NOKIA

Maintenance

$$C\hspace{-0.3em}\epsilon$$

$C\hspace{-0.2em}\epsilon$ 0523 (!)	Hereby, Nokia Corporation, declares that this Nokia InLite is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC. The product is marked with the CE marking and Notified Body number according to the Directive 1999/5/EC

FCC

FCC §15.21 - Information to user - The Nokia InLite is used as an intentional radiated equipment and any changes or modifications on the equipment without any approval by Nokia could void the user's authority to operate the equipment.

FCC §15.27 b) - Special Accessories - If a device requiring special accessories is installed by or under the supervision of the party marketing the device, it is the responsibility of that party to install the equipment using the special accessories. For equipment requiring professional installation, it is not necessary for the responsible party to market the special accessories with the equipment. However, the need to use the special accessories must be detailed in the instruction manual, and it is the responsibility of the installer to provide and to install the required accessories.

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FCC §15.105 - Information to user - This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

• Consult the dealer or an experienced radio/TV technician for help.

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History

Date	Version	Author	Details
22-5-2000	Draft1	N. T. Thomas	Compilation of a first draft of the User Manual: installation
13-10-2000	Draft 2	T N Williams	Draft updated to include RF team comments.
06 - 02 - 2001	Draft 3	Indi Liepa	Updated after review by Harri Vaananen
23 - 03 - 2001	Issue 1	Brian Searle	Additions and corrections after review team activity
27 - 07 - 2001	Issue 2 Draft 1	Tom Dumic	Included US Type Approval requirements
22 - 08 - 2001	Issue 2	Tom Dumic	Release for Product v1.0 US
05 - 09 - 2001	Issue 2, Draft 1	Tom Dumic	Draft for Product v2

1 About this document

This document provides instructions for maintaining the InLite. Maintenance procedures are carried out to ensure the efficient operation of the Nokia InLite system after it has been installed and commissioned.

Throughout the document, warnings, cautions and notes are given whenever appropriate.

2 Preventive maintenance

The Nokia InLite system requires a minimum of maintenance and supervision. Should an alarm condition occur, its location can readily be determined, using the laptop PC, then quickly corrected.

To ensure the continued integrity of the InLite system, certain maintenance tasks must be performed at regular periods.

2.1 Periodic checks

Visual inspection and cleaning

Check that the following conditions are satisfied:

1. The Main Unit (MU) is firmly secured in position.
2. The MU is not damaged in any way and that the lock performs its function correctly.
3. The MU is clean and free from dirt. (Clean the surfaces as necessary.)
4. The green LEDs on in all plug-units inside the MU (i.e., there are no alarm conditions).
5. Each Remote Unit (RU) is properly secured in its position.
6. The installed RUs are not damaged.
7. The red LED (Fault) indicator on the RU is not lit.
8. The RU is clean and free from dust or dirt. (Clean the surfaces as necessary.)
9. Exposed cables (RF, optical and power) are not damaged or under stress.

2.2 Action plan

It is recommended that an action plan be prepared if a fault occurs in MU or RUs. The purpose of this plan is to correct the fault and if necessary, replace any faulty unit minimal traffic disruption.

Consult with the indoor network planners and use the Switch Matrix capability to reroute services and capacity to other MUs or RUs to reduce or avoid cut in services or in RF coverage.

Pay attention to the fact that Intelligent Network dedicated services (e.g., GSM Office, Private Virtual Network) located in a specific area of a building cannot be relocated.

If it becomes necessary to replace BTS RF cables, contact the Operations and Maintenance Centre (OMC), advising them of possible internal or external alarms and asking them to take the related TRXs out of service before starting any repair activities.

3   Repair

3.1   Locating faults

Faults in the MU or the Remote Unit can be diagnosed and located using the Supervisor software application installed on the laptop PC.

⚠ **WARNING**

All persons who perform operations on this equipment should be advised of the potential dangers.

Warnings and cautions are provided in *Nokia InLite: Warnings and Cautions*.

3.1.1   Using the laptop PC

Use the following procedure to connect the laptop PC to the MU and to start the Supervisor software.

Relevant Warnings and cautions are given in *Warnings and Cautions*.

