VOLTAGE (NO INPUT SIGNAL).  
 • VOLTAGE (MEASURED WITH VTVM) (—V—) DC VOLTAGE (FM STEREO).

**SCHEMATIC DIAGRAM**  
Model T-4090  
120V model

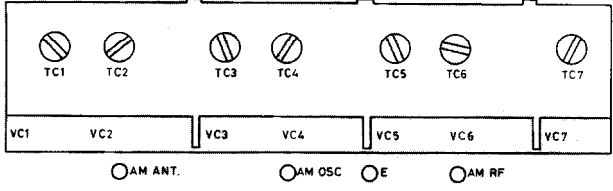
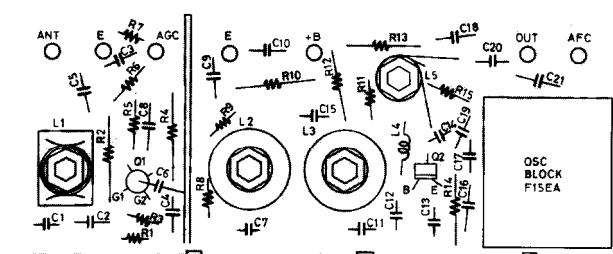
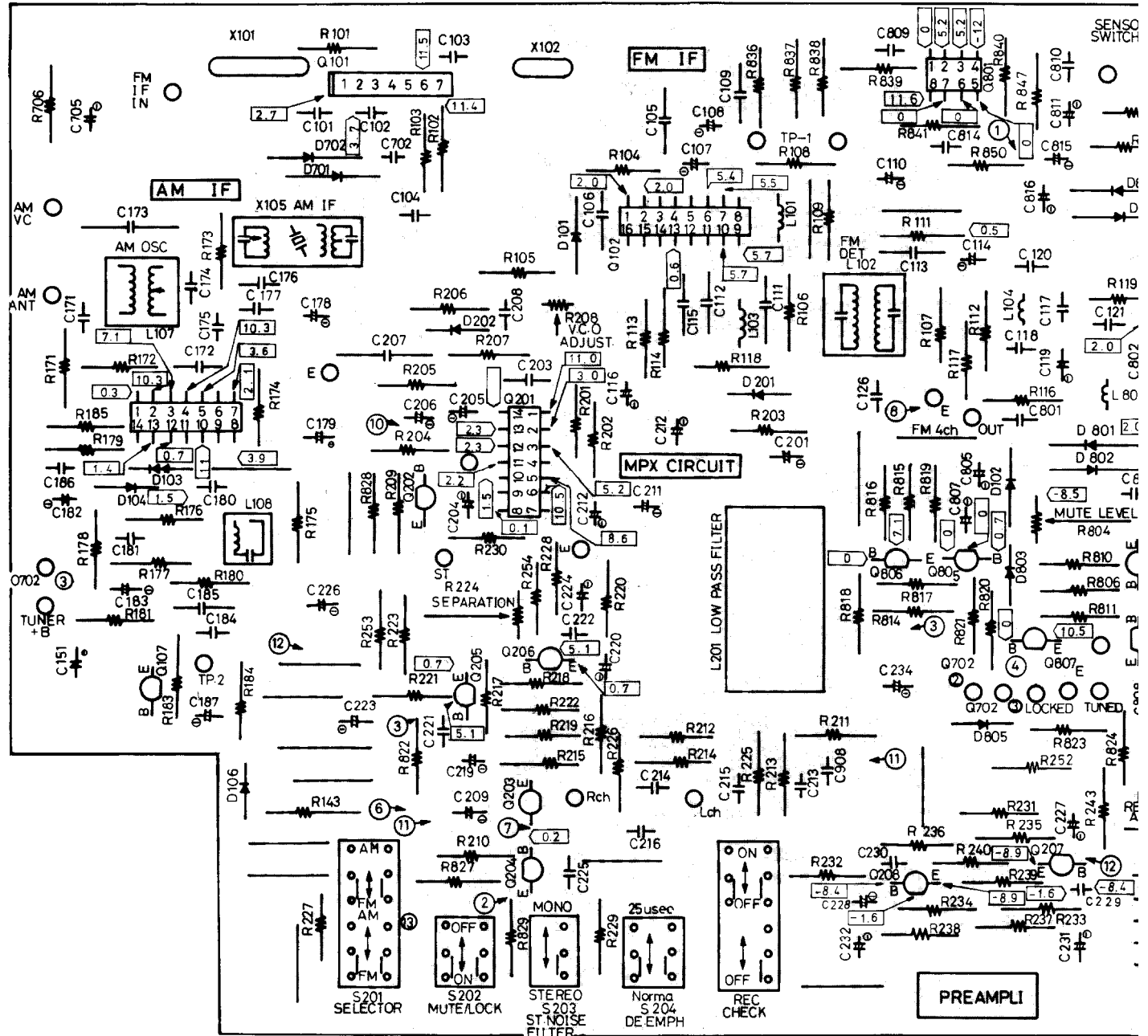


