

- Optional
- Recommended
- Mandatory

### Lynx Time Code Module Circuit Board Modifications

DATE: 03/10/94  
MODEL: Lynx Time Code Module  
REVISION: All  
SERIAL NO: Serial numbers below 3280\* (See Description)

#### SOFTWARE:

#### REQUIRED TOOLS:

Static safe workstation	IC Extractor/Insertor or
Grounding wrist strap	Small slotted screwdriver
Phillips screwdriver	Soldering iron
Wire cutters	

#### DESCRIPTION:

This procedure permanently converts the REV. A version of the Lynx Module's main PCB to use 256k PROMs instead of the 128k PROMs originally installed in early modules. Once this procedure has been completed, the module cannot use 128k PROMs; all current software versions are available on 256k PROMs.

\* This Service Bulletin brings Rev. A PCB's (Serial No. 0769 and below) up to current specification, and details changes that apply to boards with Serial Numbers up to 3280. Review each modification to see if it applies to your PCB.

#### PROCEDURE:

##### Disassembly

1. Turn off the power to the Lynx module. Disconnect all cables.
2. Place the Lynx on a static safe workstation. Ground yourself and the workstation anti-static mat.
3. Remove the six phillips screws holding the top cover to the chassis. Remove the top cover. (Figure 1)
4. Turn the module over and remove the six phillips screws holding the bottom cover to the chassis. Remove the bottom cover.

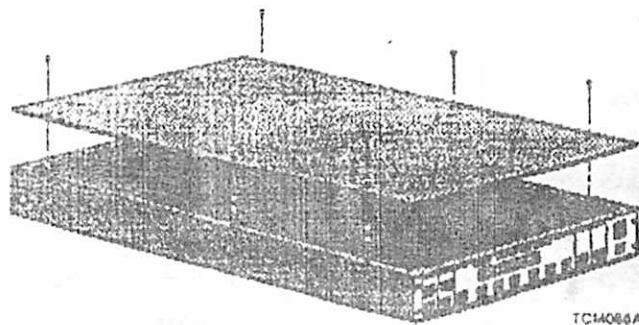


Figure 1. Removing Top Cover

**PROCEDURE (continued):**

**Step 1. Modifications Applicable to REV. A Main PCBs**

See schematic at the back of this document for assistance with Items 1 and 2

**1. Installation of Battery Backed-up RAM**

- a. Remove lithium battery E1 from main PCB.
- b. Remove diode CR10 (1N5711) from main PCB.
- c. Remove resistor R9 (100 k $\Omega$ ) from main PCB.
- d. Remove diode CR9 (1N5711) from main PCB and replace with an insulated bus wire jumper.
- e. Remove components at CR12 (1N914 diode plus paralleled 1 M $\Omega$  resistor) from main PCB and replace with an insulated bus wire jumper.
- f. Change R77 from 10 k $\Omega$  to 100 k $\Omega$  (This change may already have been done in some modules).
- g. Replace resistor R31 (10 k $\Omega$ ) on main PCB with a 2.2 k $\Omega$  resistor.
- h. Remove old RAM chip from U3 on main PCB.
- i. Install Dallas DS1220AB in U3 on main PCB. (TimeLine Part Number 24L001)
- j. Make sure that jumper JP2 is in position B.

**2. 256k PROM Modification and Processor Upgrade**

- a. On the component side of the main circuit board, carefully cut the circuit trace going to Pin A of JP1 (trace goes between two legs of U16's socket).
- b. Move the jumper on JP1 to the 'A' position.
- c. On the solder side of the main board, carefully cut the circuit trace that connects Pin 27 and Pin 28 of U7. Also, carefully cut the circuit trace that connects Pin 27 and Pin 28 of U16.
- d. Install a jumper from JP1-a to Pin 28 of U48.
- e. Install a jumper between U48 Pin 27, U16 Pin 27, and U7 Pin 27.
- f. Remove the 128k PROMs from U16 and U7 (if installed).

PROCEDURE (continued):

**Warning:**

Use an IC inserter to remove and replace the PROM. If one is not available, use a small slotted screwdriver. Insert the screwdriver under the PROM, twist slightly and gently lift up. Inserting the screwdriver incorrectly, could damage surrounding components or traces below the PROMs.

