SEQUENTIAL
Publications Department

TM2000A
December, 1985

MODEL 2000

PROPHET-2000
DIGITAL SAMPLING KEYBOARD
(Including Model 877/878 Memory Expansion)

TECHNICAL MANUAL

by Rick Davies

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Data sheets for the CEM3379 are courtesy of Curtis Electromusic Specialties.

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SECTION 0

THE PROPHET-2000 SYSTEM AND CHASSIS

FUNCTIONAL DESCRIPTION

The following pages describe how the Prophet-2000 operates as a system. The 2000 is divided into three interacting subsystems, which are also broken down into sections by function. Figure 0.1 Abstract Schematic (page 0.3) shows the interconnection of these sections. Often, as in the case of the "decoding circuits," the line dividing one section from another is hazy. This is the result of trading-off technical details against clarity of the general represention. For detailed descriptions of the circuits themselves, refer to the schematics and hardware descriptions mentioned below.

Operating System

Please refer to Figure 0.1 on page 0.3. The function of the 2000's computer is to coordinate all activities. On power-on, -RESET goes low, ensuring that the 2000 always starts from "scratch." The 68B09 CPU operates at 8 MHz, supplied by the crystal oscillator and divider circuits. The CPU communicates with other devices through the Address Buss, the Data Buss, the Q, E, and R/-W signals, and three interrupt lines which notify the CPU of activities requiring immediate attention.

The 68B09 CPU features sixteen address lines for accessing memory. IC size and cost prohibit most of the above circuits from running directly off all sixteen Address lines, so additional address decoding circuits are required to provide the "chip selects" required for any ICs accessed by the CPU.

Generally, these control signals are produced by combining Address lines with the CPU's Q, E, and R/-W lines according to the address and nature of the circuit. All of the decoding circuits are located on PCB2. For details, see Schematic A and U218 hardware description.

As mentioned above, the CPU must sometimes drop everything it is doing to respond to "interrupts" from various circuits. There are four sources of interrupts in the 2000:

The clock divider,

the keyboard processor,

the sample ADC, and

the MIDI UART.

Each of these interrupts may be disabled with corresponding enable/disable control signals depending on the CPU's currrent activity.

Each section of hardware interfacing with the CPU through these signals is described below.

256K ROM (Read Only Memory)
Contains the operating software which determines how the 2000 behaves. Its contents are fixed and may only be altered by replacing U214 itself. The only time the 2000 does not execute instructions in ROM is when diagnostic tests are loaded from disk, in which case the 2000 executes instructions located in RAM (see below). For details, see Schematic A and U214 hardware description.

1K Scratchpad RAM (Random Access Memory)
During normal operation, used for "scratchpad," temporarily storing results of calculations, arpeggiator, stack, and "key handler" data. When power is switched off, all data is lost. Does not contain sample data, unless transmitting data over MIDI (see below). For details, see Schematic A and U212/13 hardware description.

Program Interval Timer
Interacts with the 8 MHz clock to generate accurate timing signals for the Sample Memory (TUNE CLOCK and SAMPLE CLOCK), A-440, and 500kHz for the MIDI UART. Also operates with the Control Panel ADC to read knob settings (see below). To carry out these three independent activities, U216 Program Interval Timer contains a "programmer" section which interfaces with the CPU through the Data Bus, and three gated counter/timer sections which connect directly to each circuit affected. For details, see Schematic A and U216 hardware description.

MIDI UART
Used exclusively for sending and receiving MIDI data. Incoming data is optoisolated, while transmitted data is driven by Q201/02 transistors. For transmitting, data is "stored" at the UART's address like any other memory location. When data is received, the UART generates an interrupt signal which is combined with the sample interrupt (ADCINT, see below), then drives the CPU's -FIRQ input. For details, see schematic A and hardware descriptions for U211 and U215.

Disk Drive
The disk drive used for storing program data (samples, maps, etc.) is accessed in the same manner as other memory devices. The Disk Drive Controller simplifies the hardware --and hence, the number of control signals-- needed in addition to the Data and Address busses. For details, see Schematic B and U205 hardware description.

Keyboard
U206 Keyboard Processor is a computer-on-a-chip dedicated to scanning the 5-octave keyboard. When a key is pressed or released, U206 interrupts the CPU with -KBDINT. The CPU then reads the note information from U206. As the keyboard consists of a switch matrix with two switches per note, delegating the keyboard scanning to U206 saves a great deal of time for the CPU to take care of other activities. For details, see Schematic B and U206 hardware description.

Front Panel

Front panel switches and LEDs (including the 7-segment displays) are arranged in matrices which are strobed one row at a time onto, or from the Data Buss. By strobing the LED matrix, any combination of LEDs can appear to be on at a time.

Analog-to-digital conversion of the four front panel knobs is accomplished with minimal hardware. The potentiometer wiper voltages are multiplexed into one voltage (VOUT) which U105 One-shot converts into a constant-amplitude waveform of varying pulse width. This gates one section of U216 Counter/Timer (see above). U216 times the pulse durations, which the CPU interprets as the digital equivalent of the pot settings.

For details, see schematic on page 1.3.

Sample Input

Audio signals are low-pass filtered for anti-aliasing, then converted to 12-bit digital data by the successive approximation Sample ADC. Conversion occurs at all times, with the ADC generating -ADCINT upon completion of each A/D conversion. Whether or not the CPU is interrupted by this signal is determined by the corresponding enable signal (-ADC INT EN), the status of which is set according to the current operation.

