

AZDEC LTD

INSTALLATION GUIDE
FOR
WORKS ORDER No. EXAMPLE

(EXAMPLE)

Two Way Infra Red Communications System

(TWIRC)

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INSTALLATION GUIDE FOR WORKS ORDER No. EXAMPLE

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0.1 Amendment Record

Issue	Date	Comment
1	-	Final Installation Guide

0.2 Future Updates

None known.

0.3 Drawings

970306/201 Noise Attenuating Headset General View

970306/202 Lightweight Headset General View

970306/203 Baseline Battery Pack General View

970306/204 Enhanced Battery Pack General View

970306/206 Baseline Base Station General View

970306/207 Enhanced Base Station General View

970306/208 Battery Charger General View

970306/209 Antenna - Long Cable General View

970306/210 Auxiliary Power Supply

970306/211 Noise Attenuating Headset - Enhanced General View

1. Introduction

1.1 Scope

This document describes the procedure for installing the TWIRC System. The document is not ship specific and therefore does not specify the quantities of each unit or the area where the installation is to be made. These will be detailed in other documents normally prepared by the Weapons Project Manager (WPM). The Ship specific documents will also provide the installer with forms in order to record the serial number, date installed and any options selected for each of the items installed.

This document only describes the planning and installation of the equipment and stops short of applying power to the equipment. The procedure for Setting to Work of the equipment is described in document reference EXAMPLE/032.

The Document is split into 8 sections:

1. Introduction
2. Pre-Installation Planning
3. Fixed Unit Installation
4. Portable Unit Installation
5. Mobile Unit Installation
6. Co-Located Systems
7. Installation Tools
8. Typical Installation Records

It is recommended that all sections are read prior to starting the installation or installation planning process.

1.2 System Description

The Two Way Infra-Red Communication System is designed to allow the user to be mobile in an area and to maintain communication with other users of the TWIRC system and users of the Ship's Communication system.

Each TWIRC user will have a Headset & Mobile Unit which allows them to listen to other users using their earpiece and to speak to other users using their microphone. The power for the Headset & Mobile Unit will be provided by a small belt mounted battery pack on which will be mounted the user controls e.g. the Press to Speak key. The battery pack is designed to allow the user to operate in the TWIRC area for at least 4 hours without changing the battery pack (assuming a fully charged battery).

The system consists a collection of Antenna mounted above head height in the designated area. The users Headset & Mobile Unit will communicate with the Antenna using Infra-Red signals in both directions. These Antenna are wired to a fixed Base Station which in turn is wired to the Ship's Communication system.

The infra-red communication to and from the Headset & Mobile Unit on any discrete system is not to any particular Antenna, therefore the user may be mobile in the area as long as the system maintains infra-red communication with the system. For this reason the Headset & Mobile Unit is designed such that the infra-red devices are located on the top of the unit.

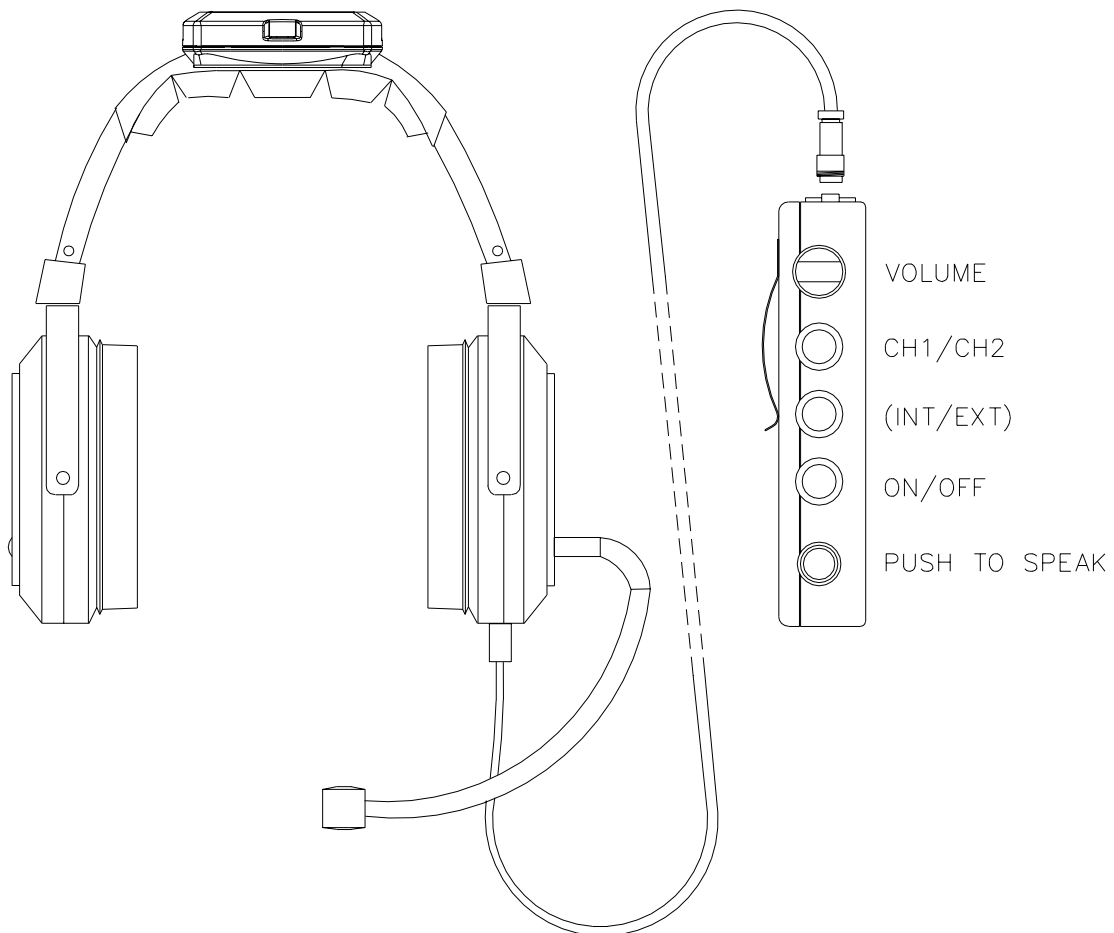


Figure 1 - a typical "Man on the Move" equipment

The above shows a typical "Man on the Move" equipment which consists of two units:

the **Headset & Mobile Unit** and the **Battery Pack**.

The TWIRC system is a digital communication system which allow the users access to up to 2 channels (Baseline System). The system is such that all users may hear the signal on the particular channel selected. In order to speak on one of the two channels the user must press the Press To Speak (PTS) key. Normal PTS discipline is necessary to ensure all users have access to the channels in order to speak.

When the system is being used to communicate with the Ship's Communication

System the TWIRC system is provided with a user's sidetone signal such that the signal from the user speaking is fed back to all user's earpieces together with the incoming voice signal from the Ship's Communication System

Two systems are available the Baseline System and the Enhanced System. The Baseline system allows the user to communicate with other users on the TWIRC system and on the Ship's Internal Communication System. The Enhanced System has all the facilities of the Baseline System but has the additional feature of being able to communicate with the Ship's External Communication System.

