

11401/11402 Firmware Upgrade Instructions


WARNING

The following servicing instructions are for use by **qualified service personnel only**. To avoid personal injury, do not perform any servicing unless you are qualified to do so.

INSTRUMENT SERIAL NUMBERS

Each instrument has a serial number on a panel insert, tag, or stamped on the chassis. The first number or letter designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B000000	Tektronix, Inc. Beaverton, Oregon, USA
100000	Tektronix Guernsey, Ltd., Channel Islands
200000	Tektronix United Kingdom, Ltd., London
300000	Sony/Tektronix, Japan
700000	Tektronix Holland, NV, Heerenveen, The Netherlands

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11401/11402

Firmware Upgrade Instructions

W A R N I N G

Dangerous shock hazards may be exposed when the instrument covers are removed. Before proceeding, ensure that the mainframe PRINCIPAL POWER SWITCH is in the OFF position. Then, disconnect the instrument from the power source. Disassembly should only be attempted by qualified service personnel.

C A U T I O N

STATIC SENSITIVE DEVICES

Static discharge can damage any semiconductor component in this instrument. Static voltages of 1 kV to 30 kV are common in unprotected environments.

To avoid damage, observe the following precautions:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist-strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work-surface covering capable of retaining a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only approved, anti-static type, desoldering tools.

NOTE

These instructions assume familiarity with the instrument. If additional assembly or disassembly details are required, refer to the 11401 /11402 instrument manuals.

Preliminary Verification Procedure

1. Preparing the Instrument

- a. Set the PRINCIPAL POWER SWITCH to OFF and remove the power cord.
- b. Place the instrument on its right side and use a large flat-blade screwdriver or coin to remove the bottom cover.

2. Checking the Cal Constant Tag

- a. Locate the Cal Constant tag on the A5 Acquisition Board. This small tag has the printed label:

mcalconst 134
- b. Check that the Cal Constant tag also includes a handwritten four-digit number. Note the value of this number for use later in this procedure.

NOTE: If no Cal Constant tag is attached to the Acquisition Board, DO NOT PROCEED with the upgrade until you have contacted your local Tektronix, Inc. Field Office or representative.

3. Checking the Cal Constant

- a. Connect a power cord to the instrument.
- b. Connect a terminal or controller as described in the User's Reference Manual.
- c. Set the PRINCIPAL POWER SWITCH and ON/STANDBY switch to ON.
- d. Set the necessary communication parameters such as baud rate, etc.
- e. When the instrument has powered up, establish communication from the terminal or controller by entering the following commands (<CR> is the return key):

```
e<CR>  
V<CR>
```

- f. Enter the query:

```
mcalconst? 134<CR>
```

NOTE: If the four-digit value returned after the query does not match the value on the Acquisition Board tag, DO NOT PROCEED WITH THE FIRMWARE UPGRADE. Call your local Tektronix, Inc. Field Office or representative for instructions concerning the proper value of Cal Constant 134.

If the number returned after the query matches the number written on the Cal Constant tag, note the number for use in step 8 of the Firmware Upgrade Procedure.

4. Preparing the Instrument for the Firmware Upgrade Procedure

- a. Set the PRINCIPAL POWER SWITCH to OFF and remove the power cord.
- b. Leave the instrument on its right side to provide access to circuit boards involved in the Firmware Upgrade Procedure.

