Alcatel 9900

Multiservice broadband wireless access solution Terminal Station – release 2.0

USER MANUAL

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Table of contents

1 – Foreword

1.1 – Structure of the manual

This manual is for users with a sound knowledge of how to operate and install **point–multipoint microwave systems** and how to use a **PC-based craft termina**l running the Windows™ operating system. With it, you should quickly be able to operate the equipment. It is not intended to replace the training services that we can provide for your particular needs.

The manual is divided into seven sections followed by appendixes:

- **Foreword**
- **Description of the equipment**
- **Installation of the equipment**
- **Servicing**
- **Maintenance**
- **Upgrading configurations**
- **Appendixes**

1.2 – Using the manual

With this manual, you should be able to commission and operate the described equipment to a basic level.

You should always read this manual in conjunction with the attached “Update” document (if provided) so that you are aware of the latest equipment upgrades.

Manual updates

This edition of the manual describes hardware and software releases of the following revision indexes and above:

Hardware revision: 01

In cases where an equipment upgrade affects the content of the manual, the relevant modification should be inserted in the “**Update**” document, with the same reference number, but with code type VE (instead of TQ).

When the number or extent of the changes justifies it, they should be incorporated in the body of the manual and the manual’s revision index should be incremented. Revision bars will show the differences from the previous version.

Note: MS-DOS, MICROSOFT and WINDOWS are registered trademarks of Microsoft Corporation.

1.3 – Safety instructions

1.3.1 – General rules

The following general safety precautions must be observed by the installer and the operator. ALCATEL assumes no liability for the customer's failure to comply with these requirements.

Ground the equipment:

For Safety Class 1 equipment, always connect the earth conductor of the power cable to an appropriate earthing device.

DO NOT operate the product in an explosive atmosphere or in presence of flammable gases or fumes.

For protection against fire:

replace the line fuse(s) only with fuse(s) of the same voltage and current rating and type.

Dangerous voltages:

Users must not remove equipment covers or shields. The installation and maintenance procedures described in this manual are for use by service–trained personnel only.

DO NOT operate equipment which may be damaged:

Whenever it is possible that the safety protection features built into this equipment have been impaired, ISOLATE FROM THE POWER SUPPLY and do not use the equipment until safe operation can be verified by service–trained personnel. If necessary, return the equipment to Alcatel After Sales for service and repair.

DO NOT substitute parts or modify equipment:

Return the product to Alcatel Customer Service for servicing and repair.

1.3.2 – Symbols on products

1.3.2.1 – Danger symbols

When subsystems and modules have warning labels, it is extremely important to follow their instructions.

These labels are designed to indicate dangerous situations; they may contain any standard symbol or any text considered necessary to protect users and employees.

The most frequent danger situations and symbols are:

Danger or general warning

Prompts the user to refer to the manual.

Dangerous electrical voltages

Close to dangerous voltages (>42.4 V AC peak, 60 V DC; power level ≥240 VA) you will find this warning label

Presence of heat-radiating mechanical parts

1.3.2.2 – Earth symbols

Terminal for connecting the protective earth conductor in power supply wiring

Other earth terminal

1.3.2.3 – Other symbols

Indicates compliance with European standards

1.3.3 – Symbols used in the document

These symbols alert the reader the possible risks. They indicate:

- the cause and type of danger,
- the possible consequences,
- the preventive action.

1.3.3.1 – Warning

- **protection of personnel,**
- warning of a **possible dangerous situation,**
- danger of fatal or serious injury.

1.3.3.2 – Precautions

- **protection of equipment,**
- warning of a procedure, practice or condition that **could be dangerous** to equipment or its environment,
- danger of damage to the equipment or its environment; permanent loss of data possible.

- This symbol, introducing the description of a procedure, indicates that it will cause the link to be temporarily disconnected.

- This symbol, introducing the description of a procedure, indicates that it cannot be continued without a full knowledge of the data contained in the procedure sheet concerning the stations concerned.

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2 – Equipment overview

2.1 – Overview of the A9900 system

The **Alcatel 9900** is a multi–service **broadband wireless local loop** system designed to provide telecom services to small and medium–sized enterprises.

Broad band WLL (Wireless Local Loop) system, Alcatel 9900 allows **operators** to offer rapid provision – to a large number of client sites – of a comprehensive range of telephone and data transmission **services**.

For **cellular phone network** operators, Alcatel 9900 offers the possibility of linking **base stations** to base station **controllers**. This makes Alcatel 9900 an economical transmission solution, for the implementation or extension of high traffic density areas coverage.

For **mixed network** operators (fixed and mobile), Alcatel 9900 enables to connect, with the same system, fixed professional end user as well as **base stations of cellular telephony**.

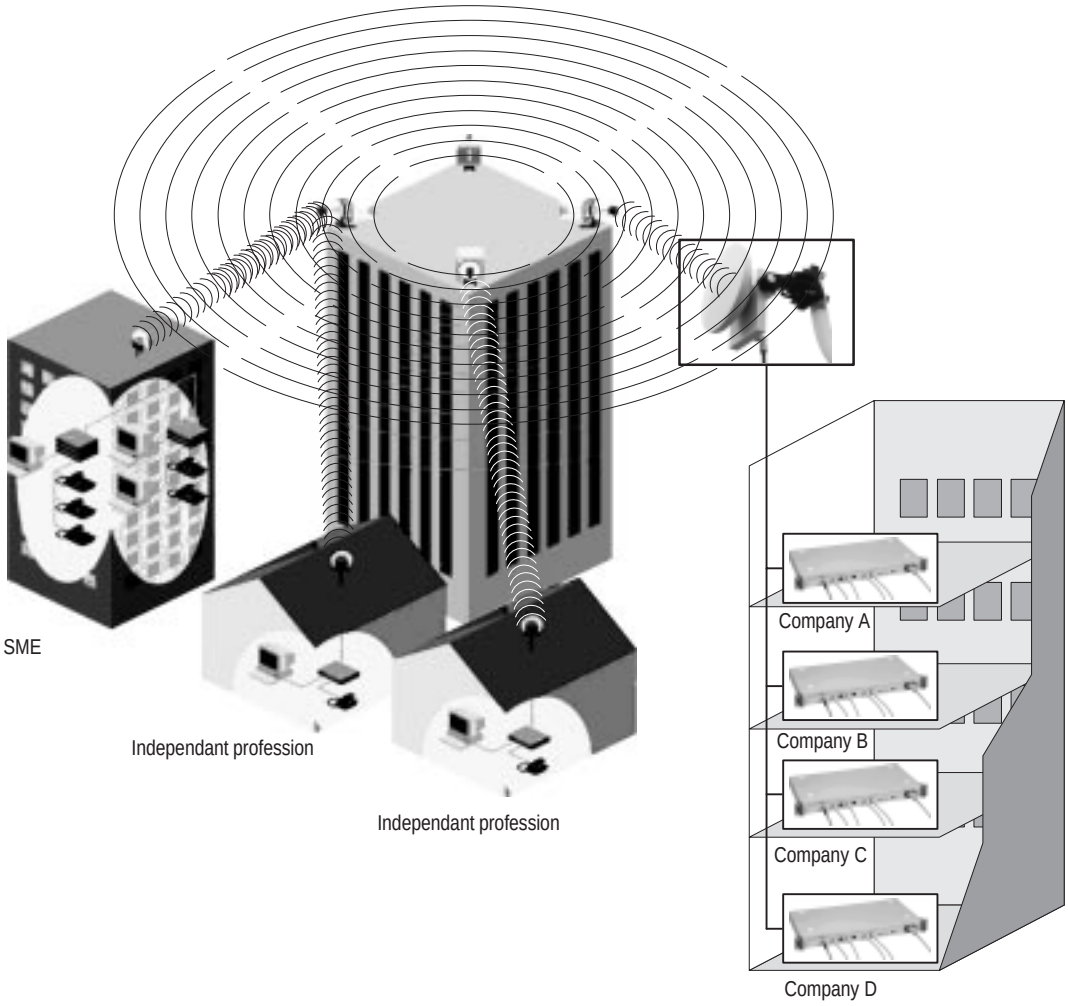


Figure 1 – A9900 System – Local point–multipoint service distribution –

2.2 – Composition of the A9900 system

An A9900 network cell consists of the following:

- a common **base station** designated **9900BS**;
- and several **terminal stations** distributed across the user sites, and designated **9900TS**.

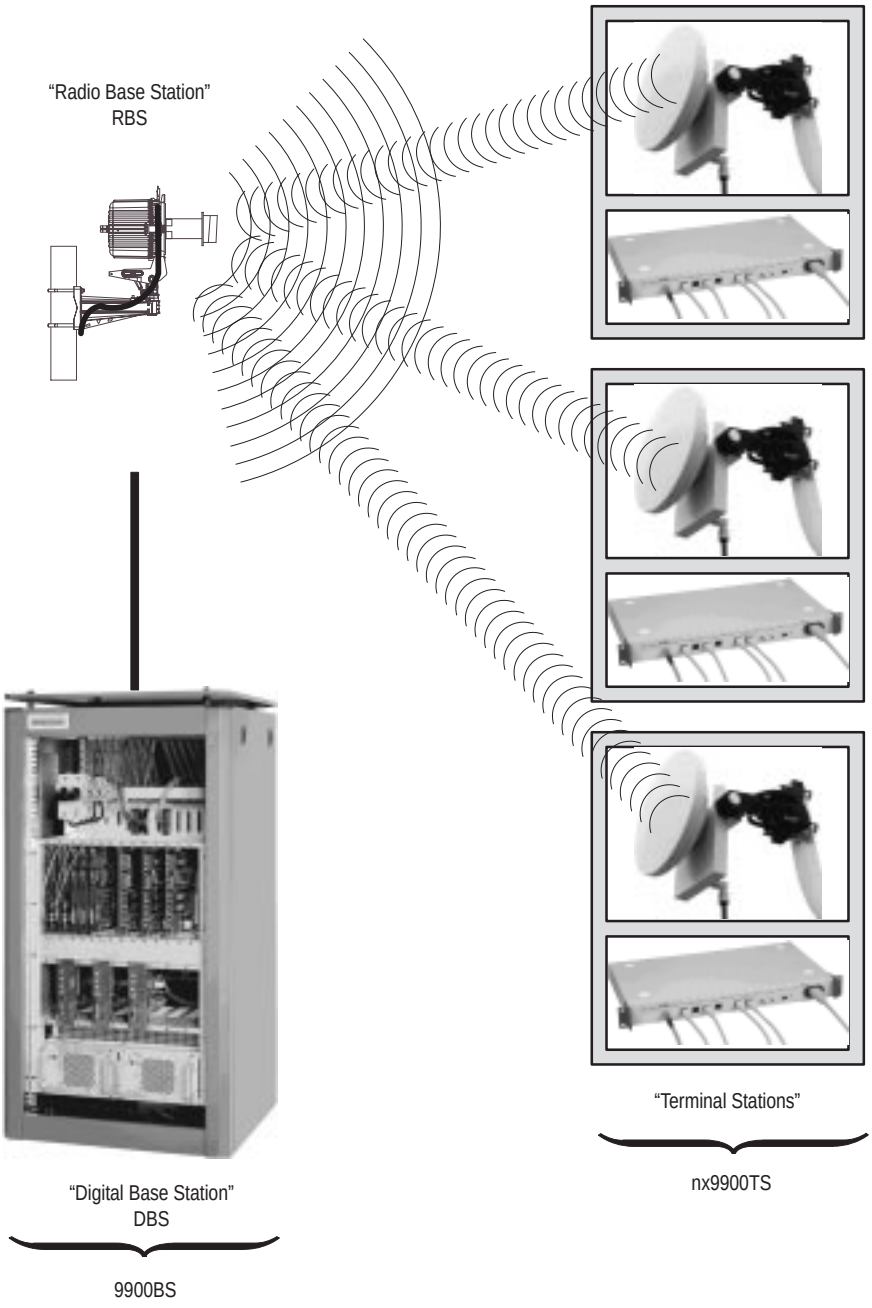


Figure 2 – Base Station and Terminal Stations

2.3 – A9900 system specifications

2.3.1 – Frequency bands used

25 GHz frequency band:

– CEPT T/R 13–02E European recommendation 24.5 – 26.5 GHz

26 GHz frequency band:

– MPT (Japan) 25.25 – 27 GHz

28 GHz frequency band:

– 27 GHz (LMCS – Canada) 27.35 – 28.35

– 28 GHz (CEPT) 27.5 – 28.6, 29.1 – 29.5

– 29 GHz (LMD – USA) 27.5 – 28.35, 29.10 – 29.25

2.3.2 – Radio transmission specifications (typical values)

The following table gives the main characteristics of the A9900 wireless system.

A downstream (BS to TS)carrier is combined with up to four upstream (TS to BS) carriers.

	Downstream			
Channel bandwidth	**14 MHz**		**28 MHz**	
Occupied bandwidth	13.63 MHz		27.25 MHz	
Modulation	QPSK		QPSK	
Cross bit rate	20.19 Mbit/s		40.37 Mbit/s	
Code	Convol. 7/8 (k=7)		Convol. 7/8 (k=7)	
Interlace	depth 12		depth 12	
Code	Reed–Solomon (204,188,8)		Reed–Solomon (204,188,8)	
Bit rate before coding	16.19 Mbit/s		32.38 Mbit/s	
Link budget	**25 GHz**	**28 GHz**	**25 GHz**	**28 GHz**
RBS output power	17 dBm	17 dBm	17 dBm	17 dBm
Transmit antenna gain	15 dB	15 dB	15 dB	15 dB
Receive antenna gain	35 dB	34.5 dB	35 dB	34.5 dB
Rx RF level for error ratio = 10^{-10}	– 83.5 dBm	– 83.5 dBm	– 80.5 dBm	– 80.5 dBm
System gain	150.5 dB	150 dB	147.5 dB	147 dB

	Upstream			
Channel bandwidth	**3.5 MHz**		**7 MHz**	
Occupied bandwidth	3.36 MHz		6.72 MHz	
Modulation	D–QPSK		D–QPSK	
Cross bit rate	5.38 Mbit/s		10.75 Mbit/s	
Code	Convol. 7/8 (k=7)		Convol. 7/8 (k=7)	
Interface	depth 12		depth 12	
Code	Reed–Solomon (63,53,5)		Reed–Solomon (63,53,5)	
Bit rate before coding	4.19 Mbit/s		8.38 Mbit/s	
Link budget	**25 GHz**	**28 GHz**	**25 GHz**	**28 GHz**
RBS output power	12 dBm	12 dBm	12 dBm	12 dBm
Transmit antenna gain	35 dB	34.5 dB	35 dB	34.5 dB
Receive antenna gain	15 dB	15 dB	15 dB	15 dB
Rx RF level for error ratio = 10^{-10}	– 87 dBm	– 87 dBm	– 84 dBm	– 84 dBm
System gain	149 dB	148.5 dB	146 dB	145.5 dB

2.3.3 – Capacity

The network capacity depends on the **traffic mix** betwen the services and leased lines or telephony services. It also depends on the **channeling** and the **number of upstream channels**.

The following tables give the characteristics of three combinations: **minimum**, **medium** and **maximum** circuit throughput; however, any intermediate combination is possible.

28 / 7 MHz channeling:

Downlink: 28 MHz	Trafic MIX: circuit capacity		
Uplink: 1 x 7 MHz	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	60	121
ATM uplink capacity (cells/s)	18,980	9,569	0
ATM downlink capacity (cells/s)*	76,141	67,084	57,877

Downlink : 28 MHz	Trafic MIX: circuit capacity		
Uplink : 2 x 7 MHz	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	120	242
ATM uplink capacity (cells/s)	37,961	19,137	0
ATM downlink capacity (cells/s)*	76,141	58,028	39,613

Downlink : 28 MHz **Uplink : 3 x 7 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	180	363
ATM uplink capacity (cells/s)	56,941	28,706	0
ATM downlink capacity (cells/s)*	76,141	48,971	21,349

Downlink : 28 MHz **Uplink : 4 x 7 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	240	484
ATM uplink capacity (cells/s)	75,922	38,275	0
ATM downlink capacity (cells/s)*	76,141	39,915	3,084

14/3.5 MHz channeling:

Downlink: 14 MHz **Uplink: 1 x 3.5 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	30	60
ATM uplink capacity (cells/s)	9,412	4,706	0
ATM downlink capacity (cells/s)*	38,047	33,519	28,990

Downlink : 14 MHz **Uplink : 2 x 3,5 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	60	120
ATM uplink capacity (cells/s)	18,824	9,412	0
ATM downlink capacity (cells/s)*	38,047	28,990	19,934

Downlink : 14 MHz **Uplink : 3 x 3,5 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	90	180
ATM uplink capacity (cells/s)	28,235	14,118	0
ATM downlink capacity (cells/s)*	38,047	24,462	10,877

Downlink : 14 MHz **Uplink : 4 x 3,5 MHz**	Trafic MIX: circuit capacity		
	Minimum	Medium	Maximum
nb of circuits: 64 kbit/s	0	120	240
ATM uplink capacity (cells/s)	37,647	18,824	0
ATM downlink capacity (cells/s)*	38,047	19,934	1,821

* : part of the ATM downlink bit rate can be used for dynamic bandwidth allocation. This proportion varies within the following limits:

- 2.5 % of the bit rate , if **one** upstream channel is used,
- 4 % of the bit rate , if **two** upstream channels are used,
- 5.5 % of the bit rate , if **three** upstream channels are used,
- 7 % of the bit rate , if **four** upstream channels are used.

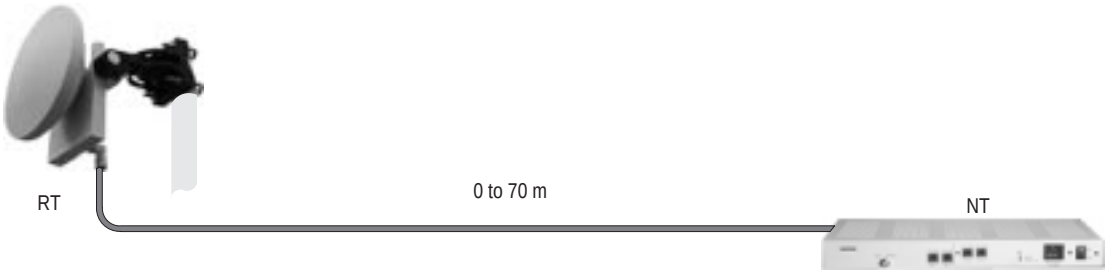
2.4 – Description of the Terminal Station (9900TS)

The A9900 system Terminal Station (**9900TS**) consists of the following main elements:

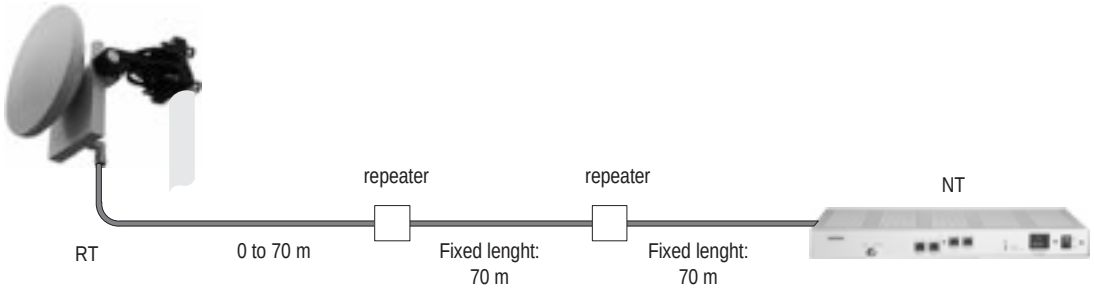
- an external transceiver constituting the **radio antenna** part and designated "**RT**" (Radio Termination);
- a user connection unit constituting the "**indoor**" part and designated **NT** (Network Termination);
- a cable linking the RT and NT and called the indoor–outdoor cable;
- depending on the configurations (see sections 2.5 3.7 3.8), one (or more) **repeater** module(s), or (and) one (or more) **splitter** module(s).

