SIEMENS

SED2 Advanced Operator Panel AOP

Operating Instructions

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1 How to Use this Manual

The Advanced Operator Panel (AOP) enhances the user interface and communications capability of the SED2 Variable Speed Drives ("SED2 VSD").

1.1 Manual Organization

This manual contains the following sections:

1 *How to Use this Manual*, describes the organization of this manual and symbols used throughout this manual.

2 *AOP Overview*, shows the AOP main menu and details the AOP function keys.

3 *AOP Startup & Initialization*, describes AOP power-on and initialization procedures and discusses using the AOP for single drive control or for control of a network of drives.

4 *AOP Applications*, describes different applications of the AOP (controlling just a single SED2 drive or a network of up to 31 SED2 drives).

5 *Editing Parameters*, describes how to edit parameters and provides procedures to upload and download a parameter set.

6 *AOP Operating Modes*, discusses the AOP operating modes (LOCAL, MASTER, or SLAVE) and the functions of the OPERATE menu.

7 *Timer Function*, explains how to use the AOP timer, much like a time switch.

8 *AOP Setup & Configuration*, explains how to customize the AOP via the SETUP menu.

9 *Faults and Warnings*, discusses the handling of possible errors and warnings displayed on the AOP.

1.2 Manual Notations

Notation	Symbol	Meaning
Caution:		Indicates that equipment damage, or loss of data may occur if you do not perform a procedure as specified.
Notes:		Provides other important information or helpful hints.

1.3 Referenced Documents

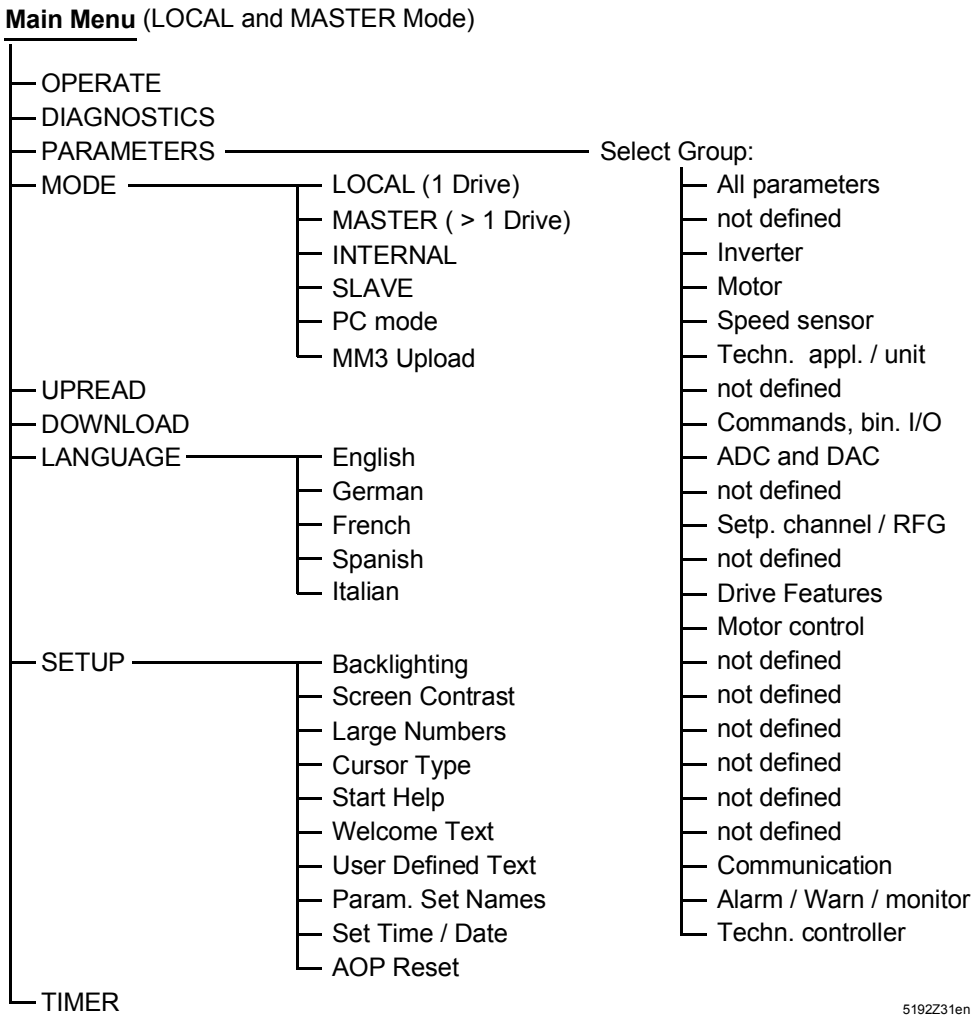
The following SED2 VSD documentation is available from your local Siemens Building Technologies representative:

- *SED2 Data sheet,* Document No. CM1N5192en
- *SED2 Getting started guide*, Document No. CM1G5192en
- *SED2 Operating instructions*, Document No. CM1U5192en
- *SED2 Engineering manual*, Document No. CM1J5192en

2 AOP Overview

2.1 AOP Menu Structure

The menus available on the AOP display depend on the currently active operating mode. The following diagram shows the menu structure when the AOP is in either the **LOCAL** or **MASTER** operating mode.



2.2 Key Functions

Note:  This symbol is used throughout this manual to indicate a special keypad function.
To control an SED2 VSD with the AOP keys, the parameter **P0700[1] must be set to 4 or 5**

Key/ Function	Functional Description
0	Stops the motor. **OFF1** Press this button to stop the SED2 within the selected ramp-down time. As part of the factory setting, this function is enabled for manual mode. **OFF2** Press this button twice (or once with sustained pressure) to cause the motor to coast freely to a standstill. This function is enabled in the manual and automatic operating modes.
I	**Starts** the motor. As part of the factory setting, this function is enabled for manual mode.
Hand	Places the SED2 VSD in **HAND** mode.[1]
Auto	Places the SED2 VSD in **AUTO** mode.[1]
▲	– Scroll through text on a display consisting of more than four lines. – Increases the display value. – During parameterization, this button increases the current value. – In manual mode, this button increases the speed (internal motor potentiometer).
▼	– Scroll through text on a display consisting of more than four lines. – Decrease the display value. – During parameterization, this button decreases the current value. – In manual mode, this button decreases the speed (internal motor potentiometer).
P	Accesses the parameters. Also exits a parameter by accepting its value.
Fn	Error Acknowledgement: When a fault occurs and the SED2 VSD trips, use this button to acknowledge the error. Jump Function: – Press this key (from any parameter, rXXXX or PXXXX) to return to the r0000 display. – Press this key again to return to the previous screen. – Press this key for several seconds to return to the status screen (normal operating mode).
Fn and P	Simultaneously press these keys at any time, to display the **main menu**.
Fn and ▼	Simultaneously press these keys to display the relevant **help** screens.
Fn and ▲	While uploading a parameter set, simultaneously press these keys to **delete a stored parameter set**. While viewing a stored parameter set, simultaneously press these keys **to see the software version**.
Change Single Parameter Digit	Quickly change a single digit of a parameter value as follows: 1. Ensure you are in the parameter value changing level. 2. Press Fn and the right hand digit blinks. 3. If desired, press ▲ or ▼ to change the value of this digit. 4. Press Fn again and the next digit blinks. 5. Perform steps 3 and 4 until the required value appears. 6. Press P to leave the parameter value changing level.