Parts List and Required Tools

Components Included in the Upgrade Kit

Circuit Number	Quantity	Part Number	Description
11401 Only:			
U240	1 ea	160-3749-xx	Microckt, dgtl, EPROM: Main Processor (A17)
U250	1 ea	160-3748-xx	Microckt, dgtl, EPROM: Main Processor (A17)
11402 Only:			
U240	1 ea	160-4555-xx	Microckt, dgtl, EPROM: Main Processor (A17)
U250	1 ea	160-4554-xx	Microckt, dgtl, EPROM: Main Processor (A17)
All 11401/11402:			
U281	1 ea	160-3941-xx	Microckt, dgtl, EPROM: Time Base (A6)
U283	1 ea	160-3942-xx	Microckt, dgtl, EPROM: Time Base (A6)
U602	1 ea	160-3716-xx	Microckt, dgtl, EPROM: Display Controller (A7)
U612	1 ea	160-3717-xx	Microckt, dgtl, EPROM: Display Controller (A7)
U600	1 ea	160-3746-xx	Microckt, dgtl, EPROM: Memory (A18)
U612	1 ea	160-3744-xx	Microckt, dgtl, EPROM: Memory (A18)
U620	1 ea	160-3742-xx	Microckt, dgtl, EPROM: Memory (A18)
U630	1 ea	160-3740-xx	Microckt, dgtl, EPROM: Memory (A18)
U700	1 ea	160-3747-xx	Microckt, dgtl, EPROM: Memory (A18)
U712	1 ea	160-3745-xx	Microckt, dgtl, EPROM: Memory (A18)
U730	1 ea	160-3743-xx	Microckt, dgtl, EPROM: Memory (A18)
U740	1 ea	160-3741-xx	Microckt, dgtl, EPROM: Memory (A18)
	1 ea	131-0993-00	Shorting Strap

Tools Required

- Large flat-blade screwdriver
- Torx-15 Screwdriver
- I.C. Puller
- Needle-nose pliers

Firmware Upgrade Procedure

CAUTION: This procedure contains instructions for resetting the NVRAM, which contains the instrument settings and parameters. After the NVRAM is reset, the instrument will power up in factory default settings and will have reset the time, the hours meter, and the number of power-on cycles. If this information is considered important, turn the instrument power on and note these values before performing this procedure!

1. Upgrading the Display Controller Board Firmware

- a. Make sure the PRINCIPAL POWER SWITCH is set to OFF and the power cord is disconnected.
- b. Remove the instrument top panel cover.
- c. Locate the A7 Display Controller Board (670-8848-xx ; see Figure 2 at the end of these instructions). The Display Controller Board is horizontally positioned above the plug-in compartment.
- d. Locate the two EPROM's, located near the near right corner (as viewed when facing the instrument; see Figure 2). The circuit numbers for these components are U602 and U612.

CAUTION: Be certain pin 1 is positioned correctly when replacing components.

- e. Remove U602 and replace it with the new 160-3716-xx, where the xx portion of the part number on the new component should be higher than that on the component being replaced.
- f. Similarly replace U612 with the new 160-3717-xx.

2. Accessing Boards Within the Card Cage

- a. Remove the two nylon circuit board guides from the top of the card cage (at the left rear of the instrument).
- b. Remove the screws that secure the card cage retainer, an angle bar that prevents removal of the boards in the card cage.

3. Upgrading the Memory Board Firmware

- a. Remove the A18 Memory Board (670-8856-xx) from the card cage. The Memory Board is typically located nearest the outside of the instrument.

- b. On the Memory Board, replace the following IC's (see Figure 3 at the end of these instructions):

U600	160-3746-xx
U612	160-3744-xx
U620	160-3742-xx
U630	160-3740-xx
U700	160-3747-xx
U712	160-3745-xx
U720	160-3743-xx
U730	160-3741-xx

In each case, the xx portion of the component number should be higher on the replacement part than on the part being replaced. Again, be certain that pin 1 is oriented correctly.

- c. Return the Memory Board to its former location in the card cage.

4. Upgrading the Main Processor Board Firmware

- a. Remove the A17 Main Processor Board, which is typically located in the slot beside the Memory Board. For the 11401 this board is numbered 670-8855-xx and for the 11402 it is numbered 671-0068-xx. A cable connector must be removed from the top of the board before it can be removed from the instrument.

- b. On the Main Processor Board, replace U240 and U250 with the following part numbers (see Figure 4):

U240	160-3749-xx	(11401 ONLY)
U250	160-3748-xx	(11401 ONLY)
U240	160-4555-xx	(11402 ONLY)
U250	160-4554-xx	(11402 ONLY)

The xx portion of the component number should be higher for the replacement parts than the replaced parts. Be certain to orient pin 1 correctly when inserting the new parts.

