NO. 993-044595-001

TECHNICAL SERVICE INFORMATION for

moog LIBERATION

DOMESTIC MODEL 338A
EXPORT MODEL 338BX

MOOG MUSIC INC.
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993-044595-001

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MODEL 338A
ODEL 338BX

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DISASSEMBLY PROCEDURES

CAUTION

Before proceding with disassembly, take special care to protect the finished wooden portions of the instrument from damage from sharp objects. The use of carpeting or styrofoam is recommended.

KEYBOARD CIRCUIT

1. To gain access to the keyboard circuit, remove the bottom cover by removing the eight screws and cup washers. This will provide the capability to troubleshoot the oscillator, the keyboard circuit, 12 volt regulator, VCA, VCF, force sensor and circuitry associated with the left-hand controller.

2. The board may be completely loosened by removing the four screws and lock washers along the center of the printed circuit board and connectors S19, S110, S111 and S113. This yields access to the keyboard contacts.

3. The force sensor may be removed by loosening the printed circuit board and removing the two mounting screws of the opto-interrupter at the center of the keyboard.

CONTROL BOARD

1. The control board assembly may be disassembled by removing the two 10-32 3/4" screws and washers at each end of the top assembly. To completely remove the printed circuit board, remove knobs from controls and sliders, the three screws on the back and the four screws securing the printed circuit board in place.

LEFT-HAND CONTROLLER

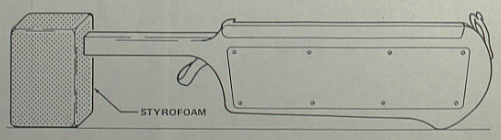
1. To gain access to the switches and controls, remove only the two screws at each end of the neck.

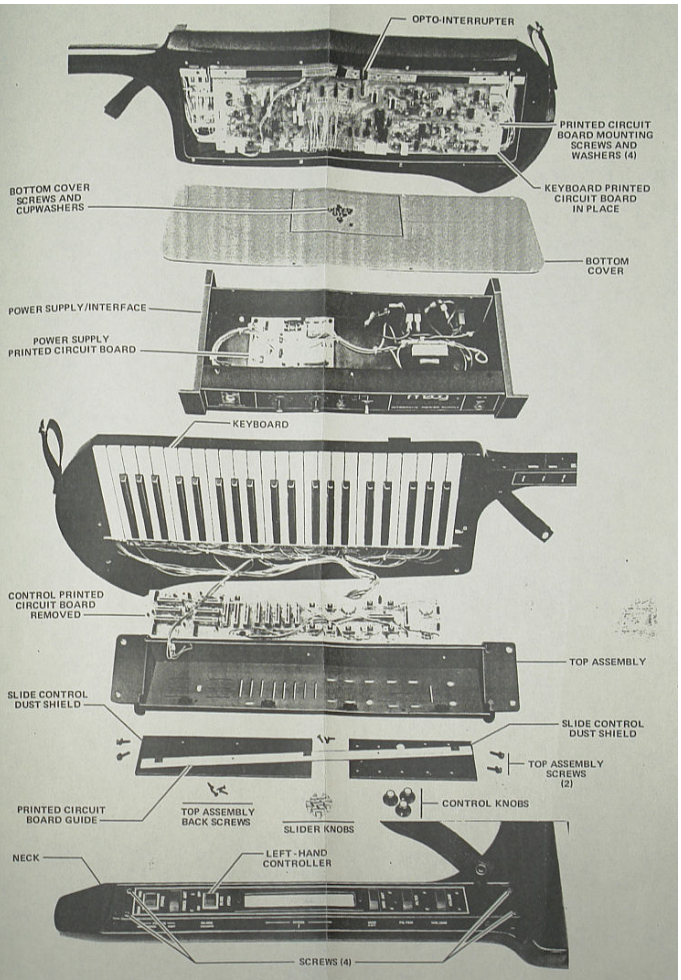
POWER SUPPLY/INTERFACE

1. To gain access to the power supply, remove the three screws on the rear lip of the back panel chassis, three screws on the top extrusion and the two top screws from each end cap. This allows the top cover to be removed.

OVERALL TROUBLESHOOTING

1. After the instrument is fully disassembled it is suggested that the instrument neck be strongly supported with a suitable material such as foam to facilitate troubleshooting. The foam can be used quite successfully by cutting an under-sized rectangular hole in the foam at a height that places the instrument in a horizontal plane with the keyboard facing up.