[1] The VSD mode of operation (HAND or AUTO) is shown on the AOP display when it is set to Large Numbers. See *8.1.3 Large Number Display.*

3 AOP Start-Up & Initialization

3.1 Important Notes

Caution:

- You can mount or remove the AOP while power is applied to the SED2 VSD.
- You must set Command Source **P0700[1]=4** (USS on BOP link or AOP) before the AOP can start or stop an attached SED2 VSD.
- On setting the AOP as the command source, you must set USS Telegram Off Time for Serial Interface BOP Link **P2014[1]=5000** (5 seconds) to prevent unexpected drive operation. In this mode, removal of the AOP from the SED2 VSD causes a timeout to occur in 5 seconds.
- On setting the AOP as the command source, the drive control buttons (I , 0 , Hand , and Auto) can control the drive at all times.
- When the AOP is replaced by the BOP, you have to set the command source parameter **P0700[1]=1** (BOP)

Notes:

Parameter editing (bit field indicator) — When editing a bit-field type parameter, the AOP increments the display value as a binary number.

Inhibit — When the AOP displays 'Inhibit', the SED2 VSD is in an inhibit mode of operation as reported by the USS message. This **inhibit status clears when the SED2 VSD receives a valid start/stop command from the AOP**. On first power-up, send an OFF1 command to the SED2 before trying to run the VSD; **this must also be done when the VSD is under Automatic Timer Control**.

3.2 Power-on and Initialization

1. On initial power-up, the AOP performs internal self tests and displays a welcome screen.
2. After establishing initial AOP-to-SED2 VSD communications, the Start Help screen(s) appear.
   If the current AOP display language is acceptable, continue with the *Start Help* section.
   If you need to change the current AOP display language, continue with the *Language Selection* section.

3.3 Language Selection

The AOP provides the capability to display information in five different languages.

Caution:

Memory Limitation:
The delivered AOP supports five European languages: English, German, French, Spanish, and Italian. **Due to internal memory limitations, you should delete one of these languages in order to upload the specified ten parameter sets that can be held on the AOP.**

To Delete a Language:
Select LANGUAGE from the main menu, highlight the language you want to delete, and then press Fn and ▲.

Note: Once a language has been removed, it cannot be restored.

Language selection is performed with the AOP online and connected to the SED2. After initial power-up or after a reset and after the AOP performs internal self-tests, the AOP prompts you to select a language.

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **LANGUAGE** item. Press P to confirm the selection.
   The AOP displays the LANGUAGE selection screen with a choice of 5 languages (English, German, French, Spanish, and Italian).
2. Use ▲ and ▼ to scroll through and highlight the desired **language**.
   Press P to confirm the selection. The AOP returns to the main menu.

3.4 Start Help

1. On completion of the initial AOP self tests, or if the Start Help feature is on, then the on-line help screens display.
2. If desired, use ▲ and ▼ to scroll through the help screens.
   An arrow on the left-hand side of the screen indicates if more information is available and the direction in which to navigate.
   Use P to move past the help screens and to go to the main menu.

To activate / deactivate the Start Help see *8.1.5 Start Help*

3.5 Quick Commissioning

Note:  Simultaneously press Fn and P, at any time, to display the main men

The following table describes the main menu items.

Menu Item	Description
OPERATE	Displays the current status of the SED2 VSD/motor.
DIAGNOSTICS	Displays a recent fault history.
PARAMETERS	Allows you to select a parameter group (similar to Parameter Filter P0004) and to configure individual parameters.
MODE	Allows you to select the AOP mode of operation as follows: – LOCAL – MASTER – INTERNAL – SLAVE – PC mode
UPREAD (UPLOAD)	Allows you to read a parameter set from a SED2 VSD to the AOP.
DOWNLOAD	Allows you to write a parameter set from the AOP to a SED2 VSD.
LANGUAGE	Allows you to select a new language for the AOP display.
SETUP	Allows you to customize the configuration of the AOP.
TIMER	Allows you to set a start and stop time for SED2 VSD operation.

1. Use ▲ and ▼ to scroll through the list of options and to highlight the **PARAMETERS** item.
   Press P to confirm the selection.
   The AOP prompts to select the desired parameter group. Use ▲ and ▼ to scroll through the list of options and to highlight the **All parameters** item. Press P to confirm the selection.

   Note: The chapter *Editing Parameters*, provides an overview of parameter access levels and a procedure for editing parameters.

2. Use ▲ and ▼ to scroll through the parameters and to highlight **User Access Level** Parameter **P0003**.
   Press P to confirm the selection and the cursor advances to the parameter value.
   Use ▲ and ▼ to set **P0003=3** (Expert level).
   Press P to confirm the setting and the cursor returns to the parameter.

3. Use ▲ and ▼ to scroll through the parameters and to highlight **Commissioning Parameter P0010**.
   Press P to confirm the selection and the cursor advances to the parameter value.
   Use ▲ and ▼ to set **P0010=1** (Quick Commissioning).
   Press P to confirm the setting and the cursor returns to the parameter.

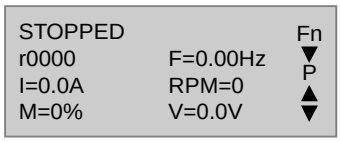
4. Use ▲ and ▼ to scroll through the parameters and to highlight **Command Source P0700**.
   Press P to confirm the selection and the cursor advances to the parameter index.
   Use ▲ and ▼ to scroll through the indexes for P0700 and to highlight **P0700[1]** (index 1).
   Press P to confirm the selection and the cursor advances to the parameter value.
   Use ▲ and ▼ to set **P0700[1]=4** (USS on BOP/AOP local link).
   Press P to confirm the setting and the cursor returns to the parameter.

