

Protection and control

Sepam range

Sepam 2000

Sepam 1000

Diagnosis guide



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■ Merlin Gerin ■ Modicon ■ Square D ■ Telemecanique

Sepam 2000 diagnosis guide

Contents

	page
Sepam 2000 diagnosis guide	2
Sepam 2000 appendix	13
Sepam 1000 diagnosis guide	14
Sepam 1000 appendix	19

■ the **symptoms** column describes the fault observed, together with the possible consequences.


■ the **possible causes** column describes what could have caused the fault.

■ the **remedies** column describes the tests to be performed or operations to be carried out to correct the situation (they are not necessarily given opposite the causes discussed).


All indicators off

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ all the indicators and the display unit are off,■ the TSM 2001 terminal is not communicating, the screen is blank.	<ul style="list-style-type: none">■ the Sepam 2000 is not being supplied with power,■ the device has been switched on rapidly several times in a row, causing internal tripping of the CE40 power supply.	<ul style="list-style-type: none">■ check the voltage on the power supply connector,■ disconnect the power supply for a few minutes,■ if the fault persists, change the Sepam 2000 power supply board. The CE40 board is fitted with an internal fuse; never replace it (since other power supply components are damaged when the fuse blows).

“maintenance” message and red indicator on


Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ Sepam displays the maintenance message, ■ the red  indicator is on, ■ the TSM 2001 pocket terminal is not operational, ■ the Sepam 2000 is not working; the watchdog has dropped out. 	<p>The parameters have been altered. There may be several causes for the alteration:</p> <ul style="list-style-type: none"> ■ the memory cartridge has been inadvertently plugged in or pulled with the power on. ■ Sepam 2000 self-testing has detected an internal fault which prevents it from carrying out its functions. 	<ul style="list-style-type: none"> ■ replace the customer cartridge by the TSM 2005 final testing cartridge and read the internal fault using the TSM 2001 (see TSM 2005 manual, chapter on reading internal faults). <p>without the TSM 2005</p> <ul style="list-style-type: none"> ■ to locate the fault, replace the cartridge by another one (made for use in the same model). If the fault disappears, it came from the cartridge: reprogram it with LOGIPAM using the reprogram settings option, ■ if necessary, replace the faulty cartridge, ■ if the fault persists, replace the power supply card, ■ if the fault persists, replace Sepam 2000. <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Before re-energizing the Sepam, check the complete parameter setting of the Sepam:</p> <ul style="list-style-type: none"> ■ status, ■ protection settings, ■ control logic parameters: bistables, time delays... </div>

“maintenance” message and red indicator off


Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ Sepam displays the maintenance message, ■ the red  indicator is off, ■ the TSM 2001 pocket terminal is operational, ■ Sepam 2000 is working, ■ the maintenance message disappears when a key on the front of the device is pressed, but comes back again after a few seconds. 	<ul style="list-style-type: none"> ■ the microswitches are in a prohibited setting, ■ Sepam 2000 internal self-testing has detected an internal fault which does not prevent Sepam 2000 from momentarily performing its functions. 	<ul style="list-style-type: none"> ■ check the setting of the microswitches on the ECM (or ECA) and 3U+Vo boards (installation manual), ■ for S25 and S35 Sepam, an error code can be read with the pocket terminal in the About Sepam menu, SFT 2800 heading; it appears in line 4 of the screen, on the right : <ul style="list-style-type: none"> □ code 0400: change the ECM (ECA) board (slot 2), □ code 1000: change the 3U+Vo board, □ code 0800: change the additional ECM (ECA) board (slot 3), □ codes 2000, 8000: change the RTD boards, □ other codes or if the fault persists: replace Sepam 2000. <p>With TSM 2005</p> <ul style="list-style-type: none"> ■ replace the customer cartridge by the TSM 2005 final testing cartridge and read the internal fault using the TSM 2001 (see TSM 2005 manual, chapter on reading internal faults).

