

EK-VSV21-PSG-003

**VSV21**  
**Version 2.0**  
Pocket Service Guide



**VSV21**  
**Version 2.0**  
Pocket Service Guide

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Company Limited.

Digital Equipment Company Limited assumes no responsibility for any errors that may appear in this document.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by Digital Equipment Company Limited or its affiliated companies.

Copyright © 1985,1986,1987 by Digital Equipment Company Limited.

All Rights Reserved

Printed in U.K.

Using Digital's networked computer systems, this book was produced electronically by the Media, Publishing and Design Services Department in Reading, Reading

The following are trademarks of Digital Equipment Co. Ltd.

**digital**

|           |              |                |
|-----------|--------------|----------------|
| DEC       | P/OS         | VAX            |
| DECmate   | Professional | VMS            |
| DECUS     | Rainbow      | VSV21          |
| DECwriter | RSTS         | VT             |
| DIBOL     | RSX          | Work Processor |
| MASSBUS   | RT           |                |
| PDP       | UNIBUS       |                |

**WARNING**

Some of the procedures described on this guide call for the removal of system covers. Such procedures should only be performed by suitably trained personnel. For the user, this material is provided for information only.

# CONTENTS

|          |   |    |
|----------|---|----|
| <b>1</b> | <b>INTRODUCTION</b>                                       |    |
| <b>2</b> | <b>CONFIGURATIONS</b>                                     |    |
| 2.1      | Power/Bus Requirements .....                              | 13 |
| 2.2      | Address/Vector Ranking .....                              | 13 |
| 2.3      | Monitor Section .....                                     | 13 |
| 2.4      | Switch Setting .....                                      | 14 |
| 2.5      | Serial Port Defaults .....                                | 17 |
| 2.6      | REMOTE BOX INTERNAL POWER<br>SUPPLY .....                 | 17 |
| <b>3</b> | <b>ON-BOARD SELF-TEST</b>                                 |    |
| <b>4</b> | <b>DIAGNOSTIC PROGRAMS</b>                                |    |
| 4.1      | XXDP+ — PDP SYSTEMS .....                                 | 25 |
| 4.2      | DECX-11 PDP Systems .....                                 | 27 |
| 4.3      | MDM — MicroVAX II Systems .....                           | 27 |
| 4.3.1    | Basic Functionality Test (Diagnostic<br>Tests 1-15) ..... | 28 |
| <b>5</b> | <b>INSTALLATION</b>                                       | 31 |
| <b>6</b> | <b>TROUBLESHOOTING</b>                                    | 33 |
| <b>A</b> | <b>ASSOCIATED DOCUMENTATION</b>                           | 47 |
| <b>B</b> | <b>LK-201 KEYBOARD DETAILS</b>                            | 49 |
| <b>C</b> | <b>RECOMMENDED SPARES LIST</b>                            | 53 |
| <b>D</b> | <b>THE NVRAM —NON-VOLATILE<br/>RAM</b>                    | 55 |

**FIGURES**

|     |   |    |
|-----|---|----|
| 1-1 | Standard VSV21 Option Kit<br>Components .....                             | 7  |
| 1-2 | VSV21 Peripheral Concentrator Option<br>Kit Components .....              | 9  |
| 2-1 | Standard VSV21 System Configuration<br>Block Diagram .....                | 11 |
| 2-2 | VSV21 Peripheral Concentrator System<br>Configuration Block Diagram ..... | 12 |
| 2-3 | Device Address Setting Guide .....  | 15 |
| 2-4 | Vector Address Setting Guide .....  | 16 |
| 3-1 | On-Board Diagnostic LED Indication  | 20 |
| 3-2 | Self-Test Test Picture .....  | 22 |
| 6-1 | VSV21-CA/DA: Remote box power<br>supply replacement .....                 | 46 |
| B-1 | Layout of an LK-201 Keyboard .....  | 50 |

**TABLES**

|     |  |    |
|-----|--|----|
| 2-1 | Graphic Resolution Selection Guide ...                         | 14 |
| 6-1 | Troubleshooting Procedures for Standard<br>VSV21 Systems ..... | 33 |
| 6-2 | Trouble-Shooting Procedures for VSV21<br>PC System .....       | 38 |
| 6-3 | Remote Interface Box Test Point<br>Allocation .....            | 45 |

# 1 INTRODUCTION

The VSV21 is a single-module quad size option for the Q22 Bus. It is a high functionality graphics control module capable of working on the following processors:

- PDP11/23 +
- PDP11/53
- PDP11/73
- PDP11/83
- MicroVAX II

It is capable of interfacing with:

- A color monitor
- An LK201 keyboard
- A pointing device (joystick, trackball, mouse, tablet)
- A serial interface (example DHV11)

When the VSV21 is interfaced to the host processor via its serial interface, it can be configured to emulate a basic terminal. In this configuration the Q22 bus interface is not used, and the VSV21 can be used as the host console terminal.

Full graphics functionality is obtained by down-loading firmware from the host VSV21 device driver.

The strategy for testing the VSV21 is to use the power-up self-test and the host-resident diagnostic to isolate the faulty FRU. The VSV21 FRU's are:

- M7656 quad module

## 6 INTRODUCTION

- Panel assembly (70-20091-01) for standard VSV21 option
- or
- Bulkhead panel (70-24336-01) for VSV21 Peripheral Concentrator(PC) opt
- Data cable (70-20093-01) 12 inch for BA23 housing
- or
- Data cable (70-20093-02) 30 inch for BA123 housing
- or
- Data cable (70-20093-03) 36 inch for BA11S/H9642 housing
- Video cable (70-20094-01) 12 inch for BA23 housing
- or
- Video cable (70-20094-02) 30 inch for BA1123 housing
- or
- Video cable (70-20094-03) 36 inch for BA11S/H9642 housing
- Fuse 3.0 amp (12-10929-07) (+5 volt peripheral device fuse)
- Fuse 3.0 amp (12-10929-07) (+12 volt peripheral device fuse)
- Remote interface box (RIB) assembly (70-24335-01)
- RIB power supply (30-21558-01)
- Fuse 1.0 amp (90-07212-00) (RIB AC mains supply fuse)

Figure 1-1 shows the components that make up a typical standard VSV21 option kit.

Note that the loopback test connectors do not form part of the option kit, and must be separately provided (VSV21-AJ option).



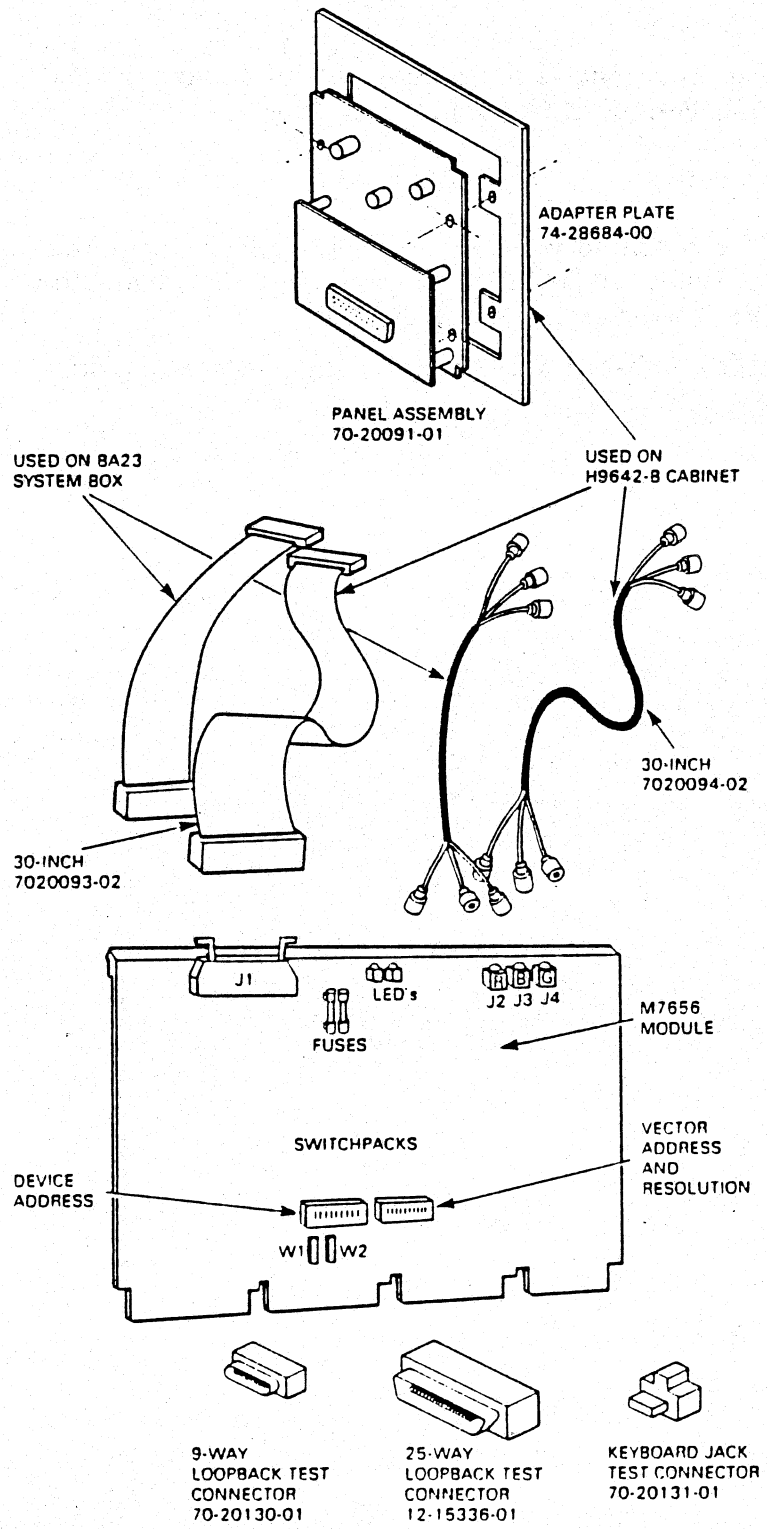


Figure 1-1 Standard VSV21 Option Kit Components

## 8 INTRODUCTION

Figure 1-2 shows the components that make up the VSV21 Peripheral Concentrator option kit.

Note that:-

- The bulkhead panel 70-24336-01 replaces the panel assembly 70-20091-01 supplied with the standard VSV21 option kit (see figure 1-1)
- The loopback test connectors form part of the option kit.