5. Use ▲ and ▼ to scroll through the parameters and to highlight **Frequency Setpoint P1000**.
   Press P to confirm the selection and the cursor advances to the parameter index.
   Use ▲ and ▼ to scroll through the indexes for P1000 and to highlight **P1000[1]** (index 1).
   Press P to confirm the selection and the cursor advances to the parameter value.

Use ▲ and ▼ to set **P1000[1]=1 motor potentiometer [MOP] setpoint**.
Press P to confirm the setting and the cursor returns to the parameter.

6. Use ▲ and ▼ to scroll through the parameters and to highlight **Commissioning parameter P0010**.
   Press P to confirm the selection and the cursor advances to the parameter value.
   Use ▲ and ▼ to set **P0010[0]=0** (Ready) to exit the quick commissioning mode.
   Press P to confirm the setting and the cursor returns to the parameter.
7. Use ▲ and ▼ to scroll through the parameters and to highlight **USS Telegram Off Time P2014**.
   Press P to confirm the selection and the cursor advances to the parameter index.
   Use ▲ and ▼ to scroll through the indexes for P2014 and to highlight **P2014[1]** (index 1, Serial Interface BOP Link). Press P to confirm the selection and the cursor advances to the parameter value.
   Use ▲ and ▼ to set **P2014[1]=5000** (USS on BOP/AOP local link) to prevent unexpected drive operation. In this mode, removal of the AOP from the SED2 VSD causes a timeout to occur in 5 seconds.
   Press P to confirm the setting and the cursor returns to the parameter.
8. Press Fn to return to r0000. Press P to display the standard (OPERATE) screen.
9. Press Hand to switch the SED2 to HAND mode.
10. Press I to start the SED2.
11. Use ▲ to increase the output; Use ▼ to decrease the output.

The AOP displays the current status of the SED2 and motor. The following table explains information on this display.



The following table explains the Status Information of an AOP Display with an Operating SED2.

Data	Description
STOPPED	Indicates the motor connected to the SED2 is *not* running (pulses disabled).
RUNNING	Indicates the motor connected to the SED2 is running (pulses enabled).
FAULT	Indicates a fault condition has occurred. The SED2 is *not* running. A fault, described by the AOP under the DIAGNOSTICS menu, is preventing operation.
WARNING	The SED2 has detected a problem in normal operation and is informing you of the drive condition.
INHIBIT	A previously occurring fault or OFF condition is preventing SED2 operation. Sending an OFF1 command from the currently active command source clears this condition.
r0000	Indicates a read-only parameter. Drive Display r0000 is the normal operating display.
F= 0.00 Hz	Indicates the frequency at which the SED2 VSD/motor is running.
S= 0.00 Hz	Indicates the speed (frequency) when the motor last stopped.
I= 0.0 A	Indicates the output current.
RPM= 0	Indicates the speed of the motor.
M= 0%	Indicates the current torque of the motor.
V= 0.0 V	Indicates the output voltage.
Vdc= 0.0V	Indicates the dc link voltage.
⬅➡	Indicates the direction of the running motor.

4 AOP Applications

Notes:

If the AOP is the command source for the SED2, set USS Telegram Off Time for Serial Interface BOP Link **P2014[1]=5000** (5 seconds). To do this, first set P0003=3. The P2014[1]=5000 setting causes the drive to trip if communications with the AOP control source is lost.

If you have problems connecting to the SED2 drives, set the internal AOP Parameter “Enable Autobaud” to Off and the “Default baud rate” to the same as the SED2 (9,600). See *5.5 Editing Internal AOP Parameter Set*.

4.1 Single Drive Control Using the AOP

Per **default**, the AOP is configured to work with only one SED2 in **LOCAL** mode. In LOCAL mode, the AOP normally mounts directly onto the SED2. The RS-232 and RS-485 ports handle communications. Full operator control of the SED2 is available with access to all normal drive and AOP internal parameters.

To configure a single SED2 VSD with the AOP as the control source, follow the procedure in the *Quick Commissioning* section of this manual.

4.2 Network Setup (RS-485 with Panel Mounting Kit)

The AOP has the capability to control up to 31 SED2 VSDs connected as a network. In a network configuration, a unique two-digit number identifies each VSD. When the AOP connects to a network of SED2 VSDs, there are two MASTER Modes of operation:

- The AOP can access a single SED2 VSD on the network with full control/parameter access
- The AOP can use the Broadcast mode to simultaneously start/stop all drives on the network.

Use the following procedure to set up a network of SED2 VSDs under control of an AOP:

1. Use the BOP/AOP panel mounting set (PMS) for multiple VSD control (ASN: SED2-DOOR-KIT2) to connect RS-485 communications as follows:
   a. Correct wiring for PMS and SED2 VSD is as follows:
      PMS terminal 3 → SED2 terminal 9 = DC +24V
      PMS terminal 4 → SED2 terminal 28 = DC 0V
      PMS terminal 1 → SED2 terminal 29 = RS-485 communication
      PMS terminal 2 → SED2 terminal 30 = RS-485 communication
   b. Connect additional SED2 VSDs to RS-485 as follows:
      SED2 Drive 1 terminal 29 → SED2 Drive 2 terminal 29
      SED2 Drive 1 terminal 30 → SED2 Drive 2 terminal 30 etc.
   c. Use twisted pair cable or shielded cable (preferred).
   d. The end-of-line SED2 VSD must have a 120-ohm terminating resistor across RS-485 Pins 1 and 2.
   e. Use a common ground for all SED2 VSDs and the PMS.
   f. For correct communication **DIP Switch 1** on the PMS board **must be ON**.
2. Configure the SED2 VSDs for network use.
   a. Set the Command Source **P0700[0]=5** (USS on Com link). This sets the control over the USS link on the communications port.
      Note: The BOP need not be removed. If, in that case, P0700[1] is set to 1, the drives can be controlled via the AOP or the network when in automatic mode (that is, by the AOP timer also). Manual operation on site is also possible, via the BOP or AOP, when P0700[1] is set to 4.

b. Assign each drive a unique RS-485 USS address in the range of 0 to 30. To do this set User Access Level P0003=3 (expert) and use P2011[0] USS Address to assign a unique address to each SED2 VSD.

c. If using the AOP as the normal control means for the SED2 VSD, it is recommended that P2014[1] is set to 5000 (USS telegram off time for Serial Interface BOP Link). To do this, first set User Access Level P0003=3 (expert). The P2014[1]=5000 setting causes the drive to trip if communications with the control source (the AOP) are lost.

