686

307465

FILE NO.

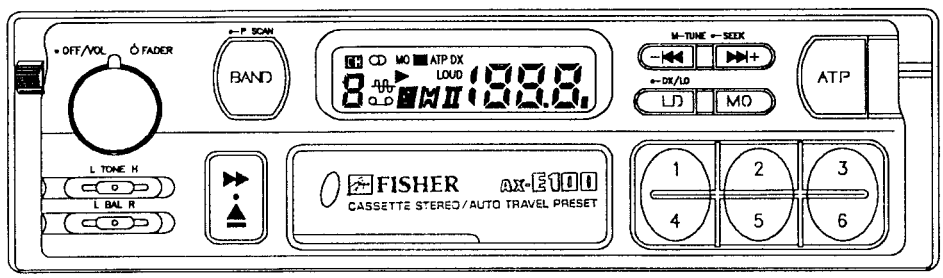
PARTS LIST &
CIRCUIT DIAGRAMS

FISHER

AX-E100

(EUROPE)

Auto Stop CarFidelity Receiver/Cassette Player



PRODUCT CODE No.
147 582 50

CONTENTS

REFERENCE No.SM750079

626

SPECIFICATIONS

Tape section

Tape ..... Cassette
Tape Speed ..... 4.75 cm/s
Wow & flutter (DIN) 0.15%
Output power ..... Maximum 2x7.5W
Signal to noise ratio 50dB
Cross talk (1,000Hz) 40dB
Frequency response ..... 63 — 12,500Hz

Tuner section

Frequency range ..... MW: 522 — 1620kHz
FM: 87.5 — 108MHz
Channel spacing
Manual ..... MW: 9kHz
FM: 50kHz
Auto ..... MW: 9kHz
FM: 100kHz

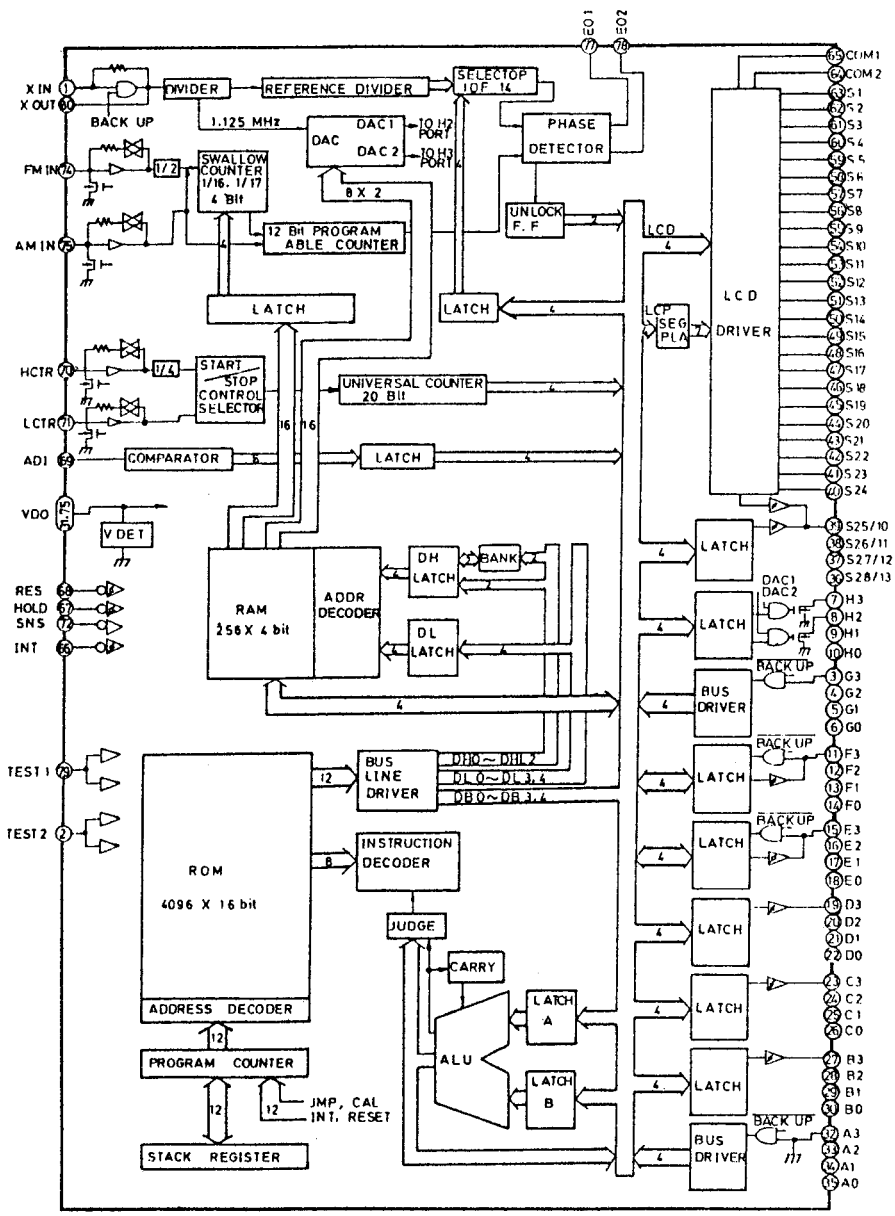
General

Power source ..... DC 14V (11~16V) Negative ground only
Speaker output impedance 4Ω
Dimensions ..... 178(W)x50(H)x155(D) mm
Weight ..... 1.4 kg

Specifications are subject to change without notice.

IC BLOCK DIAGRAM

LC7232-8424



ALIGNMENT PROCEDURE

1. General

a) Test Conditions

Signal generator output:
Modulation frequency (AM) 1kHz (FM) 1kHz
Modulation percentage (AM) 30% (FM) 22.5kHz
Signal level just enough to provide meter deflection.
Signal application:
Antenna receptacle through the dummy antenna.
Output meter connection:
Across speaker of dummy load (4 ohms).
Setting of radio controls:
Tone control at center position.
Power supply 14.4V.

* Location of the components for alignment are shown in MAIN PARTS IDENTIFICATION ILLUSTRATION (BOTTOM VIEW).