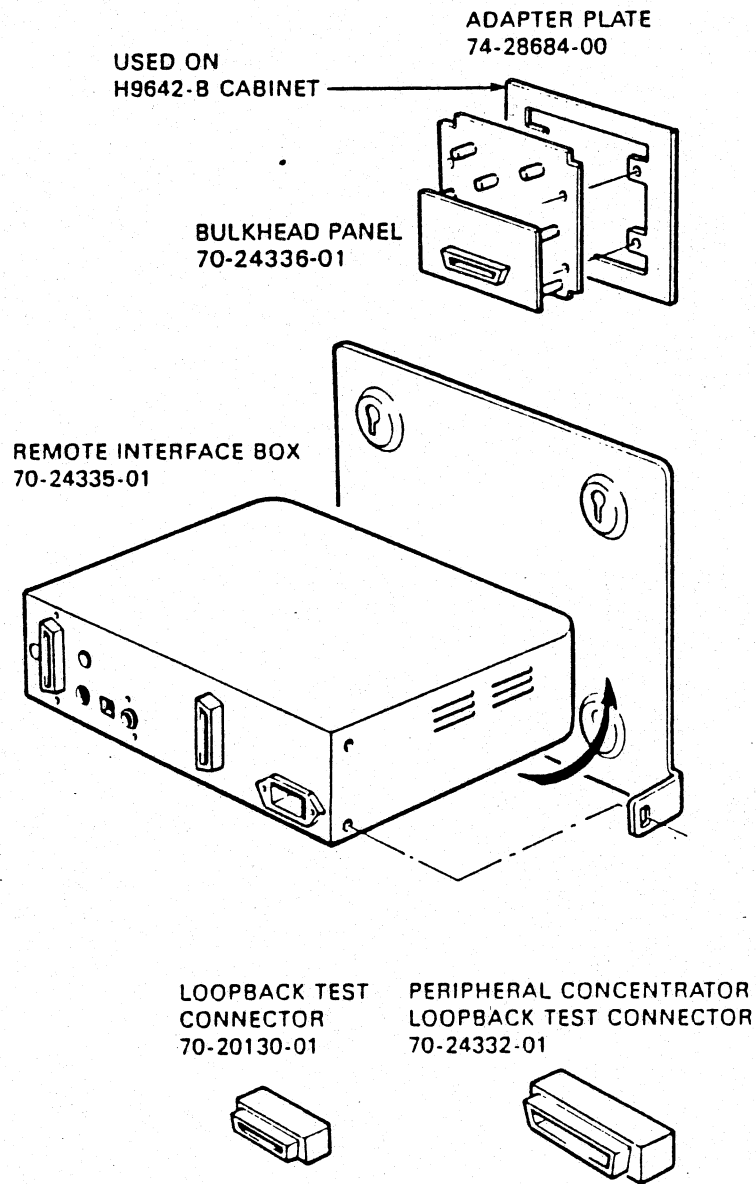
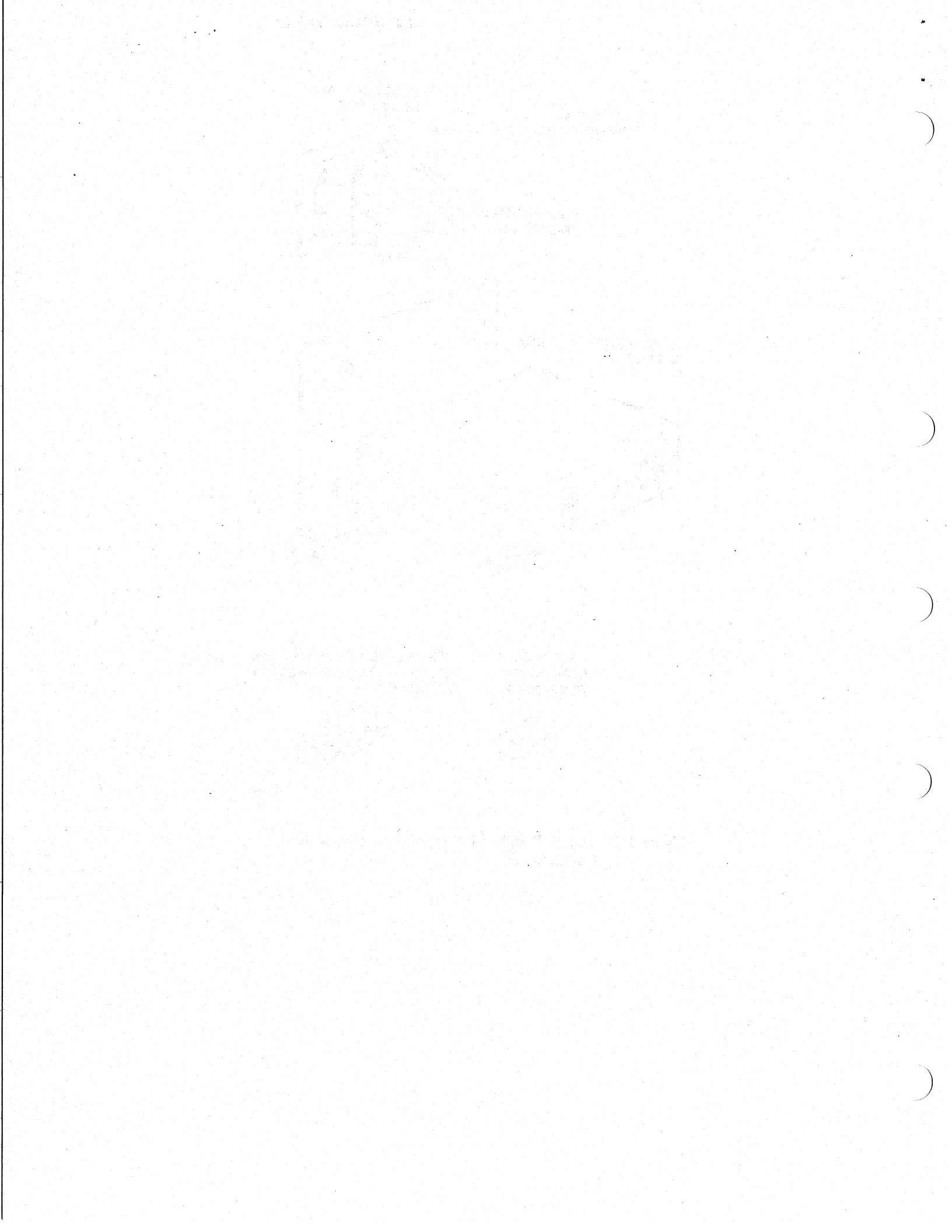
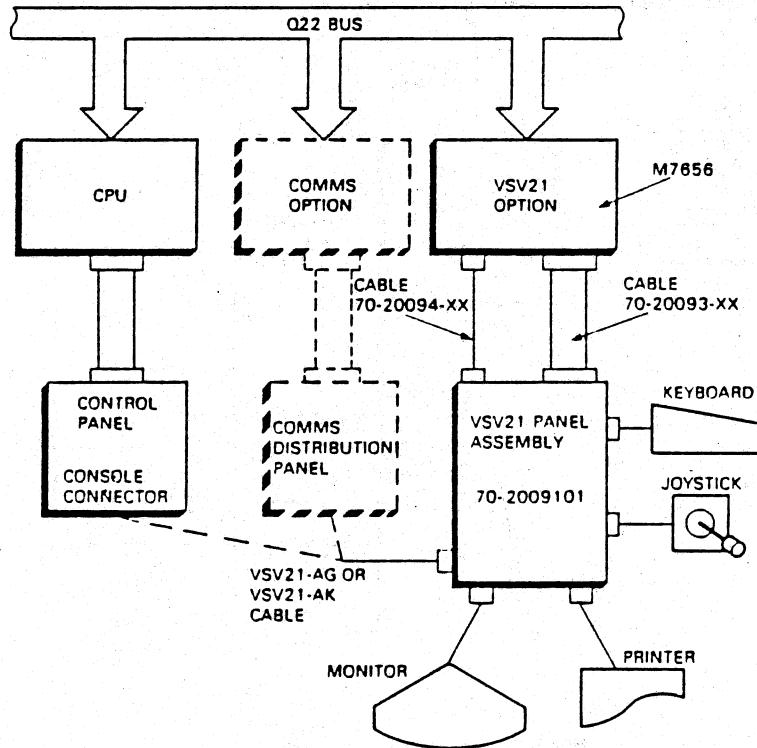


Figure 1-2 VSV21 Peripheral Concentrator Option Kit Components



# 2 CONFIGURATIONS

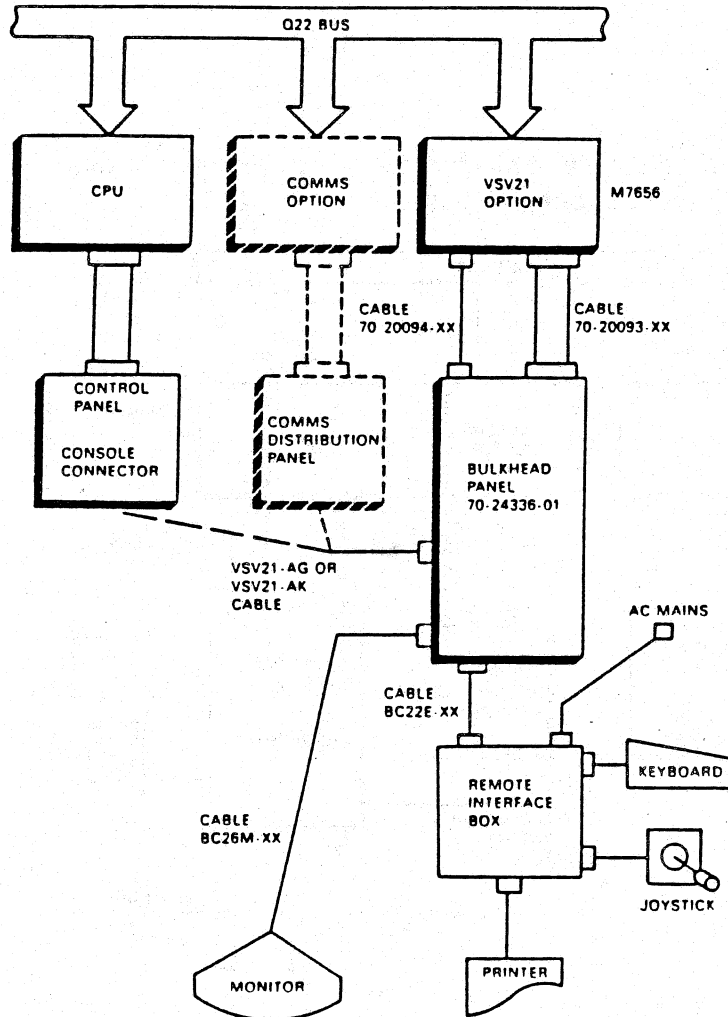
Figure 2-1 shows a block diagram of a typical standard VSV21 system configuration.



