



If You Didn't Get This From My Site,
Then It Was Stolen From...
www.SteamPoweredRadio.Com

MOSELEY ASSOCIATES, INC.

Warranty

All equipment designed and manufactured by Moseley Associates, Inc. is warranted against defects in workmanship and material that develop under normal use within a period of one (1) year, or (2) years for all MRC series equipment, from the date of original shipment, and is also warranted to meet any specifications represented in writing by Moseley Associates, Inc., so long as the purchaser is not in default under his contract of purchase and subject to the following additional conditions and limitations:

1. The sole responsibility of Moseley Associates, Inc. for any equipment not conforming to this Warranty shall be, at its option:

A. To repair or replace such equipment or otherwise cause it to meet the represented specifications either at the purchaser's installation or upon the return thereof f.o.b. Goleta, California, as directed by Moseley Associates, Inc.; or

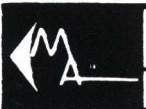
B. To accept the return thereof f.o.b. Goleta, California, credit the purchaser's account for the unpaid portion, if any, of the purchase price, and refund to the purchaser, without interest, any portion of the purchase price theretofore paid; or

C. To demonstrate that the equipment has no defect in workmanship or material and that it meets the represented specifications, in which event all expenses reasonably incurred by Moseley Associates, Inc., in so demonstrating, including but not limited to costs of travel to and from the purchaser's installation, and subsistence, shall be paid by purchaser to Moseley Associates, Inc.

2. In case of any equipment thought to be defective, the purchaser shall promptly notify Moseley Associates, Inc., in writing, giving full particulars as to the defects. Upon receipt of such notice, Moseley Associates, Inc. will give instructions respecting the shipment of the equipment, or such other manner as it elects to service this Warranty as above provided.

3. This Warranty extends only to the original purchaser and is not assignable or transferable, does not extend to any shipment which has been subjected to abuse, misuse, physical damage, alteration, operation under improper conditions or improper installation, use or maintenance, and does not extend to equipment or parts not manufactured by Moseley Associates, Inc. and such equipment and parts are subject to only adjustments as are available from the manufacturer thereof.

4. No other warranties, express or implied, shall be applicable to any equipment sold by Moseley Associates, Inc. and no representative or other person is authorized by Moseley Associates, Inc. to assume for it any liability or obligation with respect to the condition or performance of any equipment sold by it, except as provided in this Warranty. This Warranty provides for the sole right and remedy of the purchaser and Moseley Associates, Inc. shall in no event have any liability for consequential damages or for loss, damage or expense directly or indirectly arising from the use of equipment purchased from Moseley Associates, Inc.



MOSELEY ASSOCIATES, INC.

A FLOW GENERAL COMPANY

SANTA BARBARA RESEARCH PARK

111 CASTILIAN DRIVE
GOLETA, CALIFORNIA 93017
TELEPHONE: (805) 968-9621
TELEX: 658448 CABLE: MOSELEY

INSTRUCTION MANUAL

MODEL MRC-1
POWER-FAIL MEMORY OPTION

MOSELEY ASSOCIATES, INC.
Santa Barbara Research Park
111 Castilian Drive
Goleta, California 93017

(805) 968-9621

September 1980

*TECH SUPPORT
DAVE - 213*

TABLE OF CONTENTS

1. INTRODUCTION	Page 1-1
2. SPECIFICATIONS	2-1
3. OPERATION	3-1
3.1 If Installed at Remote Terminal	3-1
3.2 If Installed at Control Terminal	3-3
3.3 Some Notes About Batteries	3-3
3.4 Further Notes	3-4
4. INSTALLATION	4-1
5. CIRCUIT DESCRIPTION	

1. INTRODUCTION

The Power-Fail Memory Option adds an extra measure of convenience and security to an MRC-1 Microprocessor Remote Control System.

In the standard MRC-1 Remote Terminal, calibration factors, alarm tolerances, status attributes, and other "programming" data entered by the user is stored in a static Random-Access Memory (RAM) with battery back-up. If for any reason battery power is removed when main power is also down, the contents of the RAM will be lost, and the system must therefore be set up again.

Similarly, commands entered for the Automatic Logging Option (if installed) are also stored in RAM, and are therefore subject to loss if all power is removed.

The Power-Fail Memory Option provides a non-volatile back-up copy of the contents of the Random-Access Memory, using advanced Electrically-Alterable-Read-Only Memory (EAROM) Integrated Circuits. A copy is automatically made whenever any important parameter is changed. After any sort of power failure or reset, the contents of RAM are restored automatically from the EAROM. Operation of the MRC-1 is in no way changed when the Power-Fail Memory Option is installed.