5. Resetting NVRAM

- a. Locate the following components on the A17 Main Processor Board (see Figure 4):
- lithium battery BT 160
 - jumper J150
 - vertically-mounted capacitor C150, located near the battery
- b. Remove jumper J150 (see Figure 4). If jumper J150 is not installed and the two pins are soldered together unsolder the two pins.
- c. Use the needle-nose pliers to short axially-mounted capacitor C150 for 30 seconds.

CAUTION: Do not short the battery!

- d. After 30 seconds, remove the needle-nose pliers and replace jumper J150 (or solder pins together).
- e. Replace the Main Processor Board in its previous location in the card cage.

6. Replacing the Card Cage and Circuit Board Retainers

- a. Replace the card cage retainer with the two screws and replace the two nylon circuit board guides.
- b. Reconnect the cable at the top of the Main Processor Board.
- c. Replace the top cover of the instrument.

7. Upgrading the Time Base Board Firmware

- a. Locate U281 and U283 on the A6 Time Base Board (670-8849-xx; see Figure 5 at the end of these instructions). These components are found near the bottom front of the instrument as it rests on its right side.
- b. Replace U281 with 160-3941-xx and U283 with 160-3942-xx.

The xx portion of the component number should be higher on the replacement part than the replaced part. Be certain pin 1 is oriented correctly.

8. Setting the Cal Constant

- a. Locate the CAL-LOCK pins, J450 (between U195 and U205; see Figure 5) on the Time Base Board, and add the shorting jumper.
- b. Connect a power cord to the instrument.
- c. Connect a terminal or controller as described in the User's Reference Manual.
- d. Set the PRINCIPAL POWER SWITCH and ON/STANDBY switch to ON.
- e. Set necessary communication parameters such as baud rate, etc.
- f. After the instrument has powered up, establish communication from the terminal or controller by entering the following commands (<CR> is the return key):

e<CR>

v<CR>

- g. Enter the command:

`mcalconst 134:XXXX<CR>`

where XXXX is the 4-digit value noted on the Acquisition Board Cal Constant tag. (See step 3 of the Preliminary Verification Procedure.)

9. Verifying the Cal Constant

- a. Press the ENHANCED ACCURACY button to begin an Enhanced Accuracy cycle self-calibration.
- b. Check that the instrument successfully completes the Enhanced Accuracy cycle.

NOTE: The Enhanced Accuracy cycle must be performed for the instrument to recognize the new Cal Constant value.

- c. If desired, the stored Cal Constant can be verified with the query:

`mcalconst? 134<CR>`

- d. Verify that the value returned is the same as written on the Cal Constant tag.

10. Verifying the Instrument Serial Number

- a. Verify that the serial number on the instrument front panel matches the instrument identification number found via the Utilities menu and Instrument Options pop-up menu.
- b. If the numbers do not match, enter the command:

`uid main:"B01XXXX"<CR>`

where XXXX corresponds to the serial number digits found on the front-panel serial number marker.

- c. Verify that the proper ID is now displayed in the Instrument Options pop-up menu.

11. Removing the Procedure Setup

- a. Set the PRINCIPAL POWER SWITCH to OFF.
- b. Remove the J450 CAL-LOCK jumper on the Time Base Board.
- c. Replace the bottom instrument cover and set the instrument upright.

12. Performing Final Power-Up and Verification

NOTE: The power-up sequence must be performed for the instrument to recognize the new CAL-LOCK strap configuration and Cal Constant value.

- a. Install a plug-in unit in each plug-in compartment. (If enough plug-in units are not available to fill all compartments, repeat the following steps enough times to ensure that each compartment is tested with a plug-in unit installed.)
- b. Set the PRINCIPAL POWER SWITCH and ON/STANDBY switch to ON.
- c. Verify that the instrument powers up and successfully completes the self-diagnostic sequence.
- d. Press the ENHANCED ACCURACY button and verify that the instrument successfully completes the self-calibration sequence.

