
TEK PRODUCT
MODIFICATION

Part No. 040-1340-02
Product Group 47

M74977, M78382

040 KIT

DSA6F02
Firmware Enhancement
Version 2.2

DSA601 All Serial Numbers
DSA602 All Serial Numbers

This modification kit contains firmware version 2.2 with installation instructions and updated manuals for a DSA 601 or DSA 602 instruments.

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Kit Parts List:

Ckt. Number	Quantity	Part Number	Description
A16U440	1 ea	160-4782-06	Microckt, dgtl:EPROM, ver 2.2
A16U540	1 ea	160-4783-06	Microckt, dgtl:EPROM, ver 2.2
A17U240	1 ea	160-5469-06	Microckt, dgtl:EPROM, ver 2.2
A17U250	1 ea	160-5470-06	Microckt, dgtl:EPROM, ver 2.2
A18U800	1 ea	160-4918-06	Microckt, dgtl:EPROM, ver 2.2
A18U810	1 ea	160-4919-06	Microckt, dgtl:EPROM, ver 2.2
A18U820	1 ea	160-4920-06	Microckt, dgtl:EPROM, ver 2.2
A18U830	1 ea	160-4921-06	Microckt, dgtl:EPROM, ver 2.2
A18U900	1 ea	160-4922-06	Microckt, dgtl:EPROM, ver 2.2
A18U910	1 ea	160-4923-06	Microckt, dgtl:EPROM, ver 2.2
A18U920	1 ea	160-4924-06	Microckt, dgtl:EPROM, ver 2.2
A18U930	1 ea	160-4925-06	Microckt, dgtl:EPROM, ver 2.2
A19U410	1 ea	160-4784-07	Microckt, dgtl:EPROM, ver 2.2
A19U420	1 ea	160-4786-07	Microckt, dgtl:EPROM, ver 2.2
A19U460	1 ea	160-5955-07	Microckt, dgtl:EPROM, ver 2.2
A19U510	1 ea	160-4785-07	Microckt, dgtl:EPROM, ver 2.2
A19U520	1 ea	160-4787-07	Microckt, dgtl:EPROM, ver 2.2
A19U560	1 ea	160-5956-07	Microckt, dgtl:EPROM, ver 2.2
	1 ea	070-8180-00	Manual, tech:Tutorial
	1 ea	070-8181-00	Manual, tech>User Reference
	1 ea	070-8182-00	Manual, tech:Programmers Reference
	1 ea	070-8183-00	Manual, tech:Quick Reference
	1ea		Label:040-kit

Instructions

WARNING

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

A lithium battery (BT150) is mounted on the BB Memory circuit board A18, Option 4C. The battery requires special handling for disposal. Refer to the instructions on Lithium Battery Disposal and First Aid earlier in this section. Care is required when placing the BB Memory circuit board A18 on metal surfaces. If some IC or battery leads are shorted, the battery may discharged or overheat and vent. (Plastic standoffs are used to prevent shorts.)

CAUTION

Many components within this instrument are extremely susceptible to static-discharge damage. Service the instrument only in a static-free environment. Observe standard handling precautions for static-sensitive devices while installing this kit. Always wear a grounded wrist and foot strap.

NOTE

These instructions assume a familiarity with the instrument. If additional assembly or disassembly details are required, refer to the DSA 601/602 Service Reference Manual.

- Step 1:** Remove the top cabinet panel cover by loosening the fasteners one quarter turn counterclockwise
- Step 2:** Remove the six (6) Torx drive screws (three on each side) that secures the platform to the sides of the instrument. Refer to Figure 1, Platform Removal.
- Step 3:** Remove the two (2) Torx drive screws that are located on the top of the platform. Refer to Figure 1, Platform Removal.
- Step 4:** Raise the platform on its hinges, then secure the platform in the up position using the support rod (refer to the instructions printed on the back of the platform). Refer to Figure 2, Field Replaceable Units Locator.
- Step 5:** Remove the two (2) card cage retainer screws located on the left side of the instrument to remove the two (2) plastic card cage retainers from the top of the card cage. Refer to Figure 3, Top View of Card Cage.
- Step 6:** Disconnect connectors J47 and J48 from the Digitizer CPU circuit board A19. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.
- Step 7:** Disconnect connectors J28 and J83 from the Digitizer I/O circuit board A20. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.
- Step 8:** Disconnect connectors J72, J77, J78 and J90 from the I/O circuit board A14. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.
- Step 9:** Disconnect connectors J77 from the Main Processor circuit board A17. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.
- Step 10:** Disconnect connectors J79 and J83 from the MMU circuit board A15. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.
- Step 11:** Disconnect connectors J53, J54 and J79 from the Display Controller circuit board A16. Note the position of the multi-pin connector's index triangle to ensure correct reassembly.

