

LR-4 LARC Framelink

Service Manual

lexicon

Precautions

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Safety Suggestions

Read Instructions Read all safety and operating instructions before operating the unit.

Retain Instructions Keep the safety and operating instructions for future reference.

Heed Warnings Adhere to all warnings on the unit and in the operating instructions.

Follow Instructions Follow operating and use instructions.

Heat Keep the unit away from heat sources such as radiators, heat registers, stoves, etc., including amplifiers which produce heat.

Ventilation Make sure that the location or position of the unit does not interfere with its proper ventilation. For example, the unit should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a cabinet which impedes the flow of air through the ventilation openings.

Wall or Ceiling Mounting Do not mount the unit to a wall or ceiling except as recommended by the manufacturer.

Power Sources Connect the unit only to a power supply of the type described in the operating instructions, or as marked on the unit.

Grounding or Polarization* Take precautions not to defeat the grounding or polarization of the unit's power cord.

*Not applicable in Canada.

Power Cord Protection Route power supply cords so that they are not likely to be walked on or pinched by items placed on or against them, paying particular attention to cords at plugs, convenience receptacles, and the point at which they exit from the unit.

Nonuse Periods Unplug the power cord of the unit from the outlet when the unit is to be left unused for a long period of time.

Water and Moisture Do not use the unit near water — for example, near a sink, in a wet basement, near a swimming pool, near an open window, etc.

Object and liquid entry Do not allow objects to fall or liquids to be spilled into the enclosure through openings.

Cleaning The unit should be cleaned only as recommended by the manufacturer.

Servicing Do not attempt any service beyond that described in the operating instructions. Refer all other service needs to qualified service personnel.

Damage requiring service The unit should be serviced by qualified service personnel when:

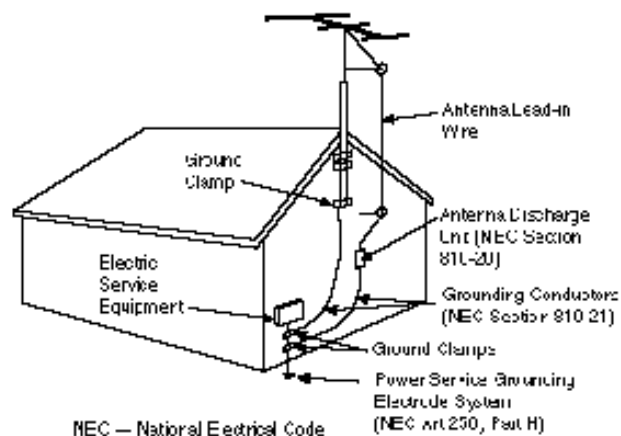
the power supply cord or the plug has been damaged, objects have fallen, or liquid has been spilled into the unit,

the unit has been exposed to rain,

the unit does not appear to operate normally or exhibits a marked change in performance,

the unit has been dropped, or the enclosure damaged.

Outdoor Antenna Grounding If an outside antenna is connected to the receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70-1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna-discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See figure below.



Power Lines An outside antenna should be located away from power lines.

SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. Failure to comply with these precautions, or with specific warnings elsewhere in these instructions violates safety standards of design manufacture and intended use of the instrument. Lexicon assumes no liability for the customer's failure to comply with these requirements.

GROUND THE INSTRUMENT

To minimize shock hazard the instrument chassis and cabinet must be connected to an electrical ground. The instrument is equipped with a three-conductor AC power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing and adjusting.

SAFETY SYMBOLS

General definitions of safety symbols used on equipment or in manuals.



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.



Indicates dangerous voltage. (Terminals fed from the interior by voltage exceeding 1000 volts must be so marked.)

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition or the like which, if not correctly performed or adhered to, could result in injury or death to personnel.

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE:

The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like which is essential to highlight.



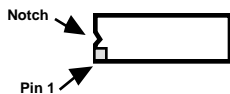
CAUTION

Electrostatic Discharge (ESD) Precautions

The following practices minimize possible damage to ICs resulting from electrostatic discharge or improper insertion.

- Keep parts in original containers until ready for use.
- Avoid having plastic, vinyl or styrofoam in the work area.
- Wear an anti-static wrist-strap.
- Discharge personal static before handling devices.
- Remove and insert boards with care.
- When removing boards, handle only by non-conductive surfaces and never touch open-edge connectors except at a static-free workstation.*
- Minimize handling of ICs.
- Handle each IC by its body.
- Do not slide ICs or boards over any surface.
- Insert ICs with the proper orientation, and watch for bent pins on ICs.
- Use anti-static containers for handling and transport.