Connecting the laptop PC

1. Unlock the MU cover.

2. Holding the cover firmly, carefully push the cover upwards and pull it clear of the InLite MU.

3. Connect the laptop PC to the LMP port on the MU, using the LMP cable as shown in Figure .

Main Unit

LMP port
(front connector)
9-way 'D' type
connector
(male)

LMP cable

Laptop P.C (with Supervisor software)
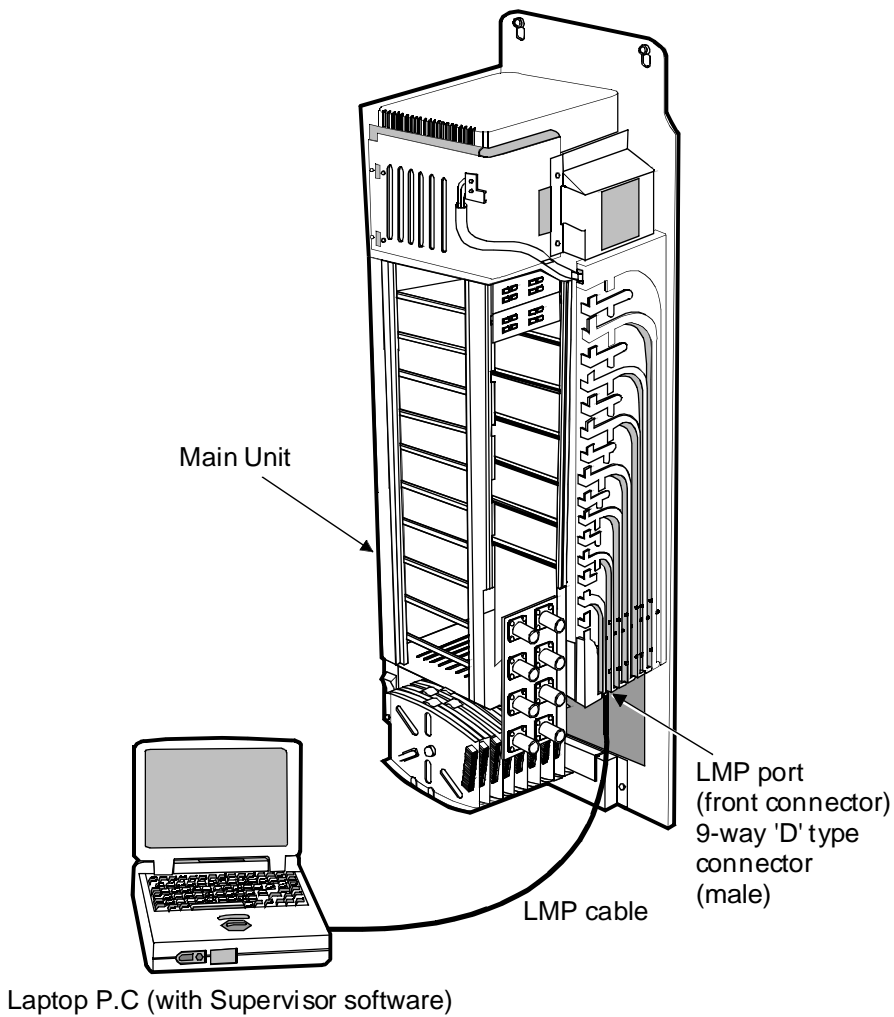
Figure 1.   Laptop to MU connection

