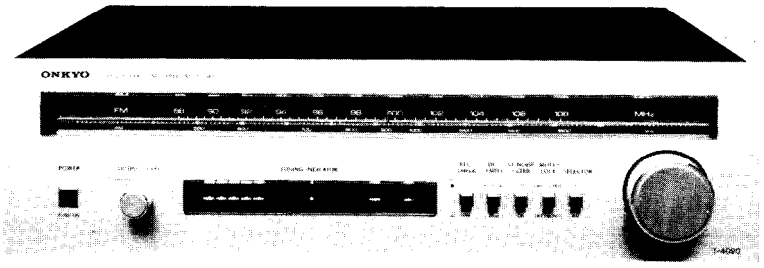
SERIAL NO. 3058

ONKYO® SERVICE MANUAL

QUARTZ LOCKED STEREO TUNER MODEL T-4090



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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

120V model

FM Section

Tuning Range:	88 ~ 108 MHz
Usable Sensitivity:	mono: 9.8 dBf, 1.7 μV stereo: 17.2 dBf, 4μV
50 dB Quieting sensitivity:	mono: 14.7 dBf, 3μV stereo: 36 dBf, 35μV
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 μV
Stereo Threshold:	17.2 dBf, 4 μV
Quartz Lock Level:	17.2 dBf, 4 μV
Frequency Response:	30 ~ 15,000 Hz + 0,5 −1.5 dB

AM Section

Tuning Range:	525 ~ 1605 kHz
Usable Sensitivity:	25 μV
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 μV DIN (S/N 26 dB, 40 kHz devi.) 1.7 μV, 9.8 dBf IHF stereo: 45 μV DIN (S/N 46 dB, 40 kHz devi.) 4 μV, 17.2 dBf IHF
50 dB Quieting sensitivity:	mono: 3 μV, 14.7 dBf stereo: 35 μV, 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) (±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 μV
Stereo Threshold:	4 μV
Quartz Lock Level:	4 μV
Frequency Response:	30 ~ 15,000 Hz + 0.5, −1.5 dB

AM Section

Tuning Range:	525 ~ 1605 kHz
Usable Sensitivity:	25 μV
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.)

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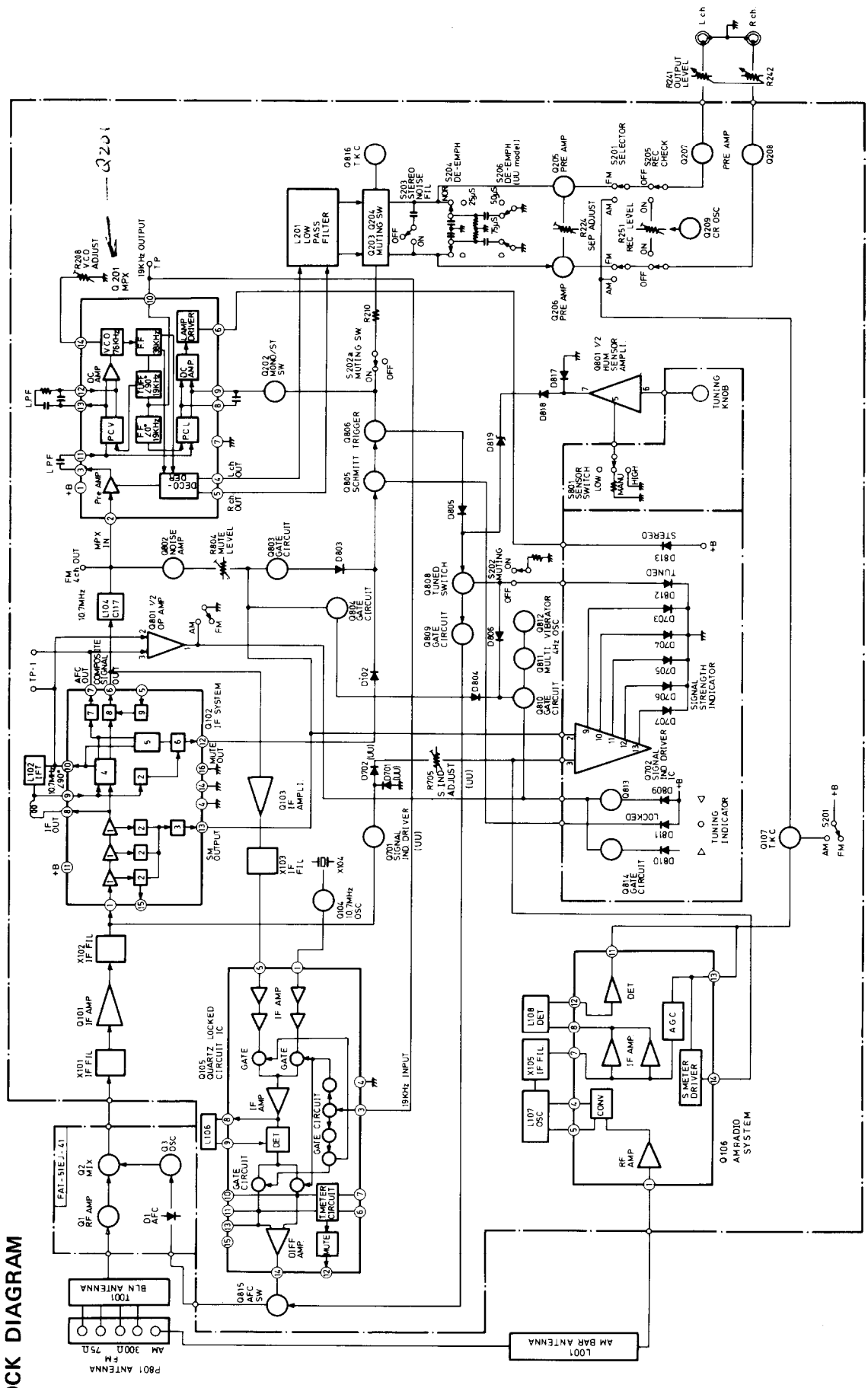
BLOCK DIAGRAM



MPX DECODER IC

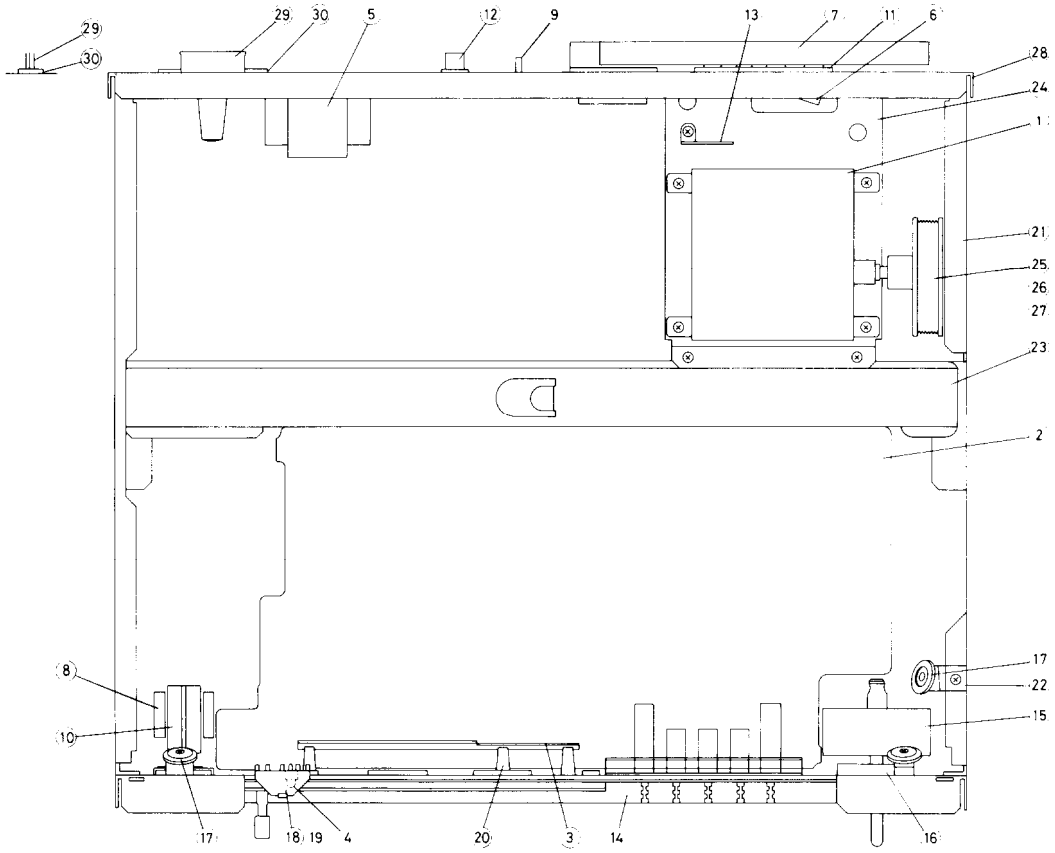
P.C.V: Phase comparator for V.C.O
P.C.L: Phase comparator for lamp
TUFF: Direct coupled type flip-flop
V.C.O: Voltage controlled oscillator
L.P.F: Low pass filter