*To make a plastic-laminated workbench anti-static, wash with a solution of Lux liquid detergent, and allow to dry without rinsing.



CAUTION

ICs inserted backwards will be destroyed. Incorrect insertion of ICs is also likely to cause damage to the board.

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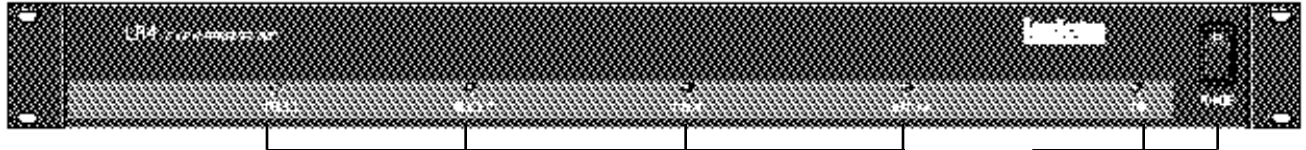


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1 Controls and Connectors

LR-4 Front Panel



MACH 1-4 LEDs
Indicate which machine is currently selected for LARC control.

Power
Provides front panel control of power on/off. LED lights when power is on.

LR-4 Rear Panel



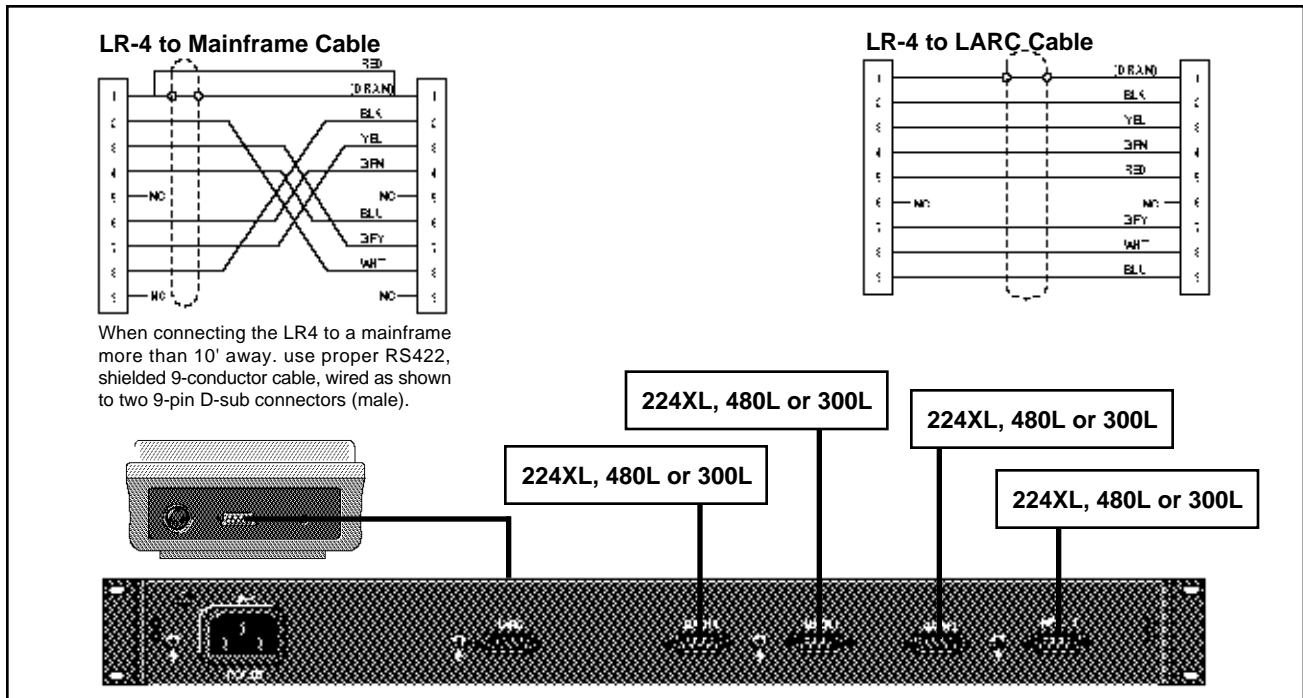
AC Power
Standard 3-pin IEC power connector. 100-115/230V, 50-60Hz internal switches set voltage.