2.5 – Examples of configuration of the Terminal Station (9900TS)

2.5.1 – Mono "NT" without repeater



2.5.2 – Mono "NT" with repeater



A repeater compensates 70 meters of cable.

The system can support maximum **three** 70 m cable sections and **two repeaters**.

2.5.3 – Multi “NT” (max.4) with passive splitters and repeaters

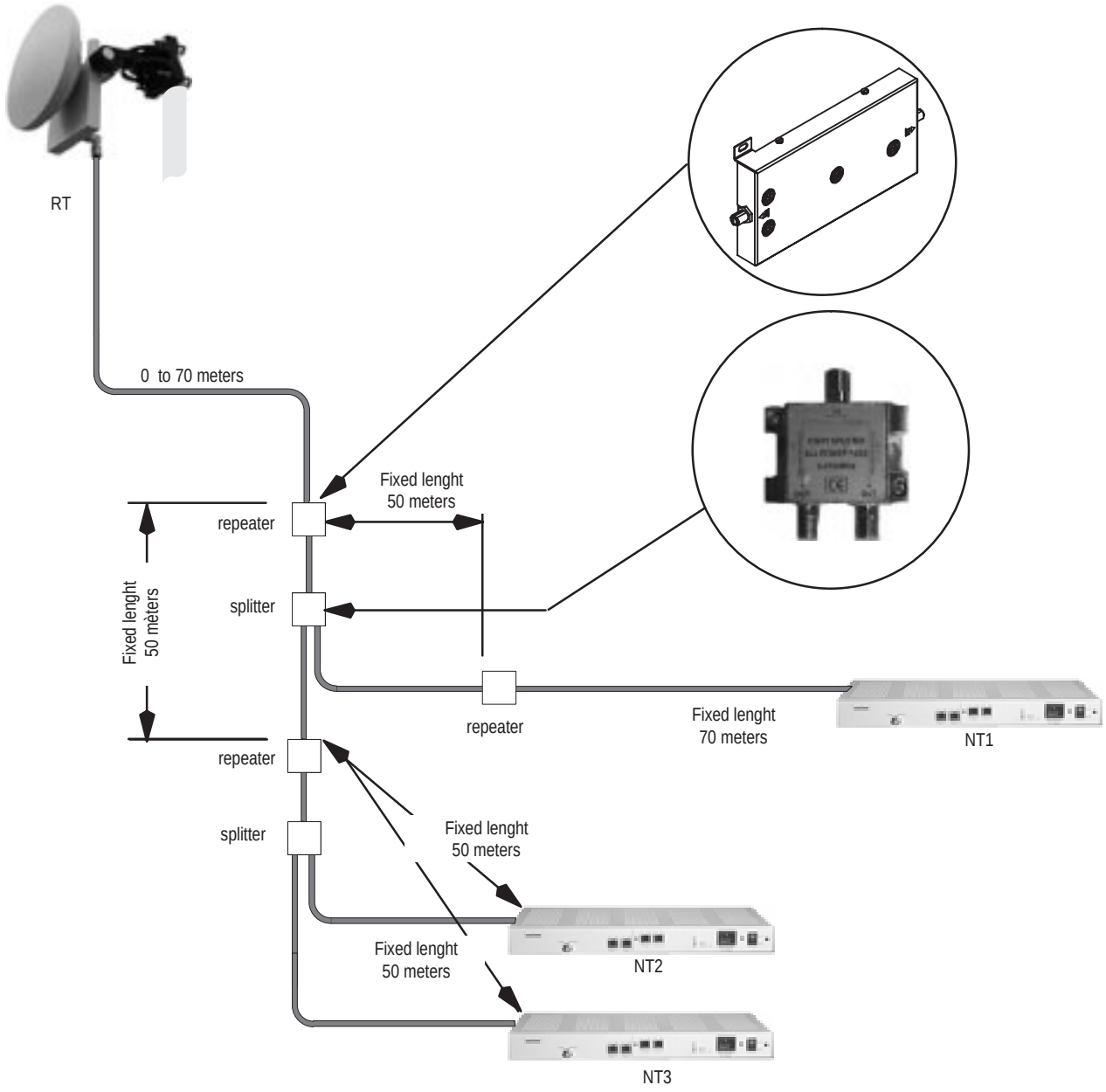


Figure 3 – Example of assembly with passive splitters and repeaters

The system can support 2 repeaters and 3 passive splitters per route. **Route** means the path between a NT unit and the RT unit.

The fixed distance between two repeaters or between a repeater and a NT unit is 50 meters if a passive splitter is used.

The fixed distance between two repeaters or between a repeater and a NT unit is 30 meters if two passive splitters are used.

2.6 – Technical specifications of the Terminal Station (9900TS)

2.6.1 – RT specifications

Designation	Description	Observations
Dimensions HxLxD	200(mm)x200(mm)x50(mm)	antenna diameter: 26 cm cf. diagram in § 3 Installation
Weight	2 kg	—
Operating temperature	–33°C to + 55°C	—

2.6.2 – NT specifications

There are three types of NT unit:

	9900 NCA 001	9900 NCA 002	9900 NCD 001
Telephony, leased lines	2 x E1 (G703+G703)	2 x E1 (G703 + X21)	—
Data	2 x 10bT Eth	2 x 10bT Eth	2 x 10bT Eth

Designation	Description	Observations
Dimensions WxHxD	19”x1Ux240(mm)	cf. diagram in § 3 Installation
Weight	3 kg	—
Supply voltage	85V–264V AC	—
Data interface	10 Base T Ethernet	—
E1 interface	G703 and/or X21	—
Operating temperature	–5°C to + 45°C	—

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3 – Installation of the 9900TS Terminal Station

3.1 – Equipment delivery

When you receive the equipment in its packaging:

- Check the condition of the packaging.
- If damaged, make your reservations known to the carrier without delay.

3.1.1 – Unpacking

Considerations

- Unpack the equipment according to the instructions on the packaging.
- Take an inventory and identify any missing items. If the delivery does not match the delivery advice note, notify ALCATEL **within 48 hours of receipt of the equipment**.

Stages (Figure 4)

1. Open the cover flap of the package lid.
2. Remove the cardboard packing wedge protecting the box's contents.
3. Remove the RT unit, taking care not to damage the antenna.
4. Remove the slotted casing from the box.
5. Remove the packaged items fixed in the slots of the casing.
6. Detach the drilling template if wall–mounting is to take place.

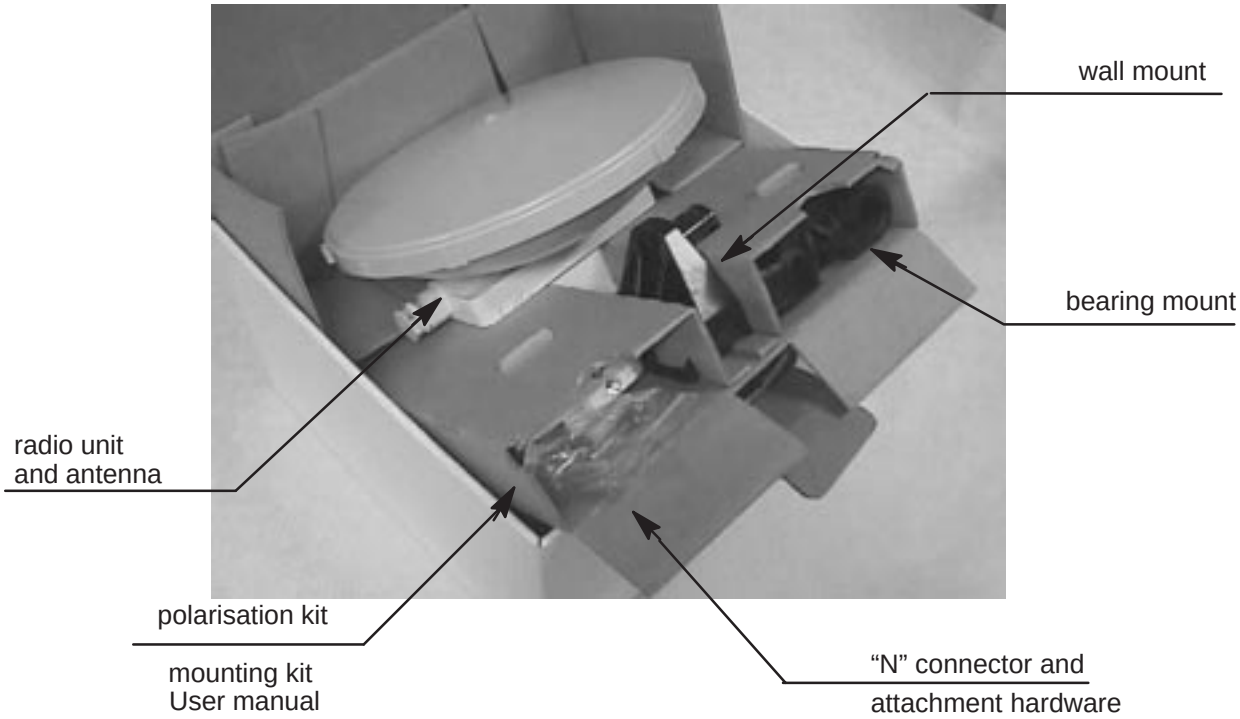


Figure 4 – Unpaking the RT unit

Figure 5 – Unpacking the NT unit

The NT unit equipment is protected by safety cover. Do not unpack the equipment in advance if it is not to be installed immediately.

3.1.2 – Checking the configuration

The Terminal Station components are delivered in cardboard boxes:

- the **RT unit** (also called **RT** or **RT radio**) and its installation accessories are in one box,
- the **NT unit** (also called **NT**) and its installation accessories are in another box,

Depending on the site configurations, the delivery will include individual boxes containing:

- one or more **splitter** modules,
- one or more **repeater** modules.

3.1.2.1 – Content of boxes

EQUIPMENT	CONTENTS
RT UNIT	1 RTwith antenna mounted assembly
	1 wall mount
	1 bearing mount
	1 horizontal polarisation kit with screw accessories
	2 U bolts
	1 bag containing 1 type “N” 75 ohm connector four M6x50 screws with washers and plugs; four M8 nuts with washers, 2 terminal lugs and one M6x20 screw with washers
	1 installation manual

EQUIPMENT	CONTENTS
NT UNIT	1 Indoor Unit
	1 power supply cable
	1 installation kit containing feet, bracket mouting, handles, attachment accessories and 1 “**F**” connector

EQUIPMENT	CONTENTS
Splitter kit	1 splitter module
	1 bag containing screw accessories

EQUIPEMENT	CONTENTS
Repeater kit	1 repeater module
	1 bag containing screw accessories

3.1.2.2 – Specific case of RT units delevered without integrated antenna

	**IMPORTANT NOTE: NEVER REMOVE THE ROUND YELLOW PADS USED TO SEAL THE OUTDOOR SYSTEM.**

3.1.2.3 – Storage

If installation is to be deferred, the type of packaging will define the equipment storage conditions:

- cardboard boxes should be warehoused indoors, in a well–ventilated and dry room ,
- wooden or plywood boxes may be stored outdoors, provided that they are protected from rain and direct sunlight.

3.2 – Labels on the equipment

The labels below are affixed to the equipment and their cardboard boxes to indicate the contents.

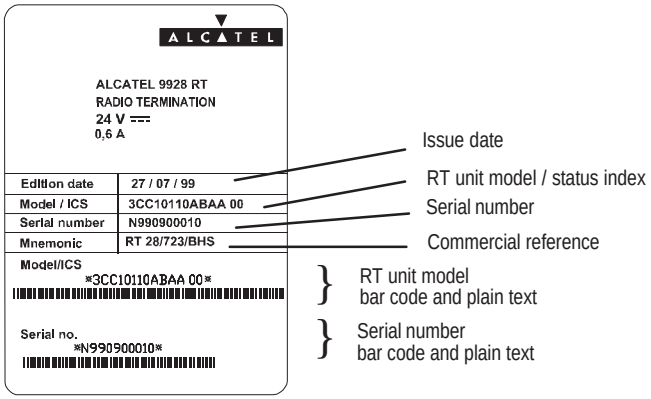


Figure 6 – Packaging of the RT unit

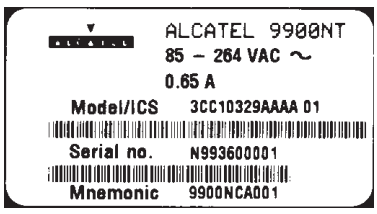


Figure 7 – Packaging of the NT unit

3.3 – Installing the equipment

It is recommended that all peripheral equipment (e.g., repeaters, splitters) as well as the engineering accessories should be installed before installation of the Terminal Station.

3.3.1 – Information required for installation

Appendix 1 contains a sheet for you to complete to collate all the general information needed for the installation procedure.

3.3.2 – Precautions concerning electromagnetic compatibility

Installation is designed to meet all new requirements concerning electromagnetic compatibility and safety

The performance of the equipment depends on installation practices (cable installation, ground connections, etc.) which should be based on best trade practices and which may be degraded if this pratices are not respected.

3.3.3 – Tools required

The installation personnel must possess a standard installation toolkit (containing, in particular: drill, drill bits, soldering iron, cable tie pliers, terminal pliers).

The list of tools required for the mechanical installation of the Terminal Station is given below.

Tool	Use
5 mm Allen key (for M6 screw)	For securing the pole mounting and wall mounting
13 wrench	For tightening the U bolts on the 40 to 50 mm tube
Level gauge or inclinometer	For verticaly of the bearing axis

A compass and a pair of binoculars (not supplied) are useful for rough prepointing of the antenna.

The use of a torque wrench is recommended.

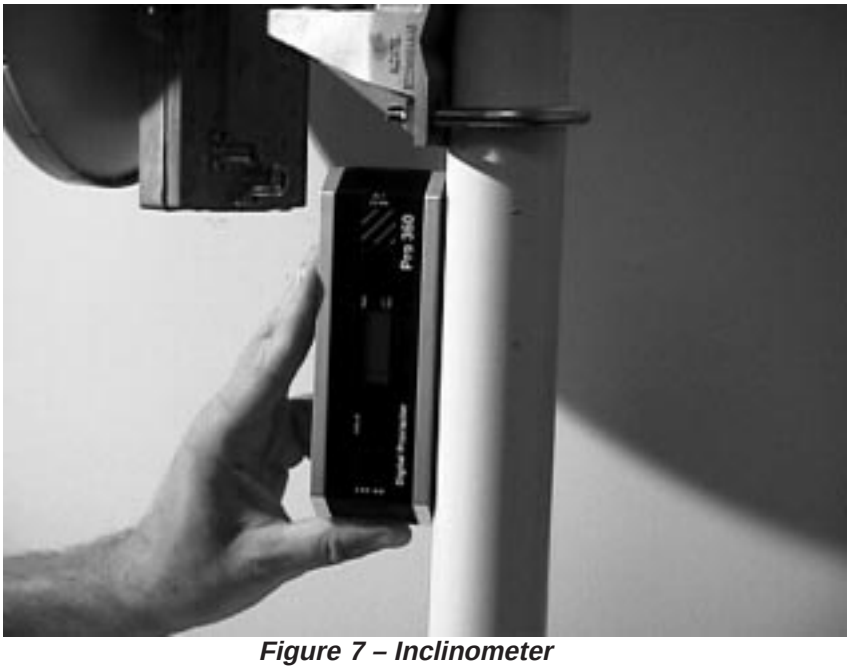


Figure 7 – Inclinometer

3.4 – Installation of the Terminal Station RT unit

IMPORTANT NOTE: NEVER HANDLE THE RT UNIT BY ITS ANTENNA BUT BY THE BODY OF THE RADIO OR THE SUPPORT ARM.

Considerations:

The installation of the RT unit should satisfy the following criteria:

- unimpeded direct line of sight between RT unit and RBS (Base Station),
- perfect mechanical rigidity,
- enabling precise antenna alignment.

The 9900RT is designed for outdoor installation without any particular protection. However, the following recommendations should be respected:

- avoid installation below bird nesting areas,
- avoid attaching to a surface prone to vibrations (machinery, lift housing, air conditioning, etc.).
- avoid attaching to chimneys which give off fat deposits, dust and other aerosols which are liable to come to rest on the equipment,
- avoid proximity to sources of heat,
- avoid placing the equipment in proximity to corrosive gas outputs,
- avoid placing the equipment below roof run–offs not equipped with guttering (high risk of microwave short–circuit).
- avoid installing at man–height to prevent human collisions against the antenna. This could cut the radio link with the central station.

Two types of assembly are possible:

- on a flat, vertical surface (e.g., a wall),
- on a pole/tube (existing or to be installed), using threaded U–bolts and nuts (M8).

Note : *The pole/tube selected should be sufficiently rigid to prevent antenna misalignment and resist vibrations.*
Use tube supports that comply with our recommendations. Support references are mentionned in the next chapters.

3.4.1 – Definition of assemblies with respect to chosen polarization

The Terminal Station RT unit can be mounted with horizontal (H) or vertical (V) polarization.

Terminal Station and Base Station must use the same polarization.

To mount the radio/antenna assembly on the support arm, in the event of horizontal polarization, the horizontal polarization kit must be used. This consists of an additional joint to compensate for the mechanical rotation of the system.

The pole–mounting mechanical assembly consists of (Figure 8):

– two components in the case of vertical polarization (V):
  - wall mounting (ref.1)
  - bearing mounting (ref.2),

– three components in the case of horizontal polarization (H):
  - wall mounting (ref.1)
  - bearing mounting (ref.2)
  - polarisation mounting (ref.3).