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

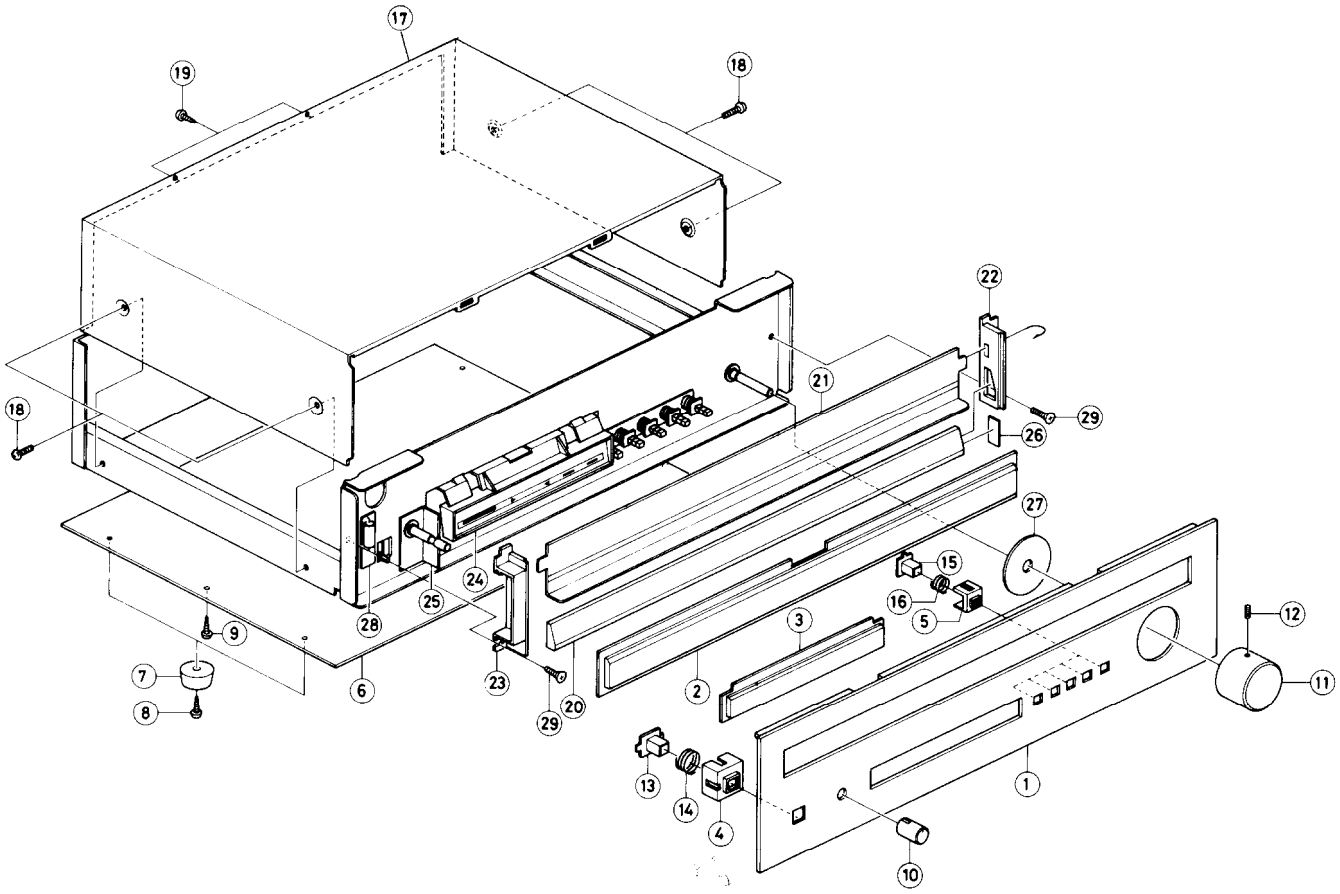
120V model

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
	F901a	25050021	X-17240, Voltage selector
30	P901	25050018	PA-125, 3P inlet

EXPLODED VIEW



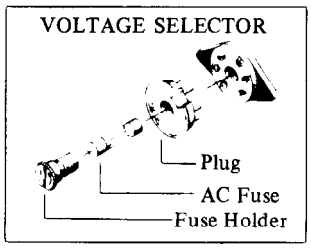
EXPLODED VIEW – PARTS LIST

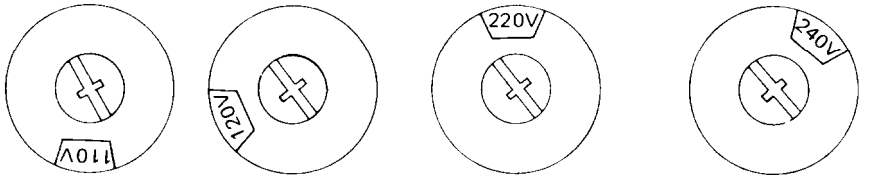
REF. NO.	PARTS NO.	DESCRIPTION
	13639121-1	Front panel ass'y (1, 2, 3)
1	27210123	Front panel
2	28191038	Dial glass
3	28191037	Indicator glass
4	27267048	Guide, power switch
5	27267049	Guide, push switch
6	27170055	Bottom board
7	27175009	Leg
8	831130162	3STW+16BQ, Tapping screw
9	831130082	3STW+8BQ,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



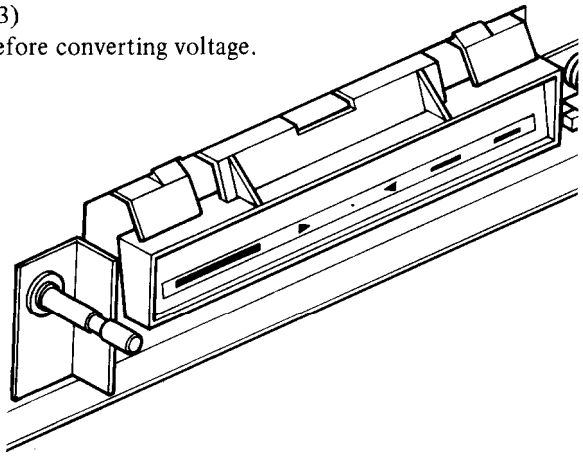


For 110V Operation | For 120V Operation | For 220V Operation | For 240V Operation

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. Disconect 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.



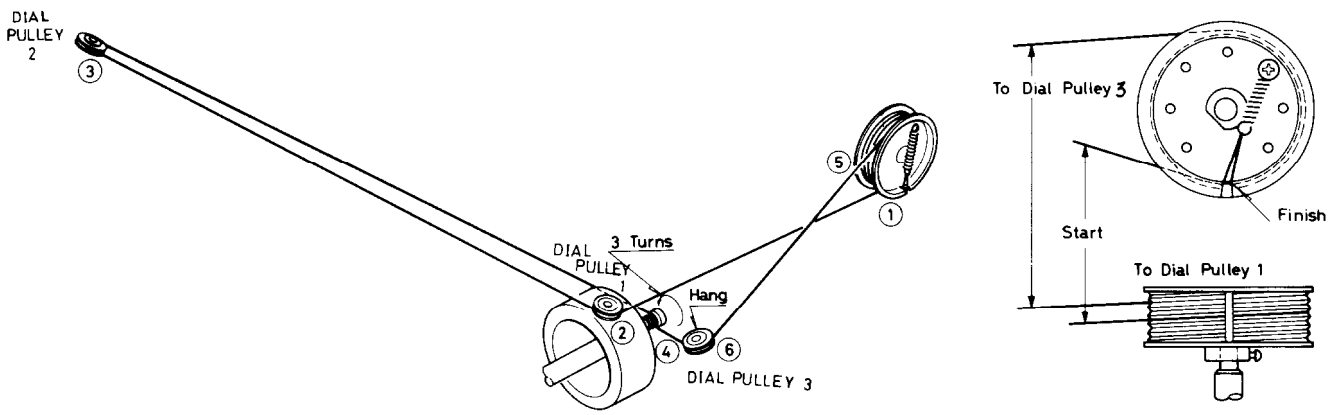
3. DE-EMPHASIS SWITCH

The 25μsec/Normal selector switch for Dolby FM broadcasts is located on the front panel. The 50μsec/75μsec 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 50μsec position. For use in 75μsec regions, switch over to the 75μsec 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.