- O1 TA7302P  
 O2 HA11225  
 O3 BA402  
 O4 2SC1815  
 O5 8A61  
 O6 HA1151  
 O7 2SC10816  
 O8 2SC945  
 O9 2SC10816  
 O10 2SC1815  
 O11 2SC1815  
 O12 2SC1815  
 O13 2SC1815  
 O14 2SC1815  
 O15 2SC1815  
 O16 2SC1815  
 O17 2SC1815  
 O18 2SC1815  
 O19 2SC1815  
 O20 2SC1815  
 O21 2SC1815  
 O22 2SC1815  
 O23 2SC1815  
 O24 2SC1815  
 O25 2SC1815  
 O26 2SC1815  
 O27 2SC1815  
 O28 2SC1815  
 O29 2SC1815  
 O30 2SC1815  
 O31 2SC1815  
 O32 2SC1815  
 O33 2SC1815  
 O34 2SC1815  
 O35 2SC1815  
 O36 2SC1815  
 O37 2SC1815  
 O38 2SC1815  
 O39 2SC1815  
 O40 2SC1815  
 O41 2SC1815  
 O42 2SC1815  
 O43 2SC1815  
 O44 2SC1815  
 O45 2SC1815  
 O46 2SC1815  
 O47 2SC1815  
 O48 2SC1815  
 O49 2SC1815  
 O50 2SC1815  
 O51 2SC1815  
 O52 2SC1815  
 O53 2SC1815  
 O54 2SC1815  
 O55 2SC1815  
 O56 2SC1815  
 O57 2SC1815  
 O58 2SC1815  
 O59 2SC1815  
 O60 2SC1815  
 O61 2SC1815  
 O62 2SC1815  
 O63 2SC1815  
 O64 2SC1815  
 O65 2SC1815  
 O66 2SC1815  
 O67 2SC1815  
 O68 2SC1815  
 O69 2SC1815  
 O70 2SC1815  
 O71 2SC1815  
 O72 2SC1815  
 O73 2SC1815  
 O74 2SC1815  
 O75 2SC1815  
 O76 2SC1815  
 O77 2SC1815  
 O78 2SC1815  
 O79 2SC1815  
 O80 2SC1815  
 O81 2SC1815  
 O82 2SC1815  
 O83 2SC1815  
 O84 2SC1815  
 O85 2SC1815  
 O86 2SC1815  
 O87 2SC1815  
 O88 2SC1815  
 O89 2SC1815  
 O90 2SC1815  
 O91 2SC1815  
 O92 2SC1815  
 O93 2SC1815  
 O94 2SC1815  
 O95 2SC1815  
 O96 2SC1815  
 O97 2SC1815  
 O98 2SC1815  
 O99 2SC1815  
 O100 2SC1815

NOTES:  
 \* ALL RESISTORS ARE IN OHMS, UNLESS OTHERWISE NOTED.  
 \* ALL CAPACITORS ARE IN P.F. UNLESS OTHERWISE NOTED.  
 \* ELECTROLYTIC CAPACITORS (—E—) ARE IN DC VOLTAGE (NO INPUT SIGNAL).  
 \* VOLTAGE MEASURED WITH V.T.V.M. (—V—) DC VOLTAGE (FM STEREO).