When equipped with the Power-Fail Memory Option, an MRC-1 Terminal may undergo service or maintenance operations and be completely removed from all power for an indefinite period of time (up to ten years) and be ready for operation immediately after power is reapplied. The Power-Fail Memory Printed Circuit Board Module may itself be removed from the MRC-1 chassis without loss of data.

2. SPECIFICATIONS

The Power-Fail Memory Option is an option of the MRC-1 Microprocessor Remote Control System. The specifications listed here are supplemental to those listed in the MRC-1 Control Terminal and Remote Terminal Instruction Manuals.

Components of Option	1 plug-in printed circuit module to be mounted in MRC-1 Control or Remote Terminal (depending on data to be protected)
Storage Technology	High-speed Electrically-Alterable-Read-Only Memory (EAROM) of Metal-Nitride-Oxide Semiconductor (MNOS) type
Operating Temperature	0°C-50°C
Read Cycles	2×10^{11}
Erase-Write Cycles	10^5
Non-Volatile Storage	10 years

3. OPERATION

The key elements of each Power-Fail Memory Printed Circuit Module are the four ER3400 Electrically-Alterable-Read-Only Memory (EAROM) integrated circuits.

These MNOS (metal-nitride-oxide semiconductor) devices can retain data for up to ten years even when all power has been removed.

Programming these integrated circuits involves three power supplies (-30V, -12V, and +5V) and a rather complex and time-consuming series of timing signals. Writing all necessary data may require from two to ten or more minutes. During the period when data is being written, the system will have a "cold start" (i.e., you must push "ACK" at the Remote Terminal, push "RETURN" at the logger, etc.) in the event of a power failure (unless a battery is connected to that MRC-1 Terminal).


The manufacturer specifies that the ER3400 may experience a total of 100,000 erase-write cycles during its lifetime. These limitations have determined two basic aspects of the design of the MRC-1 software:

1. A five-minute delay ensures that when many different critical parameters are being changed at the same time, only one erase-write operation will be performed. (Each change of a critical parameter resets the delay timer to five minutes).
2. Due to the vulnerability of the system during the erase-write period, only local events can trigger a back-up process. For instance, changing a limit from the Control Terminal will not trigger the back-up process on a Power-Fail Memory Option installed at a Remote Terminal. Therefore, the user may complete his setup procedure, wait for the back-up operation to be completed, and test the system by pulling the plug of the terminal where the option is installed, disconnecting the battery, and then plugging the unit in again. Since only setup-type operations trigger the back-up, the user then has complete assurance that recovery from power failure will be made properly.

3.1 IF INSTALLED AT REMOTE TERMINAL

The following operations at the Remote Terminal trigger the back-up operation:

UPPER LIMIT (but not if changed from the Control Terminal)
LOWER LIMIT (but not if changed from the Control Terminal)
CALIBRATE - LINEAR
CALIBRATE - POWER

CALIBRATE - INDIRECT
MAP RAISE (but not RAISE)
MAP LOWER (but not LOWER)
MUTE

LATCH
INV
Telemetry Failsafe Functions

Back-up will commence five minutes after any of the operations listed above are performed. Each operation resets the timer to five minutes. If you wish not to wait five minutes, but to commence the back-up operation immediately, pushing "SHFT" then "LAMPTEST" will set the timer to "0" and begin the erase-write cycle immediately. Allow at least ten minutes for the write operation to be completed. Do not push "RESET" during the erase-write cycle.

If an Automatic Logging Option is installed at the Remote Terminal, the following actions will trigger the back-up operation after a delay of five minutes:

- Add, change, or delete type "C" Commands
- Add, change, or delete type "E" Commands
- Add, change, or delete type "H" Commands
- Change type "P" Commands

Each back-up operation covers both the main Remote Terminal and the Remote Terminal Automatic Logging Option at once. Pushing "SHFT" and then "LAMPTEST" therefore will begin the erase-write cycle for the entire Remote Terminal, including any options installed.

After a power failure, limit checking will be enabled or disabled according to its status at the time of the erase-write cycle. (This is because limit checking is frequently turned on and off in normal operation, and if each change initiated a new back-up operation, the system would be "vulnerable" too often for reliable operation.)

Therefore, when making changes in the parameters listed above, you should be certain to set limit checking to its desired status after a power failure, and leave it that way for the duration of the period when the back-up data is being written.

3.2 IF INSTALLED AT CONTROL TERMINAL

At the Control Terminal, the following operations initiate the back-up operation:

- Add, change, or delete password
- Enable or disable site

These are in fact the only critical parameters which are stored in the Control Terminal Random-Access Memory. Everything else is fetched from the Remote Terminal as needed.