LARC
DE9 connector for interface with LARC (Lexicon Alphanumeric Remote Control).

MACH 1-4
DE9 connectors for interface to LARC ports of Lexicon 224XL, 480L or 300L.

Connection to the LARC should be made via the flexible 50 ft. cable supplied with the LARC. Connection to other Lexicon devices (224XL, 480L and 300L) should be made using a 10 ft Framelink cable, Lexicon Part No. 680-04734.

LR-4 Connections



Periodic Maintenance

Under normal conditions the LR-4 requires minimal maintenance. Use a soft, lint-free cloth slightly dampened with warm water and a mild detergent to clean the exterior surfaces of the unit.

Do not use alcohol, benzene or acetone-based cleaners or any strong commercial cleaners.

Avoid using abrasive materials such as steel wool or metal polish. If the unit is exposed to a dusty environment, a vacuum or *low-pressure* blower may be used to remove dust from the unit's exterior.

Ordering Parts

When ordering parts, identify each part by type, value and Lexicon Part Number. Replacement parts can be ordered from:

Lexicon, Inc.
3 Oak Park
Bedford, MA 01730
Tel 781-280-0300
Fax 781-280-0499
Attn: Customer Service

Returning units for service

Before returning a unit, for warranty or non-warranty service, consult with Lexicon to determine the extent of the problem, and to obtain Return Authorization. No equipment will be accepted without Return Authorization from Lexicon.

If you choose to return an LR-4 to Lexicon for service, Lexicon assumes no responsibility for the unit in shipment from customer to the factory, whether the unit is in or out of warranty. All shipments must be well packed (using the original packing materials if possible), properly insured, and consigned to a reliable shipping agent.

When returning a unit for service, please include the following information:

- Name
- Company name
- Street address
- City, State, Zip Code, Country
- Telephone number (including Area Code)
- Serial number of unit
- Description of the problem
- Preferred method of return shipment
- Return Authorization #, both inside and outside of package

Please enclose a brief note describing conversations with Lexicon personnel and give the name and telephone number of the person directly responsible for maintaining the unit.

Do not include accessories such as manuals, cables, footswitches, etc. with the unit, unless specifically requested to do so by Lexicon Service personnel.

2 Specifications

Dimensions

19.0"W x 1.75"H x 4"D
(483x45x102mm)
19" rack mount standard, 1U high

Weight

Net weight: 2.75lbs (1.24kg)
Shipping weight: 3.75lbs (1.7kg)

Power Requirements

100/115VAC, -5/+10%
or 230VAC, \pm 10%, 50-60 Hz, 10W (Factory set)

Connectors

3-pin IEC power connector

Rear Panel Connectors

5 female DE-9 connectors,
RS-422 serial communication, 9600 Baud

Front Panel Control

5 LEDs, AC power switch

Environment

Operating

Temperature 32° to 95°F (0° to 35° C)

Storage -22° to 167°F (-30° to 75°C)

Relative

Humidity 95% max without condensation

Specifications subject to change without notice.

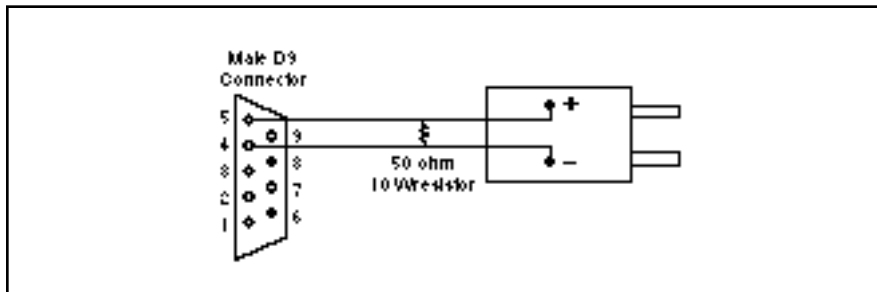
3 Performance Verification

- Clean antistatic well lit work area
- LR-4 Test Cable 10ft male to male D9 for testing the MACH ports (Lexicon P/N680-04734 or equivalent)
- LR-4 Power Supply Test Cable (custom: see diagram below)
- Variac w/voltage and current measuring capabilities
- Digital Multi Meter (DMM)
- LR-4 AC Power Cord (Lexicon P/N 680-00841 or equivalent)
- 2 Conductor Diagnostic Jumper Block (Lexicon P/N 490-02356 or equivalent)