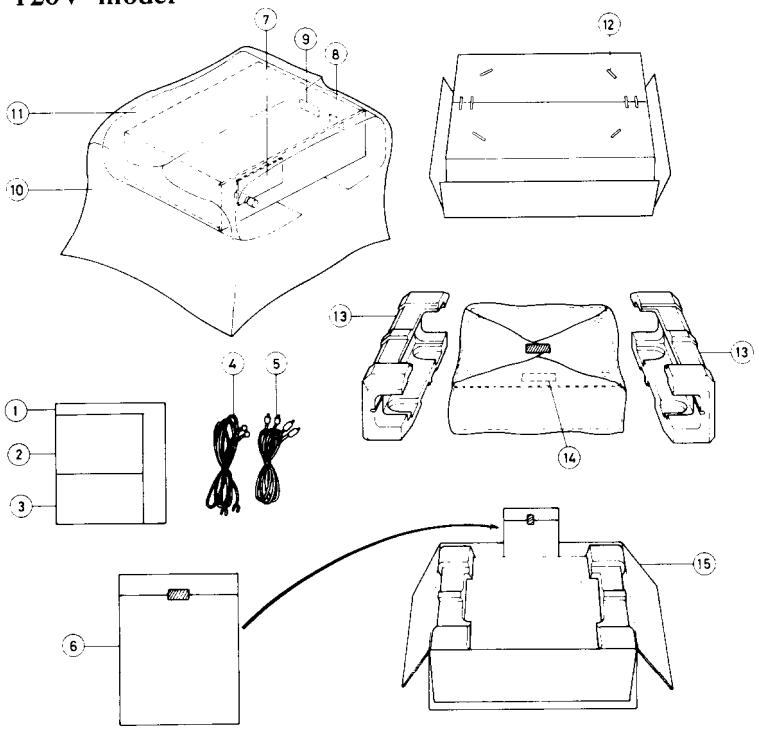
STRINGING DIAGRAM



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.

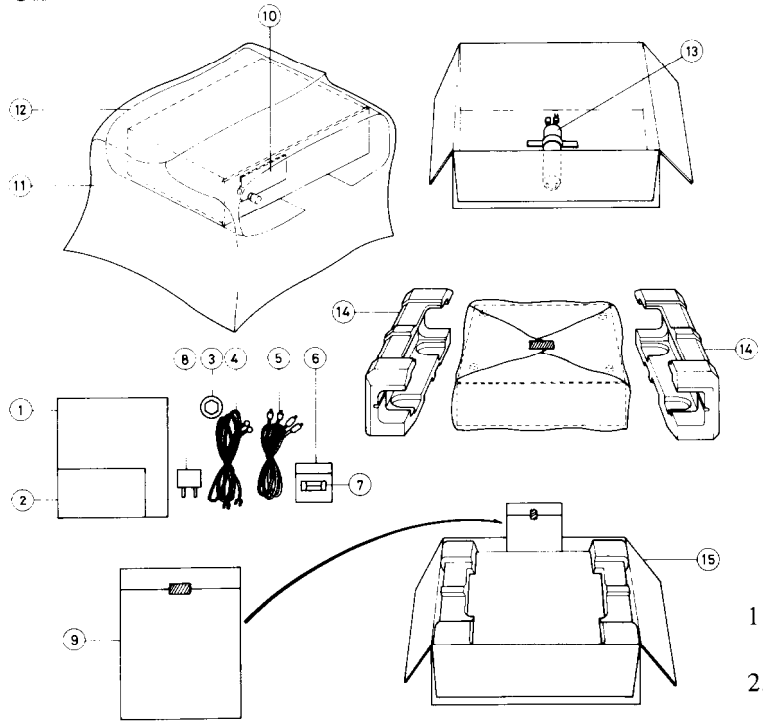
PACKING PROCEDURES

120V model



1. All printed material and accessary 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

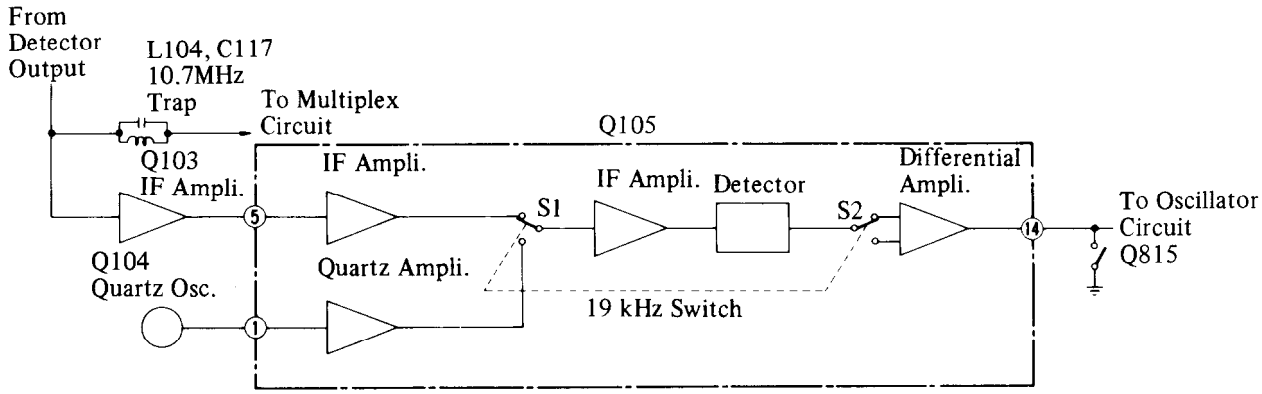
REF. NO.	PARTS NO.	DESCRIPTION
1	29340320	Instruction manual
2	29365005-1	Warranty card (G)
3	292075	Metal, "LOCKED"
4	292064	5059-01, FM antenna
5	253074	Connection cord
6		
7	252001	1A-T, AC fuse (U)
8	25055018	CV-K-1, Conversion plug (U)
9	29100006	250 x 350mm, Poly bag
10	29355045	Sensor tag
11	29100036	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 accessary items are placed in the poly bag.
2. The sensor tag is attached to the output level volume shaft.

CIRCUIT DESCRIPTION

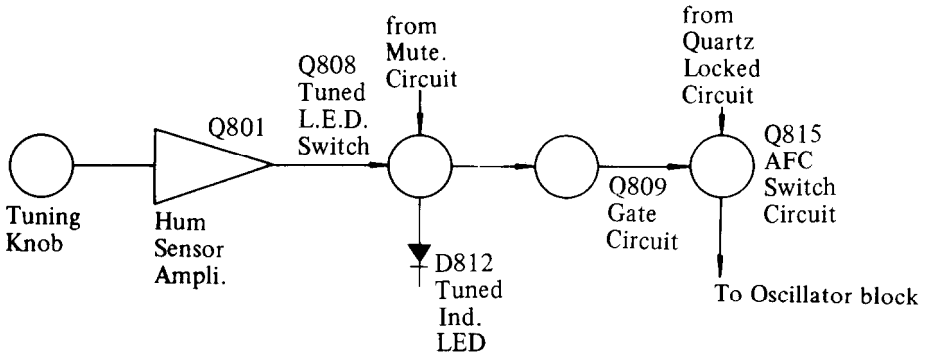
1. QUARTZ LOCKED CIRCUIT



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 and both connected to the IF signal line, the IF frequency is detected, resulting is 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 turning, 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 Volmeter
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

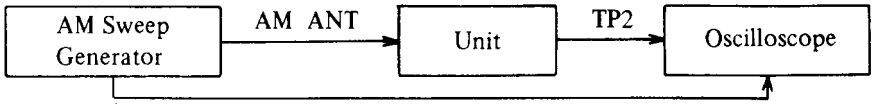
GENERAL ALIGNMENT CONDITIONS

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

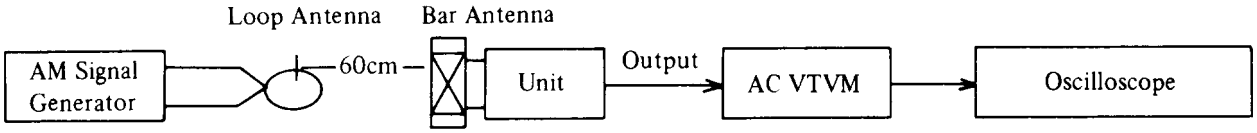
(1) AM IF ALIGNMENT

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



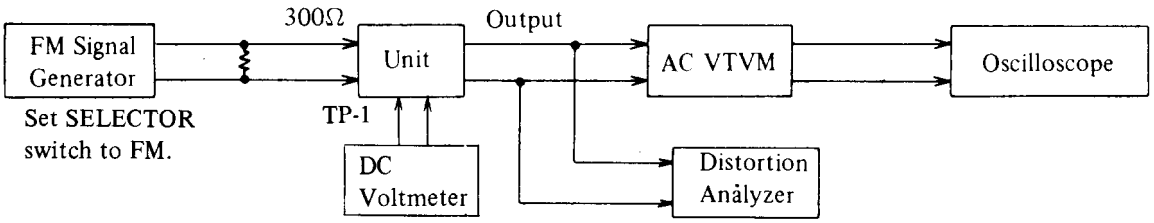
Set signal	Adjust	Oscilloscope	Remarks
455kHz	X105	Maximum Symmetrical Response	Usually not necessary to adjust