**PRINTE CIRCUIT BOARD VIEW FROM BOTTOM SIDE**

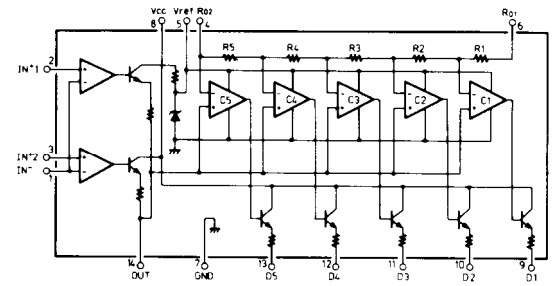
120V model

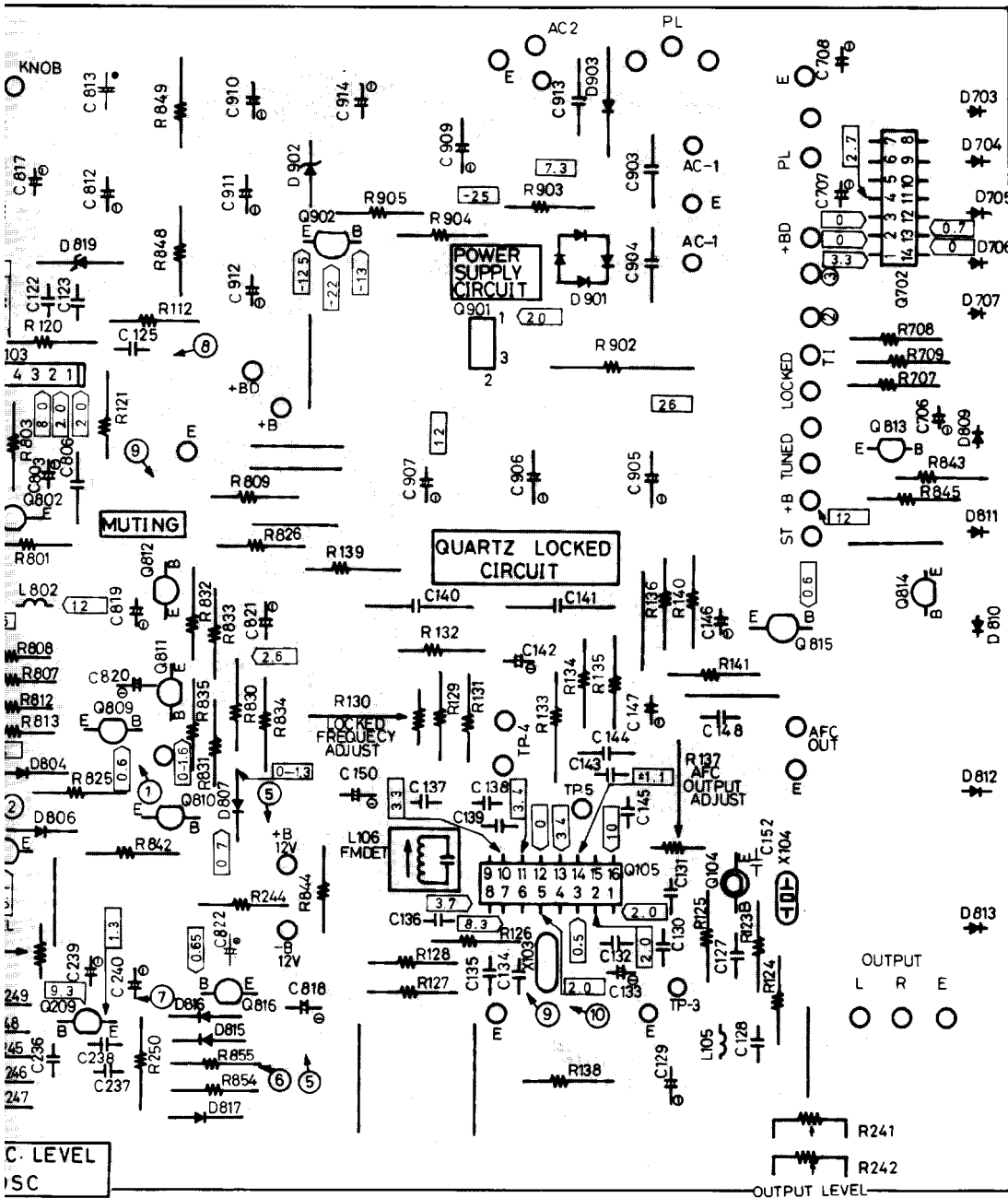


**FAT-52-EJ-41 Bottom View**

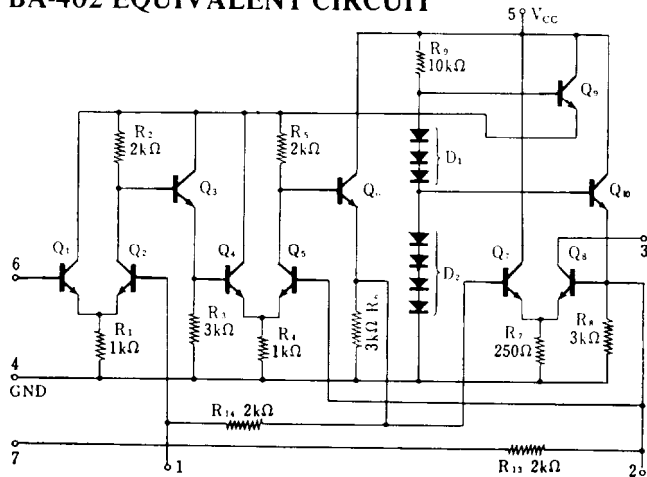
CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q1	Transistors	3SK45 (B)