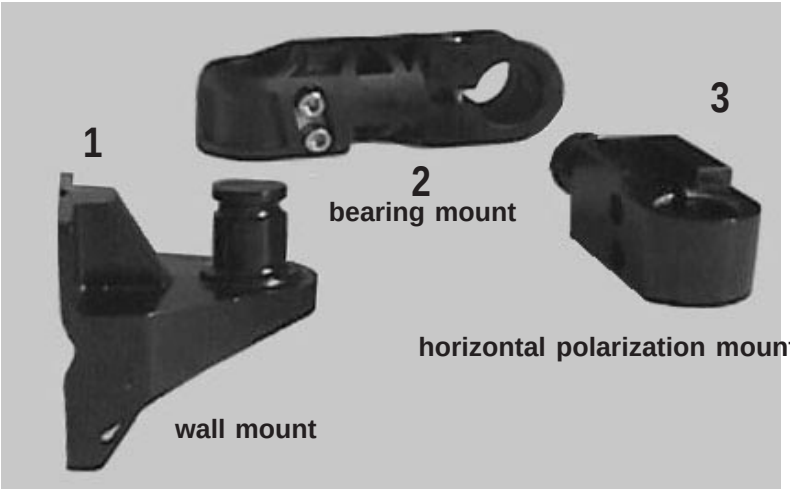


Figure 8 – Support arm components

A polarization slot indicator at the rear of the RT unit can be checked to confirm that the assembly is correct with respect to the chosen polarization:

– if the letter "**H**" can be read naturally, polarization is **horizontal**,

– if the letter "**V**" can be read naturally, polarization is **vertical**,

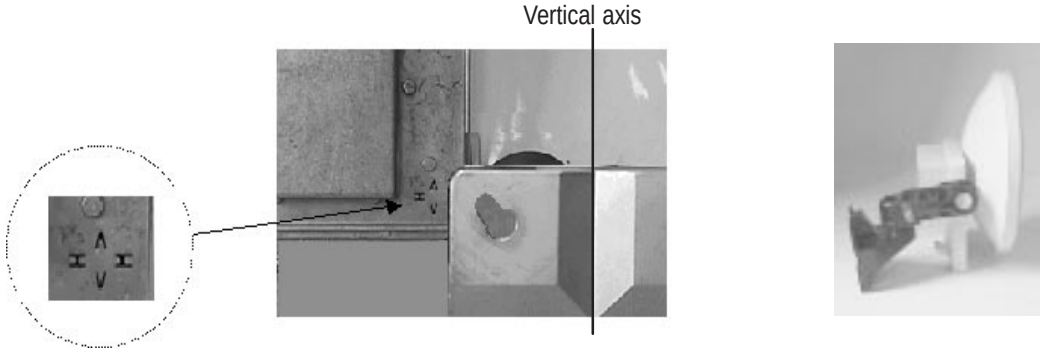


Figure 9 – Vertical Polarization

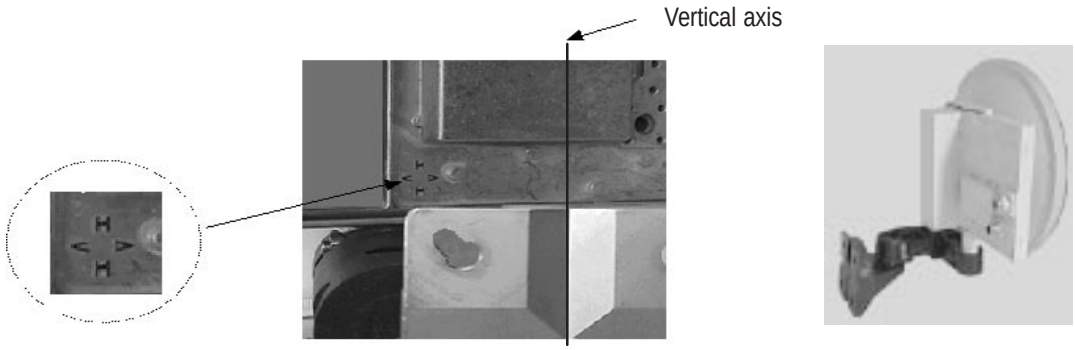


Figure 10 – Horizontal polarization

3.4.2 – Installation of the 9900RT on a wall or flat vertical surface

Considerations:

- If attaching the RT unit using bolts and plugs, select the attachment components to suit the composition of the attachment surface.
- The surface chosen should not be prone to vibrations (e.g., avoid machine housings).
- To mark the drill holes, use the drilling template printed on the inside panel of the RT unit packaging box.

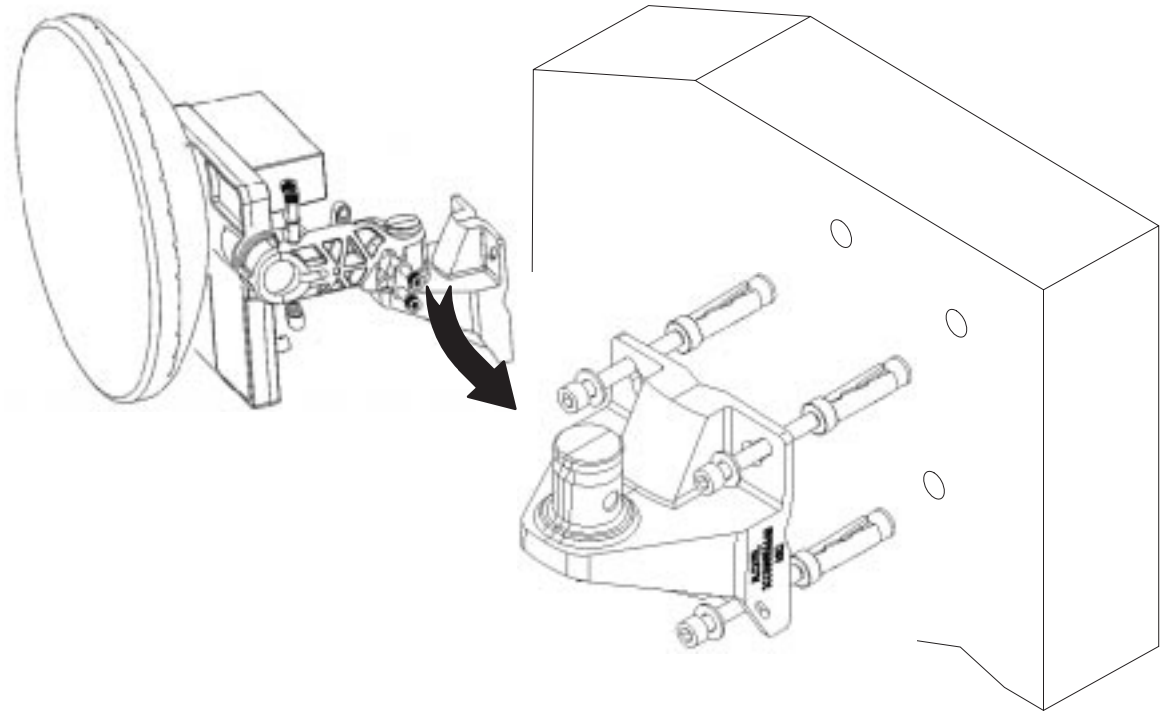


Figure 11 – Installation of the RT unit on a wall

Stages

1. Select the installation location and determine the polarization of the RT unit.
2. Place the drilling template against the wall (or surface) to be pierced.

Note : ***The vertical axis of the wall mounting assembly must be respected****. Refer to Figure 12. Used a bubble level or inclinometer.*

3. Drill the 4 holes.
4. Insert the 4 plugs.
5. Install and secure the wall mounting (V et H polarization) using four M6x50 screws with washers.

Note : *screw torque = 4,3 to 4,9m.N.*

	**IMPORTANT : WALL MOUNT VERTICALITY OF +/– 1° REQUIRED FOR POLARIZATION**

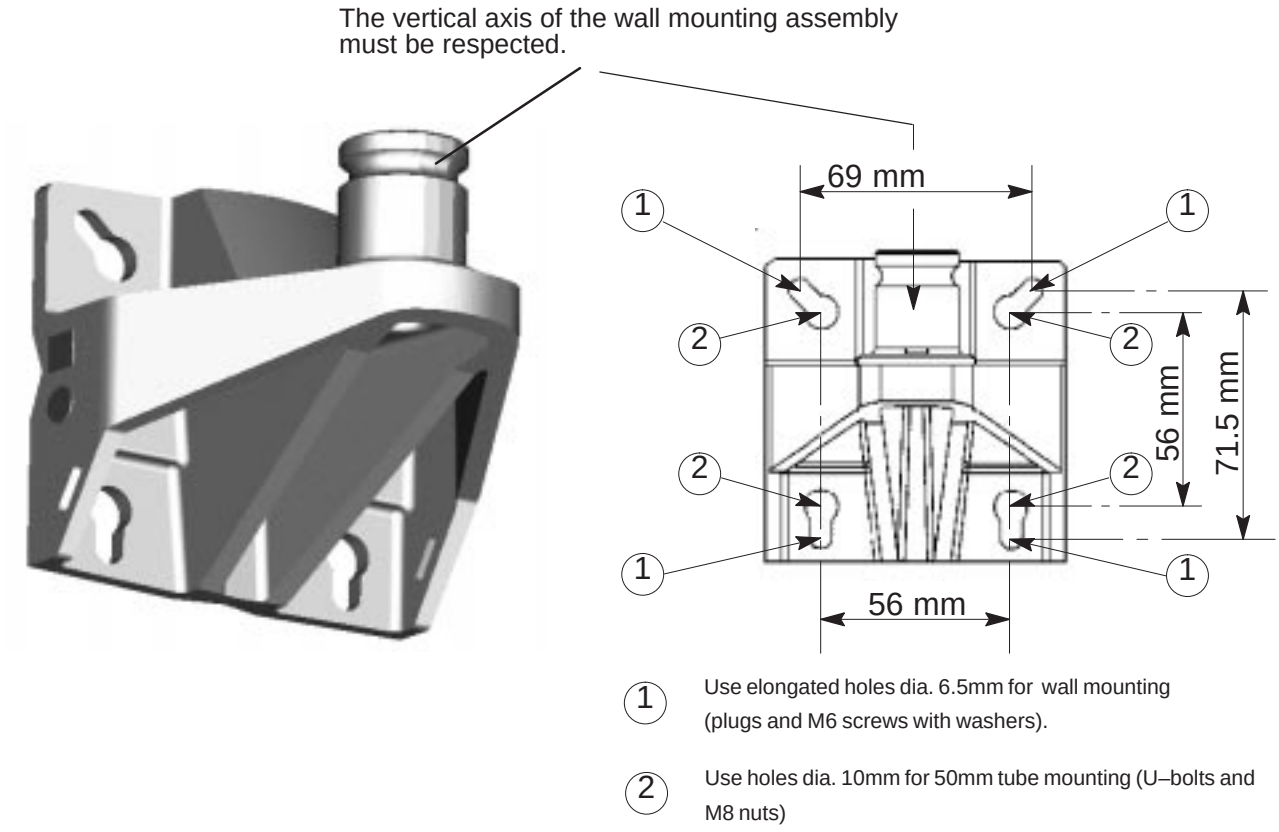


Figure 12 –Wall mounting

6. Install and secure the bearing mounting on the wall mounting (V and H polarization).

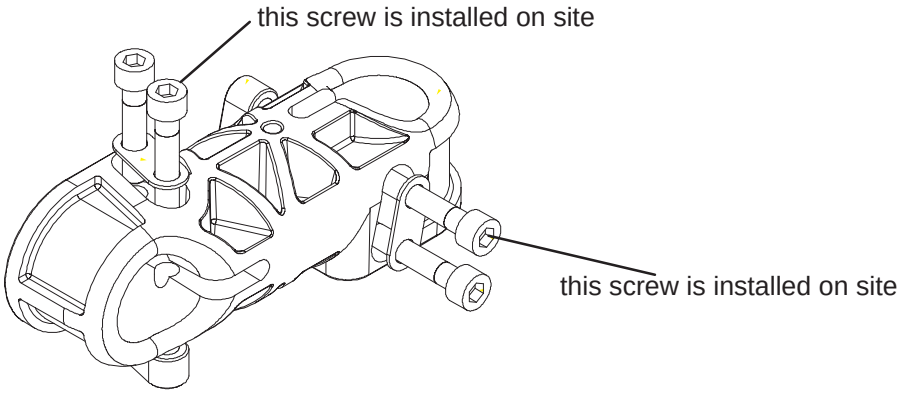


Figure 13 – Screws mounting

To continue the hardware installation, go to step 7 in the case of horizonal polarization or go directly to step 8 for vertical polarization.

7. Install and secure the polarization mounting (H polarization only).
8. Install and secure the RT unit on the support arm. Check on polarization indicator that the polarization assembly is correct.
9. Release the RT assembly locking screw and carry out antenna prepointing visually and/or using a compass and a map. To do this, orientate the assembly so that the antenna is pointed towards the Base Station antenna.
10. Remove the radio module from its axis for configuration (see Chapter 4 – Commissioning)

3.4.3 – Installation of the RT unit on a tube

Considerations

- Install on tube using two U–bolts.
- Installation may be carried out on a newly installed or existing tube, using the two U–bolts.
- The external diameter of the tube is 50 mm in standard configuration.
- The support tube, along with the U–bolts, must be clean and (apart from threads) grease–free.
- If specific site features make perfect alignment impossible (line of sight parallel to the wall, for example). you are recommended to use a support that complies with our specifications (see references) in the paragraphs which follow.

	**IMPORTANT : WALL MOUNT VERTICALITY OF +/– 1° REQUIRED FOR POLARIZATION**

	**IMPORTANT NOTE: THE USE OF SUPPORTS WITH A SLENDERNESS RATIO GREATER THAN OUR MODELS SHOULD BE EXCLUDED (TOO FLEXIBLE)**

Note : *the use of supports with slenderness ratios inferior to our own is authorized (more rigid).*

Note : *slenderness ratio = length / cross–section of sections used.*

Steps

1. Select the installation location and determine the polarization of the RT.
2. Install and secure the wall mounting (V et H polarization) using the two U–bolts (and nuts and washers) provided for this purpose or the attachment hardware delivered with the specific wall mount.

Note : *screw torque = 10.5 to 12 m.N.*

Note : ***The vertical axis of the wall mounting assembly must be respected.***

3. Install and secure the bearing mounting on the wall mounting (V and H polarization), See Figure 8.

To continue the hardware installation, go to step 4 in the case of horizontal polarization or go directly to step 5 for vertical polarization.

4. Install and secure the polarization mounting (H polarization only).
5. Install and secure the RT radio unit with its antenna on the support arm. Check the polarization indicator to check correct polarization.
6. Release the RT assembly locking screw and carry out antenna prepointing visually and/or using a compass and a map. To do this, orientate the assembly so that the antenna is pointed towards the Base Station antenna.
7. remove the radio module from its axis for configuration (See Chapter 4 – Commissioning)

3.4.3.1 – Installing th RT unit on an existing tube, 40 or 50 mm in diameter

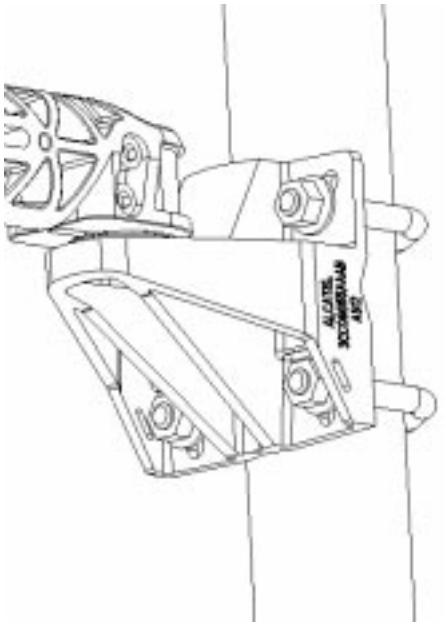


Figure 14 – Installing th RT unit on an existing tube, 40 or 50 mm in diameter

3.4.3.2 – Installing the RT unit on an existing tube, 50 to 115 mm in diameter

Use the 3CC10802 AAAA kit.

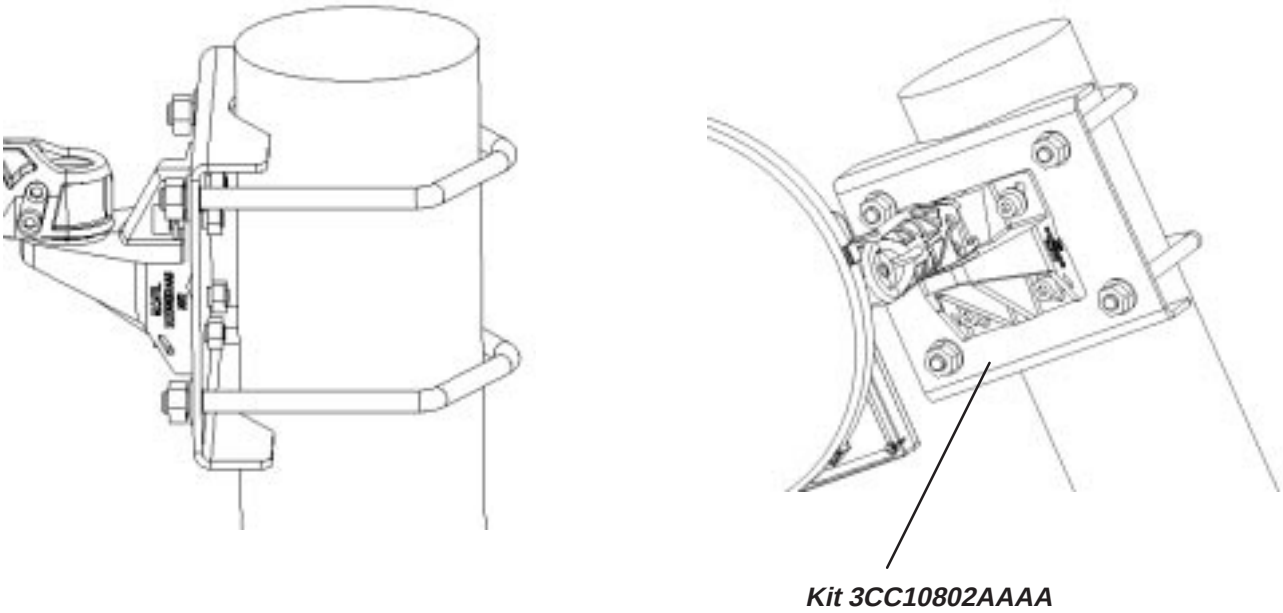
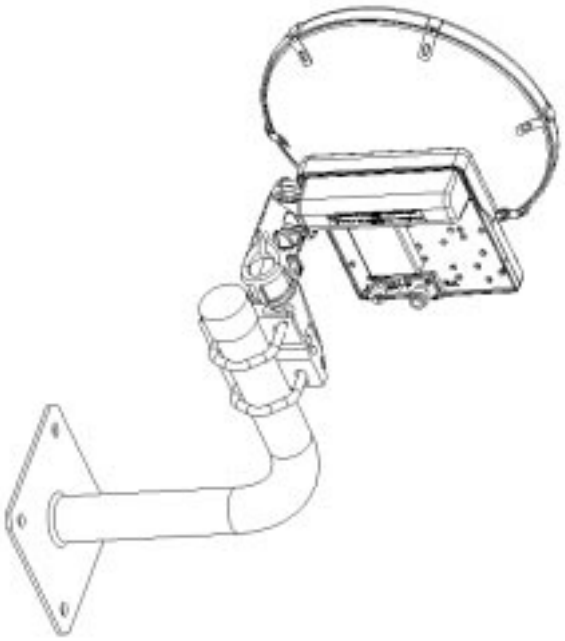


Figure 15 – Installing the RT on a tube, 50 to 115 mm in diameter

3.4.3.3 – Façade installation of the RT unit

Use a support in accordance with our 3CC11132AAAA model.