(2) AM RF ALIGNMENT

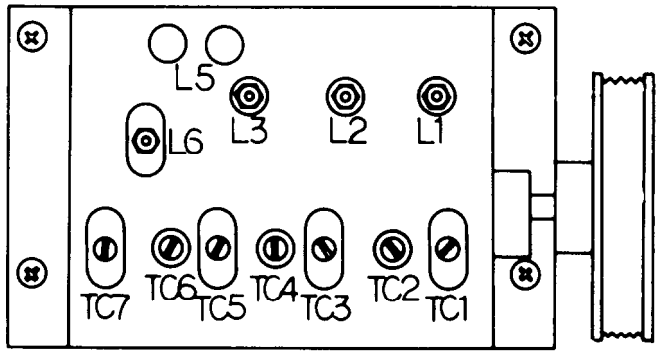


Step	Set Signal	Set Radio Dial	Adjust	VTVM reading	Remarks
1	515kHz 400Hz 30%	Lower end (515kHz)	L107	Maximum	Repeat steps 1 and 2 as necessary
2	1680kHz 400Hz 30%	Upper end (1680kHz)	TC5	Maximum	
3	600kHz 400Hz 30%	600kHz	L001	Maximum	Repeat steps 3 and 4 as necessary
4	1400kHz 400Hz 30%	1400kHz	TC2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

(3). FM FRONT END ALIGNMENT

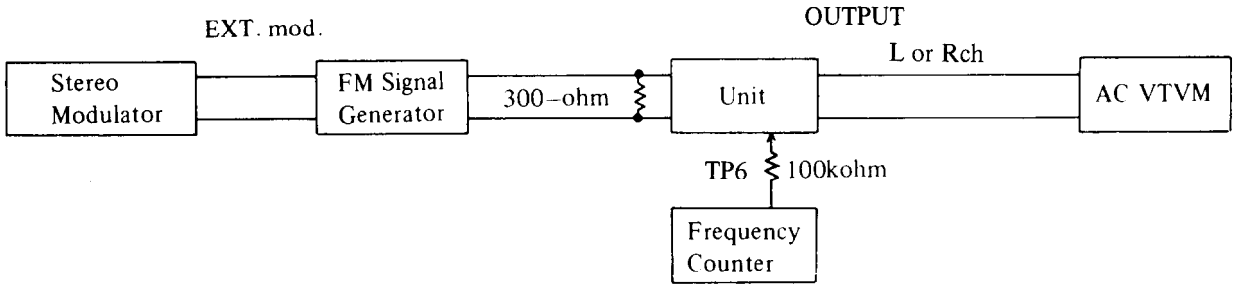


Step	FM Signal Generator	Dial to set	Adjust	Output Indicator	Adjust for	Remarks
1	No signal	Quiet Point	T101 Bottom	DC Voltmeter	OV	Repeat Steps 1 and 2 as necessary
2	98MHz 65dBf(60dB) 1kHz 75kHz devi.	98MHz	T101 Top	Distortion Analyzer	Minimum	
3	90MHz 65dBf(60dB) 1kHz 75kHz devi.	90MHz	L6	DC Voltmeter	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.

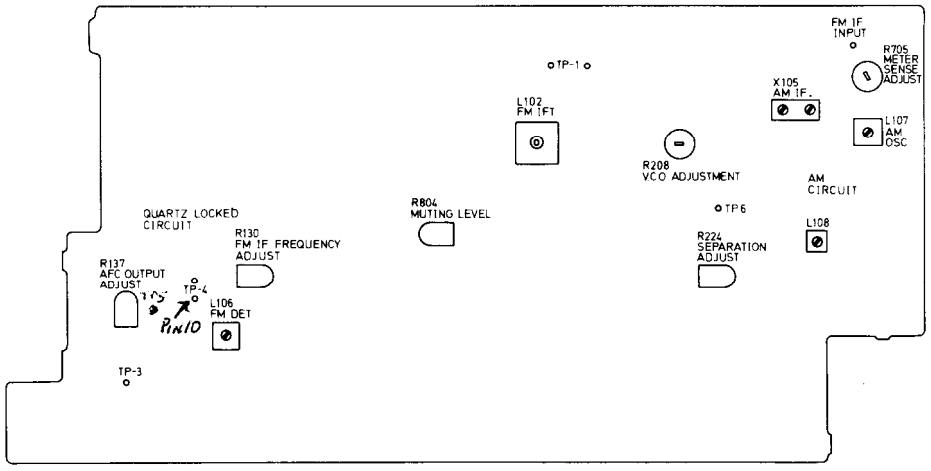
(6). RECORDING CHECK LEVEL ADJUSTMENT

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
	ICs	
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
	Transistors	
Q104	2210123	2SC380(0)
Q107, Q202	2210746 or	2SC945(A)P or
	2211255	2SC1815(GR)
Q203, Q204	2210746	2SC945(A)P
Q205-Q208	2211733	2SC1845(E)
Q209, Q815	2210746	2SC945(A)P
Q802-Q812		
Q816	2210746 or	2SC945(A)P or
	2211255	2SC1815(GR)
Q902	2211454	2SA1015(Y)
	Diodes	
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	RD-4.7EB or
	224011	YZ-047
D901	223862	WL-01
D902	223924	WZ-130
D903	223858 or	GP-08D or
	223802	1S1885
	Coils	
L101	233144	NCH-1020
L103, L105	233105 or	NCH-1005 or
	233024	NCCH-1501
L104	233121	NCH-3012
L107	232065	NMO-2002
L201	233032A	NMC-8-7
L801	233122	NCH-3013
L802	233031	NMC-9-1
	Transformers	
L102	233143	NFIF-6008
L106	233120	NFIF-6006
L108	232041	NIT-0509
	Ceramic filters	
X101	3010018	SFJ-10.7MA
X102	3010024	SFE-10.7ML-A
X103	3010006	SFE10.7MA(RED)
X105	3010012	CFT-455B
	X'tal	
X104	3010015	XTL-10.7M
	Capacitors	
C107	352750471	4.7μF, 25V, Elect.
C108, C239	352784791	0.47μF, 50V, Elect.
C110	352721011	100μF, 6.3V, Elect.
C114, C147	352780101	1μF, 50V, Elect.
C116, C119	352741001	10μF, 16V, Elect.
C129	352744701	47μF, 16V, Elect.
C133, C146	352741001	10μF, 16V, Elect.
C142	352742201	22μF, 16V, Elect.
C150	352741011	100μF, 16V, Elect.
C151	352741021	1,000μF, 16V, Elect.
C173	372323614	360pF±5%, 50V, ST
C178, C240	352741001	10μF, 16V, Elect.
C179	352741011	100μF, 16V, Elect.
C182	352780101	1μF, 50V, Elect.
C183	352780331	3.3μF, 50V, Elect.
C185	374124737	0.047μF±20%, 50V, DE
C187	352741001	10μF, 16V, Elect.
C201	352741001	10μF, 16V, Elect.
C202	352741021	1,000μF, 16V, Elect.
C203	374124737	0.047μF±20%, 50V, DE
C204, C205	392884797	0.47μF, 50V, LL
C206	392880107	1μF, 50V, LL
C207	372325114	510pF±5%, 50V, ST
C209	352742211	220μF, 16V, Elect.
C211, C212	352780221	2.2μF, 50V, Elect.
C219, C220	352780101	1μF, 50V, Elect.
C223, C224	392880107	1μF, 50V, LL
C226	352743311	330μF, 16V, Elect.
C227, C228	352784791	0.47μF, 50V, Elect.
C231, C232	352780101	1μF, 50V, Elect.
C234	352743311	330μF, 16V, Elect.
C705	352741001	10μF, 16V, Elect.
C803	392883397	0.33μF, 50V, LL
C805	352780221	2.2μF, 50V, Elect.
C807	352780101	1μF, 50V, Elect.
C808	352721011	100μF, 6.3V, Elect.
C811	352780101	1μF, 50V, Elect.
C812, C813	352743311	330μF, 16V, Elect.
C815	352742201	22μF, 16V, Elect.
C816	352784791	0.47μF, 50V, Elect.
C817, C823	352741001	10μF, 16V, Elect.
C818	352722211	220μF, 6.3V, Elect.
C819, C820	392880227	2.2μF, 50V, LL
C821	352721011	100μF, 6.3V, Elect.
C905	352764711	470μF, 35V, Elect.
C906	352754711	470μF, 25V, Elect.
C907, C822	352742211	220μF, 16V, Elect.
C909	352764711	470μF, 35V, Elect.
C910	352762211	220μF, 35V, Elect.
C911, C912	352742211	220μF, 16V, Elect.
C914	352734711	470μF, 10V, Elect.
	Resistors	
R130	5225089	N10HR30KBC, Simi-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	43Ω, 2W, Metal oxide film
	Switch	
S201-S205	25035112	NPS-322-242-L77, Selector/ Muting/Noise filter/De-empha. Rec. check
	Shielded plate	
	27150103	
	Radiator	
	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