Head Azimuth Alignment

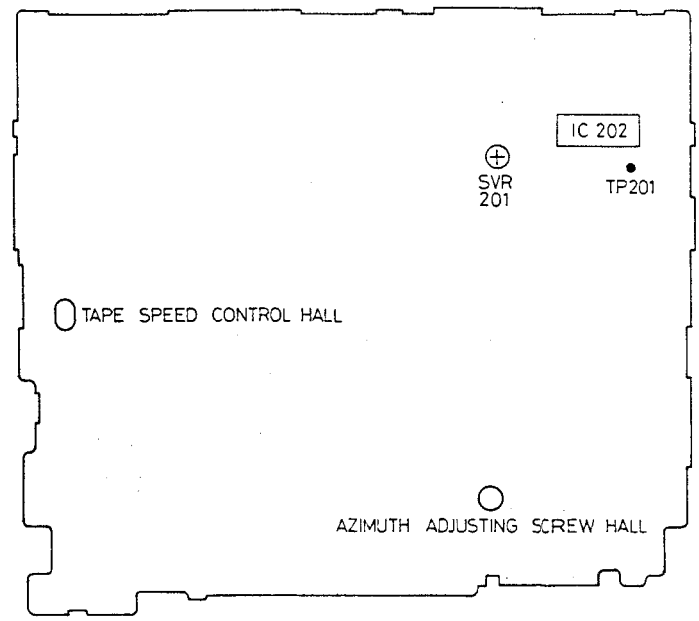
1. Insert a BASF 10 kHz standard test tape and set the unit in play mode.
2. Tune the azimuth adjusting screw until you obtain maximum reading on the VTVM.

SDK Alignment

1. Connect a frequency counter to TP201.
2. Adjust SVR201 to have 125 ±1 Hz.

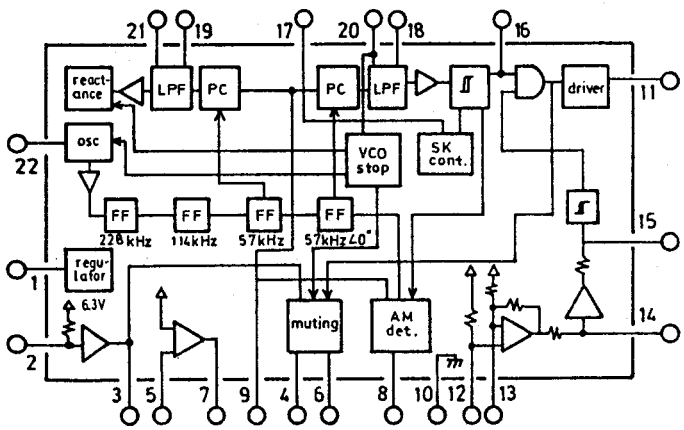
MAIN PARTS IDENTIFICATION ILLUSTRATION

MAIN P.C.B. BOTTOM VIEW

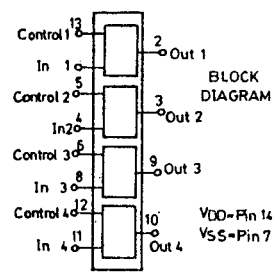


IC BLOCK DIAGRAM

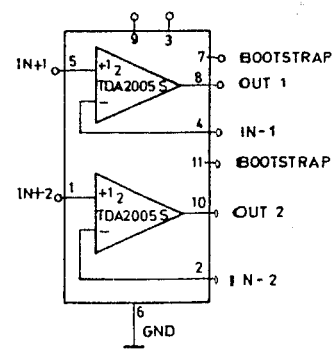
LA 2220



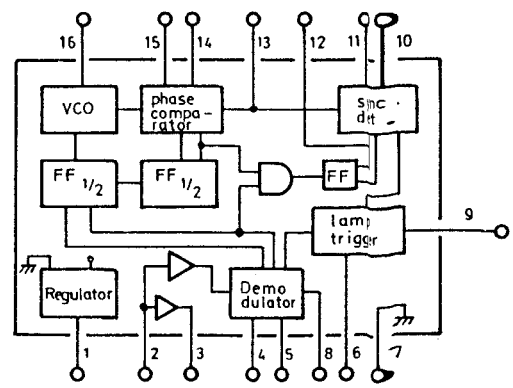
MC 14066BCP



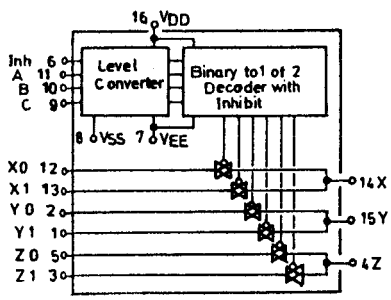
TDA 2005



LA 3361



MC 14053BCP



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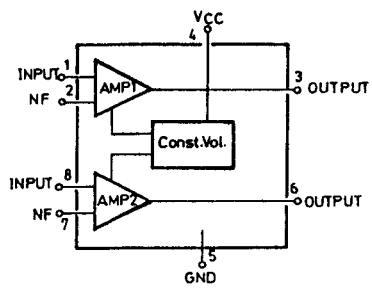
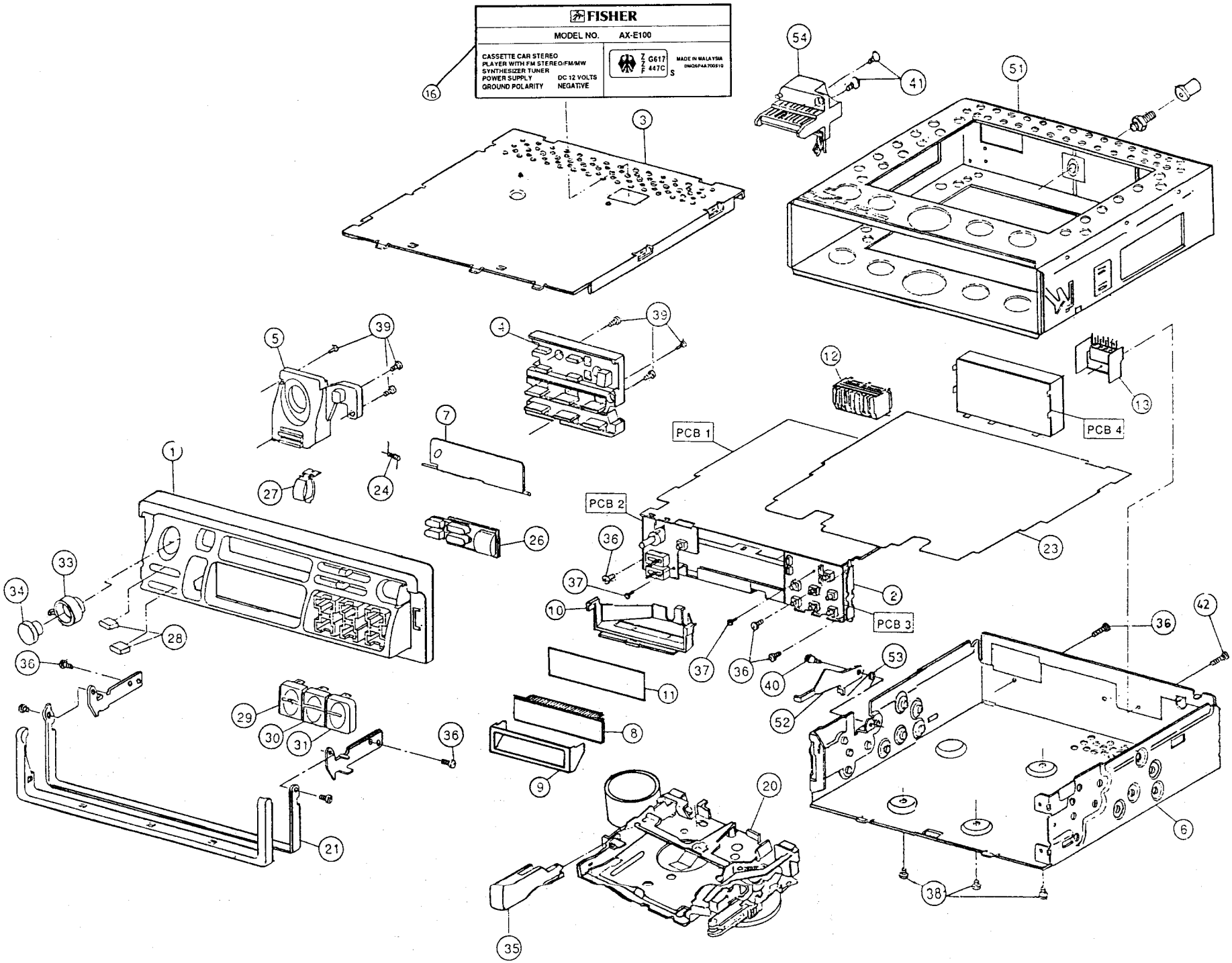