3.4.3.4 – Rooftop mounting of the RT unit (offset), 1 meter mast

Use a support in accordance with our 3CC11133AAAA model.

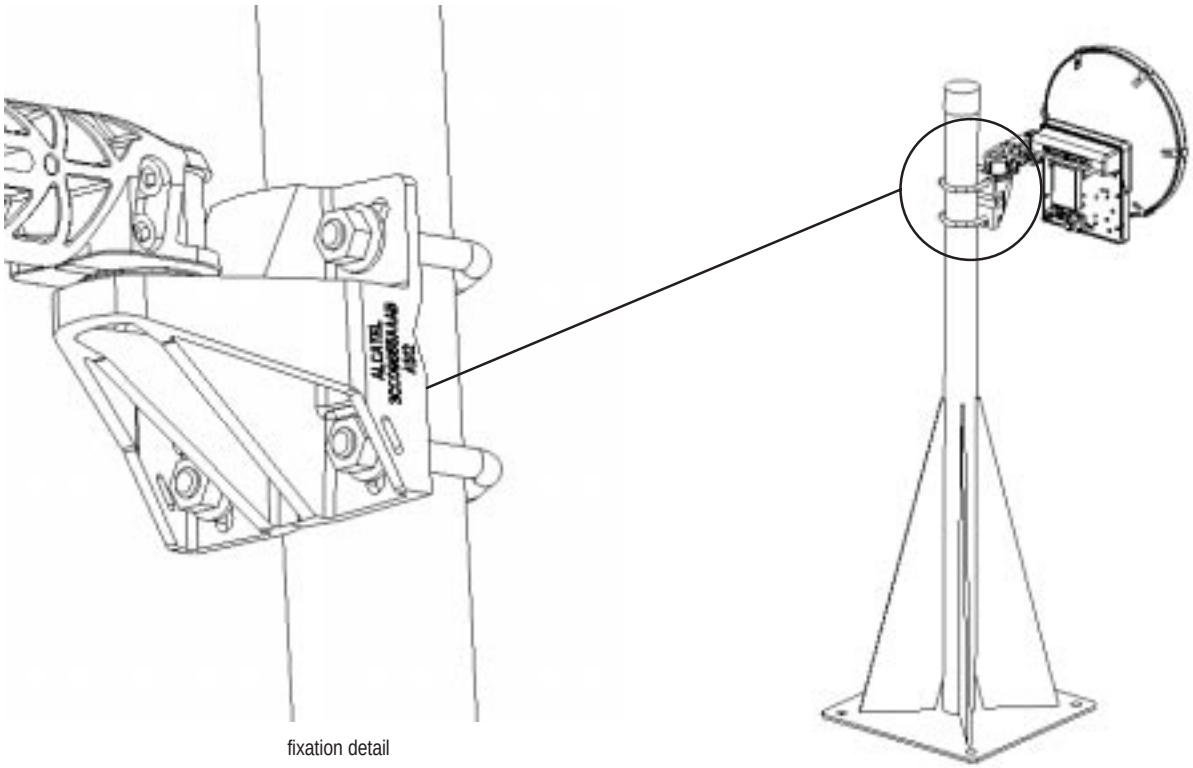


Figure 16 – Rooftop mounting of the RT unit (offset), 1 meter mast

3.4.3.5 – Rooftop mounting of the RT unit (raised), 1,5 meter mast

Use a support in accordance with our 3CC11134AAAA model.

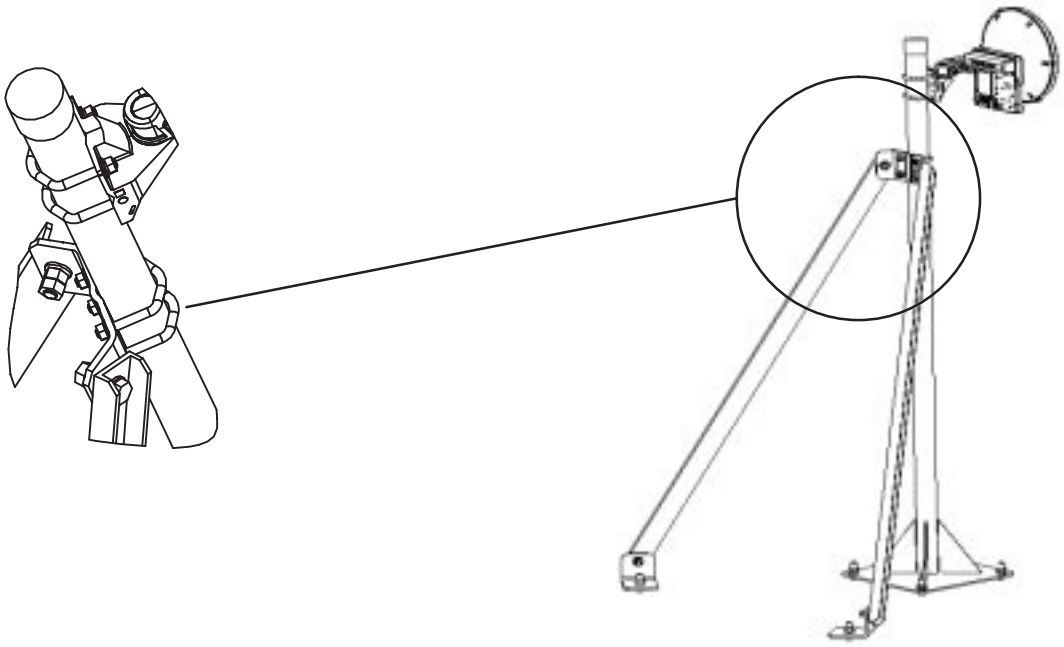


Figure 17 – Rooftop mounting of the RT unit (raised), 1.5 meter mast

3.4.4 – Grounding the RT unit

Considerations

- On the RT unit, the ground terminal is in the form of a tapped hole (see figure 18) on the attachment axis of the pole mounting.
- The RT unit can be grounded using the grounding lug and screw hardware supplied with the equipment. The grounding uses a green and yellow cable with an insulating sheath, and with a minimum cross–section of 16 mm^2.

Steps

1. Crimp a lug (ref.: 16–6 CT) on to the grounding cable (16 mm^2 cross–section).
2. Screw the cable lug into the tapped hole. Use an M6 screw.

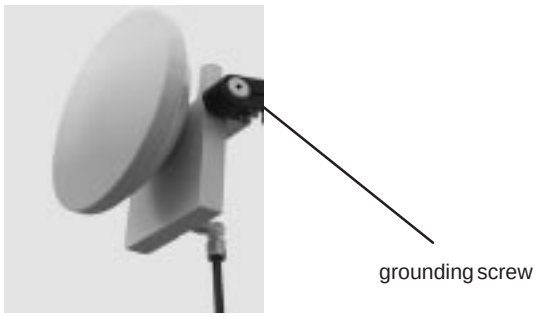


Figure 18 – Grounding the RT unit

3.5 – Installation of the RT/NT link

Considerations

- The electrical connection between the RT unit and the NT unit of the Terminal Station is made using a type ET 2PA 981 **75 ohms coaxial cable** equipped with "**F**" connectors (at the NT side end) and "**N**" connectors (at the RT side end).
- If a single cable (70 meters without connectors) does not cover the distance between the RT unit and the NT unit, two or more repeaters must be used. For the possible configurations and installation of a repeater, see paragraph 3.7 of the present chapter.
- If the RT unit is connected to several NTs of the Terminal Station, use several splitters. For the possible configurations, and installation of a splitter, see paragraph 3.8 of the present chapter.
- The length of the cable used must be noted. In order to facilitate this measurement, refer to the markings printed on the cables: every meter, on the outer sheath, the number of meters is indicated incrementally. To know the length of cable installed, subtract the number at one end from the number at the other end of the cable used. Note the result at the NT.
- You are recommended to secure the coaxial cable every meter with a cable tie.

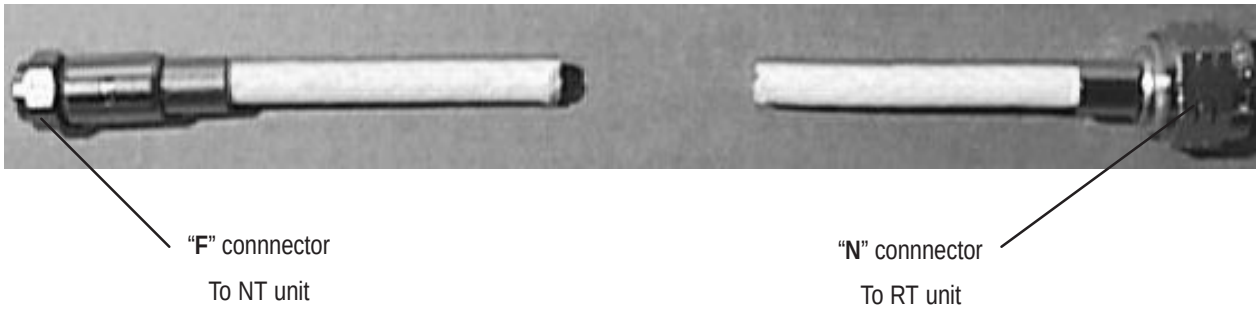


Figure 19 – Coaxial cable

Steps

1. Carry out the wiring between the RT unit and the NT unit.

Note : *In the event of the use of repeaters and/or splitters, use the number of cables required by the configuration. Refer to paragraphs 3.7 and 3.8 of this chapter.*

Note : *Make a drip groove where the cable enters the building, respection the cable's bending radius(100 mm minimum), in order to prevent water infiltration.*

	**AVOID A TOO LONG PARALLEL WALK BETWEEN THE RT/NT COAXIAL LINK AND ELECTRICAL CABLES, OR GSM/DCS BASE STATION CABLES.**

2. Note the length of the cable installed. This information will be entered into the database when the equipment is commissioned using the configuration software.

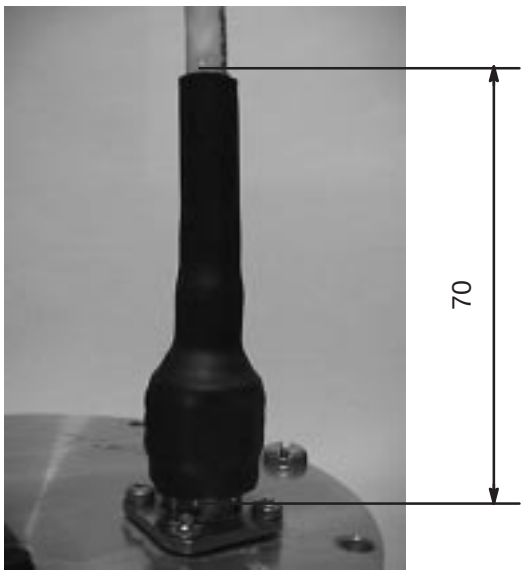
Note : *The accuracy required by the configuration software is ± 1.5 m.*

3. At the RT unit side end, equip the cable with a type "**N**" 75 ohm coaxial connector, supplied with the equipment. For attaching the coaxial terminals, refer to the manufacturer's Assembly manual and use the

specific tools as recommended. One of the main causes of installation problems is the faulty mounting of connectors.

⚠	**NEVER USE 50 OHM CONNECTORS, AT THE RISK OF DESTROYING THE RADIO UNIT.**
⚠	**IMPORTANT NOTE: NEVER HANDLE THE RT UNIT BY ITS ANTENNA BUT BY THE BODY OF THE RADIO OR THE SUPPORT ARM.**

⚠	**IMPERATIVE : PROTECT THE “N” CONNECTOR CONNECTION WITH A PRE–PASTED THERMOSHRINKABLE SLEEVE.**



Thermoshrink a pre–pasted sleeve on the connector/terminal/cable assembly 70 mm along. (80 mm minimum long before thermoshrink)

The sleeve end should stop at the terminal base.

Figure 20 – Connecting the “N” connector with the thermoshrinkable sleeve

4. Attach the cable to the RT unit using a cable tie.

⚠	**THE COAXIAL CABLE SHOULD NEVER BE TOO TIGHT BETWEEN THE ODU AND ITS MOUNTING. ADJUST THE POSITION OF THE MOUNTING AND THE LENGHT OF THE CABLE TO SUIT, OTHERWISE THERE IS A MAJOR RISK OF ANTENNA MISALIGMENT OR CABLE DAMAGE AT THE CONNECTOR. ON THE OTHER HAND, TOO SLACK A CONNECTION CAN HAVE THE SAME CONSEQUENCES UNDER THE EFFECT TO THE WIND.**

Note : *No overtighten the cable tie on the cable; this could cause deformation of the dielectric and subsequent loss of performance.*

5. Run the cable to the NT unit and equip it with a type “**F**” 75 ohm coaxial connector, supplied with the equipment.

3.6 – Installation of the Terminal Station 9900NT Indoor Unit

A SPACE OF 1U (in the event of rack mounting) OR APPROXIMATELY 50 mm MUST BE LEFT FREE ABOVE THE TERMINAL STATION IDU.

NEVER STORE DOCUMENTATION OR ANY OTHER OBJECTS ABOVE THE NT UNIT ON THE VENTILATION HOLES. THIS MAY CAUSE IT TO BE DAMAGED.

Considerations

- The NT units are intended for indoor installation only.
- The NT should be positioned in accordance with the needs of the user and the technical constraints (e.g., minimum distances to be respected, topology of the connections, accessibility of the RT/NT link, power supply).
- Always place the NT unit in a dry, dust–free environment, away from any major source of heat (–5 < T< + 45°).
- Always place the NT unit near a rated power source: 85/264V – 47/63Hz with ground connection.

Note : *Use grounded power connections only. Avoid the use of extension cables.*

- The power supply is turned on after installation of the NT, when it is commissioned.
- Do not install the NT too close to the ground (keep at a distance from dust and floor cleaning products).
- do not install on premises containing corrosive materials.

3.6.1 – Installation of the 9900NT unit on a desktop

Steps

1. After unpacking the unit, fit it with its four feet, clipping them on to the bottom of the unit.
2. Connect the NT unit to the Terminal Station RT (”**F**” connector).

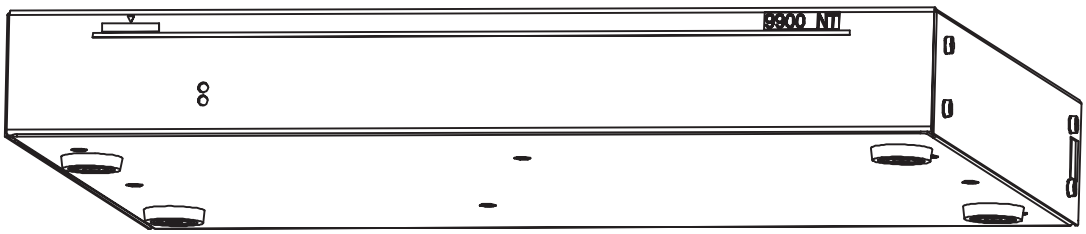


Figure 21 – Mounting the feet

3.6.2 – Installation of the NT unit on a vertical wall support

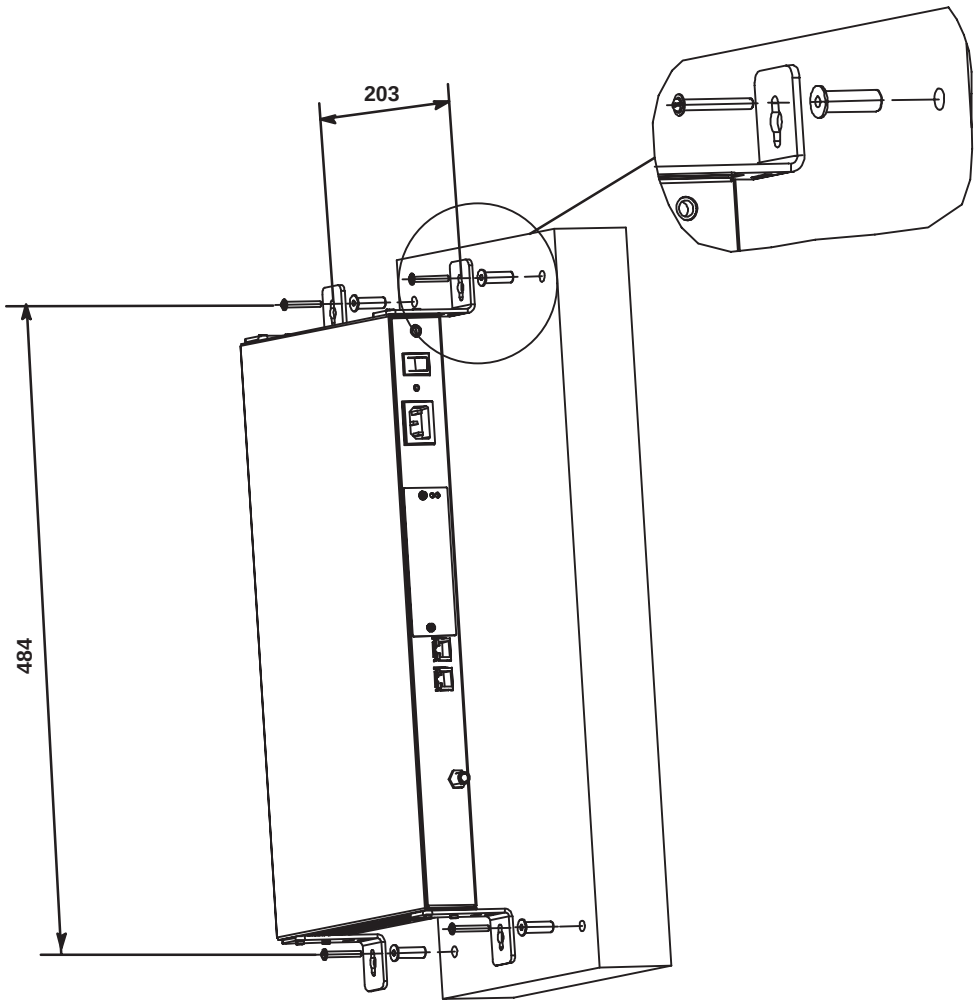


Figure 22 –Installation of the NT on a vertical wall support

Steps

1. Select a flat, vertical wall surface for installing the NT unit, at a height of over 1 meter from the ground.
2. Mount the four brackets on the unit.
3. Mark the position of the holes on the support with a sharp implement or marker.
4. Drill the holes and insert the plugs.
5. Mount and secure the screw fittings, starting from the top.

	**THE MAIN CONNECTOR MUST ALWAYS BE AT THE TOP OF THE UNIT**

	**DO NOT STRAIN OR TWIST THE UNIT**

6. Connect the NT to the RT (”F” connector).

3.6.3 – Installation of the NT unit on a 19” rack

Steps

1. Fit the handles on the NT unit (see figure 23).
2. Install the unit in the 19” (or other type) rack (screw fittings reat included, this depend on the manufacturer).
3. Connect the NT to the RT (”F” connector).

