

Service Manual

MRC
MIDI
Remote
Controller

lexicon

INSTRUCTIONS FOR INITIALIZING MRC V3.01 SOFTWARE UPDATE

After installing V3.01 software power up the unit while pressing the button above the leftmost slider. There will be six Power Up diagnostic tests.

- uP TEST
- ROM CHECKSUM
- RAM TEST
- DUART TEST
- PWR SUPPLY TEST
- BATTERY TEST

These six tests are performed sequentially. Each test name will appear on the display while the test is running. When the test is completed, "PASSED" or "FAILED" will appear briefly to indicate the test result.

After these tests are completed the display will read:

- MRC diagnostics 1-8
- 1 KBD Test

Press button 4 and the display will read:

- MRC diagnostics 1-8
- 4 Init Memory

Press ENTER and this will load presets and initialize system.

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Precautions

The MRC is a rugged device with extensive electronic protection. However, you should observe the same reasonable precautions that apply to any piece of electronic equipment:

- Always use the correct line voltage and power pack.
- Don't install the MRC in a closed, unventilated rack, or directly above heat-producing equipment such as power amplifiers.
- To prevent fire or shock hazard, do not expose the MRC to rain or moisture.

FCC Notice

Class A Computing Device

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J, Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference, in which case the user at his/her own expense will be required to take whatever measures are needed to correct the interference.

The Federal Communications has prepared a booklet which you may find useful:

"How to Identify and Resolve Radio-TV Interference Problems"

This booklet is available from the US Government Printing Office, Washington, DC 20402, Stock No. 004-000-0345-4.

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100 Beaver Street
Waltham, MA 02154 USA
617/891-6790
Telex 923 468

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MRC
Service Manual
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1

Controls
and
Connectors

Introduction

The MRC is a software defineable, remote controller and programmer for signal processors, synthesizers, and all MIDI equipment. It is designed to serve as a flexible control center for many sound production environments.

The MRC provides four basic operating modes. Two of these provide special control for Lexicon's LXP-1 Multi-Effects Processing Module and PCM-70 Digital Effects Processor; one provides unique "macro" control of FM synthesizers; one allows full access to standard MIDI program change and controller messages on virtually any piece of MIDI equipment.

By selecting the target device to be controlled, the user is able to send MIDI System Exclusive messages, controller data, and specially developed FM synthesizer programming commands.

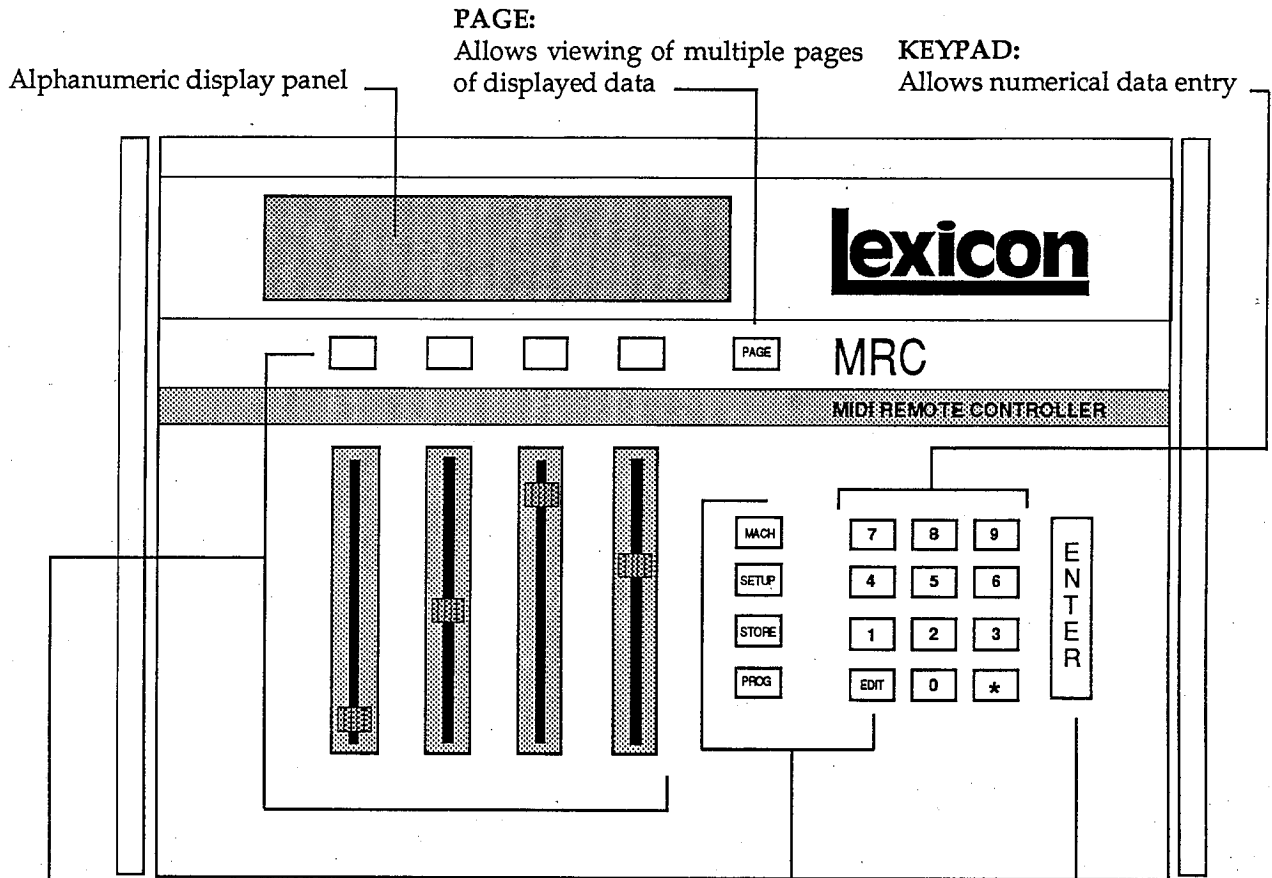
Target devices selected for MRC control are defined as MACHINES belonging to one of four categories of MACHINE TYPE: LXP-1, PCM-70, DXTX6, or GMIDI.

The LXP-1 and PCM-70 categories provide expanded control of the Lexicon LXP-1 Multi-Effects Processing Module and PCM-70 Digital Effects Processor through System Exclusive MIDI messages. The DXTX6 designation specifies control of any 6 operator FM synthesizer. The GMIDI (Generic MIDI) classification allows control of *any* device capable of responding to standard MIDI messages.

For any machine selected, the MRC behaves as a dedicated remote controller for that device. Therefore, many of the MRC's controls are soft-assignable, i. e. the user's selection of a MACHINE TYPE will activate a unique set of parameters appropriate to control of that machine. These parameter values can be modified, labeled and stored as SETUPS.

This section presents an overview of the MRC controls common to *all* modes of operation, as well as a description of the basic display configuration and the available commands. More detailed information on specific MRC operating modes is presented in the MRC Owner's Manual.

Front Panel



SLIDERS and SLIDER BUTTONS:
Referred to by numbers: 1, 2, 3, 4, reading left to right, these allow control over various parameters, depending on current mode of operation.

MACH/ SETUP/STORE/ PROG/ EDIT:
Pushbutton commands to access the MRC's machine configuration, setup, and storage routines and MIDI program change.

ENTER:
Executes the current operation.

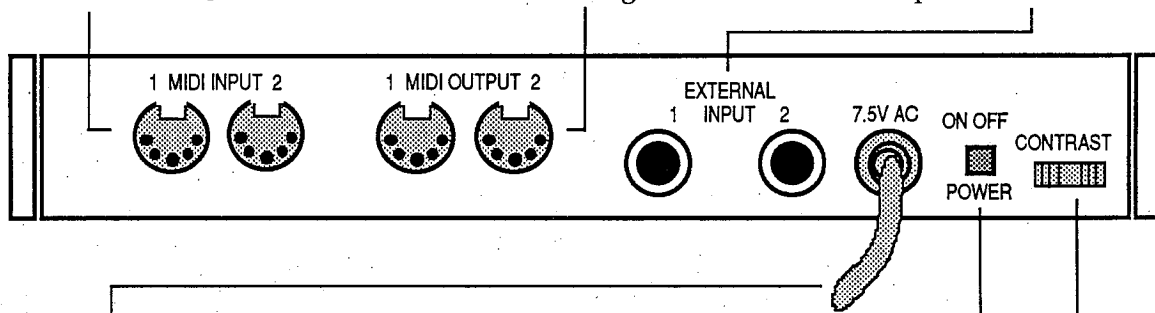
Rear Panel

MIDI Connections

Inputs 1 and 2:
will accept any standard 5 pin DIN
MIDI cable for receiving MIDI IN.

Outputs 1 and 2:
will accept any standard 5 pin DIN
MIDI cable for sending MIDI OUT.

Inputs 1 and 2
Tip-ring-sleeve 1/4" phone jack
inputs for switch or potentiometer
external pedals or other controllers.



7.5V/AC
Power jack: For attachment of the
MRC power pack; connect power
pack to AC outlet.

The MRC must be used *only* with
its supplied power pack. (Voltage
requirements are printed on the
power pack.)

POWER
System On/Off. Data entered in the
MRC is preserved during Power
OFF. The MRC will power ON to
the last target device selected.

CONTRAST
Dial for adjustment of display
viewing angle and contrast.

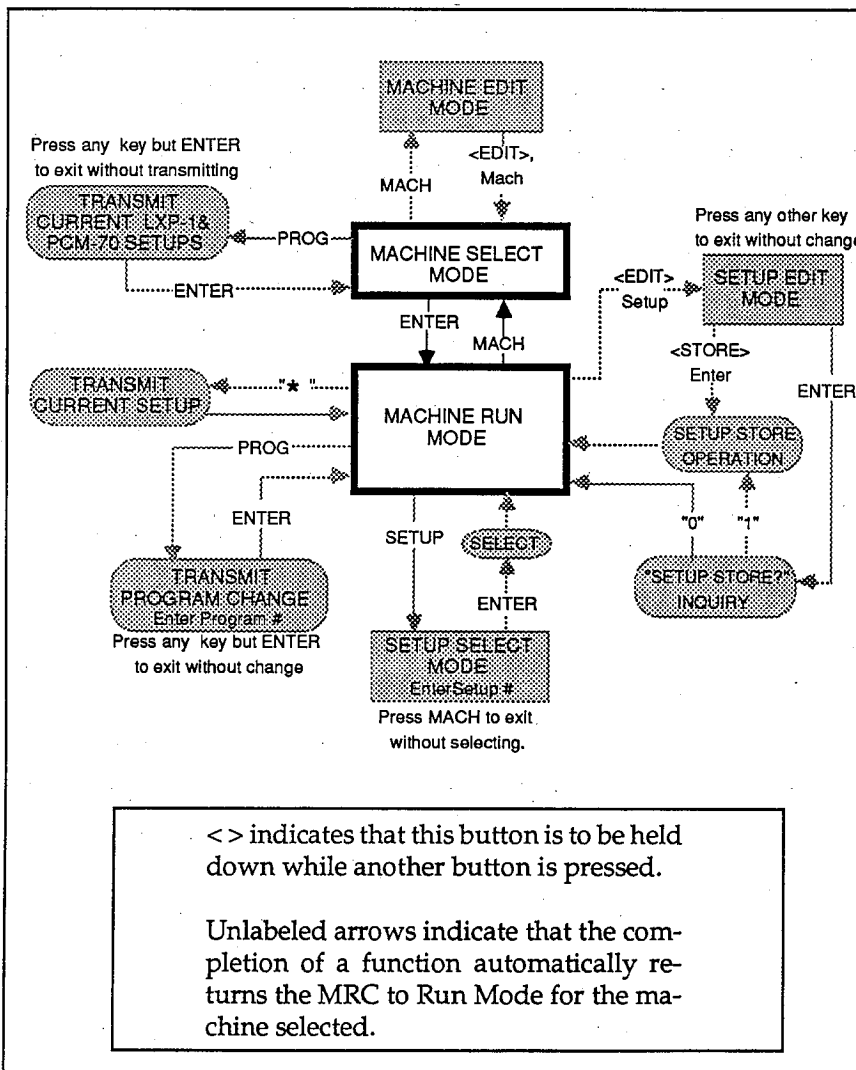
Operating the MRC

The MRC has two primary modes of operation:

- MACHINE SELECT MODE: from which all of the MRC's Machine editing functions can be accessed, and
- MACHINE RUN MODE: from which all of the MRC's setups can be selected, edited and stored.

To enable you to find your way through the system, the following diagram provides an overview of the available commands. The commands necessary to perform specific testing of the unit are detailed where needed in the Performance Verification section of this manual; this diagram is intended as an introductory reference to basic MRC operations.

