

# Maintenance and Trouble-Shooting

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In general, the LD90 system will require very little maintenance. However, the following is a list of routine tests that should be carried out as often as local regulations require, but at least annually. RCD's should be tested monthly.

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## Routine Tests

1. Load wiring should be tested in accordance with local regulations.
2. Check all terminals for tightness.
3. Ensure vents are always kept clear and not obstructed.
4. Test optional RCD's.

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## Fault finding

Fault finding is relatively easy with LD90 systems because the racks include diagnostic software (tests are run each time the rack is powered up) and include status LED's and the LCD display.

Experience shows that common faults are connected with the control signal wiring. The following will help you to identify any faults that occur:

**System Problems** The following problems are those that are generally found to affect a whole lighting system, rather than a particular rack.

**Problem** *None of the lights will come on throughout the system.*

**Answer** Having checked the obvious things such as power to the dimmers, the most likely cause is failure of the MUX connection. This can be verified by observing the MUX OK LED on each rack. Assuming that the MUX protocol has been selected correctly and the MUX start number or patch are as required (see earlier), if none of the MUX OK lights on any rack is on, then the cable is probably at fault. Check the connectors at each end, and, using a ohmmeter, check that the signal(s) and shield are not shorted. If they are not shorted, then the most likely cause is an open circuit somewhere along the line.

**Problem** *Some lights can't be turned off.*

**Answer** There are many ways to control lights with an LD90. Some common problems are: Presets being called up unexpectedly from a handheld control or wall station, or the NoMUX preset is being called up because the racks have not detected MUX (wiring fault etc.). Note that it is also possible to leave a PRESET on via the PRESET VIEW facility.

Also MIN LEVEL may be set for a particular dimmer. There is no way of turning off a dimmer with a min level set.

**Problem** *The lights flash or become erratic. The MUX OK LED goes on and off erratically.*

**Answer** This problem may be caused by one MUX signal wire being loose or disconnected. It is most often seen with DMX512 installations. Both DMX512 signal connections and ground (screen) must be connected to all dimmers and the control desk. A common installation fault with DMX512 is the reversal of the two signal connections, or a signal connection and screen. This causes havoc! Check that all cables have the correct wiring.

A further problem can be caused by either over terminating the line, or not terminating the line at all. Make sure that only the rack farthest away from the console has its line terminated (see line termination earlier)

**Problem** *The lights very occasionally flash or misbehave.*

**Answer** This may be caused by interaction with other systems. Try to isolate the occurrence of the problem and tie it in with activity in other parts of the building. Arc welding or unsuppressed motors (lifts etc.) can cause mains disturbances or corruption of control signals. LD90 is highly immune to such problems, but in extreme cases interference can occur.

If time is available, set ALL dimmers to a given (low) level from the rack keypad. This isolates the control signals and allows observation of the dimmers alone. If the problem still occurs, then it is a mains-borne interference. The solution will be to re-route the feeder cables to another supply (if at all possible), or suppress the offending equipment. If, however, the problem goes away, then it may be in the signal wiring (see above), the routing of the wiring (make sure it is not near noisy equipment), or a fault in the control desk.

If your control desk signal can use the SMX protocol, then this will provide a far greater immunity to interference than DMX512 or D54. Changing the protocol on both the dimmer(s) and control system to SMX is a cheap alternative!

**Problem** *The handheld control or wall station operates erratically.*

**Answer** The wiring between the dimmers and control system is similar to the handheld or wall station wiring. The same rules as above apply.

## Rack type problems

The following problems are those that are generally found to affect a single dimmer rack, while other parts of the system are work. correctly.

**Problem** *One rack doesn't work properly, the others do.*

**Answer** This can be caused by the wiring faults as described above. It may also be caused by incorrect programming. It is quite easy to set a dimmer to a LEVEL from the keypad, and in so doing disable MUX control. The dimmer reverts to normal control at power up, thus power cycling is a quick way to check. Equally, setting the level from the keypad verifies electrical operation of the dimmer regardless of control system.