3. With the SED2 VSDs powered-up on the network, connect and power-up the AOP on the PMS.

4. On start-up of the AOP, select Mode from the main menu. Press P to confirm the selection.
On display of the mode menu, select MASTER mode. Press P to confirm the selection. Press Fn to return to the main menu.

5. Select OPERATE from the main menu. The AOP lists all SED2 VSDs on the network. For each connected SED2 VSD drive, an '**O**' appears (indicating normal operation).

   Note: IF there is a fault with a connected drive, an '**F**' appears (indicating a fault condition).
   Use ▲ and ▼ to select the drive and to clear the fault.

   Select a single SED2 VSD and press P to confirm the selection or select **B** and press P to enter the Broadcast Mode of operation. At any time, Fn will exit the Broadcast Mode of operation.

6. Press I to start the selected SED2 VSD/motor.

7. Press 0 to stop the selected SED2 VSD/motor.

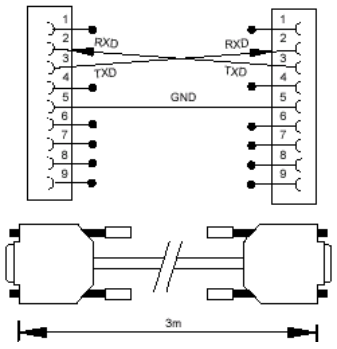
For more information, see *6 AOP Operating Modes*.

4.3 Network Setup (PC Mode)

The AOP can be configured as an RS-232 to RS-485 converter if it is used in combination with the BOP/AOP panel mounting set (PMS) (ASN: SED2-DOOR-KIT2). Thus a PC can be connected to a network of SED2 VSDs. With an adequate software you could then parameterize any SED2 VSD in a network.

To use this configuration, use a null modem cable to connect the PC to the interface print of the PMS..
At the AOP main menu, select **Mode**. At the mode menu, select **PC mode**. Enter the desired **baud rate** of operation.

Null modem cable



5 Editing Parameters

5.1 Parameter Access Levels

You can edit SED2 VSD parameters via the AOP. Access levels control access to the SED2 VSD parameters. A higher access level corresponds to a more sophisticated level of control techniques available for the SED2 VSD applications. User Access Level parameter P0003 sets the access level as follows:

- P0003=0 User Defined List
- P0003=1 Standard Parameters
- P0003=2 Extended Parameters
- P0003=3 Expert Parameters

The access level defined for a SED2 VSD (not the AOP) determines the access to the various levels of parameters. Extended level parameters permit access to all Standard level parameters as well as several others. Expert level parameters permit access to all Extended and Standard level parameters, as well as indexed parameters. Parameter indexes provide subsets of a particular parameter function. The indexes group together closely related parameter type information.

5.2 Editing Conventional Parameters

Note: All parameters that are changed using the following procedures are changing the physical parameters on the SED2 connected to the AOP.

Use the following procedure to change parameters in the SED2 VSD that connects to the AOP:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **PARAMETERS** item.
   Press P to confirm the selection.
   The AOP displays a parameter screen so you can select the desired parameter group or access level.
2. Use ▲ and ▼ to scroll through the parameter groups and to highlight the desired group. Press P to confirm the selection.
   When you select a parameter group, the AOP displays the first parameter in ascending numerical order.
3. Use ▲ and ▼ to scroll through the list of parameters and to highlight the desired parameter. Press P to confirm the parameter selection and the cursor advances to the parameter value.
4. The AOP displays the values associated with the selected parameter. Use ▲ and ▼ to change the parameter value as desired.

   Note: The AOP only accepts parameter values within a predefined range. An out-of-range value is rejected and the AOP prompts you to enter a correct value.
5. Press P to confirm the new parameter value.
   The AOP returns to the parameter screen so you can select another parameter, if desired.
   Press Fn to return to the r0000 display.
   Press Fn again to return to the previous menu.
   Press Fn for several seconds to return to the status screen (normal operating mode). The parameter value that has been changed is retained within the AOP's internal memory, but not sent to the SED2. Should power to the SED2 or AOP be interrupted, all changes are lost.

TIP: How to quickly change parameter values?

To quickly change a parameter value, use the following procedure to change the single digits of the display:

1. Press Fn and the right-hand digit blinks.
2. Press ▲ or ▼ to change the value of this digit.
3. Press Fn again and the next digit blinks.
4. Perform Steps 2 and 3 until the desired value displays.
5. Press P to exit the parameter value

Note:  Simultaneously press Fn and P, at any time, to return to the main menu

Simultaneously press Fn and ▼, at any time, to display the parameter help screens.

5.3 Editing Indexed Parameters

Use the following procedure to view and edit parameters with indexes.

1. Make certain you are in the expert access level (P0003=3).
2. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **PARAMETERS** item.
   Press P to confirm the selection.
   The AOP displays a parameter screen so you can select the desired parameter group or access level.
3. Use ▲ and ▼ to scroll through the groups/access levels and to highlight the desired **parameter group**.
   Press P to confirm the selection?
   When you select a parameter group, the AOP displays the first parameter in ascending numerical order.
4. Use ▲ and ▼ to scroll through the list of parameters and to highlight the desired **parameter**. Press P to confirm the parameter selection.
5. Press P again to access the **parameter index**. Use ▲ and ▼ to scroll through the indexes and to highlight the desired index.
6. Press P to access the **index value**. Use ▲ and ▼ to scroll through the index values and to highlight the desired index value.
7. Press P to confirm the new index value. The AOP returns to the parameter selection screen so you can select another parameter, if desired.
8. To edit another indexed parameter, repeat Steps 3 to 6.

5.4 AOP Stored Parameter Sets

The AOP contains a battery-backed storage facility for storing up to 10 parameter sets that are identified numerically from 00 to 09.

Only a parameter set containing parameter data can be edited. If the selected parameter set does not contain parameter data, the AOP asks if the default parameter set should be copied to the selected parameter set. When you confirm this request, the AOP copies only the editable parameters to the selected parameter set; read-only parameters are accessed from the original parameter location.

5.4.1 Editing AOP-Stored Parameter Sets

Use the following procedure to edit a parameter set:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **Mode** item. Press P to confirm the selection.
   The AOP displays a mode menu so you can select the operating mode.
2. Use ▲ and ▼ to scroll through the list of mode options and to highlight the **Internal** item. Press P to confirm the selection.
   The AOP displays an internal mode menu so you can select the internal mode function.
3. Press P again to confirm the selection and to return to the main menu.
4. Use ▲ and ▼ to scroll through the main menu and to highlight the **PARAMETERS** item. Press P to confirm the selection.
   The AOP displays an internal edit parameter set menu so you can select the desired parameter set.
5. Use ▲ and ▼ to scroll through the list of parameter sets and to highlight the desired **Params. Set number**. Press P to confirm the selection.
   You can now edit parameters associated with the selected parameter set.