Q2	Transistors	2SC535 (B)
	OSC Block	F-15EA
	222013	

**LB-1426 EQUIVALENT CIRCUIT**

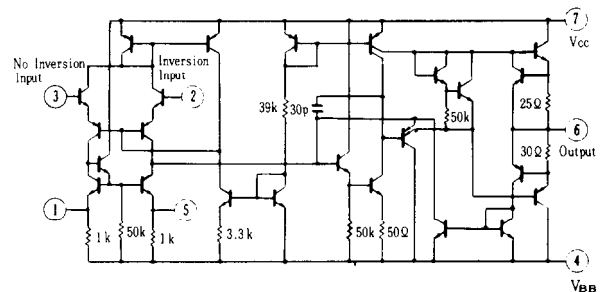




BA-402 EQUIVALENT CIRCUIT

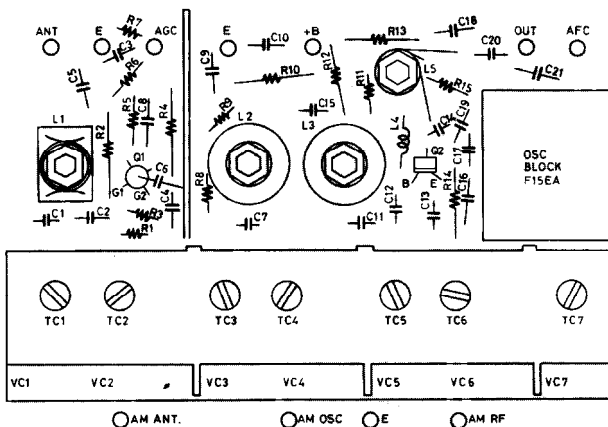
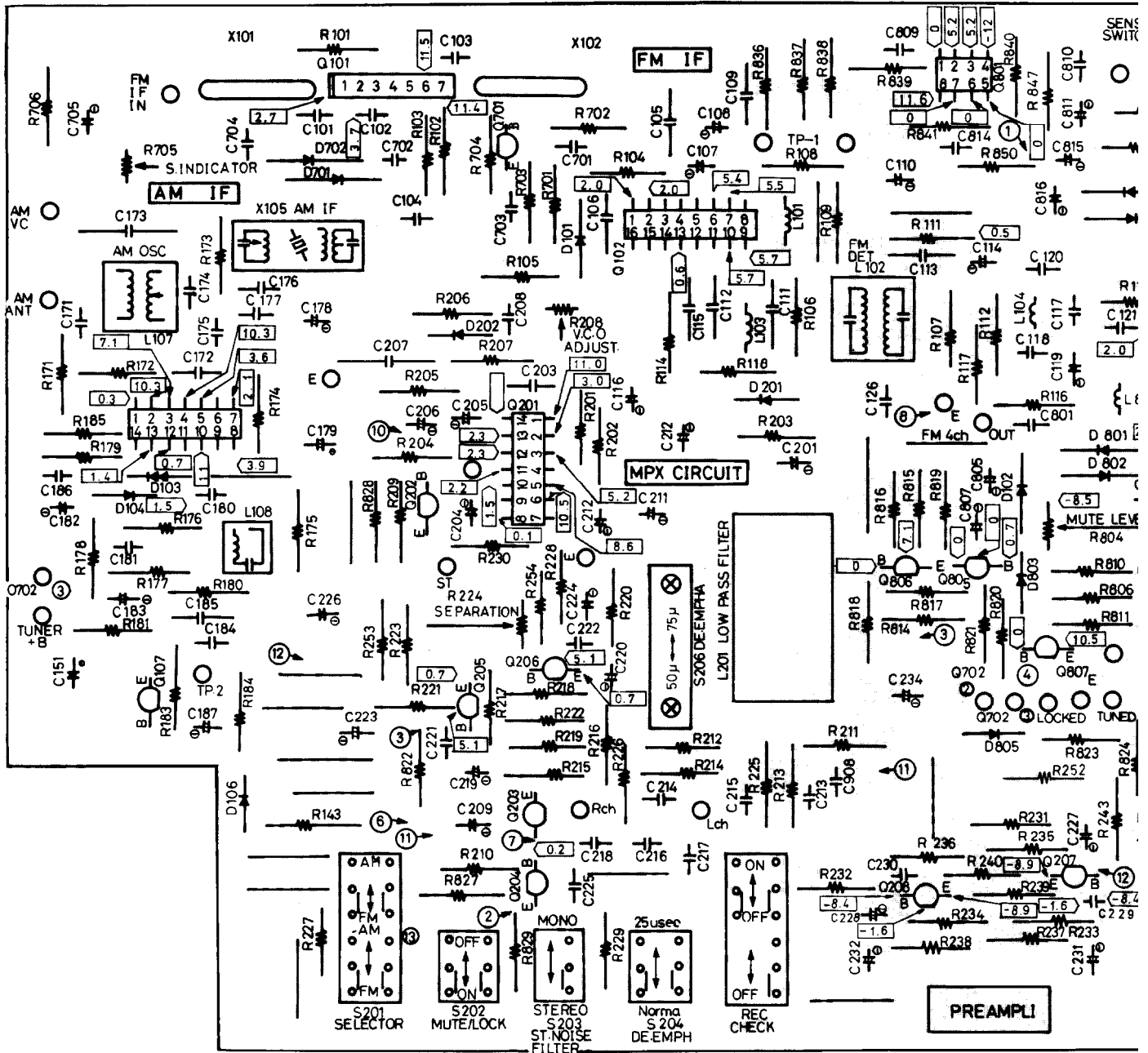