KEYBOARD CIRCUIT FINAL ASSEMBLY SELECTED REPLACEMENT PARTS LIST

REF DESIG	PART NUMBER	DESCRIPTION	QTY
P4	910-045019-001	Receptacle, No. DM7-XLR	1
R227	925-045014-002	Potentiometer, Rotary, VOLUME, 100K Ohm, 10% LOG	1
R228,R229	925-045014-003	Potentiometer, Rotary, FORCE AMOUNT and MODULATION AMOUNT, Linear, 10K Ohm	2
R230	925-045014-001	Potentiometer, Rotary, FILTER CUTOFF, Linear, 10K Ohm	1
S11,S18	906-040298-005	Connector, CIS, Housing, 5 Pin, .1 Center	2
S12 thru S14, S17,S19,S112	906-040298-004	Connector, CIS, Housing, 5 Pin, .1 Center	6
S15,S16	906-040298-008	Connector, CIS, Housing, 8 Pin, .1 Center	2
S110	906-040298-006	Connector, CIS, Housing, 6 Pin, .1 Center	1
S111	906-040298-007	Connector, CIS, Housing, 7 Pin, .1 Center	1
SW1,SW2	969-041311-005	Switch, SPDT, GLIDE and FORCE SELECT	2
	979-045177-001	Keyboard, 44 Note	1
	964-044471-001	White Key C3	1
	964-044471-002	White Key D3	1
	964-044471-003	White Key E3	1
	964-044471-004	White Key F3	1
	964-044471-005	White Key G3	1
	964-044471-006	White Key A3	1
	964-044471-007	White Key B3	1
	964-044471-008	White Key C4	1
	964-044472-001	Black Key	18
	975-044473-001	Spring No. 7	1
	960-044474-001	Switch Unit No. 6	1
	960-044474-002	Switch Unit No. 7	1
	914-044475-001	Damper 9B	1
	914-044475-002	Damper 8B	1
	906-040298-006	Connector, CIS, 6 Pin, .1 Center	1
	964-045069-001	Cable Assembly, Instrument	1
	910-045017-001	Connector, Cable Plug, Male, 6 Pin, Switchcraft XLR A6M	1
	910-045018-001	Connector, Cable Plug, Female, 6 Pin, Switchcraft XLR AF6	1
	986-041788-001	Cable, 8 Conductor, 2 No. 18AWG, 6 No. 22AWG, Belden 8448	40 Ft.
	910-040316-001	Keying Plug	2
	976-045081-001	Knob, Spring "D", .187 x .156	4
	975-045040-001	Spring, Torsion	1
	913-040345-007	Knob Insert, Blue	4
	913-040345-003	Knob Insert, Yellow	3
	913-040345-002	Knob Insert, Green	5
	913-040345-001	Knob Insert, Red	4
	915-044341-001	Dial, Potentiometer	4
	915-040272-001	Knob, 1/4 Inch Diameter, Slide Potentiometer	16
	915-040837-001	Knob, 1-1/8 Inch Diameter, Skirted	3
	975-045172-001	Spring, Force Sensor	1
	948-045171-001	Opto-interrupter, OPI1102	1
	930-045062-001	Strap Button	1
	997-040585-004	Ribbon Assembly	1
	933-041678-001	Teflon Coated Fiberglass Tape (Ribbon)	1
	978-045031-001	Body, Instrument	1
	935-045063-001	Carrying Case	1
	932-045041-001	Shipping Carton	1
	993-044595-001	Service Manual	1