Required Equipment

1. Connect the male D9 connector of the LR-4 Power Supply Test Cable to the female D9 connector on the rear panel of the LR-4.
2. Connect the dual banana connector of the LR-4 Power Supply Test Cable to the DMM in the DC volts mode; 20 volt range.
3. Power on the DMM.
4. Set the Variac to 0VAC minimum.
5. Set the power switch on the LR-4 OFF.
6. Using the AC power cord, connect the male plug to the isolated variable output on the Variac and the other end to the AC connector on the LR-4.

Setup



LR-4 Power Supply Test Cable

AC Current 120VAC Units

1. Set the power switch on the LR-4 to ON.
2. Slowly increase Variac to 120VAC.
3. Verify that the AC current draw is <0.12 Amps.

230VAC Units

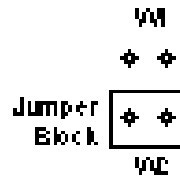
1. Set the power switch on the LR-4 to ON.
2. Slowly increase Variac to 230VAC.
3. Verify that the AC current draw is <0.06 Amps.

Power Supply/LEDs Initialization

1. Verify that the reading on the DMM is between 15VDC - 20VDC.
2. Power off the LR-4, wait for one second, then power on the LR-4.
3. Verify that the MACH 3 LED is lit for approximately one second, followed by the momentary lighting of the MACH 1 LED, and then no LEDs lit.
4. Power off the LR-4.
5. Remove the male D9 connector from the LR-4 connected to the female D9 connector (labeled LARC).

Wraparound Test

1. Install the 2-conductor diagnostic jumper block at W2 on the LR-4 PC board. W2 is located on the far left side of the PC board when facing the front of the unit. See diagram below.



2. Using the LR-4 Test Cable, connect one end to the LR-4 rear panel LARC connector and the other end to the MACH 1 connector.
3. Power on the LR-4.
4. Verify that after approximately two seconds the MACH 1 LED is lit (not flashing) and that the other three LEDs are off.

Note: When the connector isn't installed at a MACH connector, the MACH LEDs will light in rapid succession from right to left until a connection is made.

5. Move the connector from MACH 1 to MACH 2 and repeat step 4.
6. Repeat for MACH 3 and MACH 4.
7. Power off the LR-4.
8. Disconnect the LR-4 Test Cable from the LR-4.
9. Move the 2-conductor diagnostic jumper block from W2 on the PC board to W1.

1. Power on the LR-4 and verify that the MACH 3 LED is lit, and that the MACH 1 and MACH 4 LEDs flash about once per second. This is the diagnostic loop test.

After running the diagnostic loop for the desired period of time, verify that the unit is still in the diagnostic loop test by verifying that the MACH 3 LED is lit and that the MACH 1 and MACH 4 LEDs flash about once per second. If not, record which LEDs are lit and troubleshoot the unit.

2. Remove the 2-conductor diagnostic jumper block from W1 on the PC board.
3. Power on the LR-4 at the configured line voltage and verify that the MACH 3 LED is lit for approximately one second, followed by the momentary lighting of the MACH 1 LED lit, then no LEDs lit.
4. Power off the LR-4 and remove the power cord.

Diagnostic Loop

On normal power up, the following sequence of diagnostic tests are performed:

LR-4 Power Up Diagnostics Descriptions

Test Name	Test Code (1=LED lit)	Error Code (1=LED lit)
CPU Test	0001	1001
SRAM Test	0010	1010
ROM Test	0100	1011
DUART Test	1000	1100

If an error is detected, an attempt will be made to write an error code to the front panel LEDs and the boot cycle will halt. For example, if the ROM Test fails, the MACH 1,3 and 4 LEDs will light as shown below.

1 0 1 1
 MACH 1 MACH 2 MACH 3 MACH 4

CPU Test (1001=Failure)

This test detects any stuck CPU register bits. The Z80 processor will try to pass a value through its internal registers. In the second pass, the data is inverted and passed through the registers again. If an error is detected, an attempt is made to write an error code to the front panel LEDs along with a walking 1s pattern on the data bus. The boot cycle is halted.