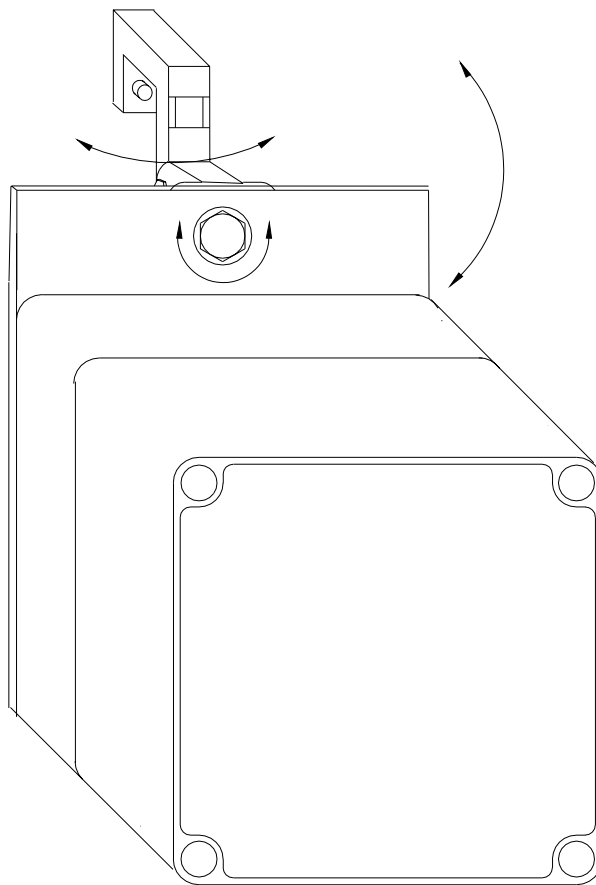


Figure 2 - Antenna

970306/209
(showing direction
adjustment)

In order to achieve a rigid support the adjustable bracket should be clamped to a heavy walled, square section tube of 20 by 40mm.

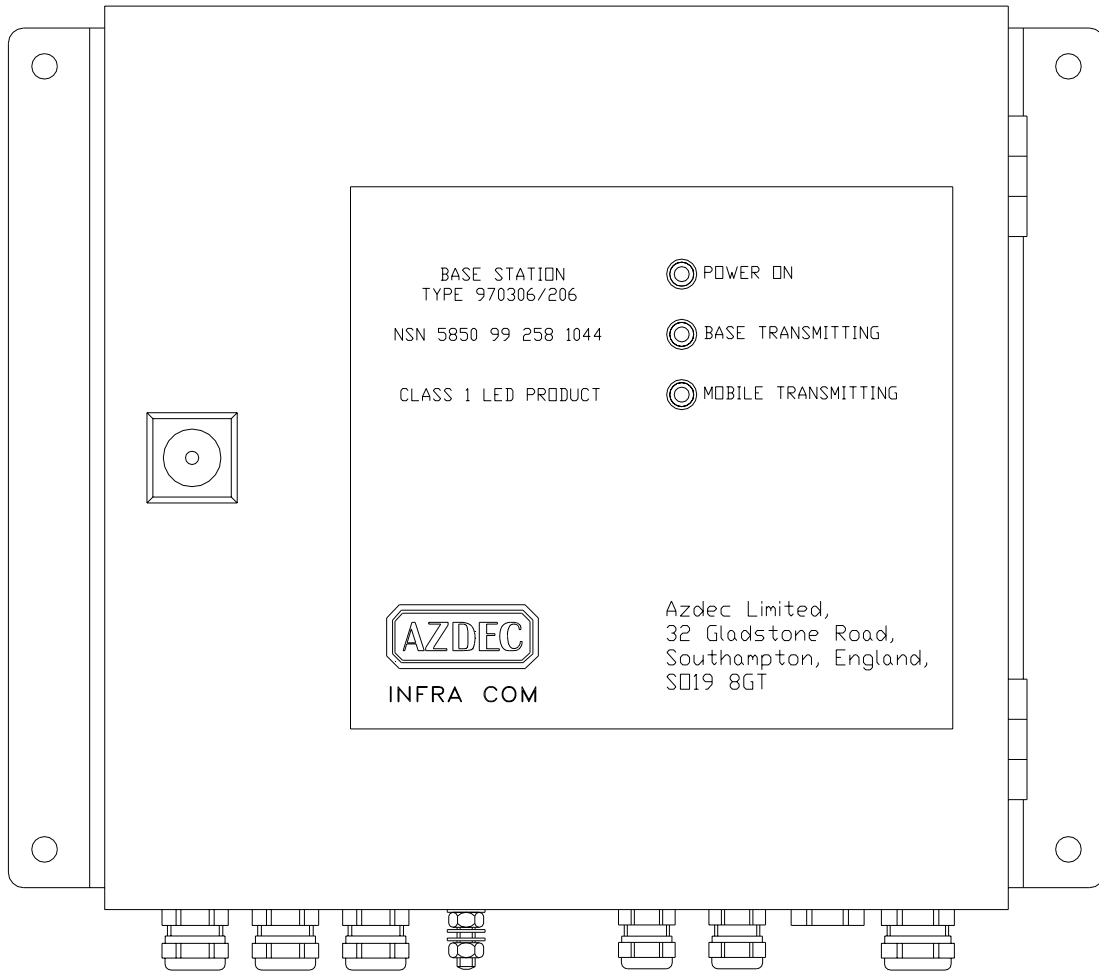


Figure 3 - Baseline Base Station

970306/206 (or 970306/207 Enhanced Base Station and 970306/210 Auxiliary Power Supply are not shown these are similar but have more or less indication lamps refer to the general views for more detail)

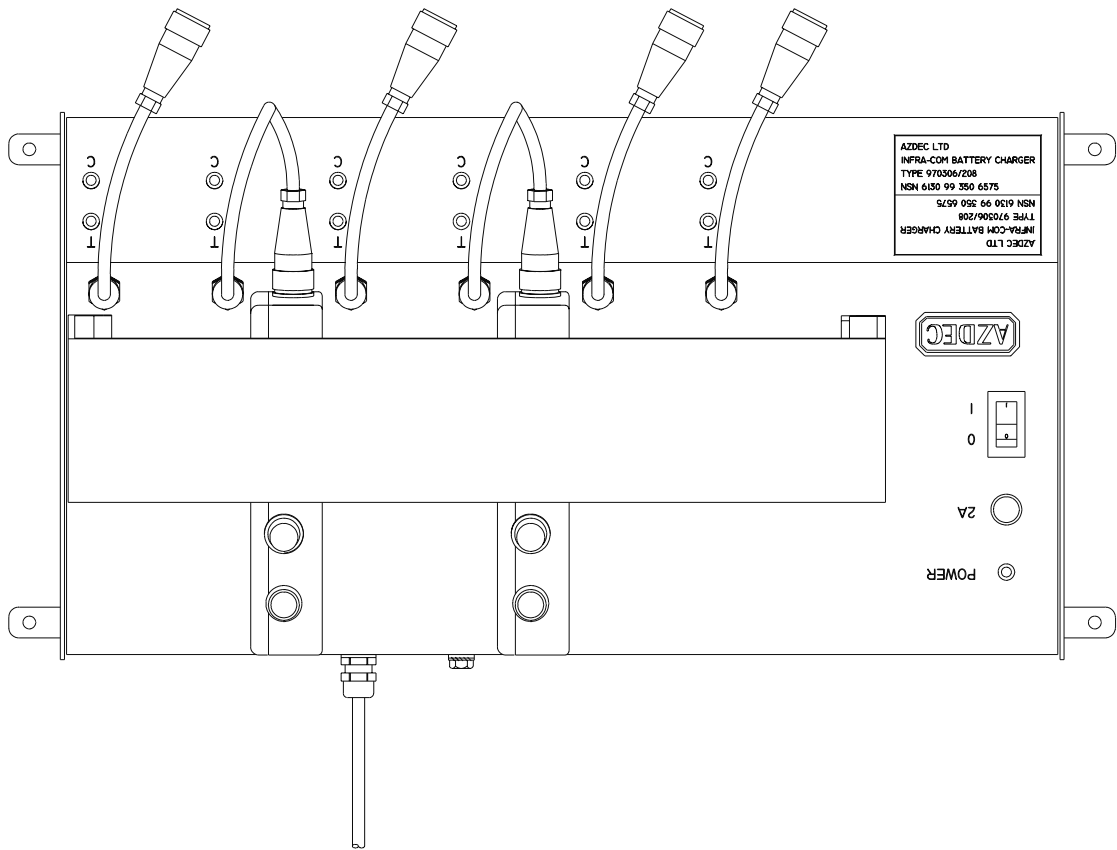


Figure 4 - Battery Charger

970306/208 (including 2 Battery Packs loaded)

2. Pre-Installation Planning

The sites for the Base Station, Antenna, Auxiliary Power Supply and Battery Charger shall be identified and the routing of the cabling from the Base Station to the Antenna shall be planned.

