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CHAPTER 1

1.0 OVERVIEW

This manual describes the procedures for installing the Voyager Base Station System (BSS) at the customer's site. It is intended for use ***only*** by trained installation or service personnel. It should ***not*** be used by anyone else.

The manual is a guideline and every effort has been made to make sure that the information it contains is as complete as possible, but it is ***not*** comprehensive. Also, this manual is subject to change without notice, may not be suitable in all situations, and may not meet all local codes and ordinances.

Installation personnel should confirm that the installation will meet all local codes and ordinances, which take precedence, before beginning to install. They should also refer to any other applicable manuals and/or instructions for additional information about the correct methods, tools, and materials that should be used when performing procedures not specifically detailed in this manual.

The procedures in this manual apply to the installation of the complete Voyager BSS and each network element (NE) in the system. The three (3) NEs comprising the BSS are the

- Voyager Base Station Controller (BSC)
- Voyager Switching Transponder Station (XTS)
- Voyager Transcoder and Rate Adapter Unit (TRAU)

The TRAU is collocated with the BSC. The XTS is usually remote from the BSC, though it can be collocated with it.

The Voyager BSS is a cellular telephone network designed to meet the requirements and configurations of the Global System for Mobile Communications (GSM). It supports all mobile telephone stations (MS) and all mobile equipment that complies with the GSM requirements and configurations.

A Voyager BSS installation will always include at least one BSC and at least one XTS. There can be more than one of each NE in an installation, depending upon the customer's requirements, but the number of BSCs in a BSS will *never* exceed the number of XTSs.

1.1 BASE STATION CONTROLLER

In the Voyager BSS, the BSC is the communications controller between the Mobile Switching Center (MSC) and the XTS. It also maintains the mobile station call processing functions.

1.2 SWITCHING TRANSPONDER STATION

In the Voyager BSS, the XTS is an intelligent transceiver. Depending on the needs of the customer, it can

- Receive and process the incoming radio signal (uplink) from the MS
- Process and transmit the outgoing radio signal (downlink) to the MS
- Maintain communication with the BSC

1.3 TRANSCODER AND RATE ADAPTER UNIT

In the Voyager BSS, the TRAU supports a standard, full rate, speech vocoder. It is physically collocated with the BSC, but it is between the BSC and the XTS logically. It compresses and decompresses the voice signals transmitted between the BSC and the XTS.

The TRAU compresses the BSC signal, from 64 kilobits per second (kbps) to 16 kbps, then sends the 16 kbps signal to the XTS. It decompresses the XTS signal, changing it from 16 kbps to 64 kbps, then sends the 64 kbps signal to the BSC.

The TRAU can compress and decompress the voice channels between one (1) BSC and up to six (6) XTSs.

CHAPTER 2

2.0 FEDERAL COMMUNICATIONS COMMISSION INFORMATION

The Voyager BSS contains a radio frequency (RF) transmitter and Class A digital devices. The user should be aware of the following Federal Communications Commission (FCC) information regarding these devices.

2.1 CLASS B DIGITAL DEVICES NOTE

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 when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, 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 the 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.

2.2 RADIO FREQUENCY EXPOSURE

This transmitter is designed, and will be installed, so as to produce less than 1640 watts equivalent isotropically radiated power (EIRP) output. Therefore, per FCC Rule Section 1.1307(b), routine environmental evaluations, or determination of compliance with RF exposure limits listed in Section 1.1310, are not required for this transmitter.

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CHAPTER 3

3.0 UNDERWRITERS LABORATORIES INFORMATION

The Voyager BSS is comprised of Underwriters Laboratories Inc. (UL) approved electrical devices. This section details the information required by UL for approved electrical devices. It includes:

- Engineering Considerations
- Grounding
- Marking conventions and requirements
- Securing subassemblies to the enclosure rack

NOTE: Throughout this manual, wherever an electrical power of 24 volts (v) direct current (DC) is specified, the current can actually vary by a maximum of ±3 v, from 21 v to 27 v inclusive.

3.1 ENGINEERING CONSIDERATIONS

The primary engineering considerations for the Voyager BSS and each network element (NE) in the system include the following.

3.1.1 BASE STATION CONTROLLER

The Voyager Base Station Controller (BSC) is a permanently-connected, stationary unit. It is suitable for only for indoor installation in an environment that includes a

- temperature range of 0° C to +30° C (+32° F to +86° F).
- noncondensing relative humidity range of 10% to 90%

3.1.1.1 Normal Power

A 20 ampere circuit powers the BSC from a 120 v AC power input provided by the customer. The BSC also receives 20 amperes of 24 v DC power from the XTS. There are no breakers inside the BSC.

3.1.1.2 Emergency Backup Power

Silicon Wireless, Incorporated (SWI) recommends that the customer provide emergency backup power for the BSC. SWI will offer an emergency backup power system option for those customers that request it.

3.1.1.3 External Connections

The external connections for the BSC include:

- a 3-prong, twist-lock, female plug supplying 15 amperes of 120 v AC power, provided by the customer
- two (2) Anderson quick disconnect plugs, each supplying up to 40 amperes of 24 v DC power, provided by the XTS
- a 4-circuit female connector, with each circuit supplying up to 5 amperes of 24 v DC

3.1.1.4 Operator Access

The BSC is designed with key-locked panels to preclude access to the interior by untrained personnel. **Only** maintenance and service personnel are allowed inside these panels.

3.1.2 SWITCHING TRANSPONDER STATION

The Voyager Switching Transponder Station (XTS) is a permanently-connected, stationary unit that is suitable for both inside and outside installations. Many of the XTS installations *will* be outside.

3.1.2.1 Normal Power

A 75 ampere branch circuit powers the XTS from a 220-240 v AC power input provided by the customer. An internal breaker panel distributes power to the AC-powered components on the circuit, including the AC/DC power supplies with 24 v DC outputs, via 20 ampere breakers.

3.1.2.2 Emergency Backup Power

Emergency backup power for the XTS is provided by 12 v DC lead-acid batteries. These batteries supply the unit with 24 v DC emergency backup power, which should allow the unit to continue operation for a minimum of 15 minutes after the normal AC power input terminates. How much longer than 15 minutes the backup power will last depends on the number of batteries installed and the environmental conditions.

NOTE: The batteries do **not** provide emergency backup power for the air conditioning unit. There will be **no** air conditioning while the XTS operates off the emergency backup power.

3.1.2.3 External Connections

The external, customer provided connections for the XTS at both indoor and outdoor sites include a:

- T1 off-premise telecommunications connection
- GPS antenna and cable
- Maximum of six (6) tower mounted, low-noise amplifiers with antenna connections
- Transmitting and receiving antenna cable(s)

Indoor XTS installations require 50 amperes of 220-240 v AC power and the wiring leading to it. SWI will install the 3-prong twist-lock female plug that the male plug from the XTS will plug into.

Outdoor XTS installations require a conduit and electrical connections installed by an electrician to meet all local ordinances and codes.

3.1.2.4 Operator Access

The XTS is designed with key-locked panels to preclude access to the interior by untrained personnel. **Only** maintenance and service personnel should be allowed inside these panels.

3.1.2.5 Battery Venting

Under certain circumstances, the batteries that provide the emergency power backup for the XTS could vent potentially explosive gases. The doors covering the battery compartments in the XTS enclosure are vented, which will allow these gases to dissipate.