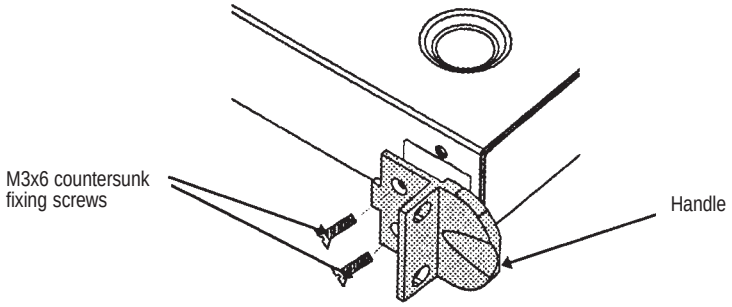


Figure 23 – Fitting the NT unit handles

	**A SPACE OF AT LEAST 1U MUST BE LEFT FREE ABOVE THE ASSEMBLY.**

3.6.4 – Grounding the NT unit

Considerations

- The NT unit can be grounded to the general ground or using a grounding terminal and lug. The grounding terminal is on the right of the NT unit (connections side) and is in the form of a tapped hole (see Figure 24).
- The ground / earth connection should be made as directly as possible between the unit and the general grounding system of the side (bar, rod, plate, etc.).

Steps

1. Crimp a lug (ref.: 16–6 CT) on to the grounding cable (16 mm^2 cross–section).
2. Screw the cable lug into the terminal designed for this purpose. Use an M6 screw.

Figure 24 – Grounding/earthing the NT unit

3.7 – Installation of one or more repeater modules

Considerations

- In the case of a coaxial cable to cover a distance greater than 70 meters between ODU (9900RT) and IDU (9900NT), a repeater module is required to compensate losses.
- Repeaters are installed indoors only, sheltered from dust and heat.
- The repeater must be installed in series on the RT/NT connection (coaxial cable).
- Respect the installation orientation of the repeaters, paying attention to the reference marks on the casing.
- The repeater needs no setting. It has no individual power supply: the repeater automatically takes its power from the supply passing through the RT/NT connection.
- The repeater is a fixed gain bi–directional amplifier. This means that the installation methodology described below MUST be respected.

Repeater installation methodology

1. Between repeater and RT unit, the length of the connection (coaxial cable) is always variable: from 0 to 70 meters.
2. Between repeater and NT unit, the length of the connection (coaxial cable) is always fixed: 70 meters.

First example

Length of coaxial cable less than 140 m (here, 110 m).

A single repeater is used.

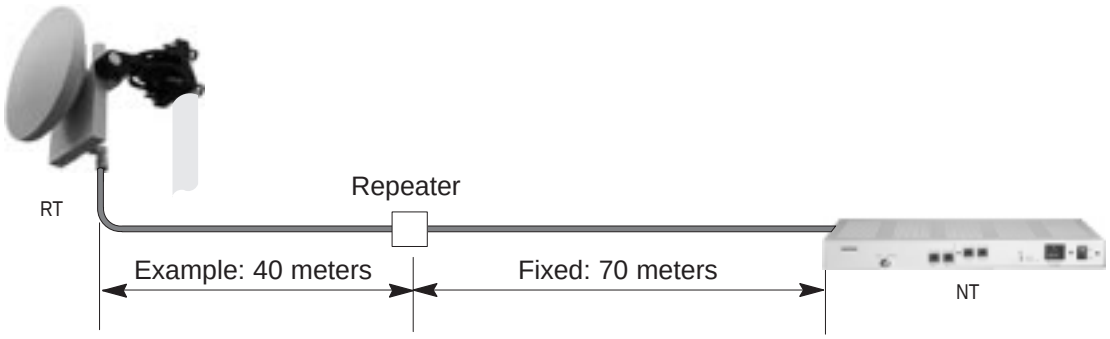


Figure 25 –Installation with one repeater

The variable length, < 70 m, is always situated between repeater and RT unit.

The fixed length, 70 m, is always situated between repeater and NT unit.

Second example

Length of coaxial cable less than 210 m but greater than140 m (here, 200 m).

Two repeaters are used.

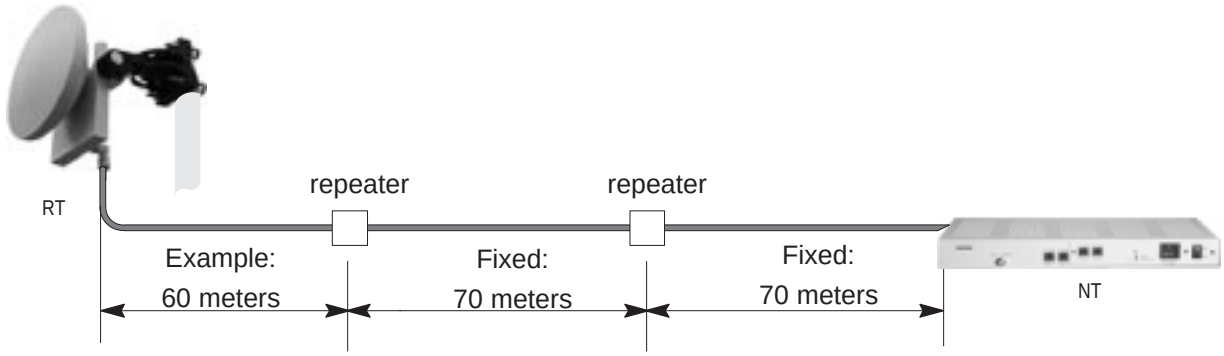


Figure 26 –Installation with two repeaters

Steps

1. Select the installation location with respect to the location of the NT unit.
2. Install and secure the repeater.
3. Wire the repeater to the NT unit and to the RT unit, respecting the instructions contained in the installation methodology above.
4. Note the length of the cables installed. The length of each should be ≤ 70 m. This information will be entered in the database when the equipment is commissioned, using the configuration software.

Note : *The accuracy required by the configuration software is ± 1.5 m.*

5. If the last 70 meter section must be coiled, respect a minimum bending radius of 200 mm.

	**IN ALL CASES, THE LENGTH OF THE CABLE SHOULD NOT EXCEED 210 meters FOR A MAXIMUM OF 2 REPEATERS.**

3.8 – Installation of one or several repeaters with passive splitter(s)

Considerations

- Where there are several NT units for a single RT unit, one or several splitter(s) need(s) to be used.
- For a single RT unit it is possible to mount up to four NT units.
- The passive splitter is installed in series on the RT/NT connection (coaxial cable).
- The passive splitter has no individual power supply: it feeds the power through from the NT to the RT.
- Respect the installation orientation of the repeaters and splitters, paying attention to the reference marks on the casing.
- The length of the cable used must be noted. In order to facilitate this measurement, refer to the markings printed on the cables: every meter, on the outer sheath. To know the length of cable installed, subtract the number at one end from the number at the other end of the cable used.

Methodology

- The system supports a maximum of 2 repeaters and 3 splitters per route. **Route** means the path between an NT unit and the RT unit.
- The variable distance between an RT and a repeater is from 0 to 70 meters.
- The fixed distance between two repeaters is 70 meters.
- The fixed distance between a repeater and an NT is 70 meters.
- The fixed distance between two repeaters encompassing a passive splitter is 50 meters.
- The fixed distance between a repeater and an NT, and encompassing a splitter, is 50 meters
- The fixed distance between two repeaters encompassing two passive splitters is 30 meters.
- The fixed distance between a repeater and an NT, encompassing two splitters, is 30 meters
- If a fixed lenght section must be coiled, respect a minimum bending radius of 200 mm.

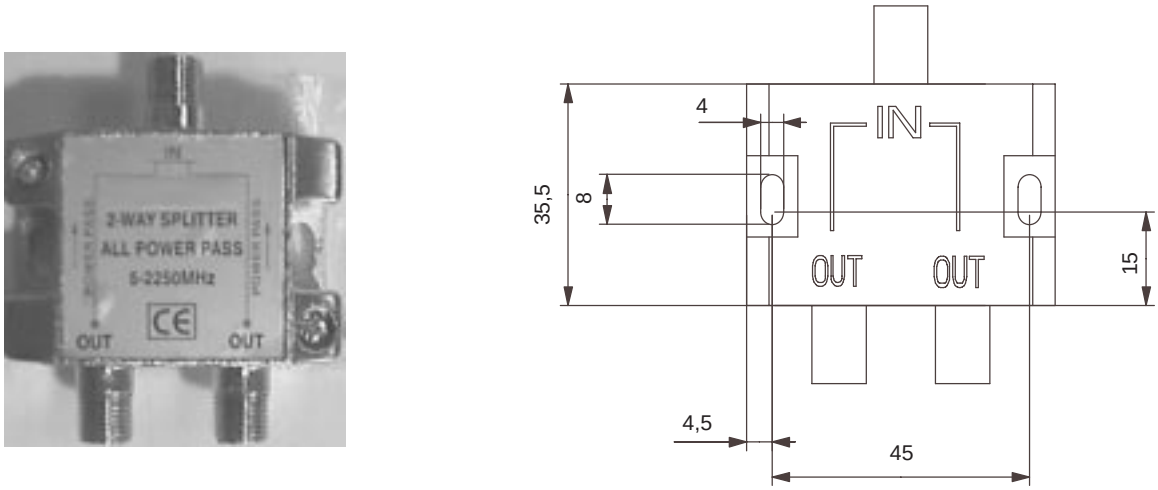


Figure 27 – Passive splitter

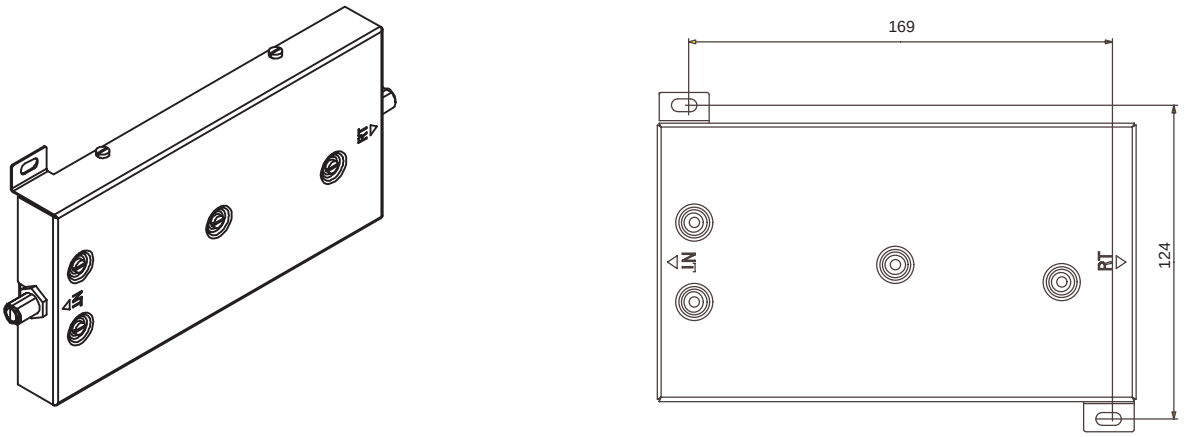


Figure 28 – Repeater

Example of "star" assembly

This scheme is to be preferred since only 2 splitters are used per route.

It is well suited to the distribution of NTs on the same floor of a building.

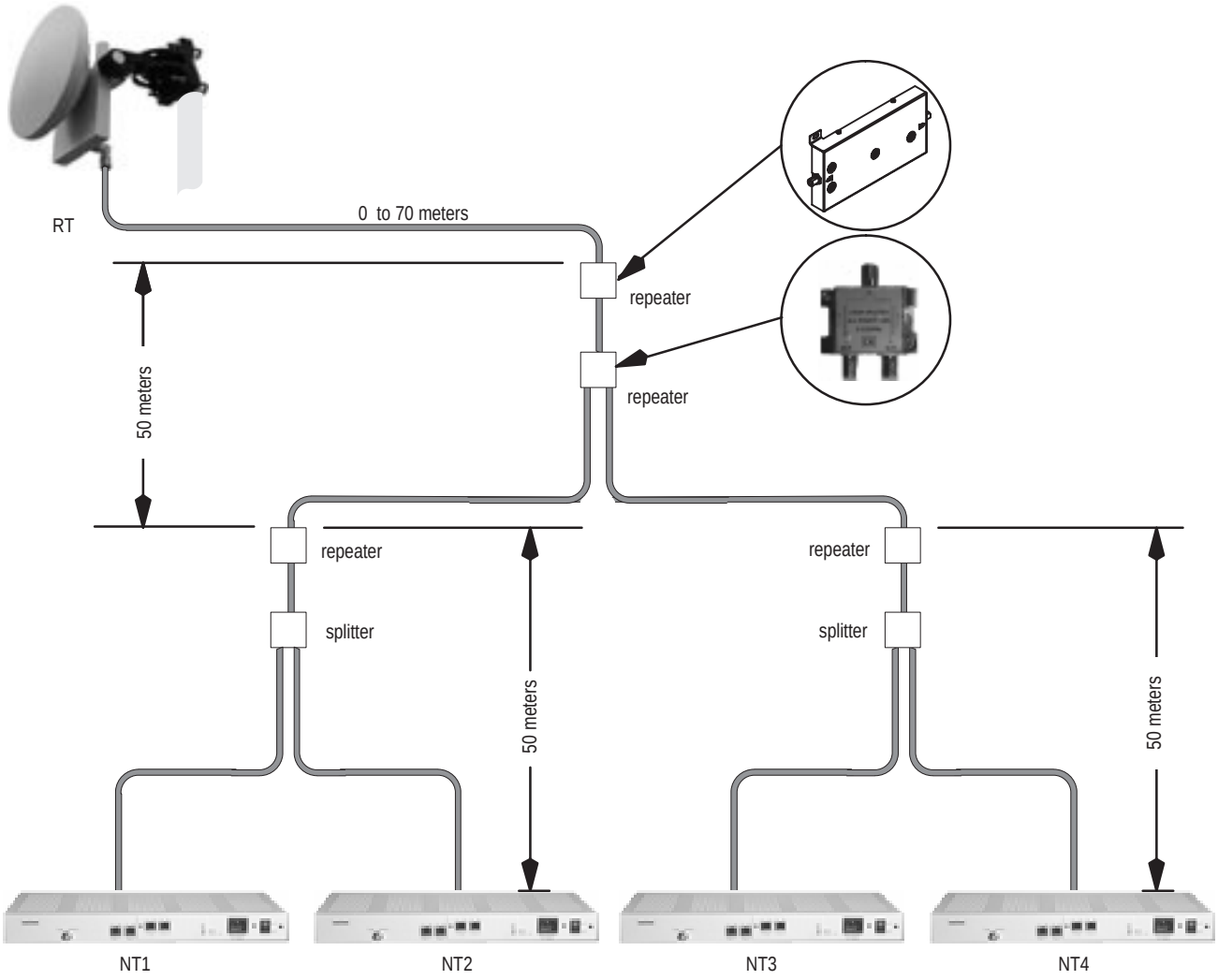


Figure 29 – Preferred "star" assembly

Example of the use of 75 ohm loads on cables or accesses waiting for one NT.

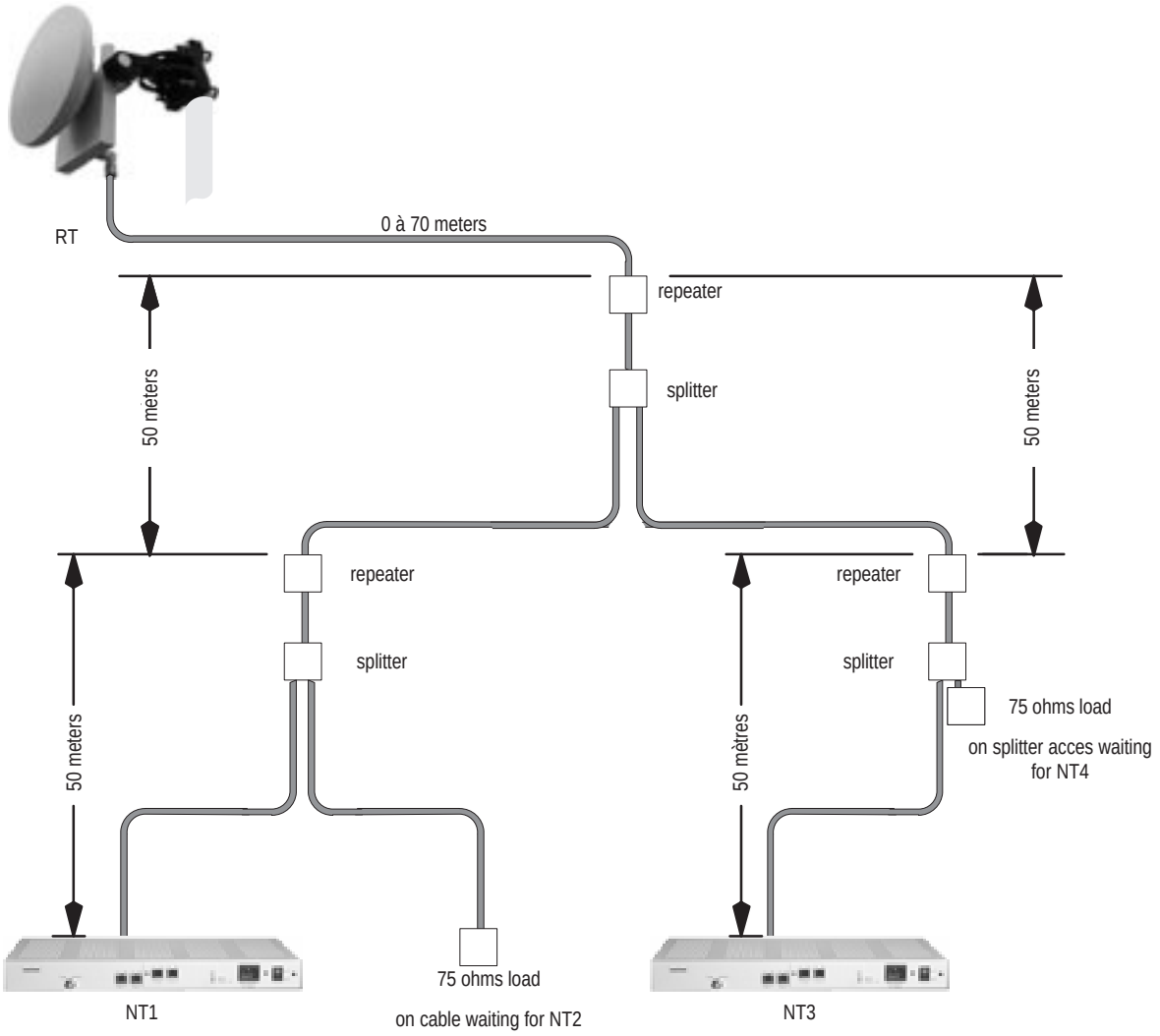


Figure 30 – assembly withs 75 ohms loads .