2.1 Base Station

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

The Base Station is a wall mounted unit. It shall be located in a convenient position for connection into the Ship's Communication System, the Ship's 24V dc supply and for connection to the Antenna system.

If the system has more than 12 Antenna then refer to section 2.8 Auxiliary Power Supply.

If the Base Station is one of pair used in a co-located system then refer to section 6 for additional requirements.

All entry for cables into the enclosure are via glands. In order to achieve speedy replacement of the electronic components in the case of failure, all connections to the Base Station Electronics assembly are via plugs and/or sockets (including quick release terminals).

For normal operation it is not necessary to gain access to the Base Station, however for initial installation, setting to work and fault based maintenance access should be possible. The planned location shall take account of this requirement. The unit shall be mounted vertically on a flat surface ensuring there are no obstructions to the air flow past the finned heat sink on the rear of the unit. It is recommended that a space of at least 200mm is left above and below the unit.

Maintenance may require access to the unit and therefore a clearance of 300mm shall be allowed in front of the unit to allow the door to be fully opened.

When the maximum number of Antennas (12 per Base Station) with the maximum cable lengths the 24V Ship's supply shall be able to supply up to 12A (at the minimum 18V specified for the 24V supply) and shall be fused at 15A. On systems with shorter cable lengths and less antenna the current will be significantly less. The following table defines some of the typical conditions together with the typical currents.

Number of Antenna	Maximum Cable Length	Supply Voltage	Typical Current
12	400m	18V	7.5A
12	150m	18V	6.0A
6	150m	18V	3.0A
6	150m	24V	2.25A

2.2 Antenna

Reference: 970306/205 Antenna General View
970306/209 Antenna - Long Cable General View

The Antenna should be located at a height above the deck of approximately 2.3m and be distributed in the area in order to give maximum coverage. Figure 8 and Figure 9 shows the typical area covered by 1 Antenna. Figure 10 shows how 4 Antenna give coverage of a complex area. Actual positions of the Antenna will need to be planned based on the size and shape of the area. Suitable fixing points will need to be identified and installed if necessary prior to the installation of the TWIRC system. The General View shows details of the fixing method.

The Antenna should be located such that in the case of damage to the unit it may be removed completely and replaced with a spare Antenna.

2.3 Battery Charger

Reference: 970306/208 Battery Charger General View

The Battery Charger is a portable unit which may be fixed to either a horizontal or vertical surface. The unit is used to recharge the batteries of the Battery Pack used for the Man on the Move equipment. The location chosen shall allow easy operation of the Battery Charger. The reference above shows the position of the Battery Pack, insertion and withdrawal of the Battery Packs should not be hindered by its position. The sketch below shows the typical boundaries. In addition a clearance of 25mm should be allowed for above the top surface.

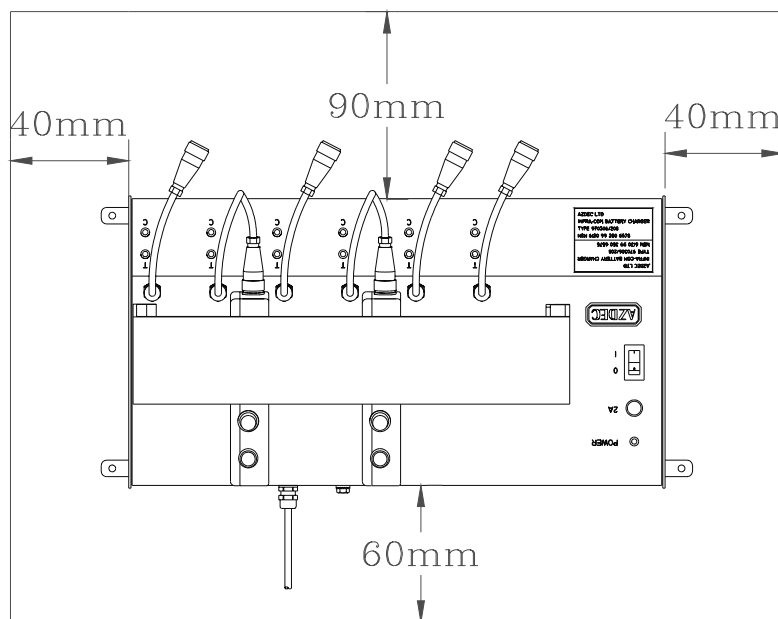


Figure 5 - Battery Charger Mounting

2.4 Internal Signal and Power Cables

Reference: The Data cable is of type NSN 6145 99 439 4729.
The Power Cable of type NSN-6145 99 096 2821.

The Base Station to Antenna data cable run shall be planned such that the start of the run is at the Base Station and so that each Antenna is connected to the next in a Bus Configuration as shown in Figure 11 - Interface Connectors . For systems with up to 12 Antenna then the power cable will be connected to the two interfaces on the Base Station as shown in Figure 11. For over 12 Antenna then the power will be provided by Auxiliary Power supplies as required (12 Antenna per Auxiliary Power Supply).

The majority of Antenna will have four cables connected to them. Two will be Data Cables and Two will be Power Cables. The exceptions are the last Antenna on the Data Bus which will only have one Data Cable and the last Antenna on the Power Buses which will only have one power cable.

Each Base Station is provided with three interfaces for connecting the Antenna, one for data and two for power. The total length of the data cable, for all of the Antenna type 970306/209, shall not exceed 1000m. Each Antenna reduces the maximum data cable length by 8m.

For an installation of between 1 and 6 Antenna then only one Antenna Power Cable Bus is needed. For an installation up to 12 Antenna then the power is connected by two buses on the Base Station, with up to 6 Antenna connected to each power cable. (See Figure 11). For over 12 Antenna then the Auxiliary Power supply will be needed.

The cabling between Antenna and between the Base Station and the Antenna shall not have any intermediate connections. That is each cable section shall be of one piece of cable.

2.5 External Signal and Power Cables

The following cables will be needed to be connected to the Base Station via the appropriate gland, plug and socket.

2.5.1 Power Input - 24V dc

Reference: The recommended cable is NSN-6145 99 096 2821
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/210 Auxiliary Power Supply General View

A 24V supply of up to 12A will be necessary to power the TWIRC system, with up to 12 Antenna, via the Base Station. The supply shall be fused at 15A. For larger systems each Auxiliary Power supply will require a supply of 12A fused at 15A.

The two core cable shall have an overall screen which will be terminated by the gland on the Base Station or Auxiliary Power supply. See section 2.1 for typical currents.

2.5.2 Internal Ship's Communications

Reference: The recommended cable is NSN-6145-99-892-0076.
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

The ships internal communication system may be connected to the Base Station using the socket supplied. The cable shall be a 3 pair cable with each pair screened and an overall screen. The cable entry is via a gland, the overall screen will be terminated by the gland.