3.2 GROUNDING

The BSC and the XTS should be grounded in a manner that meets the BellCore specifications and all local codes and ordinances. (In the event that the BellCore specifications and local requirements conflict, local codes and ordinances take precedence.)

3.3 MARKING CONVENTIONS AND REQUIREMENTS

The BSC and XTS enclosures, and the NEs themselves, have the following markings.

3.3.1 ENCLOSURES

The exterior of the enclosures is clearly marked with a label reading, "**MAINTENANCE OR SERVICE PERSONNEL ACCESS *ONLY***"

3.3.2 BSC AND XTS NETWORK ELEMENTS

Inside the enclosures, both the BSC and XTS have one or more labels that will provide the following information:

- Rated voltage range
- Symbol for whether the supply current is AC or DC
- Rated frequency range, in Hertz
- Rated current in amperes
- Company logo for SWI
- SWI model number
- Fuse rated current and, where applicable, fuse rated voltage
- Shock hazard symbols, as shown on the right, meeting international specifications (ISO 3864, No.5036) at all potential shock hazard locations.

3.3.2.1 BSC Network Element

In addition to the markings common to both the BSC and XTS, the BSC has a label specifying the short-circuit and over-current protection that must be provided by the customer.

3.3.2.2 XTS Network Element

In addition to the markings common to both the BSC and XTS, the XTS has a:

- Label in the vicinity of the standard power supply outlet showing the maximum load permitted when using that outlet
- Grounding symbol meeting international specifications (IEC 417 No.5019) that indicates *only* the wiring terminal intended for connection to the protective grounding conductor for the supply wiring. This symbol, shown on the right, is not used for any other grounding terminals.

3.4 SECURING SUBASSEMBLIES TO THE ENCLOSURE RACK

The mounting brackets on each subassembly are attached to the enclosure racks with the front of the subassembly facing the front of the rack (see **Figure 1**). The brackets are secured to both sides of the rack with standard, 3/4-inch, Phillips head, stainless steel, 10-32 x 1/2 (#10, 32 threads/inch, 1/2 inch long) mounting screws. Use a Phillips-head screwdriver to drive the screws, torquing them to 18 inch-pounds.

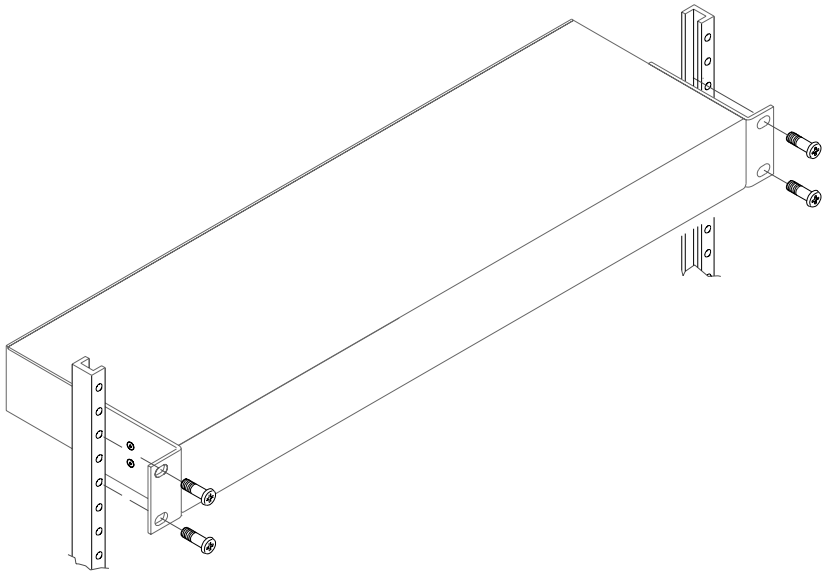

FIGURE 1. Example of how subassembly is secured to enclosure rack

CHAPTER 4

4.0 HAZARDS AND SAFETY INFORMATION

This section describes the hazards and safety issues involved with the Voyager (BSS) installation. It is designed to protect the installation personnel and prevent damage during installation to the Voyager BSS or a Network Element (NE) in the system.

There is little risk of injury or equipment damage when reasonable and accepted safety procedures are practiced and the precautions detailed in this manual are followed. For that reason, it is important that all installation personnel pay strict attention to the hazard warnings, cautions, and notes. All personnel involved in the installation process must be aware of the hazards and adhere to the safety precautions.

This section must be fully understood *before* installation is begun. Anyone who does not understand any part of this section should read that part again. If any portion of this section remains unclear, contact Silicon Wireless, Incorporated (SWI) or one of its authorized representatives for clarification.

NOTE: The symbol to the right of this note signals a safety alert. It appears at various points in this manual. Wherever the symbol is printed, read the associated safety message and follow all precautions to avoid personal injury.

4.1 WARNING LABELS AND SYMBOLS

When working with the BSS and its NEs, personnel must abide by any and all warning labels and/or symbols posted on or attached to the equipment. Warning labels must **never** be removed, modified, painted over, written on, or obscured in any way whatsoever.

4.2 MISCELLANEOUS WARNINGS

Various warnings specific to the BSS and its NEs are included throughout the text. Complying with these warnings during the installation will reduce the possibility of injury to personnel or damage to the equipment.

4.3 INJURY RESPONSE

You must contact your local area emergency services unit **immediately** whenever an injury has occurred. In the majority of communities in the United States, dialing "911" is the fastest way to reach these services. Before beginning the installation, make sure that all installation personnel know how to contact emergency services in your local area.

4.4 HAZARDS

There are several potential personnel hazards associated with the installation of the BSS and its NEs, including but not limited to:

- Battery Hazards
- Electrical Shock Hazard
- Mass Injury Hazard
- Lifting Injury Hazard
- Electromagnetic Fields And RF Exposure Hazard
- Toxic Chemical Exposure Hazard

4.4.1 BATTERY HAZARDS

There are several potential hazards associated with the lead-acid storage batteries. These include, but are not limited to:

- Electrical Shock Hazard
- Explosive Gas Hazard
- Mass Injury Hazard
- Lifting Injury Hazard
- Sulfuric Acid Hazard

4.4.1.1 Electrical Shock Hazard

The batteries used for emergency backup power in the BSS are capable of producing electrical voltage that can cause serious electrical burns or shock. In some cases, either of these, particularly the electrical shock, can be lethal. The symbol shown on the right always signifies a potential electrical burn and/or shock hazard.

Exercise extreme caution when installing the batteries in the BSS. Remove *all* rings, metallic wristbands or bracelets, necklaces, and other dangling objects before beginning work. During the installation, use only insulated tools specifically designed for the task, which reduces the possibility of shorting across electrical connections.

Contact your local emergency services for assistance with any electrical burn or shock injuries.

4.4.1.2 Explosive Gas Hazard

Explosive gases can be vented by the batteries under certain circumstances. An explosion of these gases can cause serious injury, including blindness.

These gases are ***not*** present during normal operating conditions. Nonetheless, if the batteries *do* vent these gases, the gases might not be detected before the gases contact an ignition source and explode. To minimize the possibility of explosion at all times, it is important that open flames, sparks, and all smoking materials be kept away from the battery area.

Contact your local emergency services for assistance with any explosion-caused injury.

