3.8 FLOPPY DISC CONTROLLERS

The PN-XCV21/XCV31 is a dual density controller compatible with the DEC RXV02 floppy disc system. Configured with any Shugart compatible drive, it is a direct replacement for the RXV211 subsystem. The controller provides either single density encoding compatible with IBM 3740 equipment, double density encoding, or double-sided double density recording for up to 1 Mbyte storage. When configured with two drives, each drive may operate at a different density.

All electronics are contained on one dual-wide board which plugs directly into any standard LSI backplane and interfaces a 50 conductor ribbon cable to any Shugart compatible drive. The controller is tested and ready for plug-in and operation. The controller is configured for the standard device address 177170 and interrupt vector 264. The interrupt level is factory set to level four.

3.8.1 FEATURES

- Transparent firmware bootstrap automatically loads either single or double density discs.
- Formatting capability permits writing sector headers, checking the written headers, and writing the data fields in the user selected density.
- Jumpers allow user selection of both the alternate address and vector.
- Jumper selectable four-level device interrupt priority compatible with the LSI-11/23.
- Provides power fail protection for data integrity.
- Write current control signal for tracks greater than 43.
- Write precompensation for reduced error rates.

3.8.2 COMPATIBILITY

This subsection discusses the aspects of hardware, software, and media compatibility with DEC RXV02 system. The information will aid the user in data interchange with non-DEC systems.

3.8.2.1 Hardware

The controller is compatible with the LSI-11, LSI-11/2 and LSI-11/23 processors. All circuitry is contained on one dual-wide board that plugs directly into any standard LSI-11 backplane. Alternate address selection and a four-level device interrupt priority scheme provide the user added flexibility for expanded system configurations. Shugart compatible drive logic is interfaced through a 50-pin ribbon connector. The connector pins are compatible with both the 800 and 850 series drives.

6200 Series System User Reference Manual

3.8.2.2 Software

The PM-XCV21/XCV31 is completely compatible with RXV211 register
definition and command protocol. All DEC-supplied software designed
to operate with the RXV02 system will operate with the controller
without modification.

3.8.2.3 Media

The media used with the PM-XCV21/XCV31 is compatible with the IBM
3740 family of equipment. Either performatted or blank soft
sectored discs may be used with the controller. The following list
summarizes the suggested media.

```
Single Sided    IBM
Double Sided    IBM
RXV01/RXV02     DEC
```

3.8.3 SPECIFICATIONS

3.8.3.1 Recording Technique

```
Single Density      IBM 3740 FM
Double Density      DEC Modified MFM
```

3.8.3.2 Power Requirements

```
Voltage             Single 5V supply
                    (From LSI-11 backplane)

Current             Typical 2.5A
```

3.8.3.3 Environmental

```
Temperature         0 C to 45 C
Humidity            10% - 95% non-condensing
```

3.8.4 CONTROLLER CONFIGURATION

The PM-XCV21/XCV31 controller is shipped with standard options
configured. The standard address 177170 and vector 264 are set. The
device interrupt priority is set to level four. The firmware
bootstrap is disabled. Write precompensation is enabled. Write
current control is disabled. Both drive and side select options
have been configured for either single- or double-sided drives.

Most options are factory foil-etched to the most often used
configuration. The foil jumpers must first be cut before the

6200 Series System User Reference Manual
----

alternate jumpers are inserted. Refer to Table 3-7, 3-8, and 3-9
for alternate options and Figure 3-2 for jumper location. Several
of the options are selectable by using AMP 530153-2 pin jumpers. If
these pin jumpers are not available, use 30 wire wrap.