Display Controller Circuit Board A16

- Step 12:** Lift the hinged tabs (circuit board ejectors) at the front and rear edges of the Display Controller circuit board A16. Pull the tabs upward until the Display Controller circuit board A16 separates from Mother circuit board A13. Then remove the circuit board from the instrument.

- Step 13:** Replace **U440** and **U540**, EPROMs on the Display Controller circuit board with the new microcircuits provided in this kit.
- Step 14:** Replace the Display Controller circuit board **A16** to its former location in the card cage.

BB Memory Circuit Board A18

- Step 15:** Lift the hinged tabs (circuit board ejectors) at the front and rear edges of the BB Memory circuit board **A18**. Pull the tabs upward until the BB Memory circuit board **A18** separates from Mother circuit board **A13**. Then remove the circuit board from the instrument.
- Step 16:** Replace **U800**, **U810**, **U820**, **U830**, **U900**, **U910**, **U920**, and **U930** EPROMs on the BB Memory circuit board **A18** with the new EPROM's provided in this kit.
- Step 17:** Replace the BB Memory circuit board **A18** to its former location in the card cage.

Main Processor Circuit Board A17

- Step 18:** Lift the hinged tabs (circuit board ejectors) at the front and rear edges of the Main Processor circuit board **A17**. Pull the tabs upward until the Main Processor circuit board **A17** separates from Mother circuit board **A13**. Then remove the circuit board from the instrument.
- Step 19:** Replace **U240** and **U250**, EPROMs on the Main Processor circuit board with the new microcircuits provided in this kit.
- Step 20:** Replace the Main Processor circuit board **A17** to its former location in the card cage.

Digitizer CPU Circuit Board A19

- Step 21:** Lift the hinged tabs (circuit board ejectors) at the front and rear edges of the Digitizer CPU circuit board **A19**. Pull the tabs upward until the Digitizer CPU circuit board **A19** separates from Mother circuit board **A13**. Then remove the circuit board from the instrument.
- Step 22:** Replace **U410**, **U420**, **U460**, **U510**, **U520**, and **U560** EPROMs on the Digitizer CPU circuit board **A19** with the new EPROM's provided in this kit.

Reassembly

- Step 23:** Reconnect **J53**, **J54**, and **J79** connector that were removed in step 11.

- Step 24:** Reconnect J79 and J83 connector that were removed in step 10.
- Step 25:** Reconnect J77 connector that were removed in step 9.
- Step 26:** Reconnect J72, J77, J78 and J90 connector that were removed in step 8.
- Step 27:** Reconnect J28 and J83 connector that were removed in step 7.
- Step 28:** Reconnect J47 and J48 connector that were removed in step 6.
- Step 29:** Power-up the DSA and check if it passes the self-test. If the instrument fails the self-test check if the circuit boards are properly seated, cables are properly connected, and the EPROMs are in the correct locations.
- Step 30:** Replace the card cage retainer securing it using the screws removed in step 5.
- Step 31:** Lower the platform securing it into place using the screws removed in steps 2 and 3. Return the support rod to its storage position.
- Step 32:** Replace the top cabinet cover.
- Step 33:** Remove the protective backing from the 040-kit label and place it on the clean, dry area on the rear panel of the instrument. This label indicates that 040-1340-XX kit (Firmware version 2.2) has been installed.