POWER SUPPLY/INTERFACE FINAL ASSEMBLY SELECTED REPLACEMENT PARTS LIST

A = DOMESTIC MODEL, X = EXPORT MODEL, BLANK = BOTH MODELS

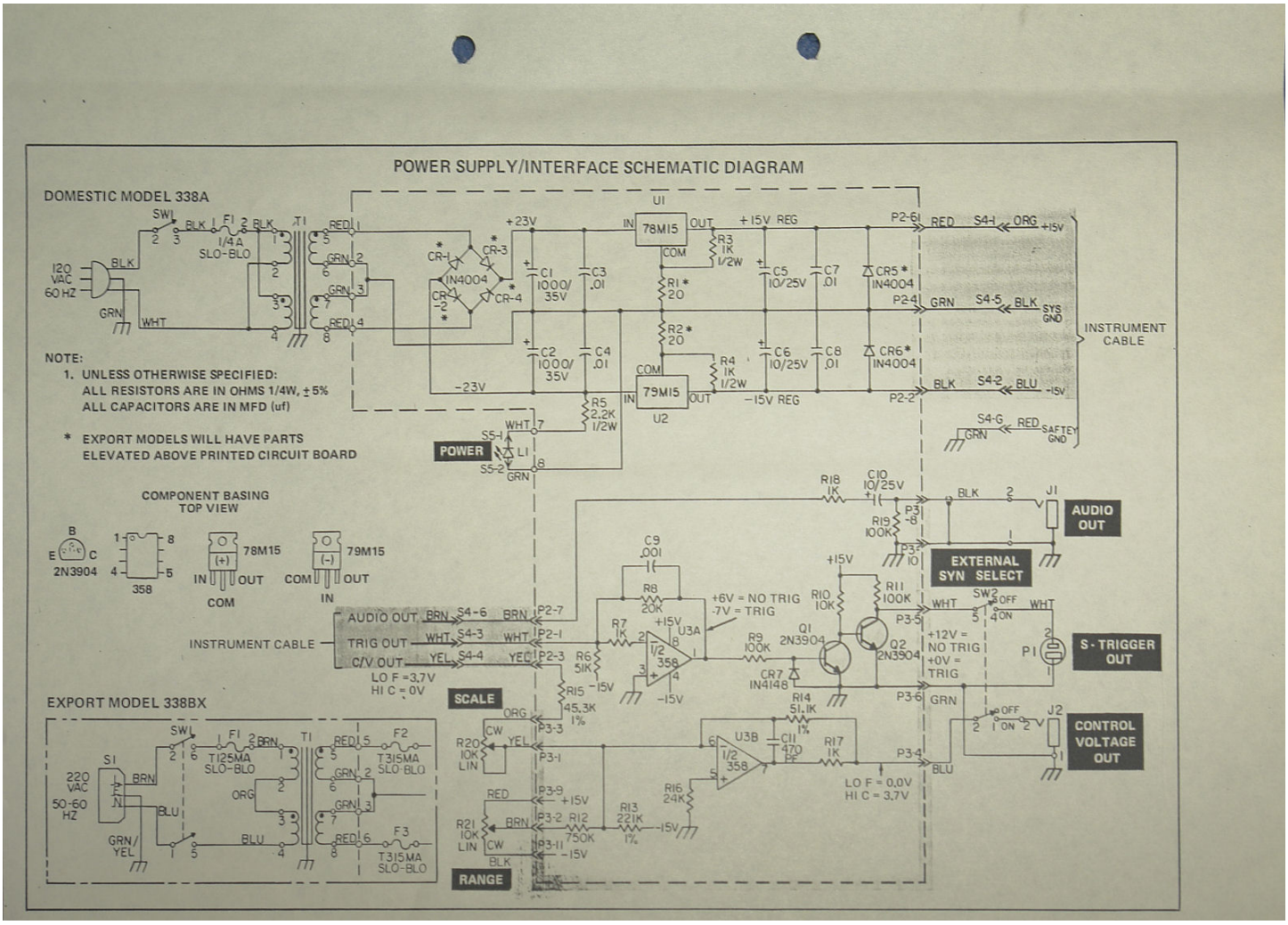
REF DESIG	PART NUMBER	CODE	DESCRIPTION	QTY
F1	939-041620-002	A	Fuse, Slo-Blo, 1/4 A, 3AG	1
F1	939-044094-010	X	Fuse, T125MA, 5MX 20M	1
J1,J2	910-041306-001		Jack, Phone, 1 Circuit, Switchcraft 111	2
L1	939-041850-001		LED, Red, Hi Intensity	1
P1	910-041697-002		Plug, Panel	1
R20,R21	925-045056-001		Potentiometer, Rotary Control, Linear, 10K Ohm	2
S1	910-042913-001	X	Connector, CEE-22 Housing	1
S2	906-040298-007		Connector, CIS, 7 Pin, 1 Center	1
S3	906-040298-011		Connector, CIS, 11 Pin, 1 Center	1
S4	910-045020-001		Connector, XLR, 6 Pin Socket	1
S5	906-040298-002		Connector, CIS, 2 Pin, 1 Center	1
SW1	969-042800-001	X	Switch, Rocker, DPST, 250V, 8A	1
SW1	960-042753-001	A	Switch, Power, SPST, 125V, 15A	1
SW2	969-041311-003		Switch, Rocker, DPDT	1
	906-042911-001	X	Fuse Holder, 5MX 20M	1
	906-041331-006	A	Fuse Holder, Single	1
	915-040837-001		Knob, Skirted	2

