

CONTROL CENTER

C-1000

SERVICE MANUAL

MODEL: C-1000 CONTROL CENTER

C I R C U I T D E S C R I P T I O N

Equalizer Stage

A Cascoded Differential Direct Coupled Amplifier is adopted. This differential circuitry at the top stage stabilized the direct coupled stage and helps obtain better linearity. Also this shields the NF amp immune from being unstabilized by the exterior effect such as cartridges to be connected to the input. Good linearity, stability and SN ratio are ensured thanks to the Cascoded Amplifier adopted for this differential stage and the following stage.

As for the output stage, the adoption of the transistor of TO-5 type at the final stage together with the push-pull circuit by Class A Inverted Darlington Configuration permits to accept the low impedance loads.

This is designed for the professional use because current standard control amp cannot stand the severe load condition at equalizer stage when a lot of lines of recording output is used frequently with professional equipment.

Constant Current Circuits are adopted at important points to improve the linearity of the transistor itself, the open loop gain and the differential function, all of which contribute to lower the distortion. The permissible input voltage at PHONO terminals is 450mV at 1KHz (R.M.S. Input Sensitivity 0dB).

R.I.A.A. equalization is within $\pm 0.2\text{dB}$, which is realized by careful selection of components used in this equalizer stage. Other function related to this stage are Input Sensitivity Adjuster, Input Impedance Adjuster and Linear Equalizer.

Intermediate Amp & Tone Control Circuit

These two stages adopt cascoded direct-coupled amp to improve linearity especially at high frequency range, and stability and SN ratio are just the same with that of the equalizer stage.

Constant Current Circuitry is adopted in the output stage to improve linearity of the transistor itself and the open loop gain. Phase compensation for NF stabilization is just one, and the aggravation of the distortion at high frequency range is almost nil.

Tone Control Circuit of LUX original NF type improves the distortion together with the above mentioned amplifying circuit. Tone control function is provided with independent frequency selector with 3 points for both bass (150Hz, 300Hz, 600Hz) and treble (1.5KHz, 3KHz, 6KHz) together with the tone defeat switch. This circuit allows low boost at the same time. Thus wider tonal adjustment is feasible.

Further a detent-volume of 21 points bype is adopted for both bass and treble level control. This is just the same type with the high-grade attenuator, which prevents gang error between right and left channel.

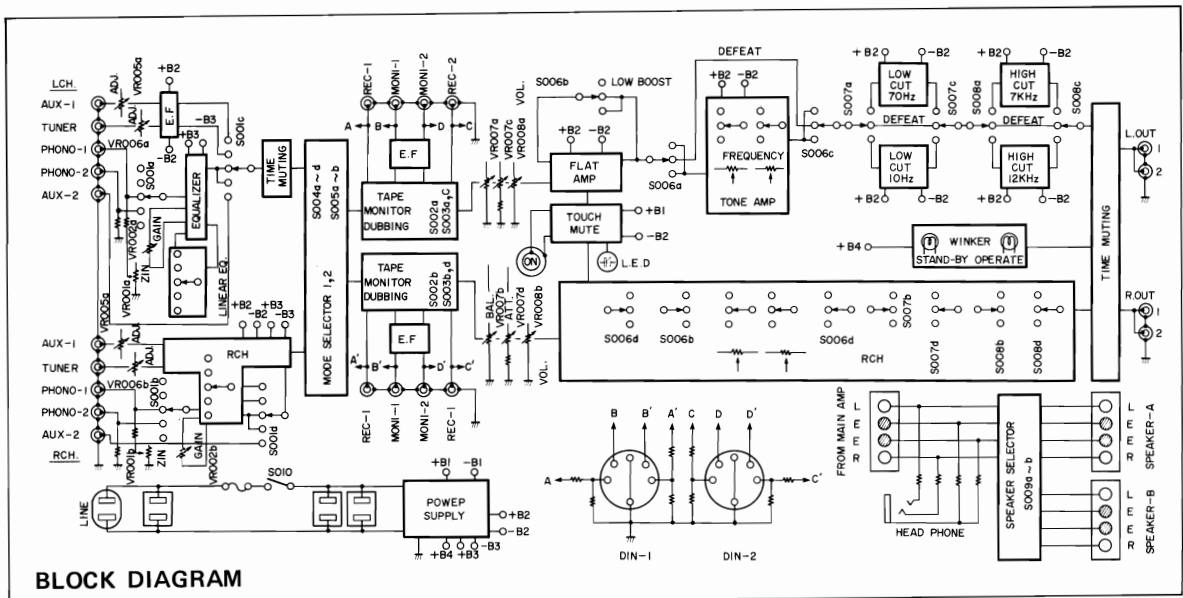
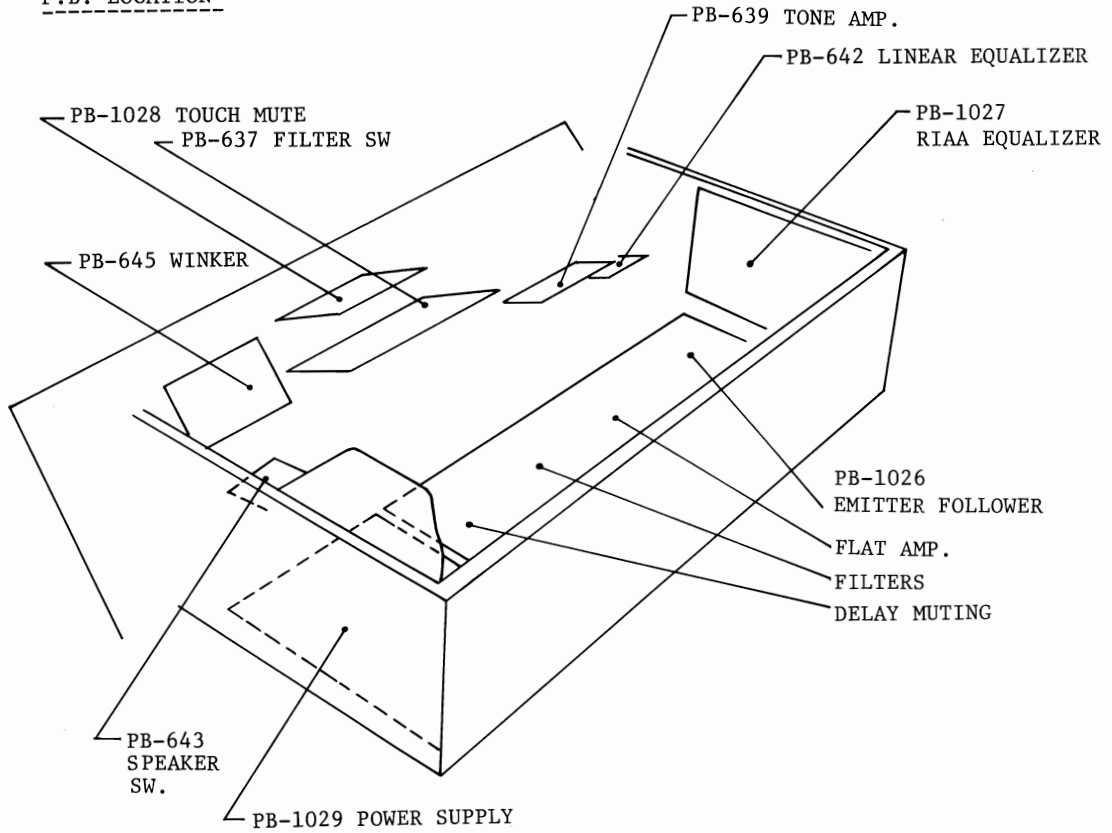
Buffer Circuit