4.   Start the laptop PC.

Starting the Supervisor software

1.   In Windows, click on the **Start** button (normally located in the bottom left hand corner of the screen display.

2.   Follow the path:

Start\Programs\Supervisor Ver 1.0.0

or

Start\Programs\Supervisor Ver 1.0.1

When the software application starts, the main window appears normally
(Figure).
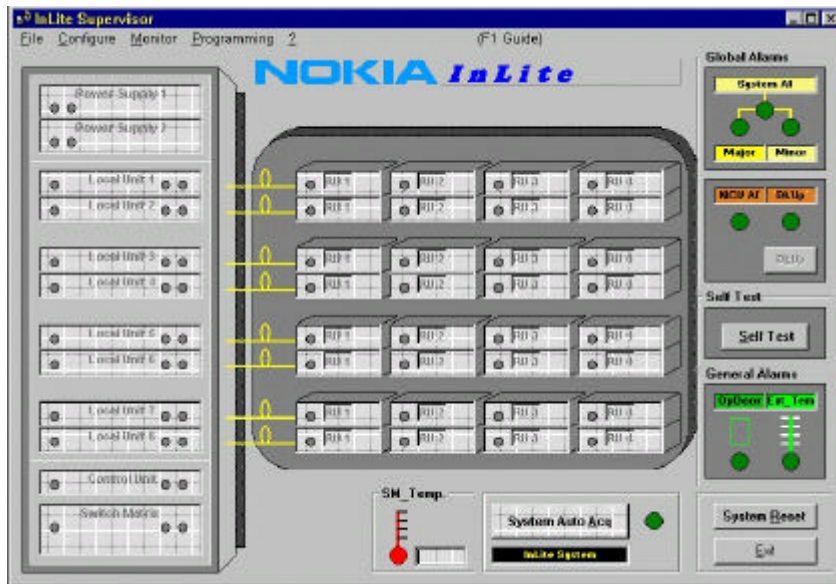
Figure 2.   InLite Supervisor main window

If the Supervisor software application is being invoked for the first time,
however, the Com Port SetUp window will appear (Figure) instead of the
main window.
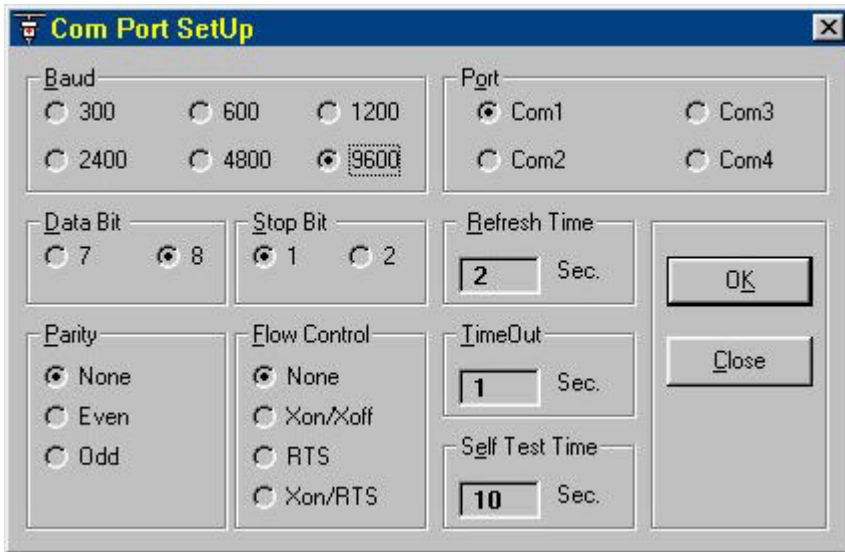
Figure 3.   Com Port Setup window

Note

The Nokia default setting is: 9600 Baud, 8NI (8 bit data, no parity bit, 1 stop bit).

If this setting is to be changed, the Com port chosen should be a com port not used by other peripherals. If the com port chosen is already in use, an error message is issued telling the operator to choose another port.

Note

The Com Port setup window can also be accessed via the **Configure** button in the main window of the Supervisor software.

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3.   In the main window, click on the **System auto Acq** button. The Supervisor software will show any alarms that exist.

Note

It is possible that at power up, the BkUp alarm (**BkUp**) will be active.

If this alarm is present, click on the BkUp button in the main window, then close the BkUP window.

For more information about the Supervisor software, refer to the document *Nokia InLite Commissioning*

3.1.2 Disconnecting the laptop PC

Use this procedure to disconnect the laptop PC after all faults have been located, diagnosed, corrected and tested.

To disconnect the laptop PC

1.   Close the Supervisor software and shut down the laptop PC.

2.   Disconnect the laptop PC and LMP cable from the MU.

3.   Store the laptop in a secure location.

4.   Carefully locate the MU plastic cover over the assembly and push back, making sure that the cover locking guides are aligned with the back-plate recesses.

5.   Push the cover down to secure it to the back-plate.

6.   Lock the MU front cover.

3.2   Correcting faults

⚠ **WARNING**

All persons who perform operations on this equipment should be advised of the potential dangers.

General warnings and cautions are provided in *Nokia InLite: Warnings and Cautions*.

The following procedure provides general instructions on how to locate, repair and test a repair.