2.5.3 External Ship's Communications (Enhanced System only)

Reference: The recommended cable is NSN-6145-99-892-0076.
970306/207 Base Station (Enhanced) General View

The ships external communication system may be connected to the Base Station using the socket supplied. The cable shall be a 3 pair cable with each pair screened and an overall screen. The cable entry is via a gland, the overall screen will be terminated by the gland.

2.5.4 Power Input Battery Charger 115V Single Phase ac

The Battery Charger is a portable unit which may be fixed to either a horizontal or vertical surface. The unit will need to be connected to the ship's 115V single phase ac supply. A suitable 3 pin plug will need to be fitted to the Battery Charger cable.

2.6 Co-Located System (Master/Slave) Cable (only if co-located system selected)

Reference: The Master/Slave cable is of type NSN 6145 99 439 4729.

The cable between the two co-located systems shall be kept as short as possible as specified in section 6. The cable shall be of one piece and there should be no connections to the cable other than at each end.

2.7 NEMP Bonding

The fixed parts of the TWIRC system are each provided with an NEMP stud (M6) which shall be connected to the ship's earth consistent with ship's practice. It is therefore necessary to plan the provision of suitable connection points to the ship's earth.

2.8 Auxiliary Power Supply

Reference: 970306/210 Auxiliary Power Supply General View

The Auxiliary Power Supply is a wall mounted unit. It shall be located in a convenient position for connection into the Ship's 24V dc supply and for connection to the

Antenna system.

If the system has more than 12 Antenna then an Auxiliary Power Supply will be required for each group of 12 Antenna.

All entry for cables into the enclosure are via glands. In order to achieve speedy replacement of the electronic components in the case of failure, all connections to the Auxiliary Power Supply Electronics assembly are via plugs and/or sockets.

For normal operation it is not necessary to gain access to the Auxiliary Power Supply , however for initial installation, setting to work and fault based maintenance access should be possible. The planned location shall take account of this requirement.

When the maximum number of Antennas (12 per Auxiliary Power Supply) with the maximum cable lengths the 24V Ship's supply shall be able to supply up to 12A (at the minimum 18V specified for the 24V supply) and shall be fused at 15A. On systems with shorter cable lengths and less antenna the current will be significantly less. The following table defines some of the typical conditions together with the typical currents.

Number of Antenna	Cable Length	Supply Voltage	Current
12	400m	18V	7.5A
12	150m	18V	6.0A
6	150m	18V	3.0A
6	150m	24V	2.25A

3. Fixed Unit Installation

The process detailed in this section concerns the installation of the fixed units. It does not detail the setting to work of the units or the system. The setting to work is described in EXAMPLE/032.

Where a section specifies that cables shall not be connected to the electronics during the installation process it is important that this restriction is observed.

Power shall NOT be applied to any part of the system during the installation process. Nor should any form of electrical insulation testing be carried out on the system as this may cause damage to the equipment.

The fixed units are identified in. All units shall be visually inspect for signs of damage prior to starting the installation process.

3.1 Base Station

3.1.1 Fixing

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

The Base Station is a Wall Mounted Enclosure with 4 fixing points the size and position are identified in the references above. The unit shall be mounted vertically on a flat surface ensuring there are no obstructions to the air flow past the finned heat sink on the rear of the unit. It is recommended that a space of at least 200mm is left above and below the unit.

Maintenance may require access to the unit and therefore a clearance of 300mm shall be allowed in front of the unit to allow the door to be fully opened.

3.1.2 Glands

All cables enter the Base Station enclosure via glands. The glands and cables are assembled as identified in the following sections.

In order to maintain the moisture resistance of the enclosure it is essential that any hole in the enclosure not being used for a gland is fitted with an appropriate Blanking Plug. These Blanking Plugs will be supplied pre-fitted to the locations where glands are optional. **Do not discard any blanking plugs that are removed, they may need to be fitted to the last Antenna on the data bus or power bus.**

3.1.2.1 Data Cable

Reference: Data cable type NSN 6145 99 439 4729
Figure 15 Cable Gland - EMC Screen Not Terminated
Figure 16 Data Cable
Figure 19 Cable Assembly - Base Station
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/230 PG9 Gland Kit NSN 5975 99 564 2923

The Data Cable shall enter the enclosure via the gland identified in the reference above, the screens shall not be terminated on the cable gland. References above show the assembly of the gland relative to the cable including the termination of the drain wires onto the drain stud.

3.1.2.2 48V Power Cables

Reference: Power cable type NSN 6145 99 096 2821
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/231 PG11 Gland Kit NSN 5975 99 000 77264

There are two access points for the Antenna 48V power cables. For a system with up to 6 Antenna then it is only necessary to use one access point. The other location should be fitted with the Blanking plug which is supplied with the Base Station.

The 48V Power Cables shall enter the enclosure via the glands identified in the reference above, the screens shall be terminated on the cable gland. The references above shows the assembly of the gland relative to the cable.

3.1.2.3 Audio Cables (Ship's Internal and External Communication)

Reference: Audio cable type NSN-6145-99-892-0076
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 18 Audio Cable
Figure 19 Cable Assembly - Base Station
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/232 PG13.5 Gland Kit NSN 5975 99 151 3187

The Audio Cables to the Ship's Internal and External Communication Systems shall enter the enclosure via the glands identified in the reference above, the overall screens shall be terminated on the cable gland. The individual screens shall not be terminated on the gland, these are terminated as defined in section 3.1.3. The references above show the assembly of the gland relative to the cable.

3.1.2.4 24V Power Cable

Reference: Power cable type NSN 6145 99 096 2821
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/231 PG11 Gland Kit NSN 5975 99 000 7264

The 24V Power Cables shall enter the enclosure via the gland identified in the reference above, the screen shall be terminated on the cable gland. The references above shows the assembly of the gland relative to the cable.

3.1.2.5 Master/Slave Cable

Reference: Data cable type NSN 6145 99 439 4729
Figure 15 Cable Gland - EMC Screen Not Terminated
Figure 16 Data Cable
Figure 19 Cable Assembly - Base Station
970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
970306/230 PG9 Gland Kit NSN 5975 99 564 2923

The Master/Slave Cable (no longer than 2m) shall enter the enclosure via the gland identified in the reference above, the screens shall not be terminated on the cable gland. The references above shows the assembly of the gland relative to the cable. In the case of a single Base Station a blanking plug shall be fitted. The Blanking Plug will be supplied with the Base Station.

3.1.3 Electrical Interfaces

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

All connections to the Base Station Electronics Assemblies are via connectors. The connections are as follows:

Port	PCB Connector Plug/Socket	Type	Function
1	P	data	Antenna 1-12 (or more)
2	S	power 48V	Antenna 1-6
3	S	power 48V	Antenna 7-12
4	P	audio	Internal Communications
5	S	+24V input	Input Power
6	P	data	Master/Slave
7	P	audio, PTS	External Communications

P indicates that the connection on the Electronics Assembly is a plug (pin) and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable.

S indicates that the connection on the Electronics Assembly is a socket and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

The references above shows the location and type of each port and the appropriate gland entry point.

The connection to each port are shown in the following table.