Emitter follower circuit is adopted for this stage. But this is somewhat different from the ordinary one. Here two transistors are used; one is for the emitter follower and the other for the constant current circuit to the emitter follower stage. This constant current driving circuit not only keeps good linearity of the transistor itself but suppresses the distortion lowest for wide frequency range by means of its high open gain.

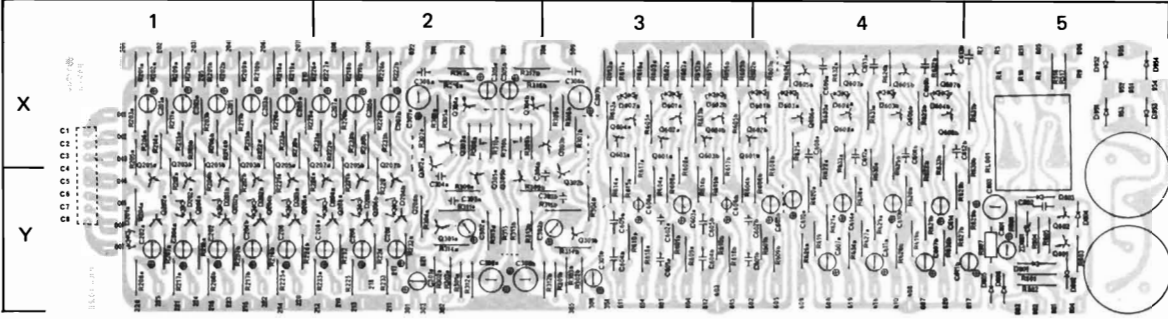
Filter Circuit

This stage is an NF type utilizing emitter follower. The constant drive system is adopted likewise the Buffer stage. Cut off frequency can be selected either at 10Hz (-18dB/oct.) or 70Hz (-12dB/oct.) for Bass cut and 7KHz (-12dB/oct.) or 12KHz (-12dB/oct.) for Treble cut. Independent filter circuits for each cut off frequency are provided, and these cut off points can be selected by the whole switching of the circuit. Of course no signals will go through these circuits when the filter switch is off.