The rate at which data is sampled is determined by SAMPLE CLOCK, generated by the Program Interval Timer (see above). When the CREATE SAMPLE function is used, -ADCINT tells the CPU to read the twelve-bit sample data in the sample ADC's two eight-bit output registers. -LSADC and -MSADC are generated to access each register separately. The sample data is then placed in sample memory (see below). For details, see Schematic E and U306 hardware description.

Sample Memory

The CPU coordinates the input and output of sample data, but delegates the addressing of Sample Memory to custom ICs. (See below.)

Voice Circuits

The CPU calculates control voltages for the analog circuits (including envelopes) which are distributed to the 2000's eight voice circuits. (See below.)

Sample Memory

256K of dynamic RAM is used exclusively for storage of sample data either loaded from disk, or converted from the audio sample input by the sample ADC. The sample memory is addressed by the BA (sample address) lines (buffered RA Bus lines) generated by custom ICs which simplify the CPU's interaction with the sample memory.

The four custom ICs operate similarly, each routing sample data to two of the eight output channels through the DQ (sample data) Bus, one at a time with the Voice Select lines. For details, see Schematic D and U233-36 hardware descriptions.

In addition, U233 alone handles the reading of sample data onto the Data Bus, while U234 handles writing sample data from the Data Bus to sample memory. For details, see Schematic D and hardwaredescriptions for U233-36 and U237-40.

Note that earlier production models clocked the custom ICs with 8 MHz, while later models use 6 MHz clocking for improved performance. For details on modifying earlier units, see UPDATES, page 0.12.

Voice Circuits

Detailed descriptions of the 2000's voice structure are already provided in the Prophet-2000 Operation Manual (CM2000). The voice circuits can be divided into the following sections:

Waveform Generators

Twelve-bit sample data is converted into analog by the eight Voice DACs. To eliminate clock jitter and noise, two sets of latches are used. The first set is updated at the cycle rate of the custom ICs (approximately 92 kHz). The second set is updated at the playback rate. The first set of latches is decoded from the custom IC CHIP ON signals. When sample data is clocked through to the latch outputs, the corresponding Voice Select line clocks this data to the outputs of the second set of latches, to the Voice DAC. The ouput of the Voice DAC is then processed like any other analog signal source.

Analog Processing

Each Voice DAC is followed by a combination VCF/VCA which requires only three control voltages (filter cutoff (VCF), resonance (Res), and voice volume (VCA)). Control voltages are converted from twelve-bit data to analog by the CV DAC, then distributed to the VCF/VCAs. For details, see Schematic F and U315 and U325 hardware descriptions.

Voices 1-4 are summed to produce the LEFT audio output, voices 5-8 to produce the RIGHT output, and both of these are summed for the MONO output.

The divison of the digital and audio circuits in the Prophet-2000 is similar to that in Sequential's previous computer-controlled analog synthesizers. The majority of digital circuitry is located on the Prophet-2000 "2-Board," while all audio circuits are on the "3-board." For information on the physical interconnections inside the 2000, see Figure 0.5 Interconnection Diagram on page 0.9.

MECHANICAL ASSEMBLY/DISASSEMBLY

WARNING! Be sure to disconnect the 2000 power connector before disassembling or reassembling the 2000.

Opening The 2000

Place the 2000 face down on a soft flat surface. Watch out for any surfaces which might scratch the front panel.

Remove the two bottom panel screws (6-32 panhead phillips) which fasten the top panel at both ends of the keyboard. (See figure 0.2 below.)