FISHER
MODEL NO. AX-E100
CASSETTE CAR STEREO
PLAYER WITH FM STEREO/FM/MW
SYNTHESIZER TUNER
POWER SUPPLY DC 12 VOLTS
GROUND POLARITY NEGATIVE
MADE IN MALAYSIA
PCB 1
PCB 2
PCB 3
PCB 4

PARTS LIST

Ref. No.	PART No.	DESCRIPTION	Q'ty
PACKING MATERIALS			
	641 002 2946	INDIVIDUAL CARTON	1
	632 298 2086	POLYETHYLENE BAG	1
	641 001 8055	POLYFOAM	2
	641 002 2953	POLYETHYLENE BAG	1
MANUAL			
	641 002 2960	INSTRUCTION BOOK	1
ACCESSORIES			
51	641 001 8499	ASSY EXTRACTABLE DRAWER	1
52	641 001 8093	LEVER, DRAWER	1
53	641 001 8086	SPRING, TORSION	1
CABINET & CHASSIS			
1	641 001 8642	NOSE PANEL	1
2	641 001 8529	CHASSIS, FRONT	1
3	641 001 7720	TOP LID	1
4	641 001 8604	ILLUMINATOR, PRESET	1
5	641 001 8611	ILLUMINATOR, VR	1
6	641 001 8635	CHASSIS	1
7	641 002 3004	CASS LID	1
8	641 001 8567	LCD	1
9	641 001 8512	SHEET, LCD	1
10	641 001 8536	REFLECTOR, LCD	1
11	641 001 8543	SHEET, REFFUSION	1
12	641 001 7621	BRACKET-E, SOCKET	1
13	641 001 7645	BRACKET, IC	1
16	641 002 3011	LABEL, RATING	1
20	641 001 9520	CASS MECH FEC-1012PN3	1
21	641 001 7676	HANDLE ASSY	1
23	641 001 8628	INSULATOR	1
24	641 001 8659	SPRING, TORSION	1
26	641 001 8574	KNOB BAND	1
27	641 002 2991	KNOB, APT	1
28	641 001 7973	KNOB, SLIDE	2
29	641 001 8680	KNOB PRESET, A(1,4)	1
30	641 001 8697	KNOB PRESET, B(2,5)	1
31	641 001 8673	KNOB PRESET, C(3,6)	1
33	641 001 7928	KNOB, LEVER	1
34	641 001 7935	KNOB, ROTARY	1
35	641 001 8703	KNOB, EJECT	1
36	411 028 5906	SCR S-TPG PAN 2.6X5	6
37	411 028 3001	SCR S-TPG PAN 2X5	2
38	411 001 1901	SCR S-TPG BIN 3X6	3
39	411 025 9105	SCR S-TPG BIN 2X5	6
40	412 044 8704	SPECIAL SCREW	1
41	412 044 8803	SPECIAL SCREW	2
42	411 028 6606	SCR S-TPG PAN 2.6X8	1
	432 021 4909	FUSE 250V 6.3A	1
	641 002 2977	BATTERY	1
SPEAKER CONNECTOR 20P ASSY			
54	641 001 9519	SPEAKER CONNECTOR 20P ASSY	1
	641 001 8802	TERMINAL	13
	641 001 1407	ANTENNA SOCKET	1
	641 001 8789	HOUSING COVER 20P	1
	641 001 8796	HOUSING CONNECTOR 20P	1
MAIN P.C.B. ASSEMBLY			
PCB1	641 002 3028	PC BOARD ASSY, MAIN	1
CP1,2	641 000 7776	PLUG, 3 P	2
CS101	641 002 3035	BANDPASS FILTER, FM	1
CS501	641 001 8314	SOCKET, 20P	1
D501,503, 814	407 012 0200	DIODE 1N4002S	3
D502	407 145 2805	ZENER DIODE HZS9B3	1
D61	407 151 3407	ZENER DIODE HZS7B1	1
D62-64,802-813,815,817-820	407 012 4406	DIODE 1SS133	20
D801	407 144 9706	ZENER DIODE HZS6C3	1
IC1	409 016 7902	IC LA3161	1
IC201	409 016 6301	IC LA2220	1
IC202	409 042 2405	IC LA3361	1
IC21	409 030 5908	IC MC14066BCP	1
IC22	409 132 7909	IC MC14053BCP	1
IC23	409 222 7604	IC TDA2005R	1
IC801	409 271 6504	IC LC7232-8424	1
L501	632 548 1067	CHOKE COIL, 2MH	1
L801	641 001 8727	CHOKE COIL, 33UH	1
L802	641 000 9787	CHOKE COIL, 33UH	1
PL801	641 001 2138	LAMP 5V 115MA	1
Q1,101,22, 86,122	405 035 6506	TR 2SD1306N-E-TR	5
Q201	405 013 1301	TR 2SC21210Y-T	1
Q121,401 21,402,803, 808,812	405 015 4201	TR 2SC2712-GR	7
Q405	405 105 4609	TR RN2405	1
Q407	405 001 0705	TR RN1404	1
Q408	405 064 1909	TR 2SC2714Y	1
Q501	405 102 7108	TR 2SD882-P	1
Q62,403,300	405 088 1701	TR RN1407	3
Q801	405 012 2002	TR 2SC1815-GR	1
Q804,805, 807,809, 810,811	405 002 4603	TR 2SA1162-GR	6
Q813	405 035 9408	TR RN2407	1
SVR201	632 246 9372	PRESET RESISTOR, 10K	1
TP201,202	632 287 4336	TERMIANL	2
X201	632 251 0326	CERAMIC OSCILLATOR	1
X801	641 000 7066	CRYSTAL OSC, 4.5MHZ	1
TONE P.C.B. ASSEMBLY			
PCB2	641 001 8772	PC BOARD ASSY, TONE	1
PL803	641 001 2138	LAMP 5V 115MA	1
S801	641 000 8758	TACT SWITCH	1
VR42	641 001 7522	VR, SLIDE 50KW	1
VR41	641 001 7515	VR, SLIDE 50KA X 2	1
SWITCH P.C.B. ASSEMBLY			
PCB3	641 001 8741	PC BOARD ASSY, SWITCH	1
PL804,805	641 001 2138	LAMP 5V 115MA	1
S807-812	641 001 7485	TACT SWITCH	6
S802-804, 806	641 001 8765	TACT SWITCH	4
S805	641 001 8758	TACT SWITCH	1
TUNER P.C.B. ASSEMBLY			
PCB4	641 001 7997	PC BOARD ASSY, SWITCH	1
CP401	641 001 4552	PLUG, 6P	1
CP402	641 001 4545	PLUG, 3P	1
CP403	641 001 4569	PLUG, 13P	1
D301,401, 307	407 012 7605	DIODE 1SS226	3
D302	407 012 6202	DIODE 1SS184	1
D303	407 133 7102	VARACTOR D1 HN2V02H	1
D405	407 012 6509	DIODE 1SS193	1
D402,403, 404	407 126 2305	VARACTOR D1 KV1410TR00	3
D406	407 056 6800	ZENER DIODE RD 4.7 M-L BL	1