If the Control Terminal Automatic Logging Option has been installed, the following actions will trigger the erase-write cycle after a delay of five minutes:

- Add, change, or delete type "C" commands
- Add, change, or delete type "E" commands
- Add, change, or delete type "H" commands
- Change type "P" commands

Each back-up operation simultaneously covers both the standard Control Terminal and any options installed. There is no equivalent to pushing "SHFT" then "LAMPTEST" at the Control Terminal and therefore the five-minute delay period is mandatory.

3.3 SOME NOTES ABOUT BATTERIES

It is advisable to leave the Gel-Cell (R) battery connected to the MRC-1 terminals where the Power-Fail Memory Option is installed. This is for two reasons:

1. As mentioned above, during the erase-write cycle, if there is a power failure, the system will suffer a "cold start" in the event of a power failure, unless a battery is connected.
2. Certain items by their nature cannot be protected by writing them into an EAROM. The correct time is required by the Logger Option to operate properly, and of course the Power-Fail Memory Option is of no help here. A crystal-controlled clock is provided as part of the Logger Board circuitry, and this runs from battery power. Similarly, the current page position of the logger is recorded in RAM but changes far too often for back-up to be possible.

In the event of a power failure where the battery runs down, the time must be entered back into the system before logging can commence, and set-top-of-form function must be performed. However, all other commands will have been preserved.

3.4 FURTHER NOTES

Pushing the "RESET" button on the CPU board has the same effect as removing and reapplying AC power to the unit: recovery from the Power-Fail Memory Board occurs.

Any recovery accomplished from a Power-Fail Memory Board will put any Automatic Logger Option installed in the same terminal into "Log Mode"; therefore logging will automatically resume after a recovery.

It should be understood that each Power-Fail Memory Option protects only "local" data, i.e., a Power-Fail Memory Board installed at a Remote Terminal will not protect Control Terminal data stored at the Control Terminal.

During the erase-write cycle all functions of the terminal are in full operation and the back-up procedure is accomplished as time permits interspersed with the terminal functions. Therefore, the exact time required for a full erase-write cycle cannot be given precisely. The time required will vary from two to ten minutes.

4. INSTALLATION

If the Power-Fail Memory Option was shipped at the same time as the MRC-1 Terminal where the option is to operate, the module will be pre-installed at the factory. Otherwise, the user must install the printed circuit module as follows:

1. Upon removing the option from the shipping carton, inspect the printed circuit module carefully for damage that may have occurred in transit.
2. Verify that the MRC-1 Terminal where the module is to be installed operates properly without the module installed. You should be familiar with the operation of the MRC-1 before attempting installation of the Power-Fail Memory Option.
- 3.

CAUTION

ALWAYS REMOVE POWER FROM THE TERMINAL WHENEVER THE PRINTED CIRCUIT MODULES ARE REMOVED OR REPLACED IN THE UNIT. FAILURE TO OBSERVE THIS CAUTION MAY CAUSE DAMAGE TO ONE OR MORE MODULES. REMOVING POWER INCLUDES DISCONNECTING THE BATTERY (IF PRESENT) ALSO.

4. Install the Power-Fail Memory printed circuit module into the MRC-1 mother board as follows:

Standard Control Terminal: Install the module in the fourth slot counting from the bottom, i.e., in the next-to-the-topmost slot.

Remote Terminal (and MRC-1A Control Terminal): Install the module in the rightmost slot, at the opposite side of the chassis from the CPU card.

NOTE: The module will function equally well when installed in any slot (except the slot reserved for the CPU board). However, it is strongly advised that the board be installed in the standard locations given above. Future options and their instruction manuals will assume that all boards have been installed in their standard locations.

5. Apply power to the MRC-1 Terminal at which the Power-Fail Memory Option has been installed. The terminal and all associated devices should display a "cold start"

condition (i.e., you must push "ACK" at the Remote Terminal, push "RETURN" on the Logger, etc.). Operation of the terminals and their installed options should remain unchanged after the installation of the Power-Fail Memory Option.

POWER-FAIL MEMORY BOARD

Schematic 91D7187
Component Layout 20D2720
P.C. Board 51C5887

I. PURPOSE

This board provides 2048 bytes of non-volatile storage on Electrically-Alterable-Read-Only-Memory (EAROM) along with the support circuitry necessary to read and write data.

II. TECHNICAL DESCRIPTION

Data is read and written via a Motorola MC6821 Peripheral Interface Adapter (PIA). The A-side data register is used to transmit and receive the actual data, while the B-side data register contains timing, addressing, and control bits (which must be set by software in a correct sequence of operations to accomplish successful read and write operations.)

The PIA will respond to a block of four addresses. Which addresses these are depend on the settings of the four switches contained in S1. If all four switches are in the "OFF" position, the gates of U17 all function as inverters and the CS1 line of the PIA is set high when addresses 8100H, 8101H, 8102H, or 8103H appear on the address bus. (The MRC-1 software assumes that all four switches are off and that this block of addresses has been selected.)