RD2311

Figure 2-1 Standard VSV21 System Configuration Block Diagram

Figure 2-2 shows a block diagram of a typical VSV21 Peripheral concentrator system configuration.



RE4187

Figure 2-2 VSV21 Peripheral Concentrator System Configuration Block Diagram

Note that the VSV21 can also be configured to function as a system console, and as such is used to boot/set-up the system.

**2.1 POWER/BUS REQUIREMENTS**

The power requirements are:

- 5.5 A (typical), 7.6 A (maximum) at +5 V dc
- 0.15 A (typical), 0.2 A (maximum) at +12 V dc
- 1.9 Q-bus ac bus loads
- 0.5 Q-bus dc bus loads

**2.2 ADDRESS/VECTOR RANKING**

The VSV21 rankings are both in the floating space:-

|           | Rank | Size | Modulus (octal) |
|-----------|------|------|-----------------|
| Address - | 49   | 4    | 10              |
| Vector -  | 77   | 2    | 4               |

**NOTE**

To ensure compatibility with the diagnostics on MicroVAX II installations, the device addresses/vectors are required to be set to the following fixed values:-

| Dev No. | Address | Vector |
|---------|---------|--------|
| 1       | 7772000 | 300    |
| 2       | 7772010 | 320    |
| 3       | 7772020 | 340    |
| 4       | 7772030 | 360    |

**2.3 MONITOR SECTION**

Refer to Table 2-1 which shows the E48 switch settings for selecting the graphic resolution. Ask the customer what resolution is required and adjust the switches accordingly.

VSV21 is designed to work with 60Hz Non-Interlaced Monitors of either 16kHz (nominal) or 32 kHz (nominal) line frequency. The video signals are compatible with RS343 specified voltage levels with sync on green and standard should option be terminated in a 75 ohm impedance.

**Table 2-1 Graphic Resolution Selection Guide**

| <b>E48<br/>9</b> | <b>Switch<br/>10</b> | <b>Resolution<br/>(pixels)</b> | <b>Line Frequency<br/>kHz</b> |
|------------------|----------------------|--------------------------------|-------------------------------|
| ON               | ON                   | 512 × 512                      | 33                            |
| ON               | OFF                  | 512 × 256                      | 16.5                          |
| OFF              | ON                   | 640 × 480                      | 32                            |
| OFF              | OFF                  | 640 × 240                      | 16                            |

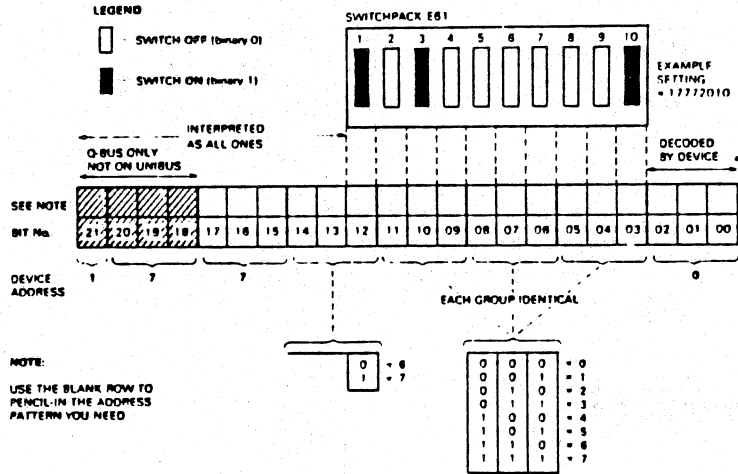
#### 2.4 SWITCH SETTING

Switch 8 in switchpack E48 is used to disable the module's response to BUSINIT signals. If the VSV21 is used as a system console, it will normally respond to BUSINIT signals and clear the display when it enters selftest. This may give rise to problems in running diagnostics on other modules. Switch 8 can be moved to disable the response to BUSINIT signals and should be returned to ON on completion of diagnostic testing.

Switch 8 is OFF to disable the module's response to BUSINIT signals and ON to enable the module's response to BUSINIT.

The jumpers W1 and W2 should be installed when the M7656 module occupies a Q/Q slot, and should be removed when it occupies a Q/CD slot.





R02234

Figure 2-3 Device Address Setting Guide

# 16 CONFIGURATIONS

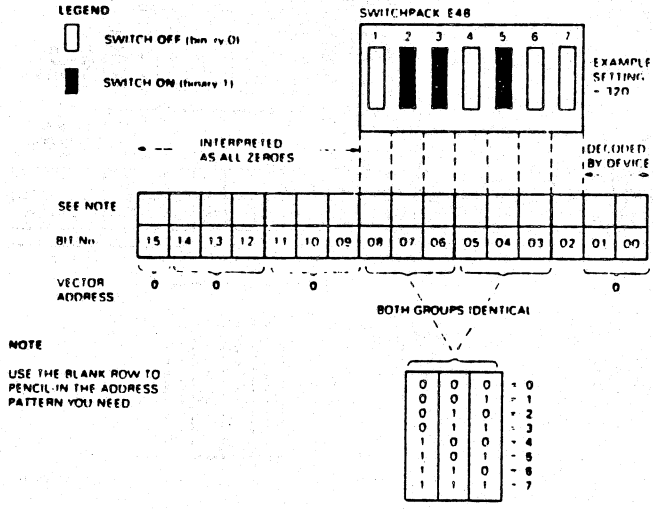


Figure 2-4 Vector Address Setting Guide

## 2.5 SERIAL PORT DEFAULTS

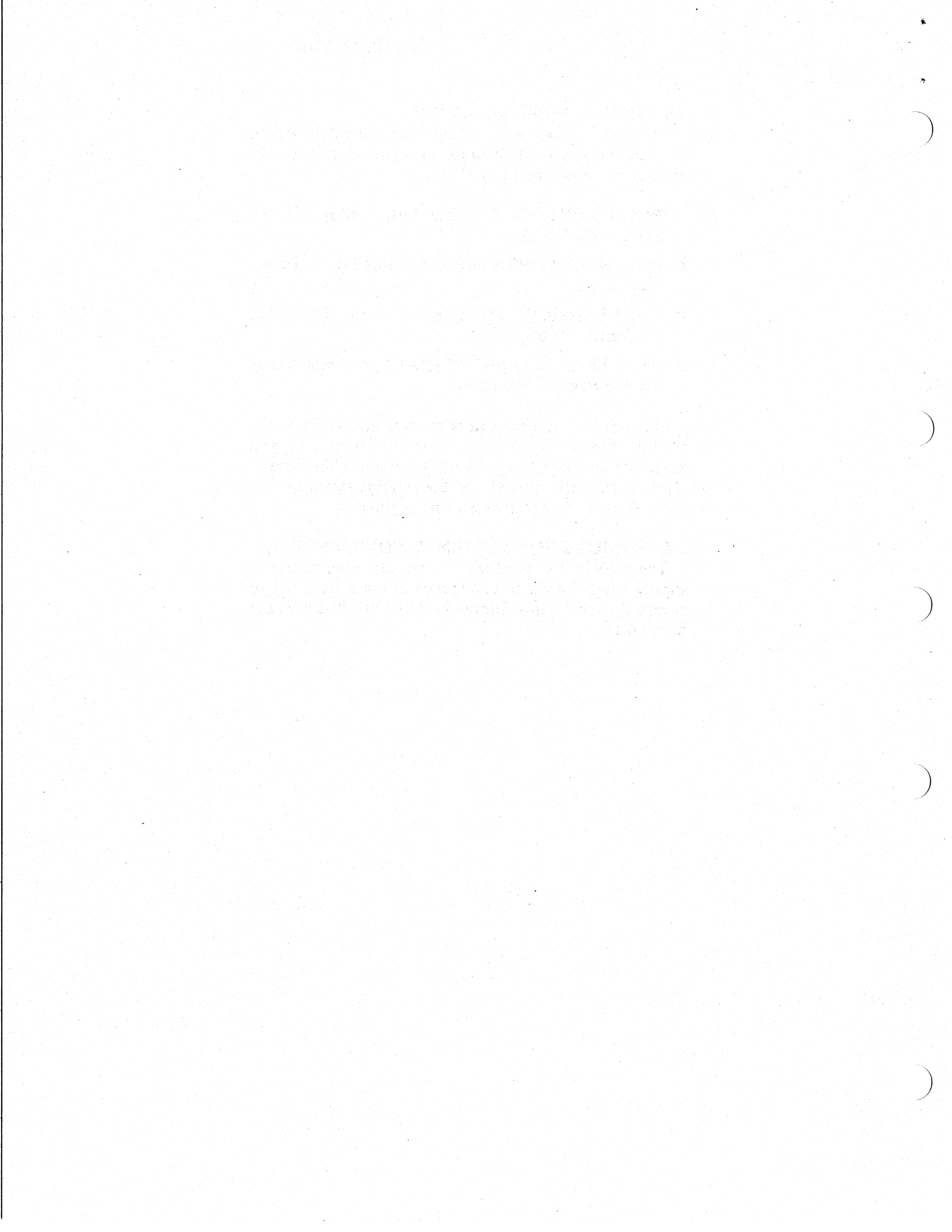
The VSV21 module serial interfaces are configured to the following default settings. Other settings must be entered on replacement modules:

- Port 0 KEYBOARD 8-data bits, 1 Stop bit, No Parity, 4800 Baud
- Port 1 HOST PORT 8-data bits, 1 Stop bit, No Parity, 9600 Baud
- Port 2 POINTING DEVICE 8-data bits, 1 Stop bit, No Parity, 9600 Baud
- Port 3 TRANSPARENT SERIAL 8-data bits, 1 Stop bit, No Parity, 9600 Baud

Other default settings can be entered and saved on the module. Check to see if the customer has altered and saved the default settings. When a module is replaced, it must be correctly altered and the settings saved so that the module is compatible with its peripherals.