NOTE: If problems are encountered, check for the following:

- Proper orientation of components in the sockets
- All component pins are properly seated
- Components are installed in the correct location

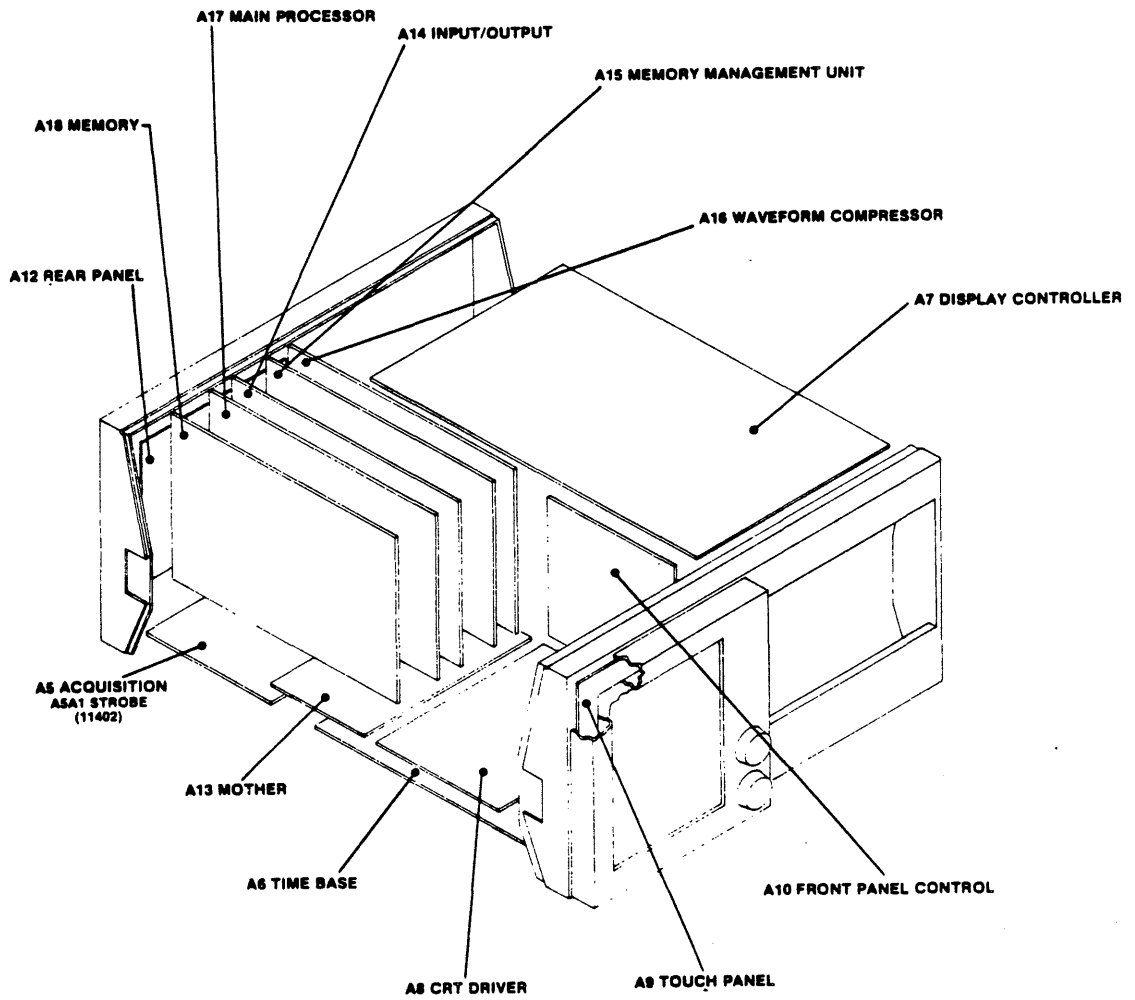


Figure 1. Circuit Board Locations.