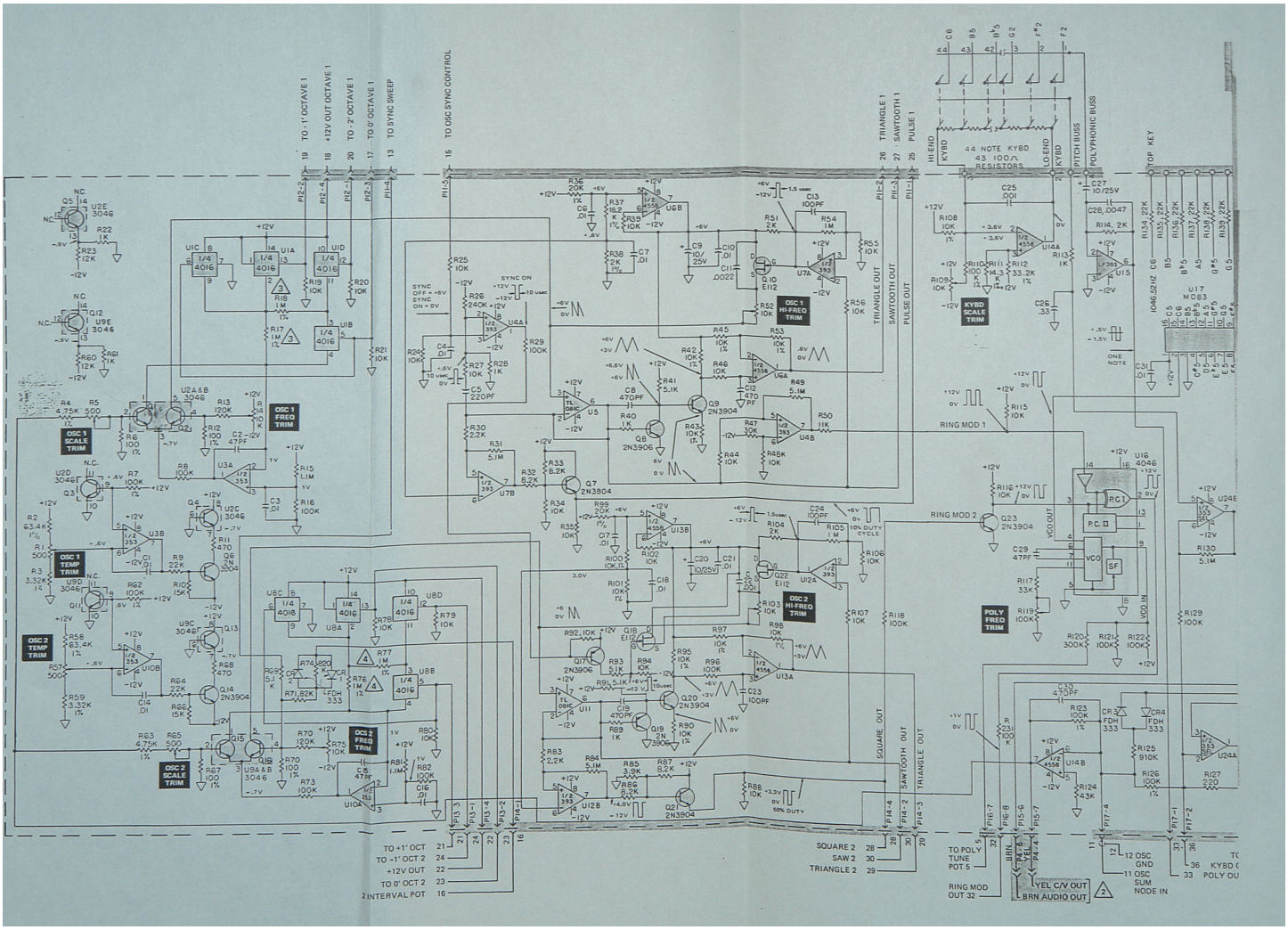
KEYBOARD CIRCUIT PRINTED CIRCUIT BOARD ASSEMBLY SELECTED REPLACEMENT PARTS LIST (PREFIX ALL REFERENCE DESIGNATORS WITH 1000)

