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06-006B  
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## M401 to M403 Upgrade with Leads / Dasibi Emulation

### **I. PURPOSE:**

This procedure covers the upgrade of the M401 Ozone Calibrator to M403 Ozone Calibrator. The new M403 is LEADS compatible (Dasibi dot commands functionality) and utilizes the same major hardware parts. The upgrade consists of installing of new firmware (EPROM chip), an additional RAM chip, configuration and jumper changes, setup routines, recalibration, and installation of sequence and level files. The sequences and levels may be input manually through the front panel if desired, or may be put in easily through HyperTerminal.

***\*NOTE\* - THIS MODIFICATION MAY NOT WORK FOR ALL SYSTEMS!***

### **II. TOOLS:**

Chip remover or a small flat tip screwdriver  
Large slot head screwdriver

### **III. PARTS / MATERIALS:**

KIT000245  
Service Note 06-005 Extracting Parameters, Readings, Settings, and Data using HyperTerminal  
Sequence Table text file  
Level Table text file

### **IV. PROCEDURE:**

1. Although not required, it is strongly recommended to capture machine settings and data by interfacing a laptop computer and capturing these parameters (pre-upgrade). Follow instructions in Service Note 06-005; or at minimum record values for the Photo Slope (O3\_SLOPE), Photo Offset (O3\_OFFSET), Dark Offset (DARK\_OFFSET), and go to VARS (using password 929) and record the value for RS232\_MODE.
2. Power down calibrator, unplug power cord, and remove cover.