5.5 Editing Internal AOP Parameter Set

Use the following procedure to edit the internal AOP parameters:

1. Set **P0003=**3 (expert parameter access level).
2. In the **Internal** mode, scroll through the list of parameter sets until the **AOP** parameter set appears. Press P to confirm the selection.
3. Press P again to select **All** parameters.
4. Use ▼ to access the internal AOP parameters.

Internal parameters that display AOP information include:

Parameter	Description	Parameter	Description
P0964	Software Version Information	P8562	Free Memory
P8552	Base slave address	P8563	Enable Text Scrolling
P8553	Default baud rate	P8564	RS-232 Error count
P8564	Enable Autobaud	P8565	RS-485 Error count
P8560	Battery level	P8566	Null USS Responses
P8561	Enable Backlight	P8567	USS Timeouts

5.6 Copying Parameter Sets

Caution

Upload/Download Limitations:
With any of the software versions up to and including A03/1.45, SED2 VSD parameters of access level 4 cannot be uploaded. With software versions A06/1.59 or higher, this limitation no longer applies, that is, parameter sets of all four access levels can be uploaded or downloaded, including all motor parameters.

Memory Limitation:
The delivered AOP supports five European languages: English, German, French, Spanish, and Italian. **Due to internal memory limitations, you should delete one of these languages in order to upload the specified ten parameter sets that can be held on the AOP**.

To Delete a Language:
Select LANGUAGE from the main menu, highlight the language you want to delete, and then press Fn and ▲.

Note: Once a language has been removed, it cannot be restored.

5.6.1 Parameter Upload (Upread)

The upload/upread procedure reads a parameter set from a SED2 VSD and stores that parameter set in the internal memory of the AOP. The AOP can read from a single SED2 VSD in LOCAL mode or from one specific SED2 VSD on a network of SED2 VSDs in MASTER mode.

Use the following procedure to upload/upread a parameter set from a SED2 to the AOP:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **UPREAD** item. Press P to confirm the selection. Press Fn to cancel the upload process.
   The AOP displays an UPLOAD / UPREAD menu.

   Note: In MASTER mode, the AOP prompts for selection of a specific SED2 VSD from a list of the networked SED2 VSDs.

2. Use ▲ and ▼ to scroll through the list of parameter sets and to highlight the parameter set into which information will be written.
   Press P to confirm the selection.

   Notes: If the selected parameter set already contains information, the AOP prompts to clear the existing parameter set.

   Simultaneously press Fn and ▲ when uploading to delete the existing parameter set.

   When viewing stored parameter sets, press Fn and ▲ to display the software version number of the uploaded parameter set.

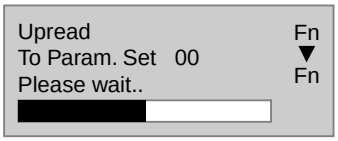
3. The AOP prompts for confirmation.
   Press P to confirm the process. Press Fn to cancel the upload process.

4. The AOP displays a wait screen while the upload process occurs.

5. On completion of the upload process, the AOP returns to the main menu.

5.6.2 Wait Request

Certain tasks that the SED2 performs take longer than other tasks. If this occurs, a screen (such as the following) displays to inform you that the SED2 is completing a task.



5.6.3 Parameter Download

The download procedure writes a parameter set stored in the AOP to any SED2 VSD connected in LOCAL mode or to a single specified SED2 VSD on a network of SED2 VSDs connected in MASTER mode. In MASTER mode, the download procedure must select a specific SED2 VSD as the recipient SED2 VSD. (The download cannot simultaneously occur in all networked SED2 VSDs.)

Use the following procedure to download a parameter set:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **DOWNLOAD** item.
   Press P to confirm the selection. Press Fn to cancel the download process.
   The AOP displays a DOWNLOAD menu.

   Note: In MASTER mode, the AOP prompts for selection of a specific SED2 VSD from a list of the networked SED2 VSDs.

2. Use ▲ and ▼ to scroll through the list of parameter sets and to highlight the parameter set from which information will be copied.
   Press P to confirm the selection.
3. The AOP displays a confirmation screen.
   Press P to confirm the selection. Press Fn to cancel the download process.
4. The AOP displays a wait screen while the download process occurs.
5. On completion of the download process, the AOP returns to the main menu.

Notes:

If the download fails, perform the following:

1. Reset VSD parameters: Commissioning Parameter P0010=30 for factory settings and Factory Reset Parameter P0970=1 to reset all parameters to their default values.
2. Cycle VSD power off/on.
3. Repeat the download process.

6 AOP Operating Modes

6.1 Selecting an Operating Mode

The mode menu allows you to select the desired AOP operating mode. The following table summarizes the AOP operating modes and lists associated main menu items.

Operating Mode	Main Menu Items										Description
	OPERATE	DIAGNOSTICS	PARAMETERS	MODE	UPLOAD	DOWNLOAD	LANGUAGE	SETUP	TIMER	ENGINEERING	
LOCAL	●	●	●	●	●	●	●	●	●		In LOCAL mode, the AOP mounts directly onto one SED2 VSD and then scans its RS-232 and RS-485 ports to establish communications with the first port that answers. You can control the SED2 VSD by accessing all normal SED2 and AOP internal parameters. LOCAL mode is the default of the AOP on initial power-up or after a reset.
MASTER	●	●	●	●	●	●	●	●	●		In MASTER mode, the AOP can control up to 31 SED2 VSDs which connect in a multi-drop arrangement. An operator can control each SED2 VSD by accessing all normal SED2 and AOP internal parameters. In MASTER mode, the network controls the SED2 VSDs either individually or by *broadcast* operation. A broadcast operation can simultaneously start or stop all networked SED2 VSDs.
INTERNAL		●	●	●			●	●	●	●	In the INTERNAL mode, you can access all parameter sets which are stored within the AOPs hardware. You can *not* access any parameter sets stored in the SED2 VSDs. In the INTERNAL mode, the main menu includes an Engineering item. This menu item allows you to view a USS message log of the last 1k bytes of messages between the AOP and the connected SED2 VSDs.
SLAVE				●							In SLAVE mode, the AOP communicates with a PC using the AOP Desk Mounting Kit. In this configuration, the AOP acts as a slave to the PC. At the PC, you can upload and access parameter sets or the AOP internal parameter set as a USS address, numbered 1 through 10.
PC mode				●							In PC mode, the AOP is used with a panel mounting set to control a network of SED2 VSDs. In this configuration, the AOP acts as an RS-232/RS-485 converter. In PC mode, you can modify only the communications baud rate function.
UPLOAD				●	●		●				

1. At the MODE menu, use ▲ and ▼ to scroll through the list of options until the desired operating mode is highlighted.
2. Press P to confirm the selected operating mode (press Fn to return to the main menu.)

