



8515 BUS EXPANSION CHASSIS  
AND  
FLEXIBLE DISK SUBSYSTEM

ABSTRACT

THIS DOCUMENT PRESENTS INSTRUCTIONS FOR INSTALLATION AND USE OF THE TERAK 8515 EXPANSION CHASSIS AND FLEXIBLE DISK SUBSYSTEM.

NOTE: The 8515 is delivered with a Bus Expansion PWB installed. The PWB which is to be installed in the host 8510/a chassis is packed inside of the 8515 in protective packaging material.

These instructions include removal of the 8515 cover to access the 8510/a Bus Expansion PWB.

This document should be thoroughly understood before installation of the 8515 or peripheral controller PWB's.

## CAUTION

These installation instructions are preliminary and assume that the user has some familiarity with the 8510/a Graphics Computer System internal architecture and the LSI-11 "Q-Bus".

The 8515 Expansion Chassis and Flexible Disk Subsystem is delivered with the bus extender PWB (assembly #92-0016-002) and its associated interconnect cables already installed. In addition, the rear of the 8515 chassis has been provided with two External Interface Boards (EIB) in the form of cable clamps for exiting multi-conductor flat cables from the rear of the chassis while maintaining the integrity of the positive air pressure inside the chassis. This is important in that the system should not be run with any of the EIB's not installed. Failure to follow this procedure can cause a great deal of cooling air loss through one of the EIB slots thereby significantly reducing the efficiency of the cooling system and providing the opportunity for damaging components due to over-heating.

The 8515 is also delivered with the 8510/a side of the bus extension (assembly #92-0016-001), intercabling and Bus Extension EIB.

### INSTALLATION OF 8510/a BUS EXTENDER

Disconnect all cables from the rear of the 8510/a chassis and move the system to a suitable work area. To remove the cover of the 8510/a, first remove the two phillips head screws located at the rear outer edges at the lower portion of the chassis (screws are mounted with white nylon finishing washers). Locate two phillips head screws at the front bottom of the chassis at each outer corner (these screws are mounted with a flat washer and a lock washer). DO NOT REMOVE THESE SCREWS, simply loosen these screws approximately three turns. The cover can now be removed from the chassis by sliding it forward off of the chassis.

Position chassis so that PWB handles are facing toward installer. Note that at the extreme right and left edges of the PWB's they are secured to the card guides with black nylon lacing cable. This lacing cable must be cut before PWB's can be removed.

There is sufficient slack cable attached to the uppermost PWB (24K memory and video PWB) such that this board can be removed without disconnecting the cable. Remove the uppermost PWB.

The 8510/a bus extension PWB can now be inserted into the rear card slot (left hand side) in the second backplane connector from the top. (In a standard 8510/a configuration this would have been the only remaining empty slot.) The PWB is designed with a slot for accommodating the extension cables during installation. This slot should face toward the card guides during installation and the cables should be pulled upward through this slot to facilitate installation of the PWB.

Reinsert the top most card (24K memory and video PWB).

Position the 8510/a chassis such that rear of chassis is facing installer. Remove four screws and washers from blank (black metal) EIB. Remove blank EIB.

Remove four screws and washers from Disk Drive Controller EIB (uppermost). Leave the EIB hanging loose out of the rear of the chassis.

The Bus Extension EIB can now be extended through the rear of the chassis. Using four screws and flat washers removed from the blank EIB panel, attach the Bus Extension EIB into the uppermost EIB slot at the rear of the chassis.

Using four screws and flat washer previously removed, install the disk drive controller EIB into the remaining EIB slot on the chassis.

Replace cover by slipping it on from the front being careful to tuck in any wires or cables which may be extending beyond the cover. Once cover is fully seated, reinstall small phillips screws with white plastic washers on either side of the unit near rear of chassis. Tighten two screws under the front edge of chassis and return to normal position reinstalling all external cables.

### INSTALLATION OF THE 8515 EXPANSION CHASSIS

The 8515 Expansion Chassis must be placed on top of the 8510/a system. Inter-connection is made by inserting the connectors from the pigtail cables exiting from the rear of the 8515 into the connectors provided on the bus expansion EIB just installed on the 8510/a.

The 8515 chassis also is provided with a disk drive controller EIB. This EIB and the disk controller EIB on the 8510/a must be connected using the daisy chain connector cable delivered with the 8515. (NOTE: This disk EIB cable is slightly longer than the one provided with an 8512 chassis and should be used in place of the daisy chain cable which may have been delivered with an 8512 flexible disk drive.)

User can now insert additional PWB modules into the 8515 chassis. User installed cables exiting from the chassis should be installed in the "cable clamp" EIB's delivered with the 8515.

IMPORTANT: User should be cognizant at all times of neatly dressing the exited cables to insure an absolute minimum of open area at the EIB's to preserve the integrity of the air flow within the system for cooling of components.