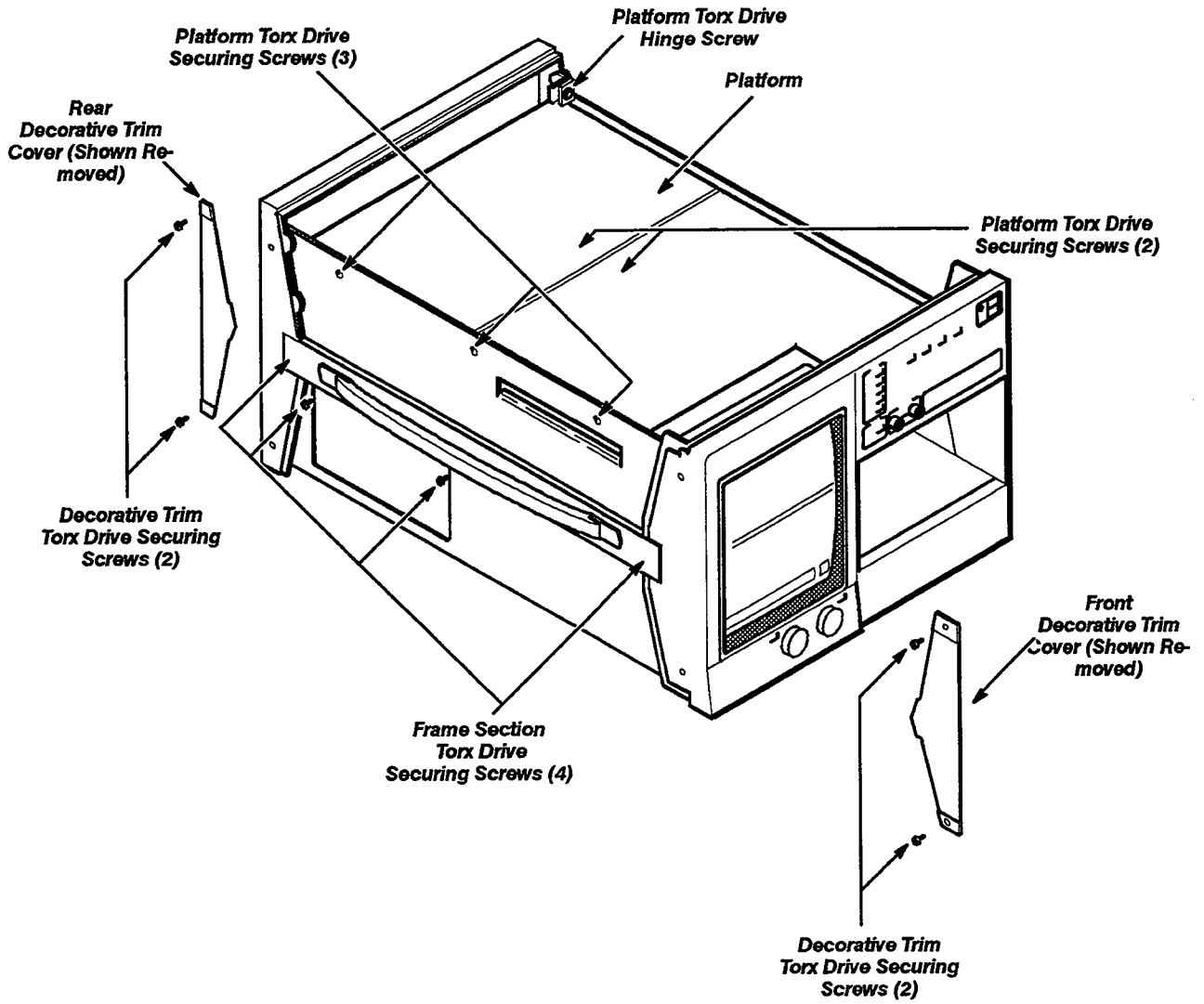