To locate and correct a fault in the InLite system

1.   Connect the laptop PC and start the Supervisor software as described in Section 3.1.1.

2.   Locate the fault, using the Supervisor software.

3.   Perform the maintenance procedure relevant to the fault.

4.   Check that the fault has been corrected, using the Supervisor Software.

5.   Shut down and disconnect the laptop PCas described in Section 3.1.2.

3.3 MU

3.3.1 Locating a faulty unit

To locate a faulty unit in the MU

1. Connect the laptop PC as described Section 3.1.1.

2. Start the Supervisor software application.

3. The LED icon of the faulty unit in the Supervisor software window will be coloured red.

3.3.2 Replacing a faulty unit

Relevant warnings and cautions are given in *Nokia InLite: Warnings and Cautions*.

⚠ **WARNING**

Advise all persons who perform operations on this equipment of the potential dangers.

To replace a unit in the MU

ⓘ Caution

If the faulty unit is a Local Unit, the fibre optic cables must be disconnected before the unit is removed.

1. Undo the four captive retaining screws securing the unit to the MU rack.

2. Carefully withdraw the unit from its position in the MU rack, then store the unit in a safe place.

3. Insert a known good unit into the location vacated by the faulty unit, making sure that the unit is correctly aligned on its guides and is pushed firmly back to engage with the mating connector at the rear of the location.

4. Secure the unit in position using the four captive retaining screws.

5. Check that the replacement unit is operating correctly, using the Supervisor software. The LED icon should be coloured green.

6. Close the Supervisor software and shut down the laptop PC as described in Section 3.1.2.

7. Refit the MU cover.

8.   Send the faulty unit to Nokia for repair, using the procedure advised by the local Nokia agent. The unit should be identified and accompanied by a fault statement.

3.4   Remote Unit

3.4.1   Localising an RU fault

Normally, an RU fault is located with the use of the InLite Supervisor software application. However, an RU has two LEDs (green and red) that are visible externally. The LEDs are illuminated when the RU is in a fault state and not functioning.

An RU fault is identified using the Supervisor software.

Note

The RU LEDs (2) are located under the cable cover of the RU mounting rack. It is advisable to remove the cable cover so the two LEDs can be seen properly.

3.4.2   Replacing an RU

General warnings and cautions are given in *Warnings and Cautions*.

3.4.2.1   To replace a faulty RU IP41

⚠ WARNING

Disconnect the power connector from the RU before performing this procedure.

⚠ WARNING

Shut down the laser in the LU connected to the RU that is to be replaced. Respect the laser radiation warnings.

Note

Refer to document *Installation*

1.   Connect the laptop PC to the MU as described in Figure .
2.   Start the ISMMan software application.

3. Go to the Local Unit window of the ISMMan software. Use the ISMMan software to switch off the DL laser of the relevant LU. The colour of the LED icon will change to red.

4. Remove the four M3 x 20 fixing screws that secure the cable cover to the Remote Unit mounting rack.

5. Remove the cable cover.

6. Disconnect the power supply cable from the RU.

7. Disconnect the antenna cables from the RU.

8. Disconnect carefully the two fibre optic cables from the RU and fit protective caps to the ends of the fibre optic cables.

9. Remove the five M3 x 8 fixing screws that secure the RU to its mounting rack.

10. Lift the RU up and off its mounting rack, then store in a safe place.

11. Obtain a known good RU and carefully place it on the mounting rack, pushing it down gently to secure it in position.

12. Secure the RU to the mounting rack using five fixing screws.

13. Connect the antenna cables to the RU in their correct positions.

14. Remove the protective caps from the ends of the fibre optic cables and connect carefully the two fibre optic cables to the RU. Store the protective caps in a safe place.

15. Secure the cable cover of the RU mounting rack with four screws.

16. Connect the power supply cable to the RU power supply connector.

17. Where applicable, set the RU power to ON at the mains switchboard or at the CPSU or insert power supply plug to the socket.

18. At the location of the replacement RU, verify that its power LED is lit (green) and the red FAULT LED is unlit (dark) on the RU.

19. Use the supervisor software to check that the alarm has disappeared.

20. Send the faulty RU, suitably identified and fault symptom(s) stated, to Nokia for repair, using the procedure advised by the local Nokia agent.

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3.4.2.2 To replace a faulty RU IP53

⚠ **WARNING**

Disconnect the power connector from the RU before performing this procedure.