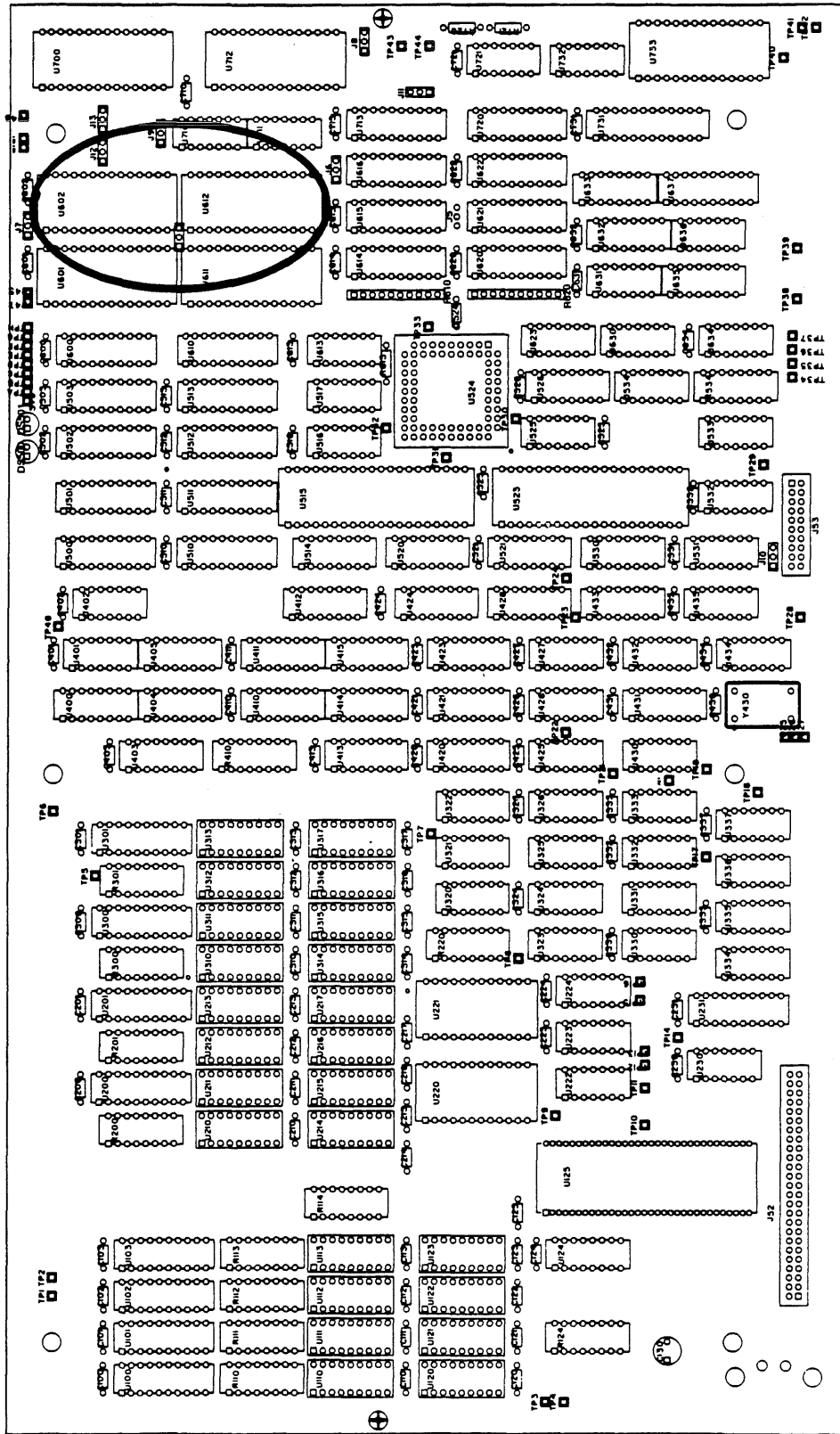


Figure 2. A7 Display Controller Board.