4.4.1.3 Mass Injury Hazard

Each battery is heavy (up to 100 pounds) and will cause injury if it falls on someone. Make sure that no one is under the battery when it is carried, placed on an elevated shelf, or removed from a shelf.

Contact your local emergency services for assistance with any mass injury.

4.4.1.4 Lifting Injury Hazard

The batteries are **heavy**. Each one weighs up to 100 pounds. Use caution and proper lifting techniques when moving or carrying them. Each battery weighs more than 50 pounds, the maximum specified by the Occupational Safety and Health Administration (OSHA), so use a lifting device and/or assistance when lifting even *one* (1) battery. Check carefully for obstacles and/or poor footing before moving any batteries.

Contact your local emergency services for assistance with any lifting injury.

4.4.1.5 Sulfuric Acid Hazard

Lead-acid batteries contain sulfuric acid, which can cause serious injury, including blindness, and/or serious chemical burns. When handling or working with the batteries, wear rubber gloves and a rubber apron or coveralls to reduce the chance of contact with the sulfuric acid. Protect your eyes and your eyesight by wearing a good form of eye protection, such as safety goggles.

Contact your local emergency services for assistance with any sulfuric acid contact.

4.4.2 ELECTRICAL SHOCK HAZARD

The BSS and its NEs require a single-phase power input of either 220 volts (v) AC, 110 v AC, or both, and also -48 v DC or +24 v DC input. These voltages are extremely dangerous and can be lethal. They can cause serious electrical burns or shock. The symbol shown on the right always signifies a potential electrical burn and/or shock hazard.

Before working with or near the power supplies, electrically isolate the equipment by switching off the AC input, locking the switch, ***and*** disconnecting the batteries that provide the emergency power backup. Remove *all* rings, metallic wristbands or bracelets, necklaces, and other dangling objects before beginning work. During the installation, use only insulated tools specifically designed for the task, which reduces the possibility of shorting across electrical connections.

Contact your local emergency services for assistance with any electrical burn or shock injuries.

4.4.3 MASS INJURY HAZARD

Much of the equipment that comprises the BSS and its NEs is heavy and will cause injury if it falls on someone. Make sure that no one is under the equipment while carrying it, placing it on an elevated shelf, or removing it from a shelf.

Contact your local emergency services for assistance with any mass injury.

4.4.4 LIFTING INJURY HAZARD

Much of the equipment that comprises the BSS and its NEs is **heavy**. Use caution and proper lifting techniques when moving or carrying it. Use a lifting device and/or assistance when lifting anything weighing more than 50 pounds, as specified by the Occupational Safety and Health Administration (OSHA). **When in doubt, use a lifting device or get assistance**. Check carefully for obstacles and/or poor footing before moving any of the equipment.

Contact your local emergency services for assistance with any lifting injury.

4.4.5 ELECTROMAGNETIC FIELDS AND RF EXPOSURE HAZARD

Strong electromagnetic fields and high radio frequency (RF) potentials are present whenever the BSS or any of its NEs are operating. Exposure to these fields and potentials is dangerous and, under certain circumstances, can be lethal. Switch off **all** transmitters/transceivers before changing any antenna connections. Do **not** activate any unterminated transmitters/transceivers.

Contact your local emergency services for assistance with any electromagnetic field or RF exposure.

4.4.6 TOXIC CHEMICAL EXPOSURE HAZARD

Some components in the BSS and its NEs use beryllium oxide dust as an electrical insulator. However, there is ***no*** risk of beryllium oxide contamination as long as the dust is contained inside the component. It is only when the component is damaged and the beryllium oxide dust is released that there is a risk of serious injury.
To prevent injuries, do **not** subject any of the components to harsh treatment. Do not drop, smash, bend, gouge, or otherwise damage the integrity of each component.

Beryllium is a light, steel-gray, and strong but brittle, metallic element that is used primarily as a hardening agent in alloys. It comes from a naturally occurring beryl ore, beryllium silicate, which is nontoxic. However, beryllium metal and most of its compounds, including beryllium oxide, can be extremely toxic. Beryllium and its compounds can be absorbed by the body through the skin, mouth, lung tissue, eyes, nasal cavities, or an open wound.

Inhaling beryllium oxide dust can cause berylliosis, the symptoms of which are similar to pneumonia. In some rare circumstances, beryllium poisoning has been lethal. Beryllium is stable in room-temperature air, but burns brightly in oxygen or at high temperature. Burning Beryllium or any of its compounds produces toxic gases.

Contact your local emergency services for assistance with any beryllium/beryllium compound/beryllium oxide exposure.

4.5 EQUIPMENT SAFETY

This paragraph describes what steps must be taken by the installation personnel to prevent damage to the BSS and its NEs.

The BSS and its NEs are susceptible to damage from several causes. These include, but not limited to

- Sudden Deceleration Damage
- Mass Damage
- Electrostatic Discharge Damage
- High Voltage Damage
- Liquid Damage
- Physical Contamination Damage

4.5.1 SUDDEN DECELERATION DAMAGE

If dropped, the BSS and its NEs can be damaged by the sudden deceleration when striking another object or the ground. Caution should be used when lifting or moving the equipment to prevent accidental damage of this type. Make sure that the equipment is always held and/or placed securely whenever it is handled.

4.5.2 MASS DAMAGE

The BSS and its NEs can be damaged when another object strikes the equipment. Make sure that the equipment is protected from falling objects and collision with anything that is being moved in the immediate area.

4.5.3 ELECTROSTATIC DISCHARGE DAMAGE

Electrostatic discharge (ESD) can cause irreparable damage to the thin layer of insulation in many semiconductors, including those in the BSS and its NEs. To prevent such damage, personnel must comply with all required anti-ESD procedures when handling the equipment.

4.5.4 HIGH VOLTAGE DAMAGE

High voltage, whether continuous or in the form of a sudden spike, can permanently damage the BSS and its NEs. To prevent such damage, the installation procedures that protect the equipment from high voltage must be followed exactly.

4.5.5 LIQUID DAMAGE

Water and other liquids can cause irreparable damage to the BSS and its NEs. **Never** put liquids of any type on or above the equipment. Make sure that the equipment is always protected from liquid contamination.

4.5.6 PHYSICAL CONTAMINATION DAMAGE

Dust and other physical contaminants can damage the BSS and its NEs. Every effort should be made to protect the equipment from any physical contamination.

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CHAPTER 5

5.0 SITE REQUIREMENTS

This section describes the physical site conditions required for installation of the Voyager BSS or a network element (NE) in the system. It applies to all one-, two-, and three-carrier systems. It describes the specifications for the following:

- Flooring requirements
- Indoor Base Station Controller (BSC) installation
- Indoor Switching Transponder Station (XTS) installation
- Outdoor XTS installation

The indoor locations for both the BSC and the XTS assume that the NE will ***not*** be exposed to the elements.

5.1 FLOORING REQUIREMENTS

The flooring for each of the NEs in the system must be

- Raised flooring, a concrete pad, or a steel structure
- Able to support the weight of the individual NE and its enclosure
- Within two degrees of level
- Sloping away from the center so that liquids do not pool under the NE enclosure Good drainage is strongly recommended

5.1.1 CONCRETE PAD REQUIREMENTS

When an NE is installed on a concrete pad, pad construction must address the following areas:

- General pad considerations
- Pad form preparation

NOTE: The instructions in this manual apply to construction of a typical concrete pad for a typical NE installation. Variations in construction methods may be used for compliance with local conditions, practices, or building codes.