## 2.6 REMOTE BOX INTERNAL POWER SUPPLY

The VSV21 PC remote box has an integral power supply which has been configured in manufacturing to accept the local mains supply ie. 110-120/220-240V. See figure 6.1.



# 3 ON-BOARD SELF-TEST

The VSV21 contains an on-board diagnostic held in ROM, which runs on power-up.

To run the tests, you must first make sure the power is turned OFF and you must gain access to the module cage by removing the covers from the appropriate housing box.

Locate the M7656 module and the position of the two on-board LEDs. See Figure 1 for the layout of the module. The LEDs will give an indication when the diagnostics are running.

Now turn the power ON.

The result of the on-board diagnostic tests is displayed on the monitor screen and on the Red and Green LEDs in the following way:

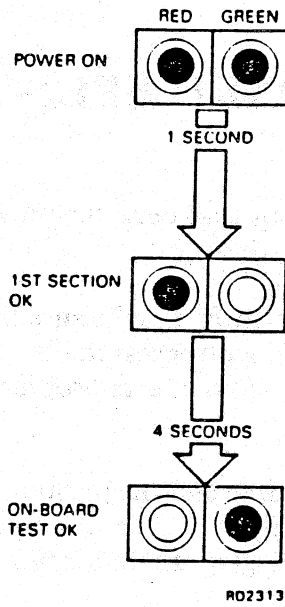


Figure 3-1 On-Board Diagnostic LED Indication

Figure 3-2 shows the picture that is displayed on the monitor screen. If you do get the TEST OK indication but not the correct picture, use the trouble-shooting flow charts shown in Chapter 6 to identify the problem.

The test picture remains on the screen until:

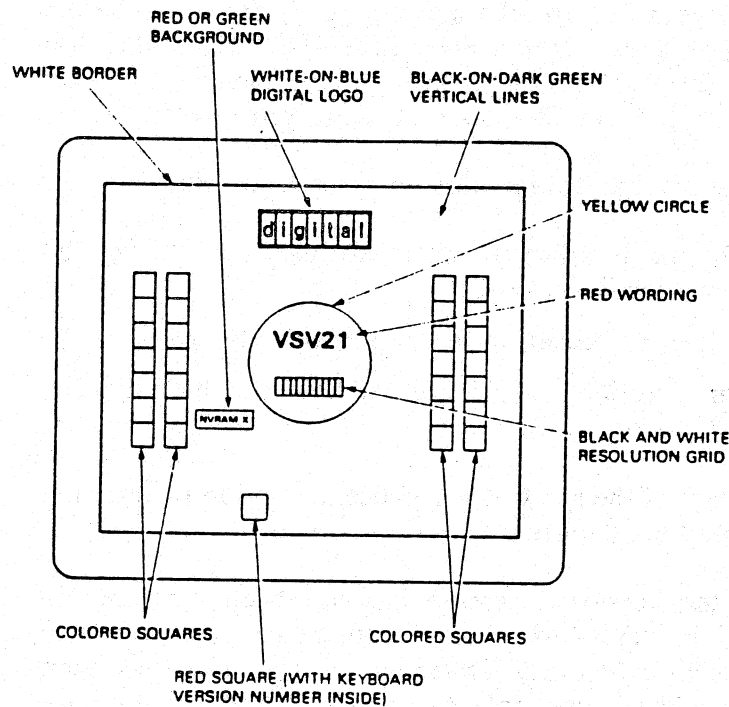
- The host software starts to use the VSV21 by down-loading to it or
- A key is pressed on the attached keyboard or
- On selecting the version of the attached LK-201 keyboard.

Either of the last two will cause the option to enter the terminal emulation mode.

If the keyboard version has not been permanently saved in NVRAM, then it can be selected after the completion of every power-up self-test. If it has been saved, then it can only be changed either by software control or by running the Parameters Reset test of the diagnostic suite.

The test picture displayed gives an indication if the keyboard version has been saved or not. If not, it displays the message NVRAM X on a Red rectangular background. You can now enter the number associated with the keyboard version; then press the RETURN key and the VSV21 will clear the display and enter terminal emulation mode (see Appendix B for list of LK201 keyboard versions and the associated number code required).

If the keyboard version has been previously saved, then the picture will display the message NVRAM v on a Green rectangular background. The keyboard version can only be changed by either program control or by clearing the NVRAM using the diagnostic programs. Press the RETURN key and the VSV21 clears the screen and enters the terminal emulation mode.



RD7316

Figure 3-2 Self-Test Test Picture

If you do not get the TEST OK indications, then:

1. Turn off all power

#### CAUTION

Always switch power OFF before inserting or removing modules. Be careful not to snag module components on the card guides or on adjacent modules.

Take anti-static measures to protect the M7656 module when handling.

2. Disconnect and remove M7656 module
3. Make sure that all switchpack switches are correctly set.
4. Return the module into its slot and re-connect it
5. Turn the power on again, and check the LEDs again. If tests still do not pass, replace the M7656 module.



6. (Standard VSV21 Option Only). Check that the fuses on the M7656 module are not blown by checking that +5 volts is available at pin 11, and +12 volts at pin 18 of the 25-way D-type connector on the I/O bulkhead panel. Use pin 1 or pin 7 as the common return. Fuse F1 is for the 12 volt supply, and F2 for the 5 volt supply. Replace any faulty fuses. The rating should be 3.0 amps.

**WARNING**

**Do NOT plug-in or unplug the keyboard or the pointing device while system power is switched ON. The current surge will blow the module fuses. Always plug-in or unplug, with the power switched OFF. (This warning does not apply if the VSV21 PC option is installed.)**

7. (VSV21 PC option only). Check that the +5 volt LED on the remote interface box is lit. If the LED is not lit, momentarily press the +5V RESET pushbutton on the box. If the LED does not then light and remain lit, and the pushbutton remain locked-in, switch OFF the ac mains supply and check for a short circuit on the +5V external supply. If no short circuit can be found, check and replace the following as necessary:
  - Remote interface box mains supply fuse
  - Remote interface box power supply (See figure 6.1)
  - Remote interface box

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud.

The second part of the document outlines the various methods used to collect and analyze data. It describes the use of statistical techniques to identify trends and anomalies in the data, and the importance of using reliable sources of information.

The third part of the document discusses the role of the auditor in the process. It explains that the auditor's primary responsibility is to provide an independent and objective assessment of the financial statements. This involves a thorough review of the records and the application of professional judgment.

The fourth part of the document discusses the importance of communication in the auditing process. It notes that clear and concise communication is essential for the auditor to effectively convey findings and recommendations to the management and the board of directors.

The fifth part of the document discusses the importance of ethics in the auditing profession. It emphasizes that auditors must adhere to a strict code of ethics to maintain the trust and confidence of the public.

The sixth part of the document discusses the importance of continuous learning and professional development for auditors. It notes that the auditing profession is constantly evolving, and auditors must stay up-to-date on the latest developments in the field.

The seventh part of the document discusses the importance of teamwork and collaboration in the auditing process. It notes that auditors often work in teams, and effective communication and collaboration are essential for the success of the team.

The eighth part of the document discusses the importance of transparency and accountability in the auditing process. It notes that auditors must be open and honest in their reporting, and must be held accountable for their actions.

The ninth part of the document discusses the importance of risk management in the auditing process. It notes that auditors must be aware of the risks associated with their work, and must take steps to mitigate those risks.

The tenth part of the document discusses the importance of quality control in the auditing process. It notes that auditors must adhere to strict quality control standards to ensure the accuracy and reliability of their work.

The eleventh part of the document discusses the importance of public interest in the auditing process. It notes that auditors have a duty to the public to provide accurate and reliable information, and to act in the best interests of the community.

The twelfth part of the document discusses the importance of international cooperation in the auditing process. It notes that auditors often work across national borders, and effective international cooperation is essential for the success of the profession.

The thirteenth part of the document discusses the importance of innovation and technology in the auditing process. It notes that auditors must embrace new technologies and methods to improve the efficiency and effectiveness of their work.

The fourteenth part of the document discusses the importance of leadership in the auditing profession. It notes that effective leadership is essential for the success of the profession, and for the ability to attract and retain top talent.

The fifteenth part of the document discusses the importance of the future of the auditing profession. It notes that the profession is facing many challenges, but also has many opportunities for growth and development.

# 4 DIAGNOSTIC PROGRAMS

## NOTE

When the VSV21 is used as the host console terminal, it is not possible to run the host-based diagnostics for module testing, and also get back error messages. Therefore, when used as the console, only the on-board self-test can be run. However, it is possible to run the diagnostic on the VSV21 used as a host console if another terminal is connected temporarily to the host port of the system. Diagnostics can be run on all other modules in the system while using the VSV21 as a console terminal, provided the module is set to DISABLE response to BUSINIT signals.

### 4.1 XXDP+ — PDP SYSTEMS

Diagnostic Module Name CZVSW?? ( ?? = revision level)

#### Basic Functionality Tests (Diagnostic Tests 1-16)

- Fit the loopback test connectors
- BOOT XXDP+
- Answer System Questions
- R(UN) ZVSW??
- At the DR> prompt enter STA/FLA:UAM press RETURN
- Answer the CHANGE H/W (L)? query with Y press RETURN
- Enter the number of units under test after UNITS (D)? prompt
- Enter device and vector addresses for each unit

- The tests will start and will execute all the non-interactive (UAM) tests
- Type CONTROL-C to return to command mode

#### Manual Intervention Tests

##### (A) Test 17 NVRAM Read/Write Test

1. Type STA/TEST:1-2:17/PASS:1 press RETURN
2. Respond to questions and prompts

#### NOTE

This test may change the settings of the NVRAM. Refer to Chapter 6 and Appendix D for further details about the NVRAM

3. Type CONTROL-C to return to command mode

##### (B) Test 18 Display Test Pictures

1. Type STA/TEST:1-2:18/PASS:1 press RETURN
2. Respond to all the questions and prompts generated by the tests

##### (C) Test 19 Keyboard Confidence Test

1. Type STA/FLA:LOE/TEST:1-2:19/PASS:1 Press RETURN
2. Press up to six different keys and check for correct code (see Appendix B)

##### (D) Test 20 Pointing Device Confidence Test

1. Type STA/FLA:LOE/TEST:1-2:20/PASS:1 Press RETURN
2. Respond to instructions and prompts generated by the test
3. Check direction of movement of pointing device is shown correctly

##### (E) Test 21 Peripheral Confidence Test

1. Type STA/FLA:LOE/TEST:1-2:21/PASS:1 Press RETURN
2. Select Port to be tested
  - (i) Port 0 = Keyboard port, 4-way jack
  - (ii) 1 = Host port, 9-pin D-type (J3)

(iii) 2 = Pointing device port, 25 pin D-type (J4)

(iv) Port 3 = Transparent serial port, 9-pin D-type (J5)

3. If output is selected, then the test will output a fixed ASCII string as follows:-

```
!@#S%^ &*()_ + 1234567890qwertyuiop{ }asdfghjkl;'/
```

4. If input is selected, the first 16 characters input to the port are displayed on the console running the test. The data is displayed as 8 pairs of octal numbers.