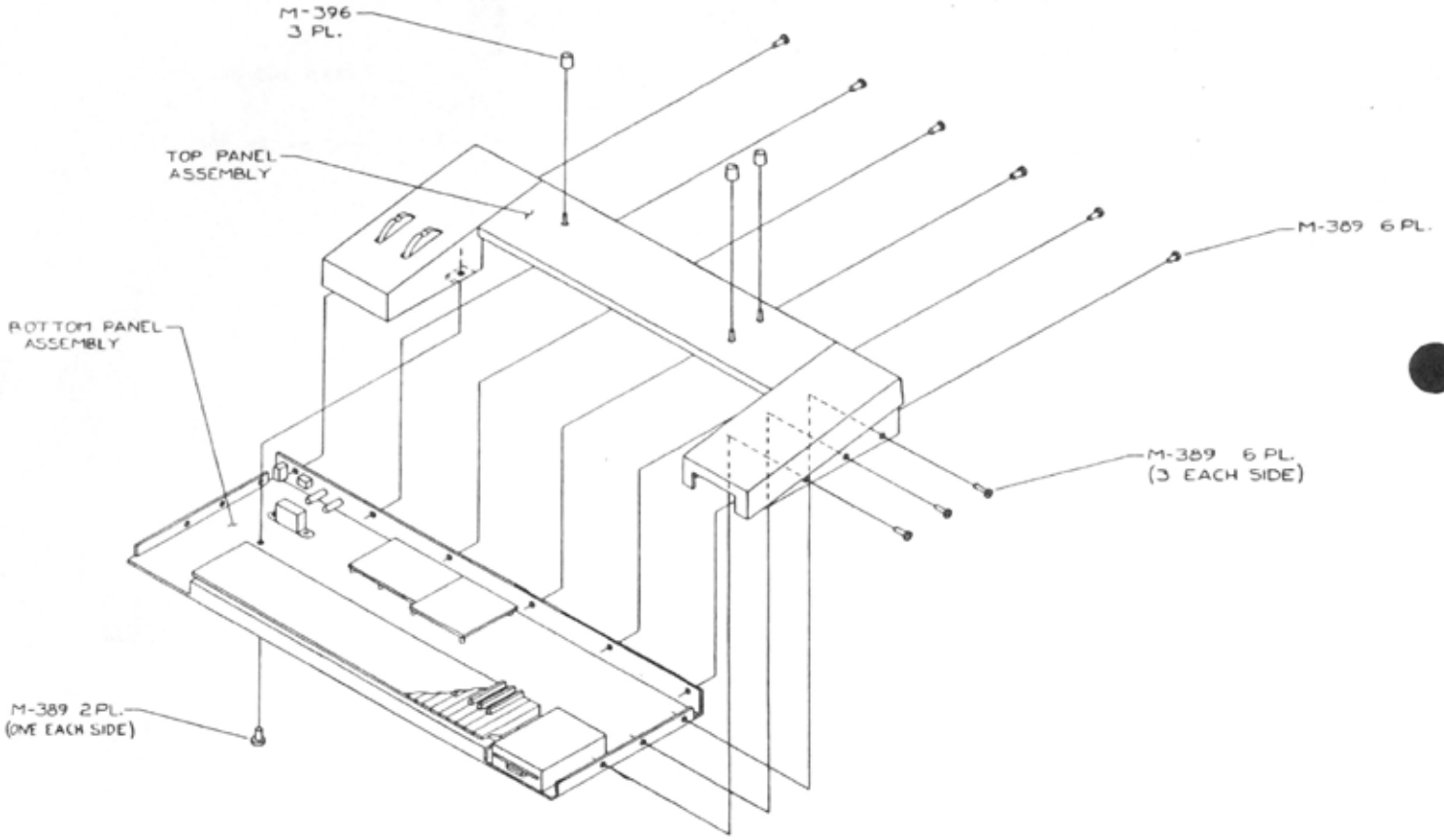


Figure 0.2
POSITION OF BOTTOM PANEL SCREWS

Turn the unit right side up.

Remove the three 6-32 panhead phillips screws from each side of the unit. The top panel can then be opened by lifting the sides.

If the 2000's software is going to be replaced, or if you are going to need access to the computer or output circuits, you will also need to remove the keyboard.

Removing The Keyboard Or Disk Drive

Please refer to Figure 0.3 below. Due to the 2000's dimensions, the keyboard covers a portion of PCBs 2 and 3, which contain the computer and output circuitry respectively. For servicing either of these boards, it may be necessary to remove the keyboard.

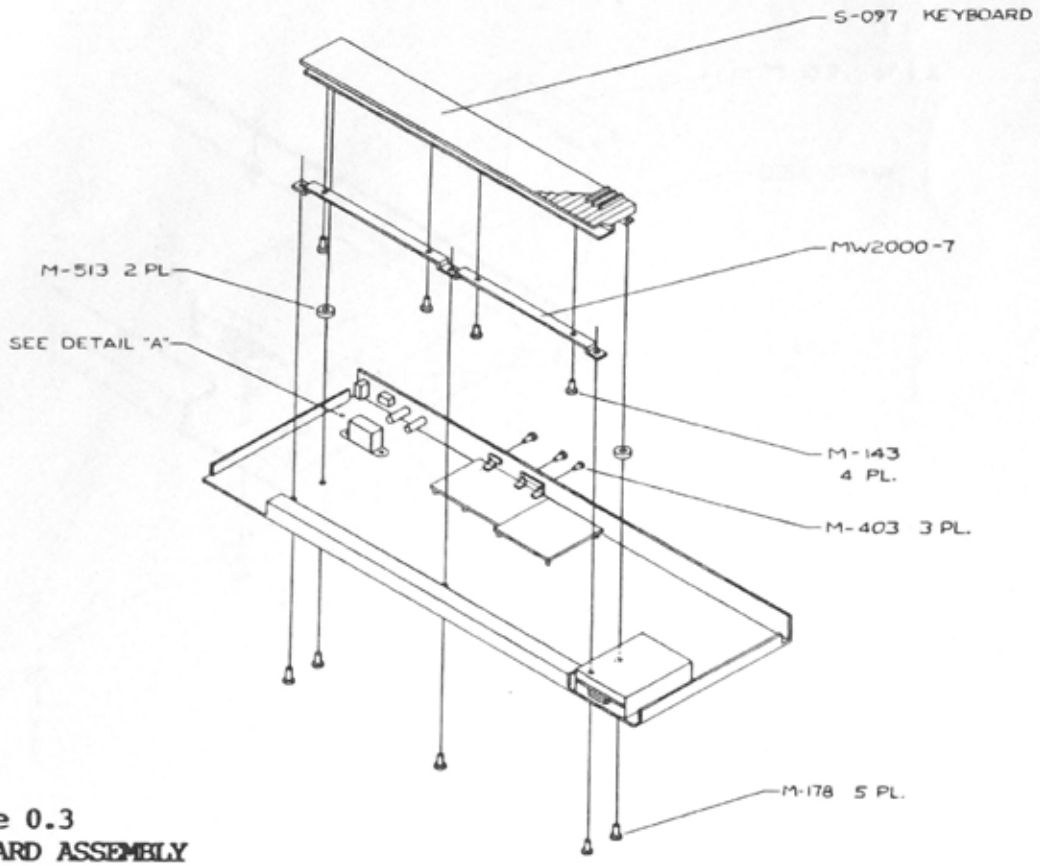


Figure 0.3
KEYBOARD ASSEMBLY

Note: For software change, may only be necessary to remove the two keyboard screws nearest the back panel. This allows the keyboard to be lifted enough to access the EPROM (U214).