The MRC, when first powered on, comes up in Machine Select Mode. Note that you can always return to this mode simply by turning the MRC off and then on again.



Display Commands

Display Definitions

When first powered on, the MRC will be in Machine Select Mode, The display in this mode is configured as shown:

MACH #	(mtype)	SETUP #
CH#	OUT#	(algorithm)

- MACH#** The MRC provides direct control for as many as ten devices capable of receiving MIDI messages. For selection purposes, each device is referred to as a MACHINE and assigned a number (1-10).
- (mtype)** LXP-1, PCM-70, DXTX6 or GMIDI
- SETUP** A Setup contains initial parameter values and labeling information for a particular machine type. When the MRC is first powered on, these setups will contain mid-range parameter values which have been specified by Lexicon. These setups have been entered as a convenient starting points only; they are not permanent default settings. Any adjustments you make to these setups in the course of configuring your system can be stored in their place. Each machine type has a fixed number of setups available: the LXP-1 and PCM-70 each have 32 setups available; there are 10 setups available for the GMIDI category. Because the MRC acts as a "programmer" for FM synthesizers, and sounds created in the DXTX6 mode of operation can be stored at the synthesizer, setups are not available in this mode.
- CH#** MIDI channels 1-16 are available for User assignment.
- OUT#** Two output ports are available (1-2).
Machines specified as DXTX6 must be assigned to Output 1.
- (algorithm)** This portion of the display is reserved for reference once a machine type has been selected.

Slider Functions

In Machine Select Mode, Slider 1 will scroll through the entire list of ten machines, enabling you to scan the selection of machines in your system as they have been designated. Pressing any of the keypad numbers 0-9 will call up the display for the machine assigned to that number. (0 on the keypad corresponds to number 10.) Pressing MACH allows you to step through the same list sequentially.

In this mode, Sliders 2, 3 and 4 are inactive.

Exit From Machine Select Mode the User can enter either the Machine Edit Mode, to define or alter the definition of any machine displayed (Hold EDIT and press MACH) or the Machine Run Mode for any machine currently displayed (Press ENTER.)

To enter the MRC Diagnostics Mode, turn Power off, then follow the Power Up instructions presented in Section 2. Performance Verification.

2

Performance
Verification

Performance Verification

Periodic Maintenance

Under normal conditions the MRC requires minimal maintenance. Use a soft cloth lightly dampened in warm water and a mild detergent to clean exterior surfaces. Do not use alcohol, benzene, or acetone-based cleaners and avoid the use of abrasive materials such as steel wool or metal polish. If exposed to a dusty environment, a vacuum or *low-pressure* blower may be used to remove dust from the unit's surface.

Visual Inspection

1. Inspect the unit for any obvious signs of physical damage. Verify that all sliders, pots and pushbuttons operate properly.
2. Verify that all screws and hex nuts are secure .
3. The supplied power transformer should be rated at 7.5 VAC @ 1A with the proper 5mm/ 2.5mm barrel connector attached.

Initial Power Up

1. Connect the AC power transformer to the unit , insert into a 117 VAC wall socket and depress the Power button located on rear panel. Verify the following:
 - a. The display screen lights up
 - b. Adjusting the rear panel Contrast Control pot results in display character contrast variations. The minimum setting should display no characters; an acceptable contrast level should be reached as the setting is increased towards maximum.
 - c. When the unit is powered on, the Machine Select display should appear. This display is identified by the characters "MACH #" in the upper left corner. The remainder of the displayed data will depend on the actual machine selected. Machine specific data appears in parentheses in the example below.

MACH # (NN)	(Machine type)
(CH/OUT# or Set-up)	(ALG:TYPEor LABEL)

NN refers to a specific machine number (1-10). Slider 1 (the left most slider) should vary the displayed values of NN from 1 (at the bottom) to 10 (at the top).

Power Supply / Clock measurements

1. Set Variac to 117 VAC. Use DMM to measure VDC and measure the following points:

	Location Power/Ground	Measurement
Regulated +5 Volt :	U117pin 3 /pin 2	+5 VDC \pm 5% (4.75-5.25VDC)
Unregulated +5 Volt	U117 pin 1 /pin 2	9.2 VDC \pm 10% (8.2-10.2VDC)
3 V battery	3 V BAT +/-	2.8 to 3.4 VDC

Equipment Required

DMM
Variac
Frequency Counter
(optional)
50 MHz Oscilloscope
w/ X10 probe

2. Connect Oscilloscope to U113 pin 7.

- a. With a 117VAC input, verify that level on U113 pin 7 is logical hi (+5V).
- b. Slowly reduce AC input. U113 pin 7 should change to a logical low (0V) as AC input level passes in the range of 92 to 78 VAC.

3. Measure the frequency at the following point:

	Location	Measurement
Z80-CPU	U101 pin 6	4 MHz (\pm 0.1%)

To enter Diagnostic Mode, apply power to the MRC while pressing the button above the leftmost slider.

There are two different sets of diagnostic tests are run by the MRC in Diagnostic Mode:

Power Up diagnostics (run automatically upon power up in Diagnostic Mode)

Numbered Diagnostics (selected by number via the numeric keypad and executed on pressing ENTER)

There are four Power Up diagnostic tests.

ROM CHECKSUM
RAM TEST
uP TEST
PWR SUPPLY TEST

These four tests are performed sequentially. Each test name will appear on the display while that test is running. When the test is completed, "PASSED" or "FAILED" will appear briefly to indicate the test result.

Diagnostics

Power Up Diagnostic Tests

- ROM CHECKSUM TEST** This is the first test run on power up in Diagnostic Mode. It examines the checksum of the program ROM and compares it with a value stored in ROM. If these two values are equal "PASSED" will appear momentarily on the display. "FAILED" indicates possible program ROM damage.
- RAM TEST** This test exercises a portion of the SRAM used by the microprocessor. "FAILED" indicates a possible fault in the SRAM circuitry.
- uP TEST** This test exercises various microprocessor functions and internal registers. "FAILED" indicates possible failure of the Z80 microprocessor.
- PWR TEST** This test utilizes one channel of the 8-channel A/D converter IC to measure the +5 V power level. If this level is unacceptably low, "FAILED" will be displayed. "PASSED" indicates that the supply level is acceptable.

Numbered Diagnostic Tests

Upon completion of the last Power Up diagnostic test, the MRC automatically enters the Numbered Diagnostic test mode. Upon entering this mode the MRC will display:

MRC diagnostics 1 - 9

(1 KBD test *)

* The number and label in parentheses depends on the specific test selected. (Parentheses are not displayed.)

Numbers 1-7 on the numeric keypad allow selection of any of the numbered tests listed below. Pressing ENTER will execute the test currently displayed.

Test number	Test name
1	KBD TEST
2	PORT TEST
3	LCD TEST
4	INIT MEMORY
5	DOG TEST
6	QUIT
7	ADC TEST
8	Not assigned
9	Not assigned

The Keyboard test is selected by default upon completion of the Power Up diagnostic tests. It can also be selected by pressing "1" on the numeric keypad. To execute this test press ENTER. The display will appear as shown below:

1 KBD TEST

KBD test

The operator must press *every* button on the keyboard (PROG, STORE, SETUP, MACH, PAGE, all of the buttons on the keypad, and the four buttons located above Sliders 1-4.) If all buttons have been pressed and are operating properly, the MRC will return to Diagnostic Test Select mode. If any of the keys are faulty OR if all keys have not been pressed, the MRC will remain in KBD TEST until

- a) all keys are recognized as having been pressed at least once,
or
- b) the unit is powered down, then powered up again.

Connect MIDI cables from MRC MIDI Out 1 to MRC MIDI In 1, and from MIDI Out 2 to MIDI In 2.

**2 PORT TEST
(2 MIDI Cables Required)**

When ENTER is pressed, the display will show:

p1 PASSED

p2 PASSED

"FAILED" displayed next to either P1 or P2 indicates a fault in the MIDI I/O circuitry, or indicates that cables are not connected. Press ENTER to exit.

WARNING:

**Remove MIDI cables upon completion of this test.
SYSTEM CAN CRASH IF OPERATED WITH A MIDI IN/OUT
CONNECTION.**

3 LCD TEST When ENTER is pressed, all pixels on the display will be turned on for approximately 2 seconds to verify that they are all functional. After the 2 second duration The MRC will return automatically to Diagnostic Test Select mode following this display.

4 INIT MEMORY

4 INIT MEM TEST **CAUTION: THIS TEST WILL DESTROY ALL FACTORY PRESETS AND ANY USER-STORED SETUPS WHICH EXIST IN MEMORY.**

This operation initializes the non-volatile SRAM. All labels, parameter values and machine assignments will be returned to factory presets. Upon completion of this operation, the MRC will exit Diagnostic Test mode and enter Machine Select mode. To re-enter Diagnostic Test mode, the operator must power down , then power up again with the left-most slider button pressed.

5 DOG TEST This test verifies that the internal watchdog circuit is properly monitoring microprocessor activity and that its reset driver circuitry is operable. When ENTER is pressed the microprocessor will cease its refresh cycle of the watchdog circuit which will, if operating properly, reset the processor. As a result, the MRC will exit Diagnostic Test mode and enter Machine Select mode. To re-enter Diagnostic Test mode, the operator must power down , then power up again with the left-most slider button pressed.

CAUTION: This test is equivalent to turning MRC power OFF and ON. It may alter the memory contents and may *not* return the MRC to Machine Select Mode.

6 QUIT When ENTER is pressed the MRC will exit Diagnostic Test mode and enter Machine Select mode.

7 ADC TEST This test displays the digital value of the voltage applied to the inputs of the A/D converter from the sliders and the external inputs. When ENTER is pressed the numeric values of the eight A/D converter inputs will be displayed as shown.

(NNN) Not assigned	(NNN) Unregulated primary level	(NNN) ext 1	(NNN) ext 2
(NNN) slider 1	(NNN) slider 2	(NNN) slider 3	(NNN) slider 4

By moving Sliders 1-4, the values associated with them on the screen should range from 0 (at the lowest slider position) to 255 (at the highest). A 50K ohm foot pedal or potentiometer can be connected to each external input. Varying the external control should display a range from 0 to a maximum level of at least 210. Pressing ENTER again will exit to Diagnostic Test Select mode.

Functional Testing

The purpose of this test is to prove that the MRC is capable of manipulating and storing data and retaining setup data after powerdown. The tests listed below assume that user setups have been stored and must not be destroyed.

The MRC has software to operate four different MIDI machine types. These are:

1. Lexicon LXP-1
2. Lexicon PCM-70
3. Yamaha DX/TX 6-operator synthesizers
4. Generic MIDI

Any one of these machine types can be assigned to any of 10 possible numbered machine locations in the MRC. To test functionality regardless of how the MRC is configured, the numbered machine locations must be scanned to find a suitable user- assigned machine .

Upon power-up, the MRC will enter Machine Select Mode. Using Slider 1 (the left most slider on front panel), select a numbered machine location which is assigned to LXP,PCM 70, or Generic MIDI (DXTX6 does not save setups so it will not be suitable for testing setup storage functionality). Upon locating one of the above mentioned machine assignments follow the set of instructions below pertaining to the machine you have selected.

Machine Selection

The MRC should be in Machine Select Mode with a numbered machine assigned to LXP selected on screen. Make note of the title of the algorithm printed to the right of ALG: on the screen.

LXP-1

MACH # (NN)	LXP
CH#(NN) OUT#(N)	ALG:(algorithm)

1. Press <ENTER>, The MRC will display the Setup screen shown below for approximately 2 seconds.

LXP-1	SETUP (NN)	(setup label)
PAGE 1		(algorithm)

NN: refers to one of the 32 setups assigned to this machine
 setup label: a user-defined label
 algorithm: one of the eight LXP-1 algorithms selected for this particular setup

After the 2 second display of the Setup screen, the MRC will display the page 1 parameter screen associated with selected algorithm. Below are the seven possible screens that could be displayed at this time:

VVVV refers to current parameter value

ALG: REVERB/PLATE*

RTIME	SIZE	HICUT	FXLVL
VVVV	VVVV	VVVV	VVVV

*Factory Preset

ALG: CHORUS 1

RATE	DEPTH	WVFRM	FXLVL
VVVV	VVVV	VVVV	VVVV

ALG: DELAY 1

RATE	DELAY	HICUT	FXLVL
VVVV	VVVV	VVVV	VVVV

ALG: DELAY 2

GPDLY	FDBK	HICUT	FXLVL
VVVV	VVVV	VVVV	VVVV

ALG: INVERSE

SLOPE	SIZE	HICUT	FXLVL
VVVV	VVVV	VVVV	VVVV

ALG: GATE

SLOPE	TIME	HICUT	FXLVL
VVVV	VVVV	VVVV	VVVV

ALG: CHORUS 2

TUNE	RESON	LOCUT	FXLVL
VVVV	VVVV	VVVV	VVVV

2. Before moving any sliders, make note of the current parameter values, then move each slider from its minimum to maximum setting 2 or 3 times to verify that the displayed value is changed by slider action. It should be noted that upon entering a new screen, the slider motion will not affect the current value until the slider passes through the currently displayed parameter value.