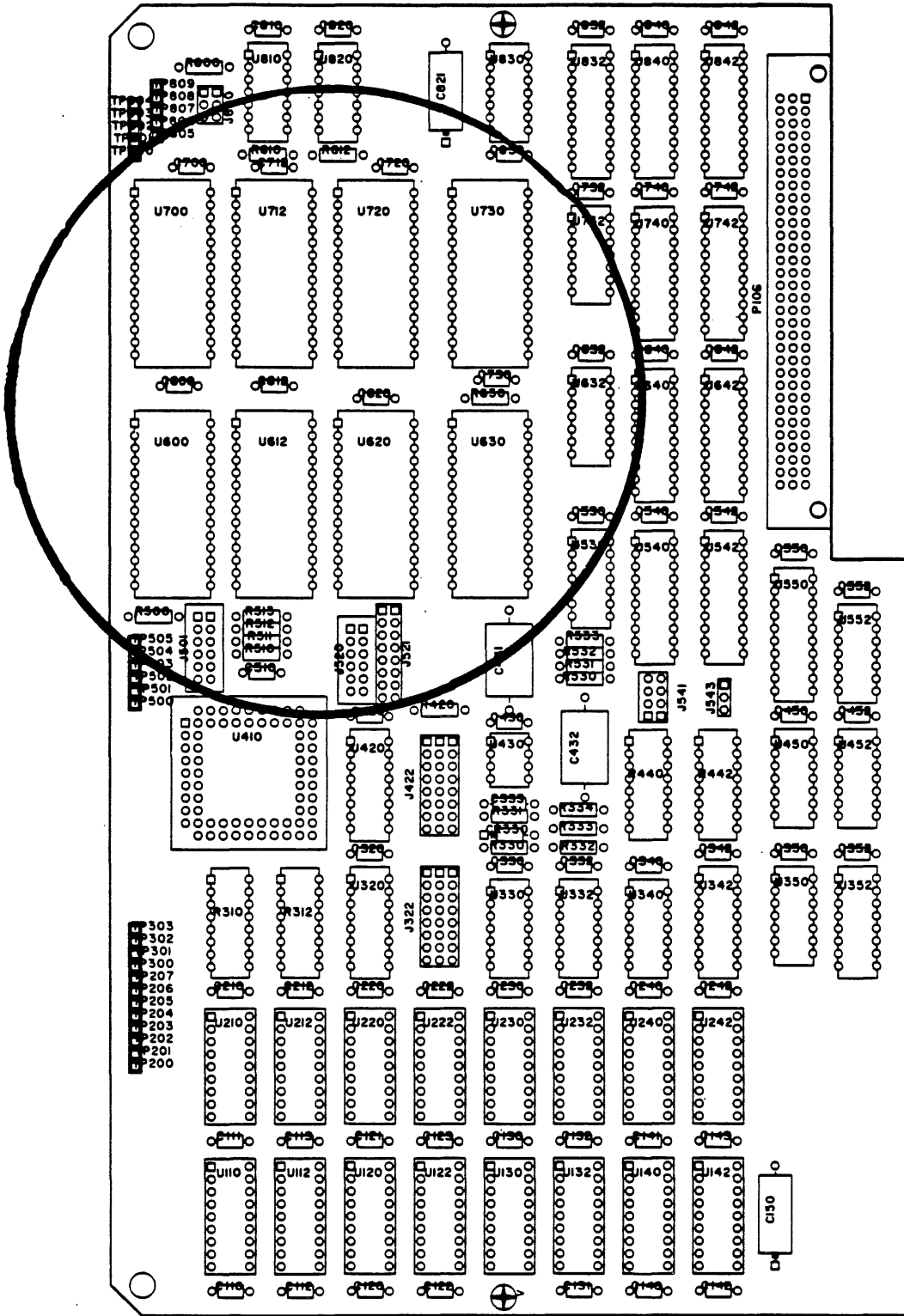


Figure 3. A18 Memory Board.