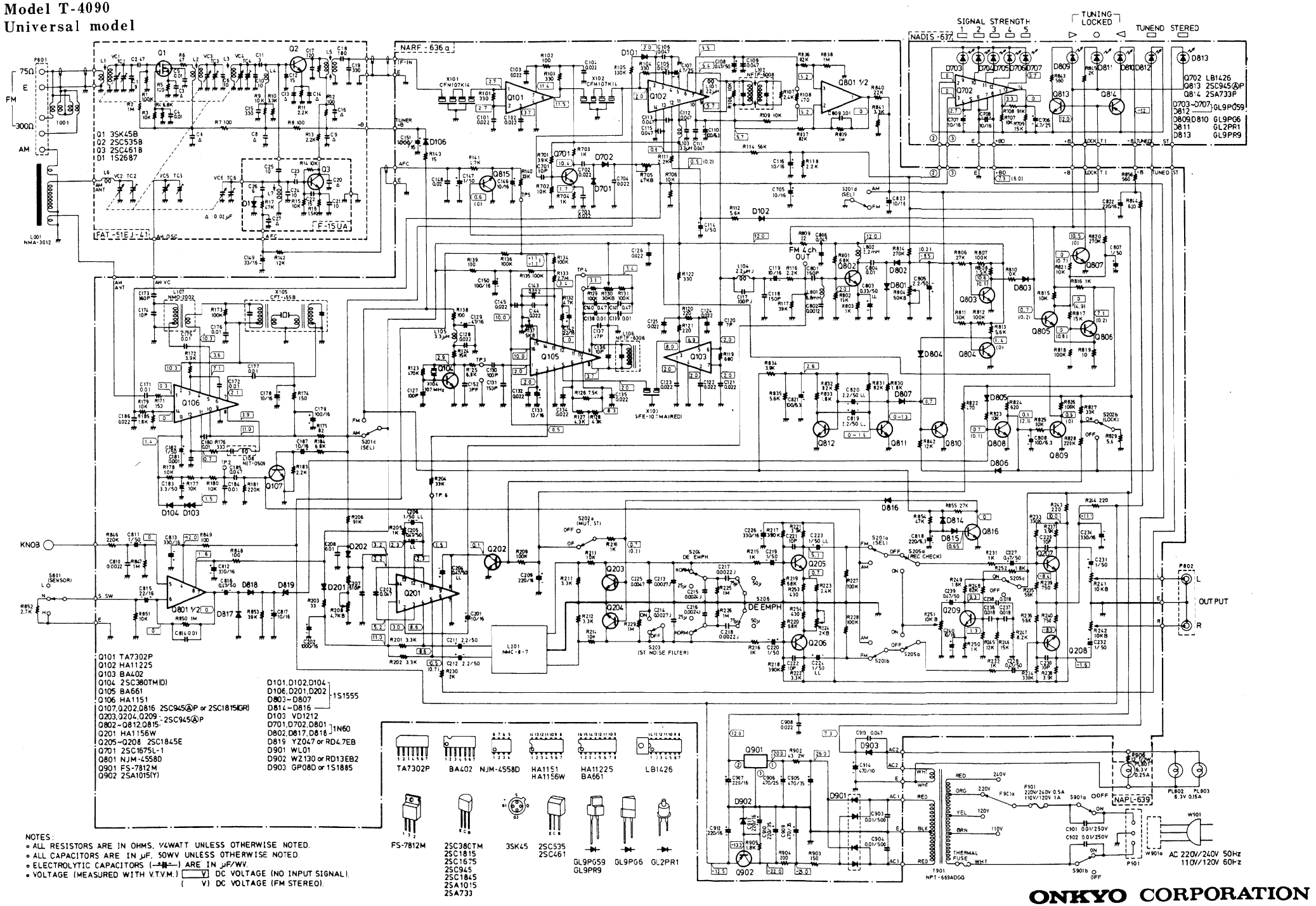
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	IC	
Q702	222541	LB-1426
	Transistors	
Q813	2210746	2SC945A(P)
Q814	2210803	2SA733(P)
	L.E.D.	
D703-D707	225028	GL-9PG59, Green
D812		
D809, D810	225031	GL-9PG-6, Triangle
D811	225018	GL-2PR1, Red
D813	225029	GL-9PR9, Red
	Capacitors	
C706	352750471	4.7μF, 25V, Elect.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

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

SCHEMATIC DIAGRAM

Model T-4090

Universal model



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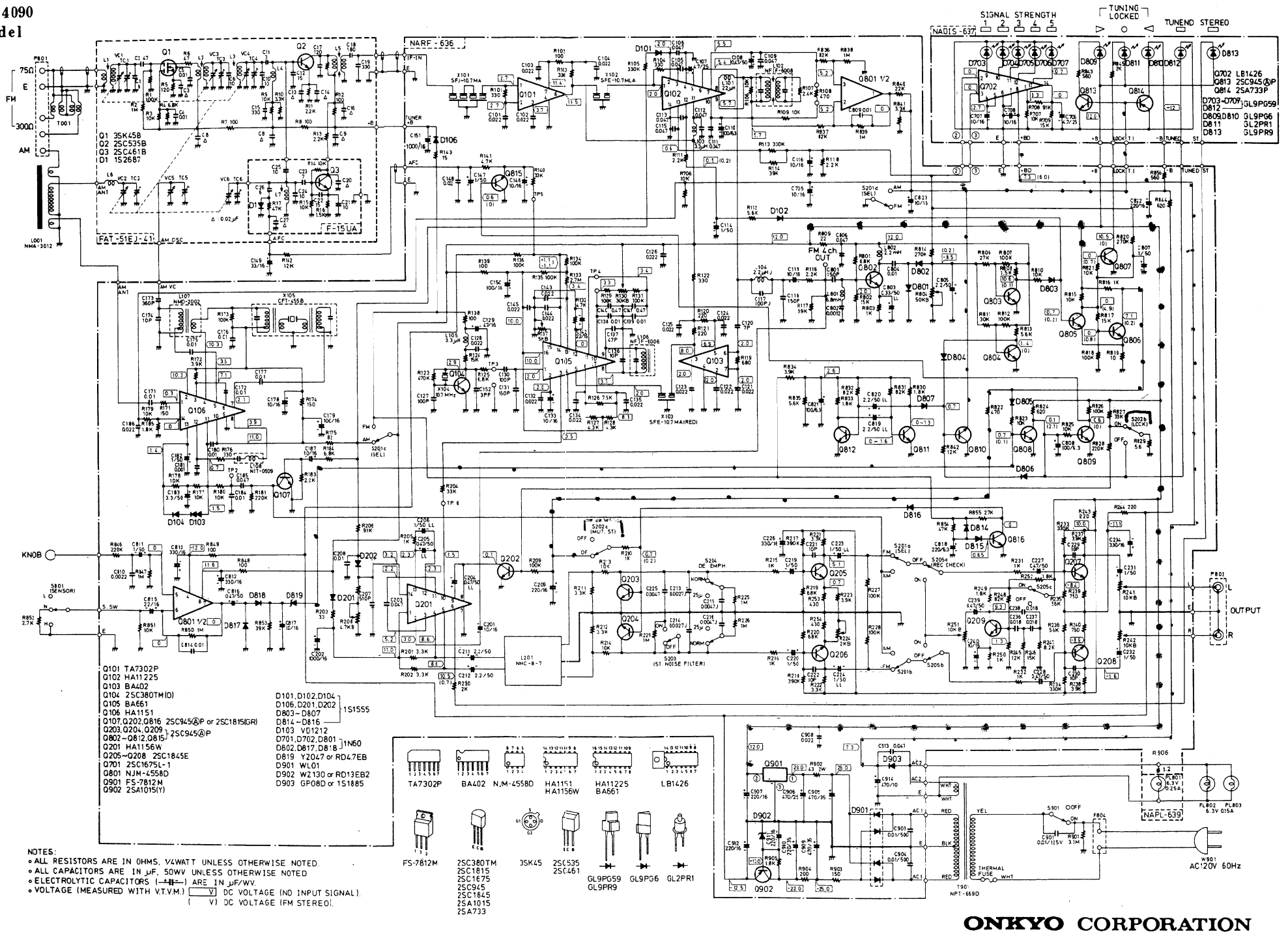
SCHEMATIC DIAGRAM