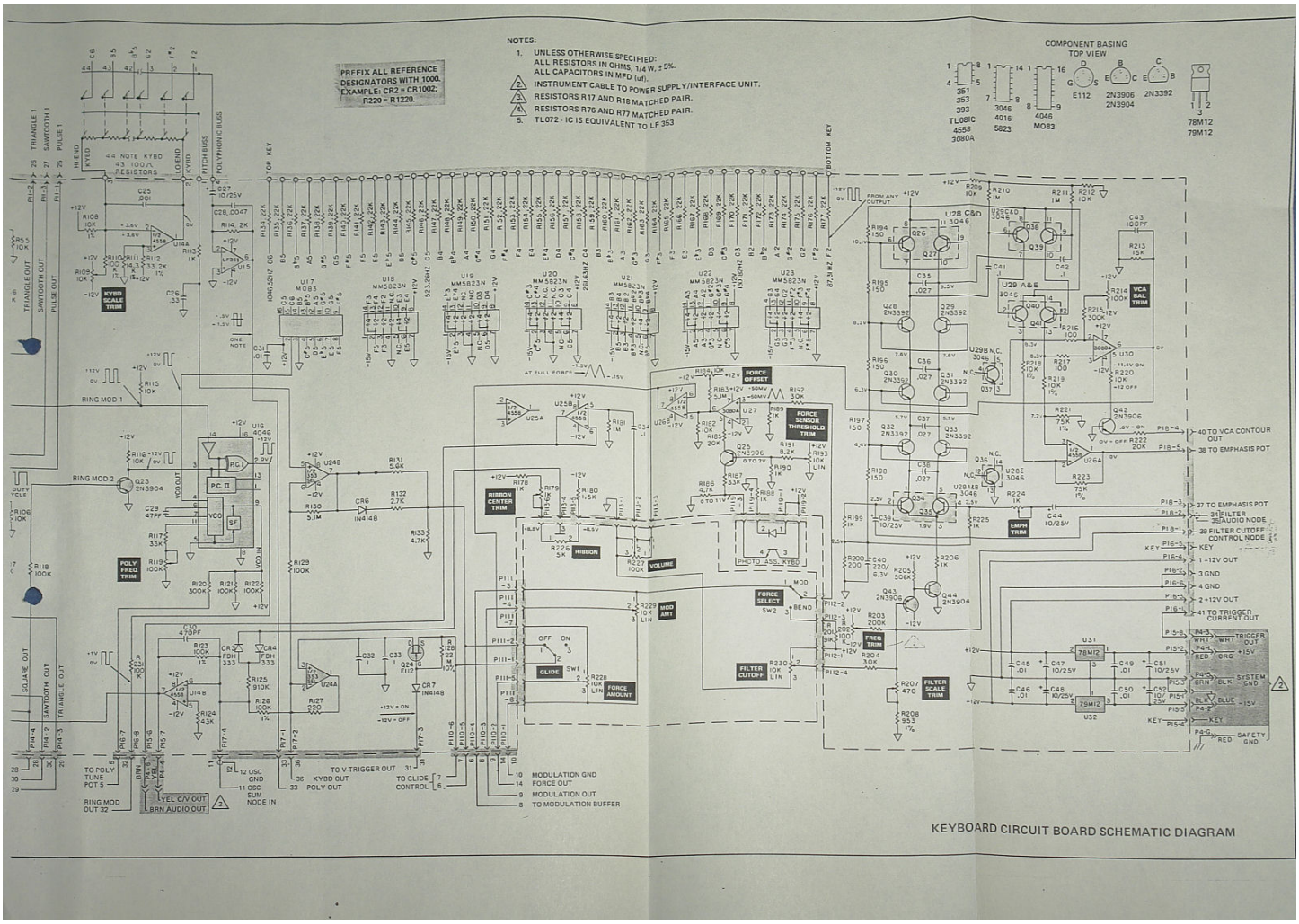
REF DESIG	PART NUMBER	DESCRIPTION	QTY
C9,C20,C27, C39,C44,C47, C48,C51,C52	945-040209-001	Capacitor, Aluminum Electrolytic, 10uf, 25V	9
C49	945-040209-003	Capacitor, Aluminum Electrolytic, 220uf, 6.3V	1
CR1 thru CR4	919-044468-001	Diode, Low Leakage, FDH333	4
CR6,CR7	919-041075-001	Diode, Signal, IN4148	2
Q6,Q7,Q9,Q14, Q20,Q21,Q23, Q24	991-041051-001	Transistor, NPN, 2N3904	8
Q8,Q17,Q19, Q25,Q42,Q43	991-041052-001	Transistor, PNP, 2N3906	6
Q10,Q18,Q22, Q24	991-041055-001	Transistor, FET, N-Channel, E112	4
Q28 thru Q33	991-042617-001	Transistor, NPN, 2N3392	6
R1,R5,R57, R65	925-042389-004	Resistor, Trim,Cermet, 500 Ohm	4
R14,R75,R109	925-042389-002	Resistor, Trim, Cermet, 10K Ohm	3
R52,R103, R184,R193	925-040275-004	Resistor, Trim, Carbon, 10K Ohm	4
R76,R77	949-044333-001	Resistor, Matched Pair, 1 Megohm, 1/4W, ± 1%	2
R119,R202	925-042389-006	Resistor, Trim, Cermet, 100K Ohm	2
R179,R224	925-040275-002	Resistor, Trim, Carbon, 1K Ohm	2
R207	925-040275-011	Resistor, Trim, Carbon, 470 Ohm	1
R214	925-040275-001	Resistor, Trim, Carbon, 100K Ohm	1
U1,U8	991-041087-001	Integrated Circuit, CMOS, Quad Bilateral Switch, 4016	2
U2,U9, U28,U29	991-041104-002	Integrated Circuit, Trans Array, 3046	4
U3,U10	991-042908-001	Integrated Circuit, Dual Operational Amplifier, LF353	2
U4,U7,U12	991-042388-001	Integrated Circuit, Dual Voltage Comparator, 393	3
U5,U11	991-042386-001	Integrated Circuit, Operational Amplifier, TL081C	2
U6,U13,U14, U25,U26	991-041146-001	Integrated Circuit, Dual Operational Amplifier, 4558	5
U15	991-042793-001	Integrated Circuit, Operational Amplifier, LF351	1
U16	991-041091-001	Integrated Circuit, CMOS, Phase Locked Loop, 4046	1
U17	991-041105-002	Integrated Circuit, Top Octave Synthesizer, MO83	1
U18 thru U23	991-042015-001	Integrated Circuit, Digital, 6 Stage Frequency Divider, 5823	6
U24	991-042908-002	Integrated Circuit, Dual Operational Amplifier, Special, LF353	1
U27,U30	991-041089-003	Integrated Circuit, Operational Amplifier, 3080A	2
U31	991-041112-002	Integrated Circuit, +12 Volt Regulator, 78M12	1
U32	991-044316-001	Integrated Circuit, -12 Volt Regulator, 79M12	1
	967-040935-001	Heat Sink	2

