CHAPTER 10

10 TROUBLESHOOTING & MAINTENANCE

10.1 What can go Wrong?

Please note: According to Mr. Murphy's law, anything that can go wrong will do so. ;-)

10.2 Local Diagnostic Tools

Surveyor: For more information on the Surveyor functions contained in the GC application, please refer to chapters 5.8 and 5.5.4.5

10.3 DSP Rack

The D950 Core system consists of:
- A backplane (1.950.650.00)
- A ”MEMNET” communication card (1.950.620.20) used to communicate with the PC.
- One or more ”MADI” interface cards (1.950.615.21) to interface MADI devices.
- One or more ”PEAES” cards (1.950.605.20) to interface AES/EBU I/Os and for audio processing.
- One or more ”PE” cards (1.950.610.20) to do audio processing without AES/EBU I/Os.

The slightly more expensive PEAES card can replace the PE card in all respects.
Each card has several LEDs on its front panel. Some of the LEDs are the same on all the cards, some have special meanings for each card.

10.3.1 Configuration Meets Core – FailSafe and Hot Plug-In Concepts

Distributing Configurations is the art to combine hardware (Core) and software (Configuration). A Configuration is divided into Tasks. These Tasks represent the DSP code used by one Card.
The system will distribute the Tasks to the Core Cards:
- At startup;
- When changing the Session Configuration;
- In case of a Card failure.

The Core has four different types of cards. Therefore we also have four different types of Tasks:

Card Type	Description
MEMNET	handles the communication between the PC and the Core
PEAES	has 6 SHARC DSPs and 8 AES/EBU interfaces
PE	has 6 SHARC DSPs (no audio interfaces)
MADI	has 2 SHARC DSPs and 2 MADI interfaces

MemNet Task The core has only one MemNet Card. The MemNet Task is added automatically to the Configuration. It cannot be configured.

PEAES Tasks PEAES Tasks consist of a DSP processing part and an AES/EBU interfacing part. PEAES Tasks can run on both PE and PEAES cards. If a PEAES Task is distributed to a PE card, all the DSP functions will work except the AES interfacing. Each PEAES Task has a unique Card number which can be set with the Session Configuration Tool if desired (otherwise, it starts with 00).
The PEAES Task will be distributed to the PEAES Card with the corresponding Card number. In case the Core offers no PEAES card with that number., the Task will be distributed to any available PEAES or PE card. If the intended PAES Card is added to the Core later, the task will be switched to this card automatically.

PE Tasks PE Tasks consist only of a DSP processing part. PE Tasks can run on both PE and PEAES cards. The Card number of all PE Tasks is internally set to zero (which has no effect). If there is no PE Card available, the PE Task will be distributed to the next available PEAES Card.

MADI Tasks MADI tasks can only run on MADI Cards. The Card number of the Task must correspond to the Card number of the Card. Each MADI Task has a unique Card number, which can be set with the Session Configuration Tool if desired (otherwise, it starts with 00).

Fail Safe

The Fail Safe principle allows automatic switchover of Tasks in case of a Card failure. In other words, if a Card fails, another Card can take over under the following conditions:
If a card hosting a task fails, the task will be redistributed applying the rules above;
There must be a free Card in the system, conforming to the rules above.

Examples: The core houses 7 PEAES Cards. The currently loaded Session Configuration requires only 3 PEAES Tasks and 3 PE Tasks, leaving one PEAES Card idle. We usually say there is one redundant card. There are 24 AES/EBU inputs and 24 AES/EBU Outputs configured.

Case 1: The sixth PEAES Card with a PE Task fails.
The seventh PEAES Card automatically takes over the full PE Task;
All DSP Channel functions are working.

Þ All System functions restored!

Case 2: The second PEAES Card with the Card number 01 fails.
The seventh PEAES Card automatically takes over the full PEAES Task;
All DSP Channel functions are working;
The 8 AES/EBU Inputs and Outputs of the original card (connected to the slot where Card 01 is) do not work.

Þ System functions partially restored!