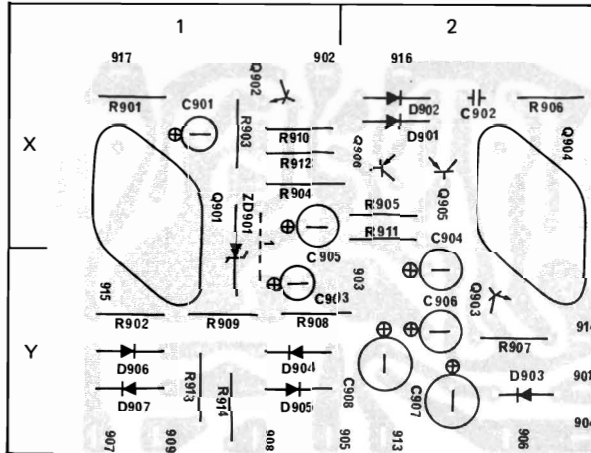
MODEL: C-1000
P.B. LOCATION



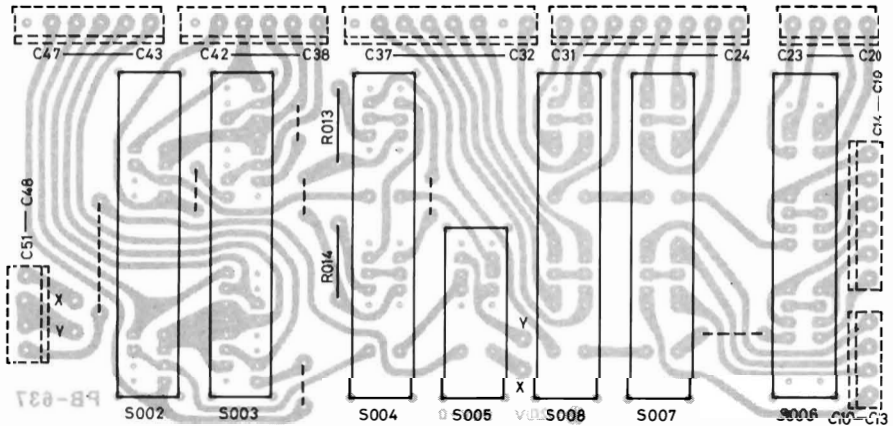
PB1026



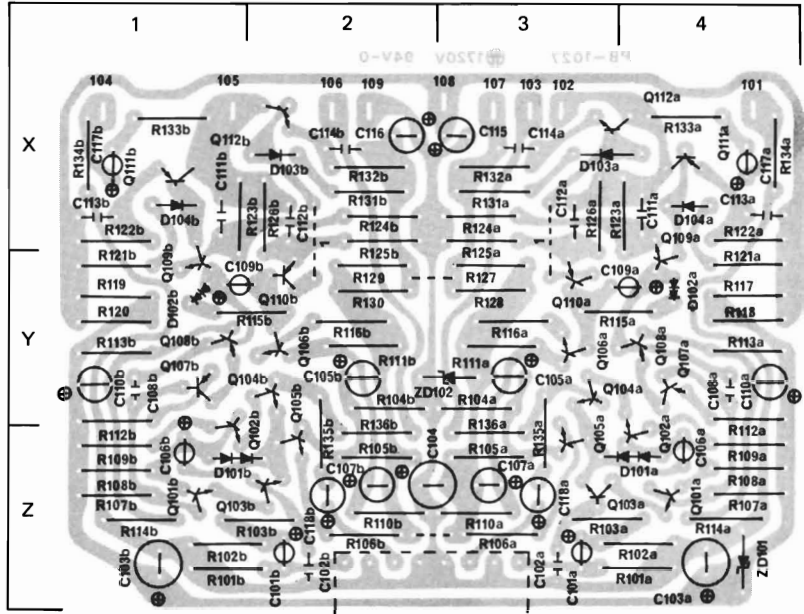
PB1029



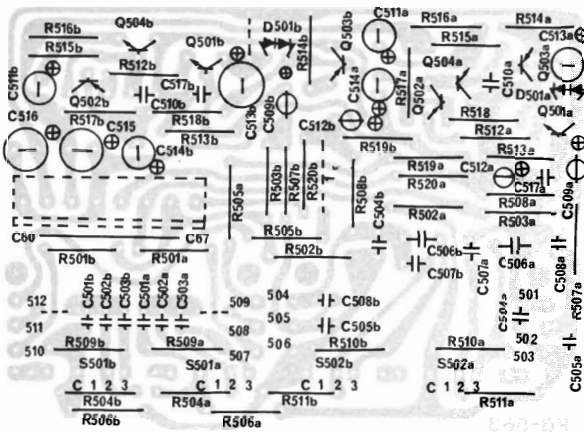
PB637



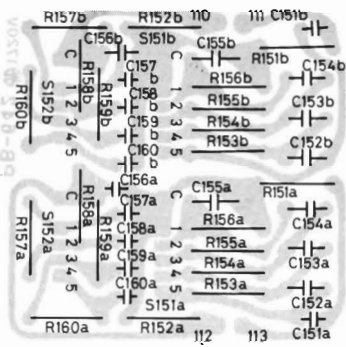
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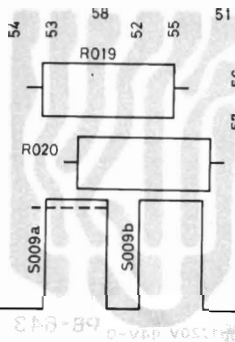
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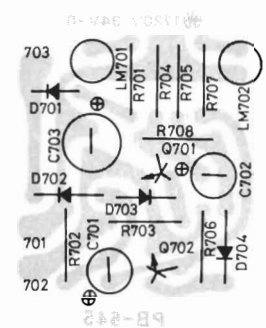
PB642



PB643



PB645



MODEL: C-1000 REPLACEMENT PARTS LIST

All resistors are carbon 1/4 watt resistor unless noted otherwise. Unit of resistance is OHM.