NOTES:1. Part orders must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

PARTS LIST(CONTINUED)

Ref. No.	PART No.	DESCRIPTION	Q'ty
F301	641 002 2694	CERAMIC FILTER, AM	1
F401,402	632 249 8242	CERAMIC FILTER, 10.7MHZ	2
F403	641 000 7035	CERAMIC FILTER	1
F404	641 001 4538	CERAMIC FILTER, FM	1
IC401	409 202 6405	IC LA1886M	1
L301	641 001 4460	CHIP INDUCTOR, 33UH	1
L401	641 001 4576	SPRING COIL, FM	1
L402	641 001 4477	CHIP INDUCTOR, 4.7UH	1
L403	641 001 4583	SPRING COIL, FM	1
L404	641 001 4590	SPRING COIL, FM	1
Q301	405 117 7605	TR 2SK494-C	1
Q302	405 087 8503	TR 2SC2715-0	1
Q401	405 105 1301	TR BF964	1

Ref. No.	PART No.	Description	Q'ty
SVR403	641 001 7423	SVR, 33K OHM	1
SVR404	641 001 7416	SVR, 22K OHM	1
SVR405	641 001 7409	SVR, 10K OHM	1
T301	641 001 4699	RF1, MW	1
T302	641 001 4606	RF2, MW	1
T303	641 001 4651	OSC COIL, MW	1
T304	641 001 4668	RF COIL	1
T305	641 001 4637	IF TRANSFORMER, AM	1
T401	641 001 4613	IF TRANSFORMER, FM	1
T402	641 001 4620	IF TRANSFORMER, FM	1
VR301,406	641 001 7256	SVR, 47K OHM	2
	641 001 4521	SHIELD CASE	1

NOTES:1. Part orders must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

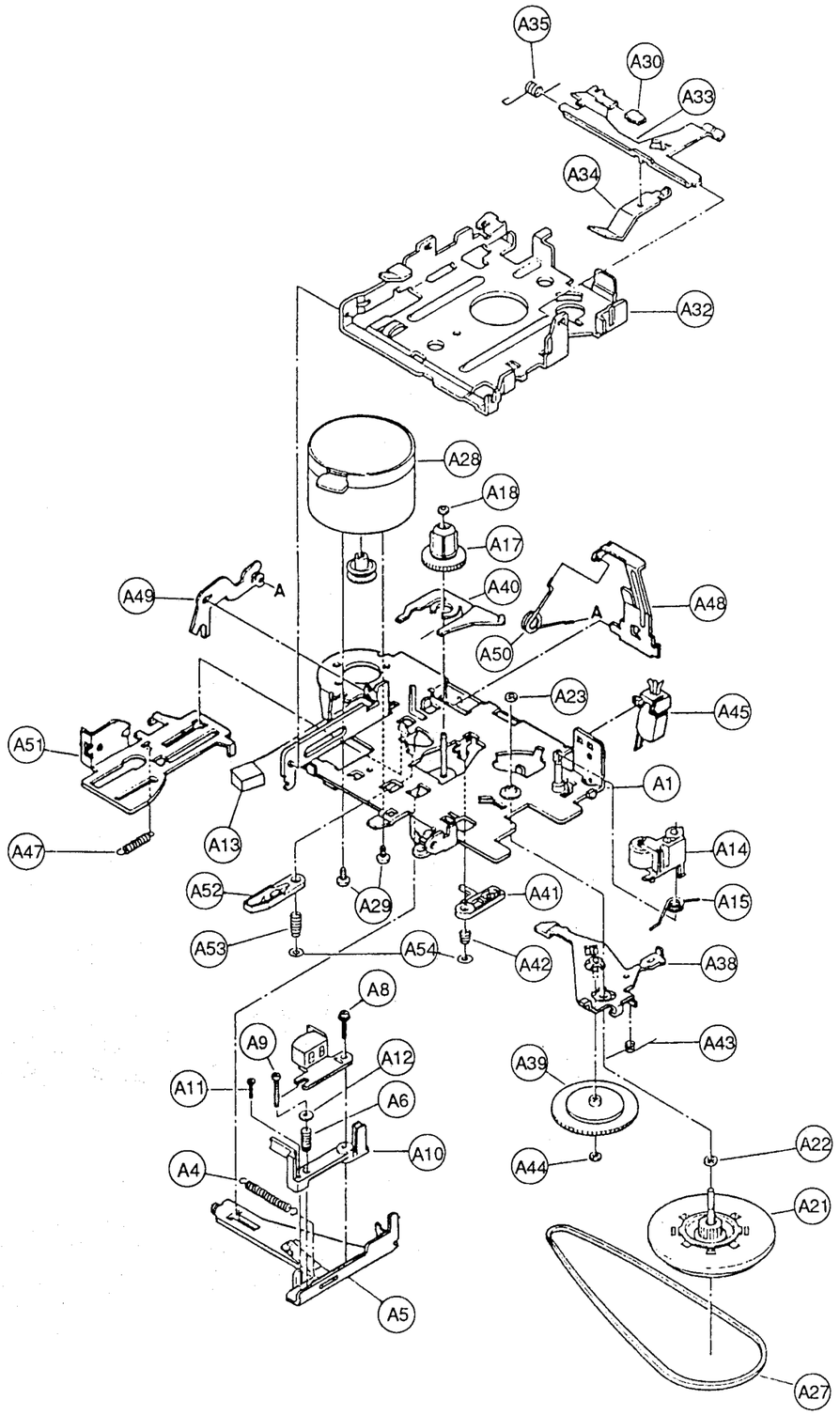
PARTS LIST(CASSETTE MECHANISM)