The two least significant bits of the address bus are connected to the two Register Select lines (RS1, RS0) of the PIA. The four possible bit patterns determine which of the four register addresses within the PIA have been selected.

U16 and U20 (SN74LS244) provide three-state bus interfacing for the data lines. These gates are enabled as required whenever a read or write operation is performed to or from the PIA.

This board is designed to write to sequential (rather than random) addresses on the EAROM chips. Therefore, the address counters U6, U7, and U8 (SN74LS163) may be cleared (by setting PB3 high then low again) or advanced (by setting PB2 high then low again) from the PIA B-register.

Actual storage of data takes place in U1, U2, U3, and U4. These are ER3400 EAROM's. Three power supplies are required for read and write operations: +5V, -12V (provided by VR1) and -30V (provided by the block of circuitry shown at the upper right of the schematic).

Since erase and write operations require -30V, this power supply is switched on and off by line CB2 from the PIA in order to prevent "glitches" (which could write incorrect data onto the ER3400 chips when the board is powered up or down).

When line CB2 is in its high state, the photo-transistor in opto-isolator U5 can conduct current, switching on Q1 and Q2, and thereby providing -30V to the EAROM's.

The -30V supply is provided by op-amp U11. The output of U11 at pin 6 oscillates between +15V and -15V. This signal is coupled through C11, so the "-" side of C11 oscillates between -30V and -45V. This signal is rectified by CR2 and CR3 and filtered by C10, causing a value of approximately -37V to appear on the input of VR2. VR2 maintains a difference of -15V between its output and ground terminals. Since the "ground" terminal is connected to the -15V power supply, -30V appears at the output of VR2.

A read, write, or erase function on the ER3400 is performed as follows:

1. Set up address on A0-A9
2. Set up function on C0 and C1 as follows:

	$\frac{C0}{0}$	$\frac{C1}{0}$
Read	0	0
Write	1	0
Erase	0	1

3. Set *CE (chip enable) low if reading. Data will appear on D0-D3 after 900 nsec, and operation is over.
4. If writing, apply data to D0-D3.
5. If writing or erasing, set *WE (write enable) low for at least 500 nsec, then set high again.
6. Set *CE high. If writing, hold high for 1-2 msec. If erasing, hold high for 10-20 msec.
7. If writing or erasing, conclude by reading back the data just written.

Of course, all of the above operations are performed automatically by the software of the unit where the board is installed.