(Class "SG" --- low noise, Class "J" --- $\pm 5\%$, Class "G" --- $\pm 1\%$)

The resistors marked (■) are all non-flamable type.

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SYMBOL NO. (RESISTORS)

R201	1.5M	J	X1	R233	150K	J	Y2	R613	270K	J	X3
202	4.7K	"	X1	301	1K	"	Y2	614	4.7K	"	Y3
203	18K	"	X1	302	470K	SG	Y2	615	68K	"	Y3
204	33K	"	Y1	303	8.2K	SG	Y2	616	33K	"	X3
205	1M	"	X1	304	15K	SG	Y2	■ 617	120	"	X3
206	330K	"	X1	305	15K	SG	X2	618	22K	"	Y3
■ 207	120	"	Y1	306	1.5K	SG	X2	619	150K	"	Y4
208	150K	"	Y1	307	10	SG	X2	620	100K	"	Y4
209	1.5M	"	X1	308	150K	SG	X2	621	10K	"	Y4
210	4.7K	"	X1	310	2.2K	"	X2	622	27K	"	Y4
211	18K	"	X1	311	470K	SG	Y2	623	4.7K	"	X4
212	33K	"	Y1	312	22K	"	Y2	624	33K	"	X4
214	1M	"	X1	313	1.5K	"	Y2	■ 625	120	"	X4
215	330K	"	X1	314	68K	SG	Y2	626	150K	"	Y4
■ 216	120	"	Y1	■ 315	150	"	Y2	627	150K	"	Y4
217	150K	"	Y1	316	150K	"	X2	628	100K	"	Y4
218	150K	"	X1	317	1M	SG	X2	629	10K	"	Y4
219	4.7K	"	X1	516	270	"	X5	630	27K	"	Y4
220	18K	"	X1	517	270	"	X5	631	4.7K	"	X4
221	33K	"	Y1	601	150K	"	Y3	632	33K	"	X4
222	1M	"	X1	602	33K	"	X3	■ 633	120	"	X4
223	330K	"	X1	603	1M	"	X3	634	150K	"	Y4
■ 224	120	"	Y2	604	4.7K	"	Y3	801	100K	"	Y5
225	150K	"	Y1	605	220K	"	X3	802	1.2M	"	Y5
226	150K	"	X2	606	100K	"	Y3	803	470K	"	Y5
227	4.7K	"	X2	607	33K	"	X3	804	3.3K	"	Y5
228	18K	"	X2	■ 608	120	"	X3	805	3.3K	"	Y5
229	33K	"	Y2	609	150K	"	Y3	806	6.8K	"	Y5
230	1M	"	X2	610	150K	"	Y3	■ 807	330 1/2W	"	Y5
231	330K	"	X2	611	10K	"	X3				
■ 232	120	"	Y2	612	100K	"	X3				

SYMBOL NO. (CAPACITORS)

C201	4.7uF	25V	tantalum	X1	C604	0.12uF	50V ^{+5%}	mylar	Y3
202	4.7uF	"	"	Y1	605	0.12uF	50V ^{-5%}	mylar	Y3
203	4.7uF	"	"	X1	606	1uF	35V	tantalum	Y3
204	4.7uF	"	"	Y1	607	4.7uF	25V	tantalum	Y4
205	4.7uF	"	"	X1	608	0.0022uF	50V ^{+5%}	mylar	X4
206	4.7uF	"	"	Y1	609	820pF	50V ^{-5%}	polystyrol	X4
207	4.7uF	"	"	X2	610	4.7uF	25V	tantalum	Y4
208	4.7uF	"	"	Y2	611	4.7uF	25V	tantalum	Y4
301	4.7uF	"	"	Y2	612	0.0012uF	50V ^{+5%}	mylar	X4
302	10uF	"	electrolytic	Y2	613	470pF	50V ^{-5%}	polystyrol	X4
304	3.3pF	50V ^{+1%}	ceramic	Y2	614	4.7uF	25V	tantalum	Y4
305	4.7uF	25V	tantalum	X2	801	10uF	25V	electrolytic	Y5
306	0.027uF	50V ^{+5%}	mylar	X2	802	0.1uF	25V +80% -20%	ceramic	Y5
307	33uF	25V	electrolytic	X2	803	22uF	50V	electrolytic	Y5
308	33uF	"	"	Y2		3300uF	35V	electrolytic	Y5
601	0.022uF	50V ^{+5%}	mylar	Y3		3300uF	35V	electrolytic	Y5
602	0.01uF	50V ^{-5%}	mylar	Y3					
603	4.7uF	25V	tantalum	Y3					

SYMBOL NO. (TRANSISTORS)

