

7. TROUBLE SHOOTING

In the following indications are given on possible corrective actions in relation to the error message generated or other abnormal situations.

7.1 Handling Error Messages

A Error 1 – Microprocessor Fault

An error was detected by the microprocessor due to internal fault.
The Microprocessor Control Board has to be replaced.

B Error 2 – EPROM Error

An error was detected by the microprocessor.
The Microprocessor Control Board has to be replaced

C Error 4 – RAM Error

An error was detected by the microprocessor.
The Control Unit board has to be replaced

D Error 12 – Incongruent TOMO/CEPH switches status

The error is detected during exposure.

The status of TOMO/CEPH switches did change during exposure (in PAN CEPH models).

Check the positioning switch on tube-head rotation and those set by the collimators.

Verify continuity of the jumper T-GND on the power switching unit in PAN SOLO systems.

E Error 14 - Failure of high voltage

This message is generated when the inverter current or tube voltage are increasing abnormally.

Failure on the Power Switching Unit or in the tube-head itself is possible.
Replace the Power Switching Unit board first and the tube-head in case.

F Error 16 - Heating current out of permitted range during irradiation

Refer to Error 17.

G Error 17 - Heating current out of permitted range before starting irradiation

The value of filament current in the filament converter (left side of the Power Switching unit) is too high or too low.

This error can be generated by a short circuit of the tube filament, by the open circuit in the filament circuit or by a problem in the filament converter. The value of the filament heating current is measured as a voltage across the resistor R209, with information passed to the control unit.

Check for proper connection of all cables to the Power Switching unit, especially the filament supply cables ZH1 and ZH2 on the connecting block XT202.

Check for about 18 VDC at test point D10 on the Power Switching unit. In case the value is correct, check for continuity of the R209 resistor (nominal value 1 Ohm) and for the voltage drop on it.

If the resistor value is much higher than 1 Ohm, the resistor is interrupted and the Power Switching unit has to be replaced.

H Error 18 – Anode current failure

No or low anode current.

This error can be caused

- by interruption of High Voltage power supply (right side of the Power Switching Unit board)
- or by interruption of the filament power supply (left side of the Power Switching Unit board)
- or by interruption of the driving circuits (in the regulation board)
- or by fault in the tube-head (input transformer or multiplying circuits).

Check the supplying circuit in the bushing (multi-pole cable) and the flat cable between the regulation and power switching boards.

On the Power Supply unit check the switch SA 301 (must be ON), fuses FU 304 and FU 305. If they are OK, switch exposure and check the driving signals for HV regulator and inverter (points 1, 2, 6 and 7 on the Regulation Unit) and the HV inverter supplying voltage (between points D3 and S5 in the Power Switching Unit) – should be in range from 50 to 100 volts (depending on kV and mA setting). Then measure the primary circuit of HV transformer.

If all is correct, the circuit between the secondary of HV transformer and tube is broken.

Depending on the location of the fault, consider to replace the Power Switching Unit board, the Regulation Unit board, the connecting cables or the tube-head.

This error can be also activated by sparking in the tube, when a very short over-current signal switches off the HV regulator only, but is not trapped by the Control Unit in order to activate error 14.

In this case try to perform the tube seasoning (de-gassing by a number of exposures at low kV) or replace the tube-head if necessary.

I Error 19 - Exposure hand-switch released during irradiation

The film is damaged (partially exposed). Refer to Error 21.

J Error 20 - Exposure hand-switch released during preparation phase

Exposure terminated. The film was not damaged and can be exposed. Refer to Error 21.

K Error 21 Exposure hand-switch released after irradiation before carriage stop

This is usually a consequence of the “dead man functionality” which allows the operator to terminate irradiation any time by releasing the exposure hand-switch.

Error 19 is generated by interruption during movement with radiation.

Error 20 is generated by interruption during movement but without radiation (test mode or programs with delayed switching of radiation).

Error 21 is generated by interruption after the radiation phase, but before the carriage has come to a complete stop. Irradiation was already terminated and re-take is not needed, unless in the case of quitting the exposure in the middle of the TMJ procedure.

In case the error appeared without specific request by the operator a malfunction could be present in the cable of the hand-switch, in its connector or in the Control Unit itself.

Fix or replace accordingly.

L Error 23- Steps of the rotating carriage do not match in first half of the track

Refer to Error 28.

M Error 25 – Steps of the cassette carriage do not match in first half of the track (film systems)

Refer to Error 30.

N Error 28 - Steps of the rotating carriage do not match at the end of the track

The number of motor steps exceeds the tolerances permitted in service program number 8.