Base Station port	pin 1st (co-located)	cable	wire	function 1st (co-located)
1	1	data pair 1	red	RI+
	2	data pair 1	black	RI-
	3	data pair 1	drain	
	4	data pair 2	white	DO+
	5	data pair 2	black	DO-
	6	data pair 2	drain	
2	1	48V	red	+48V
	2	48V	blue	48V return
3	1	48V	red	+48V
	2	48V	blue	48V return
4 (Internal)	1	pair 1	blue	Receive
	2	pair 1	red	Receive
	3	pair 1	Internal Screen	
	4	pair 2	blue	Transmit
	5	pair 2	red	Transmit
	6	pair 2	Internal Screen	
	7	pair 3	Internal Screen	
	8	pair 3	blue	PTS Common
	9			PTS NC
	10	pair 3	red	PTS NO
5	1	24V	red	+24V
	2	24V	blue	0V in
6	1 (4)	M/S pair 1	red	RI+ (DO+)
	2 (5)	M/S pair 1	black	RI- (DO-)
	3 (6)	M/S pair 1	drain	
	4 (1)	M/S pair 2	white	DO+ (RI+)
	5 (2)	M/S pair 2	black	DO- (RI-)
	6 (3)	M/S pair 2	drain	
7 (External)	1	pair 1	blue	Receive
	2	pair 1	red	Receive
	3	pair 1	Internal Screen	
	4	pair 2	blue	Transmit
	5	pair 2	red	Transmit
	6	pair 2	Internal Screen	
	7	pair 3	Internal Screen	
	8	pair 3	blue	PTS Common
	9			PTS NC
	10	pair 3	red	PTS NO

3.1.4 Antenna Data Cable Termination

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

The Antenna Data connection on the Electronics Assembly is a pin header (plug) Port 1 and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable. Note that the Data Cable screens are terminated on the connector and are not directly connected to the gland or the enclosure.

The cable shall be fitted with the socket but shall not be connected to the Base Station plug on the electronics assembly.

3.1.5 Antenna 48V Power Cable Termination

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station

The 48V output power connections on the Electronics Assembly is a socket Port 2 and Port 3 and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

3.1.6 Ship's Internal Communication Cable Termination

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
Figure 18 Audio Cable
Figure 19 Cable Assembly - Base Station

The Ship's Internal Communication connection on the Electronics Assembly is a pin header (plug) Port 4 and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable. It should be noted that the individual screens of the cable are terminated at the Base Station and therefore should not be terminated at any other point.

The cable shall be fitted with the socket but shall not be connected to the Base Station plug on the electronics assembly. Connection of the plug and socket are covered in the Setting to Work Procedure.

3.1.7 24V Input Power Cable Termination

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station

The 24V input power connection on the Electronics Assembly is a socket Port 5 and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

The 24V cable shall NOT be terminated on the socket until it is isolated from the live 24V supply. Power shall NOT be applied to the system during the installation process.

3.1.8 Co-Located System (Master/Slave) Cable Termination (only if co-located system selected)

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
Figure 16 Data Cable
Figure 19 Cable Assembly - Base Station

The Co-Located System connection on the Electronics Assembly is a plug Port 6 and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable.

The cable shall be fitted with the socket but shall not be connected to the Base Station plug on the electronics assembly.

Note: This connection is associated with the Master/Slave function.

3.1.9 Ship's External Communication Cable Termination

Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View
Figure 18 Audio Cable
Figure 19 Cable Assembly - Base Station

The Ship's External Communication connection on the Electronics Assembly is a plug Port 7 and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable.

It should be noted that the individual screens of the cable are terminated at the Base Station and therefore should not be terminated at any other point.

The cable shall be fitted with the socket but shall not be connected to the Base Station plug on the electronics assembly.

3.1.10 NEMP Bonding

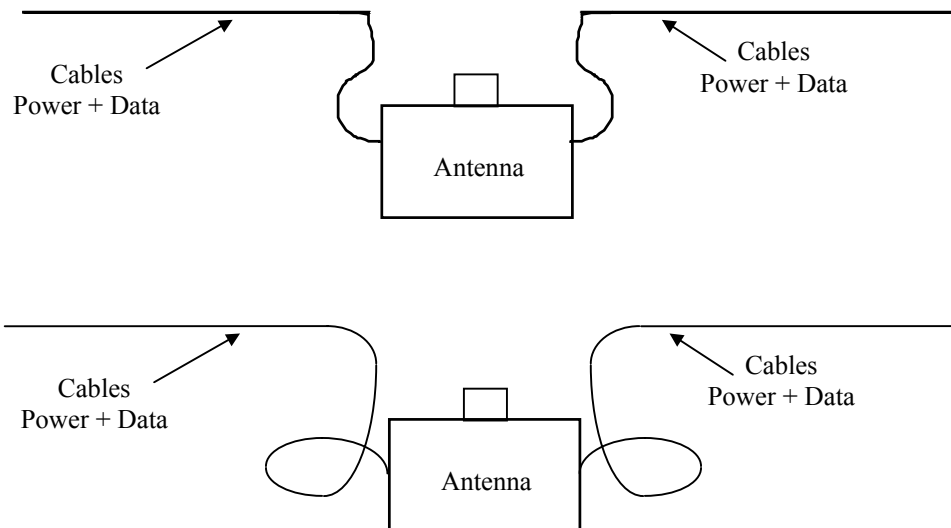
Reference: 970306/206 Base Station (Baseline) General View
970306/207 Base Station (Enhanced) General View

The external M6 NEMP stud shall be connected consistent with ship's practice.

3.2 Antenna Cabling

Reference: The Data cable is of type NSN 6145 99 439 4729.
The Power Cable of type NSN-6145 99 096 2821.

The data cable run from the Base Station to the Antenna shall be 1 bus (see section 2.4). The power cable from a Base Station may be one or two buses depending on the number of antenna and their location relative to the Base Station. Fixing of cables shall be consistent with ship's practice. The termination of cables at the Antenna requires that the cable be flexible enough to allow the direction of the Antenna to be adjusted after the cable is terminated on the Antenna. This shall be achieved by leaving a "gooseneck" or "pigtail" on the end of each cable. Each of the 4 cables shall have at least 400mm of spare cable to allow for adjustment of the Antenna and termination of the cable.



The cabling between adjacent Antenna and between the Base Station and the Antenna shall not have any intermediate connections. That is each cable section shall be of one piece of cable.

3.3 Antenna

3.3.1 Fixing

Reference: 970306/209 Antenna - Long Cable General View

The Antenna is single point mounted unit which is designed at allow the direction of infra-red reception to be optimised. The reference above shows the fixing method. The location and fixing point will be identified in the ship specific instructions.

3.3.2 Electrical Interfaces

Antenna Port	Pin	Cable	Wire	Function
JP1 (input) (nearest base station) on the left when viewed from the front	1	data pair 1	black	DO-
	2	data pair 1	red	DO+
	Drain stud	data pair 1	drain	
	3	data pair 2	black	RI-
	4	data pair 2	white	RI+
	Drain stud	data pair 2	drain	
	5	48V in	blue	48V return
	6	48V in	red	+48V
JP2 (output) (furthest from base station) on the right when viewed from the front	1	data pair 1	black	RI-
	2	data pair 1	red	RI+
	Drain stud	data pair 1	drain	
	3	data pair 2	black	DO-
	4	data pair 2	white	DO+
	Drain stud	data pair 2	drain	
	5	48V out	blue	48V return
	6	48V out	red	+48V

3.3.3 Data Cable Connection

Reference:

- 970306/209 Antenna - Long Cable General View
- Data cable type NSN 6145 99 439 4729
- 970306/230 PG9 Gland Kit NSN 5975 99 564 2923
- Figure 15 Cable Gland - EMC Screen Not Terminated
- Figure 16 Data Cable
- Figure 20 Cable Termination - Antenna

Each Antenna will be connected to typically 4 cables, two for power and two for data.

The Data cables each enter the Antenna enclosure via a gland. The references above shows the assembly of the gland relative to the cable.

