3.7 DISC DRIVE CONTROLLER

The PM-FCV21B is a dual-wide single module 5 1/4-inch Winchester disc drive controller that interfaces with the Xebec S1410 FFV21B formatter and emulates the DEC RL01/RL02 disk subsystem.

The compact controller is pin-to-pin, signal, and power compatible with Q bus backplanes that support LSI-11 CPUs and associated modules. It plugs directly into any Q bus slot.

The PM-FCV21B is software compatible with DEC operating systems and diagnostics designed for the RL01/RL02.

3.7.1 FEATURES

- Controller contained on one dual-wide module.
- 22-bit addressing capability.
- Error Correction (ECC).
- Multi-level interrupt priorities.
- Drive configuration PROM allows selection of up to four different drive types.
- Drives may be configured as either RL01 or RL02.

3.7.2 SPECIFICATIONS

Power Requirements:	5VDC at 2.5A typical.
Priority Level:	Selectable. Compatible with LSI-11/23.
Device Address:	774400 standard. Selectable alternate.
Interrupt Vector:	160 (octabl) standard. Alternate standard.
Bus Load:	1
Interface:	Xebec S1410 (SASI bus)
Media:	Fixed.
Recording Method:	Modified frequency modulation (MFM).
Drives/Controller:	2 (up to 4 logical units).
Error Detection:	Cyclic redundancy check (CRC) on data and headers. 11-bit ECC.
Cable:	Requires 50-conductor ribbon cable to Xebec formatter (not included).

Dimensions:	Standard dual-wide module. 10.45" (26.6cm)H x 8.94" (22.7cm)L.
Installation:	
Operating:	0 C to 50 C
Storage:	-16 C to 60 C
Humidity:	10% to 95% noncondensing

3.7.3 JUMPER SETTINGS

The jumpers are numbered differently for the two different boards.

<u>Assembly number 400185 (Old Artwork)</u>

TO 0041612711896 P.04/24

Interrupt request level:

W1 - W2 IN Bus Request 5 (Standard)
W1 - W2 OUT Bus Request 4

Address Select Jumpers:

W3 - W32 These are etched in for address 774400. These should not be changed in the field as the vector cannot be changed.

W37 - W38
W34 - W35 Are for test only and are factory set.

<u>Assembly Number 400250 (New Artwork)</u>

Interrupt Request Level:

W1 - W2 IN Bus Request 5 (Standard)
W1 - W2 OUT Bus Request 4

Board Reset:

W3 - W5 Board reset by BINIT (Standard)
W3 - W4 Board reset by BDCOK

Boot Enable:

W6 - W7 IN Enable bootstrap at 773000
W6 - W7 OUT Disable bootstrap (Standard)

Address and Vector Select:

	W10-W11	W8-W9	W14-W15
Standard 774400,160	IN	OUT	OUT
Alternate 776400,150	OUT	IN	IN

22-Bit Addressing:

	W26-W27	W28-W29	W28-W30
22-Bit (Standard)	IN	OUT	IN
18-Bit	OUT	IN	OUT

Mixed Capacity drive select: W24-25 Not available.

TO 0041612711896 P.06/14

Test only jumpers: W16-17, W12-13, W34.

3.7.3.1 Drive Configuration

The PM-FCV21B controller has the capability of RL01 and RL02 emulation. The 6200 series systems come equipped with either a 10.4 megabyte or a 20.8 megabyte Winchester disk drive. These drives may be configured as either RL01 or RL02.

The jumpers are located at the upper righthand corner as viewed from the component side, for both boards.

Assembly Number 400185 (Old Artwork)
Assembly Number 400250 (New Artwork)

62X0 10.4 MB Series

	Old Artwork			New Artwork	
2xRL01	W39 to W40	W42 to W43*	:	W18 to W19	W21 to W22
1xRL02	W39 to W40	W43 to W44	:	W18 to W19	W22 to W23

62X1 20.8 MB Series

	Old Artwork			New Artwork	
4xRL01	W40 to W41	W42 to W43	:	W19 to W20	W21 to W22
2xRL02	W40 to W41	W43 to W44*	:	W19 to W20	W22 to W23

* = Standard Configuration

Note

After changing emulation, the drive must be reformatted and the bad sector file rewritten.

3.7.4 BOOTSTRAPPING

The PM-FCV21B may be bootstrapped from a standard bootstrap device such as the Plessey PM-MFV11 or the DEC MXV11 in the same manner as the DEC RL01/RL02 subsystem. The mnemonic is DL* where * = drive number.

3.7.5 DRIVE FORMATTING

TO 0041612711896 P.05/24

The PM-FCV21B provides a firmware routine to format attached drive(s). When exectued, the format routine formats to 32 sectors/track, each cylinder as defined by the PM-FCV21B configuration PROM.

To format the drive(s), use the following procedure:

1. While in ODT, access the PM-FCV21B disk address register (DAR) at location 774404 by entering 774404/ at the console. The processor will respond with the contents of 774404, displaying 774404/000000 (not necessarily all zeroes).

2. Enter 264 and RETURN.

3. Access the PM-FCV21B control status register (CSR) by entering 774400/. The response will normally be 774400/000201.

4. Enter 4 and RETURN.

The drive will then be accessed and will format completely. If formatting is unsuccessful, be sure to verify that the configuration PROM is correct for the installed drive.

3.7.6 WRITING BAD SECTOR FILE

The PM-FCV21B includes a firmware program designed to write a bad sector file at the end of each logical drive. The format of the bad sector file is per DEC STD-144, and is compatible with the bad sector file found on the DEC RL01/RL02 disk cartridge.

DEC diagnostic CZRLM may also be used to generate or check the bad sector file information. To write a bad sector file on each logical unit, while in ODT, deposit 360 into the DAR (774404) and then deposit 4 into the CSR (774400) for logical unit 0 and 404 into the CSR (774400) for logical unit 1. The controller will access the drive and perform the function.

3.7.7 SELF-TEST

The PM-FCV21B has an extensive set of diagnostic software built into the controller. Each time a power-up or BINIT routine is completed, the PM-FCV21B executes a complete set of self-test diagnostics that test the PM-FCV21B and the Xebec S1410 formatter.

Upon successful completion of the self-test diagnostics, LED CR2 is latched in the ON state. If the LED remains OFF after a power-up cycle, part of the subsystem is not functioning properly and the fault should be remedied before trying to use the disk.

The diagnostics executed on power-up include:

- PM-FCV21B Diagnostics: These tests check the SDC-RLV12 microprocessor and buffer memory and all related data paths.
- Xebec Formatter Diagnostics: These tests verify the SDC-RLV12 interface to the formatter by executing the internal formatter tests.

The Xebec formatter board interfaces between the PM-FVC21B controller and the 5 1/4-inch Winchester disc drive. This formatter board hooks up to the drive and does the formatting, phase lock loop, data separation, and ECC for the PM-FCV21B controller. The formatter has an ST-506 interface for the 5 1/4-inch Winchester disc drive and can control a maximum of two drives.

The board has three jumpers:

W1	Factory test, must be in.
W2	Factory test, must be in.
W3	SS to 2, 256-byte sector, 32 sectors/track.

J1	Drive control cable, 34 pin cable to drive (max. 20 ft.)
J2	Data cable to first drive (max. 20 ft.)
J3	Data cable to second drive (max. 20 ft.)
J4	Test only.
P1	Power cable: +5V and +12V.
P2	SASI interface to PM-FCV21B (max. 15 ft.)