TA-7302P EQUIVALENT CIRCUIT





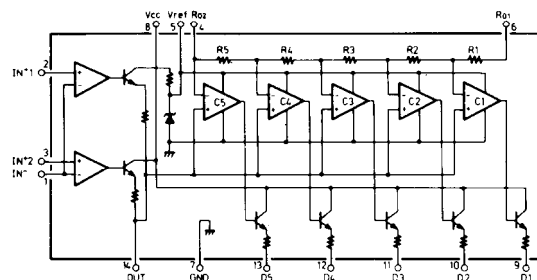
**PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE**  
**Universal model**

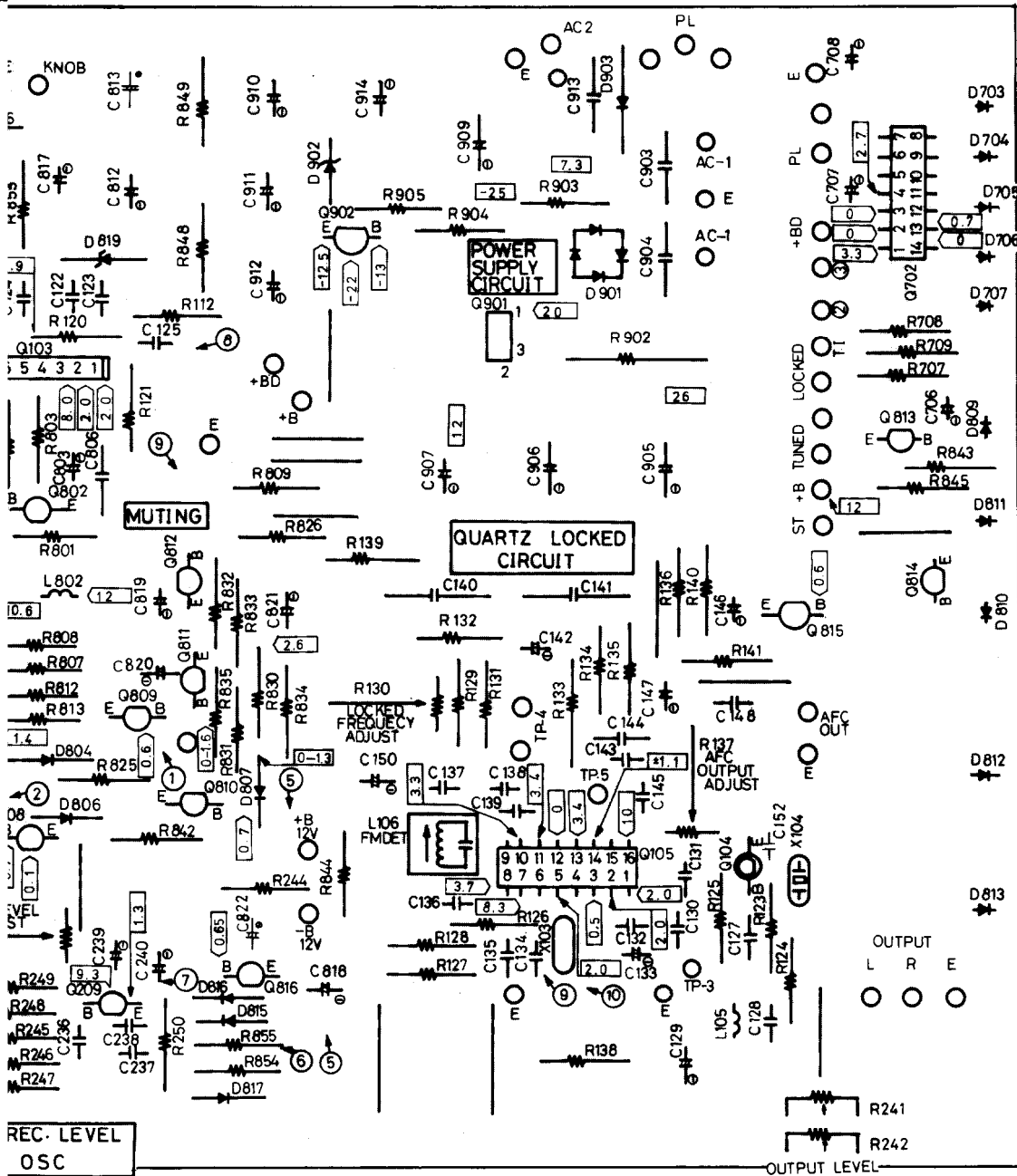


**FAT-52-EJ-41 Bottom View**

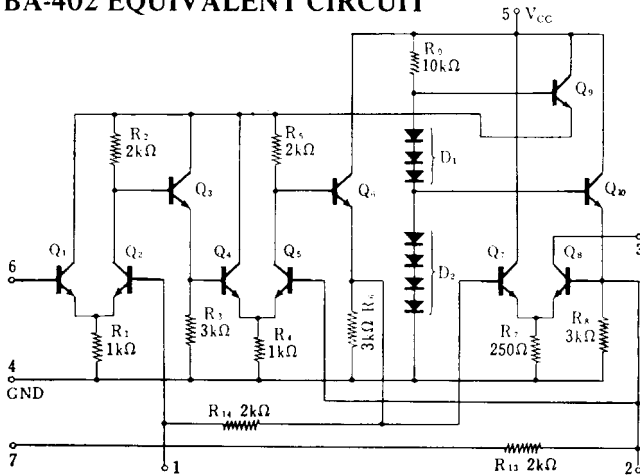
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Transistors</b>	
Q1		3SK45 (B)
Q2		2SC535 (B)
	<b>OSC Block</b>	
	222013	F-15EA