In the case of the last Antenna on the bus it will only have one data cable gland fitted which terminates on J1. There will be no connection to J2. In order to maintain the environmental sealing of the Antenna a blanking plug (as supplied with the Base Station see section 3.1.2) shall be fitted in place of the other cable.

The references above show how the cable shall be terminated including the screen.

The location of the connectors is shown in the references above. The connections schedule is shown in section 3.3.2.

3.3.4 48V Power Cable Connection

Reference:

970306/209 Antenna - Long Cable General View
Power cable type NSN 6145 99 096 2821
970306/231 PG11 Gland Kit NSN 5975 000 7264
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 17 Power Cable
Figure 20 Cable Termination - Antenna

Each Antenna will be connected to typically 4 cables, two for power and two for data.

The 48V Power cables each enter the Antenna enclosure via a gland. The references above shows the assembly of the gland relative to the cable.

In the case of the last Antenna on the bus it will only have one power cable gland fitted. In order to maintain the environmental sealing of the Antenna a blanking plug (as supplied with the Base Station see section 3.1.2) shall be fitted in place of the other cable.

The references above show how the cable shall be terminated.

The location of the connectors in the references above. The connections schedule is shown in section 3.3.2.

The maximum cable lengths for the antenna power cable is defined in Appendix A.

3.3.5 NEMP bonding

Reference: 970306/209 Antenna General View

The external M6 NEMP stud shall be connected consistent with ship's practice.

3.4 Auxiliary Power Supply

3.4.1 Fixing

Reference: 970306/210 Auxiliary Power Supply General View

The Auxiliary Power Supply is a Wall Mounted Enclosure with 4 fixing points identified in the reference above. The unit shall be mounted vertically on a flat surface ensuring there are no obstructions to the air flow past the finned heat sink on the rear of the unit. It is recommended that a space of at least 200mm is left above and below the unit.

Maintenance may require access to the unit and therefore a clearance of 300mm shall be allowed in front of the unit to allow the door to be fully opened.

3.4.2 Glands

All cables enter the Auxiliary Power Supply enclosure via glands. The glands and cables are assembled as identified in the following sections.

In order to maintain the moisture resistance of the enclosure it is essential that any hole in the enclosure not being used for a gland is fitted with an appropriate Blanking Plug. These Blanking Plugs will be supplied pre-fitted to the locations where glands are optional. **Do not discard any blanking plugs that are removed, they may need to be fitted to the last Antenna on the data bus or power bus.**

3.4.2.1 48V Power Cables

Reference: Power cable type NSN 6145 99 096 2821
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station
970306/210 Auxiliary Power Supply General View
970306/231 PG11 Gland Kit NSN 5975 99 000 77264

There are two access points for the Antenna 48V power cables. For a system with up to 6 Antenna connected to the Auxiliary Power Supply then it is only necessary to use one access point. The other location should be fitted with the Blanking plug which is supplied with the Auxiliary Power Supply.

The 48V Power Cables shall enter the enclosure via the glands identified in the reference above, the screens shall be terminated on the cable gland. The references above show the assembly of the gland relative to the cable.

3.4.2.2 24V Power Cable

Reference: Power cable type NSN 6145 99 096 2821
Figure 14 Cable Gland - EMC Outer Braid Screen Terminated
Figure 17 Power Cable
Figure 19 Cable Assembly - Base Station
970306/210 Auxiliary Power Supply General View
970306/231 PG11 Gland Kit NSN 5975 99 000 7264

The 24V Power Cables shall enter the enclosure via the gland identified in the reference above, the screen shall be terminated on the cable gland. The references above shows the assembly of the gland relative to the cable.

The maximum cable lengths for the antenna power cable is defined in Appendix A.

3.4.3 Electrical Interfaces

Reference: 970306/210 Auxiliary Power Supply General View

All connections to the Auxiliary Power Supply Electronics Assemblies are via connectors. The connections are as follows:

Port	PCB Connector Plug/Socket	Type	Function
2	S	power 48V	Antenna 1-6
3	S	power 48V	Antenna 7-12
5	S	+24V input	Input Power

P indicates that the connection on the Electronics Assembly is a plug (pin) and therefore the connector on the cable is a socket. Figure 19 defines the method of attaching the cable socket to the end of the cable.

S indicates that the connection on the Electronics Assembly is a socket and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

The references above shows the location and type of each port and the appropriate gland entry point.

The connection to each port are shown in the following table.

Auxiliary Power Supply port	pin 1st (co-located)	cable	wire	function 1st (co-located)
2	1	48V	red	+48V
	2	48V	blue	48V return
3	1	48V	red	+48V
	2	48V	blue	48V return
5	1	24V	red	+24V
	2	24V	blue	0V in

3.4.4 Antenna 48V Power Cable Termination

Reference: 970306/210 Auxiliary Power Supply General View
 Figure 17 Power Cable
 Figure 19 Cable Assembly - Base Station

The 48V output power connections on the Electronics Assembly is a socket Port 2 and Port 3 and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

3.4.5 24V Input Power Cable Termination

Reference: 970306/210 Auxiliary Power Supply General View
 Figure 17 Power Cable
 Figure 19 Cable Assembly - Base Station

The 24V input power connection on the Electronics Assembly is a socket Port 5 and therefore the connector on the cable is a pin crimp. Figure 19 defines the method of attaching the cable pin crimp to the end of the cable.

The 24V cable shall NOT be terminated on the socket until it is isolated from the live 24V supply. Power shall NOT be applied to the system during the installation process.

3.4.6 NEMP Bonding

Reference: 970306/206 Base Station (Baseline) General View
 970306/207 Base Station (Enhanced) General View

The external M6 NEMP stud shall be connected consistent with ship's practice.

4. Portable Unit Installation

4.1 Battery Charger

Reference: 970306/208 Battery Charger General View

The Battery Charger is a portable unit that may be mounted on either a horizontal or a vertical surface. The unit should be mounted to allow easy insertion and removal of the Battery Packs. For its operation it is necessary to be able to clearly see the LED located on the surface of the Battery Charger and to be able to operate the PTS and On/Off switches on the Battery Pack.