Ref. No.	PART No.	DESCRIPTION	Q'ty
CASSETTE MECHANISM(641 002 9520)			
A1	641 001 8956	CHASSIS ASSY	1
A4	641 001 9045	HEAD PANEL SP	1
A5	641 001 9021	HEAD PANEL	1
A6	641 001 9014	AZIMUTH SP	1
A8	641 001 9281	TAMS SC 2X9	1
A9	641 001 9298	SC(+) CUT 2X10	1
A10	641 001 9038	HEAD BASE	1
A11	641 000 6076	CAMERA SCR 2X505	1
A12	641 000 6793	WAS. 2.1X5X0.2	2
A13	641 001 9007	ANTI-VIB FELT MAT	1
A14	641 001 8963	PINCH ROLLER ASSY	1
A15	641 001 9069	PINCH ROLL SP	1
A17	641 001 8970	REEL GEAR ASSY	1
A18	641 001 9274	H.W (C1.2X308X0.4)	1
A21	641 001 8987	FLYWHEEL ASSY	1
A22	641 001 9311	H.W(2.2X308X0.2)	1
A23	641 001 9328	H.W(CU1.5X3.2X0.5)	1
A27	641 001 9076	MAIN BELT	1
A28	641 001 9052	MOTOR ASSY, WITH PULLEY	1
A29	632 547 2966	MACHINE SCREW, PAN M2.6X3	2
A30	641 001 9113	BRAKE SHOE	1
A32	641 001 9120	CASS CASE	1
A33	641 001 9090	KICK PLATE	1

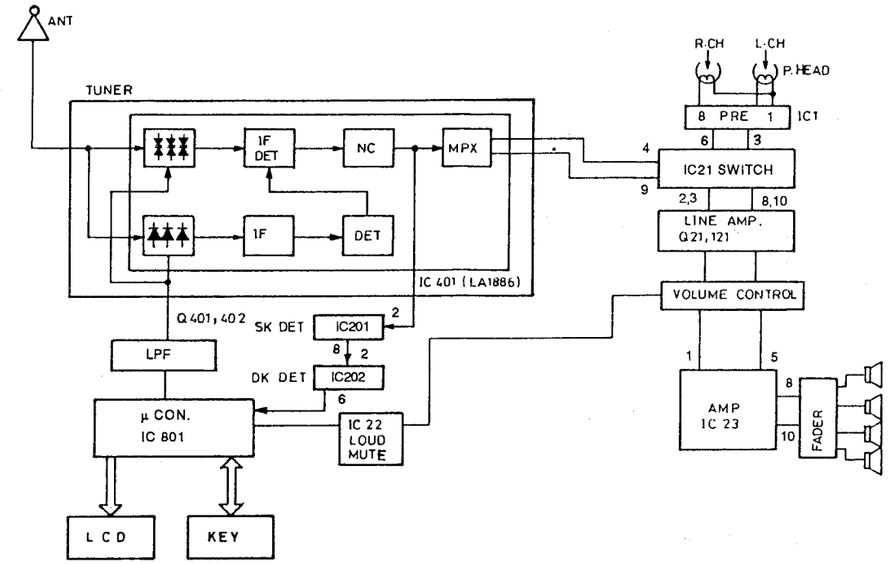
Ref. No.	PART No.	DESCRIPTION	Q'ty
A34	641 001 9106	PACK HOLDER SP	1
A35	641 001 9083	KICK PLATE SP	1
A38	641 001 8994	GEAR PLATE ASSY	1
A39	641 001 9137	CAM GEAR	1
A40	641 001 9144	SENSOR	1
A41	641 001 9175	G LOCK LEVER	1
A42	641 001 9151	G LOCK LEV SP	1
A43	641 001 9168	GEAR PLATE SP	1
A44	641 001 9267	P.W (C1.2X3.8X0.3)	1
A45	641 001 9250	LEAF SW	1
A47	641 001 9205	FUNCTION LEV SP	1
A48	641 001 9229	PUSH PLATE	1
A49	641 001 9212	LIFT UP LEV	1
A50	641 001 9243	REVERSE SP	1
A51	641 001 9236	FUNCTION LEV	1
A52	641 001 9182	FF LOCK LEVER	1
A53	641 001 9199	LOCK LEVER SP	1
A54	641 001 9304	H.WASH 2.1X5X0.3	2
CS1	641 000 3464	CORD, 3P	1
CS2	641 001 9335	CORD, 3P	1
	632 547 1389	PLAY HEAD	1
	641 000 2870	MOTOR MMI 6S2 RF	1
	641 000 2887	WIRE TIE	1
	403 041 8804	ELECT 10U M 16V	1

NOTES:1. Part orders must contain Model Number, Part Number and Description.
2. Ordering quantity of screws and resistors must be multiple of 10 pcs.