5.1.1.1 General Pad Considerations

When a concrete pad is constructed for a BSC or XTS installation, the pad should

- Be precast or cast in place
- Be designed to accommodate the footprint and support the weight of the individual NE
- Either be predrilled and have anchor inserts installed to orient the mounting bolts and access conduits in the pad, or have mounting bolts on the preform
- Have the cable, conduit, ground rod, and ground wire placed before the pad is installed/constructed
- Be constructed on a firm location and level to within 1/2-inch over 6’ in all directions (ensure a level location by compacting any loose soil, then placing a level base of sand or gravel to a depth of at least 6” across the entire pad location)
- Have the top surface of the pad approximately 2” above the final grade
- Be located so that the NE enclosure will be no less than 42” from any and all obstructions, fences, hedgerows, etc.
- Be constructed with a high-early strength concrete mix, allowing the NE enclosure to be placed three days after concrete pouring
- Be constructed with concrete where the *only* course aggregate used is graded from 3/4-inch to No.4
- Be constructed with concrete that has a minimum compression strength of 4,000 psi, as determined by the ASTM C39 test of compression strength of concrete cylinders (the slump of this concrete must be two (2) to four (4) inches, as determined by the ASTM test method C143)

5.1.1.2 Pad Form Preparation When Casting In Place

When pouring the concrete pad, the pad location should have

- A ring ground system placed around the proposed concrete base (this should be done according to local practices and building safety codes)
- The site checked to make sure that it is firm and level
- A trench dug to the area where the cable and electrical conduit will rise into the NE enclosure (the depth of the trench will depend on local practices and building codes)
- The conduits placed in the trench as shown in the engineering drawings
- The cables, ground rod(s), and ground wire(s) placed in position as shown in the engineering drawings
- The exact position where the form will be placed clearly marked (mark the location of the rectangular cable entry and the AC cable entry, and position the conduits horizontally to fit the four cable openings in the base of the NE enclosure)
- The trench backfilled to hold the conduit firmly in place (make sure that the conduit ends extending up into the pad location are vertically aligned, and the conduit ends are perpendicular to the template surface)
- The pad form built and placed as shown in the engineering work prints (build the wooden pad form according to local practices)
- Wire mesh or reinforcing bars placed in the pad form (be sure that the wire mesh or reinforcing bars are set approximately two inches (2”) above the bottom of the form)
- The AC cable conduit placed into position in the wood form and secured prior to pouring the concrete (make sure that the AC conduit is perpendicular to the wooden form and two inches above the its top)
- A rectangular wood box(es) built for the cable conduit (the outside dimensions of the box(es) should be slightly smaller than the cable opening, and the box(es) should be placed into a position where the cable will rise into the side chamber(s) and secure in position)
- The pad form squared and levelled (the conduit should extend approximately two inches (2”) above the pad form, and the tops of all conduits should be covered to keep concrete from entering them during the pour)
- The area below the pad and outward for two feet (2’) around its perimeter treated to eliminate insects. Follow all local practices and ordinances
- The position of the wire mesh or reinforcing bars rechecked (they should be approximately two inches above the bottom of the form)
- The concrete poured and finished so that when the NE enclosure is placed, the concrete will either be flush with or no more than 1/4-inch below the top of the NE enclosure mounting surfaces (this will ensure that the enclosure clears the finished concrete surface and does not prevent the panel below the cabinet main chamber from being removed)
- The concrete cured for a minimum of three days before it must support any significant load or the NE enclosure is installed (high strength concrete must be cured for seven days)
- The concrete pad visually inspected after it has fully cured (make sure that the pad is level and there are no cracks or holes that would affect the stability of the NE enclosure)
- The cable wood box(es) removed
- Holes drilled for the 1/2-inch x 13” anchor inserts (follow all local practices and ordinances during this procedure) when the mounting bolts are **not** on the preform
- The anchor inserts installed into the concrete pad at the mounting locations specified in the engineering drawings when the mounting bolts are **not** on the preform

5.1.2 ROOFTOP INSTALLATION SUPPORT REQUIREMENTS

Each rooftop installation site will have its own set of issues that will have to be addressed before installation. In addition, all rooftop sites must

- Be carefully designed and constructed to support the weight and loads associated with each NE under any and all conditions
- Have grounding accessibility
- Have AC availability
- Be accessible for ongoing service and maintenance
- Be designed to ensure the safety of all personnel
- Have lifeline capability
- Meet all Occupational Safety and Health Administration (OSHA) requirements for such sites
- Take wind shear factors into consideration
- Have adequate drainage
- Have network interface capability
- Meet the requirements for all zoning, construction, and other local permits
- Be physically secure
- Be constructed with a metal mounting template that is mounted to 150 mm “C” channels, with 1/2-13 UNC x 1” SS bolts (torqued to 45 foot-pounds) and 5/8” ID stainless steel washers, unless this requirement is superseded by local building practices or codes

5.2 INDOOR BSC INSTALLATION REQUIREMENTS

Specifications for indoor BSC installation sites must address the following areas:

- General Requirements
- Space Requirements
- Power Requirements
- Grounding Requirements
- Environmental Requirements

5.2.1 GENERAL REQUIREMENTS

The indoor BSC installation site must have

- Flooring able to support at least one-half pound per square inch
- Good lighting
- Access to the BSC enclosure from the top and the bottom for cabling
- Standard outlets for several power tools, either more than one outlet or one outlet with a power strip
- A modem on a dedicated phone line
- A 10/100 BaseT connection
- A 66-block punchdown block for alarm cabling
- Each cable terminated with 3’ of loose cabling

It is strongly recommended that the installation site be equipped with some method of anchoring the BSC enclosure to the floor.

5.2.2 SPACE REQUIREMENTS

The available space for the BSC must

- Be able to accommodate a 24” by 24” BSC enclosure footprint
- Have at least 3’ of access in front and back of the BSC enclosure
- Measure at least 8’6” (102”) from the floor to the first obstruction, which allows at least 2’ of clearance above the BSC enclosure, which is 6’6” high (78”) with the riser

5.2.3 POWER REQUIREMENTS

The customer supplied input power for the BSC must be

- 110 volts AC on a 20 ampere circuit
- Brought directly to the BSC enclosure
- Equipped with transient and surge protection ***external*** to the enclosure
- Equipped with emergency backup power ***external*** to the enclosure

5.2.4 GROUNDING REQUIREMENTS

A grounding circuit meeting BellCore specifications and all local codes and ordinances must be brought to the BSC. In the event that the BellCore specifications conflict with any local codes or ordinances, the local codes and ordinances take precedence.