- g. Carefully install the 256k PROM(s) in the appropriate socket(s). Current software is supplied on a pair of chips labeled U7 and U16. Be careful to correctly align Pin 1 and properly seat the PROM(s).
- h. Locate and remove U48, the 8031 micro processor. Replace with the 8032 micro processor (TimeLine Part Number 24P002).

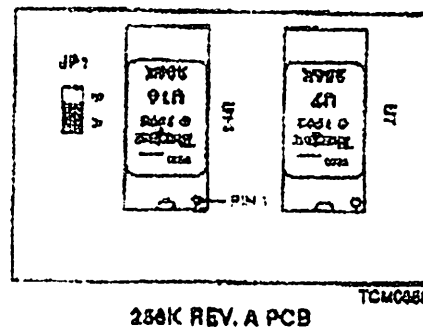


Figure 2. PROM Location

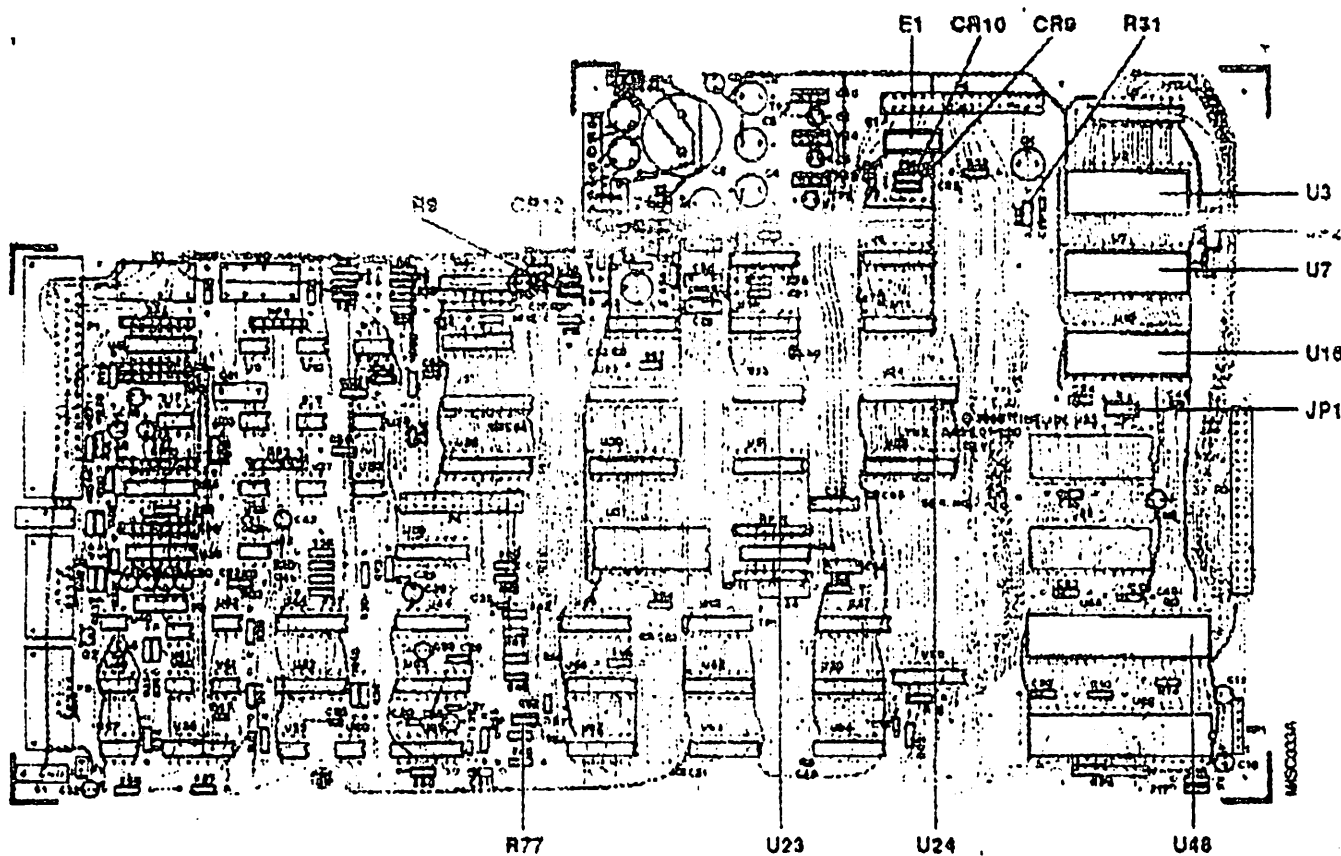


Figure 3. Component Location for Step I, 1 and 2

**PROCEDURE (continued):**

**3. Sync Separator Phase Modification**

Applies to: Lynx Time Code Modules through S/N 0568. Starting with S/N 0569, this modification should have been done at the factory, but should be checked.