This test should only be run when there is no specific test for the peripheral device.

(f) Test 22 Control Parameter Reset Test

1. Type STA/TEST:1-2:22/PASS:1 Press RETURN
2. Diagnostic will display warning about limited NVRAM life
3. Respond to instructions and prompts generated by the test

#### 4.2 DECX-11 PDP SYSTEMS

Exerciser Module Name — CXVSV?? — ( ?? = revision level)

Each module will exercise up to 4 consecutively addressed modules. The device addresses should be at 10 (octal) spacing and the vectors should be at 4 (octal) spacing. The vector spacing can be changed by modifying Location 704.

Modules not addressed consecutively will need to be exercised via separate modules.

#### 4.3 MDM — MICROVAX II SYSTEMS

(a) Diagnostic Module Name — NAVVA? — ( ? = revision level)

(b) Device mnemonic — VSV21? ( ? = device number)

The MDM diagnostic for VSV21 is available in the general release of the MicroVAX Maintenance System (MMS). Tests of the VSV21 can be selected in either the MENU or COMMAND LINE mode of the MicroVAX Diagnostic Monitor (MDM) Refer to the MDM User Guide (AA-FM7AA-DN) or the MicroVAX System maintenance manual (ZNABX-GZ) for further details.

#### 4.3.1 Basic Functionality Test (Diagnostic Tests 1-15)

v = Verify Mode

s = Service Mode

1v = In Depth Q-22 Bus Test

2v = ROM Checksum Test

3v = NVRAM Checksum Test

4v = RAM Test

5v = RAM Addressing Test

6v = 68000 Processor Test

7v = Internal Exceptions Test

8v = ACRTC Internal Test

9v = ACRTC External Test

10v = Illegal Command Test

11s = Basic DUART Test — Loopback Connectors  
Required

12s = Full DUART Test — Loopback Connectors  
Required

13s = Full On- Board Test — Loopback Connectors  
Required

14s = Internal Loopback Test — Loopback Connectors  
Required

15s = External loopback Test — Loopback Connectors  
Required

Tests 1 through 10 are tests of the module itself and failure of any of them should result in the need to exchange the VSV21 module.

Tests 11 through 15 are tests of the serial ports of the module and require the fitting of the loopback connectors to the serial ports on the I/O panel. Failure of any of these tests indicate a problem in either the module, the internal data cables, the I/O panel or the loopback connectors themselves.

#### Exerciser Tests

- (a) 1v — Verify DMA Test
- (b) 2v — Verify Screen Exerciser
- (c) 3s — Service Exerciser — Loopback Connectors  
Required

#### Utilities Manual Intervention Test

##### NOTE

For tests 4, 5, and 6, the user has the option to extend the timeout for use with VSV21 PC option.

##### 1. Monitor Test Picture Utility

Follow diagnostic prompts to select required test picture

##### 2. NVRAM Reset Utility

Follow diagnostic prompts to clear the NVRAM so that default settings will subsequently be used.

##### 3. On-Board Error Control Utility

Leave at default setting, Halt on Error

## 4. Peripheral Confidence Test Utility

Select port to be tested

- (a) Port 0 = Keyboard port, 4-way jack (J2)
- (b) Port 1 = Host port, 9-pin D-type (J3)
- (c) Port 2 = Pointing device port, 25-pin D-type (J4)
- (d) Port 3 = Transparent serial port, 9-pin D-type (J5)

If output is selected, then the test will output a fixed ASCII string as follows:-

```
!@#%&^&*()_+1234567890QWERTYUIOP{}asafghjkl;'/
```

If input is selected, the first 16 characters input to the port are displayed on the console running the test. The data is displayed as 8 pairs of octal numbers.

This test should only be run when there is no specific test for the peripheral device.

## 5. Keyboard Confidence Test Utility

This utility displays the ASCII code (in decimal) of the first six keys pressed after the test is started. Verify the codes by comparing them with the table in Appendix B.

## 6. MSI Pointing Device Test Utility

This utility will output the data received from an MSI Pointing Device.

Check direction of movement of pointing device is shown correctly.

## 7. NVRAM Read/Write Test Utility

Follow diagnostic prompts to test NVRAM.

**NOTE**

This test may change the settings of the NVRAM. Refer to Chapter 6 and Appendix D for further details about the NVRAM.

## 8. VSV21/VSV90 Selection Utility

If a VSV21 is being tested, there is no need to select this test.



# 5 INSTALLATION

To install the option, the following tasks need to be performed:

- Check that all the option items are available
- Check that there is space and power available in the selected backplane
- Configure the M7656 module for correct addresses and graphics resolution

## CAUTION

Take anti-static measures to protect the M7656 module when handling.

- Plug the module into the host box backplane.
- Attach the I/O bulkhead panel 70-20091-01 (standard VSV21 option) or 70-24336-01 (VSV21 PC option) to the host system box/cabinet. (Use the adapter panel with an H349, see Figures 1-1 and 1-2).
- Install and connect the cables between the module and the I/O panel.
- Connect a host serial port (console) to the VSV21 serial port (if needed).
- Install the remote interface box (VSV21 PC option only).
- Check for correct local mains : ie. 110-120/220-240V
- Connect the data link cable between the I/O bulkhead panel and the remote interface box (VSV21 PC option only).

- Connect any of the peripherals such as the keyboard, colour monitor, pointing device and printer. For the standard VSV21 option, this connection is made direct to the I/O bulkhead panel. For the VSV21 PC option, the keyboard, pointing device and printer are connected to the remote interface box; the colour monitor connects direct to the I/O bulkhead panel via the video cable assembly.

**WARNING**

**Do NOT plug-in or unplug the keyboard or the pointing device while system power is switched ON. The current surge will blow the module fuses. Always plug-in or unplug with the power switched OFF. This WARNING does not apply to the VSV21 PC option.**

- Power ON and check the on-board diagnostic LED indications, and check the monitor display picture
- Run appropriate diagnostic programs to verify that all installed items are operating correctly.

# 6 TROUBLESHOOTING

## NOTE

The VSV21 uses a non-volatile RAM (NVRAM) to store various parameters associated with the configuration of the module. These settings can be altered by the customer under program control. Be aware that some problems reported can in fact be due to an incompatibility between these settings and the requirements of the peripherals connected to the VSV21. Refer to Appendix D for further information about the NVRAM.

Note that probable causes/remedies assume that all previous steps in the flow-chart have been executed successfully.

Table 6-1 Troubleshooting Procedures for Standard VSV21 Systems

| Probable Cause           | Remedy                               |
|--------------------------|--------------------------------------|
| <b>STEP 1</b>            |                                      |
| Remove cover to see LEDs |                                      |
| Power-up system          |                                      |
| Self-test OK ?           |                                      |
| YES                      |                                      |
| NO                       |                                      |
| ↓                        | ↓                                    |
| YES                      | No power to module                   |
|                          | Faulty module                        |
|                          | Repair host system<br>Replace module |

**Table 6-1 Troubleshooting Procedures for Standard VSV21 Systems (Cont.)**

|                                 | Probable Cause               | Remedy                        |
|---------------------------------|------------------------------|-------------------------------|
| <b>STEP 2</b>                   |                              |                               |
| Check O/P voltages on I/O panel |                              |                               |
| Are voltages OK ?               |                              |                               |
| <b>YES</b>                      |                              |                               |
|                                 | <b>NO</b> ↘                  |                               |
|                                 | Host power supply fault      | Repair host system            |
|                                 | On-board fuses blown         |                               |
|                                 | Faulty cable or I/O panel    | Check connections and replace |
|                                 | Faulty module                | Replace module                |
| <b>STEP 3</b>                   |                              |                               |
| Is Test picture O.K.?           |                              |                               |
| <b>YES</b>                      |                              |                               |
|                                 | <b>NO</b> ↘                  |                               |
|                                 | 1 No Picture                 |                               |
|                                 | Wrong cable connections      | Check carefully               |
|                                 | Broken connection            | Find and replace broken item  |
|                                 | Monitor not set-up           | Adjust monitor                |
|                                 | Module faulty                | Replace module                |
|                                 | 2 Incomplete Picture         |                               |
|                                 | Module faulty                | Replace module                |
|                                 | 3 Incorrect colours          |                               |
|                                 | Wrong connection             | Check carefully               |
|                                 | Broken connection            | Find and replace broken item  |
|                                 | Monitor not set-up or faulty | Check/adjust monitor          |
|                                 | Module faulty                | Replace module                |

**Table 6-1 Troubleshooting Procedures for Standard VSV21 Systems (Cont.)**

| Probable Cause   | Remedy  |
|--|---|
| 4 Picture distorted<br>Monitor not set-up  | Adjust monitor  |
| 5 Picture present but not stable   |   |
| YES<br>NO →<br>Monitor not set-up  | Adjust monitor to sync with incoming signal<br>Check termination of all video cables<br>Set monitor to internal sync. (sync on green) |
| Incompatible resolution/line frequency   | Check resolution switches   |
| 6 Multiple 'stretched' images or Incompatible resolution/line frequency            | Check resolution switches   |
| <b>STEP 4</b><br>Type any key or select LK-201 version on keyboard to clear screen |   |
| Go to Step 5 if no keyboard<br>Is screen clear?                                    |   |
| YES<br>NO → Picture complete?  |   |
| NO → Self test failed  | Replace module  |
| YES<br>Keyboard Disconnected   | Check connection  |
| YES<br>Faulty keyboard   | Replace keyboard  |