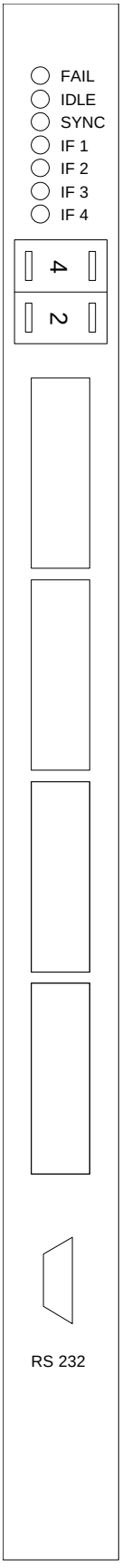
Hot Plug-In

For case 2 above, several remedies can be taken:
If there is a spare AES/EBU Card on stock, the faulty PEAES Card can be hot-unplugged and replaced by the new one, which can be hot-plugged. To restore the original functionality after a card change, the new one must have the correct Card number (01 according to the example above). The spare card will take over the original PEAES Task, restoring the full system functionality.
Simply plugging the AES/EBU cables into the right connectors corresponding to the slot where the seventh card is will restore full system functionality.
In all cases above, all the other Cards function properly, so that a Card failure has only very limited consequences.

Another solution is to use the seventh card as a spare AES/EBU Card. In this case, because the seventh card currently is in operation, the core must be switched off before unplugging the seventh card. Now you can power on the DSP rack again. The faulty PEAES Card can be unplugged and replaced by the seventh card. To restore the original functionality after a card change, the new one must have the correct Card number (01 according to the example above). The spare card will take over the original PEAES Task, restoring the full system functionality.

10.3.2 Looking at the LEDs

10.3.2.1 LEDs of the MEMNET card, 1st Generation 1.950.615.20



FAIL The red FAIL LED on a working card normally should be off. It is on whenever the card fails or it is reset either manually or by the system.

IDLE The green IDLE LED has a special meaning on the MEMNET card. Its flashing rate depends on how much communication is going on. The busier the system communication is, the higher is the flashing rate. No flashing could mean that the PC system is not working, or that the MEMNET flash EPROM is being erased.

SYNC The green SYNC LED turns on whenever a valid AES/EBU SYNC input signal is fed to the MEMNET SYNC input, and the system has locked to the external clock. When the LED is off the core operates from its internal 48 kHz clock source.

IF 1...4 Only the first of the four green IF LEDs is used on a MEMNET card. When it is on, the optical-fibre link to the PC is valid. When it is off, either the core or the PC is shut down, or the optical link is broken. The IF 2...4 LEDs are not used.

Card number The card number has no real meaning on a MEMNET card during normal operation and should simply be set to a non-zero value. *When the card is reset while this number is zero, the flash EPROM memory will be erased. This can be useful when the core system must be forced to reload a configuration for whatever reason.*

Connectors The first interface (SC connector) is used to connect the core to the Control PC. When the connection is done properly, the IF1 LED will be green.
The three remaining SC connectors are not used.

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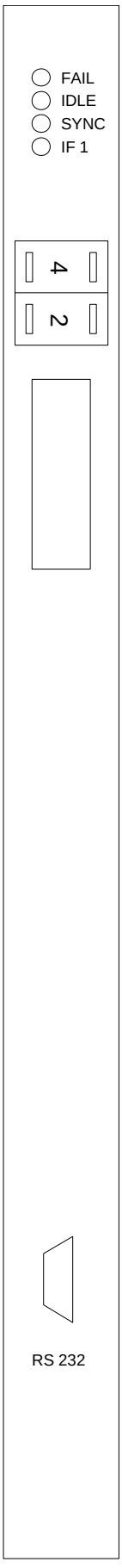
10.3.2.2 LEDs of the MEMNET card, 2nd Generation 1.950.620.20



FAIL The red FAIL LED on a working card normally should be off. It is on whenever the card fails or it is reset either manually or by the system.

IDLE The green IDLE LED has a special meaning on the MEMNET card. Its flashing rate depends on how much communication is going on. The busier the system communication is, the higher is the flashing rate. No flashing could mean that the PC system is not working, or that the MEMNET flash EPROM is being erased.

SYNC The green SYNC LED turns on whenever a valid AES/EBU SYNC input signal is fed to the MEMNET SYNC input, and the system has locked to the external clock. When the LED is off the core operates from its internal 48 kHz clock source.

IF 1 When the IF 1 LED is on, the optical-fibre link to the PC is valid. When it is off, either the core or the PC is shut down, or the optical link is broken.

Card number The card number has no real meaning on a MEMNET card during normal operation and should simply be set to a non-zero value. *When the card is reset while this number is zero, the flash EPROM memory will be erased. This can be useful when the core system must be forced to reload a configuration for whatever reason.*

Connectors The interface (SC connector) is used to connect the core to the Control PC. When the connection is done properly, the IF1 LED will be green.