- a. Cut trace between U52 Pin 5 and U43 Pin 6 on component side of main PCB.
- b. Cut trace between U52 Pin 5 and U53 Pin 2 on solder side of main PCB.
- c. Cut trace between U43 Pin 9 and U44 Pin 10 on solder side of main PCB.
- d. Install insulated wire jumper from U43 Pin 9 to U44 Pin 9 on solder side of main PCB.
- e. Install insulated wire jumper from U53 Pin 5 to U43 Pin 6 on solder side of main PCB.
- f. Install .001 $\mu$ F capacitor from U52 Pin 5 to U52 Pin 7 on solder side of main PCB.
- g. Install 10 k $\Omega$ , 1/4 watt resistor from U52 Pin 5 to U53 Pin 5 on solder side of main PCB.
- h. Replace resistor R49 (43 k $\Omega$  or 47 k $\Omega$ ) on main PCB with a 33 k $\Omega$  resistor.
- i. Replace resistor R54 (5.1 k $\Omega$ ) on main PCB with a 1 k $\Omega$  resistor.
- j. Replace capacitor C28 (220 pF) on main PCB with a 10 pF capacitor.
- k. Replace capacitor C29 (.001  $\mu$ F) on main PCB with a 10 pF ceramic capacitor.
- l. Remove CD4528 from U44 (on main PCB) and replace with 74HC4538. (TimeLine Part Number 24D018.)

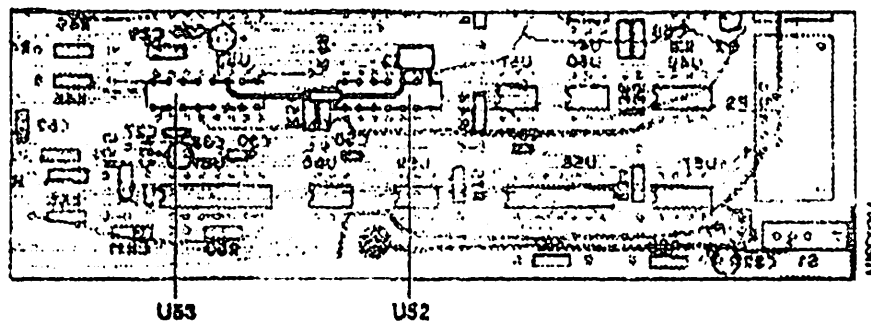


Figure 4. Modification, Solder Side for Step 1, 3f and g

**4. Capacitor Change in Crystal Oscillator**

Applies to: Lynx Time Code Modules through S/N 0628.

- a. Replace capacitor C13 (33 pF) on main PCB with a 22 pF ceramic capacitor.
- b. Adjust trimmer capacitor C14 on main PCB. Set frequency of Pilot Out signal as close as possible to 59.9400 Hz (or 16.68335 ms period) with SAL software installed, and generator set to GEN NTSC and INT XTL.

PROCEDURE (continued):

5. Capstan Frequency Output Optoisolator Modification<sup>®</sup>
  - a. Verify that optoisolator has been removed from U20 on main PCB and replaced with a 75Ω resistor from U20 Pin 2 to U20 Pin 5. (On some modules the optoisolator may already have been removed and a 10Ω resistor or a wire jumper installed; this should be replaced with a 75Ω resistor.)
6. Resistor Change in Capstan Control Frequency Generator  
Applies to: All Lynx Modules prior to S/N 1110.
  - a. Replace resistor R66 (22 kΩ or 100 kΩ) on main PCB with a 10 kΩ resistor.
  - b. Verify that capacitor C43 is .001 μF.