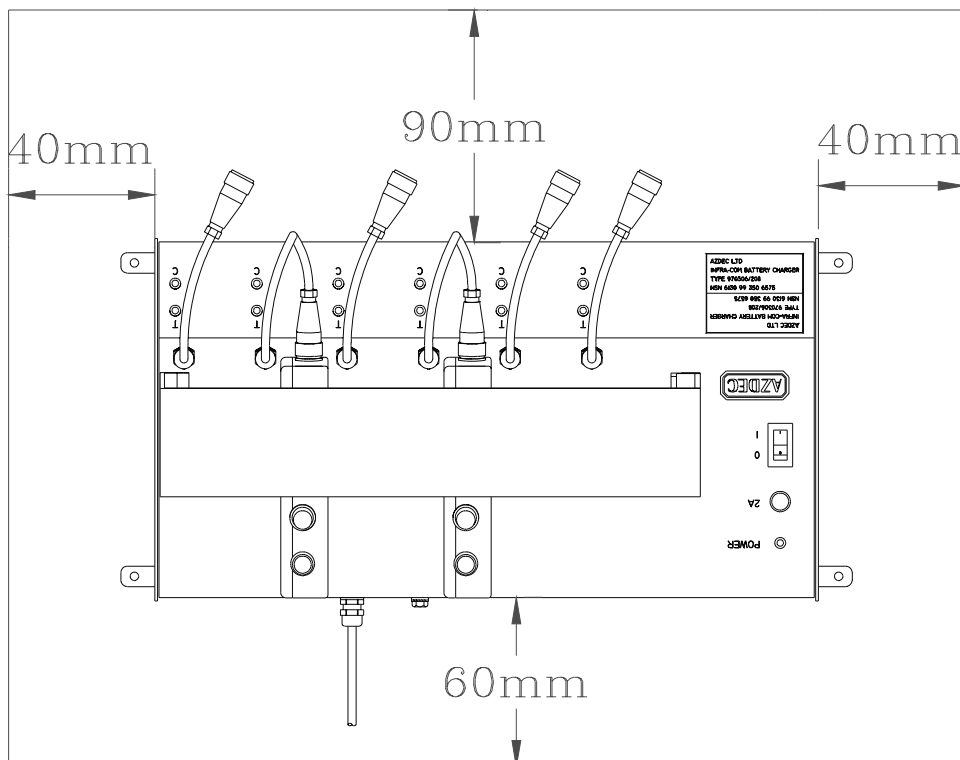


Figure 6 - Battery Charger Installation

Power to the Battery Charger is from the ship's 115V single phase ac supply and a suitable source of this supply is needed close to the Charger. The input power cable shall be terminated with a plug suitable for connection to the socket of the local 115V single phase ac supply. The cable connections are identified in 4.1.1. To ensure electrical safety the Green/Yellow wire (see section 4.1.1) must be connected to the ship's electrical earth.

4.1.1 Electrical Interface

Input power from ship's supply - cable with 3 wires.

Blue	“neutral”
Brown	115V ac single phase with respect to the “neutral” wire
Green/Yellow	Earth

5. Mobile Unit Installation

5.1 Headset & Mobile Unit

The Headset & Mobile Unit does not require any special installation instructions. The Headset & Mobile Unit shall only be used together with the correct Battery Pack.

Headset & Mobile Unit	Battery Pack
970306/201	970306/203
970306/202	970306/203
970306/211	970306/204

The installation process is restricted to inspecting the units for signs of damage.

5.2 Battery Pack

The Battery Pack does not require any special installation instructions. The Battery Pack must only be charged using the Battery Charger type 970306/208 and the Battery Pack must only be used for powering one of the Headset & Mobile Units 970306/201, 970306/202 or 970306/211. There are no user replaceable parts inside the unit and the unit should not be opened.

The installation process is restricted to inspecting the packs for signs of damage.

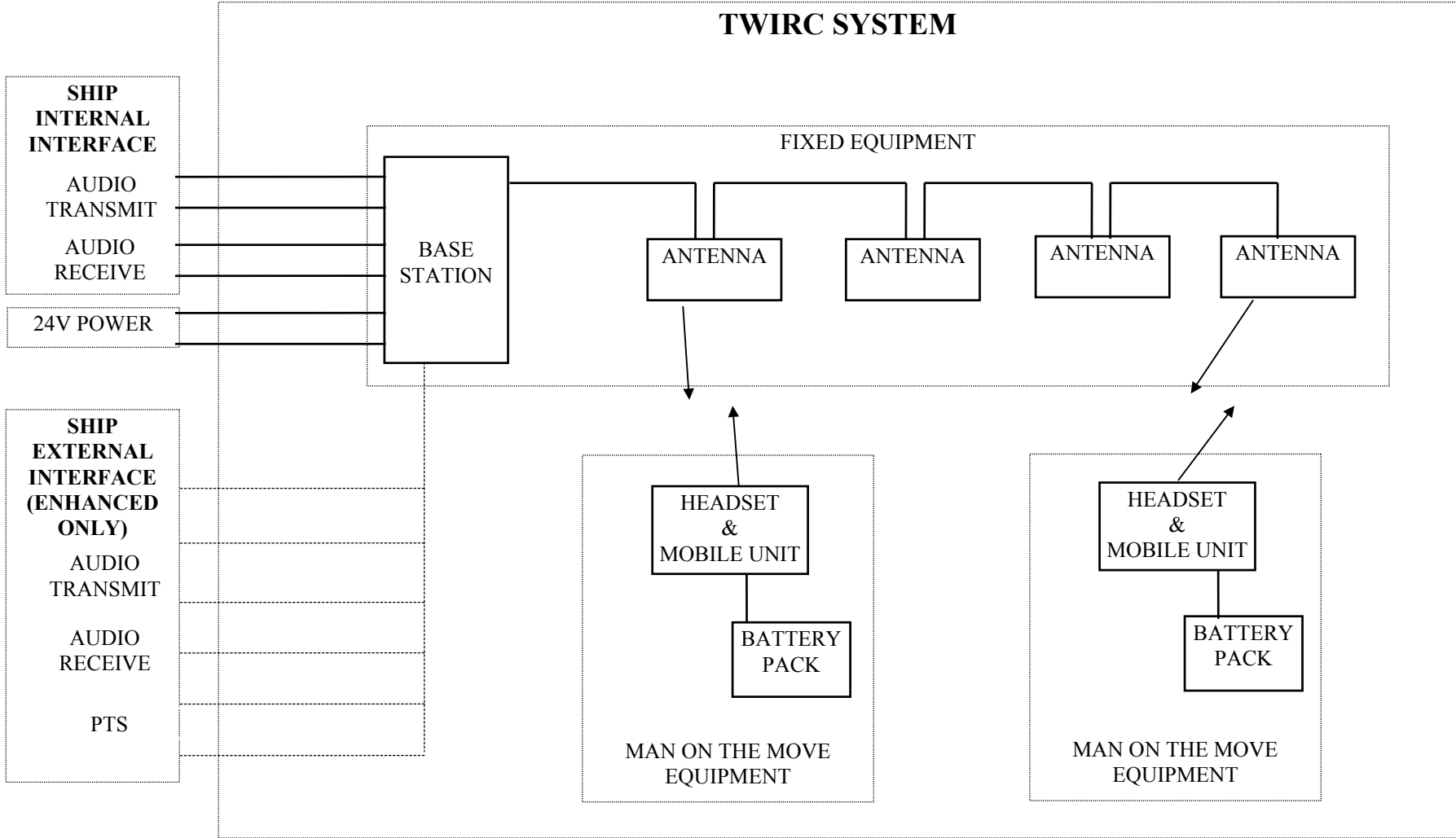
The Battery Packs are consumable items, i.e. have a limited lifetime, and at the end of their life should be disposed of according to ship's instructions. The Battery Packs contain Nickel Cadmium cells.

6. Co-Located Systems

The installation procedures identified in sections 2 to 5 are for a system based on one Base Station providing the user with one internal communication channel. The TWIRC System allows for two systems to be co-located in the same area which gives the user two internal channels. The installation procedure for the second system is identical to the procedure for the first system. If one of the Systems is an Enhanced System (reference section 2.5.3) this system must be designated the Master in the setting to work procedure.

The two Base Station should be mounted close to each other to allow the connection of port 6 on each system to be connected together using a cable length of no more than 2m. The cable to be used is identified in section 2.6.