IMPORTANT: Neither the 8510/a nor the 8515 chassis can be operated with their covers removed for more than TEN MINUTES without providing additional cooling to the 5 volt 6 amp regulators. This regulator is mounted toward the front of the chassis on the lower right hand side as the user faces the front of the machine. A small auxiliary fan blowing air across these regulators will provide sufficient cooling. FAILURE TO PROVIDE SUCH AUXILIARY COOLING WILL DEFINITELY RESULT IN FAILURE OF THIS POWER SUPPLY.

Both the 8510/a and 8515 backplanes are supplied with +5 volts DC at 6.0 amps and +12 volts DC at 3.0 amps. Users are cautioned to calculate the combined current ratings of modules installed in the 8515 to insure that these current limits are not exceeded.

## TECHNICAL OVERVIEW

The Bus Extension PWB's and cables were specifically designed to minimize inter-signal noise while preserving good signal level and clarity. The overall bus system, when installed, is terminated at one end by the LSI-11 processor module and at the other by the Bus Extender card.

Some of the backplane pins are not bussed between all slots (connectors). Principally, only the primary control and signal pins with some additional user defined spares were bussed in the backplane. Only the primary control and signal pins are being passed by the bus extension cable. Signal grounds are passed in the extension cable, but no power supply lines are passed. BDCOK and BPOK coming from the power monitors in both the 8510/a and 8515 are wire OR'D whenever the extension cable is installed. This in turn requires that both the 8510/a and 8515 must be turned on in order for the system to operate.

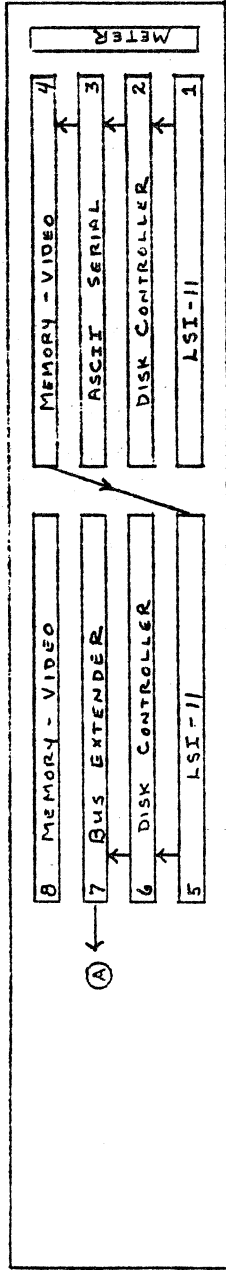
The Bus Extender passes the interrupt and DMA grant signals from the 8510/a to the 8515. In terms of interrupt priority level the 8515 has a lower priority than the 8510/a. Figure 1 illustrates the daisy chain interrupt and DMA grant order of the backplanes on the 8510/a and 8515. The 8515 backplane sequence has been modified to allow insertion of the extension cable into the rear column of connectors.

It will be the user's responsibility to observe and preserve the interrupt and DMA grant structure of the system whenever adding new modules. This shall include the accounting for interrupt vectors and addresses. For those currently in use or potentially in use within Terak systems see Table 2.

TABLE 2

TERAK 8510/a SYSTEM ADDRESSES & VECTORS

<u>Module</u>	<u>Address</u>	<u>Vector</u>
LSI-11	(Internal Traps)	0-36/244
Event Clock (60/sec)	-	100
Serial #0	177560/6	60/64
Serial #1	177520/6	120/124
Serial #2	177530/6	130/134
Serial #3	177560/6	150/154
Serial #4	176520/6	320/324
Serial #5	176530/6	330/334
Serial #6	176560/6	340/344
Serial #7	176570/6	350/354
Video (Standard)	177560/6	60/64/164
Video (Alternate)	177760/6	70/74/174
Video (Control)	177740/6	-
Disk Controller (STN)	177000	250
Boot ROM (STN)	173000/176	-
Disk Controller (ALT)	177200	254
Boot RDM (ALT)	173200/376	-
Printer (SSI Teletype)	177514/6	200
Printer (ALT)	176514/6	240

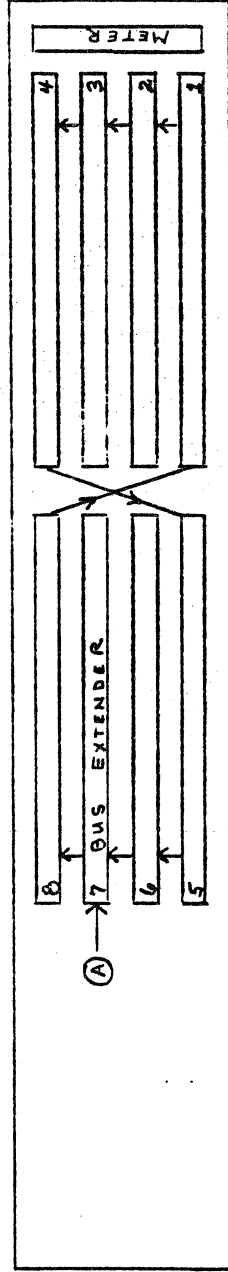


FRONT

8510

OF

SYSTEM



8515

TABLE 1

DAISY CHAIN GRANT PATH 8510/8515