Table 3-7. Address/Vector Option Configuration

| | Jumper | | |
Option	15-16	16-17	33-34
Standard Address/Vector* 177170/264	IN	OUT	OUT
Alternate Address/Vector 177174/270	OUT	IN	IN

*Factory Preset

Table 3-8 Priority Level, Assert, and Monitor Options

Priority Level	Assert	Monitor	Jumper									
			W18-19	W19-20	W21-22	W22-23	W24-25	W25-26	W27-28	W28-29	W30-31	W31-32
4*	4	5,6	Out	In	Out	In	In	Out	Out	In	In	Out
5	4,5	6	Out	In	In	Out	In	Out	Out'	In	Out	In
6	4,6	7	In	Out	Out	In	Out	In	In	Out	In	Out
7	4,6,7	None	In	Out	In	Out	Out	In	In	Out	Out	In

*Factory Preset

6200 Series System User Reference Manual

Table 3-9. Miscellaneous Options Configurations

Option	Drive Select		Side Select			Write Current	Bootstrap		Write Precomp		Factory Test				
	1-2	2-3	4-5	5-6	6-7	8-9	10-11	10-43	12-13	13-14	35-36	37-38	39-40	41-42	44-45
Bootstrap Enabled							In	Out			Must always be out	Do not remove - for test only	Do not remove - for test only	Do not remove - for test only	Do not remove - for test only
Bootstrap** Disabled							Out	In							
Write Precomp** Enabled									Out	In					
Write Precomp Disabled									In	Out					
Write Current* Control Enabled						In									
Write Current** Control Disabled						Out									
Single Sided Drives only	Out	In	Out	Out	In										
Single or Double** Sided Drives	Out	In	In	Out	Out										
One Double Sided Drive Drive 0 = Side 0 Drive 1 = Side 1	In	In	Out	In	Out										