Sepam 2000 diagnosis guide (cont'd)


“CARTRIDGE” message

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ Sepam displays the cartridge message, ■ the red  indicator is on. ■ the TSM 2001 pocket terminal is not working, ■ Sepam 2000 is not working; the watchdog relay has dropped out. 	<ul style="list-style-type: none"> ■ the cartridge does not match the Sepam model, ■ boards needed for Sepam 2000 operation are missing, ■ the boards have been switched around, ■ 2 different ECM boards are plugged in Sepam. 	<ul style="list-style-type: none"> ■ ensure that the cartridge has not been mixed up with another Sepam 2000 cartridge, ■ check the number of ESTOR I/O boards. It should be greater than or equal to the number of boards needed for the control logic program, ■ check that the cartridge is installed in the correct model of Sepam: the Sepam model in which the cartridge should be inserted appears in line 1 of the label on the front of the cartridge. <p>Example : a cartridge labeled S25 LX M01 should be inserted in a model 2025 LX Sepam, <ul style="list-style-type: none"> ■ the Sepam model appears in the label stuck to its side. Check that the boards present in the rear compartment of that model comply with the board position table in the appendix, ■ check that ECM boards have the same sérial number (03143179 or 3122288). <p>With TSM 2005</p> <ul style="list-style-type: none"> ■ replace the customer cartridge by the TSM 2005 final testing cartridge and read the internal fault using the TSM 2001 (see TSM 2005 manual, chapter on reading internal faults). </p>


“M.CARTRIDGE” message and red indicator on

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ Sepam displays the M.CARTRIDGE message, ■ the red  indicator is off, ■ the TSM 2001 pocket terminal is not working, ■ the Sepam 2000 is not working; the watchdog has dropped out. 	<ul style="list-style-type: none"> ■ cartridge memory fault, with possible altered parameters. 	<ul style="list-style-type: none"> ■ replace the cartridge. <div style="border: 1px solid black; padding: 5px;"> <p>Before re-energizing the Sepam, check the complete parameter setting of the Sepam:</p> <ul style="list-style-type: none"> ■ status, ■ protection settings, ■ control logic parameters: bistables, time delays... </div>

“M.CARTRIDGE” message and red indicator off

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ Sepam displays the M.CARTRIDGE message, ■ the red  indicator is off, ■ the TSM 2001 pocket terminal is working, ■ the Sepam 2000 is working, ■ the M.CARTRIDGE message disappears when a key on the front of the device is pressed, but comes back again after a few seconds. 	<ul style="list-style-type: none"> ■ incorrect status setting, ■ the maximum number of cartridge memory entries has been reached 	<ul style="list-style-type: none"> ■ check whether the STATUS menu parameters are blinking. Blinking parameters should be reprogrammed, ■ for S25 and S35 Sepam, an error code is read using the pocket terminal in the About Sepam menu, item SFT 2800; it appears in line 4 of the screen, on the right: <ul style="list-style-type: none"> □ code 0040 : replace the cartridge.


Everything off except for green and red indicators

Symptoms	Possibles causes	Remedies
<ul style="list-style-type: none">■ the green on indicator is on,■ the red  indicator is off,■ the TSM 2001 pocket terminal is not communicating, its screen is blank,■ the 3 indicators I on, O off, trip and the display unit are off,■ the blinking cursor is displayed on the TSM 2001 pocket terminal but the terminal is not working.	<ul style="list-style-type: none">■ the cartridge is missing,■ there may be a programming fault in the cartridge,■ the control logic part is not programmed,■ power supply board fault.	<ul style="list-style-type: none">■ check for the cartridge behind the shutter,■ replace the cartridge by a cartridge that is presumed to be a good one (intended for the same model of Sepam 2000). If the fault disappears, the fault came from the cartridge: replace or reprogram it,■ if the fault persists, change the Sepam 2000 power supply board,■ if the fault persists, change Sepam 2000.

Display of dashes

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ a line of dashes is displayed: -----,■ this message may appear in normal operating conditions.	<ul style="list-style-type: none">■ pressing a key on the front which is not used (e.g. V/Hz key on a Sepam which does not contain voltage measurement functions),■ pressing the alarm key (to display the stored messages) when no messages have been stored,■ when stored messages are being read (after the user has pressed the alarm key), the dashes appear to indicate the end of the list of messages (they appear after the oldest message).	<ul style="list-style-type: none">■ none. This is not a fault.

The TSM 2001 display is blank

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the TSM 2001 pocket terminal screen is dark, or blank except for the blinking cursor,■ the green on indicator is on,■ the red  indicator is off,■ the Sepam 2000 display unit is working and the keys on the front are operational.	<ul style="list-style-type: none">■ the TSM 2001 pocket terminal display unit contrast adjustment has been modified,■ the pocket terminal is out of order.	<ul style="list-style-type: none">■ turn the dial on the right-hand side of the TSM 2001 pocket terminal,■ test the pocket terminal on another Sepam 2000 to determine whether the fault comes from the terminal or Sepam 2000. If the fault is located in Sepam 2000, replace it.