EXPLODED VIEW(CASSETTE MECHANISM)



BLOCK DIAGRAM



IC AND TRANSISTOR VOLTAGE CHART

(V)

IC \ PIN		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
IC1	ON / OFF	1.3	0.8	2.4	7.6	0	2.4	0.8	1.3														
IC21	ON / OFF	0	0	0	0	*0 / 4.2	*0 / 4.2	0	0	0	0	0	*4.9 / 0	*4.9 / 0	5.4								
IC22	ON / OFF	0	0	3.3	3.3	0 / 1.9	0	0	0	0 / 4.6	4.6 / 0	4.6 / 0	0	0	0	0	5.4						
IC23		1.3	0.8	8.5	0.8	1.3	0	13.9	7.0	14.0	7.0	13.9											
IC201		7.14	2.06	2.08	0	2.08	6.99 / 0	2.08	2.18	3.02	0	7.14	2.89	2.9	2.9	0.42	3.33	0.05	3.0	3.0	3.0	3.0	3.8
IC202		6.48	2.52	1.7	0	0	6.5 / 0	0	0	2.2	1.4	1.4	2.0	1.4	1.4	1.4	0.1						

(V)

TR \ PIN		Q 1	Q 101	Q 21	Q 121	Q 22	Q 122	Q 62	Q 300	Q 401	Q 402	Q 403	Q 405	Q 407	Q 408	Q 501
E		0	0	0.4	0.4	0	0	0	0	0	0.6	0	8.2	0		8.2
C	OFF / ON	0	0	3.8	3.8	0	0	5.0 / 0	N.C	1.2~ / 7.8	1.2~ / 7.8	5.9 / 0	0 / 8.2	0 / 8.2		12.8
B	OFF / ON	0 / 0.6	0 / 0.6	1.0	1.0	0 / 0.6	0 / 0.6	0 / 4.2		0.6	1.1	0 / 4.6	8.2 / 0	2.7 / 0		8.8

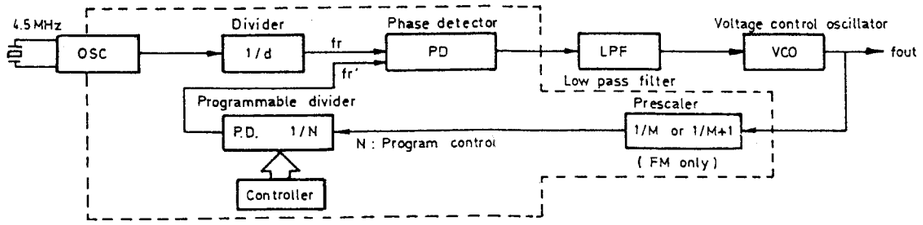
(V)

TR \ PIN		Q 801	Q 802	Q 803	Q 804	Q 805	Q 807	Q 808	Q 809	Q 812	Q 811	Q 810	Q 201	Q 86
E		5.5	5.5	0	N.C		N.C	0	N.C	4.7 / 0.2	N.C	N.C	0 / 7.2	0
C	OFF / ON	12.6	0 / 5.5	5.4 / 0	N.C	N.C	N.C	0	N.C	5.5	N.C	N.C	13.7	N.C
B	OFF / ON	6.1	5.4 / 0	0 / 0.6	4.9 / 0.7		N.C / 0	N.C / 0.6	4.2 / 0	0.2 / 5.4	6.4 / 0	6.4 / 0	0 / 7.8	0 / 0.6

* TA / RA

CIRCUIT OPERATION DESCRIPTION

1.BASIC OPERATION OF PULL FREQUENCY SYNTHESIZER



The illustration above is a block diagram which is a fundamental PLL frequency synthesizer.
In order to obtain reference frequency fr, the frequency of 4.5 MHz generated from a crystal oscillator (OSC) is passed into a divider circuit of 1/d.
This fr is compared with fr', and runs through phase detector (PD) and low pass filter (LPF) to be inverted to directcurrent signal, which is then applied as varicap voltage of voltage control oscillator (VCO), thereby controlling the oscillation frequency.
This oscillation frequency fout is divided down to 1/N by programmable divider (PD), so that one closed loop is fixed in the relation of

fout=frxN

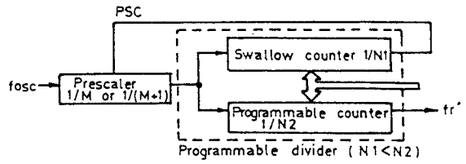
therefore, the operation of PLL is stabilized
In case of automatic channel selection, the dividing ratio N is altered by the PD by a command from controller, and fout is changed accordingly.

Programmable divider
Since the oscillation frequency of VCO is very high as compared with fr, it is divided down to 1/N (in the case of AM) to decrease the difference from fr in this circuit.

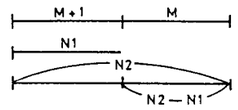
Phase detector
This is a circuit to detect the difference in frequency and phase between reference frequency fr and comparison frequency fr in terms of pulses.

Low pass filter
This circuit is intended to vary and fix the output voltage in order to deliver a varicap voltage necessary for desired VCO frequency, on the basis of the output of the phase detector.

Prescaler
The local oscillation frequency in FM is higher than the operating speed of the programmable divider of PLL, thereby opposing to accurate operation. To avoid this, the local oscillation frequency is preliminarily divided down in this circuit to a proper frequency permitting reliable operation of the programmable divider.
Pulse swallow count system is employed. A couple of programmable divider (swallow counter and programmable counter) can be selected.



f osc= {(M+1)N1+M(N2-N1)}fr'
= (MN2+N1)fr'



The prescaler at first starts the frequency division with the ration M+1. Then swallow counter and programmable counter start counting simultaneously. When N1 inputs are applied, swallow counter stops counting. Then the frequency division ratio of the prescaller is switched to M. Programmable counter continues to count however and stops when the input reaches N2. The frequency division ratio of the prescaller switches back to M+1 and swallow counter and programmable counter start to count again.
FM reception employs the pulse swallow count system. AM reception does not employ the pulse swallow count system but employs the direct frequency division system and so only programmable counter is operated.

2. GENERAL DESCRIPTION OF LOGIC IC (IC801)

a) IC801 LC7232-8424
This IC includes PLL and controller is a C-MOS LSI for digital tuning of FM/AM PLL frequency synthesizer system and controls such functions as FM/AM automatic channel selection, preset memory and frequency digital display driver. It is packed in a 80-pin flat package.

3. AUTOSTOP

If counter start, when High level signal is applied to IF terminal (PinNo.15 of Tuner). Then IF frequency become 10.7MHz ±30kHz at FM or 450kHz ±3kHz at AM. When SD and IF is agreed radio auto search tuning stops.