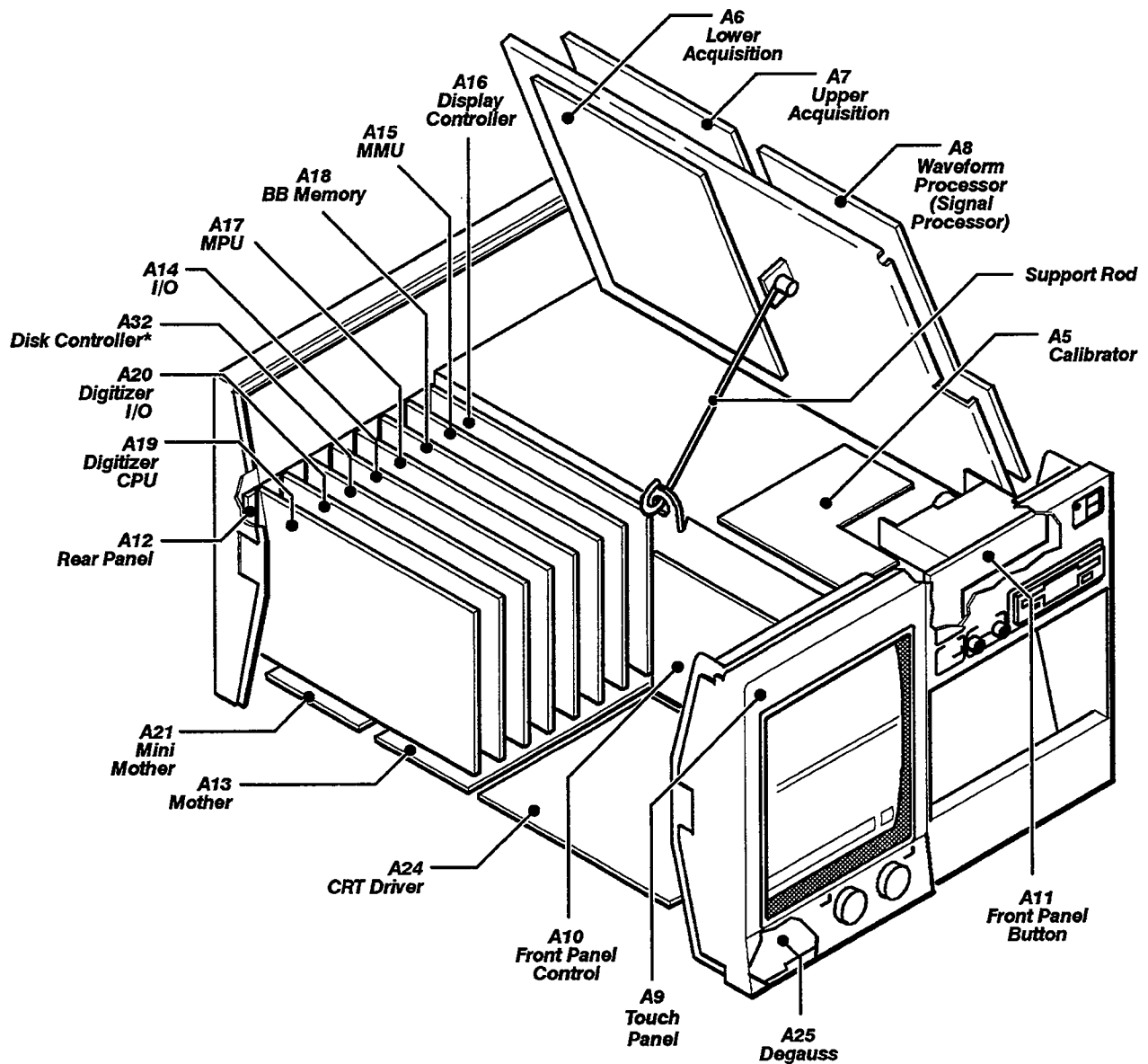