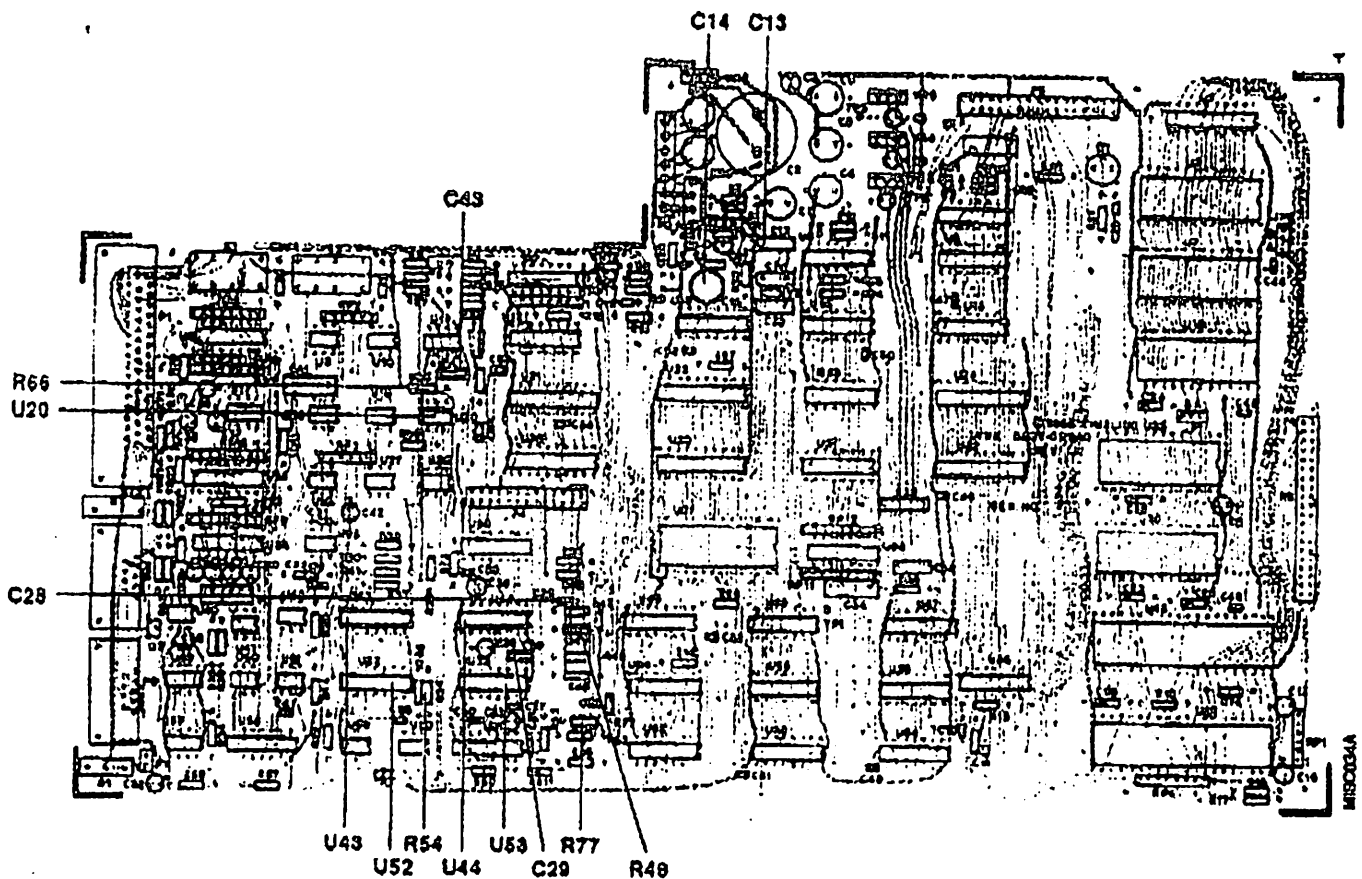


Figure 5. Component Location Step I, 3 - 6

**PROCEDURE (continued):**

**7. MUART Wiring Change**

Applies to: All Lynx Modules prior to S/N 0763 (Rev. A main PCB).

NOTE: This modification should have been done on all Rev. A main PCBs after S/N 0310.