**Table 6-1 Troubleshooting Procedures for Standard VSV21 Systems (Cont.)**

| Probable Cause   | Remedy                             |
|--|------------------------------------|
| <b>STEP 5</b>  |                                    |
| Is VSV21 configured as system console ?  |                                    |
| <b>YES</b>   |                                    |
| <b>NO</b>  |                                    |
| Fit loopback connectors and test basic configuration.  |                                    |
| Test error-free ?  |                                    |
| <b>YES</b>   |                                    |
| <b>NO</b>  |                                    |
| 1 No device on selected CSR Address switches wrong - Module faulty                                     | Reset switches<br>Replace module   |
| 2 Interrupt Test fails Vector switches wrong Module faulty   | Reset switches<br>Replace module   |
| 3 Loopback Test fails Missing loopback connector Open connection from module to I/O panel              | Fit connector<br>Check and replace |
| Remove loopbacks and attach peripherals.<br>Run Peripheral Confidence Tests.<br>Are tests error-free ? |                                    |
| <b>YES</b>   |                                    |
| <b>NO</b>  |                                    |
| 1 Pointing Device or Printer Fault Wrong baud rate   | Reset baud rate*                   |
| Open connection in device cable  | Check and replace                  |
| <b>FINISH</b>  |                                    |

**Table 6-1 Troubleshooting Procedures for Standard VSV21 Systems (Cont.)**

| Probable Cause                      | Remedy  |
|-------------------------------------|---|
| Faulty device                       | Replace device or advise customer                             |
| 2 Keyboard Fault<br>Faulty keyboard | Replace keyboard  |
| Open extension cable                | Replace cable   |
| 3 Faulty picture                    | Refer to table of causes and remedies in Step 3 of flow chart |

**STEP 6**

Fit loopback connector to host port on I/O panel.  
Type on keyboard.  
Is echo on screen correct?

**YES**

**NO**

|  |  |
|--|--|
| 1 Faulty drivers on module   | Replace module   |
| 2 No Echo<br>Open connection from module to I/O panel<br>Faulty module<br>Host port missing loopback connector | Check and replace cable<br>Replace Module<br>Fit connector |

**FINISH**

Replacement modules will be set to the default communications settings and may not match the peripheral requirements. If so, ask the customer to set the VSV21 communications settings to the required parameters.

**Table 6-2 Trouble-Shooting Procedures for VSV21 PC System**

| Probable Cause   | Remedy  |
|--|---|
| <b>STEP 1</b>  |   |
| Remove cover to see LED's                                    |   |
| Power-up System  |   |
| Self-test O.K?   |   |
| YES  |   |
| NO   |   |
| No power to module   | Repair host system                              |
| Faulty module  | Replace module                                  |
| <b>STEP 2</b>  |   |
| Is Test Picture O.K?   |   |
| YES  |   |
| NO   |   |
| 1 No Picture<br>Wrong cable connections<br>Broken connection | Check carefully<br>Find and replace broken item |
| Monitor not set-up<br>Module faulty                          | Adjust monitor<br>Replace module                |
| 2 Incomplete picture<br>Module faulty                        | Replace module                                  |
| 3 Incorrect colours<br>Wrong connection<br>Broken connection | Check carefully<br>Find and replace broken item |
| Monitor not set-up or faulty<br>Module faulty                | Check/adjust monitor<br>Replace module          |
| 4 Picture distorted<br>Monitor not set-up                    | Adjust monitor                                  |



**Table 6-2** Trouble-Shooting Procedures for VSV21 PC System (Cont.)

| Probable Cause   | Remedy   |
|--|--|
| 5 Picture present but not stable<br>Monitor not set-up | Adjust monitor to sync with incoming signal    |
|  | Check termination of all video cables          |
|  | Set monitor to internal sync. (sync. on green) |
| Incompatible resolution/line frequency                 | Check resolution switches                      |

**STEP 3**

Type any key on keyboard to clear screen or select LK-201 version

Go to Step 4 if no keyboard

Is screen clear?

**YES**    **NO** → Picture complete?

|           |              |                                   |   |
|-----------|--------------|-----------------------------------|---|
| <b>NO</b> | <b>YES</b> ↘ | Keyboard disconnected             | Check connection  |
|           |              | Remote interface box disconnected | Check connections to keyboard, I/O panel and mains supply |
|           |              | Faulty keyboard                   | Replace Keyboard  |

**Table 6-2 Trouble-Shooting Procedures for VSV21 PC System (Cont.)**

| Probable Cause              | Remedy  |
|-----------------------------|---|
| Faulty remote interface box | Check remote interface box mains supply fuse and power supply |
| Self-test failed            | Replace module  |

**STEP 4**

Is VSV21 configured as System Console?

YES

NO

Boot XXDP+ Verson 2

Run ZVSWB?

Fit loopback connectors to\* PD1, KBD and AUX ports on remote interface box

Fit host loopback connector\* on I/O panel

Test basic configuration

Test error-free?

YES

NO

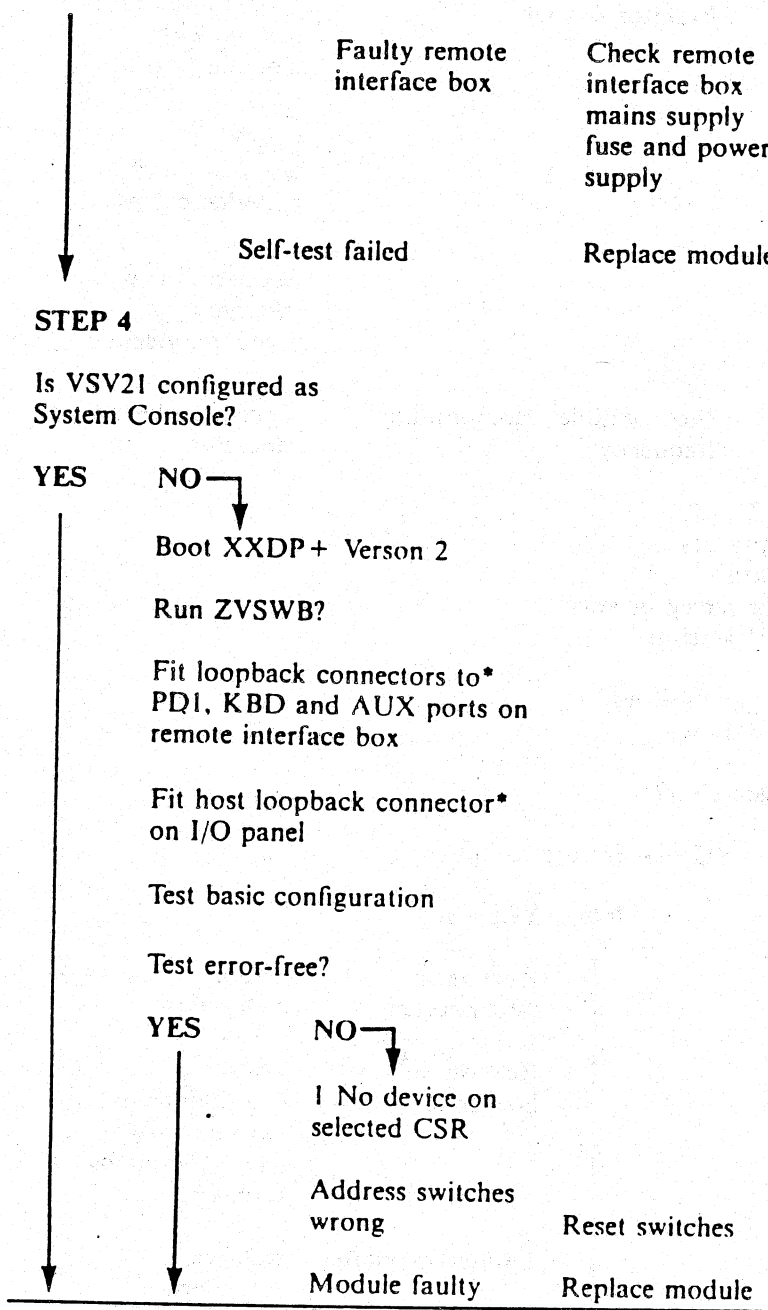
! No device on selected CSR

Address switches wrong

Reset switches

Module faulty

Replace module



**Table 6-2 Trouble-Shooting Procedures for VSV21 PC System (Cont.)**

| Probable Cause   | Remedy  |
|--|---|
| 2 Interrupt test fails                                     |   |
| Vector switches wrong                                      | Reset switches  |
| Module faulty  | Replace module  |
| 3 Loopback test fails                                      |   |
| Missing loopback connector                                 | Fit connector   |
| Open connection from module to remote interface box ports  | Fit PC loopback connector to data link port on I/O panel        |
| Repeat loopback test                                       |   |
| Test error free?   |   |
| YES  | NO  |
| ↓  | ↘   |
| Refit data link cable to I/O panel                         | Open connection from module to I/O panel      Check and replace |
| Fit PC loopback connector to remote end of data link cable |   |
| Repeat loopback test                                       |   |
| Test error free?   |   |


**Table 6-2 Trouble-Shooting Procedures for VSV21 PC System (Cont.)**

| Probable Cause   | Remedy   |
|--|--|
| <p>YES</p> <p>↓</p> <p>Faulty remote interface box</p> <p>Remove loopbacks and attach peripherals</p> <p>Run Peripheral Confidence Tests</p> <p>Are tests error-free?</p> <p>YES</p> <p>↓</p> <p>FINISH</p> <p>↓</p> | <p>NO ↘</p> <p>Open connection from I/O panel to remote interface box</p> <p>check/replace data link cable</p> <p>Check data circuits within box (see Table 6.3)/replace power supply or box (See fig. 6.1)</p> <p>Reset baud rate**</p> <p>Check and replace</p> <p>Replace device or advise customer</p> <p>Check remote interface box mains supply fuse and power supply</p> <p>Replace keyboard</p> <p>Replace cable</p> |
| <p>1 Pointing Device or Printer fault</p> <p>Wrong baud rate</p>   | <p>1</p>   |
| <p>2 Keyboard fault</p> <p>Faulty keyboard</p>   | <p>2</p>   |
| <p>Open extension cable</p>  | <p></p>  |

**Table 6-2** Trouble-Shooting Procedures for VSV21 PC System (Cont.)

| Probable Cause              | Remedy  |
|-----------------------------|---|
| Faulty remote interface box | Check remote interface box mains supply fuse and power supply |
| 3 Faulty picture            | Refer to Table of Causes and Remedies in STEP 2 of flow chart |



**STEP 5**  
 Fit loopback connector to host port on I/O panel

Type on keyboard

Is echo on screen correct?