Q201	2SC1345 (E)	emitter-follower	Y1	Q305	2SC1345 (E)	flat amp	Y2
202	2SC1345 (E)	"	Y1	601	2SC1345 (E)	low cut filter	X3
203	2SC1345 (E)	"	Y1	602	2SC1345 (E)	low cut filter	X3
204	2SC1345 (E)	"	Y1	603	2SC1345 (E)	low cut filter	X3
205	2SC1345 (E)	"	Y1	604	2SC1345 (E)	low cut filter	X3
206	2SC1345 (E)	"	Y2	605	2SC1345 (E)	high cut	X4
207	2SC1345 (E)	"	Y2	606	2SC1345 (E)	high cut	X4
208	2SC1345 (E)	"	Y2	607	2SC1345 (E)	high cut	X4
301	2SC1345 (E)	flat amp	Y2	608	2SC1345 (E)	high cut	X4
302	2SA836 (E)	"	Y2	801	2SA836 (E)	time muting	Y5
303	2SA836 (E)	"	X2	802	2SC1345 (E)	time muting	Y5
304	2SC1345 (E)	"	X2				

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SYMBOL NO. (DIODES)

D201	VD-1221	compensator	Y1	D803	IS1554V	time muting	Y5
202	VD-1221	"	Y1	804	IS1554V	"	Y5
203	VD-1221	"	Y2	805	IN4003	rectifier	Y5
204	VD-1221	"	Y2	806	IN4003	rectifier	Y5
601	VD-1221	"	X3	951	IN4003	rectifier	X5
602	VD-1221	"	X3	952	IN4003	rectifier	X5
603	VD-1221	"	X4	953	IN4003	rectifier	X5
604	VD-1221	"	X4	954	IN4003	rectifier	X5
801	IS1554V	time muting	Y5	ZD801	WZ-120	time muting	Y5
802	IS1554V	"	Y5				

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SYMBOL NO. (RESISTORS)

R102	560K	SG	J	Z1	R119	4.7K	J	Y1	R 136	1K	SG	"	X1
103	470	"	"	Z2	120	4.7K	"	Y1					
104	39K	"	"	Y2	121	1.2K	"	Y1					
105	3.3K	"	"	Z2	122	82	"	X1					
106	2.7K	"	"	Z2	123	2.7K	SG	"	X1				
107	8.2K	"	"	Z1	124	1.8K	"	"	X2				
108	330K	"	"	Z1	125	1.8K	"	"	X2				
109	10	"	"	Z1	126	2.7K	"	"	X2				
110	22K	"	"	Z2	127	4.7K	"	"	Y3				
111	1.5K	"	"	Y2	128	4.7K	"	"	Y3				
112	10	"	"	Y1	129	4.7K	"	"	Y2				
113	1.5K	"	"	Y1	130	4.7K	"	"	Y2				
114	22K	"	"	Z1	131	1.2K	"	"	X2				
115	820	"	"	Y2	132	82	"	"	X2				
116	680	"	"	Y2	133	270	"	"	X1				
117	4.7K	"	"	Y4	134	100K	J	"	X1				
118	4.7K	"	"	Y4	101	470K	SG	"	Z1				

SYMBOL NO. (CAPACITORS)

C102	33pF	50V ⁺ 10%	ceramic	Z2	C108	100pF	50V ⁺ 10%	ceramic	Y1	C114	4700pF	50V ⁺ 10%	ceramic	X2
103	33uF	25V	electrolytic	Z1	109	100uF	6.3V	tantalum	Y1	115	4.7uF	50V	electrolytic	X3
104	33uF	25V	electrolytic	Z2	110	47uF	10V	electrolytic	Y1	116	4.7uF	50V	electrolytic	X2
105	47uF	10V	electrolytic	Y2	111	150pF	50V ⁺ 10%	ceramic	X1	118	22uF	10V	tantalum	Z2
106	0.68uF	35V	tantalum	Z1	112	150pF	50V ⁺ 10%	ceramic	X1	101	47uF	25V	tantalum	Z2
107	47uF	10V	electrolytic	Z2	113	4700pF	50V ⁺ 10%	ceramic	X1	117	2.2uF	25V	tantalum	X1

(non-polar)

SYMBOL NO. (TRANSISTORS)

Q101	2SC1345 (E)	EQ amp	Z1	Q106	2SC1345 (E)	EQ amp	Y2	Q111	2SA606(L)	EQ amp	X2
102	2SC1345 (E)	"	Y1	107	2SA836 (E)	"	Y1	112	2SC959(L)	"	X1
103	2SC1345 (E)	"	Z2	108	2SA836 (E)	"	Y1				
104	2SC1345 (E)	"	Y2	109	2SC1345 (E)	"	Y1				
105	2SC1345 (E)	"	Z2	110	2SC1345 (E)	"	Y2				

SYMBOL NO. (DIODES)

D101	KB-265	EQ circuit	Z1	D104	IS1554V	EQ circuit	X1
102	VD-1221	EQ circuit	Y1	ZD101	WZ-192	EQ circuit	Z4
103	IS1554V	EQ circuit	X2	102	WZ-192	EQ circuit	Y3

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SYMBOL NO. (RESISTORS)

R901	680	J	X1	R908	2.7K	J	Y1
902	18K	"	Y1	909	1.2K	"	Y1
903	47	"	X1	910	10K	"	X1
904	1K	"	X1	911	10K	"	X2
905	4.7K	"	X2	912	10K	"	X1
906	680	"	X2	913	82	1/2W	Y1
907	3.3K	"	Y2	914	82	1/2W	Y1
					1	"	X1