Sepam 2000 diagnosis guide (cont'd)

The current measurements are false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the difference between the expected measurement and the measurement indicated by Sepam 2000 may be between 10% and 500%,■ the green on indicator is on,■ the red ! indicator is off,■ the display unit is lit up,■ the TSM 2001 pocket terminal is working normally.	<ul style="list-style-type: none">■ the microswitches on the back of the ECM (or ECA) board are not set correctly,■ one of the parameters in the status menu is not set correctly.	<ul style="list-style-type: none">■ check the setting of the microswitches on the ECM (or ECA) board; refer to installation manual,■ check that the In setting (status menu, phase CT heading) matches the rating of the CTs or CSP sensors being used; refer to use/commissioning manual,■ check that the network frequency has been selected correctly (50 or 60 Hz, status menu). <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 to test the ECM or ECA current boards (see TSM 2005 manual, chapter on testing ECM or ECA boards).

The residual current measurement is false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ reading < 50% of injected current.	<ul style="list-style-type: none">■ the core balance CT is not compatible.	<ul style="list-style-type: none">■ replace the core balance CT by a CSH,■ check that the core balance CT is wired to the core balance CT input and not to the CT input.

I2 current measurement does not appear

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the I2 measurement is missing. It does not appear on the display or on the TSM 2001 pocket terminal,■ the phase 1 and 3 currents are correct.	<ul style="list-style-type: none">■ the number of phase CTs selected in the status menu is 2 instead of 3. If this is the case, Sepam is unaware of the presence of the phase 2 CT.	<ul style="list-style-type: none">■ check the number of CTs indicated in the status menu, phase CT heading. Set it to 3.

One of the 3 phase current measurements is zero

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ one of the measurements indicates a value of zero or close to zero,■ the other 2 phase current measurements are working normally. The indications are the same on the display and on the TSM 2001 pocket terminal,■ the green on indicator is on■ the red ! indicator is off,■ the display unit is lit up,■ the TSM 2001 pocket terminal is working normally.	<ul style="list-style-type: none">■ there are only 2 CTs in the cubicle,■ one CT is not wired,■ the ECM (or ECA) current input board is faulty,■ the current measured is less than 1.5% of In.	<ul style="list-style-type: none">■ Sepam connected to a 1A/5A CT: ensure that there is current in the CT secondary circuit which reaches the CCA 660 or CCA 650 connector,■ replace the ECM board,■ Sepam connected to a CSP sensor: momentarily reverse the connections (BNC connector) on the ECA board: if the fault disappears, the problem is an external one; if the fault persists, replace the ECA board. <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 to test the ECM or ECA current boards (see TSM 2005 manual, chapter on testing ECM or ECA boards).

The voltage measurements are false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the difference between the expected measurement and the measurement indicated by Sepam 2000 may be between 10% and 500%,■ the protections do not trip at the expected setting,■ the green on indicator is on,■ the red \ indicator is off,■ the display unit is lit up,■ the TSM 2001 pocket terminal is working normally.	<ul style="list-style-type: none">■ the microswitches on the back of the 3U+Vo board are not set correctly,■ one of the parameters in the status menu is not set correctly.	<ul style="list-style-type: none">■ check the setting of the microswitches on the 3U+Vo board; refer to installation manual,■ check that the Unp and Uns settings (status menu, phase VT heading) match the VTs being used; refer to use/commissioning manual,■ check that the network frequency has been selected correctly (50 or 60 Hz, status menu). <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 to test the 3U+Vo boards (see TSM 2005 manual, chapter on testing 3U+Vo boards).

One or two phase voltage measurements do not appear

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the U13 (and U32) measurement is missing. It does not appear on the display or on the TSM 2001 pocket terminal,■ the other voltages are correct.	<ul style="list-style-type: none">■ the phase VTs selected in the status menu are U21 (and U32). If this is the case, Sepam is unaware of the presence of the other VTs.	<ul style="list-style-type: none">■ check the number of VTs indicated in the status menu, phase VT heading. Set it to 3.

A voltage measurement is zero

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ one of the phase-to-phase voltage measurements indicates a value of zero or close to zero. The indications are the same on the display and on the TSM 2001 pocket terminal,■ the green on indicator is on,■ the red \ indicator is off,■ the display unit is lit up,■ the TSM 2001 pocket terminal is working normally.	<ul style="list-style-type: none">■ there are only one or two VTs in the cubicle,■ the 3U+Vo voltage input board is faulty,■ the voltage measured is less than 1.5% of Un.	<ul style="list-style-type: none">■ ensure that the wiring to Sepam 2000 is correct,■ replace the 3u+Vo board. <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 to test the 3U+Vo voltage boards (see TSM 2005 manual, chapter on testing 3U+Vo voltage boards).