5.2.5 ENVIRONMENTAL REQUIREMENTS

The environmental requirements for an operating BSC at an indoor site include a

- temperature range of +32° F to +104° F (0° C to +40° C)
- noncondensing relative humidity range of 10% to 95%

5.3 INDOOR XTS INSTALLATION REQUIREMENTS

Specifications for indoor XTS installation sites must address the following areas:

- General Requirements
- Space Requirements
- Power Requirements
- Antenna Cabling Requirements
- Grounding Requirements
- Environmental Requirements

5.3.1 GENERAL REQUIREMENTS

The XTS installation site must have

- Flooring able to support at least two pounds per square inch
- Good lighting
- Access to the XTS enclosure from the bottom for cabling
- Standard outlets for several power tools, either more than one outlet or one outlet with a power strip
- A modem on a dedicated phone line
- Each cable terminated with 3’ of loose cabling
- Antenna cabling terminated with a coaxial N-type *male* connection, which will be connected to the I/O panel of the enclosure

It is strongly recommended that the installation site be equipped with some method of anchoring the XTS enclosure to the flooring.

5.3.2 SPACE REQUIREMENTS

The available space for the XTS must

- Be able to accommodate a 35” by 63” XTS enclosure footprint.
- Have at least 3’ of access in front and back of the XTS enclosure
- Measure at least 8’ 6” (102”) from the floor to the first obstruction, which allows at least 2’ of clearance above the XTS enclosure, which is 6’ 6” high (78”) with the riser

5.3.3 POWER REQUIREMENTS

The input power for the XTS must be

- 220-240 volts AC on a 75 ampere branch circuit
- Brought directly to the XTS enclosure

5.3.4 ANTENNA CABLING REQUIREMENTS

The length of the cable between the XTS and the antenna is extremely important because of line loss. Line loss is the amount of signal lost per specific length of cable. Antenna cabling has a high line loss. Excessive cabling will severely affect system performance. For this reason, make sure that the installed cable length is within the design requirements.

5.3.5 GROUNDING REQUIREMENTS

A grounding circuit meeting BellCore specifications and all local codes and ordinances must be brought to the XTS. In the event that the BellCore specifications and any local codes and ordinances conflict, local codes and ordinances take precedence.

5.3.6 ENVIRONMENTAL REQUIREMENTS

The environmental requirements for an operating XTS at an indoor site include a:

- temperature range of +32° F to +104° F (0° C to +40° C)
- noncondensing relative humidity range of 10% to 95%

5.4 OUTDOOR XTS INSTALLATION REQUIREMENTS

Specifications for outdoor XTS installation sites must address the following areas:

- Site Selection
- General Requirements
- Space Requirements
- Power Requirements
- Antenna Cabling Requirements
- Grounding Requirements
- Environmental Requirements
- Local Zoning Ordinances

5.4.1 SITE SELECTION

Site selection for an outside XTS installation should include serious consideration of

- Public safety
- Vulnerability
- Rights-of-way
- Antenna cable length

5.4.1.1 Public Safety

For public safety, select an XTS installation site with

- Adequate space for the XTS enclosure so that it will *not* create a visual or physical obstruction that might be a hazard to vehicular or pedestrian safety
- Safe working conditions
- Adequate parking to insure worker and vehicle safety
- Easy access to the XTS enclosure

5.4.1.2 Vulnerability

To minimize the risks of damage to the XTS or its enclosure, select an installation site that is

- Unlikely to be vandalized
- Away from parking areas or direct exposure to vehicular traffic, or has protective posts or other obstructions between the XTS enclosure and the potential vehicle traffic
- Away from or above areas subject to flooding, such as ditches

5.4.1.3 Rights-of-Way

XTS installations should be placed in servitudes, on dedicated (recorded) easements, or on property owned by the company. In advance of construction, the installing company should acquire

- The rights-of-way from landowners
- All necessary permits and/or approvals from public authorities

5.4.1.4 Antenna Cable Length

Minimizing the length of the antenna cable is extremely important because of the high line loss (see **Subparagraph 5.4.5**).

5.4.2 GENERAL REQUIREMENTS

The outdoor XTS installation site must have

- Flooring able to support at least two pounds per square inch
- Access to the XTS enclosure from the bottom for cabling
- Each cable terminated with 3’ of loose cabling
- Antenna cabling terminated with a *male* connection

It is strongly recommended that the installation site be equipped with some method of anchoring the XTS enclosure to the flooring.

5.4.3 SPACE REQUIREMENTS

The available space for the XTS must

- Be able to accommodate a 35” by 63” XTS enclosure footprint
- Have at least 3’ of access on all sides of the XTS enclosure
- Measure at least 8’ 6” (102”) from the floor to the first obstruction, which allows at least 2’ of clearance above the XTS enclosure, which is 6’ 6” high (76”)

5.4.4 POWER REQUIREMENTS

The input power for the XTS must be

- 220-240 volts AC
- Brought directly to the XTS enclosure

5.4.5 ANTENNA CABLING REQUIREMENTS

The length of the cable between the XTS and the antenna is extremely important because of line loss. Line loss is the amount of signal lost per specific length of cable. Antenna cabling has a high line loss. Excessive cabling will severely affect system performance. For this reason, make sure that the installed cable length is within the design requirements.

5.4.6 GROUNDING REQUIREMENTS

A grounding circuit meeting BellCore specifications and all local codes and ordinances must be brought to the XTS. In the event that the BellCore specifications and any local codes and ordinances conflict, local codes and ordinances take precedence.

5.4.7 ENVIRONMENTAL REQUIREMENTS

The external environmental requirements for an operating XTS inside an enclosure at an outdoor site include a(n)

- Temperature range of -40° F to +122° F (-40° C to +50° C)
- Ambient relative humidity range of 0% to 100%

CHAPTER 6

6.0 PRE-INSTALLATION

This section describes what steps should be taken to prepare for the installation of the Voyager BSS or a network element (NE) in the system. It addresses

- Site Security
- Required Equipment, Tools, And Materials
- Special Procedures For Outdoor Sites
- NE Delivery

6.1 SITE SECURITY

SWI recommends that some form of site security be available because the installation might not be completed in one day.

6.2 REQUIRED EQUIPMENT, TOOLS, AND MATERIALS

This paragraph lists the equipment, tools, and materials that may be required for installing the BSS or the NEs that comprise it.

6.2.1 ALL SITES

All NE installation sites should have available various

- Cables
- Cable Connectors
- General Equipment
- Materials
- Test Equipment
- Tools
- Miscellaneous Items

6.2.1.1 Cables

- 4-wire & 8-wire cable (24 & 26 Gauge)
- CAT-5 cable
- flat 8-conductor cable
- grounding cable
- ribbon cable
- T1 loopback cables (various attenuations)

6.2.1.2 Cable Connectors

- cable connections, N, SMA, and 7/16” DIN
- various cable connectors

6.2.1.3 General Equipment

A mechanism for moving and positioning the NE enclosure must be present at each site. Depending on the needs of the site, this can be a

- crane
- forklift
- rolling platform

We recommend that some form of secondary and/or emergency lighting be available so that the installation could be completed after dark or a power failure.