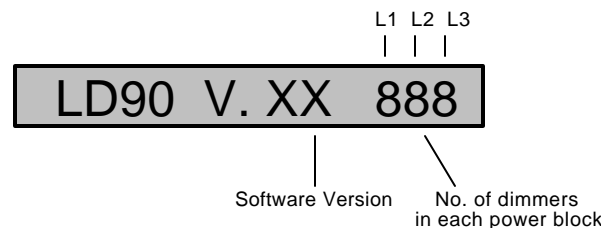
An extreme example of a wiring fault is a loose power connection to the rack. Loose neutral connections in particular cause havoc!

**Problem** *Some dimmers don't appear to work.*

**Answer** Use the LEVEL key to check dimmer operation. If the dimmer fails to work, and all load wiring and connected load has been tested, then the dimmer will require service. If the dimmer works from the keypad, but not from the control desk, check that the START NUMBER or PATCH are set correctly. Check also the dimmer patch in the control desk if applicable.

**Problem** *One power block isn't working*

**Answer** Check that the POWER LED is on for the relevant phase. The ordering of the LED's is the same as the power blocks. If power is OK, then check that the RCD unit (if fitted) hasn't tripped. If power is definitely present, turn the dimmer off and back on, and observe the "sign-on" message:



The number of dimmers in each power block should be consistent with the number of circuit breakers. If a figure is 0, then the power block may not be connected correctly.

**Problem** *Lights don't appear to track each other in fades.*

**Answer** This can be caused by using different DIMMER LAWS on each dimmer or setting dimmers to different max. output voltages. The keypad can be used to set ALL dimmers in a rack to the same law and voltage (see above) to rectify the problem.

## First Line Maintenance

The following procedures are designed for a semi-skilled technician to follow in the event of minor failures. They do not involve the use of complex tools or equipment.



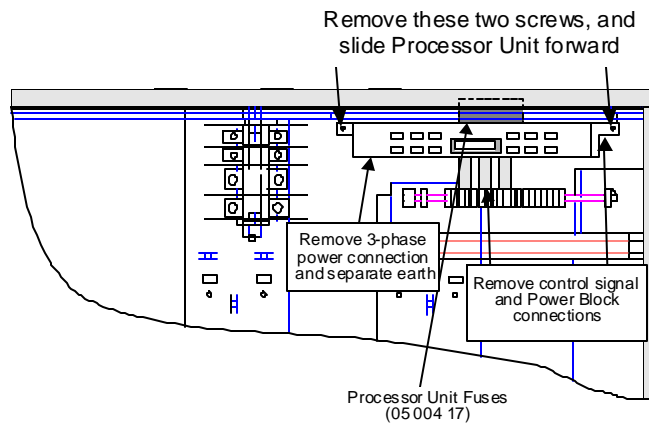
### Warning Processor Unit Replacement

**Hazardous voltages are contained within the rack. All maintenance operations must be carried out with power to the rack properly isolated.**

The processor unit contains many complex circuits, most of which are surface mounted on a multi-layer PCB. This is an expensive item, and no attempt should be made to repair it, under any circumstances.

It is, however, feasible to replace the module with an exchange unit. The following procedure should be adopted.:

1. Switch power off.
2. Remove the front cover of the rack.
3. Remove the two fixing screws shown arrowed in the diagram below.
4. Remove the earth strap from the earth bus-bar to the Processor Unit.
5. Slide the unit out approx. 75mm, giving enough space to disconnect all control signal cables, the 3-phase power cable, and the Power Block cables as shown below. Note the positions of all connectors as several of them are similar.
6. Slide the unit forward and out of the rack.
7. Replacement is the reverse of the above procedure. Make sure that the connections to the Power Modules are made to the correct plugs on the PCB. They are clearly marked "DIMMERS - PHASE L1", "DIMMERS-PHASE L2", and "DIMMERS-PHASE L3".
8. Ensure that the rack cover is replaced before applying power again.