3. Set sliders so that all four values are different from the original values stored in that setup. Make note of these new parameter values.
4. Press MACH . This will return the MRC to Machine Select Mode.
5. Power down the MRC then apply power again. Select the same numbered machine location as was being edited in the previous steps and press ENTER to view page 1 parameter values. Verify that the parameter values are identical to the values selected in step 3.
6. Press the SETUP button, then press ENTER to return the parameters to the original setup values. Verify that the displayed parameters are now set to the original user stored values.
7. Press MACH to exit to Machine Edit mode.

The MRC should be in Machine select mode with a numbered machine assigned to PCM 70 selected on the screen. Make note of the algorithm printed to the right of ALG: on the screen.

PCM - 70

MACH # (NN)	PCM 70
CH# (NN) OUT#(N)	ALG: (algorithm)

1. Press <ENTER>, The MRC will display the Setup screen shown below for approximately 2 seconds.

PCM 70	SETUP (NN)	(setup label)
PAGE 1		(algorithm)

NN: refers to one of the 32 setups assigned to this machine
 setup label: a user defined label
 algorithm: one of the eight PCM 70 algorithms selected for this particular setup

After the 2 second display of the Setup screen, the MRC will display the page 1 parameter screen associated with the selected algorithm. Below are the seven possible screens that could be displayed at this time:

VVVV refers to current parameter value

MIX	CHRS	HICUT	DIFF
VVVV	VVVV	VVVV	VVVV

ALG: REVERB/CHO & ECHO*

* Factory Preset

ALG: MBAND

MIX	DIFF	V1FBK	V2FBK
VVVV	VVVV	VVVV	VVVV

ALG: RESCHORD

MLVL	RESON	PITCH	MDLY
VVVV	VVVV	VVVV	VVVV

ALG: HALL

RTIMD	SIZE	HICUT	MIX
VVVV	VVVV	VVVV	VVVV

ALG: CHAMBER/PLATE

RTIMD	RTLOW	SIZE	MIX
VVVV	VVVV	VVVV	VVVV

ALG: INFVERB

RTIME	SIZE	HICUT	MIX
VVVV	VVVV	VVVV	VVVV

ALG: INVROOM

LSLOPE	MSLOPE	DUR	MIX
VVVV	VVVV	VVVV	VVVV

2. Before moving any sliders, make note of the current parameter values, then move each slider from its minimum to maximum setting 2 or 3 times to verify that the displayed value is changed by slider action. It should be noted that upon entering a new screen the slider motion will not affect current value until the slider passes through the currently displayed parameter value.

3. Set sliders so that all four values are different from the original values stored in that setup. Make note of these new parameter values.

4. Press MACH. This will return the MRC to Machine Select Mode.

5. Power down the MRC then apply power again. Select the same numbered machine location as was being edited in the previous steps and press ENTER to view page 1 parameter values. Verify that the parameter values are identical to the value selected in step 3 of this procedure.

6. Press the SETUP button, then press ENTER to return the parameters to the original setup values. Verify that the displayed parameters are now set to the original user stored values.

7. Press MACH to exit to Machine Edit mode.

The MRC should be in Machine select mode with a numbered machine assigned to Generic MIDI selected on the screen.

Generic MIDI

MACH #	(NN)	Generic MIDI
CH#	(NN)	OUT#(N)
		(setup label)

NN or N: numeric values
 setup label: a user definable label

1. Press ENTER to enter into Generic MIDI Run mode. The display shown below will appear for approximately 2 seconds, indicating that slider data is about to be displayed.

GMIDI	SETUP	(NN)	(setup label)
PAGE	1		SLIDERS

Following this 2 second display the MRC will display the Slider Data Screen shown below:

(Slidr 1 label)	(Slidr 2 Label)	(Slidr 3 Label)	(Slidr 4 Label)
DDD	DDD	DDD	DDD

Slidr 1-4 Label: user defined labels identifying slider 1 - 4 functions
 DDD: refers to slider function data value

2. Before moving sliders, make note of the initial value assigned to slider 1. Move each slider from minimum to maximum setting 2 or 3 times to verify that displayed value is changed by slider action. It should be noted that upon entering a new screen, the slider motion will not affect current value until slider passes through the currently displayed parameter value.

3. To change initial value of slider 1, hold down EDIT then press SETUP key. Move slider 1 to bottom position. The display should appear as follows:

SOURCE	CNT#	CH#	OUT#
pot1	(Ctrl Name)	(NN)	(N)

Pot1 should appear in the lower left corner to indicate that slider 1 (pot1) setup is being edited.

4. Press PAGE to get the next Edit setup screen. It should display the following:

INIT	LOW	HIGH	SLOPE
(NNN)	(NNN)	(NNN)	(CCC)

NNN: indicates a numeric value

CCC: indicates one of four slope types:
linear, inverse, log, or antilog

5. Move slider 1 to set the initial value (INIT) to a new setting. Make note of the new setting and press ENTER. The following prompt will appear:

STORE BEFORE EXITING ?	
1) YES	0) NO

press 1 in order to save new initial value for slider 1. The MRC will then return to Slider Screen in Generic MIDI run Mode.

6. Press MACH to return to Machine Select Mode. Power down the MRC, then apply power again. Select the numbered machine location previously selected and press ENTER to enter back into Generic MIDI Run Mode.

7. Verify that slider 1 initial value has now been changed to the new value selected in step 5.

8. Repeat steps 3. and 4. Move Slider 1 so that the initial value (INIT) is restored to its original setting. Press ENTER and respond to the prompt by pressing "1".

9. Step 6. can be repeated to verify that the Generic MIDI Slider 1 initial value has been restored to its original setting. The MRC can now be returned to Machine Select Mode by pressing MACH and powered down.

3

Circuit
Description

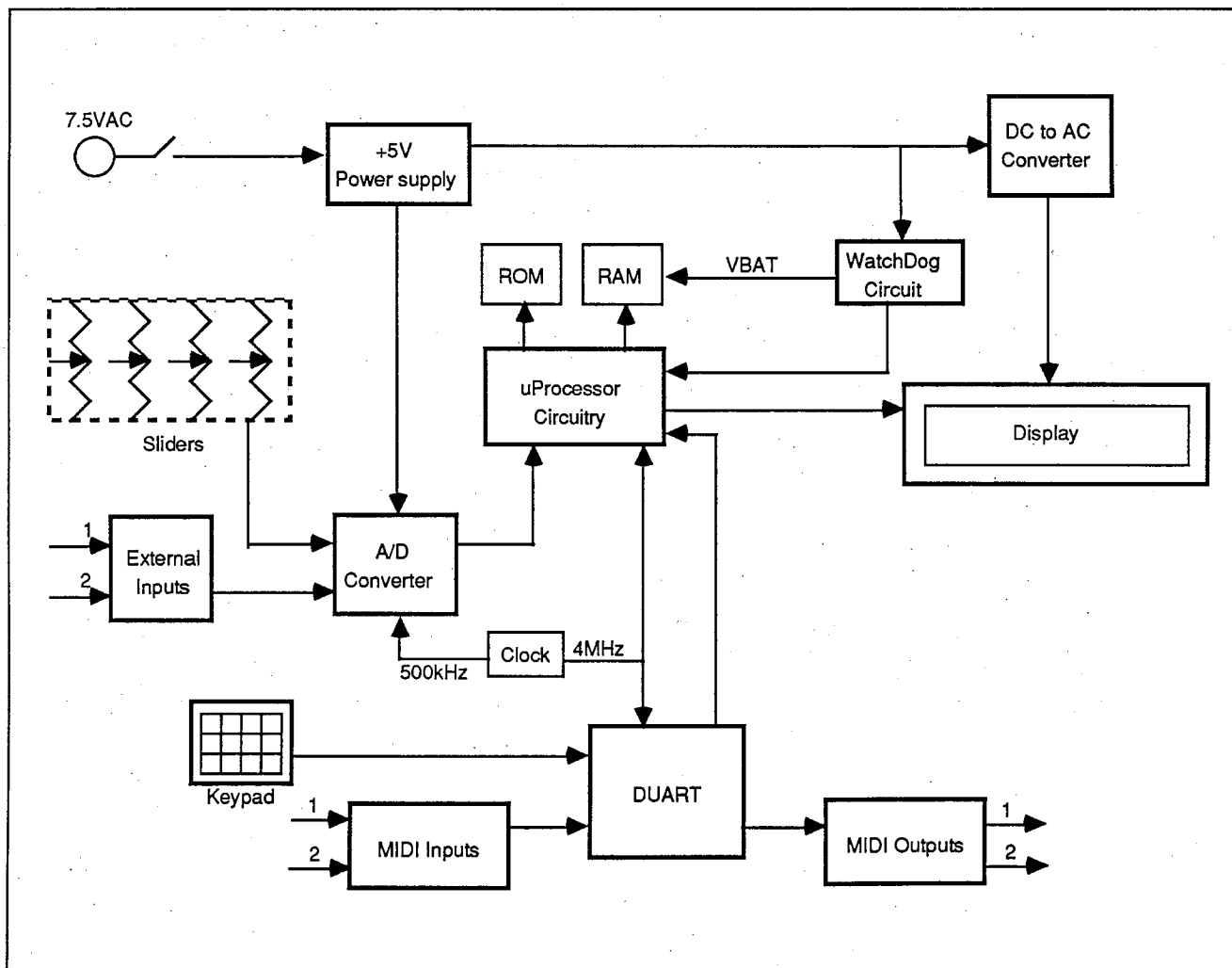
Circuit Description

This section is intended to serve as a guide to the organization and functionality of the various circuit blocks within the MRC. It is provided as an aid to qualified personnel and assumes a general knowledge of electronic hardware.

Organization Information in this section is presented in the following order:

1. Complete Block Diagram
2. 5 Volt Power Supply
3. Watch Dog Circuit
4. Data Input Hardware
5. MIDI I/O
6. ADC
7. uProcessor Circuitry
8. DUART
9. LCD Circuitry

Block Diagram



The MRC utilizes an external 7.5 Vac, 1A transformer which connects to the rear panel via a 5mm/2.5mm plug. The AC power input contains HF filtering to minimize RFI radiation.

5 Volt Power Supply

Internally, after a push on/push off power switch, the AC is rectified by full wave bridge rectifier BR101. It's output is capacitively filtered producing the unregulated DC voltage monitored by the ADC (U112). (See ADC Test, page 2-6.)

+5VCC is produced from the unregulated DC by a TO-220 Packaged LM7805 voltage regulator (U117). Tantalum capacitors are used to filter both input and output of U117. IC generated noise is capacitively decoupled to VSS by .1uf bypass caps applied to VCC inputs at each IC.

VCC overvoltage protection and current limiting functions are provided by U117.

The monitor voltage, VMON, is produced by applying unregulated DC to a resistive voltage divider. Approximately 1/3 of the unregulated DC level is applied to one of the ADC's eight inputs, allowing the processor to monitor the DC supply status. A diode connecting VMON to VCC is utilized to protect ADC from overvoltage due to power surges and irregularities. (See ADC Test, page 2-6.)

The watch dog circuit (U113 and associated support circuitry) monitors VCC voltage level and microprocessor activity in order to control RESET of microprocessor circuitry and maintain non-volatile RAM supply level during powerdown.

Watch Dog Circuit

On powerup, RESET is kept active by the Watchdog Circuit until VCC reaches an acceptable level. During powerdown, RESET is activated before VCC reaches a level which is too low for microprocessor circuitry to operate properly.

Processor activity is also monitored by the Watchdog Circuit. Under normal conditions, the processor will instruct the DUART chip to pulse its OUT7 signal line at a maximum interval of once per second. This signal drives pin 6 of U113. If, due to software or processor hardware failure, this function is not performed, U113 will activate the processor RESET signal in order to restart the system. **This is important to remember when troubleshooting what seems to be a dead processor condition.**

The 3 Volt battery connection to U113 is used to maintain non-volatile SRAM supply level during powerdown. SRAM supply (VBAT) will rise to VCC during normal operation and will equal battery voltage after powerdown.

Data Input Hardware

Sliders and External Inputs

The MRC provides six user-controllable analog voltage inputs which are converted to digital data by the ADC circuitry. Four of these voltage inputs are controlled by slider type potentiometers mounted on the front panel daughterboard. Two inputs can be controlled via an external potentiometer connection by using the 1/4" jack connectors mounted on the MRC rear panel.