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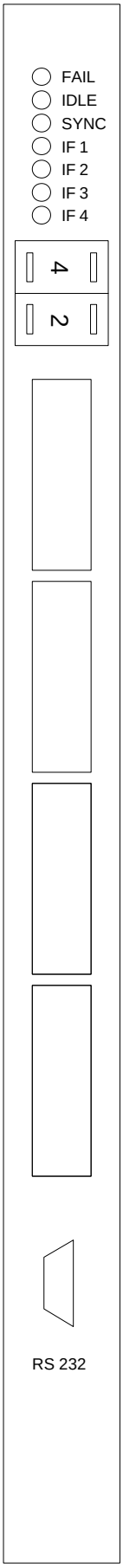
10.3.2.3 LEDs of the MADI Card 1.950.615.21



FAIL The red FAIL LED on a working card normally should be off. It is on whenever the card fails or it is reset either manually or by the system.

IDLE The green IDLE LED is on whenever a card is not used for the current configuration. It is off when the card is processing audio.

Important: *Never remove a card with both the IDLE and the FAIL LEDs off. This card is actively used to process audio data; the result of removing the card is unpredictable.*

SYNC The green SYNC LED has no meaning on a MADI card and is always off.

IF 1...4 The four IF LEDs are on whenever the corresponding interface input signal below is valid. When it is off, either the transmitting device is off, TX and RX are mismatched, or the cable is broken.

Card number The card number corresponds to the MADI interface in your configuration. Be careful to match this number to the corresponding interface number. The numbers start with “00” on the first card for the first two MADI interfaces and are continued as “01”, “02”, and so on for subsequent groups of two MADI interfaces each. A sufficient number of MADI cards must be present in the DSP rack, and they must be numbered properly.

Example: If the current Session Configuration requires four MADI interfaces, there must be two MADI cards numbered “00” and “01” in the DSP rack, in order for the system to work properly.

Connectors This first interface (SC connector) is used to connect the *main MADI A* signal to the core. When the connection is done properly, the *IF1 LED* will light green. TX1 is the main output of MADI A, RX1 is the main input of MADI A.
The second interface (SC connector) is used to connect the *main MADI B* signal to the core. When the connection is done properly, the *IF3 LED* will light green. TX2 is the main output of MADI B, RX2 is the main input of MADI B.
The third/fourth interface (SC connector) are used to connect a *redundant MADI A/MADI B* signal to the core. When the connection is done properly, the *IF2/IF4 LED* will light green. TX3/4 is a through output of the active input processed in the system. The input can be main MADI A/B or redundant MADI A/B, depending on which connection is valid. If both connections are valid, the first connection to become valid will be used. RX3/4 is used as an extra redundant MADI A/B input. When the main MADI A/B input is not valid, the system automatically switches to this input when a valid signal is available. Switching is done within one audio sample. The lost audio sample is zeroed. When the main MADI A/B input becomes valid again, the system will not switch back until the redundant MADI A/B connection fails.

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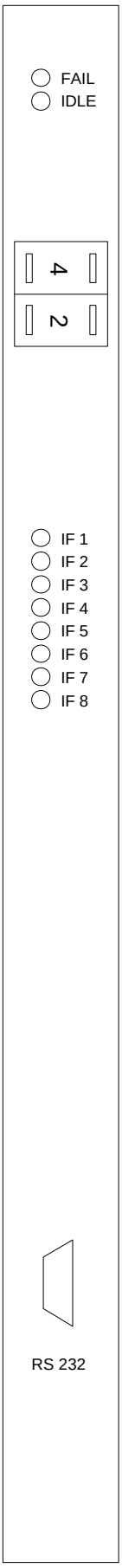
10.3.2.4 LEDs of the PEAES Card 1.950.605.20



FAIL The red FAIL LED on a working card normally should be off. It is on whenever the card fails or it is reset either manually or by the system.

IDLE The green IDLE LED is on whenever a card is not used for the current configuration. It is off when the card is processing. IDLE should be on for redundant and not used cards. It should be off for used cards.

Important: *Never remove a card with both the IDLE and the FAIL LEDs off. This card is actively used to process audio data; the result of removing the card is unpredictable.*

Card number The card number corresponds to the AES/EBU interface number in your configuration. Be careful to match this number to the corresponding interface number. The numbers start with “00” for the first eight AES/EBU interfaces (D 1 to D 8 in the patch) and are continued as “01”, “02”, and so on for subsequent groups of eight AES/EBU interfaces each. A sufficient number of PEAES cards must be present in the DSP rack, and they must be numbered properly.
The card must be plugged into the slot where the AES/EBU I/O connections are done to the AES/EBU connectors on the rear side of the DSP frame.

Example: If the current Session Configuration requires 32 AES/EBU interfaces, there must be at least four PEAES cards numbered “00”, “01”, “02”, and “03” in the DSP rack, in order for the system to work properly.