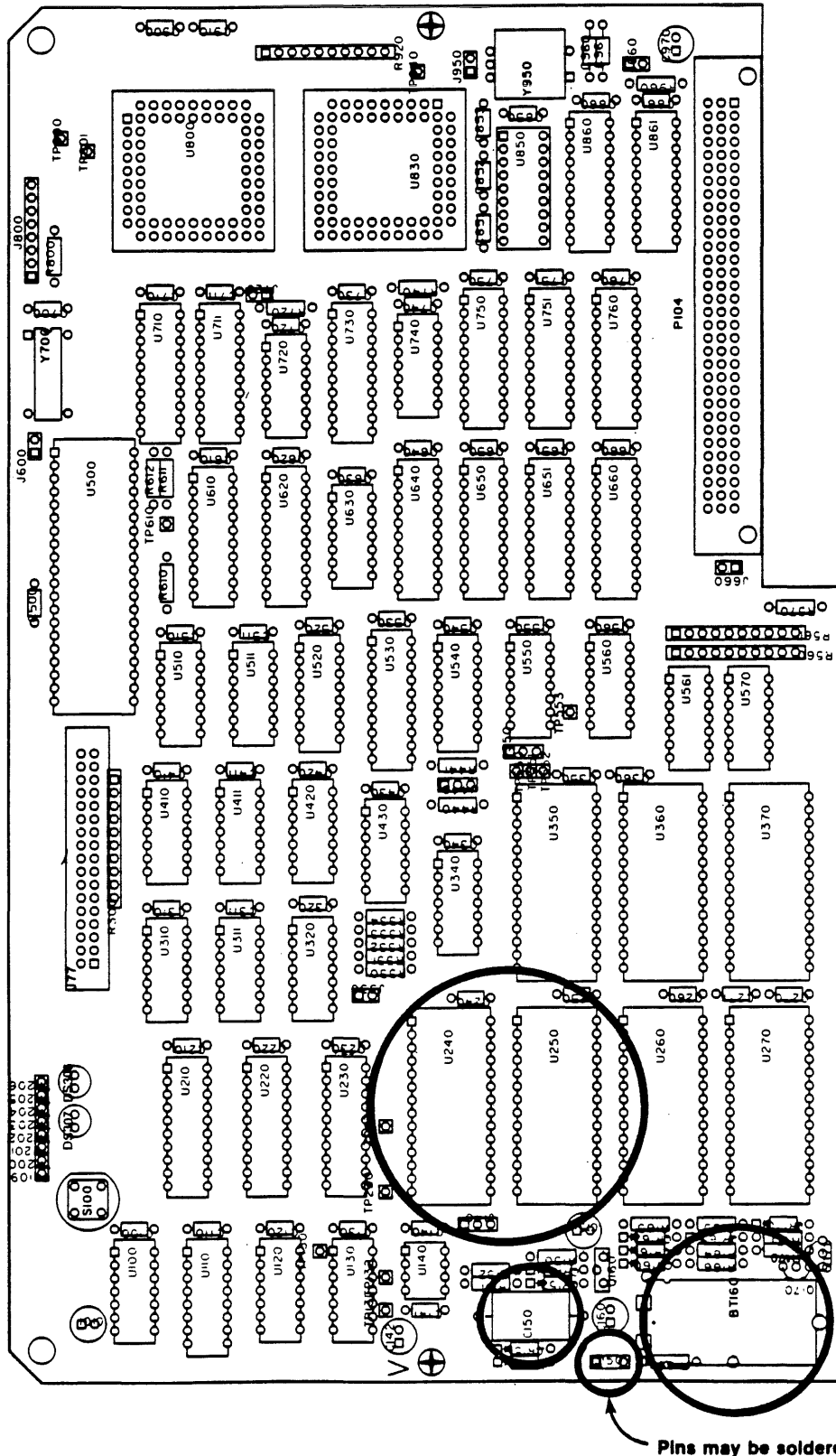


Figure 4. A17 Main Processor Board.