*Should be enabled for double sided drives.
**Factory Preset

6200 Series System User Reference Manual

WRITE
CURRENT   TEST   TEST

SIDE
SELECT

DRIVE
SELECT

W8   40   42
W39   41

W9

TEST

5 6   2
W4   W1   3
7

TEST

W37   TEST

W38   38   45
W33   W44
W34   W35

BOOTSTRAP   ALT VECTOR

ALT ADR

10
W43   11   PRECOMP

16   13
W15 17   W12 14

INT
PRIORITY   INT
                             PRIORITY

W18 21   W24 27 30
19 22   25 28 31
W20 23   W26 29 32
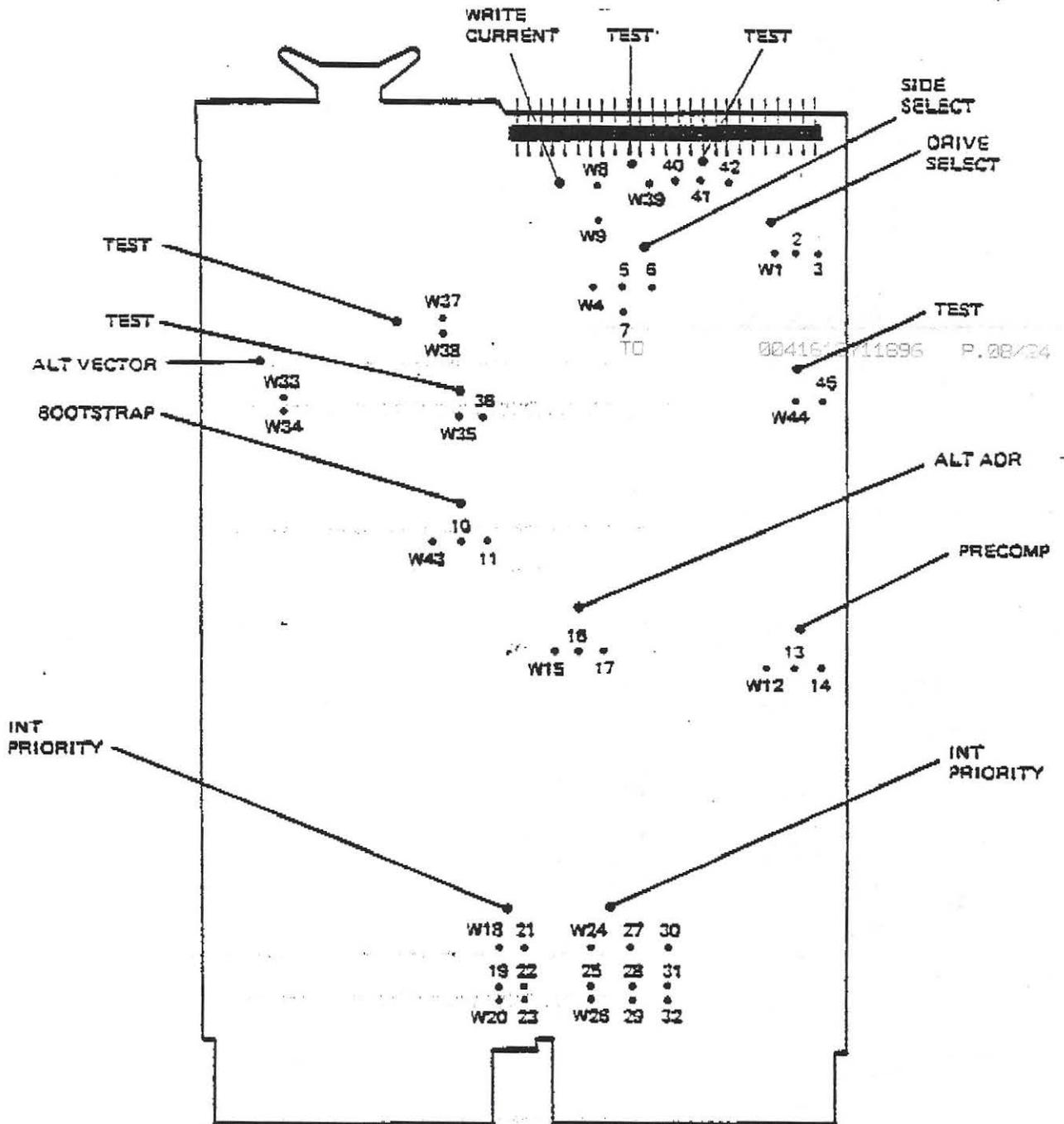
Figure 3-2. PM-XCV21/XCV31 Configuration Jumper Locations

6200 Series System User Reference Manual

3.8.4.1 Address Vector Selection

The controller is shipped with DEC standard device address and vector assignments preset to 177170 and 264 respectively. Any change in these assignments would necessitate a change in system software. However, an alternate address and vector assignment is selectable and is defined as 177174 and 270 respectively.

These assignments are typically used when more than two drives are needed; two controllers would be required and the second controller would be configured for the alternate address and vector. To select the alternate address/vector, first cut the foil between W15 and W16, jumper W16 to W17, and jumper W33 to W34 as shown in Table 3-7.

3.8.4.2 Device Interrupt Priority

The PM-XCV21/XCV31 supports the four-level device interrupt priority scheme compatible with the LSI-11/23. The controller asserts interrupt requests and monitors higher level request lines during interrupt arbitration (refer to Table 3-8). The level four request is always asserted by the controller, regardless of its priority, to maintain compatibility with the LSI-11 processors.

The interrupt priority level is configured to level four at the factory. If a different interrupt level is desired, jumpers must be cut. Refer to Table 3-8 for the proper jumpers to insert for the desired priority level.

3.8.4.3 Bootstrap

The controller board incorporates a transparent firmware bootstrap. The bootstrap is initiated whenever program execution is started at location 173000 , homing both drives to track 0. Next, track 1, sector 1, of unit 0 is read and disc density is determined. If the disc is single density, sectors 1, 3, 5, and 7 are loaded into memory starting at location 0. If the disc is double density, sectors 1 and 3 are loaded. Program execution is then transferred to location 0. Controllers are shipped with this feature disabled. To enable the bootstrap, remove the jumper between W10 and W43 and insert the jumper between W10 and W11 as indicated in Table 3-9.

Note

Only one bootstrap should be enabled in a system for proper operation. If another bootstrap exists in the system, it must be disabled before enabling the controller bootstrap.