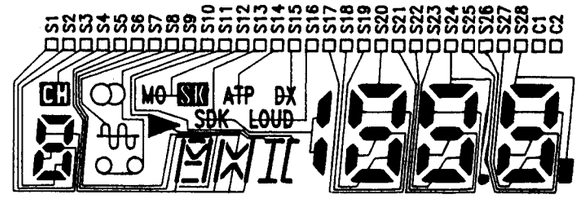
CIRCUIT OPERATION DESCRIPTION

DESCRIPTION (LC7232-8424)

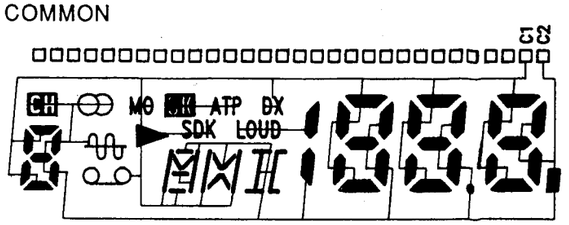
PIN NO	SYMBOL IN	SYMBOL OUT	FUNCTIONAL EXPLANATION
1	XIN		Input side of inverter for OSC
2	GND		
3	AREA3		Key return signal input
4	AREA2		Key return signal input
5	AREA1		Key return signal input
6	DIS AMSS		Key return signal input
7		BEEP	BEEP Signal output
8		BAND1	BAND1: FM I, MW O, LW O, FM*SDK 1
9		BAND2	BAND2: FM O, MW I, LW O, FM*SDK O
10		VF	VF: FM I, MW I, LW I, FM*SDK O
11	DIS DOLBY		Key return signal input
12	DIS MTL		Key return signal input
13	SDK		SDK signal output
14		$\overline{\text{MUTE}}$	MUTE signal output
15		MODE1	MODE1: TAPE O, FM I, AM I; MODE2: TAPE I, FM O, AM I (AM: MW LW)
16		MODE2	
17		STBY	AMP STBY output
18		TA MUTE	TAPE MUTE output
19		LOUD.	LOUDNESS signal output
20		LO	LO signal output
21		DOLBY	DOLBY signal output
22		AMSS	AMSS signal output
23		MO/MTL	MO/MTL signal output
24		RA MUTE	RA MUTE signal output
25		KS5	Key matrix return signal output 5
26		KS4	Key matrix return signal output 4
27		KS3	Key matrix return signal output 3
28		KS2	Key matrix return signal output 2
29		KS1	Key matrix return signal output 1
30		KS0	Key matrix return signal output 0
31	VDD		VDD 5V
32	K3		Key matrix return signal output 3
33	K2		Key matrix return signal output 2
34	K1		Key matrix return signal output 1
35	K0		Key matrix return signal output 0
36		S28	LCD 28 output for LCD
37		S27	LCD 27 output for LCD
38		S26	LCD 26 output for LCD
39		S25	LCD 25 output for LCD
40		S24	LCD 24 output for LCD
41		S23	LCD 23 output for LCD
42		S22	LCD 22 output for LCD
43		S21	LCD 21 output for LCD
44		S20	LCD 20 output for LCD
45		S19	LCD 19 output for LCD
46		S18	LCD 18 output for LCD
47		S17	LCD 17 output for LCD
48		S16	LCD 16 output for LCD

PIN NO.	SYMBOL IN	SYMBOL OUT	FUNCTIONAL EXPLANATION
49		S15	LCD 15 output for LCD
50		S14	LCD 14 output for LCD
51		S13	LCD 13 output for LCD
52		S12	LCD 12 output for LCD
53		S11	LCD 11 output for LCD
54		S10	LCD 10 output for LCD
55		S9	LCD 9 output for LCD
56		S8	LCD 8 output for LCD
57		S7	LCD 7 output for LCD
58		S6	LCD 6 output for LCD
59		S5	LCD 5 output for LCD
60		S4	LCD 4 output for LCD
61		S3	LCD 3 output for LCD
62		S2	LCD 2 output for LCD
63		S1	LCD 1 output for LCD
64		COM1	COMMON signal 2 output for LCD
65		COM2	COMMON signal 1 output for LCD
66	INT		VDD 5V
67	$\overline{\text{CE}}$		ChipEnable (+5V)
68	$\overline{\text{RES}}$		RESET
69	ADC		Signal meter level input
70	FM IF		FM IF input
71	AM IF		AM IF input
72	$\overline{\text{SNS}}$		VDD 5V
73	VDD		VDD 5V
74	FM in		FM OSC input
75	AM in		AM OSC input
76	GND		GND
77		E01	Phase detector output 1
78		E02	Phase detector output 2
79	GND		
80		XOUT	Output side of inverter for OSC