6.2.1.4 Materials

- weather-proofing material

6.2.1.5 Test Equipment

- T1 line tester
- T1 test set

6.2.1.6 Tools

- for static control:
  - anti-static mat
  - portable anti-static wrist strap kits for all personnel
  - static wrist monitor
- handheld global positioning system (GPS)
- IDC crimper
- multimeter (this should be checked for accuracy at the intervals recommended by the manufacturer and calibrated when necessary)
- multiple gauge wire stripper
- pin crimper
- RJ-11 crimper tool
- RJ-11 jacks
- RJ-45 crimper tool
- RJ-45 jacks
- screwdriver set
- socket set (including metric)
- spectrum analyzer
- tape measure
- torque wrench that can be set to 75 foot/pounds
- various wrenches, including a 5/16” open-end wrench
- wire cutters

6.2.1.7 Miscellaneous Items

- standard 110 volt (v) AC power source for power tools and lighting
- electrical tape
- gender changers & null modems for DB9 and DB25
- various resistors

6.2.2 OUTDOOR SITES

Outdoor sites may require protection from possible contamination or damage (see **Paragraph 6.3**) under certain conditions. To protect the NE at those times, one (1) of the following two (2) items may be needed at an outdoor site during installation

- A maintenance tent
- Some other form of physical protection

6.3 SPECIAL PROCEDURES REQUIRED FOR OUTDOOR SITES

Certain concerns and cautions apply only to outdoor NE installation sites. These are designed to protect the NE from contamination or damage due to

- airborne contaminants
- insects
- lightning damage
- rain, hail, snow, sleet, or other moisture

Some conditions require caution before the enclosure doors are opened during installation. Others require *extreme caution* before the enclosure doors are opened because of serious concern for the physical safety of the NE.

6.3.1 WHEN EXTREME CAUTION IS REQUIRED BEFORE THE ENCLOSURE DOORS ARE OPENED

Due to the high risk of physical damage to the NE, there are times when *extreme caution* should be used in the evaluation of the situation before the enclosure doors are opened during installation. The conditions may require that the installation be delayed until the conditions improve, or that the enclosure or the NE itself be physically protected during the installation.

Extreme caution is required when

- there is electrical storm activity
- the site is flooded
- there is heavy rain, hail, snow, or sleet
- wind speeds or wind gusts are above 25 MPH
- the NE will be exposed to a temperature below -40° F (-40° C)
- the NE will be exposed to a temperature above 149° F (65° C)
- the humidity is greater than 95%
- there is heavy insect infestation
- any of the above conditions are imminent

6.3.2 WHEN CAUTION IS REQUIRED BEFORE THE ENCLOSURE DOORS ARE OPENED

To safeguard the NE, there are times when the situation should be evaluated carefully before the enclosure doors are opened during installation. The conditions may require additional procedures or some form of physical protection for the NE during the installation.

Caution should be taken when

- there is persistent rain, hail, snow, or sleet, but it is ***not*** heavy
- airborne contaminants could contaminate the NE
- wind speeds and wind gusts are above 10 MPH but will not exceed 25 MPH

6.3.3 WHEN THE ENCLOSURE DOORS CAN BE OPENED DURING INSTALLATION WITHOUT CONCERN

The enclosure doors can generally be opened without concern for the physical safety of the NE when

- there is light to moderate precipitation, and no heavy precipitation is likely to occur during the period that the enclosure doors remain open
- wind speeds and wind gusts will not exceed 10 MPH
- the ambient temperature is between +32° F to +104° F (0° C to +40° C)
- the humidity is between 0 to 95% and noncondensing

6.4 NETWORK ELEMENT DELIVERY

This paragraph describes how

- to receive the NEs
- to store the NEs
- to transport the NEs to the installation site
- the NEs are packaged
- to unpack the NEs
- to inspect the NEs
- to prepare the NEs for installation

6.4.1 RECEIVING THE NETWORK ELEMENT

As soon as the NE is delivered, the exterior packaging should be examined. If the packaging displays excessive damage, the NE itself could be damaged. When this is the case, the NE should ***not*** be accepted from the shipper.

6.4.2 NETWORK ELEMENT STORAGE

Once the NEs have been delivered, they may be stored ***in their shipping containers*** until they are installed provided that the

- storage temperature range is -13° F to +131° F (-25° C to +55° C)
- relative humidity range is 20% to 80% and it is noncondensing

6.4.3 NETWORK ELEMENT HANDLING

This subparagraph describes how the NEs should be transported to the installation site and handled at the site.

(TO BE DETERMINED)

6.4.4 NETWORK ELEMENT PACKAGING

The NEs are factory assembled in the enclosures and shipped in reinforced corrugated cardboard cartons on wooden pallets. The NEs should remain in this packaging until they are unpacked at the installation site immediately prior to installation.

6.4.5 NETWORK ELEMENT UNPACKING PROCEDURE

It is important that all installation personnel be aware of the following information before unpacking the NEs.

HAZARD WARNING

Keep the NE enclosure upright and flat on the floor, ground, fork lift, or other support at all times. If the enclosure is not kept upright, it may become unstable and tip over, causing serious injury or death. If the enclosure tips over, the enclosure and/or the NE would likely be damaged by the impact.

CAUTION: The wooden pallet and all packaging material and covering should ***not*** be removed from the NE enclosure until the enclosure has been transported to the installation site.

At the installation site, carefully remove all packaging material from around the NE enclosure. Do ***not*** remove the NE from the its shipping pallet until it is about to be moved to the actual point of installation.

6.4.6 NETWORK ELEMENT INSPECTION

This subparagraph describes how to inspect the physical equipment to confirm that:

- nothing was damaged during shipping
- it was assembled in the desired configuration and did not change during shipping
- the subassemblies are still secured in place
- the cabling between the subassemblies is as specified and secure

6.4.6.1 Inspecting For Damage

The following steps should be taken to ensure that the NE was delivered in proper condition.

(TO BE DETERMINED)

6.4.6.2 Configuration Inspection

(TO BE DETERMINED)

6.4.6.3 Subassembly Inspection

(TO BE DETERMINED)

6.4.6.4 Cabling Inspection

(TO BE DETERMINED)

6.4.7 NETWORK ELEMENT INSTALLATION PREPARATION

(TO BE DETERMINED)

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CHAPTER 7

7.0 BSC EQUIPMENT INSTALLATION

This section provides specific instructions for installing the Voyager Base Station Controller (BSC) in its enclosure at the customer's site.

HAZARD WARNING

Observe all local safety precautions when performing the tasks in this section. Include additional safety measures as necessary, such as

- Keeping bystanders away from the installation site at all times
- Never suspending loads over anyone
- Never permitting anyone to work, stand, or pass under suspended loads
- Ensuring that all persons working with crane equipment wear standard safety gear, including but not limited to headgear, eye protection and, when applicable, gloves
- Only lifting a pallet and enclosure from the sides of the pallet with a forklift, never from the ends
- Permitting only those operators who are specially trained to operate crane equipment when placing the enclosure
- Never operating crane equipment until all stabilizers are extended and in firm contact with the ground or other adequate support (***never*** attempt to retract or extend the stabilizers when a load is suspended from the crane equipment)
- When raising the crane, checking for and avoiding any overhead obstructions or power lines that might interfere with movement of the crane
- Only permitting licensed electricians to complete the electrical hookups

This section describes how to

- Place the BSC enclosure on the installation point
- Anchor the BSC enclosure to the site
- Connect the cabling
- Connect the power source
- Power on the BSC
- Confirm that the BSC software is performing to specification

7.1 PLACING THE BSC ENCLOSURE

Place the BSC enclosure on the installation point by

1. Carefully securing the enclosure to the lifting device/mechanism before it is lifted
2. Ensuring that all electrical power at the installation point is ***turned off***
3. Holding the enclosure in a horizontally level position throughout the operation (the enclosure ***must remain vertical to the ground at all times)***
4. Lifting the enclosure
5. Moving the enclosure into position directly above the installation point
6. Carefully lowering the enclosure vertically and ***slowly*** onto the installation point (if the enclosure will be anchored---which is strongly recommended---the enclosure should align with all of the anchor bolts as it is lowered, but remain clear of any conduits or cabling)
7. Unfastening and/or removing anything supporting the enclosure ***only*** after it is in the desired location, in a stable position, and/or anchored to the installation point

7.2 ANCHORING THE BSC ENCLOSURE

Silicon Wireless, Inc. (SWI0 strongly recommends anchoring the BSC enclosure in place. This is best achieved with bolts that are fastened to anchor inserts already set into the installation point.