**NOTE: Use ESD precautions when handling static sensitive electronic devices**

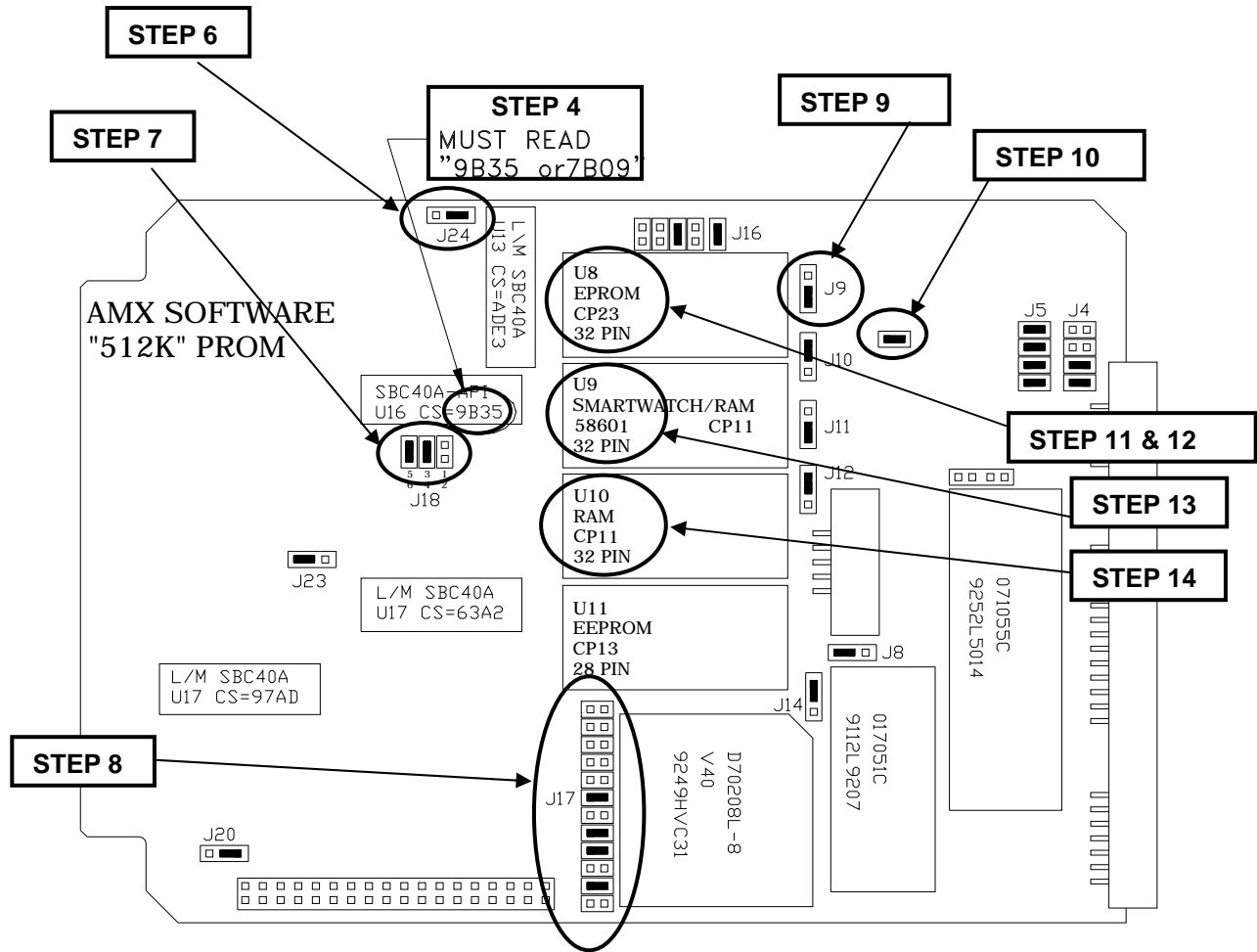


The electronics used in T-API analyzers are sensitive to Electrostatic Discharge (ESD). When working on any T-API device, please ensure that you are properly grounded prior to handling or touching any electronic circuitry in the analyzers! For more information on how to protect sensitive components from ESD during handling, please contact T-API customer service and ask for the ESD Service note number 03-022A.

3. Remove V/F board with attached CPU board, set on static protected work surface.
  - a. Loosen the slot head captive screw that holds down the V/F backplane to the motherboard.
  - b. Unplug the power cable J9 on the motherboard.
  - c. Loosen the top hold down bracket and swing away.
  - d. Unplug board, lift out and lead ribbon cables on CPU board around where they can be unplugged.
  - e. Unplug the ribbon cables and remove board from calibrator to a static protected surface.
4. Ensure IC chip "U16" (directly above J18) reads "9B35" or "7B09". If not, a new CPU board will have to be acquired.
5. Refer to the diagram on page 3 for jumper pin settings.
6. On the CPU board near the top, confirm that jumper pins "J24" are installed and that a shunt connects the center pin to the right pin. If no jumper pins are present, a new CPU board will have to be acquired.
7. On the CPU board, locate jumper pins "J18", move shunt from right pins to left pins. Now there should be a shunt on the left pins (5-6) and the center pins (3-4) – no shunt on the right pins (1-2).
8. Install new shunts to jumper pins "J17", install a shunt on the 5<sup>th</sup> set up and the 7<sup>th</sup> set up. Shunts should be installed on sets, 2, 4, 5, and 7, count from the bottom up.
9. Move shunt on "J9" from top two pins to bottom two pins.
10. Add shunt to unnumbered jumper pins to right of "J10"

# Upgraded CPU Board Configuration

All jumpers on an upgraded board should match the following diagram upon conversion completion



**NOTE: Take notice of the alignment of the notch on the IC chips before removing. If the chip is installed with the notch pointing the wrong direction, the chip will be DESTROYED.**

11. (Slot U8) Remove EPROM IC chip from the CPU board. It's the one at the top with the firmware version sticker on it.
12. Replace with the new version EPROM, ensure notch on the chip points to the side with notches on all other chips, otherwise the chip will be destroyed when power is applied.
13. (Slot U9) Erase memory and configuration by removing top chip (RAM chip) on the Dallas Smartwatch battery backup tower, wait 10 seconds and plug chip back in.
14. (Slot U10) Install new 32 pin RAM chip (CP11) provided (directly below "Dallas Smartwatch RAM), ensure notch on the chip points to the side with notches on all other chips.
15. Re-install the V/F board (with CPU) and associated cables and connectors.
16. Re-install power cord, cover and power analyzer on.
17. Input previous VARS values that were collected in step 1 through the front panel. Enter setup menu, select SETUP (use password 101 if necessary). Select MORE, then VARS (use password 929). Press NEXT until you reach each of the following parameters. For each parameter, press EDIT and input the original settings from before. After inputting the setting, press ENTR and go to the next parameter.
  - a. Photo Slope (O3\_SLOPE)
  - b. Photo Offset (O3\_OFFSET)
  - c. Dark Offset (DARK\_OFFSET)
  - d. RS232\_MODE.
18. Perform A/D – D/A calibration.
19. Perform Dark Current Signal Adjust (O3 DARK CAL).
20. Perform Photometer Calibration (O3 BENCH CAL).
21. Perform Ozone Generator Lamp Setup (O3 GEN ADJ).
22. Perform Ozone Generator Calibration (O3 GEN CAL).
23. Download sequences and tables to the calibrator using HyperTerminal.
  - a. Install the sequence and level files to the download computer.
  - b. Select Transfer / Send Text File / Browse and then navigate to and select the sequence file.
  - c. Select open to send the file.
  - d. Observe "New sequence configuration stored" message to confirm download was successful.
  - e. Repeat transfer file steps to download the level file.
  - f. Capture another text file (post upgrade) of :
    - i. t list
    - ii. v list !
    - iii. d list
    - iv. c print
    - v. c leveltable print.
24. Attach label to front panel "401 / 403" over original "401" area.