Figure 1: Platform Removal



**The A32 Disk Controller board applies only to the DSA 600A Series. The DSA 600 Series may locate the A14 I/O board either in this slot or the slot shown in the illustration. The DSA 600 Series card cage has one empty slot.*

Figure 2: Field Replaceable Units Locator

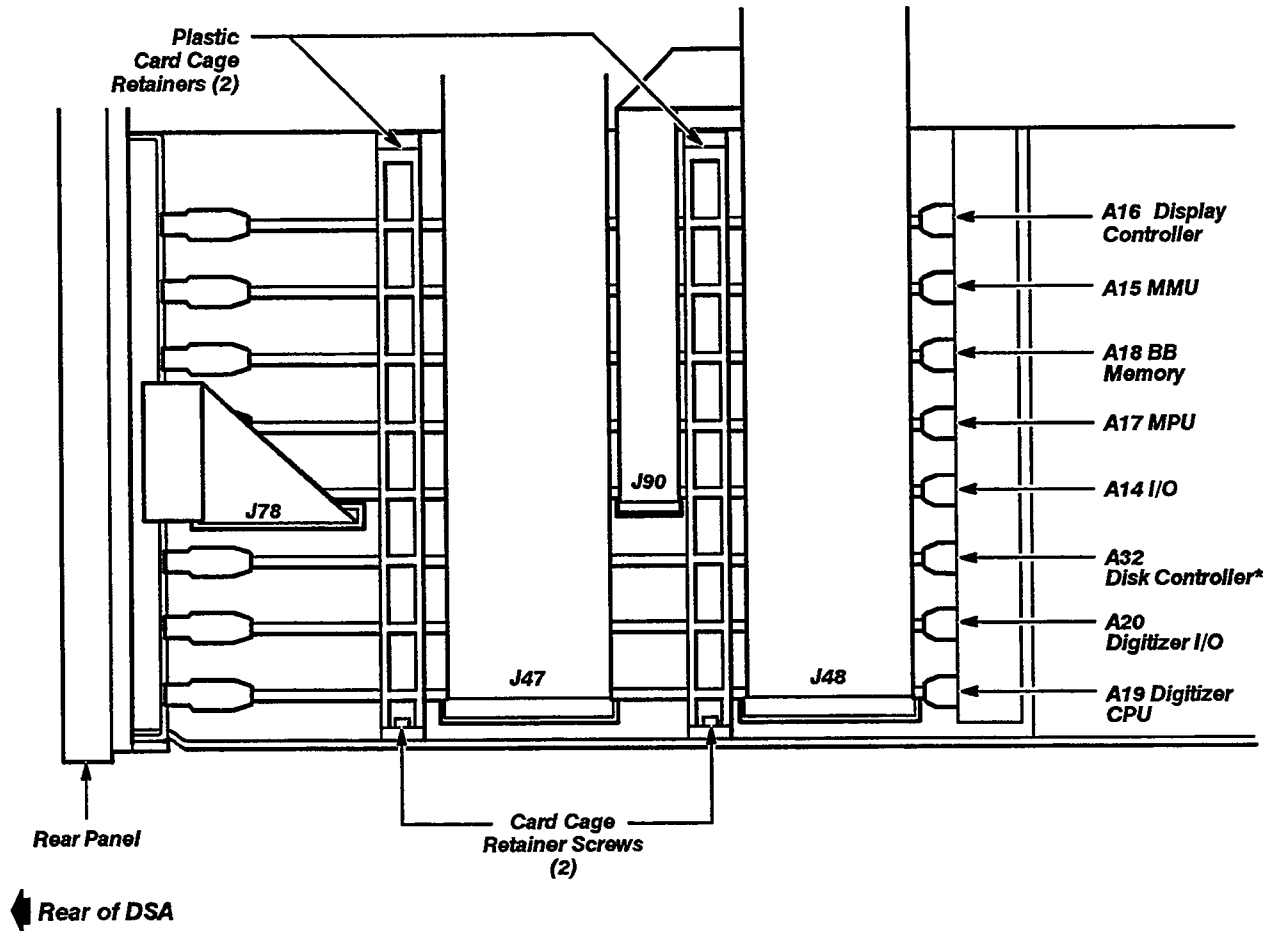


Figure 3: Top View of the Card Cage

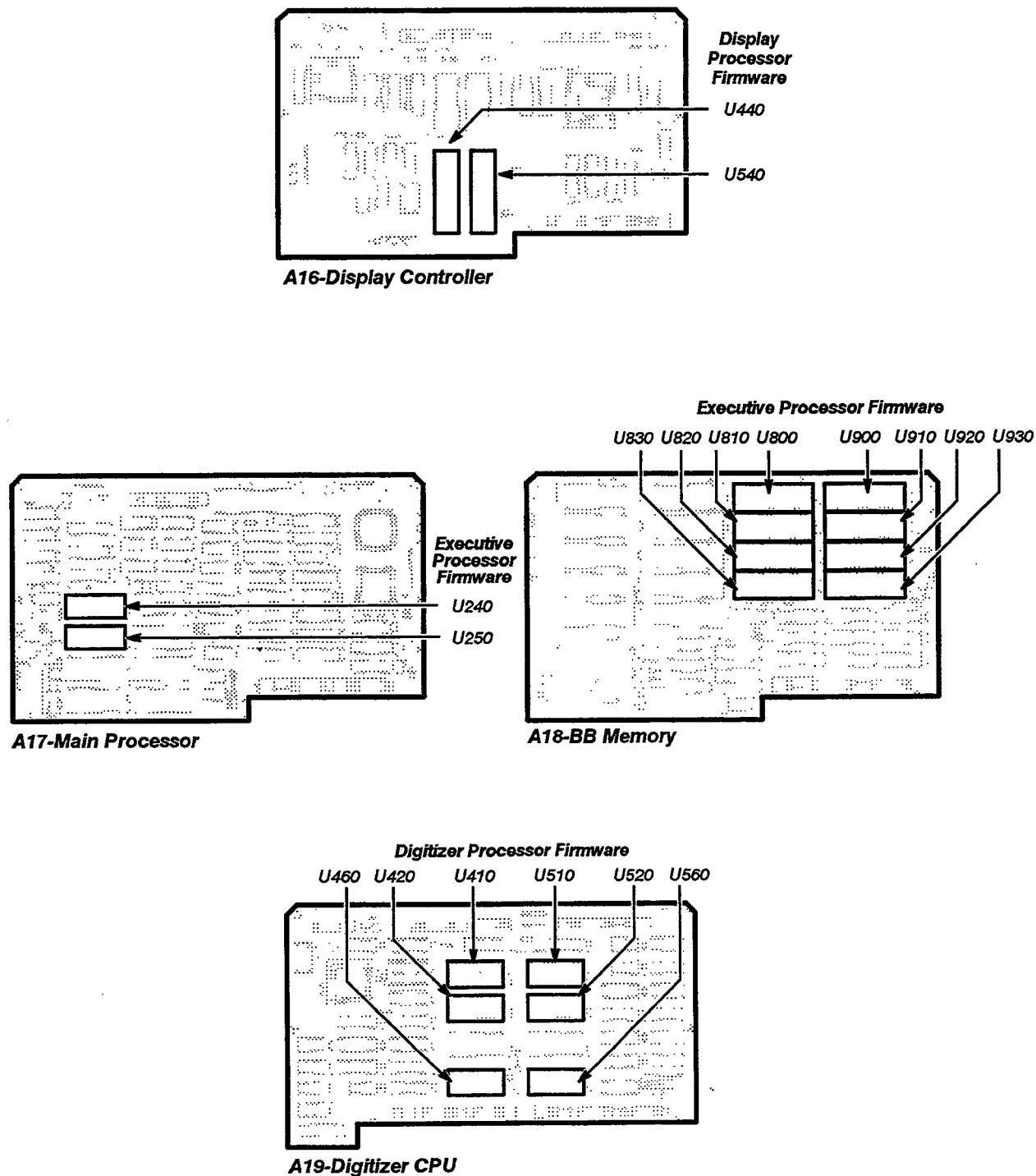


Figure 4: EPROM Locations

Features of Firmware Version 1.31

- Overshoot, undershoot, Duty cycle and skew measurements were added. The measurement model was changed to use the concept of the reference trace for phase and gain.
- Measurement statistics were added.
- The 11403 version of color was added.
- The selection of more than one waveform to be stored by repetitive single trigger is now allowed.
- Waveform area can now be used as a circular buffer saving the last n waveforms during repetitive single trigger rather than stopping when memory is full. This is a user selectable operation.
- A new ASCII command, REPCURVE, was added which provides repetitive single shot acquisitions (as is done for repetitive single trigger) and transfers each acquisition over the bus (fast data transfer mode).
- Display of hundredths of seconds of the time stamp of stored waveforms was added.
- Variable persistence was added.
- PULSE and EDGE autoset functions were added and the autoset part of the modes menu was also changed.
- The trigger syntax was changed to allow the same channel (or combinations of channels within a plug-in) to be used on both sides of a boolean expression. This will allow the user to use only one channel instead of requiring two for many applications of boolean trigger combinations.
- The trigger arrow now appears for level qualified trigger expressions.
- Trigger levels may now be set in absolute or relative mode. In absolute mode, the trigger level remains constant in volts as vertical size and position changes are made rather than remaining constant in divisions.
- FFT status was added to the FFT control/status area.
- Wildcard characters are now allowed in the OUTPUT command specification. This will allow the user to transfer multiple stored waveforms with a single command.
- Repetitive single trigger speed, increased from 60 per second to 120 per second.