7.3 CONNECTING THE CABLING TO THE BSC

This subparagraph details how to attach the required cabling to the BSC. This cabling includes the

- (TO BE DETERMINED)

7.3.1 (TO BE DETERMINED)

(TO BE DETERMINED)

7.4 CONNECTING THE EXTERNAL POWER SOURCE TO THE BSC

The BSC requires two electrical connections. These are a

- Standard 110 volts (v) AC power input on a 15 ampere circuit
- Two (2) 24 v DC power inputs on a 40 ampere circuit
- One (1) 24 v DC power input on a 5 ampere circuit

7.4.1 CONNECTING THE AC POWER

The customer must provide the 110 v AC power input and the wire leading to it. SWI will install the 3-prong twist-lock female plug that the 3-prong plug from the BSC plugs into.

Once the female plug has been installed, plug the BSC into the AC power input. The TRAU, monitor, and router require the AC power.

7.4.2 CONNECTING THE DC POWER

The digital power shelf, point-to-point microwave unit, and the DSC CSU (modem) require a DC power input. The DC power input for the BSC is provided by the XTS.

7.4.2.1 How To Connect The DC Power To The Digital Power Shelf

The digital power shelf requires two (2) 24 v 40 ampere DC power inputs. These are provided by a pair of 2-prong Anderson quick-disconnect connections that come from the rear of the Ratelco power supply in the XTS and connect to the rear of the digital power shelf.

7.4.2.2 How To Connect The DC Power to the Point-To-Point Microwave Unit And The DSU CSU

The point-to-point microwave unit and the DSU/CSU require a 24 v 5 ampere DC power input. The power is provided by a single polarized, 8-prong connection that comes from the rear of the Ratelco power supply in the XTS and connects to a terminal block inside the rear of the BSC. This terminal block then connects to the point-to-point microwave and the DSU/CSU.

7.5 POWERING ON THE BSC

Power on the BSC in the following manner:

1. (TO BE DETERMINED)

7.6 CHECKING THE BSC SOFTWARE

Confirm that the BSC software is performing to specification in the following manner:

- (TO BE DETERMINED)

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CHAPTER 8

8.0 XTS EQUIPMENT INSTALLATION

This section provides specific instructions for installing the Voyager Switching Transponder Station (XTS) in its enclosure at the customer's site.

HAZARD WARNING

Observe all local safety precautions when performing the tasks in this section. Include additional safety measures as necessary, such as

- Keeping bystanders away from the installation site at all times
- Never suspending loads over anyone
- Never permitting anyone to work, stand, or pass under suspended loads
- Ensuring that all persons working with crane equipment wear standard safety gear, including but not limited to headgear, eye protection and, when applicable, gloves
- Only lifting a pallet and enclosure from the sides of the pallet with a forklift, never from the ends
- Permitting only those operators who are specially trained to operate crane equipment when placing the enclosure
- Never operating crane equipment until all stabilizers are extended and in firm contact with the ground or other adequate support (***never*** attempt to retract or extend the stabilizers when a load is suspended from the crane equipment)
- When raising the crane, checking for and avoiding any overhead obstructions or power lines that might interfere with movement of the crane
- Only permitting licensed electricians to complete the electrical hookups
- Observing all safety precautions specified by local building codes and the National Electrical Code® (NEC)
- Following all local codes and the NEC codes for branch circuit installation
- Making sure that the AC grounding electrode system is bonded to an AC main service power neutral/ground bus (contact your local power company or applicable local authority for information about codes and restrictions for you installation site)
- Checking the procedures in this manual against local building codes (in the event the local codes specify procedures that are different from those in this manual, follow the local codes)

This section describes how to

- Place the XTS enclosure on the installation point
- Anchor the XTS enclosure to the site
- Connect the cabling
- Install the batteries for the emergency backup power source
- Connect the power source
- Connect the emergency backup power source
- Power on the XTS
- Confirm that the XTS software is performing to specification

8.1 PLACING THE XTS ENCLOSURE

Place the XTS on the installation by

1. Dressing the preplaced cable/conduit toward the center of the installation point
2. Carefully securing the enclosure to the lifting device/mechanism before it is lifted
3. Ensuring that all electrical power at the installation point is ***turned off***
4. Holding the enclosure in a horizontally level position throughout the operation (the enclosure ***must remain vertical to the ground at all times***)
5. Lifting the enclosure
6 Moving the enclosure into position directly above the installation point
7. Carefully and ***slowly*** lowering the enclosure vertically onto the installation point (if the enclosure will be anchored, which is strongly recommended because of the tipping danger when the battery tray is loaded, the enclosure should remain aligned with all of the anchor bolts as it is lowered, but stay clear of any conduits or cabling
8. Unfastening and/or removing anything supporting the enclosure ***only*** after it is in the desired location, in a stable position, and/or anchored to the installation point

8.2 ANCHORING THE XTS ENCLOSURE

Anchoring the XTS in place is highly recommended because of the tipping danger when the battery tray is loaded. This is best achieved with bolts that are fastened to anchor inserts already set into the flooring or platform.

8.3 CONNECTING THE CABLING TO THE XTS

This subparagraph details how to attach the required cabling to the XTS. This cabling includes the

- (TO BE DETERMINED)

8.3.1 (TO BE DETERMINED)

(TO BE DETERMINED)

8.4 INSTALLING THE BATTERIES FOR THE EMERGENCY BACKUP POWER SOURCE

This paragraph describes how to install the batteries that provide the emergency backup power source for the XTS.

HAZARD WARNING

There are several safety hazards associated with the batteries and the battery connection procedures. These include but are not limited to arcing, acid spills, and venting of explosive gases. When installing the batteries, be sure to:

- Follow all local safety practices
- Wear all recommended safety gear
- Use extreme care when handling the batteries and connecting them to the string
- Always have two people lift and place the batteries in the tray
- Have all personnel lifting the batteries wear heavy gloves and safety glasses
- Prohibit anyone working on the batteries from wearing rings, metallic wrist bands, or bracelets
- Prevent metal objects from resting on the batteries or falling across the terminals
- Handle each battery ***only*** by its lifting slot or an appropriate lifting tool
- Have everyone keep their hands well away from the connector pins
- Prohibit smoking and anything else that could produce flames, sparks, or excessive heat
- ***Never*** lift the cabinet with batteries installed

Install the batteries by

- (TO BE DETERMINED)

8.5 CONNECTING THE EXTERNAL POWER SOURCE TO THE XTS

This paragraph describes how to connect the external power source to the XTS at an

- Indoor site
- Outdoor site

8.5.1 HOW TO CONNECT EXTERNAL POWER TO THE XTS AT AN INDOOR SITE

At an indoor site, plug the 3-prong connection on the XTS into the 3-prong, twist-lock, female plug providing 50 amperes of 220-240 volts (v) AC power.