Note: To exit an operating mode, either follow the on-screen instructions or return to the main menu and select the MODE menu to choose a different operating mode.

6.2 Operating in Local Mode

On initial power-up or after a reset, the AOP defaults to the LOCAL operating mode. The LOCAL mode operates only with one SED2. You can change the operating mode via the MODE menu. You can control the SED2 VSD by accessing all normal SED2 and AOP internal parameters. See also *4.1 Single Drive Control Using the AOP*

6.2.1 Communications Failure

If communications between the AOP and a SED2 VSD fails, a warning screen displays.

Press P to acknowledge the warning condition.

If the failure condition occurs again, the AOP assumes it is not connected to the SED2 VSD and returns to the main menu.

If the AOP fails to establish initial communications with a SED2 VSD, any attempt to select OPERATE from the main menu results in an error warning screen.

Press P to acknowledge the warning condition and to return to the main menu.

6.2.2 Displaying Drive Status

The AOP can monitor the status of its associated SED2 VSD and motor. The screen displays the current activity of the SED2 VSD and motor, including any fault conditions.

6.2.3 Verifying Drive Type

The AOP can verify the type of its associated SED2 VSD. If the SED2 VSD type is incompatible with the AOP, it inhibits operation and returns to the main menu.

6.3 Operating in Master Mode

In MASTER mode, the AOP can control up to 31 SED2 drives that connect in a multi-drop network arrangement. Full operator control of each SED2 is possible with access to all normal SED2 parameters.

Control of the SED2 drives can be individually or by broadcast method.

6.3.1 Individual Control of SED2 VSD

To control a single unit in a SED2 VSD network:

1. Select MASTER mode from the main menu
2. In MASTER mode, select **OPERATE**
   The AOP prompts you to select a. slave VSD
3. Use ▲ and ▼ to select a slave SED2 VSD. A two-digit number on the left-hand side of the screen identifies each SED2 VSD. In the top, left-hand corner of the screen, an icon indicates the current operating status of the highlighted SED2 VSD. The following table describes the icons.

Display	Description
■	Indicates the SED2 VSD is active and communicating.
	Indicates no active slave (icon is blank).
F	Indicates a SED2 VSD fault has been recorded and the SED2 VSD has tripped.
A	Indicates a SED2 VSD with active warnings.
	Indicates a SED2 VSD with communications problems.
ρ	Indicates a non-SED2 VSD - parameter upload only.

Note: To configure SED2 VSDs for network operation:

- set Command Source **P0700[0]=5** (USS on Com link)
- set USS Telegram Off Time for Serial Interface Com Link **P2014[0]=5000**, and
- USS Address for Serial Interface Com Link **P2011[0]=a unique number** for each drive on the network.

For more information see *4.2 Network Setup (RS-485 with Panel Mounting Kit)*

6.3.2 Broadcast Operation

The purpose of the broadcast function is to allow all connected SED2 VSDs to be controlled simultaneously. With the broadcast function selected it is possible to perform the following functions on all connected SED2 VSDs:

- Start
- Stop

Since parameters can not be edited globally, the P key does not function in a broadcast operation.
The ▲ and ▼ key still function in a broadcast operation. For example, it would be possible to change the speed of all motors simultaneously across all networked SED2 VSDs.

6.3.3 Slave Communications Failure

If at any time, communications fail between the AOP and a connected slave VSD, a 'Slave Error' warning screen is displayed. This screen will indicate which slave VSD is affected and will also be displayed if a slave VSD is not working correctly.
Press P to acknowledge the warning condition.
If the failure condition occurs again, then the AOP returns to the main menu and the user will not be allowed to enter the OPERATE mode.

7 Timer Function

Notes:

- Before using the timer function as a control method, set the AOP real time clock as described in the *Set Time/Date* section.
- Setting a timing event for ‘every day’, configures the same event for each day of the week separately. To clear an ‘every day’ event, you must clear the event individually from each day.
- When multiple events must be cleared from the Timer function, it may be easier to reset the AOP as described in the *AOP Reset* section.
- When in MASTER mode of operation and viewing the connected SED2 drives, a ‘T’ displays in the top left corner to indicate that the connected SED2 drives are under timed remote control and may start or stop unexpectedly.
- To start or stop an attached SED2 VSD with the AOP timer function you must set the command source parameters **P0700[0]=4** and **P0700[1]=4** (USS on BOP link or AOP).

7.1 Setting the AOP Timer

When in LOCAL or MASTER mode, you can access the timer feature from the main menu. The timer operates as a 7-day, time-of-day, on/off controller (much like a central heating controller but with the addition of a possible multi-VSD selection).

Key	Function
▼	Moves down through the available choices of the highlighted field.
▲	Moves up through the available choices of the highlighted field.
P	Press this key to confirm a changed field and to move the cursor to the next field. Press this key for several seconds to move the cursor back to the previous field.
Fn	Cancels the current settings and returns the user to the main menu. **All changes will be discarded.**
Fn ▲	Cancels the entire timer event currently displayed.
0….31	Available USS SED2 drive network settings. In MASTER mode, 0 through 31 are selectable when the AOP detects the SED2 at that address.
B	Allows the programmed timing event to be communicated to all connected SED2 drives (in broadcast mode).
I	This is the ON symbol and indicates that the currently viewed or programmed event is when the SED2 drive is switched on.
◊	This is the OFF symbol and indicates that the currently viewed or programmed event is when the SED2 drive is switched off.

In general, use the following keys to set the timer:

- Press P to confirm the input.
- ▲ and ▼ to scroll through input ranges.
- Press Fn to cancel the input and to return to the previous entry.