Model T-4090

120V model



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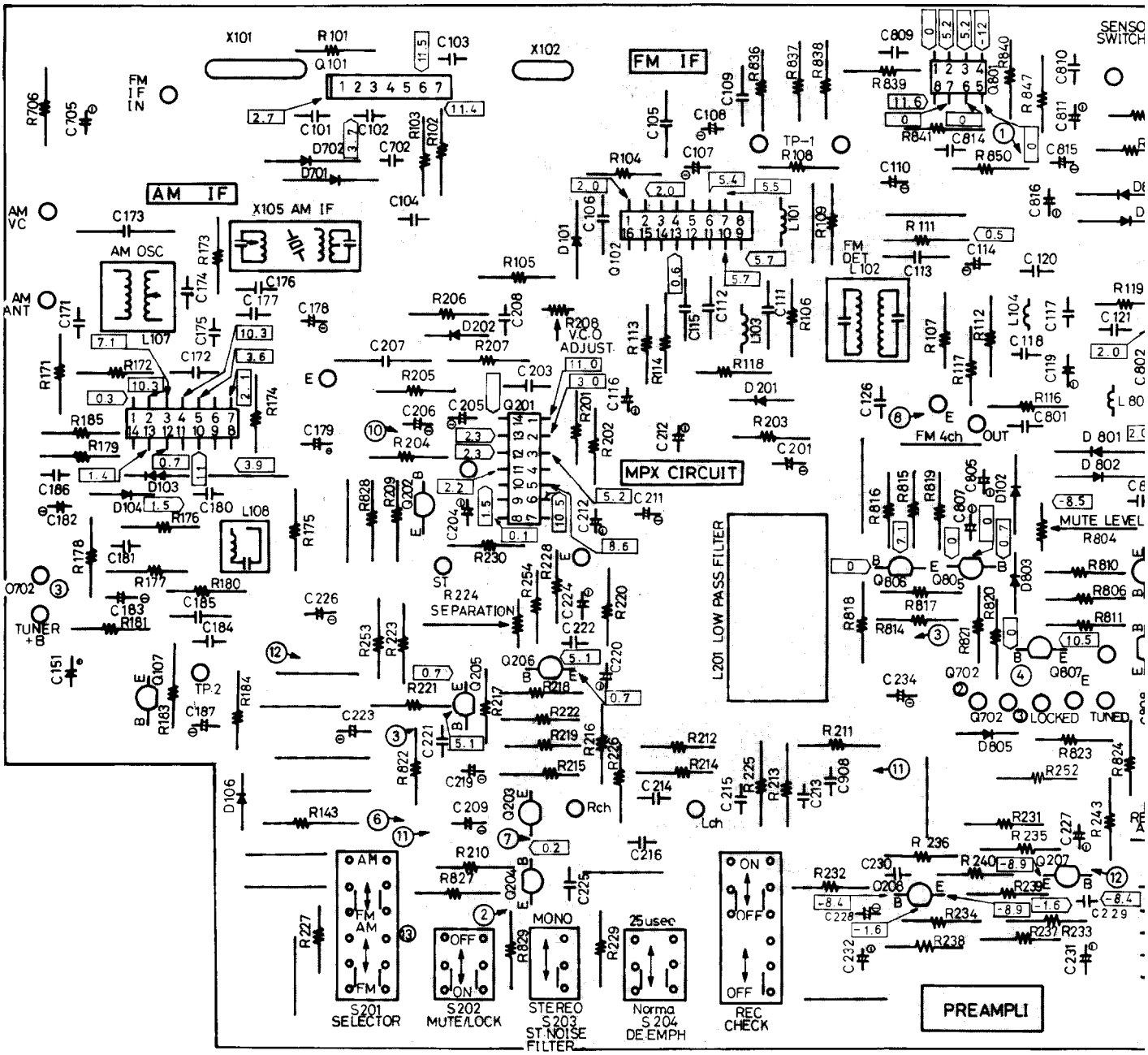
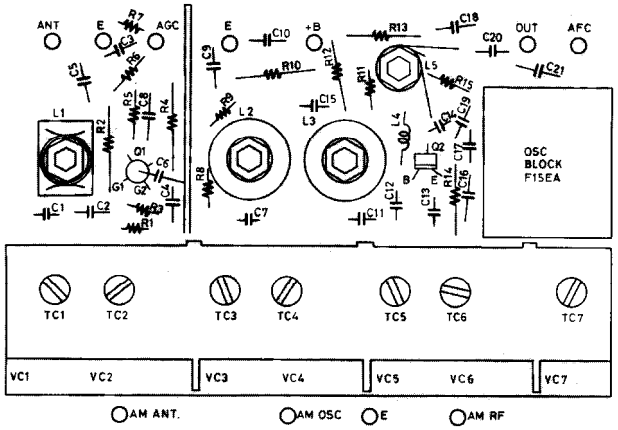
PRINTE CIRCUIT BOARD VIEW FROM BOTTOM SIDE

120V model

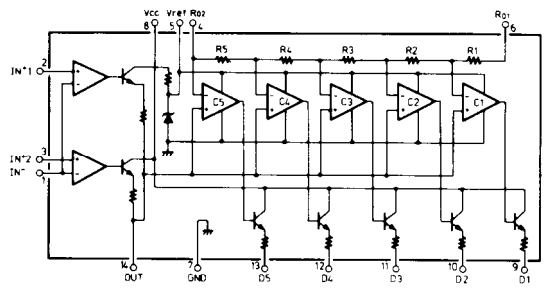


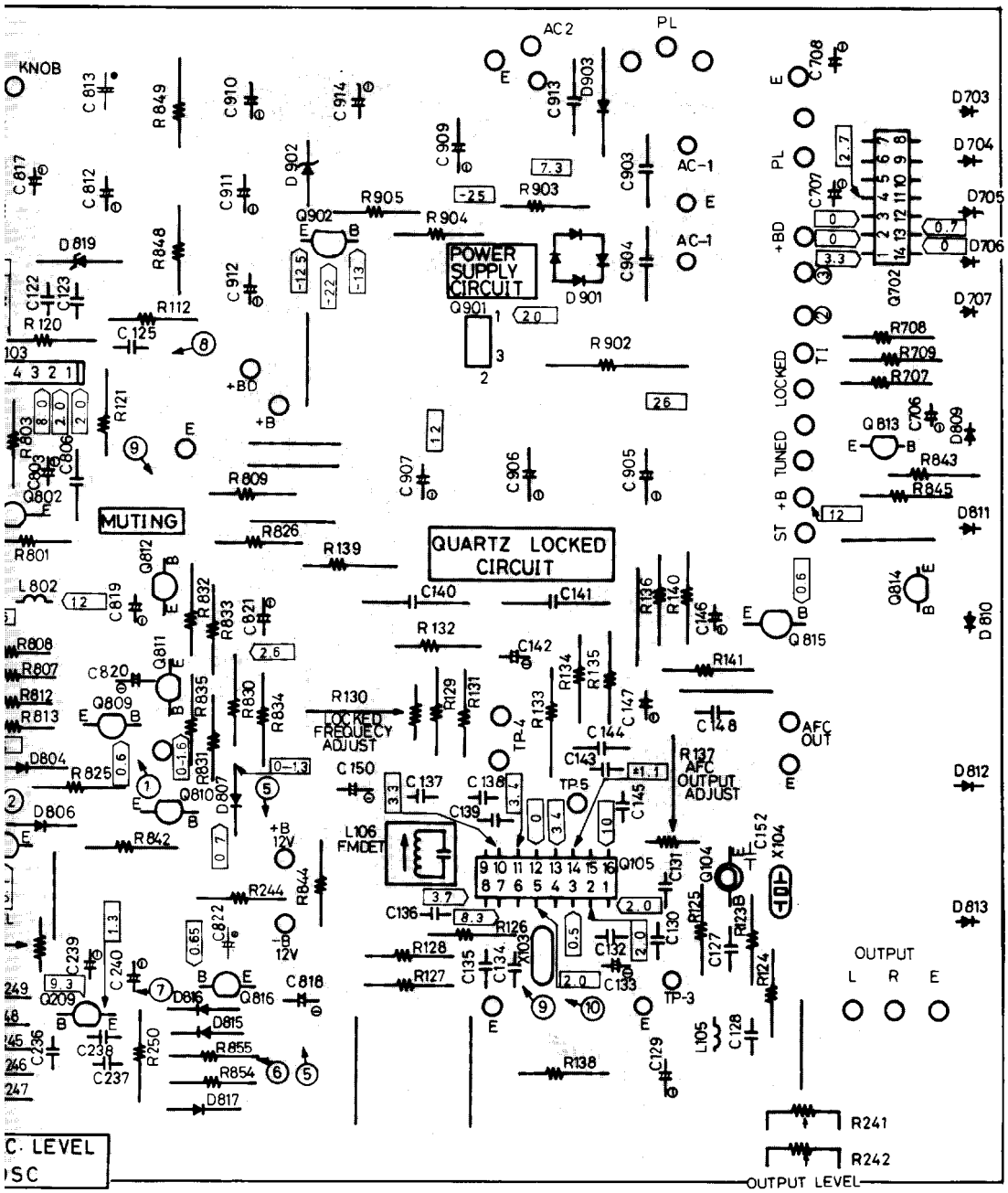


FAT–52–EJ–41 Bottom View

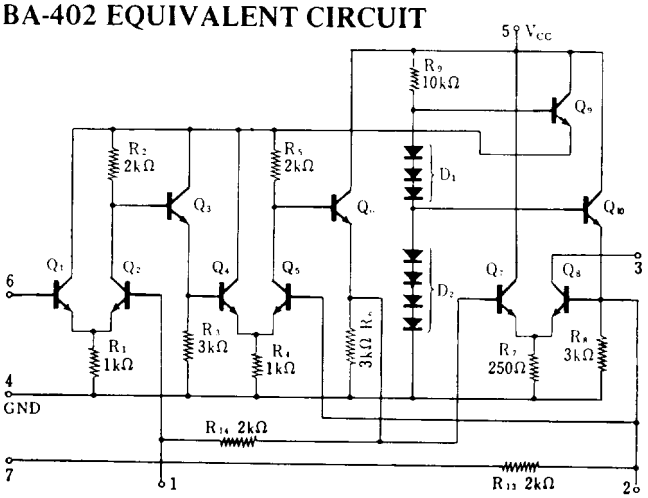
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q1		3SK45 (B)
Q2		2SC535 (B)
	OSC Block	
	222013	F-15EA