III. TROUBLESHOOTING

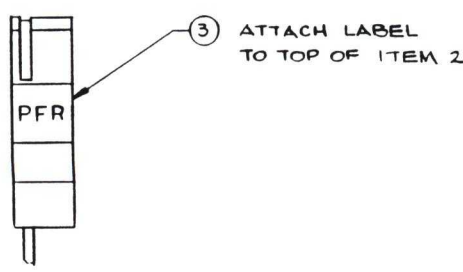
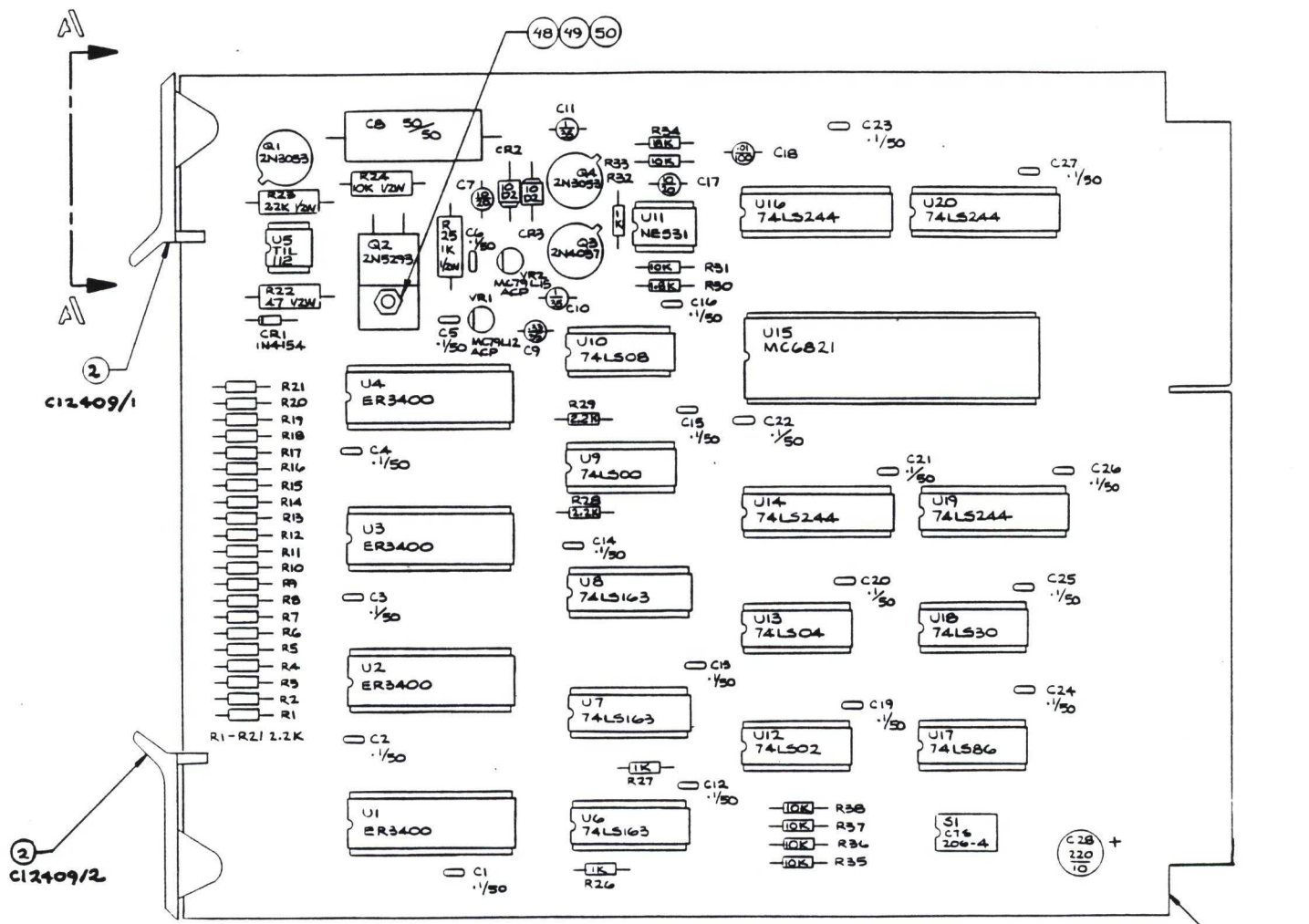
CAUTION

ALWAYS REMOVE POWER FROM THE TERMINAL WHENEVER PRINTED CIRCUIT MODULES ARE REMOVED OR REPLACED IN THE UNIT. FAILURE TO REMOVE POWER MAY CAUSE DAMAGE TO ONE OR MORE MODULES. REMOVING POWER INCLUDES REMOVING BATTERY POWER.

1. If entire terminal where the board is installed fails to run, remove the Power-Fail Memory Board and verify that the terminal runs without the board installed. If the terminal still does not run, it can be assumed that the Power-Fail Memory Option is not to blame.
2. Verify that the -12V appears on pin 2 of U1, U2, U3, and U4.
3. Verify that +5V appears on pin 22 of U1, U2, U3, and U4.
4. Verify that -30V appears at the emitter of Q2 and does not appear at the collector of Q2 (unless you are in an erase-write cycle - pushing RESET will terminate the erase-write cycle if this is the case). If -30V does appear at the collector, suspect U5, Q1 and Q2.
5. For the MRC-1, verify that all four switches in S1 are "off".
6. If the entire terminal does not run with the Power-Fail Memory Board installed, check the three power supply LED's on the CPU board. If any of them are not lit, suspect VR1 or the -30V power supply section. If the +5V LED is out, remove integrated circuits one at a time from the Power-Fail Memory Board until the problem disappears. Suspect the last integrated circuit removed.
7. If the terminal consistently experiences "cold starts" when it shouldn't, force an erase-write cycle to take place by changing a critical parameter. Observe the voltage at the collector of Q2. After the five-minute wait period, -30V should be observed for two to ten minutes, as the back-up takes place. Test the back-up by unplugging and reapplying power to the terminal (with battery disconnected). If the system seems to be okay, reread the "Operation" chapter of

this manual. It is possible that the system was in a "vulnerable" period and then experienced a power failure or reset without the awareness of the operator. Although back-ups rarely take place after the system is set up, the operator should be aware of which actions will initiate the erase-write cycle.

8. If in step 6, -30V is never observed during the erase-write cycle, look at pin 19 of U15 to see if it goes to its "high" state during the period when -30V is expected. If so, suspect U5, Q1, and Q2. If it remains low after the five-minute wait, check pin 24 of U15. It should be high periodically during the erase-write cycle (after the five-minute wait). If not, suspect U12, U13, U17, and U18. If so, suspect U9, U13, U15, U16, and U20.
9. If the cold start condition persists after the test in step 6, swap U1 and U3 with U2 and U4. If a change in behavior is observed, the problem probably lies in one or the other of the two pairs of chips.
10. If swapping the EAROM integrated circuits results in no change in behavior, observe the address counters U6, U7, and U8 during the erase-write cycle (after the five-minute wait). You should observe the address advancing as the write operation progresses. If this is observed to work correctly, suspect the remaining chips, U9, U10, U13, U14, and U19.