SRAM Test (1010=Failure)

This is a standard memory test that writes 55 (hex) into all memory locations, then reads them back to verify the data. The procedure is repeated with AA, FF and 00. If an error is detected (other than the Wraparound Test), an attempt is made to write an error code to the front panel LEDs and the boot cycle is halted. Any problems with the Static RAM, such as missing or shorted Address, Data or control lines should be detected by this test.

ROM Test (1011=Failure)

The ROM checksum, which is a byte size value, is located as the last byte in the ROM. The test will add up the entire ROM except the Checksum byte. The result should match the checksum byte. If an error is detected, an attempt is made to write an error code to the front panel LEDs and the boot cycle is halted.

DUART Test (1100=Failure)

This test verifies that the DUART data bus is operational. Incremental values are written to the internal vector and then the values are read back to verify the data. If an error is detected, an attempt is made to write an error code to the front panel LEDs and the boot cycle is halted. Any problems with the UART, such as missing or shorted Address, Data or Control lines should be detected by this test.

Extended Diagnostic Descriptions

Wraparound Test

This test verifies that the LARC and machine ports (4) are operational. Prior to performing this test, power off the LR-4 and install a jumper block (Lexicon P/N 490-02356) at W2 on the main board. A Male to Male D9 cable (Lexicon P/N 680-04734) is also needed to run the test. One end of the cable must be connected to the LR-4 rear panel connector labeled LARC and the other end to the MACH port connector under test.

Power on the LR-4 and verify that the LED on the tested MACH port lights when the cable is connected to it. This indicates that the port passed the test. The other MACH LEDs should be off. This test can be repeated for the remaining 3 ports. A problem with a MACH port under test will cause its LED to blink. Note: When the connector is not installed at a MACH connector, the MACH LEDs will light in rapid succession from right to left until a connection is made.

Burn In Loop

The Burn In Loop performs the CPU, SRAM, ROM and DUART Tests continuously. To execute this test, power off the LR-4 and install a jumper block (Lexicon P/N 680-04734) at W1 on the main board. The LR-4 will enter on power up. If a failure occurs during the burn in loop, the LR-4 will exit the diagnostic loop and display one of the error codes shown below. The LEDs will flash to represent the appropriate binary code for the failed test. The MACH 1 LED is the most significant bit and the MACH 4 LED is the least significant bit.

Test Name	Error Code
CPU Test	1001
SRAM Test	1010
ROM Test	1011
DUART Test	1100

The LR4 permits a single LARC to individually control as many as 4 Lexicon machines (224XL, 480L or 300L) individually. Its processor is a Z80 running off an external oscillator clocking at 6.144MHz. An additional crystal oscillator of 3.6864MHz is connected directly to the internal oscillator circuit of an 88C681 DUART. This frequency provides the necessary Baud rate (9600) for the RS422 serial I/O data. There are 4 machine ports and 1 LARC port connected to a 88C681 DUART.

Overview

The processor can monitor the LARC port for commands which indicate user machine selection. Serial data is moved back and forth between the LARC and the selected machine. LED indicators on the front panel are accessible, enabling both machine selection indication and diagnostic status.

Functions

The processor system consists of a Z80 (Z80C-6, U9), a 32kx8 ROM (27C256, U8), an 8kx8 RAM (4364, U7), and a DUART (88C681, U12). All software and hardware access is memory-mapped into the Z80 memory address — no I/O addressing is decoded. The 74HC32 (U11) is all that is needed to provide decoding for access to the ROM, RAM, and DUART.

Z80 Addressing

A15	A14	Function (U11)			
0	x	32k x 8 PROM, 27C256 (A14 - A0) R (U8)			
1	0	8k SRAM, 4364, upper 8k address not used (A12-A0) R/W (U7)			
1	1	DUART, 88C681 (U12)			

A3	A2	A1	A0	Read Function	Write Function
0	0	0	0	Mode reg A	=
0	0	0	1	Status reg A	Clock reg A
0	0	1	0	Interrupt stat reg	Commnd reg A
0	0	1	1	Rx Holding reg A	Tx Holding reg A
0	1	0	0	Input change reg	Aux Ctl reg
0	1	0	1	Interrupt stat reg	Interrupt mask reg
0	1	1	0	Upper Ctr/Tmr byte	Upper Ctr/Tmr reg
0	1	1	1	Lower Ctr/Tmr byte	Lower Ctr/Tmr reg
1	0	0	0	Mode reg B	=
1	0	0	1	Status reg B	Clock reg B
1	0	1	0	(reserved)	Commnd reg B
1	0	1	1	Rx Holding reg B	Tx Holding reg B
1	1	0	0	Interrupt vector reg	=
1	1	0	1	Input port	Output port
1	1	1	0	Start Ctr commnd	Set output port
1	1	1	1	Stop Ctr commnd	Rst output port