**LB-1426 EQUIVALENT CIRCUIT**

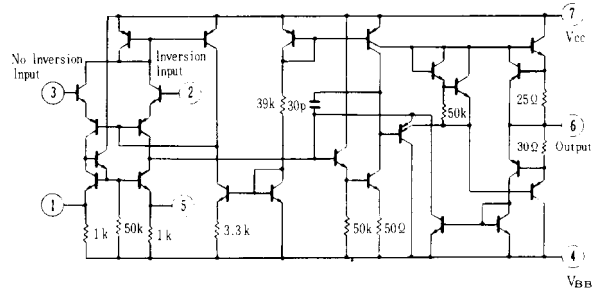




BA-402 EQUIVALENT CIRCUIT



TA-7302P EQUIVALENT CIRCUIT



## PRINTED CIRCUIT BOARD – PARTS LIST(Universal model )

FM/AM TUNER PC BOARD (NARF-636a)  
– PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>ICs</b>				
Q101	222452	TA7302P	C179	352741011	100 $\mu$ F, 16V, Elect.
Q102	222540	HA11225	C182	352780101	1 $\mu$ F, 50V, Elect.
Q103	222468	BA402	C183	352780331	3.3 $\mu$ F, 50V, Elect.
Q105	222469	BA661	C185	374124737	0.047 $\mu$ F $\pm$ 20%, 50V, DE
Q106	222418	HA1151	C187	352741001	10 $\mu$ F, 16V, Elect.
Q201	222419	HA1156W	C201	352741001	10 $\mu$ F, 16V, Elect.
Q801	222465	NJM-4558D	C202	352740121	1,000 $\mu$ F, 16V, Elect.
Q901	222542	FS-7812M	C203	374124735	0.047 $\mu$ F $\pm$ 20%, 50V, DE
	<b>Transistors</b>		C204, C205	392884797	0.47 $\mu$ F, 50V, LL
Q104	2211823	2SC380TM(0)	C206	392880107	1 $\mu$ F, 50V, LL
Q107, Q202	2210746 or 2211255	2SC945A(P) or 2SC1815(GR)	C207	372325114	510pF $\pm$ 5%, 50V, ST
Q203, Q204	2210746	2SC945A(P)	C209	352742211	220 $\mu$ F, 16V, Elect.
Q205-Q208	2211733	2SC1845(E)	C211, C212	352780221	2.2 $\mu$ F, 50V, Elect.
Q209	2210746	2SC945A(P)	C219, C220	352780101	1 $\mu$ F, 50V, Elect.
Q701	2210823	2SC1657(L-1)	C223, C224	392880107	1 $\mu$ F, 50V, LL
Q802-Q812	2210746	2SC945A(P)	C226	352743311	330 $\mu$ F, 16V, Elect.
Q815	2210746	2SC945A(P)	C227, C228	352784791	0.47 $\mu$ F, 50V, Elect.
Q816	2210746 or 2211255	2SC945A(P) or 2SC1815(GR)	C231, C232	352780101	1 $\mu$ F, 50V, Elect.
Q902	2211454	2SA1015(Y)	C234	352743311	330 $\mu$ F, 16V, Elect.
	<b>Diodes</b>		C239	352784791	0.47 $\mu$ F, 50V, Elect.
D101-D102	223105	1S1555	C240	352741001	10 $\mu$ F, 16V, Elect.
D103	4000022	VD1212	C705	352741001	10 $\mu$ F, 16V, Elect.
D104, D106	223105	1S1555	C803	392883397	0.33 $\mu$ F, 50V, LL
D201, D202	223105	1S1555	C805	352780221	2.2 $\mu$ F, 50V, Elect.
D701, D702	223103	1N60	C807	352780101	1 $\mu$ F, 50V, Elect.
D801, D802	223103	1N60	C808	352721011	100 $\mu$ F, 6.3V, Elect.
D803-D807	223105	1S1555	C811	352780101	1 $\mu$ F, 50V, Elect.
D814-D816	223105	1S1555	C812, C813	352743311	330 $\mu$ F, 16V, Elect.
D817, D818	223103	1N60	C815	352742201	22 $\mu$ F, 16V, Elect.
D819	223943 or 224011	RD4.7EB or YZ-047	C816	352784791	0.47 $\mu$ F, 50V, Elect.
D901	223862	WL01	C817	352741001	10 $\mu$ F, 16V, Elect.
D902	223924	WZ-130	C818	352722211	220 $\mu$ F, 6.3V, Elect.