Example of “stepped” assembly

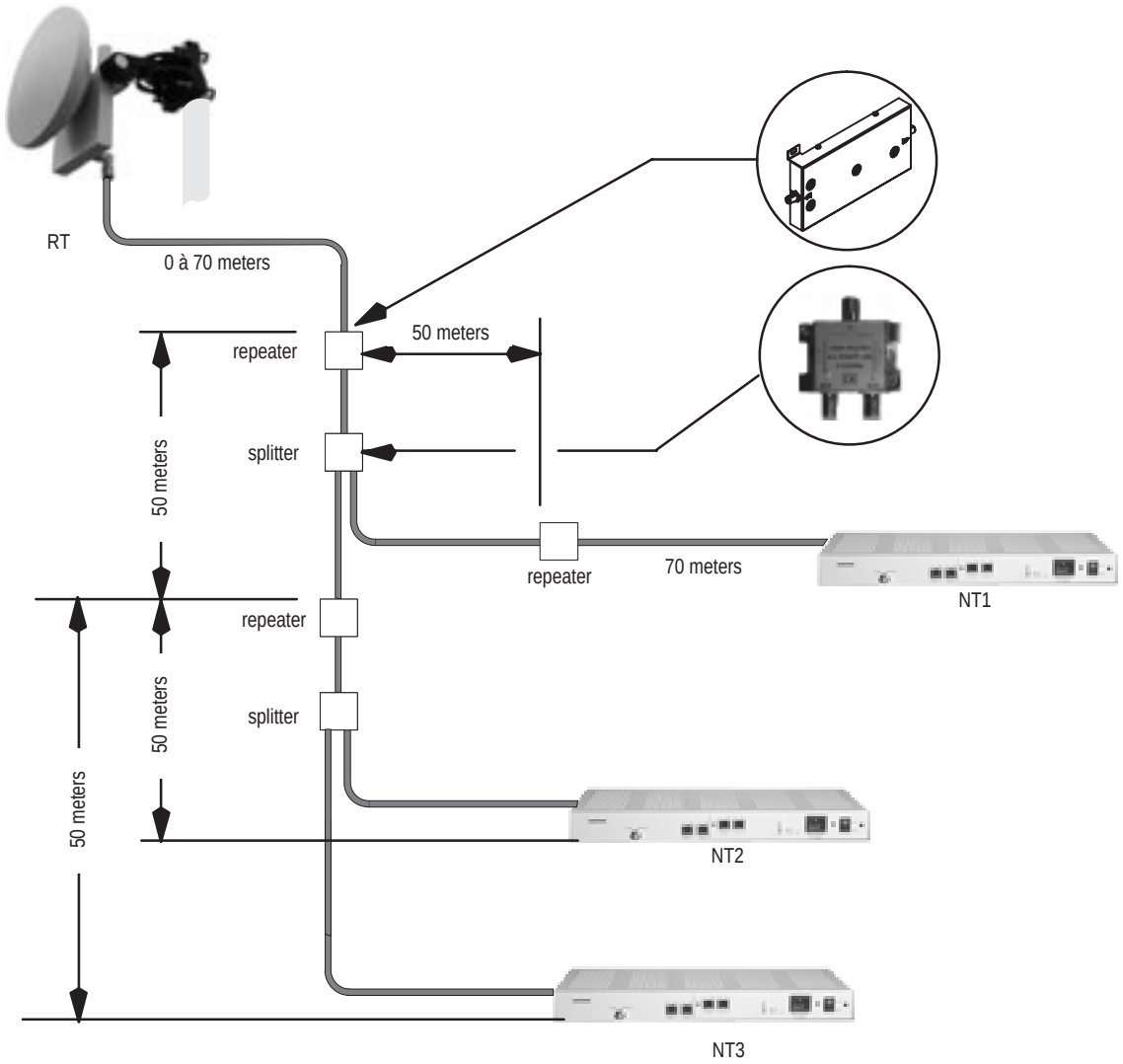


Figure 31 –”Stepped” assembly

Example with two splitters placed between two repeaters

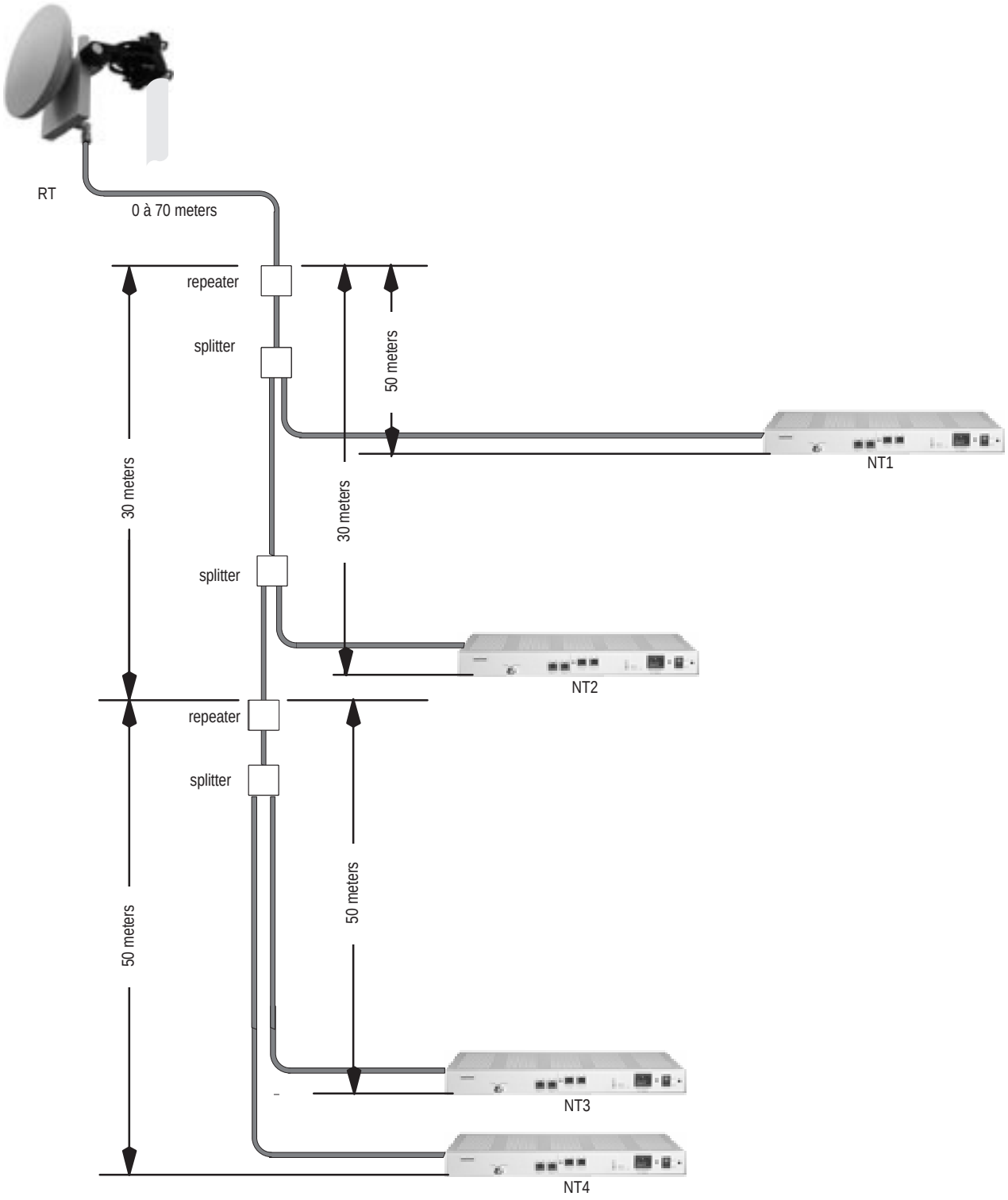


Figure 32 –Assembly with two splitters placed between two repeaters

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4 – Commissioning the 9900TS Terminal Station

4.1 – Purpose

The purpose of this task is to carry out:

- site adjustment of the RT unit (also called RT or RT radio),
- initialization and configuration of the RT unit and NT unit parameters,
- checking and validation of the installed parameters before rendering the equipment operational.

4.2 – Commissioning the RT unit

4.2.1 – Equipment required

To configure the parameters and carry out site adjustment of the RT unit, the following equipment is required:

- the **RT unit**,
- the **RIT** tool (Radio Installation Tool),

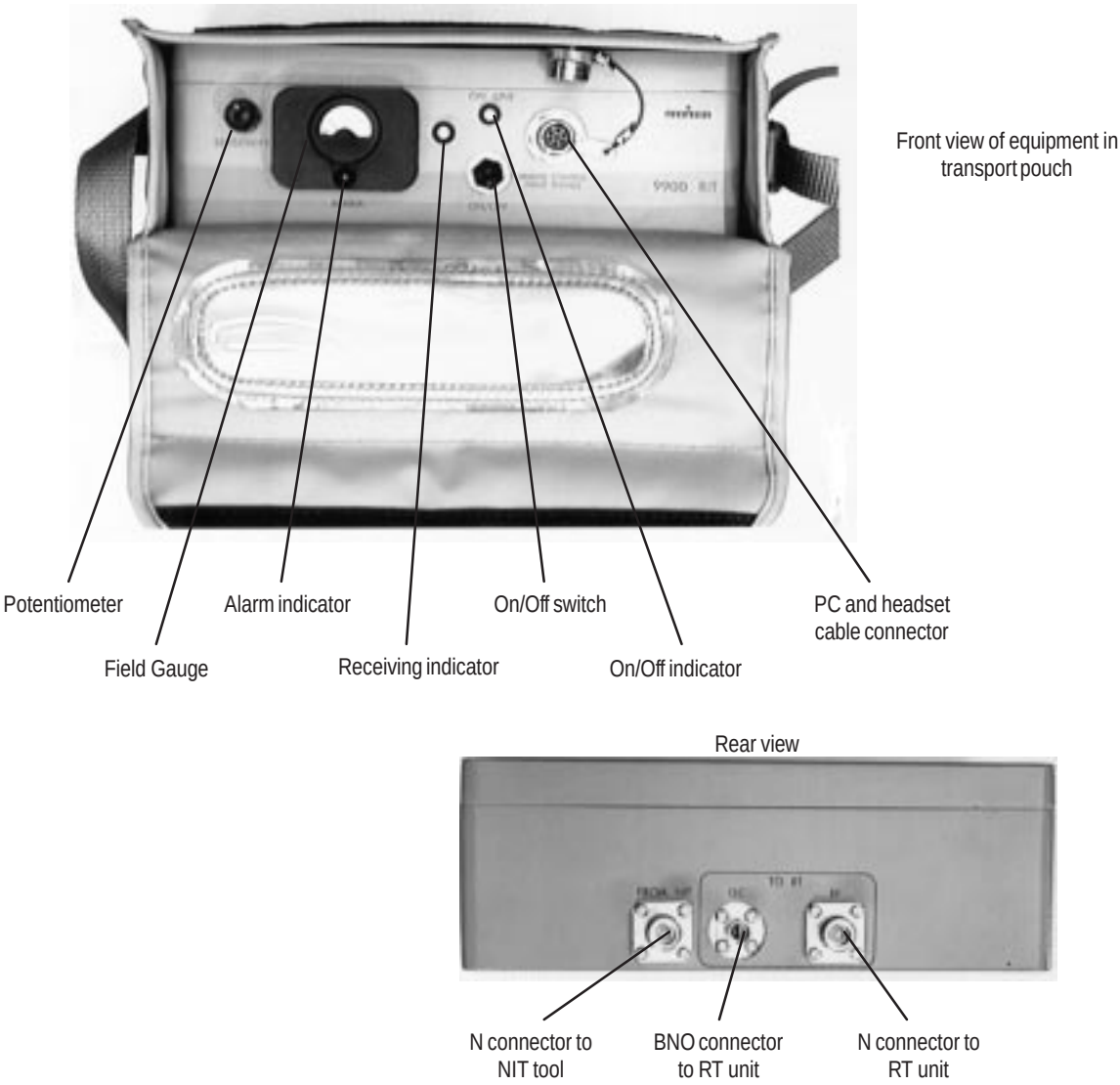


Figure 33 – RIT tool

– **NIT** tool (Network Installation Tool),

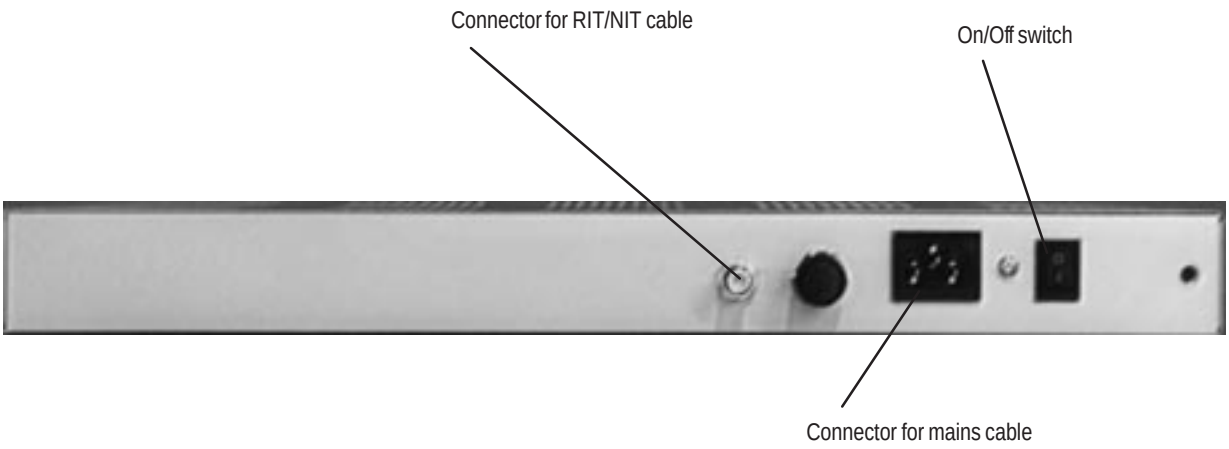


Figure 34 – NIT tool

– one tool cable set (see Figure 35 and 36),
– one audio–head set (see Figure 36),
– one No.5 Allen key,
– the RT installation and programming software pre–installed on a portable PC,
– a diskette (or CD–ROM) containing the data pre–recorded by the network operator,
– a PC fitted with the RT unit initialization and programming software; the PC should have the following minimum characteristics:
  - microprocessor: 300 MHz Pentium II,
  - RAM: 64 MB,
  - Hard disk: 2 GB,
  - Graphics board: 2 MB,
  - 3”1/2 disk drive (internal or external),
  - 12x CD drive (internal or external),
  - Ports: 1 available serial port (DB9) and 1 available parallel port (centronix),
  - 2–button mouse (PS2 series) or a pointing device,
  - network board: 10/100BT Ethernet (RJ45), 10B2 (BNC),
  - 12” screen (1024x768).

The **RIT** is used:

– as an interface between the PC and the RT unit: it receives the information necessary to the initialization and programming of the RT from the PC and transmits it to the RT unit;
– to implement optimal alignment of the antenna vis–a–vis the Base Station. This function is provided by the Received Signal Level control system (visual and/or audible) of the RIT.

The **NIT** is used:

– as a power source for the RT unit and the RIT tool during the RT adjustment and configuration procedures.

4.2.2 – Site configuration and adjustment procedures

4.2.2.1 – Configuration of the 9900RT ODU parameters

To carry out RT radio programming, implement the assembly shown in Figure 35.

Note : *It is recommended that this task be carried out indoors. The use of the portable PC in inclement weather conditions (rain, snow, etc.) is not advisable.*

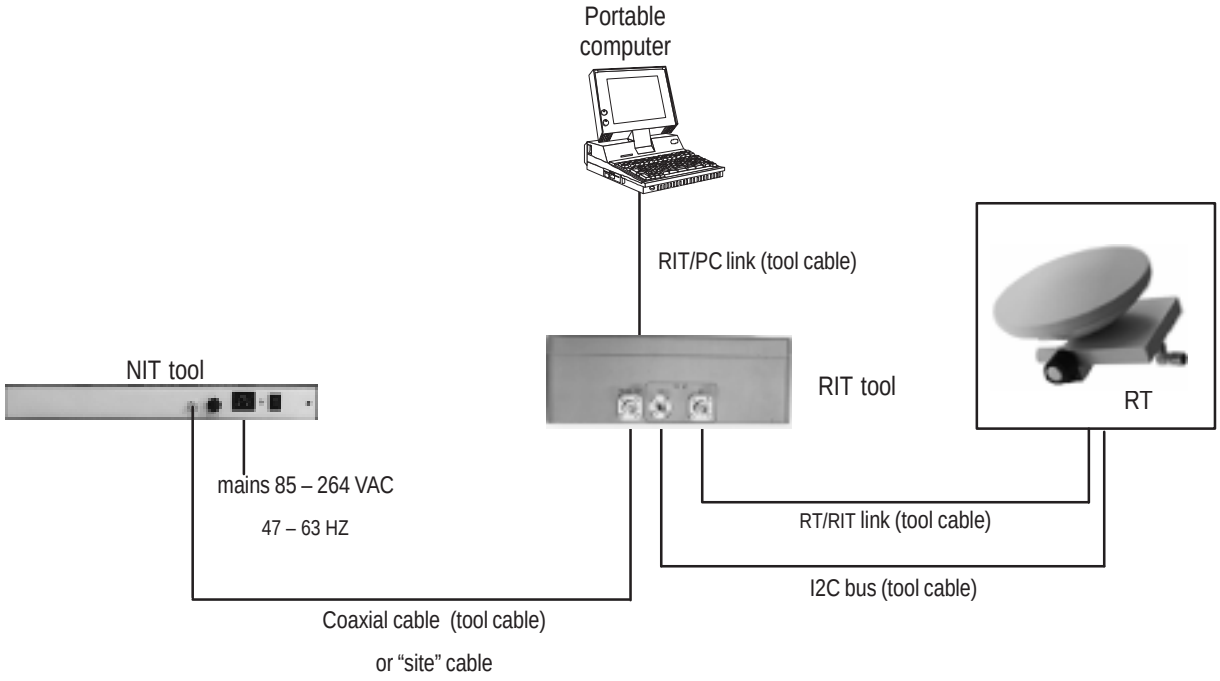


Figure 35 – RT configuration setup diagram

Stages

1. Connect the cables of the configuration tools (cables and tools delivered with the equipment):
   - between the RT unit and the RIT tool: the RT/RIT link coaxial cable ("N" type connectors at both ends)
   - between the RT unit and the RIT tool: the data transfer bus ("BNO" type connectors at both ends)
   - between the portable PC and the RIT tool,
   - between the RIT tool and the NIT tool: coaxial cable ("N" type connector at the RIT and "F" type connector at the NIT)
   - between the NIT tool and the mains power supply: mains connection cable.
2. Power–up the assembly:
   - power–up the NIT tool,
   - power–up the PC,
   - power–up the RIT tool.

3. Run the installation software from the PC.

Note : *The installation software operator is expected to understand the operation of software in the Windows™ 95, 98 and NT environments.*

4. Insert the diskette (or CD–ROM) containing the pre–recorded data and transfer it on to the PC hard disk.
5. If there is no diskette or data on diskette, enter on the PC screen displayed windows the the following data:
   - the distance between the Terminal Station (9900TS) and the link Base Station (9900BS)
   - distance (D) accuracy: 100m < D < 200m; 20m maximum error
   - 200 < D < 200m; 40m maximum error
   - 400 < D < 400m; 80m maximum error
   - D < 800m; 100m maximum error
   - the total length and/or type of RT/NT cable, required accuracy: ± 1,5 meter per cable section, ± 5 meters per cable overall lenght
   - the difference in altitude between the 9900BS antenna and the 9900TS antenna, required accuracy: ± 10%
   - whether or not a repeater is used
   - single or multi–NT configuration.