The power measurements and accumulated energy readings are false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the power indicated may be totally false or almost zero,■ the power factor indicated may be a deviant value,■ otherwise, the current and voltage measurements are correct.	<ul style="list-style-type: none">■ inversion of CT wiring to Sepam 2000 current inputs if the frequency is correct,■ inversion of VT cabling to Sepam voltage inputs if the frequency is displayed by dashes.	<ul style="list-style-type: none">■ check the wiring. Comply with the given order of phases.

The current measurement is zero and the accumulated energy increments

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the accumulated energy increments for a displayed current of zero.	<ul style="list-style-type: none">■ the load is low and the current is less than 1.5% of I_n (e.g. no-load transformer).	<ul style="list-style-type: none">■ normal operation.

The frequency measurement is not displayed or is given as dashes

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ no display of frequency measurement,■ otherwise, the current and voltage measurements are correct,■ the power indicated and the power factor are correct.	<ul style="list-style-type: none">■ inversion of VT wiring to Sepam 2000 voltage inputs,■ direction of phase rotation is incorrect,■ the frequency is not measured if voltage $U_{21} < 40\%$,■ the frequency is outside the tolerance range $45 < F < 55$ for 50 Hz $55 < F < 65$ for 60 Hz.	<ul style="list-style-type: none">■ check the wiring. Comply with the given order of phases.

A protection does not trip at the expected set point

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ one or more protections do not trip at the expected set points. 	<ul style="list-style-type: none"> ■ the causes may be same as when the current or voltage measurements are false; microswitches or status parameter set incorrectly, ■ a protection set point is outside the range accepted by Sepam 2000 after a modification of In, Ib, Unp or Uns, ■ the control logic omits the protection (see control logic operation further on), ■ the protection is set to 999. 	<ul style="list-style-type: none"> ■ check the setting of the microswitches on the 3U+Vo and the ECM (or ECA) boards; refer to installation manual, ■ check that the frequency, Unp and Uns settings (status menu, phase VT heading) match the VTs being used; refer to use/commissioning manual, ■ check that the In setting (status menu, CT ratio) matches the rating of the CTs or CSP sensors used. <p>See user commissioning manual;</p> <ul style="list-style-type: none"> ■ using the TSM 2001 pocket terminal, review the list of protections (protections menu) and check that none of them is blinking. If that is the case, reset it. <p>Generally speaking, it is recommended to set all the parameters in the status menu before setting the protections,</p> <ul style="list-style-type: none"> ■ check the control logic.

“connector” message

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ the display unit indicates connector, ■ pressing key A (for example) makes the message disappear momentarily, ■ the green on indicator is on, ■ the red ! indicator is off, ■ the display unit is lit up, ■ the TSM 2001 pocket terminal is working normally. 	<ul style="list-style-type: none"> ■ detection of unplugged connector. 	<ul style="list-style-type: none"> ■ check that all connectors are plugged into rear of device, ■ check that the detection of plugged connectors bridge (marked DPC) is present on terminals 5 and 6 of the 6-pin connectors; terminals 7 and 8 on the 8-pin connectors and terminals 20 and 21 on the 21-pin connectors. <p>N.B. The BNC, power supply and communication connectors are not equipped with the plugged connector detection system.</p>

A logic input generates a fault in cabling outside Sepam

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ the logic input is working normally but it creates interference in the outside circuit (e.g. monitoring of tripping circuit continuity), ■ the green on indicator is on, ■ the red ! indicator is off, ■ the display unit is lit up, ■ the TSM 2001 pocket terminal is working normally. 	<ul style="list-style-type: none"> ■ wiring error on the connector of the related board, ■ the ESB or ESTOR board is faulty. 	<ul style="list-style-type: none"> ■ check wiring, ■ replace the faulty ESB or ESTOR board.