D903	223858 or 223802	GP08D or 1S1885	C819, C820	392880227	2.2 $\mu$ F, 50V, LL
	<b>Coils</b>		C821	352721011	100 $\mu$ F, 6.3V, Elect.
L101	233144	NCH-1020, 22 $\mu$ H	C822	352742211	220 $\mu$ F, 16V, Elect.
L103	233105 or 233024	NCH-1005 or NCCH-1501	C823	352741001	10 $\mu$ F, 16V, Elect.
L104	233121	NCH-3012	C905	352764711	470 $\mu$ F, 35V, Elect.
L105	233105 or 233024	NCH-1005 or NCCH-1501	C906	352754711	470 $\mu$ F, 25V, Elect.
L107	232065	NMO-2002	C907	352742211	220 $\mu$ F, 16V, Elect.
L201	233032A	NMC-8-7	C909	352764711	470 $\mu$ F, 35V, Elect.
L801	233122	NCH-3013	C910	352762211	220 $\mu$ F, 35V, Elect.
L802	233031	NMC-9-1	C911, C912	352742211	220 $\mu$ F, 16V, Elect.
	<b>Transformers</b>		C914	352734711	470 $\mu$ F, 10V, Elect.
L102	233143	NFIF-6008		<b>Resistors</b>	
L106	233120	NFIF-6006	R130	5225089	N10HR30KBC, Quartz lock circuit adjust, variable
L108	232041	NIT-0509	R137	5225056	N10HR5KBC, Quartz lock circuit
	<b>Ceramic filters</b>		R208	5225019	N10HR4.7KBD, V.C.O. adjust, variable
X101, X102	3010028	CFM107K14	R224	5225018	N10HR2KBC, Separation adjust, variable
X103	3010006	SFE10.7MA(RED)	R241, R242	5148012	N16RG10KB35, Output level adjust, variable
X105	3010012	CFT-455B	R251	5225017	N10HR10KBC, Rec. check level adjust, variable
	<b>X'tal</b>		R705	5225034	N10HR47KBD, Strength meter adjust, variable
X104	3010015	XTL-10.7M	R804	5225058	N10HR50KBC, Muting level adjust, variable
	<b>Capacitors</b>		R902	441724304	43 $\Omega$ , 2W, Metal oxide film
C107	352750571	4.7 $\mu$ F, 25V, Elect.		<b>Switches</b>	
C108	352784791	0.47 $\mu$ F, 50V, Elect.	S201-S205	25035112	NP-322-242-L77, Selector/Muting/ Stereo noise filter/De-emphasis/ Rec. check/
C110	352721011	100 $\mu$ F, 6.3, Elect.	S206	250142	NSS-2225, De-emphasis
C114	352780101	1 $\mu$ F, 50V, Elect.		<b>Shielded case</b>	
C116	352741001	10 $\mu$ F, 16V, Elect.		27150103	X'tal oscillator
C119	352741001	10 $\mu$ F, 16V, Elect.		<b>Radiator</b>	
C129	352744701	47 $\mu$ F, 16V, Elect.		27160029	RAD-07
C133	352741001	10 $\mu$ F, 16V, Elect.		<b>LAMP PC BOARD (NAPL-639) – PARTS LIST</b>	
C142	352742201	22 $\mu$ F, 16V, Elect.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
C146	352741001	10 $\mu$ F, 16V, Elect.	PL801	210064	250mA, 6.3V, Pilot lamp
C147	352780101	1 $\mu$ F, 50V, Elect.			
C150	352741011	100 $\mu$ F, 16V, Elect.			
C151	352741021	1,000 $\mu$ F, 16V, Elect.			
C173	372323614	360pF $\pm$ 5%, 50V, ST			
C178	352741001	10 $\mu$ F, 16V, Elect.			