Sliders VCC and VSS are provided to each potentiometer through the ribbon cable connected to P104 on the motherboard. Each potentiometer wiper feeds directly into separate inputs of the ADC via the same ribbon cable connection. VCC is capacitively bypassed to VSS on the daughterboard and each wiper output is capacitively bypassed to VSS at the motherboard to prevent high frequency noise from coupling into the converter circuitry and to reduce RFI.

External Inputs The two tip-ring-sleeve type 1/4" jacks provide connection to an external potentiometer control.

Tip connects to the ADC input through a 10k Ohm series resistor. This resistor, in conjunction with a .01uF de-coupling capacitor, aids in RFI protection and provides current limiting to the overvoltage protection diodes connected to VCC and VSS.

Ring is connected to VCC through a 10K ohm pullup resistor.

Sleeve is connected directly to VSS.

Keypad The MRC provides a 22-key interface for user data entry functions. The rubberized keys with conductive contacts are mounted on the front panel daughterboard of the unit.

When a key is pressed, its conductive contact shorts two gold-flashed I/O lines on the daughterboard which is decoded using an X/Y matrix scheme. The 10-keypad I/O matrix lines connect to the motherboard via P104 and the DUART/PIO chip. U111 handles the keypad matrix signaling through its parallel port function. The matrix status is passed on to the processor for decoding.

MIDI I/O

MIDI Inputs

Two identical MIDI input circuits are located on the unit's motherboard. PC mounted 5-pin female DIN connectors are placed at the rear panel section of the circuit board. This standard MIDI hardware incorporates an optocoupled current loop to receive serial MIDI data at a 31.25kHz Baud rate. Optocouplers U114 and 115 electrically isolate MIDI input 1 & 2 circuitry from the rest of the MRC circuitry (as required by the MIDI 1.0 spec). Serial data from optocoupler outputs are fed into the two DUART inputs on U111.

The two serial outputs from the DUART chip provide serial data for the MIDI output circuitry. A standard MIDI device connected to outputs J106 and J107, completes the current loop circuit driven by NPN transistors Q101-2. Ferrite beads L101-4 are used to reduce RFI.

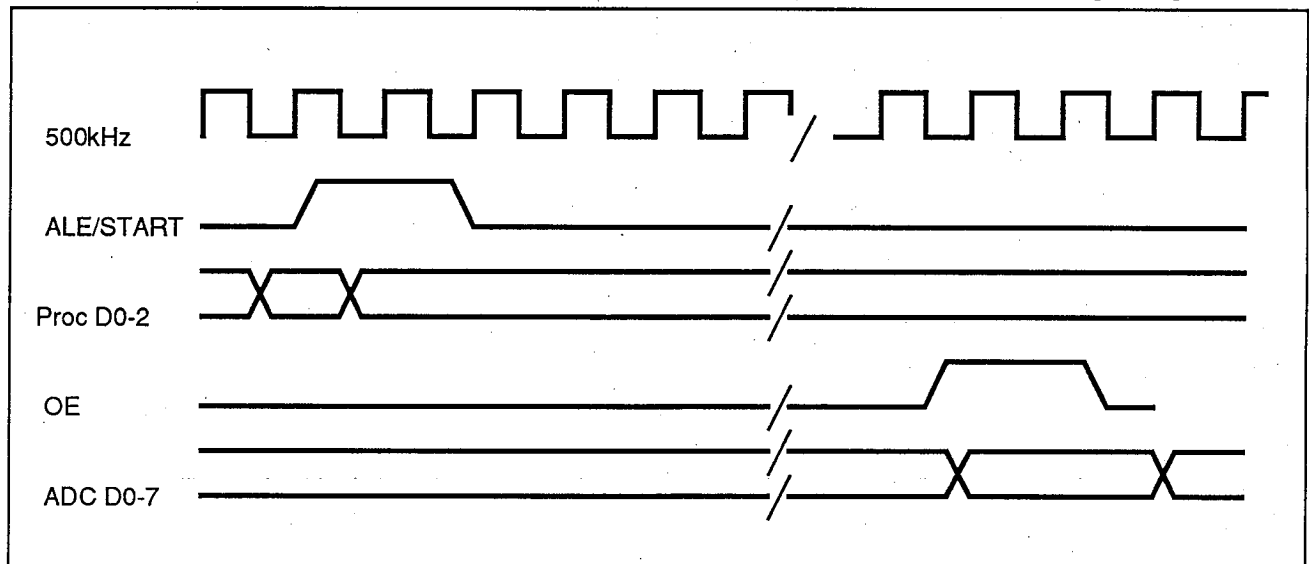
MIDI Outputs

Voltages from six analog user controls, as well as VMON from the unregulated DC supply, are converted into useable digital data by the ADC0809 (U112). This IC handles the analog to digital conversion of up to eight analog inputs. One of these inputs is unused by the MRC.

ADC Circuitry

The processor clock circuitry provides a 500kHz clock to U112 and a +5 volt level is used as a reference in the conversion process. The processor I/O decoding circuitry (described on page 3-7) activates U112 and selects a specific channel to be converted with data lines D0-2. This data selection is latched internally in U112 on the rising edge of its ALE/START signals. After the falling edge of ALE/START the processor will wait a minimum of 100 uSec for the ADC data to settle. The processor then will read converted data, causing U112's OE signal to become an active high.

ADC Timing Diagram



**Microprocessor
Circuitry**

A 4MHz Z80 microprocessor performs the CPU function in the MRC. It handles a total of 48K bytes RAM and 16K bytes ROM space and controls data to and from the DUART, ADC and LCD.

Memory Map

FFFF	RAM B (U106)
E000	
DFFF	RAM A (U105)
C000	
BFFF	ROM C (U104)
A000	
9FFF	ROM B (U103)
8000	
7FFF	ROM A (U102)
0000	

RAM/ROM

RAM Two 8K X 8 low-power 6264 SRAMS (U105,106) perform read/write memory storage. This RAM is non-volatile due to VCC supply connections provided by VBAT. As described on page 3-3, the Watchdog Circuit maintains a 3Volt level on VBAT after powerdown. This non-volatile function is essential in the storage of user setups in the MRC. If SRAM is not saved during power down, then all user controlled data such as labels, parameter settings, machine assignments and setup configurations are replaced with random data on powerup.

ROM The 48K of available program ROM consists of one 32K X 8 27C256 EPROM (U102) and two 8K X 8 27C64 EPROMs (U103,104). The operating system, factory preset data, and diagnostic software are contained in this area of memory.

A 74HCT139 dual 2 to 4 decoder IC (U107) is used in conjunction with supporting logic gates to decode both memory and I/O device addresses. Below is a listing of specific chip addresses and associated decode circuitry chip select signal names.

Address Decoding

Memory IC Addressing

ROM	ADDRESS: FROM - TO	CS SIGNAL
U102	0000H - 7FFFH	CS1
U103	8000H - 9FFFH	CS2
U104	A000H - BFFFH	CS3

RAM	ADDRESS: FROM - TO	CS SIGNAL
U105	C000H - DFFFH	CS4
U106	E000H - FFFFH	CS5

I/O Addressing

HEX ADDRESS	A7	A6	A5	A4	A3	A2	A1	A0	DEVICE	CS SIGNAL
40H	0	1	0	0	0	0	0	0	DISPLAY	CS6
43H	0	1	0	0	0	0	1	1		
80H	1	0	0	0	0	0	0	0	ADC	CS7
C0H	1	1	0	0	0	0	0	0	DUART	CS8
CFH	1	1	0	0	1	1	1	1		

Clock circuitry The 4MHz clock, derived from a Crystal oscillator circuit, is provided for the Z80 CPU (U101) and the 88C681 DUART (U111). This 4MHz clock is also applied to U110, a 4 Bit binary counter, and the 500kHz (4 MHz divided by 8) output is utilized as the ADC clock.

DUART The 88C681 DUART IC (U111) has the following ports:

- 2 serial input ports
- 2 serial output ports
- 8 data output lines
- 7 data input lines

Serial I/O ports All MIDI serial communications functions are handled by the DUART IC. MIDI data is then passed back and forth between the DUART and the Z80 CPU via their shared parallel data bus (D0-7). Signals labeled RXDA and RXDB are driven by the optocoupler IC outputs from MIDI inputs 1 and 2 and TXDA and TXDB are sent to MIDI outputs 1 and 2. The DUART is instructed by the Z80 CPU to receive and send serial MIDI data at a baud rate of 31.25kHz. The baud rate clock is generated inside the DUART by dividing down the 4MHz clock input.

Parallel I/O lines Five input and five output lines are used in the keypad decoding scheme. Each input line is connected to VCC with a 10K pullup resistor. The keypad matrix is arranged so that a key depression shorts one input to one output line. The CPU regularly scans the keypad status by instructing the DUART to make each of the five matrix line outputs low one at a time. Then, by scanning the matrix input lines status, key decoding can be performed as the depressed key's input line will go low when the corresponding output line goes low. Diodes are placed in series with each output line such that only a low output state will affect the level on an input.

An extra output port line (OP7) is pulsed at regular one second intervals in order to indicate to watch dog circuit that processor circuitry is operating properly.

LCD Circuitry The display contains its own onboard processor and memory circuitry. Instructions and data are written and read from seven data lines (D0-6). A0 selects either Data (1) or instruction (0) functions and A1 acts as a read (1), write (0) signal. The contrast control, potentiometer R125, located at the rear of the unit provides a varying voltage from 0 to +5 Vdc which results in screen contrast variations (+5 results in maximum contrast). All the above signals as well as VCC and VSS are provided to the front panel mounted display via the J105 ribbon connector.

A DC to AC converter, T101, converts +5VCC to approximately 100VAC which supplies power to the fluorescent lighting on the LCD display via J110 and is self-adjusting as the LCD ages.

4

MRC
Factory
Presets

Press ENTER to return to Machine Run Mode. The screen should display the first four parameter values for LXP-1 Setup 1 (BRIGHTHALL, as shown.

RTIME	SIZE	HICUT	FXLVL
2.93	64 M	6.90	100%

Press PAGE to display the next four parameter values.

BASS	PDLY	FDBK	DIFF
.71	.033	+0%	75

Note: Do not move any sliders while these parameter values are displayed. Moving any sliders will change the parameter values.

If desired, other setups can be selected for comparison with the values shown on the following pages, by pressing SETUP and entering the setup number desired on the numeric keypad.

To exit and return to Machine Select Mode, press MACH.

LXP-1 Preset Setups

#	Name	Type	<u>Rtime</u>	<u>Size</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Bass</u>	<u>Pdly</u>	<u>Fdbk</u>	<u>Diff</u>
1	BRITHALL	Reverb	2.93	64 M	6.90	100%	.71	.033	0%	75%
2	DARKHALL	Reverb	2.10	60 M	3.45	100%	1.4	.033	0%	70%
3	LRGE RM1	Reverb	3.60	43 M	6.90	100%	.71	.033	0%	60%
4	LRGE RM2	Reverb	2.93	51 M	4.11	100%	1.4	.033	0%	75%
5	MED RM1	Reverb	2.93	36 M	4.88	100%	2.5	.017	0%	71%
6	MED RM2	Reverb	2.93	30 M	6.90	100%	.71	.017	0%	85%
7	SMALLRM1	Reverb	4.54	15 M	4.88	100%	1.4	.000	0%	74%
8	SMALLRM2	Reverb	4.54	8 M	8.33	100%	.63	.000	0%	88%
9	DRKPLATE	Plate	2.45	27 M	4.88	100%	1.4	.000	0%	88%
10	BRTPLATE	Plate	3.60	36 M	5.80	100%	1.0	.000	0%	78%
			<u>Slope</u>	<u>Time</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Fdbk</u>	<u>Pdly</u>	<u>Diff</u>	
11	GATE	Gate	16	180	6.90	100%	0%	.000	88%	
			<u>Slope</u>	<u>Size</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Fdbk</u>	<u>Pdly</u>	<u>Diff</u>	
12	INVERSE	Inverse	16	4	6.90	100%	0%	.000	99%	
			<u>Rate</u>	<u>Depth</u>	<u>Wvfrm</u>	<u>FxLvl</u>	<u>Ldly</u>	<u>LFdbk</u>	<u>Rdly</u>	<u>RFdbk</u>
13	CHORUS1	Chorus1	1	8.00	6	100%	0.00	0%	0.00	0%
			<u>Tune</u>	<u>Reson</u>	<u>LoCut</u>	<u>FxLvl</u>	<u>Pdly</u>	<u>Slope</u>	<u>Rich</u>	<u>Shimr</u>
14	CHORUS2	Chorus2	+32	+25%	0.0	100%	.066	5	25	7
			<u>Rate</u>	<u>Delay</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Dly-2</u>	<u>Dly-3</u>	<u>Fdbk3</u>	<u>Diff</u>
15	DELAY1	Delay1	8	303	10.3	100%	0.00	0.00	+41%	25
			<u>GpDly</u>	<u>Fdbk</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Ldly</u>	<u>Rdly</u>	<u>Diff</u>	
16	DELAY2	Delay2	.110	+26%	10.3	100%	0.00	0.00	13	