Use the following procedure **To Set a Timed Event**:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **Timer** item.
   Press P to confirm the selection. The AOP displays the timer screen.
2. Use ▲ and ▼ to enable (**on**) or disable (**off**) the AOP timer function.
   Press P to confirm the selection and to advance the cursor to the day-of-week field.
3. Use ▲ and ▼ to scroll through and highlight the desired **day of the week** (individually Monday through Sunday, or 'Every Day').
   Press P to confirm the selection and the cursor advances to the event view field.
4. Press P again to move the cursor to the drive selection field.
5. Use ▲ and ▼ to either select a **drive number** from 1 through 31 or '**B**' for broadcast operations.
   Press P to confirm the input and the cursor advances to the on / off field.
6. Use ▲ or ▼ to either select I for **on** or ◊ for **off**.
   Press P to confirm the selection and the cursor advances to the HOUR field.
7. Use ▲ and ▼ to set the required hour and press P to advance to the MINUTE field.
   Use ▲ and ▼ to set the required minutes and press P to advance to the SECONDS field.
   If necessary set also the required seconds and press P to confirm the time setting.
   The cursor moves to the event view field.
8. Use ▲ or ▼ to select a blank event screen to set the required on or off time for the SED2 VSD, depending upon what timing event was previously set.
9. To program a new event perform steps 3 through 7 above.

   Note: **Ensure that a new blank screen is selected**, as any entry in a previous event will overwrite the previously entered data.

   To **cancel or delete an event**, press Fn and P simultaneously
10. **Exit** from the TIMER screen with 2 long presses of P.

8 AOP Setup & Configuration

8.1 Setup Menu

Using the SETUP option from the Main Menu of the AOP, you can personalize the following characteristics of the AOP:

- Backlighting
- Screen Contrast
- Large Numbers
- Cursor Type
- Start Help
- Welcome Text
- Parameter Set Names (Expert Level and above only)
- User Defined Text
- Set Time/Date (Service Level only)
- AOP Reset

Use the following procedure to access the SETUP menu:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **SETUP** item.
   Press P to confirm the selection. The AOP displays a SETUP menu.
2. Use ▲ and ▼ to scroll through the SETUP menu and to highlight the desired option.
   Press P to confirm the selection.

Note: Simultaneously press Fn and ▼ at any time to display the relevant help screens.

8.1.1 Backlighting

To activate the backlighting option on the AOP, the following procedure should performed:

1. Use ▲ and ▼ to highlight the **Backlighting** option on the SETUP menu.
   Press P to confirm the selection.
   The AOP displays a backlighting selection screen.
2. Use ▲ and ▼ to select either **on, off** or **sec.off**.
   Press P to confirm the selection.

   Note: When you select on or off for backlighting, the AOP returns to the SETUP menu.
3. When you select **sec.off** the AOP displays a backlighting time setting screen. The backlighting timer turns off the AOP backlighting after a specified time period of operator inactivity (in seconds).
   Use ▲ and ▼ to set the timer period of inactivity (1…250 seconds).
   Press P to confirm the setting and the AOP returns to the SETUP menu.

   Note: When you select OFF for the backlighting timer, the AOP backlighting functions continuously.

8.1.2 Screen Contrast

1. Use ▲ and ▼ to highlight the **Screen Contrast** option on the SETUP menu.
   Press P to confirm the selection.
2. Use ▲ and ▼ to adjust the contrast level.
   Press P to confirm the selection and the AOP returns to the SETUP menu.

8.1.3 Large Number Display

You can configure the AOP for a large-number display of the SED2 VSD frequency.

In the Large Number Display mode, you can temporarily switch to normal display mode (4 lines) with the keys P and Fn. After an adjustable time delay, the display switches back to large characters.

Use the following procedure to activate the large number display:

1. Use ▲ and ▼ to highlight the **Large Numbers** option on the SETUP menu.
   Press P to confirm the selection.
2. Use ▲ and ▼ to select either an **off** or **on** in the large number display option.
   Press P to confirm the selection.
3. Select a requested delay time (4 through 250 seconds).
   Press P to confirm the selection and to return to the main menu.

8.1.4 Cursor Type

1. Use ▲ and ▼ to highlight the **Cursor Type** option on the SETUP menu.
   Press P to confirm the selection.
   The AOP displays a cursor type screen.
2. Use ▲ and ▼ to select the desired cursor type (blinking underline or inverse-video [default]).
   Press P to confirm the selection and the AOP returns to the SETUP menu.

8.1.5 Start Help

Note: By default, the Start Help function is set ON. To change this setting, select **Start Help** from the SETUP menu.

1. Use ▲ and ▼ to highlight the **Start Help** option on the SETUP menu.
   Press P to confirm the selection.
2. Use ▲ and ▼ to select either an **off** or **on** to disable or enable the start help function.
   Press P to confirm the selection and the AOP returns to the SETUP menu.

8.1.6 Welcome Text

Use the following procedure to edit the welcome text that displays on the AOP at power-up:

1. Use ▲ and ▼ to highlight **Welcome Text** option on the SETUP menu.
   Press P to confirm the selection.
2. Use ▲ and ▼ to select an **on** or **off** welcome text status.
   Press Fn to cancel this selection and to return to the SETUP menu.
   Press P to confirm the selection and the AOP displays a text screen with the first character highlighted.
   The text string can contain a maximum of 20 characters.
3. Use ▲ and ▼ to scroll through the characters until the desired character is shown.
   Press P to accept the character and to advance to the next character.
   Repeat this step until the desired text is entered.
4. Press and hold P to except the text string and to return to the SETUP menu.
   Press and hold Fn to cancel the text entry, restore the original text string, and to return to the SETUP menu.

8.1.7 User Defined Text

With the following procedure, you can enter a user-defined text in the AOP:

1. Use ▲ and ▼ to highlight **User Defined Text** option on the SETUP menu.
   Press P to confirm the selection.
   The AOP displays a user text screen.
2. Use ▲ and ▼ to select an **on** or **off** user text status.
   Press Fn to cancel this selection and to return to the SETUP menu.
   Press P to confirm the selection and the AOP displays a text screen with the first character highlighted.
   The text string can contain a maximum of 20 characters.
3. Use ▲ and ▼ to scroll through the characters until the desired character is shown.
   Press P to accept the character and to advance to the next character.
   Repeat this step until the desired text is entered.
4. Press and hold P to except the text string and to return to the SETUP menu.
   Press and hold Fn to cancel the text entry, restore the original text string, and to return to the SETUP menu.

8.1.8 Parameter Set Names

Use the following procedure to edit the names of the ten parameter sets stored in the AOP.

Note: This editing option is not available in the standard access level.

1. Use ▲ and ▼ to highlight the **Parameter Set Names** option on the SETUP menu.
   Press P to confirm the selection.
2. Use ▲ and ▼ to scroll through the parameter sets (1-10) to highlight the parameter set whose name is to be edited. Press P to confirm the selection.
3. The AOP displays now the name of the selected parameter with its first character highlighted.
   Use ▲ and ▼ to scroll through the characters until the desired character is shown.
   Press P to accept the character and to advance to the next character.
   Repeat this step until the desired text is entered.
4. Press and hold P to accept the text string and to return to the SETUP menu.
   Press and hold Fn to cancel the text entry, restore the original text string, and to return to the SETUP menu.