CONTROL BOARD PRINTED CIRCUIT BOARD ASSEMBLY SELECTED REPLACEMENT PARTS LIST (PREFIX ALL REFERENCE DESIGNATORS WITH 2000)

REF DESIG	PART NUMBER	DESCRIPTION	QTY
C3	945-040209-014	Capacitor, Aluminum Electrolytic, 2.2uf, 25V	1
C7,C10,C12	945-045049-001	Capacitor, Aluminum Electrolytic, 6.8uf, 16V	3
C11,C16,C17	945-040209-001	Capacitor, Aluminum Electrolytic, 10uf, 25V	3
CR1 thru CR5	919-041075-001	Diode, Signal, IN4148	5
L1,L2	939-041850-004	LED, Red, High Intensity	2
Q1	991-041055-001	Transistor, FET, N-Channel Junction, E112	1
Q2,Q4,Q6,Q8	991-041052-001	Transistor, PNP, 2N3906	4
Q3,Q5,Q7	991-041051-001	Transistor, NPN, 2N3904	3
R1,R2	925-045012-001	Resistor, Rotary, Linear, 10K Ohm	2
R3,R6,R20 R29,R30,R60,	925-045013-005	Resistor, Trim, Slide, 10K Ohm	3
R62,R71,R81	925-045013-001	Resistor, Trim, Slide, 10K Ohm	6
R33	925-045013-003	Resistor, Trim, Slide, 2 Megohm	1
R34	925-045013-004	Resistor, Trim, Slide, 50K Ohm	1
R40,R65,R66, R75,R76	925-045013-002	Resistor, Trim, Slide, 1 Megohm	5
R54	925-045012-001	Resistor, Rotary, Linear, 10K Ohm	1
SW1 thru SW4, SW7,SW8, SW9,SW11	960-045016-001	Switch, Lever, 2P3T	8
SW5,SW6, SW10	960-045015-001	Switch, Lever, 2P2T	3
U1	991-042016-001	Integrated Circuit, Noise Generator, 5837	1
U2,U7	991-041146-001	Integrated Circuit, Dual Operational Amplifier, 4558	2
U3	991-042908-001	Integrated Circuit, Dual Operational Amplifier, LF353	1
U4	991-042388-001	Integrated Circuit, Dual Voltage Comparator, LM393	1
U5,U6	991-041086-001	Integrated Circuit, CMOS, Dual Comparator Pair, Invert, 4007	2
U8	991-041109-001	Integrated Circuit, Dual Timer, 556	1