⚠ **WARNING**

Shut down the laser in the LU connected to the RU that is to be replaced. Respect the laser radiation warnings.

Note

Refer to document *Installation*

1. Connect the laptop PC to the MU as described in Figure .
2. Start the ISMMan software application.
3. Go to the Local Unit window of the ISMMan software. Use the ISMMan software to switch off the DL laser of the relevant LU. The colour of the LED icon will change to red.
4. Remove one M6 x 40 screw on top of the cover which secures the enclosure cover to the wall.
5. Remove the cover by sliding it upwards along the bars on both sides of the backplate.
6. Disconnect the power supply cable from the RU.
7. Disconnect the antenna cables from the RU.
8. Disconnect carefully the two fibre optic cables from the RU and fit protective caps to the ends of the fibre optic cables.
9. Remove the five M3 x 8 fixing screws which secure the RU to the backplate of the enclosure.
10. Lift the RU up and off the backplate, then store it in a safe place.
11. Obtain a known good RU and carefully place it on the mounting rack, pushing it down gently to secure it in position.
12. Secure the RU to the mounting rack using five fixing screws.
13. Connect the antenna cables to the RU in their correct positions.
14. Remove the protective caps from the ends of the fibre optic cables and carefully connect the two fibre optic cables to the RU. Store the protective caps in a safe place.
15. Connect the power supply cable to the RU power supply connector.

16. Where applicable, set the RU power to ON at the mains switchboard or at the CPSU.

17. At the location of the replacement RU, verify that its power LED is lit (GREEN) and the red FAULT LED is unlit (dark) on the RU.

18. Use the ISMMan software to check that the alarm has disappeared.

19. Replace the cover by sliding it downwards from top of the backplate along the bars on both sides of it.

20. Secure the cover to the wall using one fixing screw.

21. Send the faulty RU, suitably identified and fault symptom(s) stated, to Nokia for repair, using the procedure advised by the local Nokia agent.

3.4.2.3 To replace a faulty RU IP64

⚠ **WARNING**

Disconnect the power connector from the RU before performing this procedure.

⚠ **WARNING**

Shut down the laser in the LU connected to the RU that is to be replaced. Respect the laser radiation warnings.

Note

Refer to document *Installation*

1. Connect the laptop PC to the MU as described in Figure .

2. Start the ISMMan software application.

3. Go to the Local Unit window of the ISMMan software. Use the ISMMan software to switch off the DL laser of the relevant LU. The colour of the LED icon will change to red.

4. Remove the 10 M5 x 16 screws on top of the cover which secure the cover to the enclosure, and open the cover.

5. Disconnect the power supply cable from the RU.

6. Disconnect the antenna cables from the RU.

7. Disconnect carefully the two fibre optic cables from the RU and fit protective caps to the ends of the fibre optic cables.

8. Remove the wing screw from the splice box and open the splice box.

9. Very carefully remove the fibre optic cables from the splice holder in order not to break the fibre optic cables.

10. Very carefully draw the optic cables out of the enclosure through the hole they are fitted into the enclosure.

11. Remove the four M6 x 40 fixing screws which secure the enclosure to the wall.

> ⓘ **Caution**
>
> RU IP64 weighs 11 kg so be very careful while removing the screws.

12. Lift the RU off the wall, then store in a safe place.

13. Obtain a known good RU and carefully place it on the wall.

14. Carefully support the RU and secure it to the wall using four fixing screws.

15. Very carefully draw the optic cables into the enclosure through the same hole they were removed.

16. Very carefully arrange the fibre optic cables in the splice holder, close the splice box and tighten with the wing screw.

17. Remove the protective caps from the ends of the fibre optic cables and carefully connect the two fibre optic cables to the RU. Store the protective caps in a safe place.

18. Connect the antenna cables to the RU in their correct positions.

19. Connect the power supply cable to the RU power supply connector.

20. Where applicable, set the RU power to ON at the mains switchboard or at the CPSU.

21. At the location of the replacement RU, verify that its power LED is lit (GREEN) and the red FAULT LED is unlit (dark) on the RU.

22. Use the ISMMan software to check that the alarm has disappeared.

23. Send the faulty RU, suitably identified and fault symptom(s) stated, to Nokia for repair, using the procedure advised by the local Nokia agent.

3.5   Cabling

Faulty RF cables and FO cables should be replaced.