Open the 2000 (see above).

Lift the unit up by the front, then remove the front center screw under the keyboard.

Position the unit so that one end hangs over the edge of the bench, then remove the screw holding the front foot under the keyboard and the back silver 8-32 keyboard screw (see Figure 0.3 above). Repeat this procedure for the other end of the 2000.

Slowly lift the left end of the keyboard a few inches, then carefully remove the ribbon cable.

Remove the keyboard from the unit and set it aside.

To remove the disk drive, remove the four screws (see Figure 0.4).

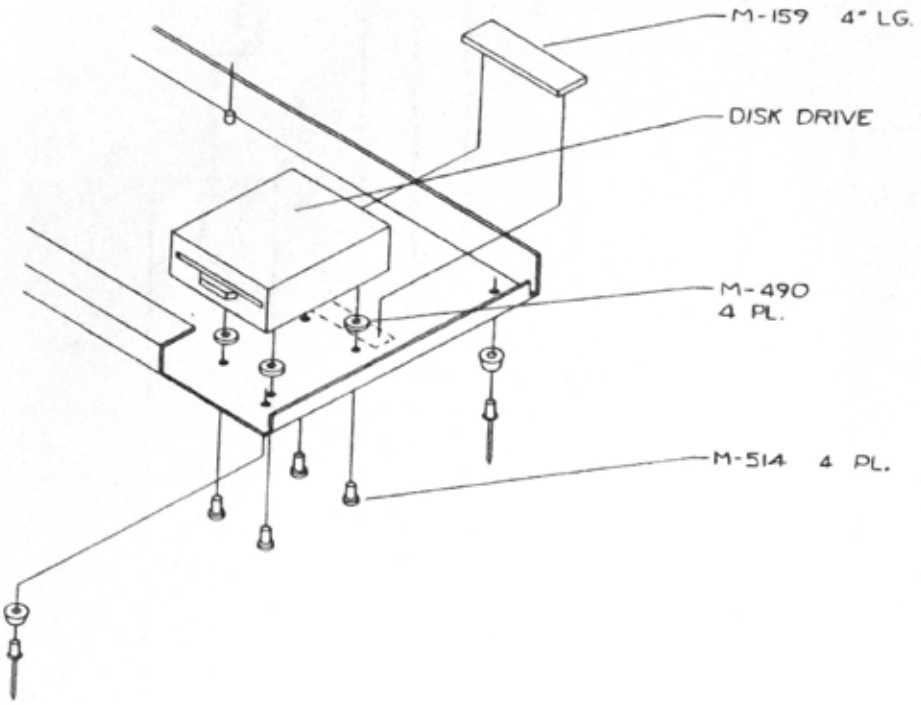


Figure 0.4
POSITION OF DISK DRIVE SCREWS

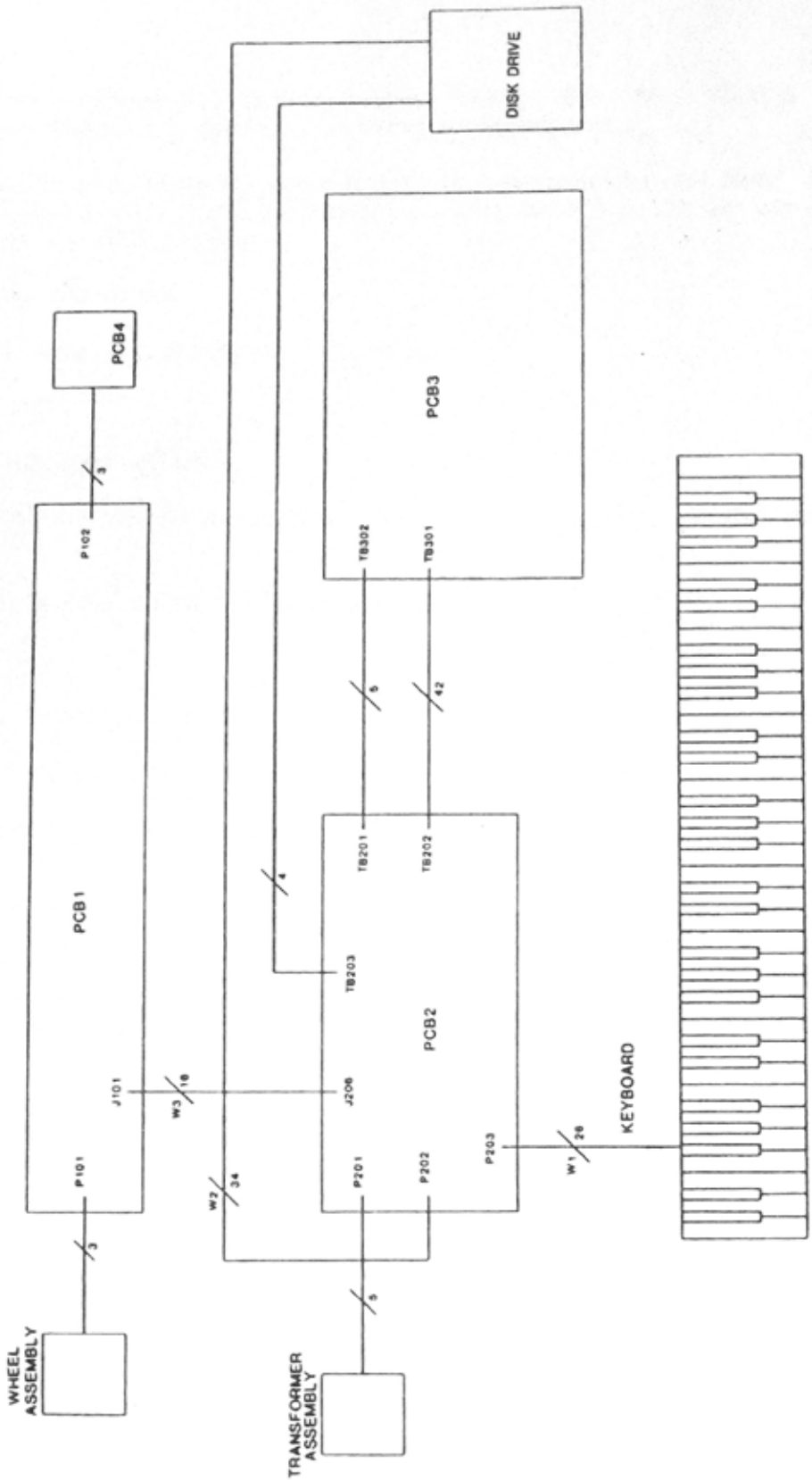


Figure 0.5
INTERCONNECTION DIAGRAM

DIAGNOSTIC TESTS

The Model 879 factory diagnostic disk provides tests for the 2000's hardware. Order the Model 879 through Sequential's service department.

Note: The diagnostics disk must be auto-loaded on power-on in the same manner as sound disks. (If loaded with the LOAD function, the 2000's built-in waveshapes may interfere with test #3 (VCF test).

To load the diagnostics disk:

If necessary, save current memory to disk.

Switch power off.

Plug in the AUX footswitch.

If a second footswitch is available, plug it into the **ALTERNATE RELEASE** input.

Insert the diagnostics disk in the disk drive.

Switch power on.

The disk drive whirrs for several seconds, then the display reads "??" until you select one of the five main diagnostic tests. (Otherwise, the 2000 will periodically strobe through all front panel LEDs.)

To select the desired diagnostic tests, use preset switches 1 through 8, assigned as follows:

KEY	TEST	SEE PAGE
1	Counter/timer test	2.1
2	Keyboard test	2.2
3	Output filter test	3.1