SYMBOL NO. (CAPACITORS)

C901	3.3uF	50V	electrolytic	X1	C905	22uF	25V	electrolytic	X1
902	100pF	50V	ceramic	X2	906	22uF	25V	"	Y2
903	3.3uF	50V	electrolytic	Y1	907	100uF	16V	"	Y2
904	22uF	25V	electrolytic	Y2	908	100uF	16V	"	Y2

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SYMBOL NO. (TRANSISTORS)

Q901	2SA653 (Q)	power supply	X1	Q904	2SC1161 (Q)	power supply	X2
902	2SC1345 (E)	power supply	X1	905	2SA855 (GR)	power supply	X2
903	2SC1345 (E)	power supply	Y2	906	2SA855 (GR)	power supply	X2

SYMBOL NO. (DIODES)

D901	IS1554V	compensator	X2	D905	IN4004	rectifier	Y1
902	IS1554V	compensator	X2	906	IN4004	rectifier	Y1
903	IN4001	rectifier	Y2	907	IN4004	rectifier	Y1
904	IN4004	rectifier	Y1	ZD901	02Z-6.8A	voltage regulator	X1

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SYMBOL NO.

R501	1.5K	R509	1M	R517	27K	C505	1000pF	C515	33uF 25V
502	18K	510	1M	518	27K	506	0.047uF	516	33uF 25V
503	470K	511	1M	519	150K	507	0.015uF	517	4.7pF
504	1M	512	330	520	270	508	1000pF	Q501	2SC1345 (E)
505	1.5K	513	470K	C501	1200pF	509	4.7uF	502	2SA836 (E)
506	3.3K	514	120	502	1200pF	510	10pF	503	2SA836 (E)
507	2.7K	515	15K	503	3900pF	511	33uF 10V	504	2SC1345 (E)
508	18K	516	220	504	0.015uF	512	4.7uF 25V	D501	VD1221
						513	33uF 10V		
						514	33uF 10V		

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SYMBOL NO. (RESISTORS)

R401	100K	J	X1	R415	8.2K	J	Y2
402	4.7K	"	X1	416	47K	"	Y1
403	4.7K	"	X2	417	15K	"	Y2
404	4.7K	"	Y1	418	33K	"	Y2
405	100K	"	X1	419	33K	"	Y2
406	4.7K	"	X1	420	100K	"	Y2
407	10K	"	X1	421	6.8K	"	Y2
408	1K	"	X1	422	2.2K	"	Y2
409	1K	"	X2	423	2.2K	"	Y2
410	10K	"	X1		10K	"	Y1
413	15K	"	Y1				
414	8.2K	"	Y1				

SYMBOL NO. (CAPACITORS)

C401	22uF 25V	electrolytic	X1	C404	4.7uF 50V	electrolytic	Y2
402	22uF 25V	"	X2	405	0.01uF 25V +80% -20%	ceramic	Y1
403	4.7uF 50V	"	Y1	406	0.1uF 25V +80% -20%	ceramic	Y2

SYMBOL NO. (TRANSISTORS)

Q401	2SC1345 (E)	touch switch	X1	Q405	2SC1345 (E)	touch switch	Y1
402	2SC1345 (E)	touch switch	X1	406	2SA836 (E)	touch switch	Y2
403	2SA836 (E)	touch switch	X1	407	2SC1345 (E)	touch switch	Y1
404	2SA836 (E)	touch switch	X2	408	2SC1345 (E)	touch switch	Y2

SYMBOL NO. (DIODES)

D401	1K188FM-1	touch switch	Y1	D405	IS1554V	touch switch	Y2
402	1K188FM-1	touch switch	Y1	406	IS1554V	touch switch	Y2
403	1K188FM-1	touch switch	Y1	407	IS1554V	touch switch	Y1
404	1K188FM-1	touch switch	Y2	408	IS1554V	touch switch	Y1

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SYMBOL NO.

R151 a,b	510K	R158 a,b	1.5M	C155 a,b	0.082uF
152 a,b	39K	159 a,b	1.5M	156 a,b	1500pF
153 a,b	1M	160 a,b	1.5M	157 a,b	1200pF
154 a,b	1M	C151 a,b	8200pF	158 a,b	820pF
155 a,b	1M	152 a,b	0.082uF	159 a,b	560pF
156 a,b	1M	153 a,b	0.082uF	160 a,b	270pF
157 a,b	1.5M	154 a,b	0.082uF		

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SYMBOL NO. (RESISTORS)

R001	33K	SG	J	R009	150K	SG	J	R021	100	J
002	68K	SG	J	010	150K	SG	J	022	100	J
003	33K	SG	J	011	150K	SG	J	023	820	SG J
004	68K	SG	J	012	150K	SG	J	024	820	SG J
005	150K	SG	J	013	6.8K		J			
006	150K	SG	J	014	6.8K		J			
007	150K	SG	J	015	10K	SG	J			
008	150K	SG	J	016	10K	SG	J			

SYMBOL NO. (CAPACITORS)