Note : *Part of the data required for the correct operation of the system is supplied to the software by the network operator in computerized form (diskette, CD–ROM, etc.).*

6. Confirm the data entries for the data to be transfered to the RT.

4.2.2.2 – Aligning the RT unit antenna

Note : *To carry out the following phases of the Terminal Station commissioning, the link Base Station must be operational and its antenna correctly orientated.*

IMPORTANT NOTE: NEVER HANDLE THE RT UNIT BY ITS ANTENNA BUT BY THE BODY OF THE RT RADIO OR THE SUPPORT ARM.

The following equipment is required for carrying out RT antenna alignment:

- the **RT unit**,
- the **RIT** (Radio Installation Tool),
- the **NIT** (Network Installation Tool),
- an audio headset,
- a No. 5 Allen key.

To carry out RT unit antenna alignment, implement the assembly shown in Figure 36.

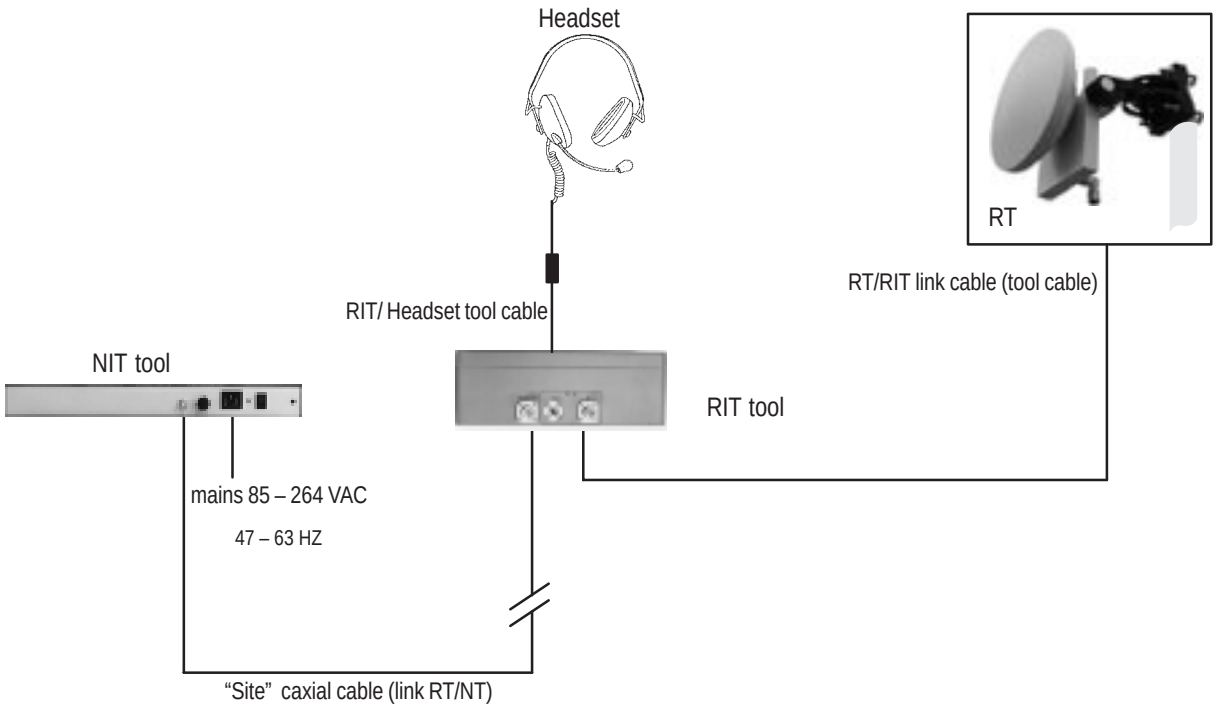


Figure 36 – RT antenna fine alignment assembly diagram

Stages

⚠	**IN VIEW OF THE FACT THAT THE SIDE LOBES ARE QUITE ADJACENT (4° TO 5°) AND AT QUITE A HIGH LEVEL (–15dB), BE SURE THAT ALIGNMENT IS CARRIED OUT WITH RESPECT TO THE MAIN LOBE.**

1. Using the Allen key, loosen the screws (ref. 1, Figure 38).
2. Adjust the RT unit by sweeping horizontally in either direction until the maximum receive level is found.
3. If no reception level is detected, lock the bearing alignment and repeat the elevation alignment procedure. Check installation for ploarization, connection..., in failure case.

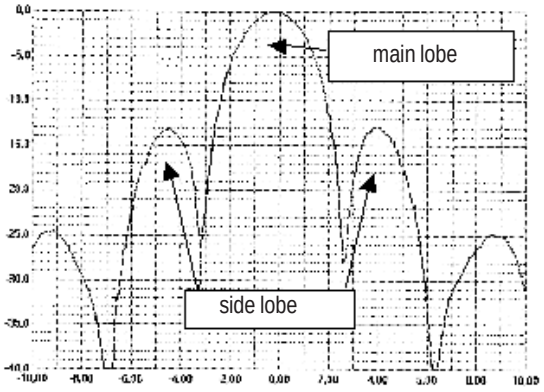


Figure 37 – Main lobe and side lobes

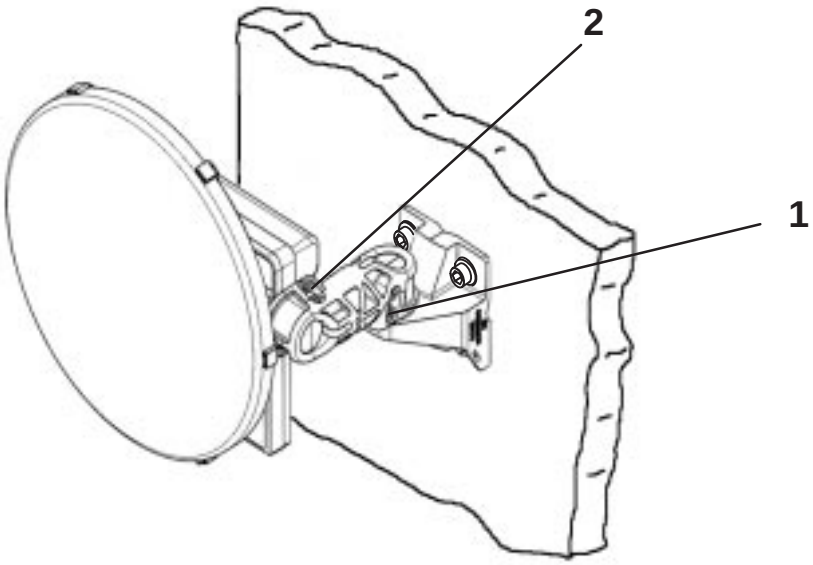


Figure 38 – Adjustment screws

4. Carry out alignment with respect to the strongest signal. To do this, either:
   – observe the maximum field level on the RIT tool indicator (the field maximum corresponds to the maximum deviation of the needle on the field gauge),
   – or, evaluate the maximum field level using the audio headset connected to the service kit cable (field minimum corresponds to a low frequency audio signal; field maximum corresponds to a high frequency audio signal).

Figure 39 – Adjustment procedure using the RIT tool potentiometer

5. Using the Allen key, re–tighten the “bearing” screws (ref. 1, Figure 38).
6. Using the Allen key, loosen the “elevation” screws (ref. 2, Figure 38).
7. Adjust the RT unit by sweeping vertically in either direction until the maximum receive level is found. Use the same methods presented in point 3 above.
8. Using the Allen key, re–tighten the “elevation” screws (ref. 2, Figure 38).
9. Tighten all the mechanical assembly screws, taking care not to mis–align the RT unit assembly.

10. Remove the tools and cables used for RT configuration and adjustment.
11. Connect the RT/NT connection cable to the RT unit.

4.3 – Commissioning the NT IDU

Note : *To carry out the following phases of the Terminal Station commissioning, the link Base Station must be operational and its antenna correctly orientated.*

Considerations

- Before commissioning the NT unit, complete the RT unit adjustment procedures.
- No adjustment is required for commissioning the NT.
- To check the voltage at the mains connector terminals, use a measuring instrument (voltmeter).
- For the mains connection, use only the connection cable supplied with the equipment.
- Never use an extension cable for connecting the NT unit to the power source.

Stages (Figure 40)

1. Connect the RT/NT connection cable. Use ref. 1 connector.
2. To ground the NT unit in this way, carry out the procedures described in Chapter 3.

   Use the lug and screw hardware supplied with the equipment, ref. 7.
3. Check that the mains socket to which the NT is to be connected supplies voltage compliant with the equipment characteristics and that it is fitted with an earth.
4. Connect the NT connection cable to the NT connector (ref. 5) and then to the mains.
5. Power–up the NT unit using the On/Off switch (ref. 6); the green “Power” LED (ref. 3) lights up. The red “Alarm” LED (ref. 4) starts to flash at different rates according to the current phase.
6. Observe the (automatic) initialization time of the NT. As soon as the red LED (ref. 4) goes out, the system is operational.

Note : *The maximum initialization time is in the order of 5 minutes.*

Client terminals are connected to the ref. 2 connectors.

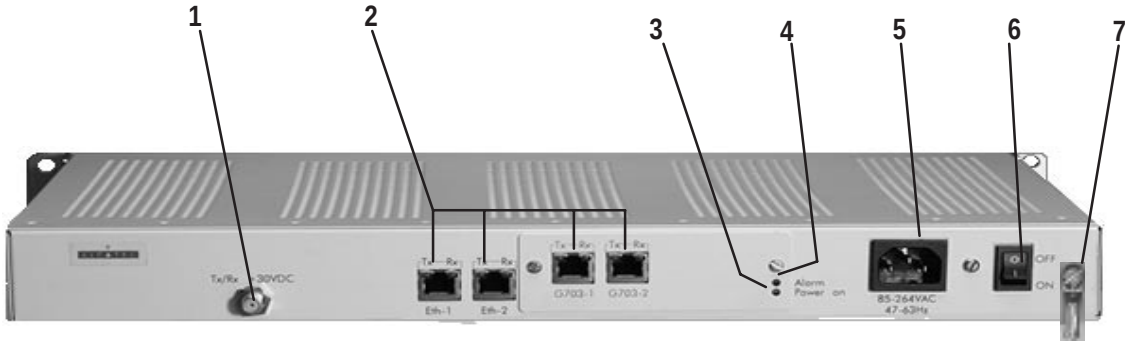
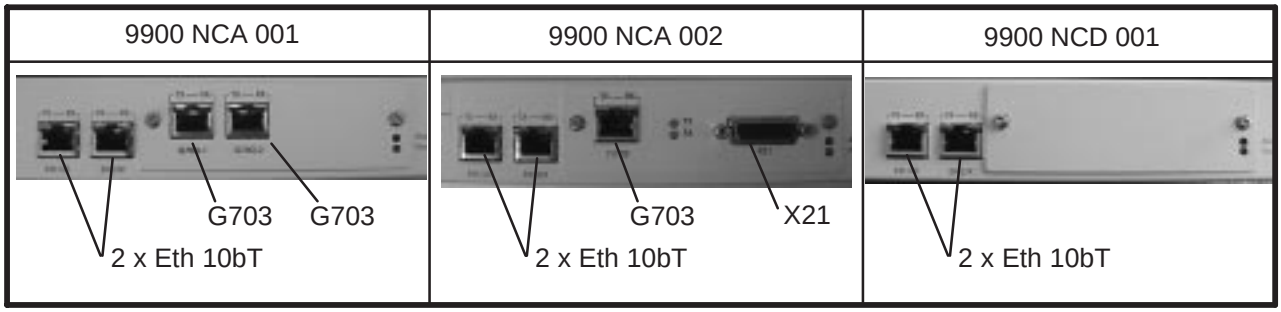


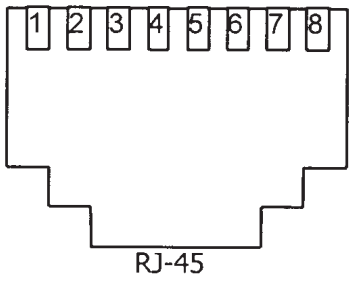
Figure 40 – The NT unit

4.4 – Client terminal connections

There are three types of NT units:



4.4.1 – Ethernet connector



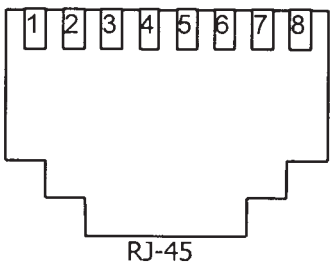
Pin 1 ––––>Tx_diff_plus
Pin 2 ––––>Tx_diff_Moins
Pin 3 ––––>Rx_diff_plus
Pin 4 ––––>Not connected
Pin 5 ––––>Not connected
Pin 6 ––––>Rx_diff_Moins
Pin 7 ––––>Not connected
Pin 8 ––––>Not connected

Unshielded cable

Figure 41 – Affectation of Ethernet access points

	**SHIELDED CABLES MANDATORY**

4.4.2 – G703 connector



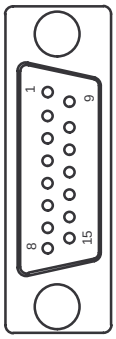
Pin 1 ––––>Rx_Ring
Pin 2 ––––>Rx_Tip
Pin 3 ––––>Not connected or equipment ground
Pin 4 ––––>Tx_Ring
Pin 5 ––––>Tx_Tip
Pin 6 ––––>Not connected or equipment ground
Pin 7 ––––>Not connected
Pin 8 ––––>Not connected

Shielded cable

Figure 42 – Affectation of G703 access points

	**SHIELDED CABLES MANDATORY**

4.4.3 – X21 connector



Pin 1 ––––>Screen
Pin 2 ––––>T_neg
Pin 3 ––––>C_neg
Pin 4 ––––>R_neg
Pin 5 ––––>I_neg
Pin 6 ––––>S_neg
Pin 7 ––––>B_neg
Pin 8 ––––>Ground
Pin 9 ––––>T_pos
Pin 10 ––––>C_pos
Pin 11 ––––>R_pos
Pin 12 ––––>I_pos
Pin 13 ––––>S_pos
Pin 14 ––––>B_pos
Pin 15 ––––>Not connected

Shielded cable

Figure 43 – Affectation of X21 connector access points

	SHIELDED CABLES MANDATORY

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5 – Operation and maintenance

5.1 – Network supervision

The network operator receives the alarms sent by the network equipment. With the aid of the the 9900LT software applications, the operator can view and analyse the alarms and trigger the appropriate corrective operations (see procedures below).

In the event of unsatisfactory results from the performance measurement programs, analyses may be made to localise the implicated station and implement the necessary maintenance operations to restore original link performance.

On detection of a fault, the operator should go to the faulty station. He should take a laptop PC enabling him to configure, if required, certain system characteristics.

5.2 – Preventive maintenance

This maintenance is carried out, either during a corrective maintenance inspection, or during a periodic inspection, on all station equipment. It consists in inspecting the units and their interconnections (connectors, cables, sockets, etc.) and ensuring that the environment of the Indoor Units (NTs) complies with installation requirements (see section 3 of this Manual). In case of doubt, the suspect parts should be checked, taking all precautions to avoid interrupting link data transmission.

5.3 – Corrective maintenance

5.3.1 – Methodology

- Analysing the NT unit alarm LEDs,
- In the case of alarms, localising them with the aid of configuration and management programs installed in a PEX, analysing them and carrying out the necessary corrections (changing the unit, module, cable, etc.).

5.3.2 – Use of 9900LT software programs for alarm localisation

To activate and use the alarms refer to section 4.10 of the Base Station User Manual, ref.: 3CC10875AAAA TQ BJB .

5.4 – Changing the NT unit

Stages

1. Turn off NT unit power. Disconnect from power source.
2. Disconnect all cables connected to the NT unit to be changed.
3. Change NT unit after checking that the characteristics coincide (number of inputs, impedance, etc.).
4. Reconnect NT unit cables.
5. Power up NT unit.
6. Wait for “Power” LED to light up.
7. Wait for flashing of “Alarm” LED. The NT unit is in operation once the LED is extinguished.
8. Check the absence of alarms in the 9900LT software application (see section 4.10 of the Base Station User Manual).
9. Update the station installation sheet .

5.5 – Changing the RT unit

Stages

1. Disconnect the RT/NT connection cable.
2. Change RT unit after checking the characteristics are identical.
3. Carry out antenna alignment. For this, refer to section 3 of the present Manual.
4. Reconnect the RT/NT connection cable. Wait two minutes. Reconfiguration is automatic.
5. Check the absence of alarms in the 9900LT software application.
6. Update the station installation sheet .

6 – Changes of configuration

The changes to the transmission network may require changes to the equipment configurations in order to meet new requirements. The A9900 equipment is likely to satisfy these changes either by modifying just the equipment software configuration or by physically modifying the equipment and its configuration.

These changes may involve either changes of configuration using the 9900LT software only, or changes of configuration with physical intervention on the equipment.

The possible changes using the 9900LT software only are:

- use of NT unit supervision,
- declaration/removal/reset of an NT terminal,
- implementation of customer services.

The possible changes with physical intervention are:

- addition of an NT unit,
- changing an NT unit,
- changing an RT unit,
- changing the BS on an NT unit.

Before any configuration change, block all remote command signals
(Procedure to be detailed subsequently.)

6.1 – Use of NT unit supervision

For the use of this function, carry out the commands indicated in section 4.6 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual, ref: 3CC10875ABAA TQ BJB .

6.2 – Declaration, deletion, reset of an NT unit

To add a new NT IDU:

- update the “Installation information” sheet required for station installation (refer to Annex 1 of the present Manual),
- carry out installation (refer to Chapter 3 of the present Manual) and commissioning (refer to Chapter 4 of the present Manual) of the NT
- to declare the new NT terminal, execute the commands indicated in section 4.6.1 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual.

To delete an NT unit from the network:

- update the “Installation information” sheet required for station installation (refer to Annex 1 of the present Manual),
- execute the commands indicated in section 4.6.3 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual,
- turn off power to unit using ON/OFF switch.

To reset an NT unit:

- execute the commands indicated in section 4.6.4 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual,
- if necessary, update the “Installation information” sheet (refer to Annex 1 of the present Manual).

6.3 – Implementation of customer services

To implement customer services:

– execute the commands indicated in section 4.12 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual,

Note : *The system benefits from E1 or IP links. For each case, use the specific procedure.*

– if necessary, update the “Installation information” sheet (refer to Annex 1 of the present Manual).

6.4 – Changing an RT unit

When changing the RT unit, it is necessary to carry out antenna alignment (tracking) and reinitialisation of the radio part configuration

To change the RT unit:

– turn off the mains supply to the NT,

– disconnect the RT/NT link cable,

– carry out installation of the RT unit and tracking of the Terminal Station antenna. For this, refer to Chapter 3 of the present Manual.