#	Name	Type	<u>Rtime</u>	<u>Size</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Bass</u>	<u>Pdly</u>	<u>Fdbk</u>	<u>Diff</u>
17	TIGHT	Reverb	.82	23 M	13.8	100%	2.5	.000	0%	77
18	MIDVERB	Reverb	1.37	41 M	13.8	100%	1.2	.000	0%	50
19	LONGVERB	Reverb	3.60	37 M	6.90	100%	1.2	.000	0%	60
20	HUGEVERB	Reverb	6.10	71 M	5.80	100%	1.2	.065	+20%	74
21	GUDPLATE	Plate	1.06	67 M	8.33	100%	1.4	.050	-6%	80
22	CHURCH1	Plate	4.54	71 M	3.45	100%	2.2	.083	+8%	77
			<u>Slope</u>	<u>Size</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Fdbk</u>	<u>Pdly</u>	<u>Diff</u>	
23	DEVERSE	Inverse	31	17	13.8	100%	0%	.000	100	
24	REVRPEAT	Inverse	19	8	13.8	100%	+30%	.202	61	
			<u>Slope</u>	<u>Time</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Fdbk</u>	<u>Pdly</u>	<u>Diff</u>	
25	GATESLAP	Gate	8	270	6.90	100%	+0%	.130	50	
			<u>Rate</u>	<u>Depth</u>	<u>Wvfrm</u>	<u>FxLvl</u>	<u>Ldly</u>	<u>LFdbk</u>	<u>Rdly</u>	<u>RFdbk</u>
26	FULLCHOR	Chorus1	8	1.75	6	100%	0.03	-35%	0.04	+44%
27	SLAPFLNG	Chorus1	2	5.50	7	100%	0.15	+19%	0.19	- 2%
			<u>Tune</u>	<u>Reson</u>	<u>LoCut</u>	<u>FxLvl</u>	<u>Pdly</u>	<u>Slope</u>	<u>Rich</u>	<u>Shimr</u>
28	EDGE1	Chorus2	+6	+52%	2.3K	100%	.000	+4	73	70
29	OPENHARP	Chorus2	0	+99%	4.0K	100%	.126	+4	65	85
			<u>Rate</u>	<u>Delay</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Dly-2</u>	<u>Dly-3</u>	<u>Fdbk3</u>	<u>Diff</u>
30	SLAPIT	Delay1	0	115	13.8	100%	0.00	0.00	+7%	0
			<u>GpDly</u>	<u>Fdbk</u>	<u>HiCut</u>	<u>FxLvl</u>	<u>Ldly</u>	<u>Rdly</u>	<u>Diff</u>	
31	IMAGE	Delay2	.020	+3%	13.8	100%	0.06	0.02	54	
32	SIDESLAP	Delay2	.020	+27%	4.11	100%	0.34	0.22	100	

PCM-70 Preset Setups (Setup numbers 1-16)

1	PCM70 SETUP 1 PROGRAM 50	CHORUS CHO&ECHO	<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>			
			255	162	236	0			
			<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>	<u>MPAN</u>			
			125	127	128	130			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>			
			255	65	133	0			
			2	PCM70 SETUP2 PROGRAM 51	CHRECHO CHO&ECHO	<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>
						255	255	237	179
<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>				<u>MPAN</u>			
126	127	127				130			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>			
			255	71	127	0			
			3	PCM70 SETUP3 PROGRAM 53	SFLANGE CHO&ECHO	<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>
						255	175	237	0
<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>				<u>MPAN</u>			
123	127	127				130			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>			
			255	18	159	0			
			4	PCM70 SETUP4 PROGRAM 54	DBLESLAP CHO&ECHO	<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>
						255	116	240	77
<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>				<u>MPAN</u>			
125	127	127				130			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>			
			255	154	156	0			
			5	PCM70 SETUP5 PROGRAM 58	ECHO BPM CHO&ECHO	<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>
						255	115	240	0
<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>				<u>MPAN</u>			
125	113	127				130			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>			
			176	127	161	0			
			6	PCM70 SETUP6 PROGRAM 60	SINGLE MBAND	<u>MIX</u>	<u>DIFF</u>	<u>V1FBK</u>	<u>V2FBK</u>
						255	0	74	66
<u>MLVL</u>	<u>MDLY</u>	<u>HICU</u>				<u>LOCUT</u>			
125	127	125				125			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1PAN</u>	<u>V2DLY</u>			
			255	215	125	252			
			7	PCM70 SETUP7 PROGRAM 61	DOUBLE MBAND	<u>MIX</u>	<u>DIFF</u>	<u>V1FBK</u>	<u>V2FBK</u>
						255	0	52	52
<u>MLVL</u>	<u>MDLY</u>	<u>HICU</u>				<u>LOCUT</u>			
125	127	125				125			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1PAN</u>	<u>V2DLY</u>			
			255	130	0	170			
			8	PCM70 SETUP8 PROGRAM 67	SHUFFLE MBAND	<u>MIX</u>	<u>DIFF</u>	<u>V1FBK</u>	<u>V2FBK</u>
						255	0	0	77
<u>MLVL</u>	<u>MDLY</u>	<u>HICU</u>				<u>LOCUT</u>			
125	111	125				125			
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1PAN</u>	<u>V2DLY</u>			
			255	131	0	121			

9	PCM70 SETUP9 PROGRAM 70	MAJOR RESCHORD	<u>MLVL</u>	<u>RESON</u>	<u>PITCH</u>	<u>MDLY</u>
			125	127	127	150
			<u>V3FDBK</u>	<u>V6FDBK</u>	<u>HFCL</u>	<u>HFCR</u>
			0	0	206	206
10	PCM70 SETUP1 PROGRAM 80	CONCERT HALL	<u>PTCH1</u>	<u>PTCH2</u>	<u>PTCH3</u>	<u>PTCH4</u>
			15	38	56	67
			<u>RTMID</u>	<u>SIZE</u>	<u>HICUT</u>	<u>MIX</u>
			136	255	222	255
11	PCM70 SETUP11 PROGRAM 90	CHAMBER CHAMBER	<u>PDLY</u>	<u>ATTK</u>	<u>DIFF</u>	<u>DEF</u>
			17	89	151	101
			<u>CHOR</u>	<u>MLVL</u>	<u>L1RFL</u>	<u>R1RFL</u>
			127	133	0	0
12	PCM70 SETUP12 PROGRAM 92	TILEROOM CHAMBER	<u>RTMID</u>	<u>RTLOW</u>	<u>SIZE</u>	<u>MIX</u>
			166	225	110	255
			<u>HICUT</u>	<u>PDLY</u>	<u>GATE</u>	<u>DIFF</u>
			123	0	255	125
13	PCM70 SETUP13 PROGRAM 93	GATED CHAMBER	<u>RTLSTP</u>	<u>RTMSTP</u>	<u>MLVL</u>	<u>MDLY</u>
			168	168	134	127
			<u>RTMID</u>	<u>RTLOW</u>	<u>SIZE</u>	<u>MIX</u>
			97	119	30	255
14	PCM70 SETUP14 PROGRAM 94	INFVERB INFVERB	<u>HICUT</u>	<u>PDLY</u>	<u>GATE</u>	<u>DIFF</u>
			206	3	255	89
			<u>RTLSTP</u>	<u>RTMSTP</u>	<u>MLVL</u>	<u>MDLY</u>
			0	0	134	127
15	PCM70 SETUP15 PROGRAM 100	PLATE PLATE	<u>RTMID</u>	<u>RTLOW</u>	<u>SIZE</u>	<u>MIX</u>
			107	131	101	255
			<u>HICUT</u>	<u>PDLY</u>	<u>ATTK</u>	<u>DIFF</u>
			219	0	198	224
16	PCM70 SETUP16 PROGRAM 51	ECHORUS CHO&ECHO	<u>RTHE</u>	<u>XOVR</u>	<u>DEF</u>	
			214	32	0	
			<u>MIX</u>	<u>CHRS</u>	<u>HICUT</u>	<u>DIFF</u>
			255	156	255	50
			<u>MLVL</u>	<u>MDLY</u>	<u>MFBK</u>	<u>MPAN</u>
			125	127	127	130
			<u>V1LVL</u>	<u>V1DLY</u>	<u>V1FBK</u>	<u>V1PAN</u>
			127	127	127	127

GMIDI Presets (Setup Numbers 1-3)

Setup 1 assigns each of the available sliders, switches and external controllers to a different control function on one channel.

Setup 1: General Purpose Controls, all Channel 1

SOURCE	CNT#	CH#	OUT#	INIT	LOW	HIGH	SLOPE	LABEL
Slr1	MODWH	1	1	0	0	127	LIN	MODW
Slr2	PORTA	1	1	0	0	127	LIN	PORT
Slr3	D-ENT	1	1	0	0	127	LIN	DATA
Slr4	CTRL0	1	1	0	0	127	LIN	CTL0
Swt1	SUST	1	1	off	off	on		SUST
Swt2	SOSTEN	1	1	off	off	on		SOST
Swt3	SOFT	1	1	off	off	on		SOFT
Swt4	NOTE	1	1	60(pitch)	60(vel)			NOTE
Ext1	FOOT	1	1	0	0	127	LIN	FOOT
Ext2	CTRL8	1	1	0	0	127	LIN	CTL8
Pgmch	0							
Label	GENERAL1							

Setup 2 addresses the same control (VOLUME) on separate channels with each of the 4 sliders, and provides sequencer control functions on the switch buttons.

Setup 2: Mix/Sequencer Control

SOURCE	CNT#	CH#	OUT#	INIT	LOW	HIGH	SLOPE	LABEL
Slr1	VOL1	1	1	0	0	127	LIN	VOL1
Slr2	VOL2	2	1	0	0	127	LIN	VOL2
Slr3	VOL3	3	1	0	0	127	LIN	VOL3
Slr4	VOL4	4	1	0	0	127	LIN	VOL4
Swt1	START	1	1	off	off	on		START
Swt2	STOP	1	1	off	off	on		STOP
Swt3	CONT	1	1	off	off	on		CONT
Swt4	NOTE	1	1	60(pitch)	64(vel)			NOTE
Ext1	FOOT	1	1	0	0	127	LIN	FOOT
Ext2	CTRL8	1	1	0	0	127	LIN	CTL8
Pgmch	0							
Label	MIXER1							

Setup 3 sends Data Entry slider data on 4 channels, and has Note On events assigned to the four switch buttons on different channels to provide an easy "test" capability.