**Table 6-2 Trouble-Shooting Procedures for VSV21 PC System (Cont.)**

| Probable Cause   | Remedy   |
|--|--|
| <p>YES</p> <p>NO ↘</p> <p>1 Incorrect Echo Data</p> <p>Faulty drivers on module</p>                            | <p>Replace module</p>  |
| <p>2 No Echo</p> <p>Open connection from module to I/O panel</p> <p>Faulty module</p> <p>Host port missing</p> | <p>Check and replace cable</p> <p>Replace module</p> <p>Fit connector loopback connector</p> |
| <p>FINISH</p>  |  |

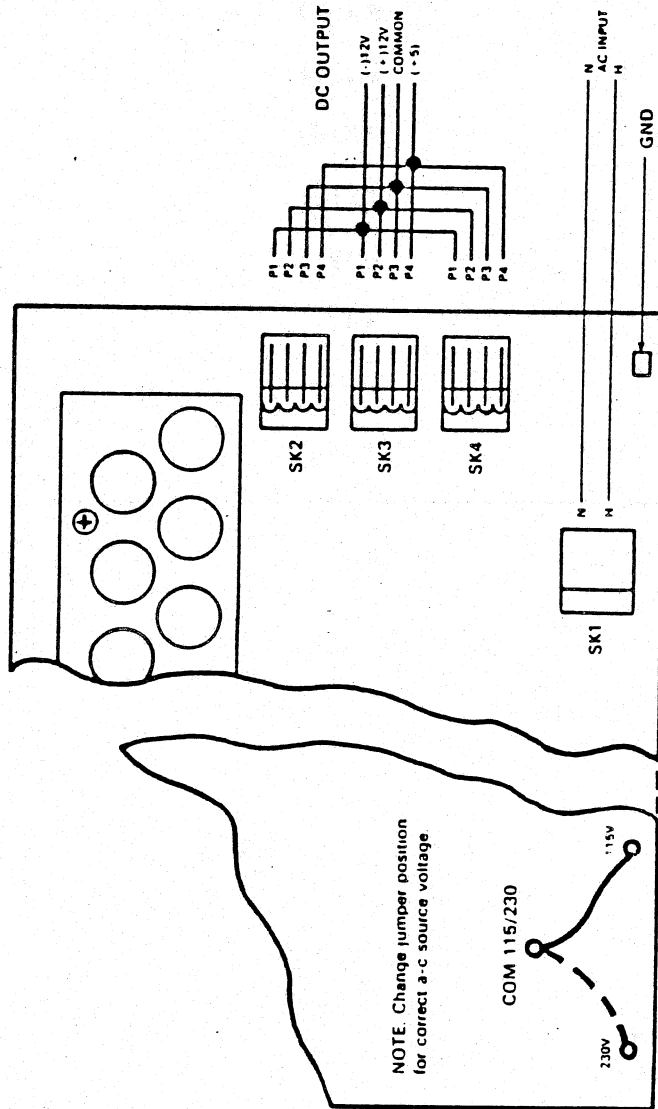
\* These actions require the loopback connectors for the standard VSV21 option. The connectors are not supplied as part of the standard option kit and must be obtained separately.

\*\* Replacement modules will be set to the default communications settings and may not match the peripheral requirements. If so, ask the customer to set the VSV21 communications settings to the required parameters.

The data passed by the remote interface box, and the voltage levels developed by the power supply 30-21558-01, can be monitored at test points along the top of the printed circuit board contained within the box. The test point allocation is shown in Table 6.3.

**Table 6-3 Remote Interface Box Test Point Allocation**

| <b>Test Point</b> | <b>Function</b> |
|-------------------|-----------------|
| TP1               | RX4.H           |
| TP2               | TX4.H           |
| TP3               | RX3.H           |
| TP4               | TX3.H           |
| TP5               | RX1.H           |
| TP6               | TX1.H           |
| TP7               | - 12V           |
| TP8               | + 12V           |
| TP9               | GND             |
| TP10              | + 5V            |



RE4188

Figure 6-1 VSV21-CA/DA: Remote box power supply replacement



**NOTE**

**VSV21-CA = 110-120V VSV21-DA = 220-240V  
Both options use same power supply —  
30-21558-01**

**Removal of power supply**

1. Disconnect mains input.
2. Remove 8 cover retaining screws.
3. Remove SK1, SK5, SK3, SK4 from power supply.
4. Remove 4 power supply retaining screws.

**Installation of new supply**

1. Configure for 115V or 230V (110-120V or 220-240V as per rating plate).
2. Re-connect SK1, SK5, SK3, SK4.
3. Re-fit 4 power supply retaining screws.
4. Re-fit 8 cover retaining screws.

THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF CHEMISTRY  
5800 S. UNIVERSITY AVENUE  
CHICAGO, ILLINOIS 60637

TO: THE DIRECTOR, NATIONAL BUREAU OF STANDARDS  
4300 RESISTANCE AVENUE  
GAITHERSBURG, MARYLAND 20885

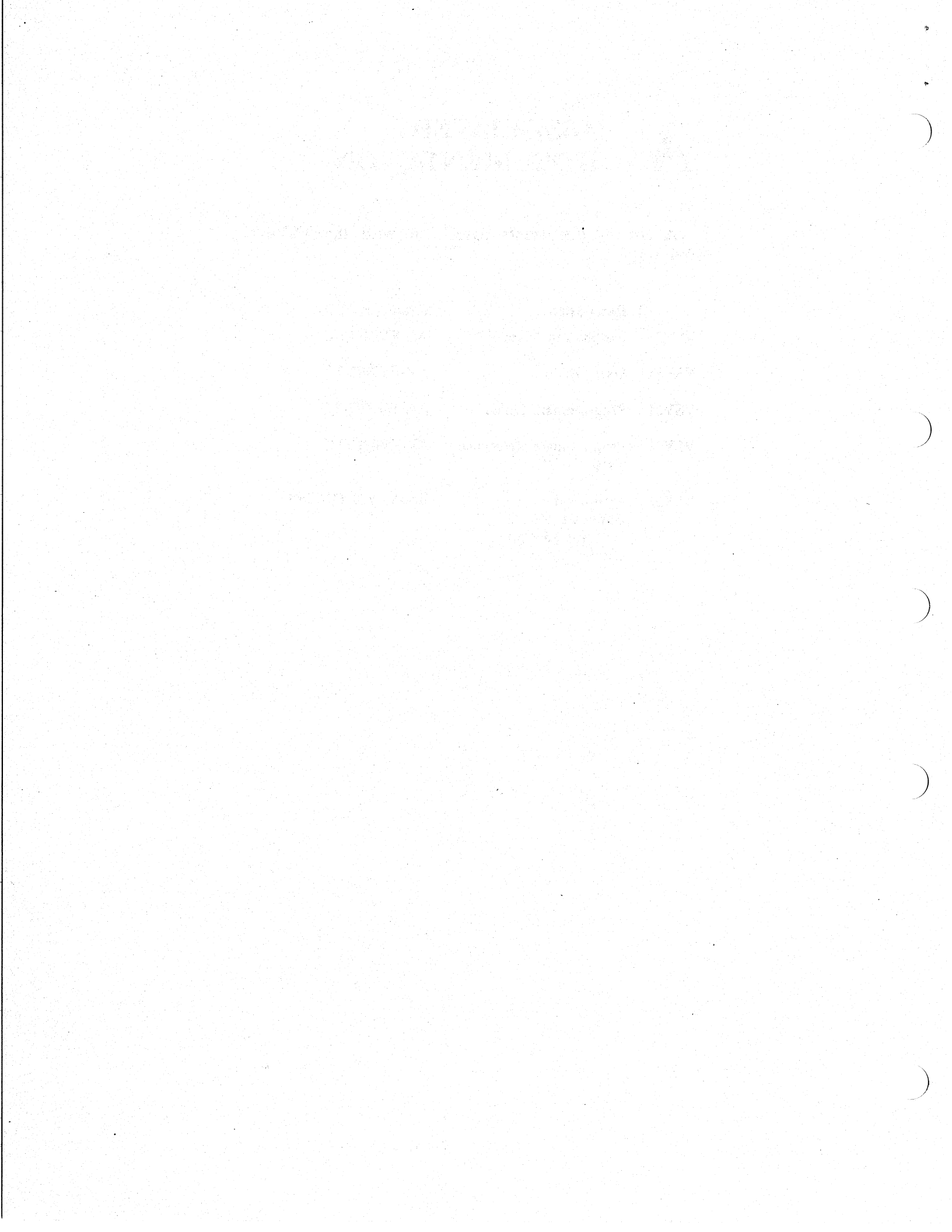
FROM: DR. J. H. GOLDSTEIN  
DEPARTMENT OF CHEMISTRY  
UNIVERSITY OF CHICAGO  
5800 S. UNIVERSITY AVENUE  
CHICAGO, ILLINOIS 60637