Duart I/O The DUART parallel input port has jumper positions and I/O port connectors attached to IP0-IP5. Jumpers W1 and W2 are used to select various diagnostic tests by grounding the IP0 and IP1 inputs.

IP0 = 0V W1 Jumper Installed - Run Loop Test
 IP1 = 0V W2 Jumper installed - Run Wraparound Test
 IP2 = 0V MACH 1 - Cable and Machine connected
 IP3 = 0V MACH 2 - Cable and Machine connected
 IP4 = 0V MACH 3 - Cable and Machine connected
 IP5 = 0V MACH 4 - Cable and Machine connected

The parallel output port (OP0-OP7) is broken into 2 nibbles of 4 bits each. The least significant nibble (L0/-L3/) controls the front panel LEDs and the machine port receive serial selection. The most significant nibble (L4/-L7/) controls the machine port transmission serial selection. These outputs are open collector types, hence the pull-up resistors R27-30 and R35-38 of 5.1k each. These bits provide gated selections through U13-15 74HC125 ICs. Dedication of the most significant bits (L4/-L7/) to the serial transmission control enables selection of all ports simultaneously for forwarding the LARC active character to all machines at once. The outputs are bit mapped as follows:

OP7 = 0 MACH 4 Port 4 Serial Output
 OP6 = 0 MACH 3 Port 3 Serial Output
 OP5 = 0 MACH 2 Port 2 Serial Output
 OP4 = 0 MACH 1 Port 1 Serial Output
 OP3 = 0 MACH 4 LED and Port 4 Serial Input
 OP2 = 0 MACH 3 LED and Port 3 Serial Input
 OP1 = 0 MACH 2 LED and Port 2 Serial Input
 OP0 = 0 MACH 1 LED and Port 1 Serial Input

The LARC port is connected to serial port "A" and the MACH ports are switched into serial port "B". The DUART IRQ/ is tied to the Z80 INT/ for interrupts. The unused Z80 NMI/ is pulled up (R32).

Serial Data Ports All serial ports utilize the RS422 EIA standard for communications via the UA9638 and UA9637 chips (U1 - U6). Command coding information is provided via programmed ROM. Inactive or unselected ports are in the mark state via the pull-up resistors R9, R10, R17 and R18, allowing the machines to see a mark state LARC condition when not in use. The tri-state outputs also permit U13 outputs to be OR-tied for single serial input selection. The I/O ports indicate connection by virtue of the two signal grounds tied together in each machine. Pins 4 and 6 of each port connector carry the signal return grounds for the serial signals, providing an indication to the software when a machine is connected. The pull-up resistors R1, R7, R11 and R15 are grounded when pin 6 of J1-J4 connects to pin 4, signaling the processor through the DUARTS IP2-IP5 inputs. Capacitors C1, 3, 5 and 7 provide the AC ground for the signals, and the resistors R2, 8, 12, and 16 with diodes D1-4 provide the necessary current and static protection.

Power on reset is accomplished by use of a spare UA9638 RS422 node (U5). Hysteresis is added by R20 and the reset pulse is approximately 20-30ms at power on.

Power

The power input uses a standard IEC 3-wire connector, allowing various 3-wire power cords to be used for different countries. Power is fused using either a 1/8A fuse for 100V and 120V operation or a 1/16A fuse for 230V operation. Discrete line filtering is done with C28-C30 and L1 for RFI suppression. The transformer, (T1) operates within spec at 100V line when the voltage changeover switch (SW1) is in the 120V position. This 10VA transformer will supply adequate secondary voltage when the line is 10% low for LARC power under worst conditions. For example, at 90V line (100V -10%) and the LARC running the LED test, the voltage should be >10VDC to guarantee LARC operation over a 50ft cord. The measured output under this condition is approximately 12.2VDC.