8.1.9 Set Time/Date

1. Use ▲ and ▼ to highlight the **Set Time/Date** option on the SETUP menu.
   Press P to confirm the selection.
   The AOP displays a set time screen and highlights the first time field (hours).
2. Use ▲ and ▼ to scroll through the digits until the desired hour (0-23) displays.
   Press P to confirm the entry.
   The cursor advances to the next time field (minutes [0-59], and then seconds [0-59]).
   Repeat this step until the desired time (hours-minutes-seconds) is set.
3. The AOP displays a set day/date screen and highlights the first field (day of week).
   Use ▲ and ▼ to scroll through and highlight the desired day of week.
   Press P to confirm the entry.
   The cursor advances to the first date field (day of month).
4. Use ▲ and ▼ to scroll through the digits until the desired day of the month (01-31) displays.
   Press P to confirm the entry.
   The cursor advances to the next date field (month [01-12], and then year [2000-2250]).
   Repeat this step until the desired date (day-month-year) is set.

Press and hold the P key to accept the Day/Date settings and to return to the SETUP menu.

8.1.10 AOP Reset

Caution: The AOP reset function enables the deletion of all parameter sets and settings, internal faults, and message logs stored in the AOP.

1. Use ▲ and ▼ to highlight the **AOP Reset** option on the SETUP menu.
   Press P to confirm the selection.
   The AOP displays an AOP reset screen.
2. Use ▲ and ▼ to select **on** or **off** to enable or disable the AOP reset function respectively.
   Press P to confirm the selection.
   Press Fn to cancel this selection and to return to the SETUP menu.
3. When you select off, the AOP disables the AOP reset function and returns to the SETUP menu.
   When you select on, you will be prompted which way the AOP reset should occur.
   If you want to reset the AOP and also delete all the parameter sets, press P
   If you want to reset only the AOP without deleting the parameter sets, press Fn.

Simultaneously press Fn and ▼ at any time to display relevant help screens.

9 Faults & Warnings

Note:

If a fault/warning condition occurs on a SED2 VSD to which an AOP connects, a fault/warning code displays with a description of the relevant fault/warning. For a list of fault/warning codes, see the *SED2 Operating instructions*, Document No. CM1U5192en.

9.1 Fault Indication / Fault Screen

If a fault condition occurs on a connected SED2 VSD, the AOP provides a fault message with specific information about the fault condition such as:

- Identity of the SED2 VSD with the fault condition
- Fault code number
- Plain text explanation of the fault condition

Proceed by doing one of the following:

– Press P to acknowledge the fault, or

– Press Fn to clear the fault and perform a manual restart of the SED2 VSD.
Clearing the fault may depend on the fault condition. It may be necessary to investigate the cause of the fault. Simultaneously press Fn and ▼ to display a fault-specific help screen to facilitate diagnosing the fault condition.

9.1.1 Multiple Faults

If a SED2 VSD or network of VSDs reports more than one fault condition, the AOP displays all fault messages by cycling through them until they are all acknowledged or cleared. See *Fault Indication/Fault Screen* above to acknowledge each fault message.

9.2 Warning Indication/Warning Screen

If a condition occurs within the connected SED2 VSD(s), that should be brought to the users attention, then the AOP provides a warning message with specific information about the warning condition such as:

- Identity of the VSD with the warning condition
- Warning code number
- Plain text explanation of the warning condition

There is no requirement for you to acknowledge a warning message. The message displays as long as the SED2 VSD reports the warning condition.

Simultaneously press Fn and ▼ to display a warning-specific help screen to facilitate diagnosing the warning condition.

9.2.1 Multiple Warnings

If a SED2 VSD or network of SED2 VSDs reports more than one warning condition, the AOP displays all warning messages by cycling through them until the conditions causing the warning messages cease to exist.

9.3 Simultaneous Faults and Warnings

If a SED2 VSD or network of VSDs reports a fault condition and a warning condition, the AOP displays all messages by cycling through them. The AOP first displays a fault message and then a warning message separated by a 2-second interval.

This cycle continues until all fault and warning messages display. The cycle repeats itself until all fault messages are either acknowledged or cleared and the conditions causing the warning messages cease to exist.

9.4 SED2 VSD Fault/Warning Record

For a VSD that connects to an AOP, the diagnostic menu provides access to recent fault history. In MASTER mode, a two-digit USS slave address identifies each SED2 VSD.

Note: Regarding fault history, the AOP time display function is only available if the AOP was connected to the SED2 VSD at the time of the fault.

Use the following procedure to access the AOP diagnostics facilities:

1. From the main menu, use ▲ and ▼ to scroll through the list of options and to highlight the **DIAGNOSTICS** item.
   Press P to confirm the selection.
2. If no fault history exists, press P or Fn to return to the main menu.
3. If a fault history exists, use ▲ and ▼ to scroll through the fault history. Simultaneously press Fn and ▼ to display the help screen which contains details of the relevant corrective action.
   Press and hold Fn to return to the main menu.

10 Applicable Standards

European Low Voltage Directive

The SED2 VSD product range complies with the requirements of the Low Voltage Directive 73/23/EEC as amended by Directive 98/68/EEC. The units are certified for compliance with the following standards:

EN 60146-1-1	Semiconductor VSDs - General requirements and line commutated VSDs
EN 60204-1	Safety of machinery - Electrical equipment of machine

European Machinery Directive

The SED2 VSD series does not fall under the scope of the Machinery Directive. However, the products have been fully evaluated for compliance with the essential Health & Safety Requirements of the directive when used in a typical machine application. A Declaration of incorporation is available on request.

European EMC Directive

When installed according to the recommendations described in this guide, the SED2 VSD fulfils all requirements of the EMC Directive as defined by the EMC Product Standard for Power Drive Systems EN50082-2.

Underwriters Laboratories

UL and CUL LISTED POWER CONVERSION EQUIPMENT 5B33 for use in a pollution degree 2

ISO 9001

Siemens SBT operates a quality management system, which complies with the requirements of ISO 9001.

11 Revision History

Changes made since edition 1.0 (of Nov. 5. 2002):

Section	Type	Change
5.6	changed	Limitations when up- and downloading SED2 VSD parameter sets in connection with access level 4 no longer apply with software A06/1.59 or higher.

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