VIEW A-A

- NOTES:
1. UNLESS OTHERWISE SPECIFIED- RESISTOR VALUES ARE IN OHMS, 1/4W, 10% AND CAPACITOR VALUES ARE IN MICROFARADS.
 2. PC BOARD 51CS887 REV. -12, -22.
 3. SCHEMATIC 91D7187 REV. 3Q
 4. I.C. SOCKETS INSTALLED AT EACH I.C. POSITION.
 5. S1, Q1 THRU Q4, ARE INSTALLED WITHOUT SOCKETS.

MOBLEY ASSOCIATES, INC. SANTA BARBARA REDWOOD PARK GOLETA, CALIFORNIA 93117	
COMPONENT LAYOUT POWER FAIL MEMORY	
TOTAL PARTS: 2176 DWG: JRM DATE: 7-19-80 ENG: GAB	SCALE: 2/1 2002720 B1

50	WASHER #6 SPLIT RING		1040582	1
49	NUT #6-32		1090544	1
48	SCREW #6-32x1/4 B.H.		1090182	1
47	RESISTOR 1K, 1/4W	R26,R27,R32	4410247	3
46	" 1.8K, 1/4W	R30	4410270	1
45	" 10K, 1/4W	R35-R38 R31, R33	4410379	6
44	" 18K, 1/4W	R34	4410403	1
43	" 2.2K, 1/4W	R1-R21, R28 R29	4410288	23
42	" 47, 1/2W	R22	4420113	1
41	" 10K, 1/2W	R24	4420386	1
40	" 1K, 1/2W	R25	4420261	1
39	RESISTOR 2.2K, 1/2W	R23	4420303	1
38	TRANSISTOR 2N5293	Q2	3630316	1
37	" 2N4037	Q3	3630191	1
36	TRANSISTOR 2N3053	Q1, Q4	3630035	2
35	DIODE 1N4154	CR1	3600145	1
34	DIODE 10D2	CR2, CR3	3610003	2
33	CAPACITOR .33/35V	C9	4280020	1
32	" .01/100V	C18	4310140	1
31	" 10/20V	C7, C17	4280079	2
30	" 1/35V	C10, C11	4280038	2
29	" 1/50V	C1-C6, C12-C16 C19-C27	4310207	18
28	CAPACITOR 50/50V	C8	4260121	1
27	CAPACITOR 220/10V	C28	4280186	1
26	SWITCH-DIP CT8 206-4	S1	3190071	1
25	SOCKET, IC - 6 PIN	U5	3250008	1
24	SOCKET, IC - 8 PIN	U11	3250024	1
23	" -14 PIN	U9, U12, U13 U17, U18, U10	3250024	6
22	" -16 PIN	U6, U7, U8	3250032	3
21	" -20 PIN	U4, U16, U19, U20	3250057	4
20	" -22 PIN	U1-U4	3250065	4
19	SOCKET, IC - 40 PIN	U15	3250099	1
18				
17	INTEGRATED CIRCUIT-74LS08	U10	3660693	1
16	" -TIL112	U5	3730777	1
15	" -ER3400	U1-U4	3710001	4
14	" -NE531	U11	3730694	1
13	" -MC79L15 ACP	VR2	3650157	1
12	" -MC79L12 ACP	VR1	3650140	1
11	" -MC6821	U15	3710027	1
10	" -74LS244	U4, U16, U19, U20	3660859	4
9	" -74LS163	U6, U7, U8	3660826	3
8	" -74LS86	U17	3660743	1
7	" -74LS30	U18	3660735	1
6	" -74LS04	U13	3660685	1
5	" -74LS02	U12	3660677	1
4	" -74LS00	U9	3660669	1
3	LABEL, CD 10A1068-5		3430329	1
2	EJECTOR SET-C12409/1,2		1250075	1
1	PC BOARD 51C5887	REV.-12,-22	3472594	1
ITEM NO	DESCRIPTION	REF DES	STOCK NO	QTY