4 System upgrades

4.1 Supervisor software

To upgrade the Supervisor Software
The procedure installs a new version of the Supervisor Software.

1. Check the version of the new CD-ROM

2. Insert the CD-ROM and run the "setup" file.

4.2 System configuration

An InLite system can comprise up to eight LUs and each LU can handle up to four RUs. The actual number of RUs installed can therefore vary between one and 32. The configuration of the system is quite flexible and can be expanded or contracted by adding and removing LUs and RUs.

4.2.1 Adding a Remote Unit

Full instructions for adding a Remote Unit to an InLite system are given in *Nokia InLite Installation*

4.2.2 Removing a Remote Unit

Full instructions for removing a Remote Unit from an InLite system are given in *Nokia InLite Installation*

5 Fault finding and clearing

5.1 Fault finding

Fault finding is arrange in two categories:

1. Coverage
2. Alarm indication.

5.1.1 Loss of coverage

The following table defines the extent of loss of coverage and the possible cause of this loss of coverage.

Loss of coverage	Possible cause
Total	The BTS is not connected
	The BTS is switched off
	Power supply is not available
	Centralised PSU fault
Some areas only	Related RU power supply is not available
	The RF/optic cable is faulty
	The RF/fibre optic connector is damaged/dirty
	The RU for that area is faulty