Setup 3: Control 4

SOURCE	CNT#	CH#	OUT#	INIT	LOW	HIGH	SLOPE	LABEL
Slr1	D-ENT	1	1	0	0	127	LIN	DTA1
Slr2	D-ENT	2	1	0	0	127	LIN	DTA2
Slr3	D-ENT	3	1	0	0	127	LIN	DTA3
Slr4	D-ENT	4	1	0	0	127	LIN	DTA4
Swt1	NOTE	1	1	60(pitch) 60(vel)				NTE1
Swt2	NOTE	2	1	60	60			NTE2
Swt3	NOTE	3	1	60	60			NTE3
Swt4	NOTE	4	1	60	60			NTE4
Ext1	FOOT	1	1	0	0	127	LIN	FT1
Ext2	FOOT	2	1	0	0	127	LIN	FT2
Pgmch	0	1	1					
Label	CONTROL4							

5

Specifications

Specifications

Power Requirements:	AC input requirements: 6.5 - 10VAC 50-60Hz
Power Source:	7.5 VAC rms \pm 5% @ 1A Wall Transformer (supplied)
Controls:	22 momentary contact keypad pushbuttons 4 slider controls pushbutton power switch contrast control
External Inputs:	Two 1/4" Tip-ring-sleeve for pedal control connectors utilizing a 50K potentiometer
MIDI Inputs:	Two 5 pin DIN connectors
MIDI Outputs:	Two 5 pin DIN connectors
Display:	LCD, 2 rows of 24 characters, 5 x 7 dot matrix, EL blue backlight
RFI:	Meets FCC Class A computer equipment requirements
Operating Temperature:	32°-95°F (0°-35°C)
Storage Temperature:	-22°-167°F (-30°-75°C)
Humidity:	95% max, without condensation
Dimensions:	9.62" W x 6.5"L x 1.55"D (24.45cm x 16.51cm x 3.95cm)
Weight:	1 lb. 11 oz. (.5kg)

6

Parts List

MAIN BOARD

PART NO.	QTY	DESCRIPTION	REF.
POTENTIOMETERS			
200-06641	1	POT,RTY,PC,5K-B,TA,9MM	R125
CARBON FLM RES			
202-00518	7	RES,CF,5%,1/4W,220 OHM	R114-119,123
202-00529	2	RES,CF,5%,1/4W,1K OHM	R120,121
202-00534	2	RES,CF,5%,1/4W,2.2K OHM	R122,126
202-00549	13	RES,CF,5%,1/4W,10K OHM	R101-112,124
202-00556	1	RES,CF,5%,1/4W,22K OHM	R113
202-00564	1	RES,CF,5%,1/4W,51K OHM	R127
ELECTROLYT CAP			
240-00609	1	CAP,ELEC,10uF,16V,RAD	C110
240-06611	2	CAP,ELEC,1000uF,25V,RAD	C111,111A
CERAMIC CAP			
245-03609	14	CAP,CER,.1uF,50V,Z5U,AX	C101-109,119-123
245-03610	15	CAP,CER,.01uF,100V,Z5U,AX	C112-117
245-03869	5	CAP,CER,100pF,100V,COG,10%,AX	C118
INDUCTORS			
270-00779	8	FERRITE,BEAD	L101-104
270-07105	4	.44uH, shielded, RAD	L5-8
DIODES			
300-01029	12	DIODE,1N914 AND 4148	CR101-112
300-03546	1	DIODE,BRIDGE,2A,200V	BR101
TRANSISTORS			
310-01647	2	TRANSISTOR,2N4401	Q101,102
DIGITAL/CMOS IC			
330-04261	3	IC,DIGITAL,74HCT00	U109,116,118
330-04272	1	IC,DIGITAL,74HCT163	U110
330-04275	1	IC,DIGITAL,74HCT139	U107
330-04567	1	IC,DIGITAL,74HCT32	U108
LINEAR IC			
340-00742	1	IC,LINEAR,7805 (LM 340 T-5)	U117
340-06564	1	IC,LINEAR,MAX690,WATCHDOG TMR	U113
MEMORY IC			
350-04282	2	IC,SRAM,4364,8KX8,150NS,LPS	U105,106
350-06781	1	IC,ROM,27C256,MRC,V1.00-1	U102
350-06782	1	IC,ROM,27C64,MRC,V1.00-2	U103
350-06783	1	IC,ROM,27C64,MRC,V1.00-3	U104
350-04707	1	IC,EPROM,27C64,250NS	U104

CONVERTER IC			
355-02903	1	IC, CONVERTER, ADC 0809	U112
MICROPROC IC			
365-04284	1	IC, uPROC, Z80, CMOS, 4MHz	U101
365-06565	1	IC, uPROC, DUART, 88C681	U111
OPTO ISLTOR IC			
375-02247	2	IC, OPTO-ISOLATOR, 6N 138	U114, 115
MODULES			
380-06642	1	DC to AC INV, 5V _{in} to 100V _{out}	T101
CRYSTALS			
390-06566	1	CRYSTAL OSC, 4.000 MHz	Y101
PSH BUT SWITCH			
453-06712	1	SW, PBPP, 2P2T, PCRA, 2MM TRAV	SW101
BATTERIES			
460-04285	1	BAT, LITH, 3V@160mAh, VERT COIN	
PC MNT CONN			
510-03961	1	CONN, POST, 100X025, HDR, 2MCG	J110
510-06041	4	CONN, DIN, 5FC@180DEG, PCRA, DJ006	J106-109
510-06042	1	CONN, DC POWER, PC, DJ005, 2.5MM	J103
510-06567	2	1/4" PHONE JACK, PCRA, 3C, SWITCH	J101, 102
510-06569	1	CONN, POST, 079, HDR, 16MC	J104
SOCKETS			
520-00946	2	IC SCKT, 40 PIN, PC, LO-PRO	U101, 111
520-01458	5	IC SCKT, 28 PIN, PC, LO-PRO	U102, 103, 104, 105, 106
MACHINE SCREWS			
640-01706	1	SCRW, 4-40X3/8, PNH, PH, ZN	U117 MTG
620-06653	1	LUG	J102
NUTS			
643-01732	1	NUT, 4-40, KEP, ZN	U117 MTG

KEYPAD BOARD

PART NO.	QTY	DESCRIPTION	REF.
PC MNT CONN			
510-06568	2	CONN, POST, 079, HDR, 6MC	P2, 3
510-06569	1	CONN, POST, 079, HDR, 16MC	P104
BULK WIRE			
670-02052	11	WIRE, JMP, 22AWG, 0.3", TEF, WHT	W1-11

KEYPAD PC BOARD

PART NO.	QTY	DESCRIPTION	REF.
PC MNT CONN 510-06568	1	CONN,POST,079,HDR,6MC	J3

SLIDER BOARD

027-06506

PART NO.	QTY	DESCRIPTION	REF.
POTENTIOMETERS 200-06561	4	POT,SLD,PC,10KB,10MMX45MM	R1-4
CERAMIC CAP 245-03609	1	CAP,CER,.1uF,50V,Z5U,AX	C1
PC MNT CONN 510-06568	1	CONN,POST,079,HDR,6MC	J2
PC BOARDS 710-06552	1	PC BD,PANEL,SLIDER,MRC	

LCD BOARD

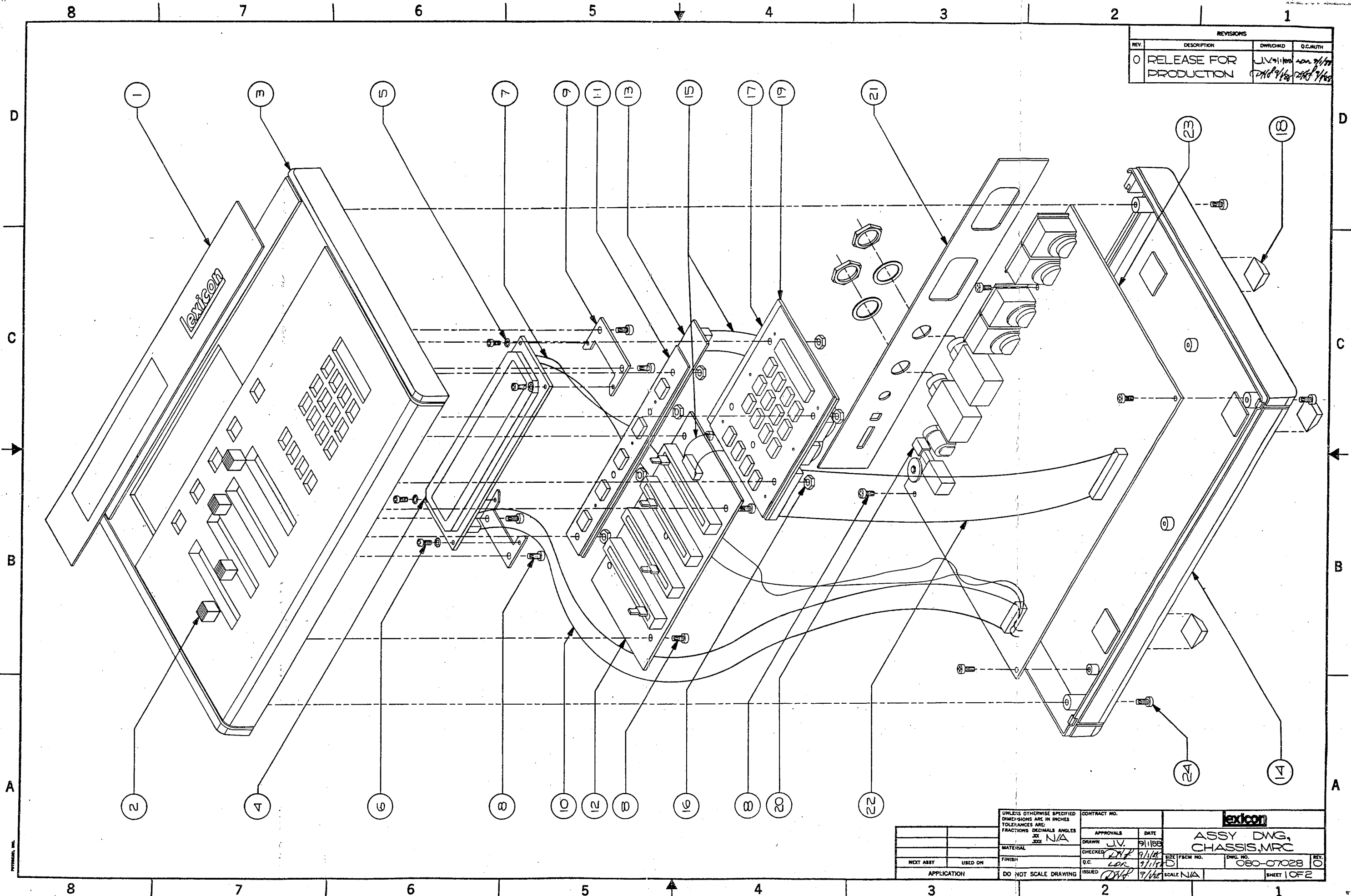
PART NO.	QTY	DESCRIPTION	REF.
DSPLY/IND/LED 430-06563	1	DISP,LCD,24X2,POS,6:00,EL	
PC MNT CONN 510-06519	1	CONN,POST,100X025,HDR,2X7MCG	J1
MACHINE SCREWS 640-01841	4	SCRW,2-56X1/4,PNH,PH,ZN	
NUTS 643-01855	4	NUT,2-56,HEX,ZN	
WASHERS 644-06635	4	WSHR,INT STAR,#2,ZN	
CABLES/CORDS 680-06546	1	CABLE,SCKT/ST&T,2C,11.5"	
BRACKETS 701-06549	2	BRACKET,LCD MTG,MRC	

MECHANICAL PARTS

PART NO.	QTY	DESCRIPTION	REF.
CUST LITERATURE			
070-06749	1	MANUAL,OWNER'S,MRC	
PSH BUT SWITCH			
453-06352	1	KEYPAD,17 KEY,MRC	
453-06353	1	KEYPAD,5 KEY,MRC	
TRANSFORMERS			
470-06502	1	XFORMER,PLUG-IN,120V,7.5VAC,1A	
FEET			
541-00781	4	BUMPER,FEET,3-M #SJ5018	
KNOBS/CAPS			
550-06044	1	BUTTON,5MMSQ,2.8MM TANG,BLK	
550-06533	4	KNOB,SLIDER,MRC	R1-4
THRD-FORM SCRW			
641-06515	4	SCRW,TAP,BT,4-24X1/4,PNH,PH,ZN	MAIN BD MTG
641-06516	9	SCRW,TAP,BT,6-20X1/4,PNH,PH,ZN	
641-06517	4	SCRW,TAP,BT,6-20X1-1/4,FH,PH,B	
NUTS			
643-06518	9	PALNUT,6-32,HEX	
CABLES/CORDS			
680-06542	1	CABLE,079,SCKT/SCKT,16C,5.5"	
680-06544	2	CABLE,079,SCKT/SCKT,6C,5"	
680-06545	1	CABLE,SCKT/MINIDIP,14C,10"	
CHASSIS/MECH			
700-06547	1	ENCLOSURE,TOP,MRC,MOLD	
700-06548	1	ENCLOSURE,BOTTOM,MRC,MOLD	
PANELS			
702-06513	1	PANEL,REAR,MRC	
LENS/PLATE/PANL			
703-06526	1	LENS,DISPLAY,MRC	
SHIPPING MAT			
730-02813	1	CARD,REGISTRATION,LEXICON	
730-04346	1	CARD,WARRANTY,LEXICON,8.5X11	
730-06708	1	BOX,13-3/8X10-7/8X3	
730-06711	2	INSERT,FOAM,MRC	
730-06760	1	BAG,CLEAR,12X12X.004	

7

Schematics
and
Assembly
Drawings



REVISIONS			
REV.	DESCRIPTION	DWG. CHG.	Q.C. AUTH.
0	RELEASE FOR PRODUCTION	J.V. 9/1/88 DWP 9/1/88	LDZ 9/1/88 DWP 9/1/88

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES		CONTRACT NO.		Lexicon	
MATERIAL JIC N/A		APPROVALS	DATE	ASSY DWG, CHASSIS, MRC	
NEXT ASSY		DRAWN J.V.	9/1/88	FILE/FSCM NO.	DWG. NO. 080-07028
USED ON		CHECKED DWP	9/1/88	ISSUED	SCALE N/A
APPLICATION		DO NOT SCALE DRAWING		SHEET 1 OF 2	