The standard control logic does not operate as expected

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ the standard control logic does not operate as expected, ■ case in which Sepam 2000 is equipped with standard control logic. The standard control logic is recognized by the presence of the CAT label which is read on the TSM 2001 pocket terminal, in the About Sepam menu, program logic heading, ■ the green on indicator is on, ■ the red off indicator is off, ■ the display unit is lit up, ■ the TSM 2001 pocket terminal is working normally. 	<ul style="list-style-type: none"> ■ the control logic time delays are not set correctly, ■ the Kp parameters, set via the pocket terminal, are not set correctly. They mainly define the control logic operating modes according to the type of switchgear, ■ fault in wiring outside Sepam 2000, ■ ESB or ESTOR board faulty. 	<ul style="list-style-type: none"> ■ if Sepam 2000 is equipped with the standard control logic, refer to the use/commissioning manual. Check: <ul style="list-style-type: none"> □ control logic time delay settings, □ Kp parameters (control logic contacts set with the TSM 2001 pocket terminal). ■ control logic with undervoltage release: check the open order input I13 wiring (normally set to 1), ■ generator control logic: check the emergency shutdown input I22 wiring (normally set to 1). <p>With TSM 2005</p> <ul style="list-style-type: none"> ■ use the TSM 2005 to test the ESB or ESTOR logic input/output boards (see TSM 2005 manual, chapter on testing ESB and ESTOR boards). <p>Without TSM 2005</p> <ul style="list-style-type: none"> ■ in case of doubt regarding the operation of a logic input, check that there is voltage on the input, and set it to 1; to do so check the input status (1 or 0) using the TSM 2001 pocket terminal (program logic menu, logic input heading). In the event of a discrepancy, change the faulty board, ■ when in doubt regarding the operation of a relay output, check that the relay is activated when Sepam sets the output to 1; to do so check the input status (1 or 0) using the TSM 2001 pocket terminal (program logic menu, logic input heading). In the event of a discrepancy, change the faulty board.

Control logic does not operate as expected

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> ■ the control logic does not operate as expected, ■ case in which Sepam 2000 is equipped with customized control logic, ■ the green on indicator is on, ■ the red off indicator is off, ■ the display unit is lit up, ■ the TSM 2001 pocket terminal is working normally. 	<ul style="list-style-type: none"> ■ error in the control logic program, ■ time delays or Kp internal bits incorrectly set, ■ defect in cabling outside Sepam 2000, ■ faulty ESB or ESTOR board. 	<ul style="list-style-type: none"> ■ if there is no CAT label, it is essential to obtain the customized control logic program in order to analyze it and detect the source of the fault, ■ when in doubt regarding the operation of logic outputs, refer to the paragraph above.

The red communication indicator stays on

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the red communication indicator is on,■ this indicator (communication watchdog) is located on the back of Sepam 2000, near the communication inlet, on the CE40 power supply board. It is normal for it to light up for a few seconds when the power is switched on. When the device is operating normally, it should be off,■ this indicator may light up even if the remote monitoring and control system is not operating or is not connected.	<ul style="list-style-type: none">■ Sepam 2000 communication coupler blockage,■ communication coupler failure.	<ul style="list-style-type: none">■ change the communication kit (2 boards).

The green Jbus indicator does not blink

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the green communication indicator does not blink,■ the green indicator is located on the back of Sepam 2000, near the communication inlet, on the CE40 power supply board. <p>If the remote monitoring and control system is connected, the indicator should blink to indicate that there is electrical activity in the line. If it does not blink, it means that the Sepam communication input is electrically deactivated,</p> <ul style="list-style-type: none">■ the red coupler indicator is off,■ the rest of Sepam 2000 is working normally.	<ul style="list-style-type: none">■ the remote monitoring and control system is not in service or is not sending messages through the line,■ the line is cut,■ the L+ and L- network wires are reversed,■ polarization or impedance matching of the RS 485 line are incorrect.	<ul style="list-style-type: none">■ refer to Jbus communication documents and check the following:<ul style="list-style-type: none">□ check the direction of line cabling to terminals 1 to 4 of all the CCA609 units in the network,□ check that the line has been polarized. This should be at one point only.□ check that line impedance has been matched at both ends. <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 and a PC to test the communication system (refer to communication kit manual).

The Jbus communication CPT2 diagnosis counter increments

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the CPT2 counter increments,■ the counter is accessed via the TSM 2001 pocket terminal, status menu, communication heading. It counts the errors in the communication frames. When the device is operating normally, it should not increment,■ the green coupler indicator is blinking (so the line is not cut). The red coupler indicator is off,■ the rest of Sepam 2000 is working normally.	<ul style="list-style-type: none">■ one of the communication parameters has not been set correctly: rate or parity,■ impedance matching and/or communication network polarization are incorrect,■ there is noise on the line <p>N.B. The frames which contain errors are detected by Sepam 2000 which does not process them. Overall Sepam/remote monitoring and control system operation is not generally affected and the number of frames with errors remains limited (a few).</p>	<ul style="list-style-type: none">■ use the TSM 2001 pocket terminal to set the communication rate and parity in accordance with the remote monitoring and control system (status menu, communication heading),■ if this is not sufficient, check polarization and line impedance matching (see Jbus communication manual),■ check that the CCA 609 clamps are tightened onto the cable shielding and not onto the insulating material. The clamps earth the cable shielding,■ check the earthing of the CCA 609 (green-yellow wire),■ check that the CCA 602 cable connecting Sepam and the CCA 609 unit is plugged in and locked at both ends. It contributes to shielding continuity,■ check that the communication network does not cross through zones with high levels of electrical pollution. <p>With TSM 2005</p> <ul style="list-style-type: none">■ use the TSM 2005 and a PC to test the communication system (refer to communication KIT manual).