Mechanical resistance inhibits smooth movement and can cause the motor to skip some steps. Check the movement with service program number 8.

A possible reason of these errors is the damage of the gear of the motor for carriage rotation or a misalignment or defect of the position sensors. Also check that the housing of the multi-pole cable is not interfering with the body of the carriage during rotation.

Fix the mechanical defects found and replace the electrical items faulty.

O Error 30 – Steps of the cassette carriage do not match at the end of the track (film systems)

The Control Unit is processing the sequence of signals coming from the motion sensors. If the count of steps exceeds the tolerances permitted in service program number 9, these errors are detected.

Mechanical resistance inhibits smooth movement. Check the movement in service program number 9.

A possible reason of these errors is the damage of the gear of the motor for motion of the cassette carriage or a misalignment or defect of the position sensors.

Fix the mechanical defects found and replace the electrical items faulty

P Error 31 - The rotating carriage does not move

The position sensor doesn't detect movement. Find and remove possible mechanical inhibition of movement.

Activate service program number 7 and drive the rotation motor in step-by-step mode. Replace motor if defective.

Alternatively activate service program number 6 and check if the sensors are detecting movement. Replace sensors if defective.

The Control Unit handling signals is also involved. In case replace it.

Q Error 32 – The cassette carriage doesn't move

The position sensor doesn't detect movement. Find and remove possible mechanical inhibition of movement.

Activate service program number 7 and drive the cassette motor in step-by-step mode. Replace motor if defective.

Alternatively activate service program number 6 and check if the sensors are detecting movement. Replace sensors if defective.

The Control Unit handling signals is also involved. Replace it in case.

R Error 33 - Heating current flows during "off" status

This error is detected if the voltage on checkpoint 10 on the Regulation Unit exceeds 0.5 V.

Check signal on the point S11 (in Power Switching Unit).

- If voltage is present, there is a fault in the filament regulator or inverter. Replace the Power Switching Unit.
- If not, there is a fault in the ADC input of CPU. Replace the Control Unit.

S Error 34 - Anode current flows during "OFF" status

This error is detected if the voltage on checkpoint 8 on the Regulation Unit is in L-level (low level).

Disconnect the flat cable from the Control Unit and switch power on.

- If checkpoint 8 is at H-level (high level), the Control Unit is faulty.
- If checkpoint 8 is at L-level, a fault is in the Regulation Unit.

T Error 60 – I²C Error

An error was detected at power-on self-test due to a bus fault.

The Control Unit board has to be replaced.

U Error 63 - Tube-Head temperature exceeding the permitted value

The Control Unit generates this error if the resistance of the thermistor drops below the value stored with service test 14.

- If the tube-head is actually hot (can be perceived also from outside the covers) wait some time for the tube-head to cool down.
- In case the tube-head is not at high temperature a defect could be in the Control Unit, which is processing the feedback signal from the temperature sensor in the tube-head. Replace the Control Unit board.

V Error 64 - Failure of 15 voltage supply

The Control Unit generates this error if the difference between the actual supply voltage and the value saved in service test 16 exceeds 10%.

Check the voltage value at the 15 V test point on the Power Supply board.

If the value is not correct replace the Power Supply board; alternatively activate service program number 16 and store the actual value in memory.

Eventually replace the Control Unit, which is also involved.

W Error 65 - Failure of 24 voltage supply or under-voltage of the supply line

The Control Unit generates this error if the difference between the actual supply voltage and the value saved in service test 15 exceeds 10%.

The error can be caused by 24 V stabiliser malfunction or low value of mains voltage (below permitted range).

Measure the mains voltage and the values on test points on Power Supply board relevant to at 24 V and 38 V.

If the values are not correct replace the Power Supply board; alternatively activate service program number 15 and store the actual value in memory.

Eventually replace the Control Unit, which is also involved.

X Error 66 - Failure of 5 voltage supply

The Control Unit generates this error if the difference between the actual supply voltage and the value saved in service test 17 exceeds 5%.

Check the voltage value at 5 V test point on the Regulation Unit.

Replace the Regulation Unit if the 5V stabiliser is defective.

Alternatively activate service program number 17 and store the actual value in memory.

Eventually replace the Control Unit, which is also involved.

7.2 Zeroes on Display

When zeroes appear on the display out of the TEST mode it could be related to a missing jumper between T and GND on the signal side of the connecting block of the Power Switching Unit board in PAN SOLO systems or the lack of the panoramic collimator in PAN CEPH systems.

Fix the jumper or replace the Control Unit board.