PARTS LIST

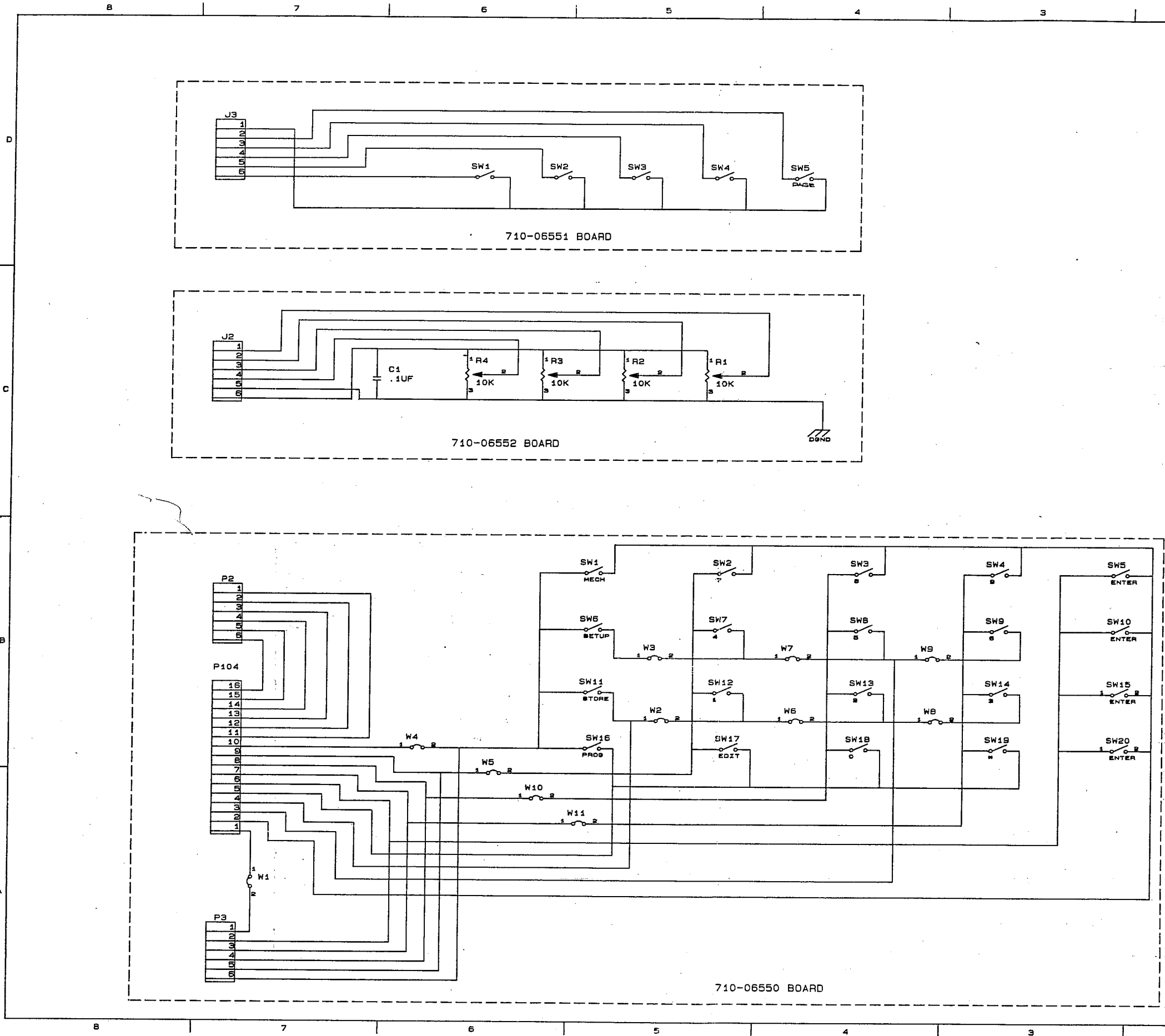
(SEE NOTE #1)

ITEM#	COMPONENT#	DESCRIPTION	QTY	UNITS
1.	703-06526	LENS DISPLAY, MRC	1	EA
2.	550-06533	KNOB, SLIDER, MRC	4	EA
3.	700-06547	ENCLOSURE, TOP, MRC	1	EA
4.	430-06563	DISP LCD, 24X2, POS. 6:00, EL	1	EA
5.	644-07090	WSHRINT STAR, M2.6, ZN	4	EA
6.	640-06517	SCRW, M2.6X4, PNH, PH, ZN	4	EA
7.	670-01679	WIRE, 24AWG, 7/32, BLK	2	EA
8.	641-06515	SCRW, TAPT, M3X6, PNH, PH	13	EA
9.	701-06549	BRACKET, LCD MTS, MRC	2	EA
10.	680-06545	CABLE, SCKT/MINIDIP, 14C, 10"	1	EA
11.	453-06353	KEYPAD, 5 KEY, MRC	1	EA
12.	023-06508	SLIDER BD ASSY, MRC	1	EA
13.	023-06507	5 KEYPAD BD ASSY, MRC	1	EA
14.	700-06548	ENCLOSURE, BOTTOM, MRC	1	EA
15.	680-06544	CABLE, 079, SCKT/SCKT, 6C, 5"	2	EA
16.	643-06518	PALNUT, M4, HEX, ZN	9	EA
17.	453-06352	KEYPAD, 17 KEY, MRC	1	EA
18.	541-00781	BUMPER, FEET	4	EA
19.	023-06506	17 KEYPAD BD ASSY, MRC	1	EA
20.	550-06044	BUTTON, 5MM SQ, 2.8MM TANG, BLK	1	EA
21.	702-06513	PANEL, REAR, MRC	1	EA
22.	680-06542	CABLE, 079, SCKT/SCKT, 16C, 5.5"	1	EA
23.	023-06509	MAIN BD ASSY, MRC	1	EA
24.	641-06516	SCRW, TAPT, M3X16, PNH, PH, BLK	4	EA

NOTES
1. PART NUMBER LISTING IS REFERENCE ONLY AND DOES NOT SUPERSEDE THE BILL OF MATERIAL

REVISIONS			
REV.	DESCRIPTION	DWR/CHKD	Q.C./AUTH
0	RELEASE FOR PRODUCTION	J.V. 9/1/88 2/16/9/88	L.M. 9/1/88 2/16/9/88

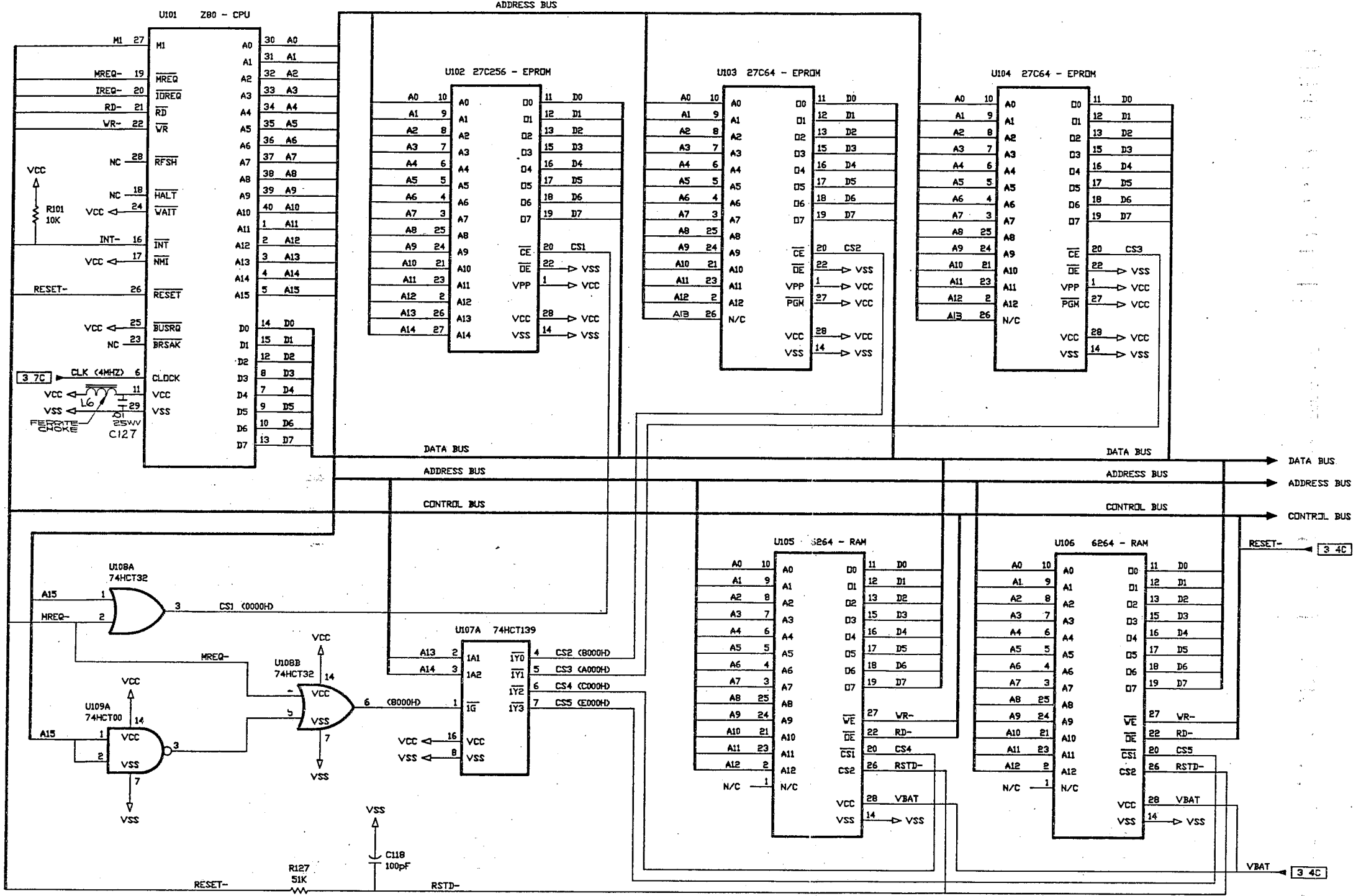
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES XX XXX N/A		CONTRACT NO.		lexicon	
APPROVALS	DATE	ASSY DWG, CHASSIS, MRC			
DRAWN J.V.	9/1/88				
CHECKED D.M.P.	9/1/88				
ISSUED	9/1/88	SIZE D	FSCM NO.	DWG NO. 050-07028	REV. 0
APPLICATION		DO NOT SCALE DRAWING	SCALE N/A	SHEET 2 OF 2	



REVISIONS			
REV	DESCRIPTION	DRAFTER/CHECKER	D.C. / AUTHORIZED
1	RELEASE FOR PROD.	RW 2/3/88	DW 2/3/88
2	REMOVED GROUND SYMBOL	JV 6/2/88 RW 7/1/88	DW 7/2/88
3	CHANGED LINES 5&6 ON J2, MOVED PAGE LABEL TO SW5 PER ECO#880803-01	JV 8/1/88 RW 8/1/88	DW 8/2/88