The JBUS communication CPT9 diagnosis counter does not increment

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the CPT9 counter does not increment,■ the counter is accessed via the TSM 2001 pocket terminal, status menu, communication heading. It counts the errors in the communication frames. When the device is operating normally, it should not increment,■ the green coupler indicator is blinking (so the line is not cut). The red coupler indicator is off,■ the rest of Sepam 2000 is working normally.	<ul style="list-style-type: none">■ the remote monitoring and control system never addresses this Sepam,■ one of the communication parameters is not set correctly: rate, slave number or parity,■ communication network impedance matching or polarization is incorrect.	<ul style="list-style-type: none">■ use the TSM 2001 pocket terminal to set the communication speed, slave number and parity in accordance with the remote monitoring and control system (status menu, communication heading),■ if this is not sufficient, check polarization and impedance matching (see Jbus communication manual).

Sepam 2000 appendix

Table of rear compartment board positions

■ The table below indicates the position of the boards in the rear compartment according to the different Sepam 2000 models.

■ If the board positions are not complied with, Sepam 2000 will not start up and will display **maintenance** or **cartridge**.

slot	8	7	6	5	4	3	2	1
S26 or S25 models								
LS			ESTOR ⁽²⁾	ESTOR	ESB	SONDE	ECM ⁽¹⁾	CE40
LT			ESTOR ⁽²⁾⁽⁴⁾	ESTOR ⁽⁴⁾	ESB	3U+Vo	ECM ⁽¹⁾	CE40
LX			ESTOR ⁽²⁾⁽⁴⁾	ESTOR ⁽⁴⁾	ESB	nothing	ECM ⁽¹⁾	CE40
XT			ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	nothing	CE40
S36 or S35 models								
KR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	nothing	ECM	ECM ⁽¹⁾	CE40
KZ	SONDE	ESTOR ⁽²⁾	ESTOR	ESB	nothing	ECM	ECM ⁽¹⁾	CE40
YR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	nothing	nothing	ECM ⁽¹⁾	CE40
ZR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	nothing	SONDE	ECM ⁽¹⁾	CE40
LR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	ECM	ECM ⁽¹⁾	CE40
LS	SONDE	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	ECM	ECM ⁽¹⁾	CE40
SR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	SONDE	ECM ⁽¹⁾	CE40
SS	SONDE	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	SONDE	ECM ⁽¹⁾	CE40
XR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	nothing	ECM ⁽¹⁾	CE40
TR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	3U+Vo	ECM ⁽¹⁾	CE40
CR	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	nothing	ECMD	ECMD	CE40
CC ⁽⁵⁾	ESTOR ⁽³⁾	ESTOR ⁽²⁾	ESTOR	ESB	ECMD	ECMD	ECMD	CE40
TS ⁽⁵⁾	SONDE	ESTOR ⁽²⁾	ESTOR	ESB	3U+Vo	3U+Vo	ECM ⁽¹⁾	CE40

Notes

⁽¹⁾ or ECA for CSP sensor,

⁽²⁾ the ESTOR 2 board may be installed, depending on the application,

⁽³⁾ option for the ESTOR board,

⁽⁴⁾ For SX1 and SX2 applications the ESTOR boards are not installed in Sepam,

⁽⁵⁾ available with S36 only.

Functions of rear compartment boards

■ CE40

Power supply: 3 versions available: 24/30 VDC, 48/127 VDC and 220/250 VDC.

■ INT RS 485 :

Communication interface. It is located behind the metal plate on the power supply board.

■ ECM

Current inputs for 1 A or 5 A sensor and CSH core balance CT input for residual current measurement. Sepam TC type.

■ ECA

current inputs for CSP sensor or CSH core balance CT input for residual current measurement. This board is installed in place of the ECM board for Sepam 2000 CS type.