4	DAC test	3.2
5	Sound RAM test	2.2
6	LED test	1.1
7	Switch test	1.2
8	Footswitch test	2.3

Each test may contain several layers of related tests. Each test is described in detail in the section of this manual indicated above.

To exit the diagnostics, switch off 2000, then reload desired sound disk.

Add jumper between U224-1 and U223-3.

In addition to these updates, several modifications are used on rev B boards (and hence rev A also) to improve the instrument's performance. These mods may not be needed in some models, and should be installed if a customer complains. Descriptions of these modifications follow.

1. PCB5 installed in PCB2, replacing U218. U218's circuit is unchanged, but a 6MHz clock circuit is added. A trace is cut on the solder side of PCB2, and the 6MHz clock is hardwired from PCB5 to PCB2 component side. This mod improves the performance of the custom ICs in the sound RAM section (described in Section 2), and is vital for proper operation. A jumper is wired from PCB5 to U236-39 (pin -33). This mod should be installed in all rev A and B PCB2s.

2. R223=2.7k (was 10k).

3. R225 (next to U223) is changed to 100 Ohms, then disconnected from +5V and connected diredtly to pin 11 of U223. (See Figure 0.8 below.) Depending on the serial number of the 2000, R225 may be either 470 or 200 Ohms. (Update UD2000-1 changed R225 to 200.)

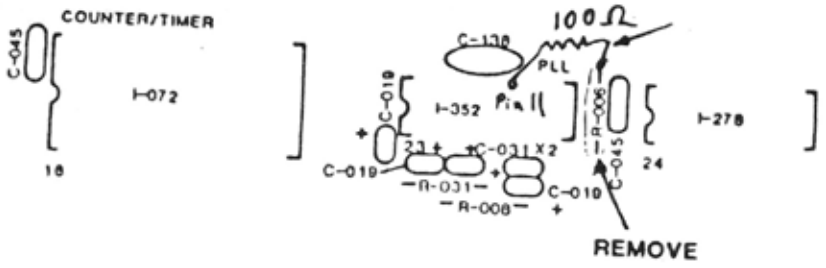


Figure 0.8
MODIFICATION OF U223 CIRCUIT

4. For future expansion, U201-1 should no longer be grounded. This section of U201 is used when using double-sided disk drives. Check solder side of U201 for pin -1 short to ground. If there is a wire creating the short, remove it. If the board is rev B, cut the solder-side trace between pin -1 and ground.