LB–1426 EQUIVALENT CIRCUIT

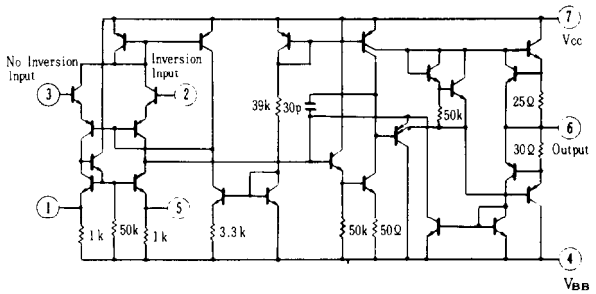




BA-402 EQUIVALENT CIRCUIT

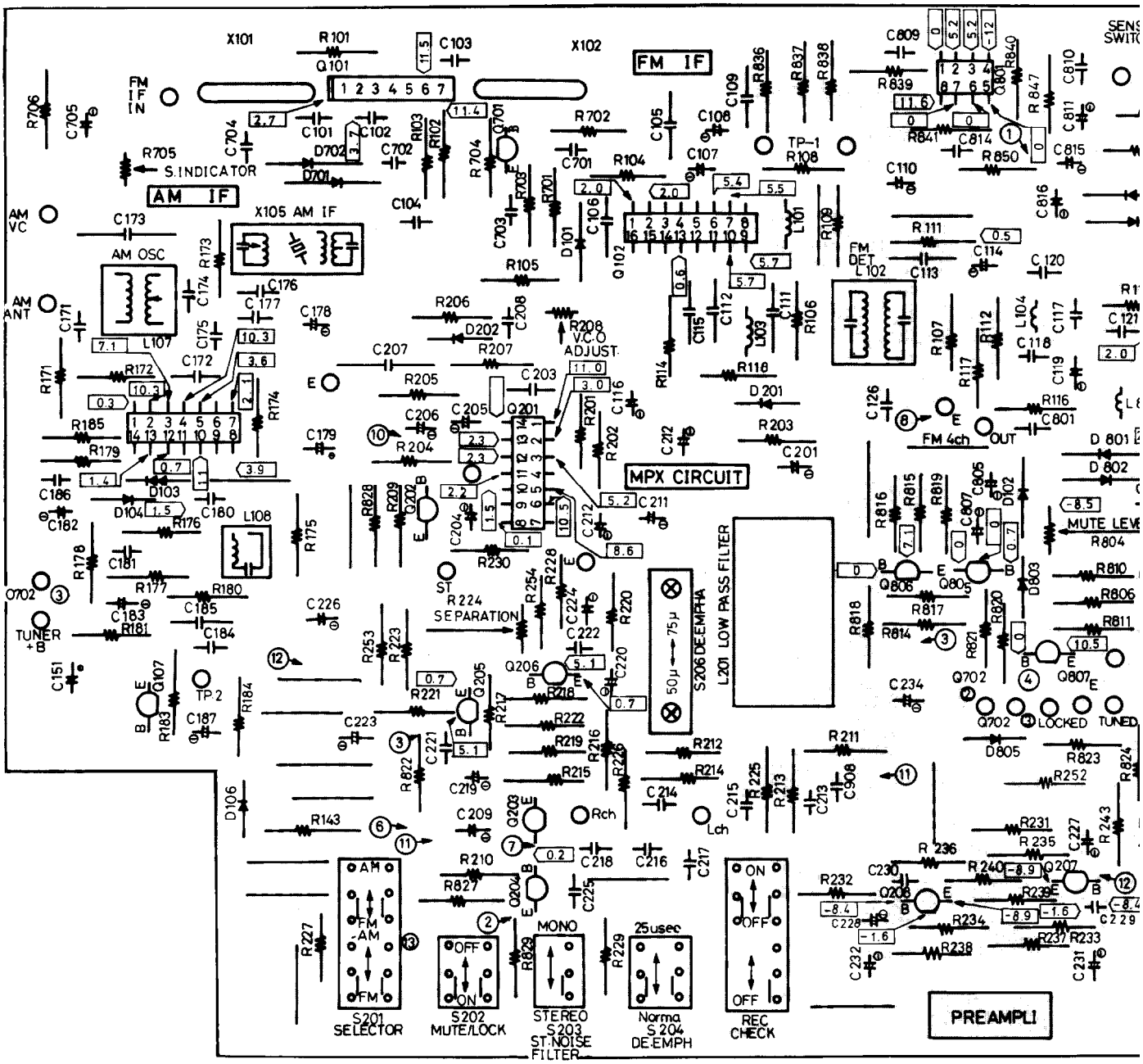


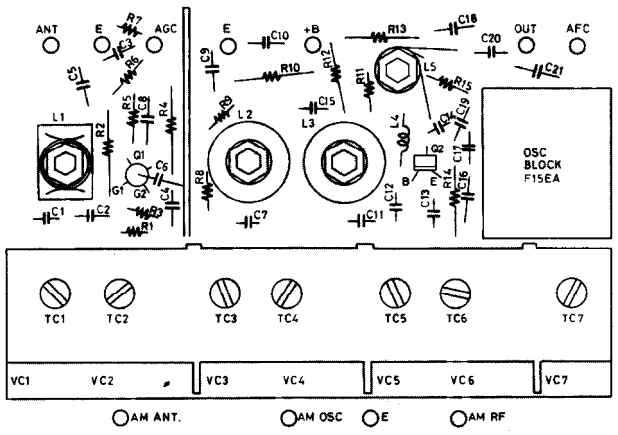
TA-7302P EQUIVALENT CIRCUIT



PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

Universal model

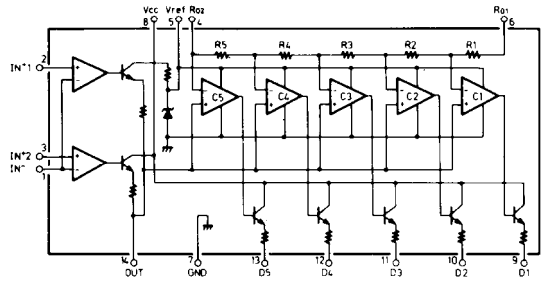


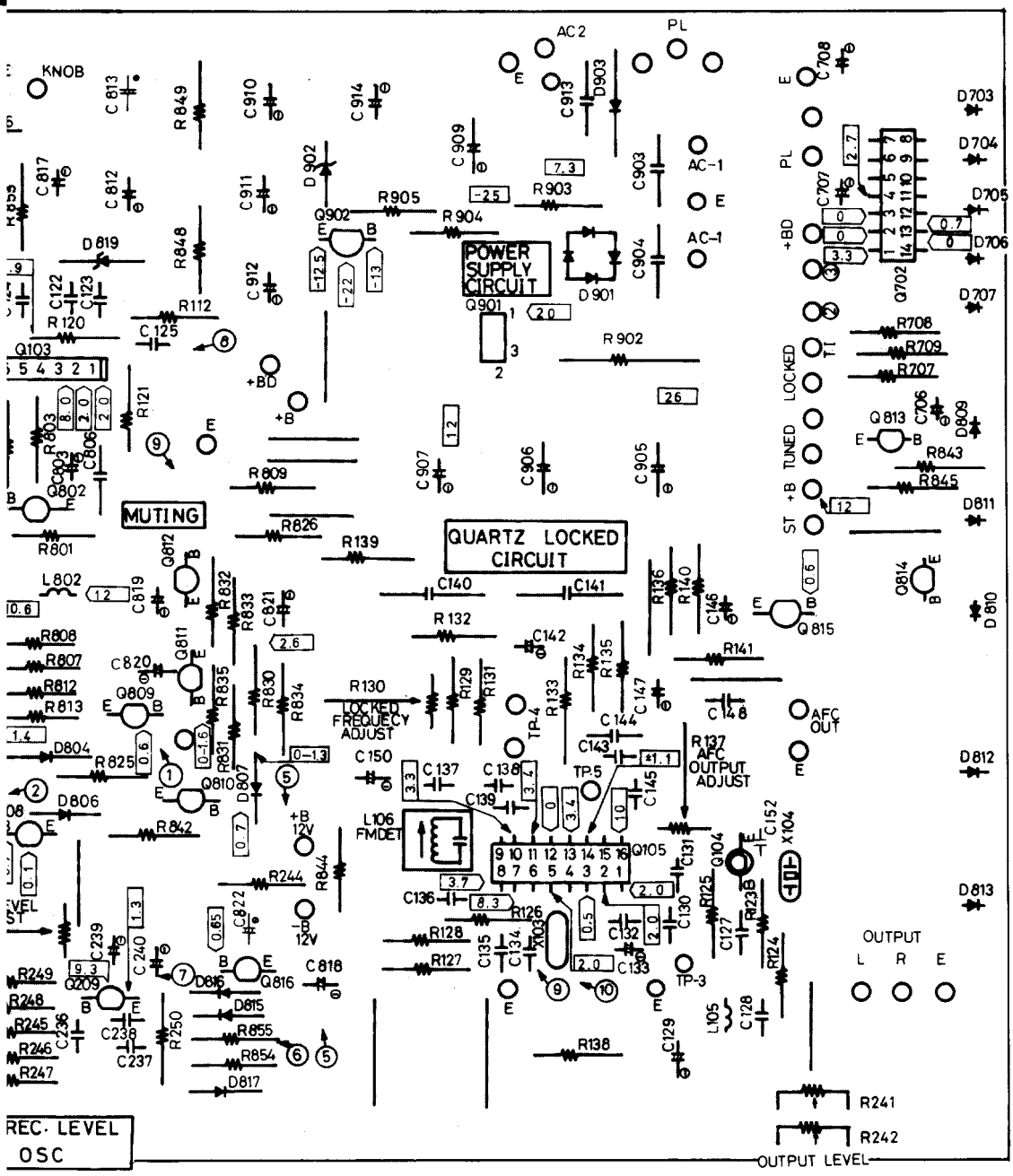


FAT–52–EJ–41 Bottom View

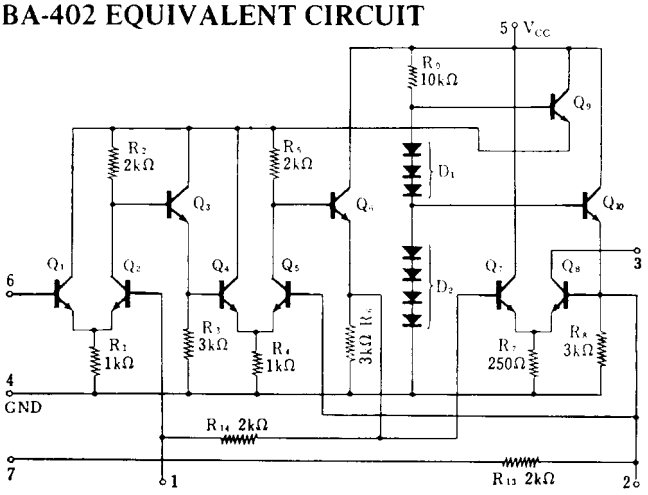
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors	
Q1		3SK45 (B)
Q2		2SC535 (B)
	OSC Block	
	222013	F-15EA

LB–1426 EQUIVALENT CIRCUIT

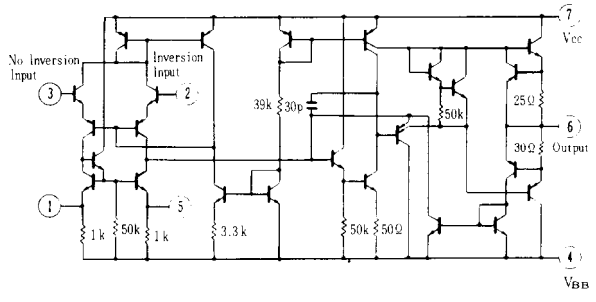




BA-402 EQUIVALENT CIRCUIT



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
	ICs	
Q101	222452	TA7302P
Q102	222540	HA11225
Q103	222468	BA402
Q105	222469	BA661
Q106	222418	HA1151
Q201	222419	HA1156W
Q801	222465	NJM-4558D
Q901	222542	FS-7812M
	Transistors	
Q104	2211823	2SC380TM(0)
Q107, Q202	2210746 or	2SC945A(P) or
	2211255	2SC1815(GR)
Q203, Q204	2210746	2SC945A(P)
Q205-Q208	2211733	2SC1845(E)
Q209	2210746	2SC945A(P)
Q701	2210823	2SC1657(L-1)
Q802-Q812	2210746	2SC945A(P)
Q815	2210746	2SC945A(P)
Q816	2210746 or	2SC945A(P) or
	2211255	2SC1815(GR)
Q902	2211454	2SA1015(Y)
	Diodes	
D101-D102	223105	1S1555
D103	4000022	VD1212
D104, D106	223105	1S1555
D201, D202	223105	1S1555
D701, D702	223103	1N60
D801, D802	223103	1N60
D803-D807	223105	1S1555
D814-D816	223105	1S1555
D817, D818	223103	1N60
D819	223943 or	RD4.7EB or
	224011	YZ-047
D901	223862	WL01
D902	223924	WZ-130
D903	223858 or	GP08D or
	223802	1S1885
	Coils	
L101	233144	NCH-1020, 22μH
L103	233105 or	NCH-1005 or
	233024	NCCH-1501
L104	233121	NCH-3012
L105	233105 or	NCH-1005 or
	233024	NCCH-1501
L107	232065	NMO-2002
L201	233032A	NMC-8-7
L801	233122	NCH-3013
L802	233031	NMC-9-1
	Transformers	
L102	233143	NFIF-6008
L106	233120	NFIF-6006
L108	232041	NIT-0509
	Ceramic filters	
X101, X102	3010028	CFM107K14
X103	3010006	SFE10.7MA(RED)
X105	3010012	CFT-455B
	X'tal	
X104	3010015	XTL-10.7M
	Capacitors	
C107	352750571	4.7μF, 25V, Elect.
C108	352784791	0.47μF, 50V, Elect.
C110	352721011	100μF, 6.3, Elect.
C114	352780101	1μF, 50V, Elect.
C116	352741001	10μF, 16V, Elect.
C119	352741001	10μF, 16V, Elect.
C129	352744701	47μF, 16V, Elect.
C133	352741001	10μF, 16V, Elect.
C142	352742201	22μF, 16V, Elect.
C146	352741001	10μF, 16V, Elect.
C147	352780101	1μF, 50V, Elect.
C150	352741011	100μF, 16V, Elect.
C151	352741021	1,000μF, 16V, Elect.
C173	372323614	360pF±5%, 50V, ST
C178	352741001	10μF, 16V, Elect.
C179	352741011	100μF, 16V, Elect.
C182	352780101	1μF, 50V, Elect.
C183	352780331	3.3μF, 50V, Elect.
C185	374124737	0.047μF±20%, 50V, DE
C187	352741001	10μF, 16V, Elect.