SEGMENT

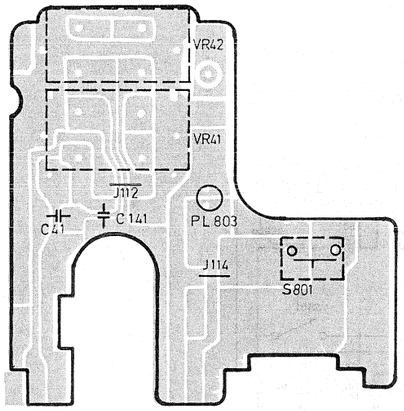


COMMON

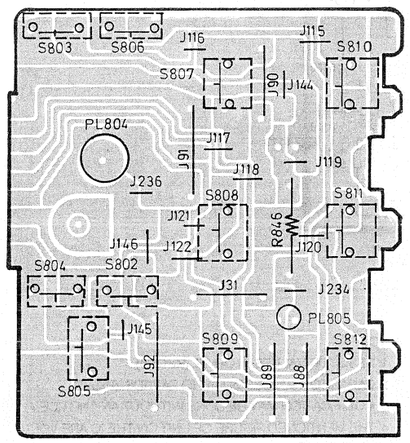


WIRING DIAGRAM

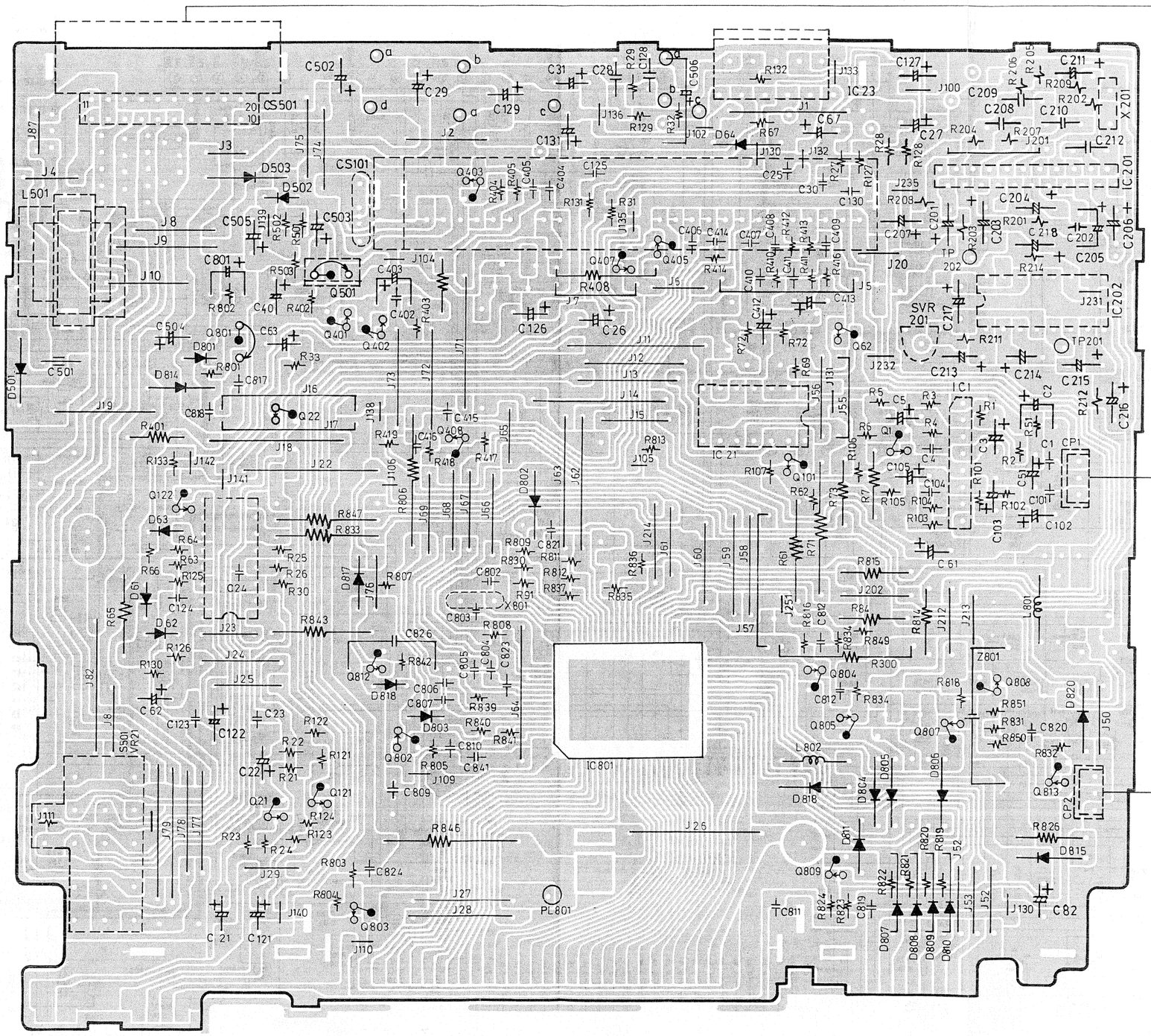
TONE P.C.B. BOTTOM



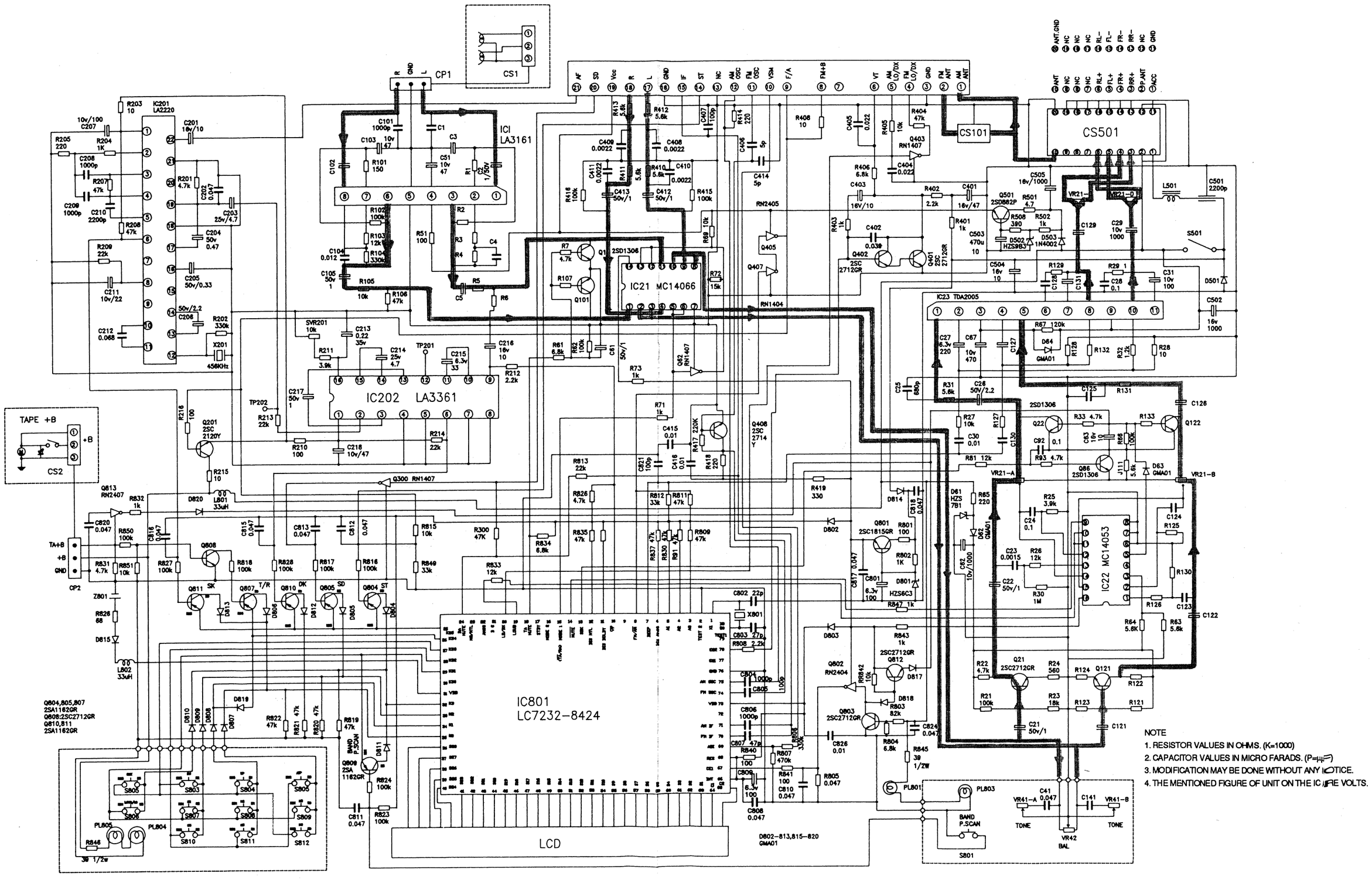
SWITCH P.C.B. BOTTOM



MAIN P.C.B. BOTTOM



SCHEMATIC DIAGRAM



NOTE

1. RESISTOR VALUES IN OHMS. (K=1000)
2. CAPACITOR VALUES IN MICRO FARADS. (P=μF)
3. MODIFICATION MAY BE DONE WITHOUT ANY NOTICE.
4. THE MENTIONED FIGURE OF UNIT ON THE IC ARE VOLTS.