- a. Remove the 8256 chip from U65 on the main PCB.
- b. Bend Pin 12 of the chip outward so that it will not go into the socket.
- c. Reinsert 8256 chip in U65 on the main PCB with Pin 12 not inserted into the socket.
- d. Attach an insulated wire jumper to Pin 12 of the 8256 chip.
- e. Attach the other end of the jumper wire to the leg of resistor R10 (8.2 k $\Omega$ ) that is closer to the front of the module.

**8. Power Supply Wiring Check**

Applies to: Lynx Time Code Modules below S/N 0763

**Test Procedure:**

- a. Unplug AC mains from module and turn the module power switch On.
- b. Set voltage selector switch to 115 volt position.
- c. Measure DC resistance across "hot" and "neutral" prongs in the module's power input socket. Resistance should be in the range of 40 to 50  $\Omega$ .
- d. Set the voltage selector to the 230 volt position.
- e. Measure the DC resistance at the power input socket as above. Resistance should be in the range of 175 to 185  $\Omega$ .

**NOTE:**

If the resistance in 230 volt selector position is approximately 70  $\Omega$  instead of 175-185  $\Omega$ , reverse the connection of the two black wires attached to the voltage selector switch and reinsulate the connections with shrink-tubing. Then retest the module.

**Step II. General Modifications, Updates and Changes**

**1. Transmit Enable Optoisolator Change**

Applies to: All Lynx Modules through S/N 1669

- a. If H11G2 optoisolator is found at U59 on main PCB, replace it with a 4N37 optoisolator.

PROCEDURE (continued):

2. Sync Separator Blocking Capacitor Polarity Check

- a. Examine tantalum bead capacitor C33 (1  $\mu$ F) on the main PCB and make sure that the banded side of the capacitor is facing the + marking on the PCB (toward the front).

3. Sync Separator Capacitor Removal

Applies to: All Lynx Modules through S/N 3260.

- a. Remove capacitor C31 (10 pF) from the main PCB.

4. Power Supply Filtration Modification

Applies to: All Lynx Modules prior to S/N 1161.

- a. Install a 470  $\mu$ F, 35 volt electrolytic capacitor at C1 on the main PCB.
- b. Solder an insulated bus wire from the positive lead of C1 (toward R1) to the positive lead of C5 (toward VR4).

5. Other Miscellaneous Resistor Changes

Applies to: All Lynx Modules through 1453 (Rev. A and Rev. B main PCB)

- a. Replace resistor R16 (10 k $\Omega$ ) with a 22 k $\Omega$  resistor.
- b. Replace resistor R6 (200 k $\Omega$ ) with a 6.8 k $\Omega$  resistor.