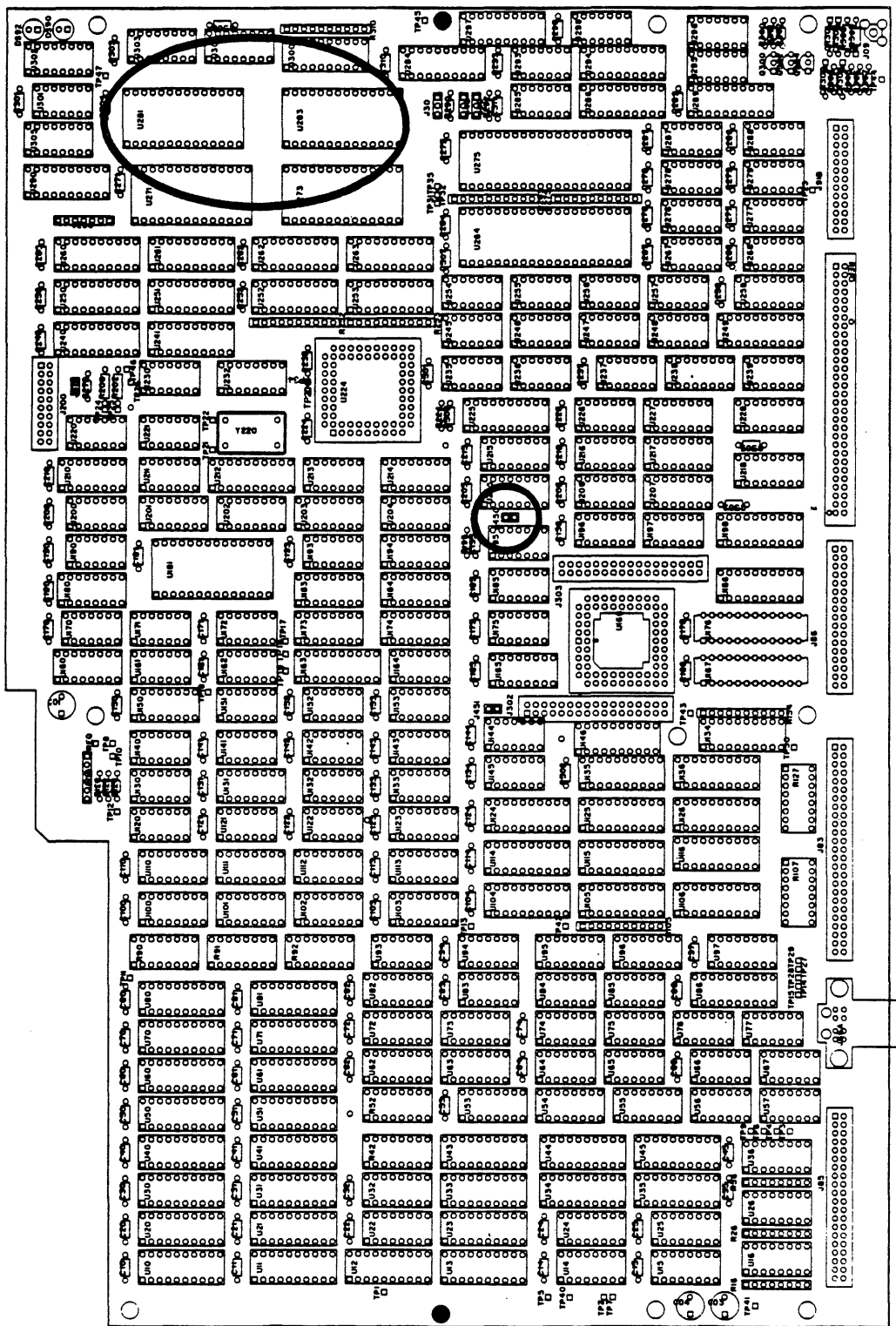


Figure 5. Time Base Board.