■ **3U+Vo**: voltage inputs and residual voltage input,

■ **SONDE**: 6 PT100 RTD inputs,

■ **ESB**: 2 logic inputs, 2 output relays and watchdog relay
3 versions available: 24/30 VDC, 48/127 VDC and 220/250 VDC,

■ **ESTOR**: 8 logic inputs and 4 output relays 3 versions available: 24/30 VDC, 48/127 VDC and 220/250 VDC.

Sepam 1000 diagnosis guide

All indicators off

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ all the indicators and the display unit are off.	<ul style="list-style-type: none">■ the Sepam 1000 is not being supplied with power.	<ul style="list-style-type: none">■ check the voltage on the power supply connector,■ if the fault persists, change the Sepam 1000 AS' power supply board. The AS' board is fitted with an internal fuse; never replace it (since other power supply components are damaged when the fuse blows).

Everything off except for green and red indicators

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the green on indicator is on,■ the red ! indicator is on,■ the trip indicator and display unit are off,■ the watchdog has dropped out.	<ul style="list-style-type: none">■ the self-tests have detected an internal fault,■ power supply board fault.	<ul style="list-style-type: none">■ change the Sepam AS' power supply board,■ if the fault persists, replace the Sepam 1000.

display of the “check settings” message

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the display unit shows the message: check settings,■ the values of some parameters are blinking,■ the protections are working normally.	<ul style="list-style-type: none">■ Sepam 1000 has detected a parameter setting faults (outside range, incompatible settings, set point modified after a change of In, etc.).	<ul style="list-style-type: none">■ switch to parameter setting mode and change the settings of all the parameters which are blinking on the display unit.


The -, + and enter keys are disabled

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the -, + and enter keys are disabled.	<ul style="list-style-type: none">■ Sepam is not in parameter setting mode.	<ul style="list-style-type: none">■ switch to parameter setting mode by pressing for a second on the P key on the back of Sepam.


Display of the “fault” message

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ internal fault.	<ul style="list-style-type: none">■ internal fault.	<ul style="list-style-type: none">■ replace Sepam.


The current measurements are false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the difference between the expected measurement and the measurement indicated by Sepam 1000 may be between 10% and 500%,■ the green on indicator is on,■ the red  indicator is off,■ the display unit is working.	<ul style="list-style-type: none">■ the microswitches on the back of the EM (or EA) board are not set correctly,■ one of the parameters in the status loop is not set correctly.	<ul style="list-style-type: none">■ check the setting of the microswitches on the EM (or EA) board;■ refer to installation manual,■ check that the In setting (status loop) matches the rating of the CTs or CSP sensors being used; refer to use/commissioning manual,■ check that the network frequency has been selected correctly (50 or 60 Hz, status loop).

One of the phase current measurements is zero

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ a measurement indicates a value of zero or close to zero,■ the 2 other phase current measurements are working normally,■ the green on indicator is on,■ the red  indicator is off,■ the display unit is working.	<ul style="list-style-type: none">■ there are only 2 CTs in the cubicle,■ one CT is not wired,■ the EM (or EA) current input board is faulty.	<ul style="list-style-type: none">■ Sepam connected to a 1A/5A CT: ensure that there is current in the CT secondary circuit which reaches the CCA 660 or CCA 650 connector,■ replace the EM board,■ Sepam connected to a CSP sensor: momentarily reverse the connections (BNC connector) on the EA board: if the fault disappears, the problem is an external one; if the fault persists, replace the EA board.

The voltage measurements are false

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the difference between the expected measurement and the measurement indicated by Sepam 1000 may be between 10% and 500%,■ the protections do not trip at the expected setting,■ the green on indicator is on,■ the red  indicator is off,■ the display unit is working.	<ul style="list-style-type: none">■ the microswitches on the back of the ET board are not set correctly,■ one of the parameters in the status loop is not set correctly.	<ul style="list-style-type: none">■ check the setting of the microswitches on the ET board; refer to installation manual,■ check that the Unp and Uns settings (status loop) match the VTs being used; refer to use/commissioning manual,■ check that the network frequency has been selected correctly (50 or 60 Hz, status loop).

The U32 and U13 phase voltage measurements do not appear

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the U32 and U13 measurements are missing,■ the U21 voltage measurement is correct.	<ul style="list-style-type: none">■ the VT's parameter in the status loop is set to U21, in which case Sepam is unaware of the value of the other voltage measurements.	<ul style="list-style-type: none">■ check the VT's parameter (status loop). Set it to U21U32.