– restart the Terminal Station. For this, refer to Chapter 4 of the present Manual.

– reconfigure the system according to the procedures in Chapter 4 of the present Manual.

For system initialisation and retrofit, refer to section 4.6 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual.

6.5 – Changing the BS on an NT

To change the Base Station on a Terminal Station:

– turn off the mains supply to the NT,

– carry out tracking of the Terminal Station antenna. For this, refer to Chapter 3 of the present Manual.

– restart the Terminal Station. For this, refer to Chapter 4 of the present Manual.

– reconfigure the system according to the procedures in Chapter 4 of the present Manual.

For system initialisation and retrofit, refer to section 4.6 of Chapter 4 – *Presentation of 9900LT Software* of the Base Station User Manual.

Appendix 1 – 9900 TS INSTALLATION SHEET

General information

Name **Address**	..... **No** ..... **Street**..... **Bld** ..... **Stair** ..... **Floor**..... **Town** .....**Country**.....	**Operator**
Site identification		
Name of the corresponding Base Station		
Sector number (1, 2, 3, 4, etc.)		
Distance between BS and TS		
Altitude difference		
Azimut (in degrees)		
Obstacle (type,distance...)		
Climatic zone (A,B, etc.)		
Frequency band (GHz)		
Duplex deviation (MHz)		
Sub–band (A,.B, etc.)		
Polarization (H or V)		

9900 NT Intervening party :.....**Date :** .....**Visa:** .....

Designation	NT1	NT2	NT3	NT4
Type				
Reference (3CC...)				
ICS (01,02,...)				
Serial number				
Downloaded application				
Version				
Position, location of the equipment				
Installation type (Rack,wall–mounting,table)				

9900 RT Intervening party :.....**Date :** .....**Visa:** .....

Designation	
Version	
Reference (3CC...)	
ICS (01,02, etc.)	
Serial number	
Reception level (dBm)	
Installation type (rooftop, tower, mast)	

Mecanical support References	
Radio installation height / ground	
Azimut (in degrees)	

RT NT cabling Intervening party :..... Date : ..... Visa :.....				
Diagram marks				
Type of cable				
Length between RT and the first element				
Splitter references				
Splitter serial numbers				
Repeater references				
Repeater ICS				
Repeater serial number				
75 ohm load references				

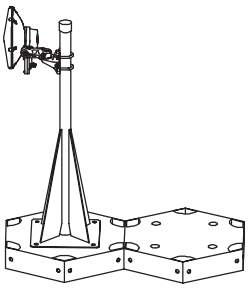
Connecting diagram

Appendix 2 – Using the DALLET® system by SOFRER™ for 1 m & 1.5 m high mast on rooftop

Recommendations according to Snow and Wind Rules **NV 65** are only indications and should be verified according to the sites

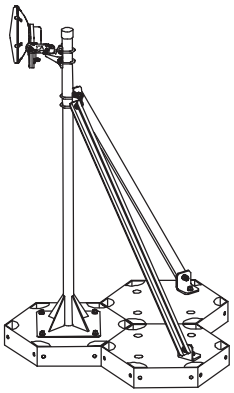
Feet weight : about 50 Kg

Zone 1 and Zone 2



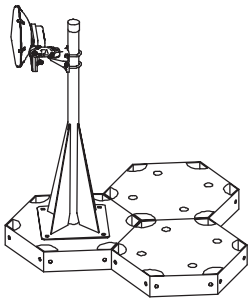
2 DALLET

Zone 1 and Zone 2



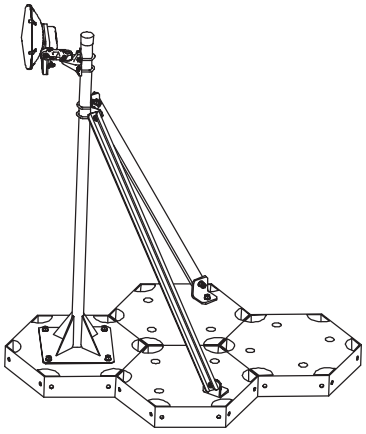
3 DALLET

Zone 3



3 DALLET

Zone 3



4 DALLET

Before any use, verify the rules applicable locally and compute according to the regulations.

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Appendix 3 – Mounting coaxial connectors

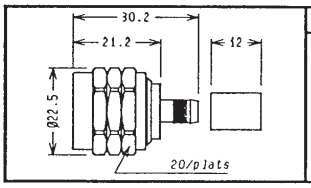
Sheet "N" 75Ω.

Delta Ohm	SPECIFICATION TECHNIQUE *Fiche N mâle 75 Ohms à sertir pour câble du groupe 04*	DSP-511 10-98-A Page: 1/1

1. CABLIER.

ALCATEL : *6 F (TC) P*
ACOME : *M 0326*

2. DIMENSIONS & CODIFICATIONS.



Référence	Groupe de câbles
08-250-178	4

3. CARACTERISTIQUES ELECTRIQUES.

Impédance : *75Ω*
Fréquence d'utilisation : *DC à 3 GHz.*
Insertion : *≤ 0,05 dB.*

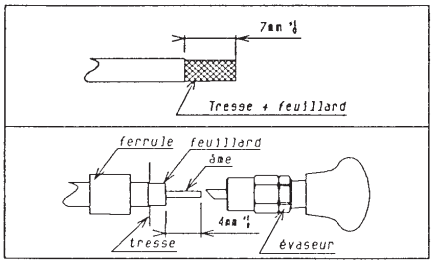
4. CARACTERISTIQUES MECANIQUES.

Corps, écrou, ferrule : *Laiton nickelé.*
Isolant : *PTFE*
Contact central : *Laiton doré.*
Tenue en traction : *≥ 20 kgs.*

5. PREPARATION DU CABLE.

5.1 Dénuder la tresse *(7.00mm)*.

5.2 Monter la ferrule et rabattre la tresse.
Dénuder l'âme *(4.00mm)*.
Evaser entre le feuillard et la tresse à l'aide de l'outil 22-395-036.

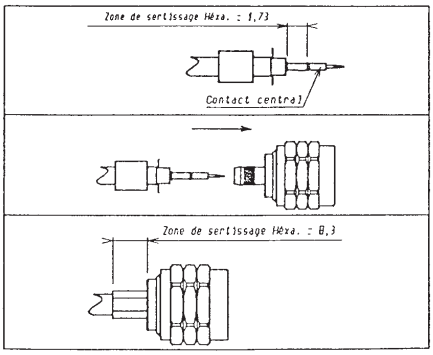


6. MONTAGE DU CONNECTEUR.

6.1 Monter le contact central sur l'âme du câble et sertir celui-ci à l'aide de la pince 22-395-208 *(hexagone 1.73mm)*.

6.2 Insérer le câble équipé dans le corps.
Couper le surplus de tresse au ras du corps.

6.3 Positionner la ferrule et sertir celle-ci à l'aide de la pince 22-395-208 *(hexagone 8.30mm)*.



Rédigé par : Pottier | Approuvé par : D. C. | Edition du : 14/10/98

Mise à jour	Par	Le	Objet de la mise à jour
A	*POTTIER*	*14-10-98*	*Issu de la DSP-511P suivant DT 095-98*

• *Siège Social* • TEL: (33) 01 42 42 88 07 • FAX: (33) 01 47 86 17 39 • *Unité de Production* • TEL: (33) 03 86 81 77 88 • FAX: (33) 03 86 81 77 22

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Fiche “F” 75Ω.

Delta Ohm

NOTICE DE MONTAGE

Connecteur F mâle 75 Ohms/F mâle 75 Ohms Connector

DSP-195
06-99-G
Page: 1/1

1. CODIFICATION. *Codification.*

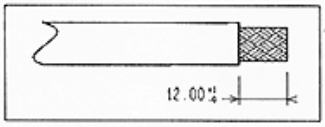
Code *Part number*	Evas. / Evid. *Widener / Remover*	Pince à Sertir *crimping tool*	Héxa. *Hexa.*	A
08-550-007	22-395-013	22-395-057	11.5	
08-550-008	22-395-021	22-395-057	11.5	
08-550-019	22-395-060	22-395-057	11.5	8.5
08-550-025	22-395-036	22-395-057	8.3	
08-550-027	22-395-021	22-395-057	11.5	
08-550-029	22-395-013	22-395-108	11.5	
08-550-031				

Code *Part number*	Evas. / Evid. *Widener / Remover*	Pince à Sertir *crimping tool*	Héxa. *Hexa.*	A
08-550-032	22-395-039	22-395-057	8.3	
08-550-035	22-395-036	22-395-057	8.3	
08-550-037	22-395-023	22-395-057	7.5	
08-550-065	22-395-013	22-395-108	12.0	
08-550-073	22-395-133	22-395-108	12.0	8.5
08-550-093	22-395-083	22-395-057	8.3	10.0
08-550-099	22-395-023	22-395-057	7.5	
08-550-122	22-395-036	22-395-057 ou 208	8.3	

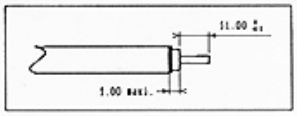
2. PREPARATION DU CABLE A CONDUCTEUR EXTERIEUR Ruban + Tresse.

/ Cable preparation – Foil + braid shielding.

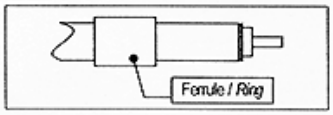
2.1 ***Dénuder.*** *Bare external jacket.*

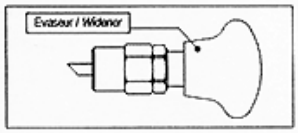


2.2 ***Rabattre tresse & feuillard. Puis couper au dia. de la gaine.***
Fold backwards braid and foil and cut at jacket diameter.



2.3 ***Evaser entre le diélectrique et le feuillard.*** */ Widen between dielectric and foil.*

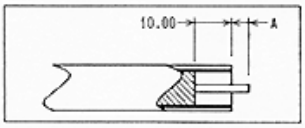


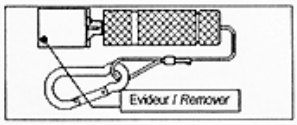


3. PREPARATION DU CABLE A CONDUCTEUR EXTERIEUR Ruban Lisse Collé.

/ Cable preparation – Smooth glued foil.

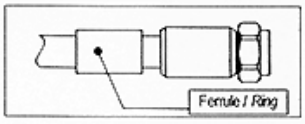
3.1 ***Evider le câble à l'aide de l'outil évideur.*** */ Remove dielectric by mean of remover tool.*

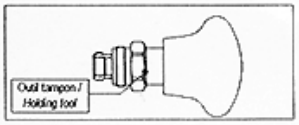




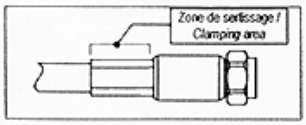
4. MONTAGE DU CONNECTEUR. */ Connector mounting.*

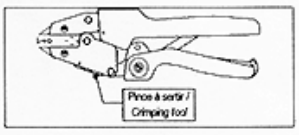
4.1 ***Assemblage à l'aide de l'outil 22-395-047.*** */ Assembling by mean of tool ref. 22-395-047.*





4.2 ***Sertissage à l'aide d'une pince à sertir.*** */ Clamping by mean of crimping tool.*





Rédigé par : Approuvé par : M. EGGENSCHWILER Edition du : 14 / 06 / 99

Mise à jour	Par	Le	Objet de la mise à jour
E	DELRE	03-04-98	Modification suivant DT 030-98
F	LARVOR	09-11-98	Modification suivant FIP 98-46-111
G	DELRE	14-06-99	Modification suivant DT 073-99

• *Siège Social* • TEL : 33 (0)1 34 18 93 93 • FAX : 33 (0)1 34 18 22 20 • *Unité de Production* • TEL : 33 (0)3 86 81 77 88 • FAX : 33 (0)3 86 81 77 22

Filotex ®

Coaxial cable 75Ω

PRODUCT REFERENCES

FILOTEX ref. : **ET 2PA 981**

CONSTITUTION

1 1.02 +/– 0.1 mm bare copper inner conductor

2 Cellular polyolefin insulation Ø = 4.60 +/– 0.1 mm

3 Aluminium/PET/Aluminium tape

4 Tinned copper braid (filling factor ≥ 60%).

5 LSZH ivory jacket Ø = 7.15 +_ 0.15 mm

Weight : 58 Kg/Km

Main applications

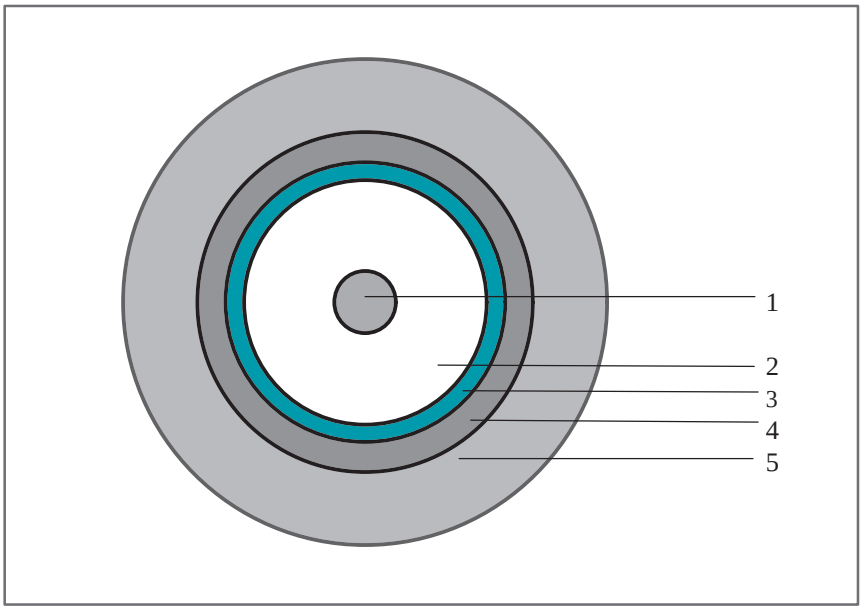
- Drop coaxial cable for indoor/outdoor applications.

Electrical values

- Characteristic impedance : 75Ω
- Nominal capacitance : 55.5 pF/m
- Relative velocity of propagation : 82 %
- Dielectric strength : 1.5 Kv
- Jacket strength : 3.0 Kv
- DC loop resistance ar 20 degres : 38.5Ω /km
- Attenuation at 50 MHz : < 4.72 dB/100 m
  300 MHz : < 11.10 dB/100 m
  450 MHz : < 13.70 dB/100 m
  600 MHz : < 16 dB/100 m
  860 MHz : < 19.50 dB/100 m
  1000 MHz : < 21.10 dB/100 m
  2000 MHz : < 32.40 dB/100 m
- Screening attenuation from 100 to 1000 MHz : ≥ 85 dB according to IEC1196–1§12–4.
- Structural return loss : 30 to 450 MHz : > 20 dB
  450 to 600 MHz : > 18 dB
  600 to 1000 MHz : > 15 dB
  1000 to 2000 MHz : > 12 dB
- Tolerance : 3 peaks at – 4 dB in each bandwith

Physical characteristics

- Maximum pulling strength : 34 daN
- Minimum bending radius for one single bend : 40 mm
  for 10 bends : 80 mm
- Weathering resistance according to NFC 20 540
- Resistance to propagation according to IEC 332–3 but with a reduced volume of flamable material (0.5l instead of 1.5l)
- Smoke emission according to IEC 1034–2
- Halogen content according to IEC 754–1



Information subject to change without notice.

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Appendix 4 – List of abbreviations/Liste des abréviations

MNEMONIC	ENGLISH	FRENCH
ADM	Add and Drop Multiplexer	(MIE) Multiplex insertion extraction
AGC	Automatic Gain Control	(CAG) Commande Automatique de Gain
AIS	Alarm Indication Signal	(SIA) Signal d'indication d'alarme
AMD	AirModem	
ANT	ATM Network Termination	
ATM	Asynchronous Transfer Mode	(?) Mode de transfert asynchrone
AS	Automatic switching	(CA) Commutation automatique
AT	Attend alarm (on CT)	(AT) Alarme en attente (sur PEX)
BER	Bit Error Rate	(TEB) Taux d'erreur binaire
BNC	Bayonet–locking Connector	(BNC) connecteur BNC
BS	Base Station	(BS) Station de base
CEPT	Conference of European Post and Tele-communications administrations	(CEPT) Conférence Européenne des Postes et Télécommunications
CCIR	International radio consultative comitee	(CCIR) Comité consultatif international des radiocommunications
CPL	coupling (in CPL board)	(CPL) coupleur (carte CPL)
CT	Craft Terminal (ECT, NCT or RCT)	(PEX) Poste d'exploitation (PEE, PER ou PED)
DBS	Digital Base Station	(DBS) Station de base numérique
EMC	ElectroMagnetic Compatibility	(CEM) Compatibilité ElectroMagnétique
EPROM	Electronically Programmable Read–Only Memory	(EPROM) Mémoire fixe programmable de façon électronique
ETSI	European Telecommunications Standards Institute	(ETSI) Institut de standardisation des télécommunications européennes
FEC	Forward error correction	(CCE) Code correcteur d'erreurs
HDB3	High Density Binary 3 code (3rd order)	Code Haute Densité Binaire d'ordre 3
I^2C or IIC	Inter Integrated Circuit	(I^2C or IIC) Inter Circuits Intégrés
IDU	InDoor Unit	(IDU) Coffret intérieur
IEC	International Electrotechnical Commission	(IEC) Commission internetionale d'électrotechnique
IP	Internet Protocol	(IP) Protocole internet
ITU	International Telecommunication Union	Union Internationale des Télécommunications
LED	Light Emitting Diode	Diode électroluminescente
LMCS	Local Multipoint Communication Systems	(LMCS) Système de communication multipoint en mode local

MNEMONIC	ENGLISH	FRENCH
LMD(S)	Local Multipoint Distribution (System)	(LMD(S)) Distribution multipoint en mode local
MAC	Medium Access Control	(MAC) sous couche MAC de l'OSI
MUX	Multiplexer	(MUX) Multiplexeur
ODU	OutDoor Unit	(ODU) Coffret extérieur
NE	Network Element	(NE) Elément de réseau
NRZ	Non return to zero	(NRZ) Non retour à zéro
NT	Network Terminal	(NT) Terminal de réseau
PC	Personal Computer	(PC) Odinateur individuel
QAM	Quadrature amplitude Modulation	(MAQ) Modulation d'amplitude en quadrature
RBS	Radio of Base Station	(RBS) Radio de la station de base
RF	Radio Frequency	(FR) Fréquence radio
RT	Radio Terminal	(RT) Terminal radio
RX	Receiver	(Rx) Récepteur
STP	Shielded Twisted Pair	(STP) Câble 1 paire trssadée blindé
SMD	Surface Mounted Device	(SMD) Composant monté en surface
TNT	Telefony Network Termination	(TNT) Terminal réseau téléphonique
TS	Terminal Station	(TS) Station Terminale
TX	Transmitter	(Tx) Emetteur

END OF DOCUMENT