5. Hardwire pin U201-1 to U220-10 on solder-side of PCB2.

PCB3 Voice Board

Current version is rev A. There have been several changes in component values. For location of these updates, refer to PCB3 designator map on page 3.10.

1. Eight resistors in the filter circuits changed from 33.2k to 42.2k. Update kit UD2000-1 covers this mod. Note that this update affects the filtering of samples, and presets may need adjustment. For location of these resistors, see Figure 0.9, below. (Model 876 factory preset disks are intended for operation with updated units, and are supplied with UD2000-1.)

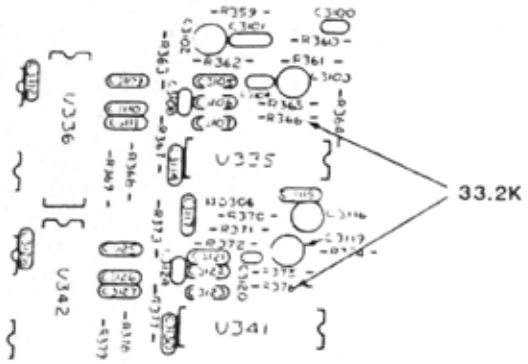


Figure 0.9
LOCATION OF 33.2K RESISTOR RELATIVE TO FILTER IC

2. Other part changes:

C309 is now C-001 (5pF).
U309 is now I-323 (LF356).
U311 is now I-324 (5532).
R320 is now R-112 (15k 1%).

The following are hardware modifications to Rev A PCB3:

1. Pin -7 of U325, U328, and U331 lifted from PCB, then hardwired to U327-11 (-12V). (See Figure 0.10, below.)

2. U377-4 hardwired to -12V as shown in Figure 0.10, below.

3. R3132 disconnected from trace going to U326-9 as shown in Figure 0.10, below.

4. Ground plane cut around C381 (near U384).

PARTS LIST/HARDWARE DESCRIPTION

DESIGNATOR FUNCTION	SEQUENTIAL PART#	DESCRIPTION
	E-019	1/2 AMP Slo-blo fuse
	E-128	SEMCO Fuse holder
	E-129	SEMCO fuse holder cap
	E-189	3 1/2 Disk drive
	E-185	Detachable power cord
	M-016	Large rubber feet
	M-019	1/4" Female faston
	M-020	12 AWG "10 Terminal ring lug
	M-035	6-32 Nuts 1/4" outside diameter
	M-071	6-32 X 1/4" Pan hd phil ms
	M-140	3 1/2" Tie wrap
	M-141	#6 Star washer ext tooth
	M-043	10-32 X 1/2" Pan hd phil ms
	M-150	3/16" Shrink tubing
	M-151	1/4" Shrink tubing
	M-178	10-32 X 3/4" Black pan hd phil
	M-396	Low profile knob/black cap
	M-403	8-32 X 3/8" Black pan hd phil
	M-490	.1" thick felt washer
	M-509	1/8" X 3/8" Alum pop rivet
	M-513	3/4" X 5/16" #10 Spacer
	M-514	3mm X 10mm long, blk pan hd phil
	MW2000-1	2000 Top panel
	MW2000-2	2000 Bottom panel
	MW2000-7	Keyboard bracket
	P-073	SEMCO AC connector
	S-054	240-Volt power switch
	S-062	110/220 Voltage selector
	S-097	5-octave weighted velocity kbrd

SECTION 1

PCB1 AND PCB4
FRONT PANEL

Before working on PCB1, check that the board is updated as described on page 0.11.

DIAGNOSTIC TESTS

The diagnostic disk offers two tests which verify that all LEDs work, and that the computer is correctly reading the front panel switches.

To run these diagnostic tests:

Check that the AUX footswitch is plugged in.

Auto-load (from power-on) the diagnostic disk. (See page 0.11.)

When the display reads "??", press the desired test number.
The tests are numbered as follows:

Switch	Test	Page
1	Counter/Timer Test	2.1
2	Keyboard test	2.2
3	VCF test	3.1
4	DAC test	3.2
5	Sound RAM test	2.2
6	LED test	1.1
7	Switch test	1.2
8	Footswitch test	2.4

Descriptions of tests #6 and #7 follow.

Test #6: LED Test

This test turns on each LED or display segment one at a time.

With the diagnostic "??" prompt, press **6**.
The LEDs light in sequence.

Check that all LEDs light.

To end this test, and return to the "??" prompt, press the AUX footswitch.

Test #7: Switch Test

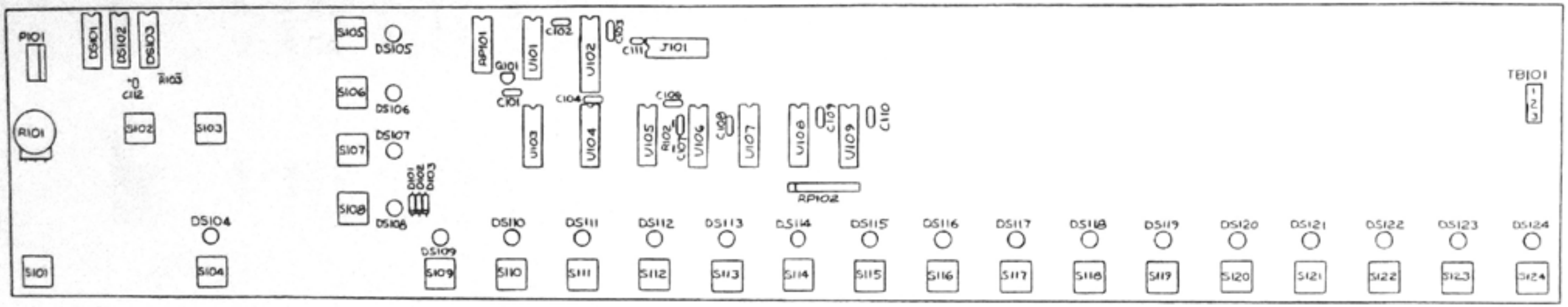
This test displays the name (two-segment abbreviation) of any switch pressed.