The regulated 5V supply uses a LM2574 (U16) simple switcher configuration to overcome heat problems. Linear TIP220 type regulators can handle 2W maximum across the 5V regulator with no heat sink, the LR4 dissipating 3.8W when the line is high and the LARC is disconnected.

Diagnostic software is simple. Front panel LEDs are used to indicate which test has failed by lighting more than one LED, in contrast to normal operation where each LED indicates which machine is selected, and failure. When power is applied the following sequence takes place:

Diagnostics

Power on Sequence	LED Code (1=On)	
Initialize		
CPU Test	1 0 0 1	Stall if failure
RAM Test	1 0 1 0	"
ROM Test	1 0 1 1	"
LED Test	1 1 0 0	"
W1 Jumper	Installed	Run I/O Loop Test
W2 Jumper	Installed	Run I/O Wraparound Test

+16VD	Unregulated LARC power
+5VD	Switching supply output
A0-A15	Z80 (U9) address output lines
D0-D7	Z80 (U9) data I/O lines
GNDC	Chassis ground
GNDD	Circuit ground
RST	Power on reset for DUART (U12)
INT/	Z80 (U9) interrupt from DUART (U12)
L0-L3/	Machine input port and panel LED enable
L4-L7/	Machine output port enable
MREQ/	Z80 (U9) memory access time
RD/	Z80 (U9) read time for MEM (U7) and DUART (U12)
RST/	Power reset to Z80 (U9) from U10
WR/	Z80 (U9) write time for MEM (U7) and DUART (U12)

Signal Names

5 Parts List

MAIN BOARD

PART NO.	DESCRIPTION	QTY	EFF•INACT	REFERENCE
CARBON FILM RES				
202-00514	RES,CF,5%,1/4W,100 OHM	4		R2,8,12,16
202-00516	RES,CF,5%,1/4W,180 OHM	1		R22
202-00521	RES,CF,5%,1/4W,330 OHM	5		R33,34,39-41
202-00524	RES,CF,5%,1/4W,470 OHM	1		R25
202-00529	RES,CF,5%,1/4W,1K OHM	4		R5,6,13,14
202-00543	RES,CF,5%,1/4W,5.1K OHM	23		R1,3,4,7,9-11,15,17,18,21, R23,26-32 R35-38
202-00545	RES,CF,5%,1/4W,6.8K OHM	1		R19
202-00549	RES,CF,5%,1/4W,10K OHM	1		R20
202-00581	RES,CF,5%,1/4W,10M OHM	1		R24
ELECTROLYT CAP				
240-00609	CAP,ELEC,10uF,16V,RAD	1		C11
240-03574	CAP,ELEC,3300uF,35V,RAD,LO-PRO	1		C21
240-05764	CAP,ELEC,330uF,25V,RAD,LO-PRO	1		C26
PCRB/PP CAP				
244-10727	CAP,MYL,.001UF,250V,20%	2		C28,29
244-10768	CAP,MYL,.015UF,250V,INTL,.6SP	1		C30
CERAMIC CAP				
245-01164	CAP,CER,10pF,50V,10%	1		C31
245-02105	CAP,CER,5pF,500V,10%,NPO	1		C32
245-03609	CAP,CER,.1uF,50V,Z5U,AX	22		C1-10,12-15,18-20,22-25,27
245-07544	CAP,CER,18pF,100V,COG,10%,AX	2		C16,17
INDUCTORS				
270-00779	FERRITE,BEAD	11		FB1-11
270-03497	INDUCTOR,300uH,1A,SWITCHING	1		L2
270-03899	INDUCTOR,2.2mH,LINE CHOKE	1		L1
DIODES				
300-01029	DIODE,1N914 AND 4148	4		D1-4
300-02401	DIODE,BAR 35,SCHOTTKY,LOW VF	1		D5
300-03498	DIODE,SCHOTTKY,POWER,3A	1		D7
300-03546	DIODE,BRIDGE,2A,200V	1		D6
DIGITAL IC				
330-07067	IC,DIGITAL,74HCU04	1		U10
330-07260	IC,DIGITAL,74HC32	1		U11
330-09084	IC,DIGITAL,74HCT125	3		U13-15
LINEAR IC				
340-10649	IC,LINEAR,LM2574N-5.0,SW REG	1		U16
INTERFACE IC				
345-03207	IC,INTER,uA9638,LINE DRVR	3		U2,4,5
345-03208	IC,INTER,uA9637A,LINE RCVR	3		U1,3,6