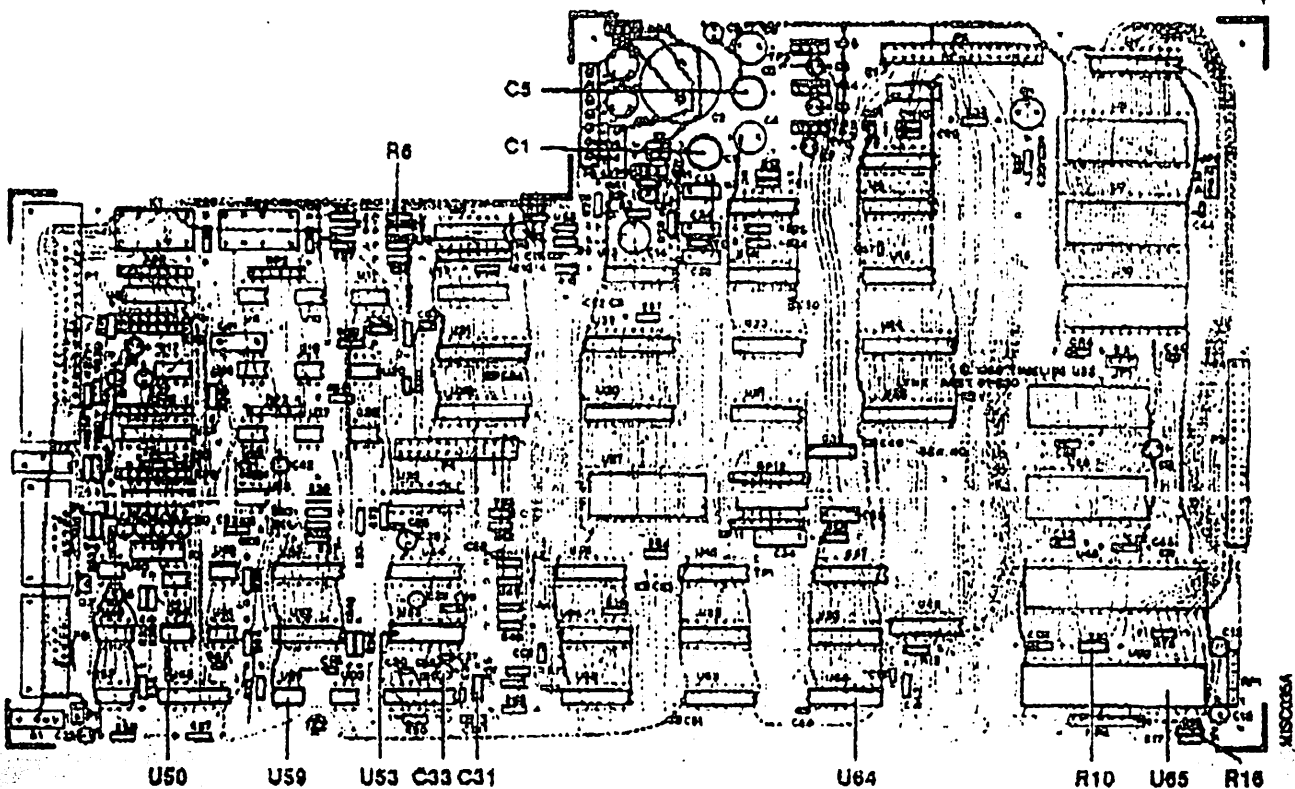


Figure 6. Component Location Step I, 8 and 9 through Step II, 1 - 5

**PROCEDURE (continued):**

6. **Frame Pulse Optoisolator Replacement**  
Applies to: Lynx Modules through S/N 3216. (Modules after this serial number were specifically tested for proper performance of this device under thermal stress.)
  - a. If an Isocom 4N37 is found in U50 on the main PCB, and if the batch code is "I923", "I945K", or "I001", replace it with a 4N37 from a different manufacturer or batch.
7. **Device Change in Crystal Reference Divider Network**  
Applies to: All Lynx Modules through S/N 3066.
  - a. Replace the CD4002 device in U64 on the main PCB with a 74HC4002 device.
8. **Sync Separator Device Compatibility**  
Applies to: All Lynx SAL Modules through S/N 2648.
  - a. If an RCA 14538 is found in U53 on the main PCB, replace it with the same device type from a different manufacturer.

**Step III. Time Code Reader PCB Modifications**

1. **Replacement of Rev. A Time Code Reader PCBs**  
Rev. A time code reader PCB's should generally be replaced with the current version of the reader board. Contact TimeLine for further information.
2. **If a Rev. A Time Code Reader Card is not being replaced, perform the following modifications**  
Applies to: Lynx Modules up to approximately S/N 0500.
  - a. Install 20 pF ceramic cap on solder side of reader PCB from U7 Pin 8 and U7 Pin 10.
  - b. Verify that C18, C27, and C29 on reader PCB are all .1  $\mu$ F monolithic ceramic capacitors. (Correct value marking: "104")
  - c. Verify that a 2.2 M $\Omega$  resistor is connected between U1 Pin 3 and U1 Pin 8, and between U6 Pin 3 and U6 Pin 8 on reader PCB.
  - d. Verify that R2 and R6 on reader PCB are 470 k $\Omega$  rather than 2.2 M $\Omega$ .
3. **Toshiba Reader Chip Replacement**
  - a. If Toshiba brand 74HC40103s are found in positions U10 and U16 on the time code reader PCB, replace them with the same device type from a different manufacturer.