With the diagnostic "??" prompt, press 7.
The dissplay goes blank.

Press each switch, then check the display for the correct readout.
Switch names are abbreviated as follows:

Switch	Display
SAMPLE	r1
CONTROL 1	r2
ANALOG	r3
CONTROL 2	r4
PRESETS 1	c1
PRESETS 2	c2
PRESETS 3	c3
PRESETS 4	c4
PRESETS 5	c5
PRESETS 6	c6
PRESETS 7	c7
PRESETS 8	c8
PRESETS 9	c9
PRESETS 10	C0
PRESETS 11	C1
PRESETS 12	C2
STACK	C3
ARP ON/OFF	C4
SAVE	C5
LOAD	C6
EXECUTE	Ec
INC	Su
DEC	Sd
PRESET	PS

To end this test, and return to the "??" prompt, press the AUX footswitch.



NOT USED	LAST USED
C105	C112
	D103
	P101
	Q101
	R103
	S124
	DS124
	RP101

DATE		REVISION	LTR
11-11-85	[illegible]	CHANGE PER ECO #0-361	B
8-21-85		RELEASE PER ECO # 0-336	A

SEQUENTIAL

	APPROVALS	DATE
DWN	[illegible]	7-8-85
CHK		
DSN		
PEN	[illegible]	7/10/85
ISS		

TITLE: DESIGNATOR MAP

MODEL No. 2000

DOCUMENT No. PP2000-1 REV B

SCALE 1/1 SHEET 1 OF 1

HARDWARE DESCRIPTION

DESIGNATOR	FUNCTION	SEQUENTIAL PART#	DESCRIPTION
Z-357	PCB1 Assembly		
C101-04		C-045	.1 50V Decoupler Mono Radial
C105	Not used		
C106		C-046	.0056 100V 10% Mylar Radial
C107-10		C-045	.1 50V Decoupler Mono Radial
C111/12		C-023	47uF 10V 20% Tantalum Radial
D101-03		D-005	1N914
DS101		L-013	/- 1 display
DS102/03		L-009	7-segment display common cathode
DS104-24		L-015	T-1 3/4 High efficiency RED
P101/02		P-098	3-pos rt ang locking molex hdr
Q101		T-002	NPN Transistor 2N3904
R101		R-235	10k Nylon shaft
R102		R-512	2.0k 1/4W 1%
R103		R-043	47 1/4W 5%
RP101		R-316	100 X 8 Resistor network
RP102		R-309	22K X 9 SIP 10%
S101-24		S-089	OMRON Key switch
	Caps for S101-24	S-093	OMRON Grey switch cap
U101		T-011	Transistor pack CA3082
U102		I-235	MC1413 (2003)
U103		I-260	74HC374
U104		I-513	74HC174
U105		I-270	74LS221 Oneshot X 2
U106		I-211	4051 8-in Analog Mux
U107		I-513	74HC174
U108/09		I-216	4503 Hex 3-state buffer
	Connector to PCB2	E-075	11" 16-pin ribbon cable
		J-027	14-pin DIP socket
		M-370	Greaseless insulator
		PC2000-1	2000 1 Board

DESIGNATOR	FUNCTION	SEQUENTIAL PART#	DESCRIPTION
Z-354	**PCB4 Volume/Balance Board Assembly**		
R401/02	MASTER VOLUME and BALANCE pots	R-235	10k Nylon shaft
		P-049	Socket pins
		P-050	3-position locking
		PC2000-4	2000 4 board
Z-355	**Wheel Assembly**		
R1/2	PITCH and MOD wheels	R-247	100k potentiometer
		E-053	22 AWG Stranded yellow
		E-061	22 AWG Stranded light blue
		E-062	22 AWG Stranded green
		J-050	3-pin housing
		M-024	6-32 X 3/8" pan hd phil
		M-159	Black foam tape
		M-510	.385 ID X 1.00 Torsion spring
		M-511	Retainer ring
		MW0000-3	MOD Wheel brace
		MW0000-4	MOD Wheel bracket
		P-049	Socket pins
		PW0000-2	Spring return MOD wheel

SECTION 2

PCB2 AND PCB 5
COMPUTER

Before trooubleshooting PCB2, check that the board is updated as described on page 0.12.

DIAGNOSTIC TESTS

The diagnostics disk offers three tests which test the computer system counter circuits, the keyboard, sound RAM, and the footswitch inputs.

To run these diagnostic tests:

Check that the AUX footswitch is plugged in.

Turn the monitor system volume down. (The 2000's VOLUME control is bypassed during the diagnostics.)

Auto-load (from power-on) the diagnostic disk. (See page 0.10)

When the display reads "??", press the **PRESETS** switch corrresponding to the desired test.