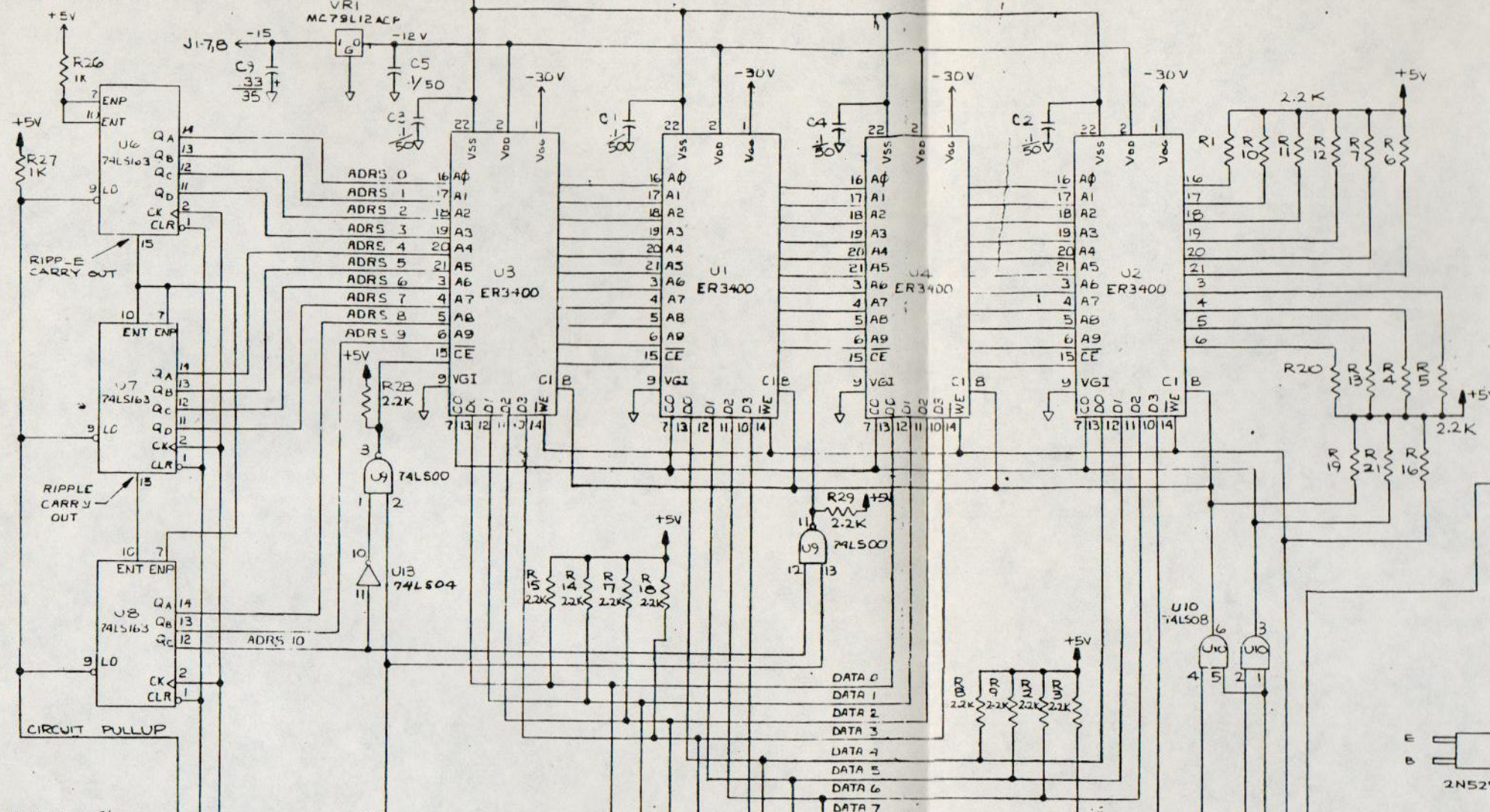
CODE L. NUMBER 44-11
 LABEL WAS 11-11-71
 PROCESS 12-11-71
 RELEASE TO PRODUCE
 11/18 SEPT 60 1708-48
 REVISED DATE
 11-11-71