New Features of Firmware Version 2.1

Firmware Version 2.1 includes all the 1.31 features plus the following:

■ **Interpolation modes:**

Linear, $\sin(x)x$ and $\sin(x)/x$ with pre-filter.

■ **FFT display formats:**

Vrms displays linear magnitude of rms volts.

dBrms displays log scale of rms volts.

dBvpeak displays log mag based on peak volts.

dBfund displays log mag relative to fundamental.

■ **Frequency Domain:**

Inverse FFT.

FFT can be displayed in wrapped or unwrapped format.

FFT real and imaginary displays are available.

FFT display can be generated from any arbitrary waveform, not just single channels.

■ **Waveform Functions:**

Pulse — generates a pulse of user-specified width, base level 0 and amplitude 1.

Delay — delays a trace by a user-specified number of points.

Averaging — adds summation averaging. The user inputs the number of waveforms for summing.

Filter — can be used to remove unwanted high frequency components for more accurate measurement results.

Correlation — indicates the similarity between waveforms.

Convolution — A mathematical means to filter waveforms.

Adjustable constants — used as part of the waveform description, users can dynamically control these constants using the knobs.

■ **Histograms:**

Users can choose log or linear histogram of any waveform.

- **Trigger:**

The trigger arrow is now shown on the waveform in all but 2 cases. In those cases, an arrow at the bottom of the graticule will indicate the horizontal position of the trigger.

- **Labels:**

The user can enable automatic label generation.

- **Cursors:**

Once displayed, cursors remain on the waveform until removed.

- **Measurement System:**

Frequency, amplitude and total harmonic distortion are now available on FFT waveforms.

Measurements are synchronized with acquisitions.

The selected measurement is remembered so when the menu is re-entered, the measurements annotation is not removed when the knobs are assigned to another function.

- **Hardcopy:**

Hardcopy output can be sent to disk, DSA 601A or DSA 602A only.

New copy format, Secure, produces only waveform & graticule with no numbers or text.

HPGL output has a choice of 2 graticules.

- **TekSecure:**

A menu selection was added for use with TekSecure.

- **Miscellaneous:**

Waveforms can be cleared for the RemWfm menu.

Sample rates with less than 100% fill will show actual sampling rates.

100 ps and 50 ps/div sweep rates added (1024 & 512 points).

XY waveform can have infinite and variable persistence.

SRQ can be generated after each repetitive single shot acquisition.

User can create a stored waveform with probe button.

All single channel waveforms are in floating point mode when waveform scaling is set to force.

Recover — allows user to recover deleted stored waveforms.

New Features of Firmware Version 2.2

Firmware Version 2.2 includes all the 2.1 features plus the following:

- **Data Format**

When Bitmap Dump is selected, the screen data is transferred as either a TIFF file, or as an ASCII title block followed by a pixel data block. The format of the pixel data is determined by the Data Format setting. Touch this selector to cycle through the six available formats.

TIFF mode supports rev 6.0 of the TIFF specification. SCREEN and DITHERED formats generate Palette Color (Class P) prints; HIRES, DRAFT, and REDUCED formats create Bilevel (Class B) prints.

TIFF Compacted generates a TIFF file using compression mode 32773 (Packbits). Note; due to changes between rev 5.0 and rev 6.0 of the TIFF specification, some applications software packages may not accept compacted Class P images.

- **Hardcopy Defaults**

Bitmap Dump have been changed to HiRes, Horizontal, TIFF Compacted, Disk.

- **Convolution**

FIRfilt is added to: Convolve, Correlate, Delay, FIRfilt, FFTmag, FFTphase, FFTreal.