Table 1.   Loss of Coverage

5.1.2   Alarms

The following fault finding algorithm shows a procedure for interpreting alarms
and methods for clearing them.

```
                        ┌─────────────────┐
                        │    Alarm ON     │
                        └─────────────────┘
                                 │
                        ╱─────────────────╲
            YES        ╱    Local Unit     ╲        NO
          ◄───────────◄      Alarm?         ►───────────┐
                       ╲                   ╱            │
                        ╲─────────────────╱             │
                                 │                      │
                        ╱─────────────────╲             │
            DL         ╱      Is it a       ╲    UL      │
          ◄───────────◄     downlink or      ►──────────►│◄───┘
          │            ╲   uplink alarm?    ╱            │
          │             ╲─────────────────╱             │
          ▼                                             ▼
┌─────────────────┐                          ╱─────────────────╲
│  The Local Unit │              YES        ╱   Remote Unit     ╲        NO
│    is faulty    │            ◄───────────◄      Alarm?         ►───────────┐
└─────────────────┘            │            ╲                   ╱            │
                               │             ╲─────────────────╱             │
                               ▼                                             ▼
                    ┌─────────────────┐                          ╱─────────────────╲
                    │ The laser is    │              YES        ╱    Is there an     ╲        NO
                    │ faulty          │            ◄───────────◄    input signal?     ►───────────┐
                    │ or under stress │            │            ╲                   ╱            │
                    └─────────────────┘            │             ╲─────────────────╱             │
                                                   ▼                                             ▼
                                        ┌─────────────────┐                          ┌─────────────────┐
                                        │  The fault is   │                          │ Connect an input│
                                        │in the fibre     │                          │ signal to the RU│
                                        │optic cable      │                          └─────────────────┘
                                        └─────────────────┘
                                                   │
                                        ╱─────────────────╲
                            YES        ╱  Are the optical   ╲        NO
                          ◄───────────◄  connectors clean?   ►───────────┐
                          │            ╲                   ╱            │
                          │             ╲─────────────────╱             │
                          ▼                                             ▼
              ┌───────────────────────────┐                 ┌─────────────────┐
              │The fibre optic cable is   │                 │ Clean the optical│
              │either broken              │                 │ connectors       │
              │or the splices are not     │                 └─────────────────┘
              │perfect.                   │
              │OTDR action is required    │
              └───────────────────────────┘
```
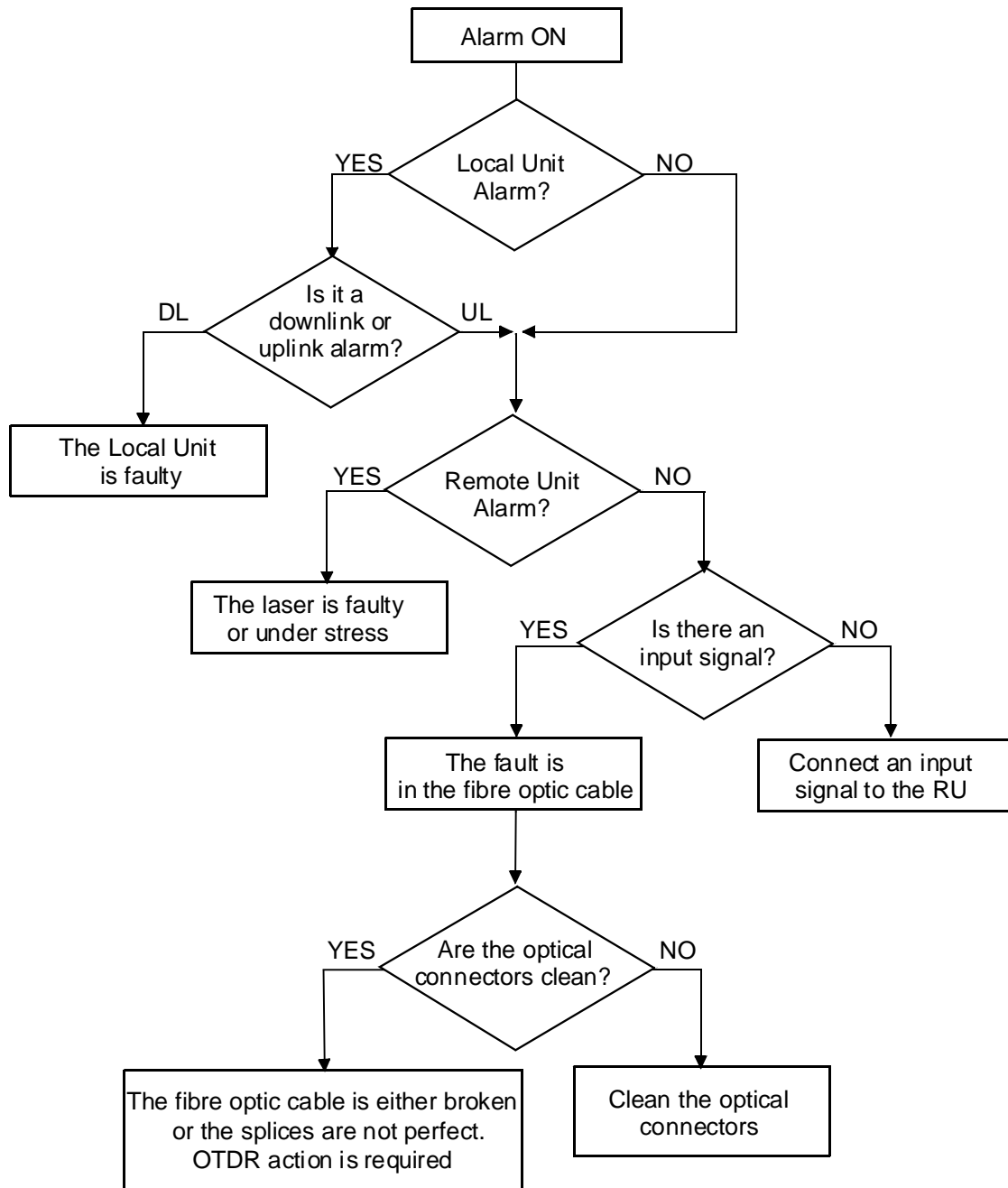
Figure 4.   Fault finding flow chart

5.2   Cleaning optical connectors

An optical connector is basically a lens, and its performance can be degraded by dust particles, finger grease and scratches.

The surface of connector ferrule can be inspected by means of a microscope.

To clean an optical connector

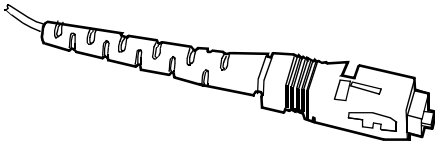1.   Open the connector.

Figure 5.   SC/APC male connector

2.   Apply a drop of cleaning liquid (pure alcohol) to the edge of the ferrule, then clean and dry it carefully with a soft tissue, using a circular movement.

Note

Always use one tissue per cleaning activity.

3.   Remove any residue particles using a clean, dry air source.

4.   Before re-inserting the connector, clean the adapter by applying a drop of cleaning liquid to the centre hole and removing it immediately, using a clean, dry air source.

5.   Re-insert the connector into the adapter, without the ferrule making any physical contact with fingers or any other object or surface.