C201	352741001	10μF, 16V, Elect.
C202	352740121	1,000μF, 16V, Elect.
C203	374124735	0.047μF±20%, 50V, DE
C204, C205	392884797	0.47μF, 50V, LL
C206	392880107	1μF, 50V, LL
C207	372325114	510pF±5%, 50V, ST
C209	352742211	220μF, 16V, Elect.
C211, C212	352780221	2.2μF, 50V, Elect.
C219, C220	352780101	1μF, 50V, Elect.
C223, C224	392880107	1μF, 50V, LL
C226	352743311	330μF, 16V, Elect.
C227, C228	352784791	0.47μF, 50V, Elect.
C231, C232	352780101	1μF, 50V, Elect.
C234	352743311	330μF, 16V, Elect.
C239	352784791	0.47μF, 50V, Elect.
C240	352741001	10μF, 16V, Elect.
C705	352741001	10μF, 16V, Elect.
C803	392883397	0.33μF, 50V, LL
C805	352780221	2.2μF, 50V, Elect.
C807	352780101	1μF, 50V, Elect.
C808	352721011	100μF, 6.3V, Elect.
C811	352780101	1μF, 50V, Elect.
C812, C813	352743311	330μF, 16V, Elect.
C815	352742201	22μF, 16V, Elcet.
C816	352784791	0.47μF, 50V, Elect.
C817	352741001	10μF, 16V, Elect.
C818	352722211	220μF, 6.3V, Elect.
C819, C820	392880227	2.2μF, 50V, LL
C821	352721011	100μF, 6.3V, Elect.
C822	352742211	220μF, 16V, Elect.
C823	352741001	10μF, 16V, Elect.
C905	352764711	470μF, 35V, Elect.
C906	352754711	470μF, 25V, Elect.
C907	352742211	220μF, 16V, Elect.
C909	352764711	470μF, 35V, Elect.
C910	352762211	220μF, 35V, Elect.
C911, C912	352742211	220μF, 16V, Elect.
C914	352734711	470μF, 10V, Elect.
	Resistors	
R130	5225089	N10HR30KBC, Quartz lock circuit adjust, variable
R137	5225056	N10HR5KBC, Quartz lock circuit
R208	5225019	N10HR4.7KBD, V.C.O. adjust, variable
R224	5225018	N10HR2KBC, Separation adjust, variable
R241, R242	5148012	N16RG10KB35, Output level adjust, variable
R251	5225017	N10HR10KBC, Rec. check level adjust, variable
R705	5225034	N10HR47KBD, Strength meter adjust, variable
R804	5225058	N10HR50KBC, Muting level adjust, variable
R902	441724304	43Ω, 2W, Metal oxide film
	Switches	
S201-S205	25035112	NP-322-242-L77, Selector/Muting/ Stereo noise filter/De-emphasis/ Rec. check/
S206	250142	NSS-2225, De-emphasis
	Shielded case	
	27150103	X'tal oscillator
	Radiator	
	27160029	RAD-07

LAMP PC BOARD (NAPL-639) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL801	210064	250mA, 6.3V, Pilot lamp

INDICATOR PC BOARD (NADIS-637) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	IC	
Q702	222541	LB-1426
	Transistors	
Q813	2210746	2SC945A(P)
Q814	2210803	2SA733(P)
	L.E.Ds	
D703–D707 D812	225028	GL-9PG59, Green
D809, D810	225031	GL-9PG6, Triangle
D811	225018	GL-2PR1, Red
D813	225029	GL-9PR9, Red
	Capacitors	
C706	352750471	4.7μF, 25V, Elect.
C707, C708	352741001	10μF, 16V, Elect.

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

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