MOSELEY ASSOCIATES, INC.
 SANTA BARBARA RESEARCH PARK
 GOLETA, CALIFORNIA 93027

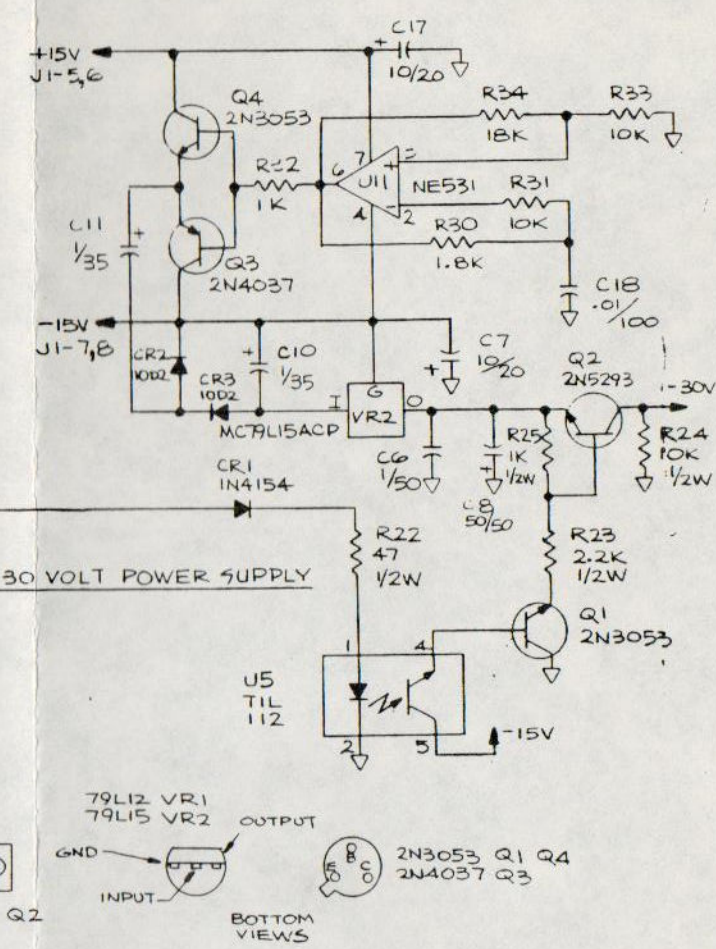
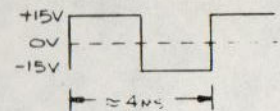
COMPONENT LAYOUT
POWER FAIL MEMORY
 YOU PRINT: 2 1/8" X 11" 25% 11" X 17" 25% 11" X 17" 25% 11" X 17" 25%
 PRINT: JRM 5-1-80 SCALE: 2/1
 CHK: JRM 7-10-80
 ENG: EARL 8-22-80

20D2720 B1

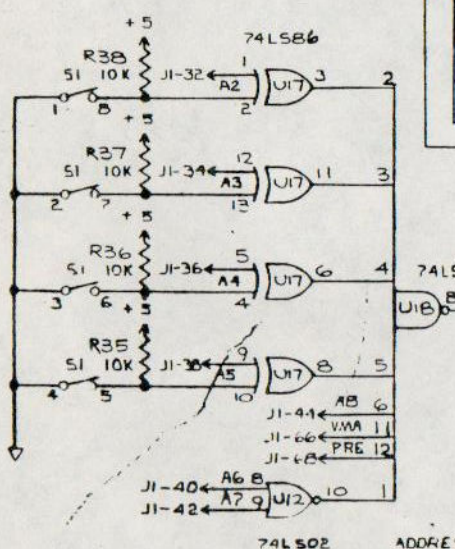
E AROM ADDRESS SELECT



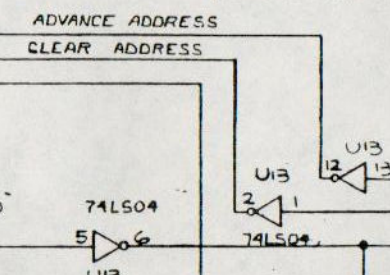
WAVEFORM AT PING OF IC U11



CARD ADDRESS LOGIC



ENABLE STROBE



REF DES	TYPE	+5V	GND
U9	74LS00	14	7
U12	74LS02	14	7
U13	74LS04	14	7
U10	74LS08	14	7
J18	74LS30	14	7
U17	74LS86	14	7
U14, U16, U19, U20	74LS244	20	10
U6-U8	74LS163	16	8
U1-U4	ER3400	22	9
U15	MC6821	20	1

SPARE GATES

74LS08	74LS02
12	2
13	3
U10	11
9	5
U10	6
10	10
U13	9
74LS04	13

- NOTES:
- UNLESS OTHERWISE SPECIFIED ALL RESISTOR VALUES ARE IN OHMS, 1/4 W, 10% CAPACITOR VALUES ARE IN MICROFARADS
 - COMPONENT LAYOUT 20D2720 REV. B0
 - P.C. BOARD 51C5887

If You Didn't Get This From My Site, Then It Was Stolen From...
www.SteamPoweredRadio.Com

FIRST USED ON MRC-1

DELETED FILM REV	DATE
CALLOUT: ECG 5815	
DATE: 11-2-73	
ADDED U18 & U20	
INFORMATIONAL: PCD	
1557	
DATE	

MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESISTOR PAPER
SOLETA, CALIFORNIA 93077

**SCHEMATIC MRC-1
POWER FAIL MEMORY**

TBL PRCT. 2 1/2, XX ± 20, XXX ± 20, 400

DWH 11-2-73 SCALE:

CHK 11-2-73

ENR 11-2-73

91D71B7