POWER SUPPLY/INTERFACE SCHEMATIC DIAGRAM
DOMESTIC MODEL 338A
NOTE:
1. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS ARE IN OHMS 1/4W, ± 5%
ALL CAPACITORS ARE IN MFD (uf)
* EXPORT MODELS WILL HAVE PARTS ELEVATED ABOVE PRINTED CIRCUIT BOARD
COMPONENT BASING TOP VIEW
2N3904
358
78M15
79M15
EXPORT MODEL 338BX
INSTRUMENT CABLE
AUDIO OUT
TRIG OUT
C/V OUT
LO F = 3,7V
HI C = 0V
+6V = NO TRIG
-7V = TRIG
+12V = NO TRIG
+0V = TRIG
LO F = 0,0V
HI C = 3,7V
POWER
SCALE
RANGE
AUDIO OUT
EXTERNAL SYN SELECT
S-TRIGGER OUT
CONTROL VOLTAGE OUT
INSTRUMENT CABLE
120 VAC 60 HZ
220 VAC 50-60 HZ
+23V
-23V
+15V REG
-15V REG
SYS GND
SAFTEY GND


TO -1' OCTAVE 1
+12V OUT OCTAVE 1
TO -2' OCTAVE 1
TO 0' OCTAVE 1
TO SYNC SWEEP
TO OSC SYNC CONTROL
TRIANGLE 1
SAWTOOTH 1
PULSE 1
HI-END KYBD
44 NOTE KYBD 43 100Ω RESISTORS
LO-END KYBD
PITCH BUSS
POLYPHONIC BUSS
TOP KEY
OSC 1 SCALE TRIM
OSC 1 FREQ TRIM
OSC 1 HI-FREQ TRIM
OSC 1 TEMP TRIM
OSC 2 TEMP TRIM
OSC 2 SCALE TRIM
OSC 2 FREQ TRIM
OSC 2 HI-FREQ TRIM
KYBD SCALE TRIM
POLY FREQ TRIM
RING MOD 1
RING MOD 2
TRIANGLE OUT
SAWTOOTH OUT
PULSE OUT
SQUARE OUT
SYNC OFF = +6V SYNC ON = 0V
SYNC ON
ONE NOTE
VCO OUT
VCO IN
TO +1' OCT
TO -1' OCT 2
+12V OUT
TO 0' OCT 2
2 INTERVAL POT
SQUARE 2
SAW 2
TRIANGLE 2
TO POLY TUNE POT 5
RING MOD OUT 32
YEL C/V OUT
BRN AUDIO OUT
12 OSC GND
11 OSC SUM NODE IN
KYBD
POLY OU


NOTES:
1. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS IN OHMS, 1/4W, ±5%.
ALL CAPACITORS IN MFD (uf).
2. INSTRUMENT CABLE TO POWER SUPPLY/INTERFACE UNIT.
3. RESISTORS R17 AND R18 MATCHED PAIR.
4. RESISTORS R76 AND R77 MATCHED PAIR.
5. TL072 - IC IS EQUIVALENT TO LF 353
PREFIX ALL REFERENCE DESIGNATORS WITH 1000.
EXAMPLE: CR2 = CR1002; R220 = R1220.
COMPONENT BASING
TOP VIEW
TL081C
4558
3080A
MO83
E112
2N3906
2N3904
2N3392
78M12
79M12
KEYBOARD CIRCUIT BOARD SCHEMATIC DIAGRAM