C001	0.1uF	25V +80% -20%	ceramic	C007	0.047uF	250V	AC capacitor
002	0.1uF	25V +80% -20%	ceramic	008	4700uF	50V	electrolytic
003	0.1uF	25V +80% -20%	ceramic	009	4700uF	50V	electrolytic
004	0.1uF	25V +80% -20%	ceramic	010	0.22uF	250V	mylar
005	0.22uF	250V	mylar	011	0.1uF	25V +80% -20%	ceramic
006	0.047uF		AC capacitor				

SYMBOL NO. (VARIABLE RESISTORS)

VR001	150K - A X 2	for impedance adjust
002	1.2K - B X 2	equalizer level adjust
005	100K - B X 2	AUX level adjust
006	100K - B X 2	TUNER level adjust
007	100K - MN X 2	balance control
	50K - B X 2	attenuator
008	100K X 2	volume control
009	100K - B X 2	bass control
010	50K - B X 2	treble control

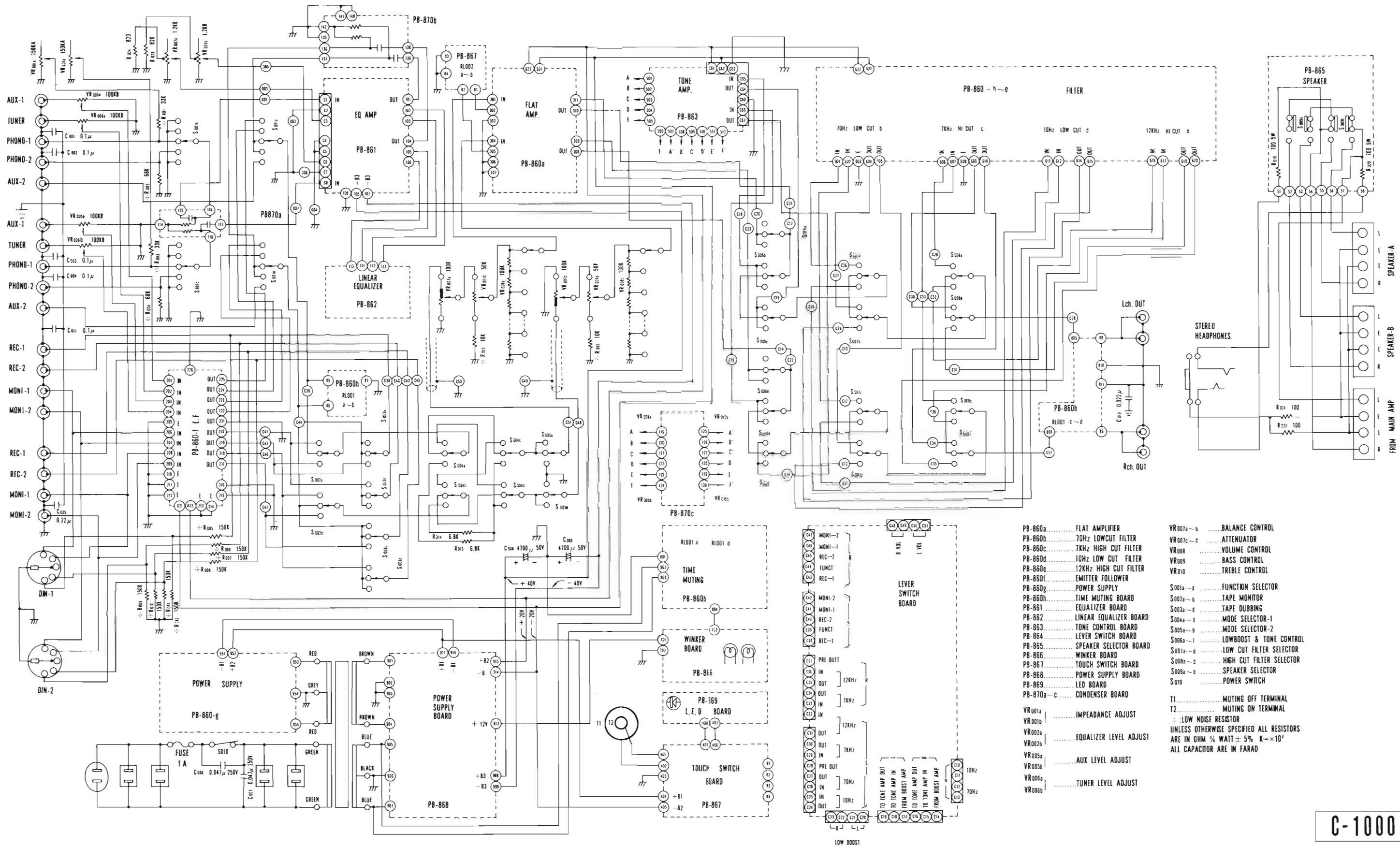
SYMBOL NO. (SWITCHES)

S001	rotary switch	4-circuit, 5-contact	function
002	lever switch	2-circuit, 3-contact	tape monitor
003	lever switch	4 3	tape dubbing
004	lever switch	2 3	mode selector - 1
005	lever switch	2 3	mode selector -2
006	lever switch	6 3	lowboost & tone control
007	lever switch	4 3	low cut filter
008	lever switch	4 3	high cut filter
009	push switch	2 2	speaker selector
010	push switch	1 1	power switch
	rotary switch	4 3	bass
	rotary switch	4 3	treble
	rotary switch	4 5	linear equalizer