**INDICATOR PC BOARD (NADIS-637)  
- PARTS LIST**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>IC</b>	
Q702	222541	LB-1426
	<b>Transistors</b>	
Q813	2210746	2SC945A(P)
Q814	2210803	2SA733(P)
	<b>L.E.Ds</b>	
D703-D707	225028	GL-9PG59, Green
D812		
D809, D810	225031	GL-9PG6, Triangle

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D811	225018	GL-2PR1, Red
D813	225029	GL-9PR9, Red
	<b>Capacitors</b>	
C706	352750471	4.7 $\mu$ F, 25V, Elect.
C707, C708	352741001	10 $\mu$ F, 16V, Elect.

NOTE: Capacitor: ST: Polystren film capacitor  
 DE: Non-inductive polyester film capacitor  
 LL: Low leakage current type electrolytic capacitor

---

**ONKYO CORPORATION**

International Division: No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Sinbashi, Minato-ku, Tokyo, Japan  
 Telex: 2423551 ONKYO J. Phone: 03-432-6981

**ONKYO U.S.A. CORPORATION**

Eastern Office

42-07 20th Avenue, Long Island City, New York 11105, U.S.A. Phone: (212) 728-4639

Midwest Office

935 Sivert Drive, Wooddale, Illinois 60191, U.S.A. Phone: (312) 595-2970

**ONKYO DEUTSCHLAND GMBH, ELECTRONICS**

8034 München-Germering, Industriestrasse 18, West Germany. Telex: 521726 Telefon: (089)-84-5041