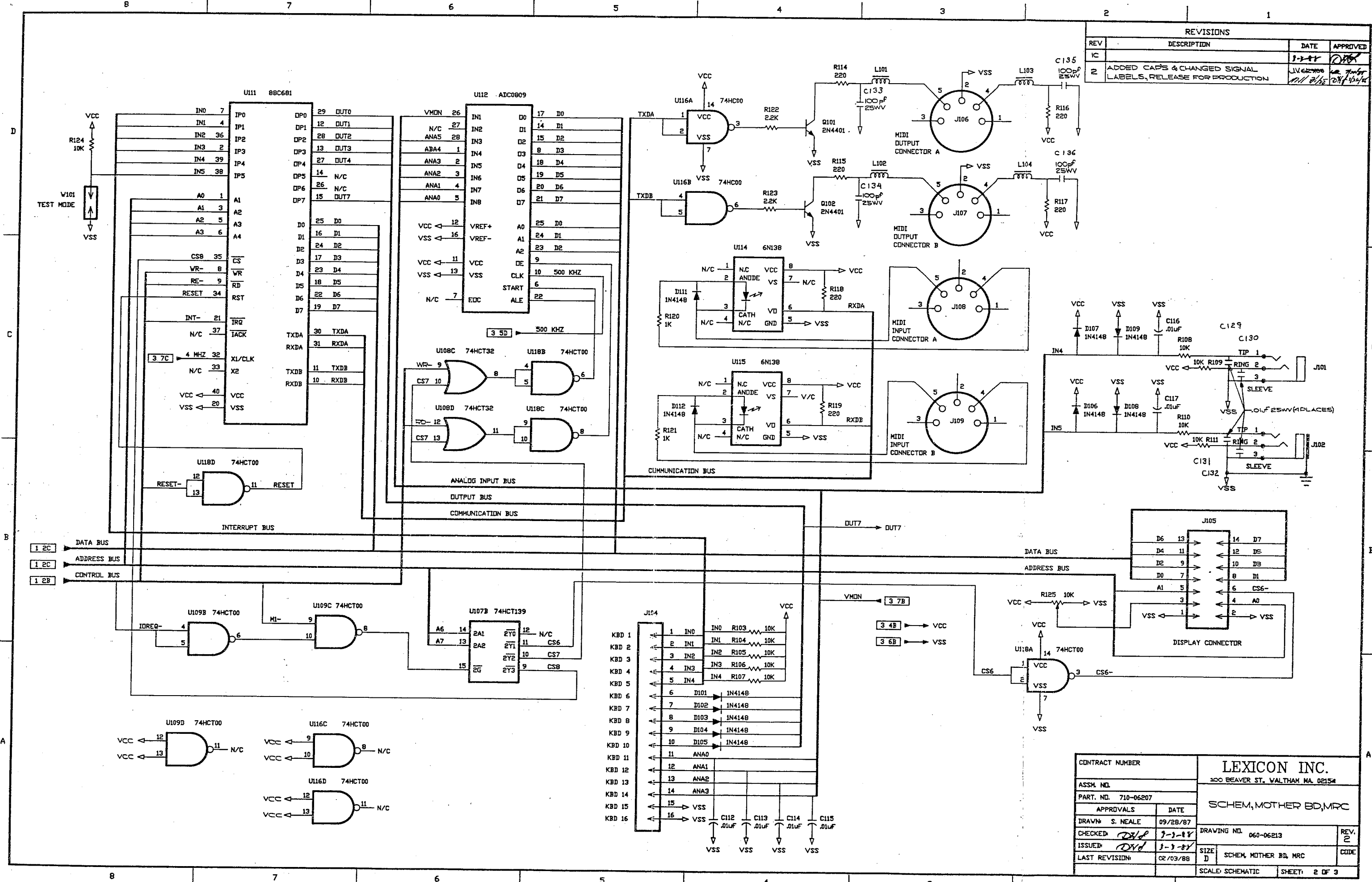
CONTRACT NO.		Lexicon	
		400 BEAVER ST WALTHAM, MA. 02154	
APPROVALS		TITLE	
		SCHEM, MRC, PANEL BDS	
DRAWN RW	DATE 2/3/88	SIZE D	CODE NUMBER 060-06558
CHECKER DW	DATE 5-3-88		REV. 3
G.C. DW	DATE 7-24-88		
ISSUED DW	DATE 8-8-88		
		SHEET 1 OF 1	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1C	CHANGE PART #R122 TO R127	02/03/88	SN [Signature]
2	ADDED CAP & FERRITE CHOKE RELEASE FOR PRODUCTION	J.V. [Signature]	[Signature]



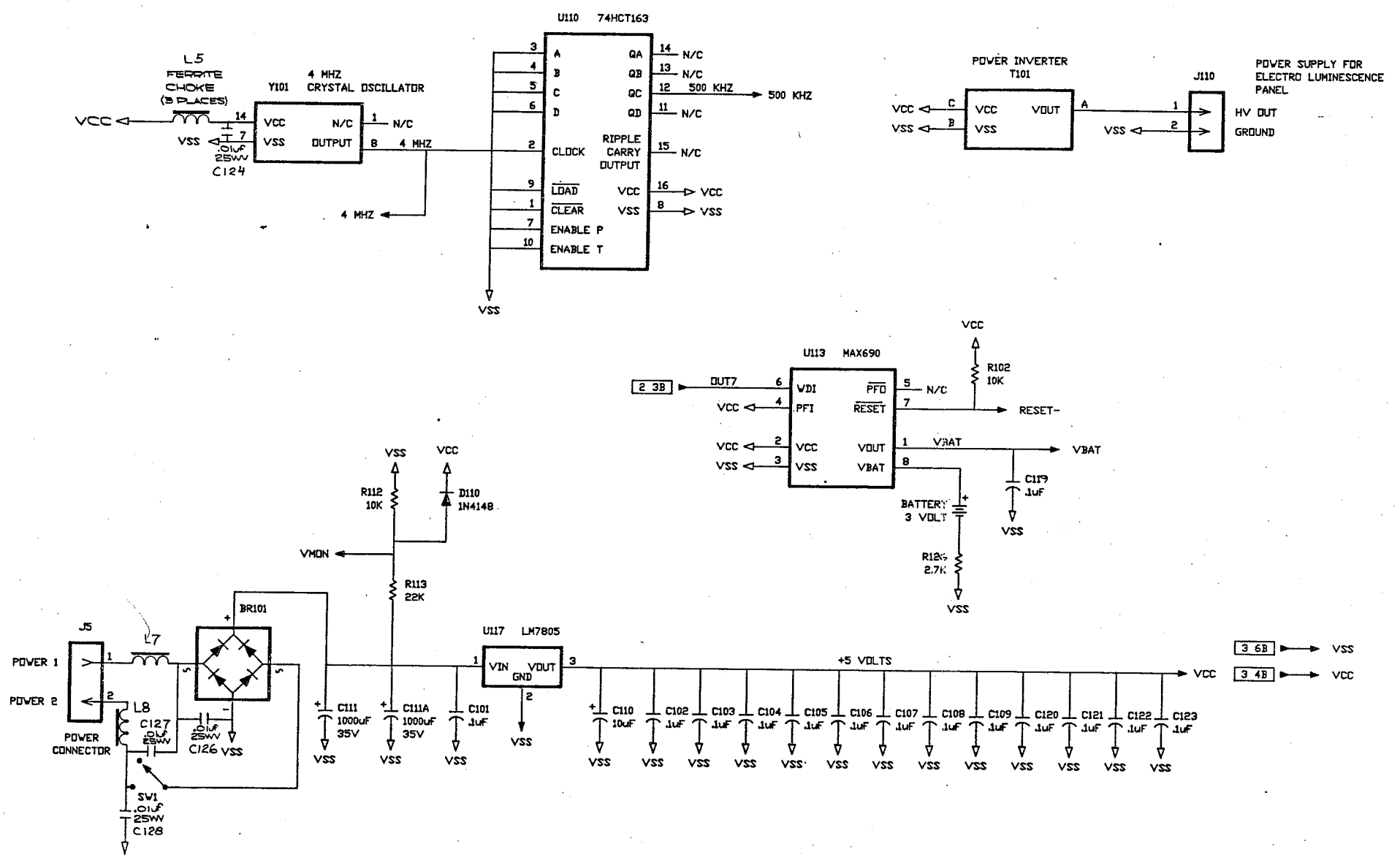
CONTRACT NUMBER		LEXICON INC.	
ASSM. NO.		100 BEAVER ST., WALTHAM MA. 02154	
PART. NO. 710-06207 REV 3		SCHEM. MOTHER BD, MRC	
APPROVALS	DATE	DRAWING NO. 060-06213	
DRAWN S. NEALE	09/28/87	REV. 2	
CHECKED [Signature]	3-2-88	CODE	
ISSUED [Signature]	3-2-88	SIZE D	SCHEM. MOTHER BD, MRC
LAST REVISION	02/03/88	SCALE: SCHEMATIC	SHEET: 1 OF 3

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1C		3-2-87	<i>Dvd</i>
2	ADDED CAPS & CHANGED SIGNAL LABELS, RELEASE FOR PRODUCTION	11/22/88	<i>W. J. ...</i>



CONTRACT NUMBER		LEXICON INC.	
ASSM. NO.		300 BEAVER ST., WALTHAM MA. 02154	
PART. NO. 710-06207		SCHEM, MOTHER BD, MRC	
APPROVALS	DATE	DRAWING NO. 060-06213	
DRAWN: S. NEALE	09/28/87	REV. 2	
CHECKED: <i>Dvd</i>	3-2-87	ISSUED: <i>Dvd</i>	3-2-87
ISSUED: <i>Dvd</i>	3-2-87	LAST REVISION: 02/03/88	SCALE: SCHEMATIC
		SHEET: 2 OF 3	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
1C		3-3-87	<i>[Signature]</i>
2	ADDED CAPS & FERRITE CHOKES RELEASE FOR PRODUCTION	11/2/88	<i>[Signature]</i>



CONTRACT NUMBER		LEXICON INC.	
ASSM. NO.		100 BEAVER ST. WALTHAM MA. 02154	
PART. NO. 710-06207		SCHEM. MOTHER BD, MRC	
APPROVALS	DATE	DRAWING NO. 060-06213	
DRAWN: S. NEALE	09/28/87	REV. 2	
CHECKED: <i>[Signature]</i>	3-3-88	SIZE D	CODE
ISSUED: <i>[Signature]</i>	3-3-88	SCHEM. MOTHER BD, MRC	
LAST REVISION:	02/03/88	SCALE: SCHEMATIC	SHEET: 3 OF 3

4

3

2

1

D

D

C

C

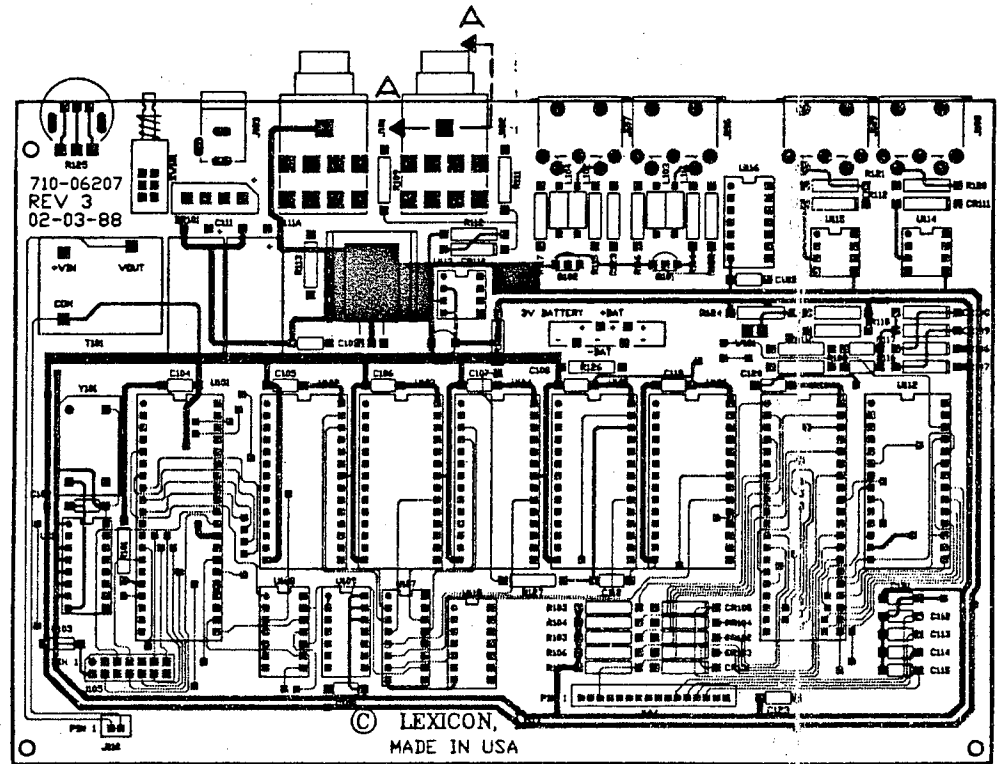
B

B

A

A

REVISIONS			
REV.	DESCRIPTION	DWR/CHKD	Q.C./AUTH
0	RELEASE FOR PRODUCTION	J.V. 7/14/88 M.H. 7/14/88	L.A. 7/14/88 D.H. 7/14/88



LUG, SOLDER, LOCKING, .048"
PN 620-06653



SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES XX .00X		CONTRACT NO.		lexicon	
MATERIAL		APPROVALS	DATE	PC, ASSY, DWG, MOTHER BD, MRC	
FINISH		DRAWN J.V.	7/14/88	SIZE FCOM NO.	DWG. NO. 080-06212
NEXT ASSY	USED ON	CHECKED M.H.	7/14/88	SCALE 1:1	REV. 0
APPLICATION		Q.C. L.A.	7/14/88	SHEET 1 OF 1	
DO NOT SCALE DRAWING		ISSUED D.H.	7/14/88		

4

3

2

1

Lexicon, Inc.
100 Beaver Street
Waltham MA 02154-8425
(617) 891-6790
Telex 923468
Fax (617) 891-0340

Lexicon Part No. 070-06953

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