IF1...8 These green interface LEDs light whenever a valid AES/EBU signal is connected to the card. Whenever these LEDs are off the corresponding AES/EBU channels are muted.

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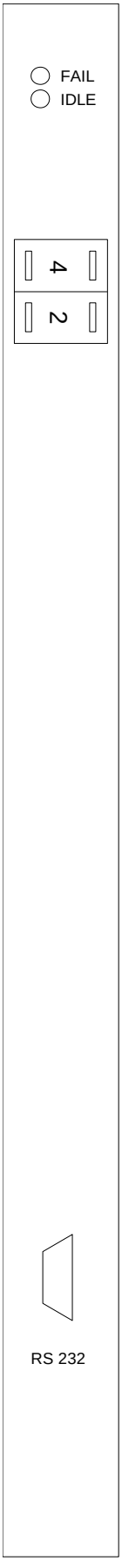
10.3.2.5 LEDs of the PE Card 1.950.610.20



FAIL The red FAIL LED on a working card normally should be off. It is on whenever the card fails or it is reset either manually or by the system.

IDLE The green IDLE LED is on whenever a card is not used for the current configuration. It is off when the card is processing. IDLE should be on for redundant and not used cards. It should be off for used cards.

Important: *Never remove a card with both the IDLE and the FAIL LEDs off. This card is actively used to process audio data; the result of removing the card is unpredictable.*

Card number The card number has no real meaning for PE cards. Make sure that no card numbers which are configured for PEAES cards are used.

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10.4 Regular Maintenance

10.4.1 Air Filters

10.4.1.1 Removing and Installing the Supply Unit (1.950.601.00) in the Rack

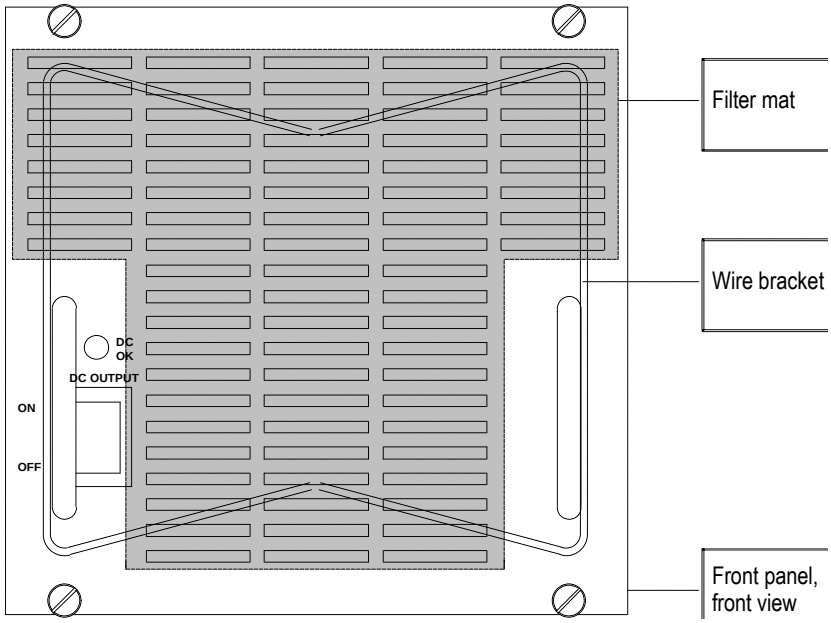
Removing:

- Before you start set the DC OUTPUT switch to OFF, also switch the mains supply off preferably.
- Loosen the four knurled screws at the front panel; pull out the supply unit towards the front.

Installation:

- Carefully insert the supply unit into the rack.
- *Never apply sheer force* if the connector contacts do not find their way easily; check the path to the female contact points inside the rack, it might be blocked by a foreign object.
- Retighten the four knurled screws at the front panel.

10.4.1.2 Changing the Air Filter Mat



- Remove the supply unit as described above.
- Place the supply unit onto your working surface in a way that the front panel is directed towards you.
- The wire bracket which fixes the filter mat is hooked into four recesses; first unhook at the upper right, then at the upper left.
- Now the filter mat can be pulled out in upward direction.
- For inserting the new filter mat tilt the supply unit to the left. Carefully lift the lower part of the wire bracket by a small amount with an appropriate tool (e.g. screwdriver); slide the new filter mat in under the bracket. Make sure that all the air vents are covered by the filter mat and readjust it, if necessary.
- Bring the supply unit in an upright position again and hook the wire bracket first at the left, then at the right-hand side.
- Recheck that all the vents are covered by the filter mat.
- Reinstall the supply unit as described above.