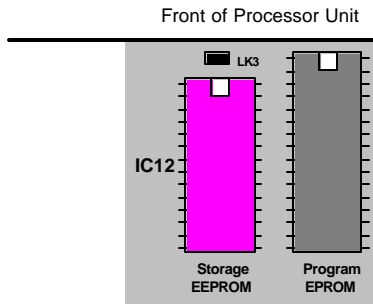


## Processor Unit Reconfiguration

All user configurations are held in a non-volatile memory device (EEPROM), IC 12, on the Processor Unit PCB. This device is socketed, and it is therefore possible to "transplant" it into an exchange unit, so avoiding the necessity to re-configure the unit manually.



***The memory device is Static Sensitive. Do not attempt removal and replacement without using proven anti-static precautions, such as an earthed wrist strap and earthed anti-static working surface. If you are in any doubt, do not proceed.***



1. Remove the Processor Unit from the rack
2. Remove the Processor Module cover (two screws)
3. Ensure anti-static precautions have been taken.
4. Gently lever out EEPROM, IC12
5. Repeat above two steps with exchange unit.
6. Swap devices over. Make sure that the device is oriented correctly, see left.
7. Replace the covers on both units.

The replacement unit will now have the "personality" of the previous one, and will require no setting up.

Test the unit as if you were applying Power for the first time (see *Testing After Power On*, in the Installation Section).

Note that the Operating Program is stored in the EPROM, IC16 next to the EEPROM, IC12. Software upgrade is a simple matter of swapping this device. Refer to the Issue Notes supplied for any compatibility issues.

## Processor Unit Fuse Replacement

The Processor Unit power is supplied via three fuses mounted directly above the Unit. In the event of a major Processor Unit fault, one or more of these may be blown. This is very unlikely, and will almost certainly mean that the Processor Unit will need to be exchanged.

Once the Processor Unit has been removed, the fuses may be examined. A fuse is removed by gently pulling the "cap", which contains it. Spare parts numbers are given later in this section.



**Warning**

**The fuses must only be replaced with ones of the correct value and similar specification. Failure to use the correct values could have serious safety implications.**

## Power Device Replacement

Power devices on all 2.5kW dimmers are identical, as are all devices on 5kW dimmers. Replacement on 2.5kW dimmers is very easy because each device is individually connected with screw terminal blocks on the Power PCB.

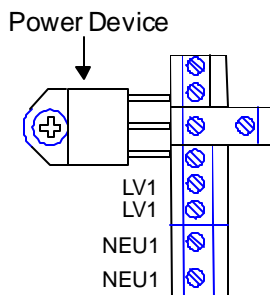
Power Devices typically fail "short circuit", and the classic indication of this, is the inability to turn a dimmer off. To verify that a device has failed, attempt to control the load using the LEVEL facility, this ensures the problem is not with the control wiring. If it is impossible either to turn the dimmer on, or off, and MCB has been checked, then the power device is most likely to be at fault.



***Power Devices can be damaged by a fault condition on the load wiring, and it is important to check that any wiring fault has been repaired before repairing the dimmer.***

If the dimmer is a 5kW type, the whole Power Block will need to be replaced. This is done as a reversal of the *Installation Procedure*, see earlier. Repair must be done only by qualified Strand Service agents.

If the dimmer is a 2.5kW type, use the following procedure:



1. Identify which physical dimmer is at fault, by reference to the fascia panel labelling.
2. Isolate the rack and remove the front cover.
3. Remove **all** the fascia covers from the Power Block in question, by gently pressing the "legs" inwards to release them from the extrusion.
4. Unscrew and remove the Power Device.
5. Replace the device with one of the pair supplied in the spare part kit 05 004 18.
6. Ensure that the screws are done up tightly to avoid a "hotspot" on the device in service.
7. Replace the mounting screw with the one supplied in the spare part kit above. This is essential to guarantee adequate thermal contact with the heatsink.



***Do not attempt to operate the dimmer without fitting a new Power Device of the correct type. It would cause considerable damage to the firing circuit.***

**Spare Parts** The following are branded spare parts to be used with LD90. Do not use any other parts, as these may compromise safety and reliability.

- 05 004 14 LD90 Processor Unit.
- 05 004 16 LD90 Spare Fascia Panel, complete with all label types.
- 05 004 17 LD90 Processor Module Fuse (3 off).
- 05 004 18 2.5kW Power Device (2 off).
- 08 680 28 5kW Power Device.