The tests are numbered as follows:

Switch	TEST	See Page
1	Counter/Timer	2.1
2	Keyboard test	2.2
3	Output Filter	3.1
4	DAC (three tests)	3.2
5	Sound RAM	2.2
6	LED test	1.1
7	Switch test	1.2
8	Footswitch test	2.4

Descriptions of tests #1, #2, #5, and #8 follow.

Test #1: Counter/Timer Test

This test verifies proper operation of the 8254 counter's registers.

With the diagnostic "??" prompt displayed, press **1**.

The display blanks.

If all sections of the counter (there are three) test OK, the display reads "Gd". If any of the sections fails the test, the display reads "Cn" (n is the number of the section which failed).

The display then reads " x", where x is the type of test failure. If "1" or "2" is displayed, chances are that the counter chip needs to be replaced. If "3" is displayed, one of the counter chips inputs or outputs may be shorted.

To end this test, and return to the "??" prompt, press the AUX footswitch.

Test #2: Keyboard Test

This test displays the name of any key played.

With the "??" prompt displayed, press 2.
The display reads "--".

Play the keyboard, checking for the correct display for each key.
Sharps are indicated by a "+". The **PRESET** LEDs indicate the key velocity.

To end this test, and return to the "??" prompt, press the AUX footswitch.

Test #5: Sample RAM Test

There are two sets of two tests for the sample RAM. The first set of tests check the standard 256K of sample RAM. The second set of tests check expansion RAM (only if installed, see Section 4). All tests run similarly, and give the same indications.

To select the sample RAM tests:

With the "??" prompt displayed, press **5**.
The display reads "rt", meaning that the CPU is writing data to sample memory.

Press **1**.
The display reads "1" as the CPU writes a data pattern into sample RAM. The display then reads "r" as the CPU reads sample RAM, making sure that the pattern was stored. If the RAM passes the test, the display reads "Gd" for a moment, then "rt".

If the RAM fails the test, the A-440 tone turns on, and the **PRESET** LEDs display the bits (1-12) which failed the test, while the seven-segment display shows the number of the first failed IC (for example "47").

Press **2**.
The display reads "2" as the CPU writes a complimentary pattern to RAM (1's and 0's reversed). Test results are displayed in the same manner as test 1.

If expansion RAM is installed, select sample RAM tests #3 and #4 with the **3** and **4** switches. These tests are similar to tests #1 and #2, respectively.

To exit these tests, and return to the "??" prompt, press the **AUX** footswitch.

Test #8: Footswitch Test

This test verifies opration of the two footswitch inputs.

With the "??" prompt displayed, press **8**.
PRESETS 1 and **2** LIGHT.

Press the AUX footswitch.
The **PRESET 1** LED turns off.

Press the ALTERNATE RELEASE footswitch.
The **PRESET 2** LED turns off.

To exit this test, and return to the "??" prompt, press the **LOAD** switch.

PARTS LIST/HARDWARE DESCRIPTION

DESIGNATOR	FUNCTION	SEQUENTIAL PART#	DESCRIPTION
Z-358	PCB2 Assembly		
C201-08		C-045	.1 50V Decoupler mono radial
C209		C-051	2.2 16V 20% Tantalum radial
C210-26		C-109	4700uF 16V Elect radial
C227		C-138	15pF 5% 20V Mica
C228/29		C-019	.47 35V 20% Tantalum radial
C230/31		C-031	10 10V 20% Tant radial
C232		C-045	.1 50V Decoupler mono radial
C233		C-021	2.2 25V 20% Tantalum radial
C234/35		C-051	2.2 16V 20% Tantalum radial
C236-38		C-021	2.2 25V 20% Tantalum radial
C239-43		C-045	.1 50V Decoupler mono radial
C244-55		C-121	.33uF 50V 20% Mono radial
C256		C-019	.47 35V 20% Tantalum radial
D201/02		D-004	1N5401 100V 3AMP
D203-06		D-001	1N4002 110V 1AMP
D207		D-008	1N34
D208		D-005	1N914
F1			Slo-blo fuse
J201/02	Footswitch Inputs	J-100	1/4" Mono phone jack low
J203-05	MIDI Jacks	J-087	5-pin rt angle PC-mnt DIN conn
P201	Power	P-069	5-pin locking
P202	Floppy Drive Connector	P-077	34-pin dbl row header
P203	Keyboard Connector	P-090	26-pin dbl row .1" header
P205	Expansion Board Header	P-095	30-pin dbl row header
Q201/02		T-003	2N4250 PNP Transistor
R201/02		R-025	100k 1/4W 5%
R203/04		R-012	10k 1/4W 5%
R205/06		R-012	10k 1/4W 5%
R207/08		R-012	10k 1/4W 5%
R209		R-029	1M 1/4W 5%
R210/11		R-040	22k 1/4W 5%
R212/13		R-010	2k 1/4W 5%
R214/15		R-402	150 1/4W 5%
R216		R-403	270 1/4W 5%
R217		R-025	100k 1/4W 5%
R218-20		R-402	150 1/4W 5%
R221		R-010	2k 1/4W 5%
R222		R-011	4.7k 1/4W 5%
R223		R-012	10k 1/4W 5%
R224		R-008	1k 1/4W 5%
R225		R-068	100 1/4W 5%
RP201		R-312	150 X 7 SIP network