When batteries are provided for emergency backup power, a conduit should be used to permanently connect them to the XTS.

8.5.2 HOW TO CONNECT EXTERNAL POWER TO THE XTS AT AN OUTDOOR SITE

At an outdoor site, the 220-240 v AC power on a 75 ampere branch circuit must be connected to the XTS according to all local codes and ordinances by a *licensed electrician*.

8.6 CONNECTING THE EMERGENCY BACKUP POWER SOURCE TO THE XTS

Use a pair of cables with Anderson quick-disconnect connections to attach the electrical hookup to the emergency backup power source (batteries) for the XTS.

8.7 POWERING ON THE XTS

Power on the XTS in the following manner:

1. Switch on all the circuit breakers *except* for the RF shelf and the power amplifier(s).
2. Switch on the front panel switches of the digital shelf DC to DC converter power supplies.
3. Immediately after the red light emitting diodes (LEDs) of the digital system interface module (DSIM) go out, switch on the circuit breaker for the RF shelf.

   NOTE: Switching on the power amplifier circuit breaker will enable the high power transmitter output. Before switching on this circuit breaker, the transmitter ports **must** be terminated to an actual antenna or a "dummy" load.

4. Switch on the circuit breaker for the power amplifier(s).
4. Ensure that the circuit breakers for the power amplifier fans are switched on.

8.8 CHECKING THE XTS SOFTWARE

Confirm that the XTS software is performing to specification in the following manner:

1. (TO BE DETERMINED)

APPENDIX A

NETWORK ELEMENT SAFETY WARNINGS

This appendix is a list of safety warnings. It should be copied, then posted at each NE installation site and remain there at all times.

The warnings should be readily visible to all installation and maintenance personnel **before** they begin working with or on the Network Element (NE). The recommended posting locations are as follows:

- At an *indoor* site, the warnings should be posted at eye level on the outside of the NE enclosure door, and on a notice board in the work area
- At an *outdoor* site, the warnings should be posted at eye level inside the enclosure, either on the NE or the inside of the enclosure door

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Safety Warnings

- Remove *all* rings, metallic wristbands or bracelets, necklaces, and other dangling objects when working on this equipment.
- Pin back long hair.
- Use insulated tools.
- Do **not** smoke or bring an open flame or ignition source near this equipment.
- When changing an antenna connection, switch *off* the power amplifier for that antenna **before** changing the connection.

  NOTE: Refer to Chapter 2 for radio frequency (RF) exposure information

- **Never** activate any unterminated transmitters / transceivers.
- Wear *all* recommended safety gear.
- Follow *all* local safety practices.
- **Never** disconnect the batteries when they are the primary source of power without first throwing the circuit breakers.
- Use rubber gloves and eye protection when working with the batteries.
- Do **not** place any objects on the batteries.
- Do **not** allow any objects to fall on the batteries.
- Do **not** touch the battery connector pins.

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APPENDIX B

GLOSSARY

ACCH	Associated Control Channel
ANSI	American National Standards Institute
ARFCN	Absolute Radio Frequency Channel Number
ASN.1	Abstract Syntax Notation One
AuC	Authentication Center
AWG	American Wire Guage
BCC	Base Transceiver Station (BTS) Color Code
BCCH	Broadcast Control Channel
BCF	Base Station Control function
Bm	Full-rate traffic channel
BSC	Base Station Controller
BSIC	Base Transceiver Station Identity Code
BSS	Base Station System
BSSAP	Base Station System Application Part
BSSMAP	Base Station System Management Application Part
BSSOMAP	Base Station Operation and Maintenance Application Part
BTS	Base Transceiver Station
CBC	Cell Broadcast Center
CBCH	Cell Broadcast CHannel
CC	Call Control
CCCH	Common Control CHannel
CCH	Control CHannel
CCITT	Comité Consultatif International Telegraphique et Téléphonique
CM	Connection Management
CMIP	Common Management Information Protocol
CMISE	Common Management Information Service Element
CTS	Collector Transceiver Station

DCCH	Dedicated Control Channel
DCF	Data Communication Function
DCN	Data Communication Network
DTAP	Direct Transfer Application Part
DTMF	Dual Tone Multi-Frequency (signaling)
DTX	Discontinuous Transmission (Mechanism)
EIR	Equipment Identity Register
ETSI	European Telecommunications Standards Institute
FACCH	Fast ACCH
FACCH/F	Full rate Fast Associated Control Channel
FACCH/H	Half rate Fast Associated Control Channel
FCCH	Frequency Correction CHannel
GMSC	Gateway Mobile services Switching Center
GMSK	Gaussian Minimum Shift Keying (modulation)
GSM	Global System for Mobile communication
HDLC	High Level Data Link Control
HLR	Home Location Register
HW	HardWare
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part (of signaling system No.7)
ITU	International Telecommunication Union
IWF	InterWorking Function
JTC	Joint Technical Committee between T1P1.4 and TR46.3 which is defining PCS air interfaces
LAC	Location Area Code
LAPDm	Link Access Protocol on the Dm channel
MIB	Managed Information Base
MIT	Managed Information Tree
MO	Managed Object
MS	Mobile Station
MSC	Mobile-services Switching Center, Mobile Switching Center
MTP	Message Transfer Part
NE	Network Element
NM	Network Management
OA&M	Operations, Administration & Maintenance
OAM&P	Operations, Administration, Maintenance & Provisioning
OMC	Operations & Maintenance Center
OMC-R	Operations & Maintenance Center - Radio
OMC-S	Operations & Maintenance Center - Switch
OSI	Open System Interconnection
PCH	Paging CHannel
PCM	Pulse Code Modulation
PCS	Personal Communications Services
PCS	Personal Communications Systems
PP	Point-to-Point
PSC	PCS Switching Center

PSTN	Public Switched Telephone Network
QAF	Q - Adapter Function
QOS	Quality Of Service
RACH	Random Access CHannel
RF	radio frequency
RR	Radio Resource
RSL	Radio Signaling Link
SACCH	Slow Associated Control CHannel
SAPI	Service Access Point Indicator
SCCP	Signaling Connection Control Part
SCCP-CL	SCCP Connection-Less
SCCP-CO	SCCP Connection-Oriented
SCH	Synchronization CHannel
SDCCH	Stand-alone Dedicated Control CHannel
service	
SMS	Short Message Service
SMS/PP	Short Message Service/Point-to-Point
SMSCB	Short Message Service Cell Broadcast
SNMP	Simple Network Management Protocol
SS	Supplementary Service
SS7/SS#7	Signaling System No 7
SW	SoftWare
TBD	to be determined
TCH	Traffic CHannel
TCH/F	A Full rate TCH
TCH/H	A Half rate TCH
TDMA	Time Division Multiple Access
TE	Terminal Equipment
Tei	Terminal endpoint identifier
TMN	Telecommunication Management Network
TRAU	Transcoder Rate Adapter Unit
TRX	Transceiver
TS	Time Slot
VAD	Voice Activity Detection
VLR	Visitor Location Register
XTS	A Voyager Switching Transponder Station

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