SUBJECT: <sup>13</sup>C NMR SPECTROSCOPY OF  
POLYMERIZATION PRODUCTS

# **A** ASSOCIATED DOCUMENTATION

A list of documents associated with the VSV21 follows:-

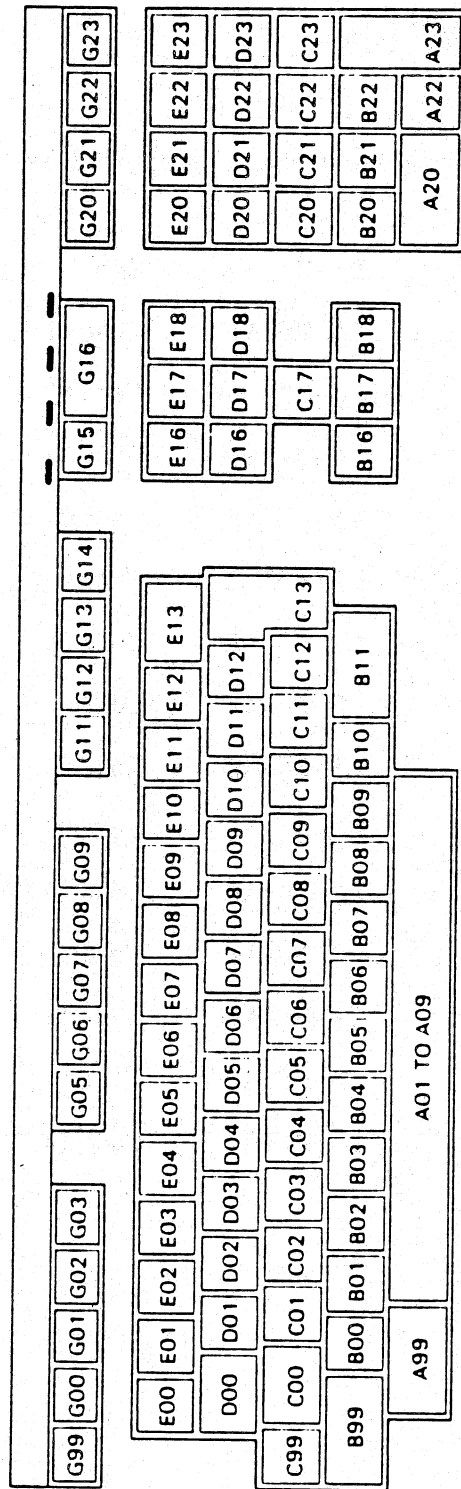
|       | <b>Description</b>                                       | <b>Catalogue No.</b> |
|-------|--|----------------------|
| VSV21 | Installation Manual                                      | AZ-FV71C-TC          |
| VSV21 | User Guide   | AZ-FV70C-TC          |
| VSV21 | Programmers Guide  | AA-FV67C-TC          |
| VSV21 | Programmers Reference<br>Card                            | AV-FV68C-TC          |
| VSV21 | Peripheral<br>Concentrator<br>User/Installation<br>Guide | EK-VSV21-UM-001      |



# **B** LK-201 KEYBOARD DETAILS

List of LK-201 keyboard versions supported by the  
VSV21 option:-

|                 |           |         |
|-----------------|-----------|---------|
| USA             | LK-201-AA | Code 00 |
| UK              | LK-201-AE | Code 01 |
| Swedish         | LK-201-AM | Code 02 |
| Dutch           | LK-201-AH | Code 03 |
| Flemish         | LK-201-AB | Code 04 |
| Canadian/French | LK-201-AC | Code 05 |
| Danish          | LK-201-AD | Code 06 |
| Finnish         | LK-201-AF | Code 07 |
| German          | LK-201-AG | Code 08 |
| Italian         | LK-201-AI | Code 09 |
| Swiss/French    | LK-201-AK | Code 10 |
| Swiss/German    | LK-201-AL | Code 11 |
| Norwegian       | LK-201-AN | Code 12 |
| French          | LK-201-AP | Code 13 |
| Spanish         | LK-201-AS | Code 14 |



RE487

Figure B-1 Layout of an LK-201 Keyboard

The following table shows the Decimal code generated by each of the LK-201 keys:-

| Key position<br>Decimal code | Decimal code | Key position | Decimal code |
|------------------------------|--------------|--------------|--------------|
| G99                          | 086          | E18          | 140          |
| G00                          | 087          | E20          | 161          |
| G01                          | 088          | E21          | 162          |
| G02                          | 089          | E22          | 163          |
| G03                          | 090          | E23          | 164          |
| G05                          | 100          | D00          | 190          |
| G06                          | 101          | D01          | 193          |
| G07                          | 102          | D02          | 198          |
| G08                          | 103          | D03          | 204          |
| G09                          | 104          | D04          | 209          |
| G11                          | 113          | D05          | 215          |
| G12                          | 114          | D06          | 220          |
| G13                          | 115          | D07          | 225          |
| G14                          | 116          | D08          | 230          |
| G15                          | 124          | D09          | 235          |
| G16                          | 125          | D10          | 240          |
| G20                          | 128          | D11          | 250          |
| G21                          | 129          | D12          | 246          |
| G22                          | 130          | D16          | 141          |
| G23                          | 131          | D17          | 142          |
| E00                          | 191          | D18          | 143          |
| E01                          | 192          | D20          | 157          |
| E02                          | 197          | D21          | 158          |
| E03                          | 203          | D22          | 159          |
| E04                          | 208          | D23          | 160          |
| E05                          | 214          | C99          | 175          |
| E06                          | 219          | C00          | 176          |
| E07                          | 224          | C01          | 194          |
| E09                          | 234          | C02          | 199          |
| E10                          | 239          | C03          | 205          |
| E11                          | 249          | C04          | 210          |
| E12                          | 245          | C05          | 216          |
| E13                          | 188          | C06          | 221          |
| E16                          | 138          | C07          | 226          |
| E17                          | 139          | C08          | 231          |

## 52 LK-201 KEYBOARD DETAILS

| Key position<br>Decimal<br>code | Decimal<br>code | Key<br>position | Decimal<br>code   |
|---------------------------------|-----------------|-----------------|-------------------|
| C09                             | 236             | B09             | 237               |
| C10                             | 242             | B10             | 243               |
| C11                             | 251             | B16             | 167               |
| C12                             | 247             | B17             | 169               |
| C13                             | 189             | B18             | 168               |
| C17                             | 170             | B20             | 150               |
| C20                             | 153             | B21             | 151               |
| C21                             | 154             | B22             | 152               |
| C22                             | 155             | A99             | 177               |
| C23                             | 156             | A01-A09         | 212(SPACE<br>BAR) |
| B99                             | 174             | A20             | 146               |
| B00                             | 201             | A22             | 148               |
| B01                             | 195             | A23             | 149               |
| B02                             | 200             |                 |                   |
| B03                             | 206             |                 |                   |
| B04                             | 211             |                 |                   |
| B05                             | 217             |                 |                   |
| B06                             | 222             |                 |                   |
| B07                             | 227             |                 |                   |
| B08                             | 232             |                 |                   |



# C RECOMMENDED SPARES LIST

| Option Type                                      | Part No.   | Description   |
|--|--|---|
| VSV21-AA<br>module only                          | M7656  | Module  |
| Fuse(0.3Amp)                                     | 12-10929-07  | Fuse  |
| VSV21-AB<br>BA23 mounting<br>kit                 | 70-20091-01<br>70-20093-02<br>70-20094-02                | Panel<br>Cable 30-in Data<br>Cable 30-in Video                  |
| VSV21-AC<br>BA123 mounting<br>kit<br>70-20094-02 | 70-20093-01<br>70-20093-02<br>Cable 30-in Video          | Panel<br>Cable 30-in Data                                       |
| VSV21-AD<br>BA11-S/H9642<br>mounting kit         | 74-28684-00<br>70-20091-01<br>70-20093-03<br>70-20094-03 | Panel adaptor<br>Panel<br>Cable 36-in Data<br>Cable 36-in Video |
| VSV21 video<br>cable                             | 17-00223-02  | 25-foot BNC to<br>BNC   |
| VSV21-AF<br>keyboard cable                       | 17-00397-01  | 14-foot 4-way<br>jack*  |
| VSV21-AG<br>PDP host cable                       | 17-00301-04  | 1 foot 9/25-way   |
| VSV21-AH<br>port cable                           | 17-00300-01  | 25-foot 25/25 way   |

\*  
Not allowed to use 14' KBD cable in Germany as VDE do not permit use of unshielded data cables of length greater than 2 metres (6' OK)

| Option Type  | Part No.   | Description   |
|--|--|---|
| VSV21-AJ<br>loopback set                           | 12-15336-01<br>70-20130-01<br>(X2)<br>70-20131-01                                      | 25-way connector<br>9-way connector<br>4-way jack plug                            |
| VSV21-AK<br>MicroVAX host<br>cable                 | 70-21425-01  | 1-foot 9/9-way  |
| VSV21-AL<br>tablet cable                           | 70-23421-01  | D-type/DIN  |
| VSV21-CA<br>VSV21-DA<br>peripheral<br>concentrator | 70-24335-01<br>70-24335-02<br>70-24336-01<br>30-21558-01<br>90-07212-00<br>70-24332-01 | Remote interface<br>box<br>Panel<br>Power supply<br>Fuse<br>Loopback<br>connector |

# D THE NVRAM — NON-VOLATILE RAM

The non-volatile RAM (NVRAM) is used to permanently store various parameters used in setting-up the module. These parameters are associated with the following functions:-

|                  |  |
|------------------|--|
| Graphics Display | — Colours, Blink, Monitor Timings          |
| Serial Ports     | — Speed, Parity, Bits/Char, Xon/Xoff codes |
| Keyboard         | — Mode, Nationality, Bell, Autorepeat      |
| Pointing Device  | — Sensitivity                              |

These settings can only be changed by using the VSV21 software function VCP (VSV21 Control Program). The settings can be altered permanently or by configuring the module after every power-up or reset. It can be called in the following way:-

RSX11-M PLUS and Micro RSX

```
RUN $VCP or INS $VCP/TASK =  
...VCP
```

MicroVMS

MCR VCP

(Refer to the VSV21 User Guide (AZ-FV70C-TC) for more information about the VCP).

On Power-up or after a Bus Reset, the VSV21 will attempt to use the parameters stored in NVRAM to configure the module. If no data has been saved in NVRAM, the VSV21 will default to the settings stored in ROM and on the resolution configuration switches on the module. This condition is indicated on the Power-Up Self Test Picture by a 'NVRAM x' message on a red background.

If data is saved to the NVRAM by either:-

- Using the /PERMANENT qualifier with VCP commands
- Running the NVRAM Read/Write Test in the Diagnostic

The Power-Up Self Test Picture will display an NVRAM v (tick) message on a green background. In this situation the VSV21 will use the data saved in the NVRAM to configure the NVRAM Module.

#### **NOTE**

**Running the NVRAM Read/Write Test on a module that has not yet had any parameters saved permanently will cause the default settings to be saved. Running this test will not affect parameters already saved by the customer.**

The diagnostics also provide a Control Parameter Reset Test which will clear the NVRAM so that on the next Power-up or Bus Reset the factory defaults will be used. This test can be used to 'clear' the VSV21 to a known state.

The NVRAM has a life of 10000 storage cycles (minimum). The diagnostic is designed to minimise the potential of damage to the NVRAM by asking the user to answer a question on every pass of the tests that write to it. This will stop damage occurring if the tests are started with no pass limit.