PART NO.	DESCRIPTION	QTY	EFF•INACT	REFERENCE
MEMORY IC				
350-04282	IC,SRAM,4364,8KX8,150NS,LPS	1		U7
350-10730	IC,ROM,27C256,LR4,V1.00	1		U8
MICROPROC IC				
365-04834	IC,uPROC,Z80B,CMOS,6MHZ	1		U9
365-06565	IC,uPROC,DUART,88C681	1		U12
CRYSTALS				
390-04645	CRYSTAL,3.6864MHZ	1		Y2
390-10590	CRYSTAL,6.144 MHz	1		Y1
DISPLAY/IND/LED				
430-05485	LED,T1,GRN	5		D8-12
FUSES				
440-02347	FUSE,5X20MM,SLO-BLO,.125AMP	1		F1 - 120V ONLY
440-07784	FUSE,5X20MM,SLO-BLO,1/16AMP	1		F1 - 230V ONLY
SWITCHES				
451-02230	SW,SL,2P2T,V-CHNG,PC,4A	1		SW1 SET TO 120 OR 230V
TRANSFORMERS				
470-10728	XFORMR,PWR,10VA,115/230V,15/30	1		T1
PC MNT CONN				
510-03961	CONN,POST,100X025,HDR,2MCG	2		W1,2
510-05885	CONN,TEST POINT,PC MNT	1		TP1
510-10725	CONN,D-SUB,9FC,PCRA,4-40SCRWLK	5		J1-5
510-10726	CONN,POST,156X045,HDR,2MC,RA	1		J6
SOCKETS				
520-01458	IC SCKT,28 PIN,PC,LO-PRO	1		U8
STRAIN REL				
530-02489	TIE,CABLE,NYL,.1"X4"	1		L2
FUSE CLIPS				
600-02227	FUSE CLIP,20MM,PC	2		F1
MACHINE SCREWS				
640-01701	SCRW,4-40X1/4,PNH,PH,ZN	4		KEYSTONE BRACKET
THRD-FROM SCRWS				
641-06574	SCRW,TAP,SW,4-40X1/2,PNH,PH,BZ	4		XFORMER MTG
PRE CUT WIRE				
675-10735	WIRE,22G,BRN,2",.187QDCRA/ST&T	2		E1,2
BRACKETS				
701-09640	BRACKET,KEYSTONE,#621,4-40	4		

MECHANICAL ASSEMBLY

PART NO.	DESCRIPTION	QTY	EFF•INACT	REFERENCE
ROCKER SWITCH				
454-03900	SW,ROCKER,1P1T,QDC,INTL LINE	1		FRONT PANEL
CONNECTORS				
490-10724	CONN,AC,3MC,SNAP,040TH,IEC,10A	1		COVER
MACHINE SCREWS				
640-01701	SCRW,4-40X1/4,PNH,PH,ZN	4		MAIN BD TO FR PNL
THRD-FRM SCRWS				
641-10243	SCRW,4-40X3/8,TH,T9,BZ,LOK	10		REAR CVR TO KEYSTONE (4) COVER TO EARS (6)
NUTS				
643-01728	NUT,6-32,KEP,ZN	1		GND LUG MTG
PRE CUT WIRE				
675-08272	WIRE,18G,GRN/YEL,3",#6RING/SS	1		CVR TO IEC CONN
CABLES/CORDS				
680-10729	CABLE,HSG/SS,2C,22G,4.5"	1		AC CONN (N.AMER)
680-08830	CORD,POWER,IEC,6A,2M,EURO	1		
680-10093	CORD,POWER,IEC,5A,2M,UK	1		
680-10097	CORD,POWER,IEC,6A,2M,JAPAN	1		
680-10094	CORD,POWER,IEC,6A,2M,ITALY	1		
680-10095	CORD,POWER,IEC,6A,2M,SWISS	1		
680-10096	CORD,POWER,IEC,6A,2M,AUSTRALIA	1		
SLEEVING				
690-02060	SLEEVING,SHRINK,3/16X1/2LG,BLK	2		IEC CONN
CHASSIS/MECH				
700-10721	COVER,LR4	1		
702-09564	PANEL,SIDE CASTING,HAL,BLK	2		
702-10718	PANEL,FRONT,LR4	1		
PLASTICS				
720-09539	TAPE,FOAM,.032X.25X7	4		COVER

6 Schematics

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