A voltage measurement channel indicates zero

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ one of the phase-to-phase voltage measurements indicates a value of zero or close to zero,■ the green on indicator is on,■ the red ↘ indicator is off,■ the display unit is working.	<ul style="list-style-type: none">■ there are only one or two VTs in the cubicle or not all the VTs are cabled,■ the ET voltage input board is faulty.	<ul style="list-style-type: none">■ ensure that the VT secondaries are wired to Sepam 1000,■ replace the ET board.

A protection does not trip at the expected set point

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> one or more protections do not trip at the expected set points. 	<ul style="list-style-type: none"> the causes may be same as when the current or voltage measurements are false; microswitches or status parameter set incorrectly, a protection set point is outside the range accepted by Sepam 1000 after a modification of In, Ib, Unp or Uns, case of residual current protection: core balance CT connection error (2 A , 30 A rating or CT). 	<ul style="list-style-type: none"> check the setting of the microswitches on the ET and the EM (or EA) boards; refer to installation manual, check that the Unp and Uns settings (status loop) match the VTs being used, check that the In setting (status loop) matches the rating of the CTs or CSP sensors being used; refer to use/commissioning manual, check that the network frequency setting has been selected correctly (50 or 60 Hz, status loop), review the list of parameters and check that none of them are blinking. If that is the case, set the parameters again. Generally speaking, it is recommended to set all the parameters in the status menu before setting the protections, residual current: check the core balance CT connection. Check that the core balance CT is a CSH.

A protection does not trip

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none"> a protection does not trip. 	<ul style="list-style-type: none"> inhibition of the protection by a 999 type setting, incorrect addressing of the protection output, residual current protection: microswitches not set correctly. 	<ul style="list-style-type: none"> check the set points, check the output addressing. Make sure in particular that the ES1 board is included if relays AUX1, AUX3 and AUX4 are supposed to be used, residual current protection: if the sum of the phase currents is used, check that the setting of the SW1 microswitches on the EM or EA board is as follows:  SW1.

Sepam 1000 diagnosis guide (cont'd)

Acknowledgement is impossible

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the reset key is disabled, acknowledgement is impossible.	<ul style="list-style-type: none">■ the fault at the origin of tripping is still present.	<ul style="list-style-type: none">■ check for the presence of the fault (current, voltage, frequency):<ul style="list-style-type: none">□ think of undervoltage protections which trip when there is zero voltage,□ also remember the thermal overload and starts per hour protections which remain in tripped status even when there is no current. In such cases, wait for the conditions which caused tripping to disappear.

Frequency measurement and functions do not work

Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the frequency measurement is displaying hyphens,■ the frequency protections do not trip.	<ul style="list-style-type: none">■ incorrect wiring,■ U21 or forward voltage too low.	<ul style="list-style-type: none">■ check the wiring (direction of phase rotation),■ check voltage amplitude: U21 voltage should be greater than 30% of Unp and forward voltage should be greater than 20% of Vnp.

The logic input does not work



Symptoms	Possible causes	Remedies
<ul style="list-style-type: none">■ the logic input remains at zero, whether it is supplied with power or not,■ the green on indicator is on,■ the red  indicator is off,■ the display unit is working.	<ul style="list-style-type: none">■ wiring error on the ES1 board connector,■ ES1 board microswitch setting error, in the case of use with 24/30 VDC.	<ul style="list-style-type: none">■ check the wiring and voltage on the input terminals,■ if the input is used with 24/30 VDC, the microswitches on the ES1 board must be set as follows:  SW1,■ if the fault persists, replace the ES1 board.

Table of rear compartment board positions

- the table below indicates the position of the boards in the rear compartment according to the different Sepam 1000 models.
- failure to use the correct board positions is liable to damage Sepam 1000.

slot	3	2	1	0
S05 model				
LX 1 A / 5 A CT sensor		EM	AS'	ES1 (option)
LX CSP sensor		EA	AS'	ES1 (option)
TX		ET	AS'	ES1 (option)

Functions of rear compartment boards

- **EM**: current inputs for 1 A or 5 A sensor and CSH core balance CT input for residual current measurement,
- **EA**: current inputs for CSP sensor and CSH core balance CT input for residual current measurement,
- **ET**: voltage inputs and residual voltage input,
- **AS'**: power supply and 2 outputs 4 versions available:
 - 24/30 VDC,
 - 48/125 VDC,
 - 220/250 VDC and 100/127 VAC,
 - 220/240 VAC,
- **ES1**: 1 logic input and 3 output relays and watchdog relays single multi-voltage version available.

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