PROCEDURE (continued):

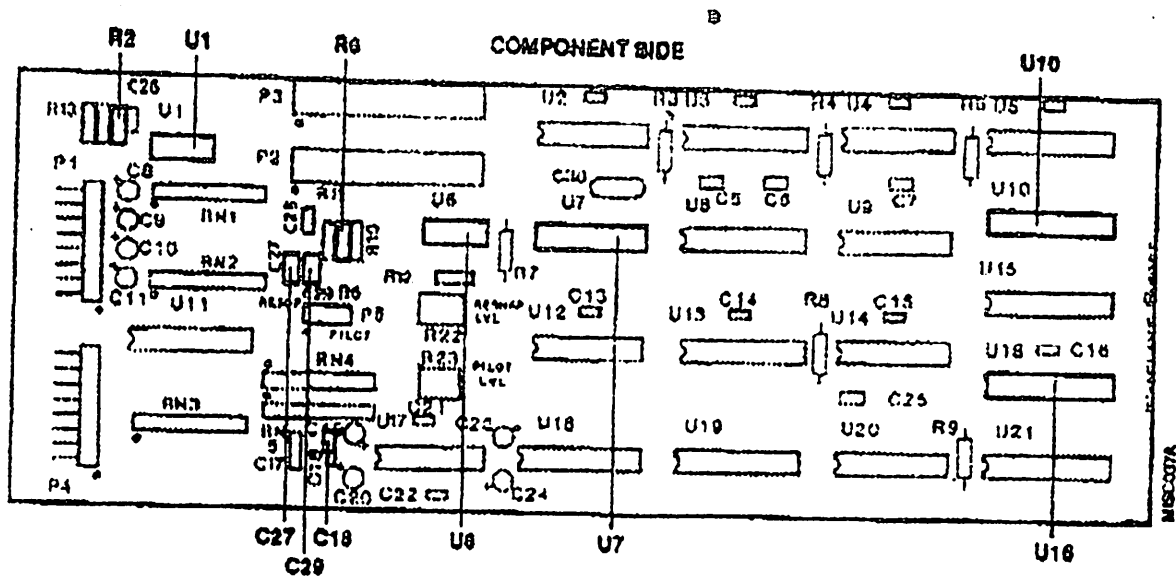


Figure 7. Reader Card Component Location

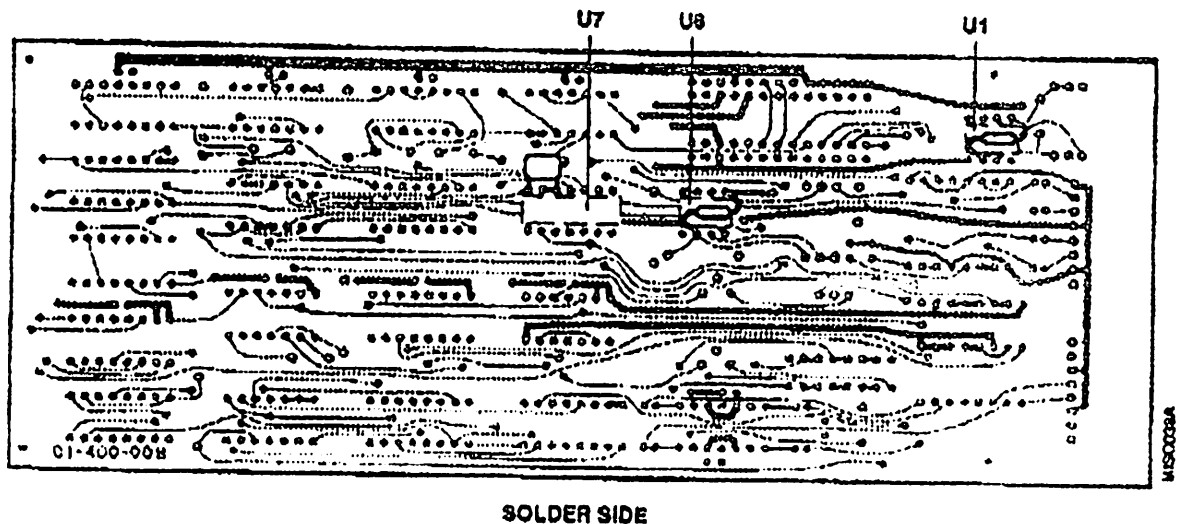


Figure 9. Reader Card Modification, Solder Side

Assembly

5. Replace the top and bottom covers on the module. Insert and tighten the screws. Connect the power cord. Turn on the module and verify that the module powers up properly.