MISCELLANEOUS

SYMBOL NO. (PRINTED CIRCUIT BOARDS)

PB637	P.C. Board	for lever switch
639		tone control
642		linear equalizer
643		speaker selector
645		winker
646		L.E.D.
1026		flat amp, filter, emitter follower & delay-time muting
1027		equalizer
1028		touch switch
1029		power supply
P-2038		power transformer (UL)
P-2023		power transformer (A)



- PB-860a..... FLAT AMPLIFIER
 - PB-860b..... 70Hz LOWCUT FILTER
 - PB-860c..... 7KHz HIGH CUT FILTER
 - PB-860d..... 10Hz LOW CUT FILTER
 - PB-860e..... 12KHz HIGH CUT FILTER
 - PB-860f..... EMITTER FOLLOWER
 - PB-860g..... POWER SUPPLY
 - PB-860h..... TIME MUTING BOARD
 - PB-861..... EQUALIZER BOARD
 - PB-862..... LINEAR EQUALIZER BOARD
 - PB-863..... TONE CONTROL BOARD
 - PB-864..... LEVER SWITCH BOARD
 - PB-865..... SPEAKER SELECTOR BOARD
 - PB-866..... WINKER BOARD
 - PB-867..... TOUCH SWITCH BOARD
 - PB-868..... POWER SUPPLY BOARD
 - PB-869..... LED BOARD
 - PB-870a-c..... CONDENSER BOARD

 - VR001a..... IMPEDANCE ADJUST
 - VR001b..... ATTENUATOR
 - VR002a..... EQUALIZER LEVEL ADJUST
 - VR002b..... TREBLE CONTROL
 - VR005a..... AUX LEVEL ADJUST
 - VR005b..... TUNER LEVEL ADJUST
 - VR007a-b..... BALANCE CONTROL
 - VR007c-d..... ATTENUATOR
 - VR009..... VOLUME CONTROL
 - VR010..... BASS CONTROL
 - VR011..... TREBLE CONTROL

 - S001a-d..... FUNCTION SELECTOR
 - S002a-b..... TAPE MONITOR
 - S003a-d..... TAPE DUBBING
 - S004a-d..... MODE SELECTOR-1
 - S005a-b..... MODE SELECTOR-2
 - S006a-1..... LOWBOOST & TONE CONTROL
 - S007a-d..... LOW CUT FILTER SELECTOR
 - S008a-d..... HIGH CUT FILTER SELECTOR
 - S009a-b..... SPEAKER SELECTOR
 - S010..... POWER SWITCH

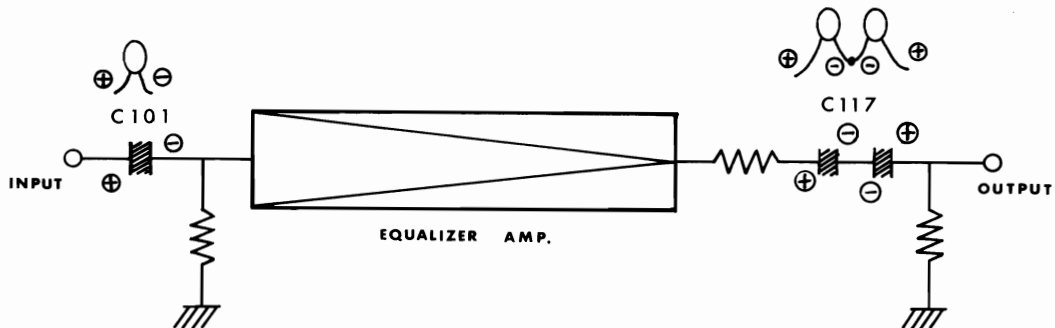
 - T1..... MUTING OFF TERMINAL
 - T2..... MUTING ON TERMINAL
 - VR001b..... LOW NOISE RESISTOR
- UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE IN OHM 1/4 WATT ± 5% K=×10³ ALL CAPACITOR ARE IN FARAD

LUX CORPORATION, JAPAN

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MODEL: C-1000 MODIFICATION (EQUALIZER SECTION)

This servicing procedure should be applied to the models whose serial NO. is marked with C at the top, which is limited to March, 1976 production.



Such capacitors as C101 and C117 which are placed at the input and output respectively should be modified as per the following procedure.

- a) Reverse the connection of the C101 as per the drawing, since the silk-prints on the PB1027 are reversed.
(⊕ for the input side, ⊖ for the amp. side)
- b) As for the C117, connect two capacitors in series on the PB1027, adding another same type, to realize electrically non-polar capacitor.

Parts Required

C101:	2.5V	4.7uF x 1/ch tantalum	total 2 pcs.
C117:	25V	4.7uF x 2/ch tantalum	total 4 pcs.

REMARKS: It is recommended in any case to apply the modification to C101 and C117, as these capacitors are in danger of breakage (mainly leakage) even if they remain functioning as they are.