Figure 7 - TWIRC - Typical System



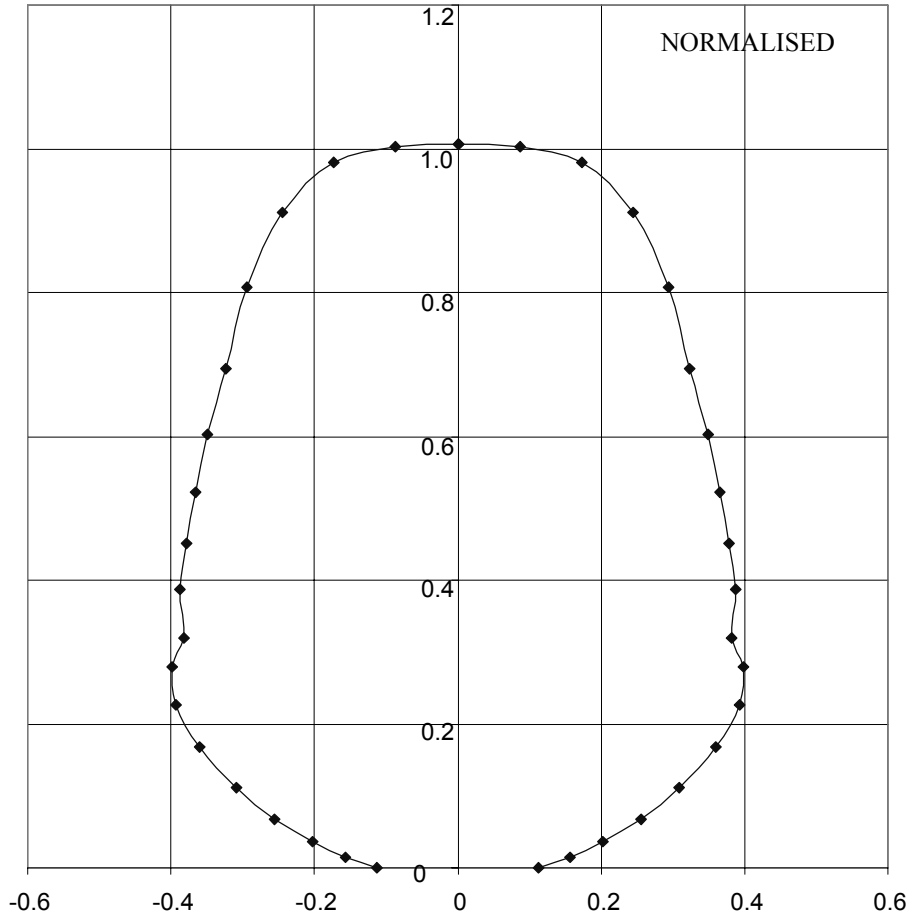


Figure 8 Antenna Coverage Plan View

Typical coverage is where the scale value of 1 is equivalent to 10 metres.

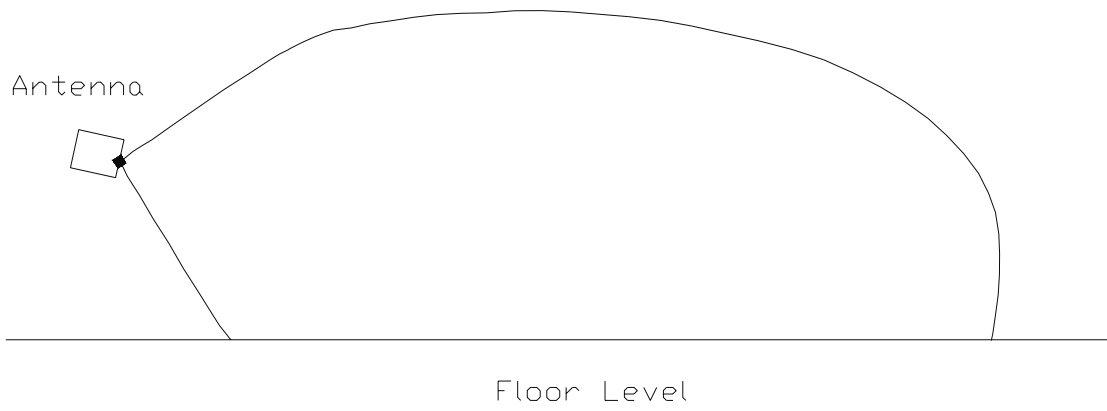


Figure 9 Antenna Coverage Side Elevation

Typical coverage at head height is 10 metres.

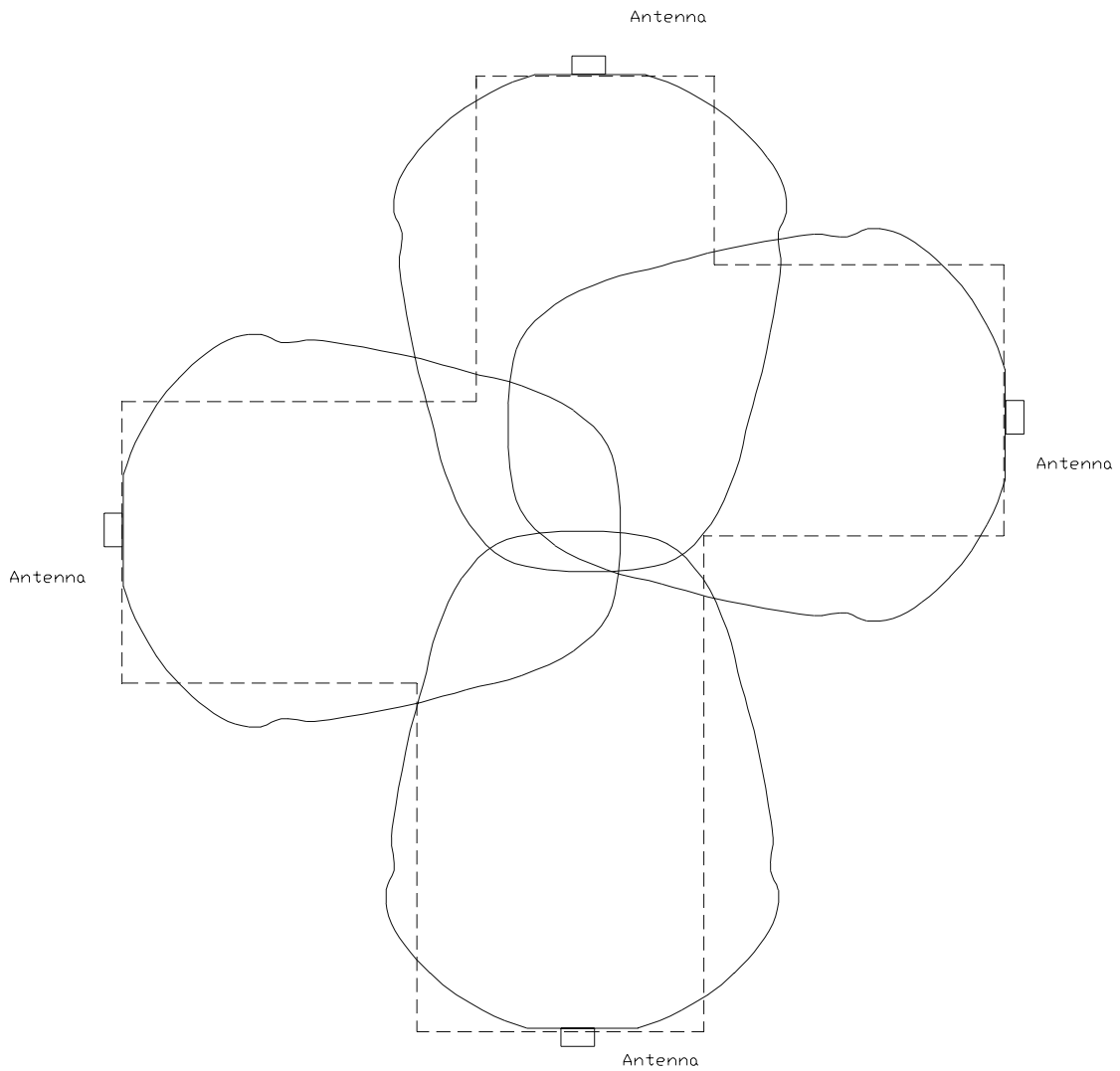
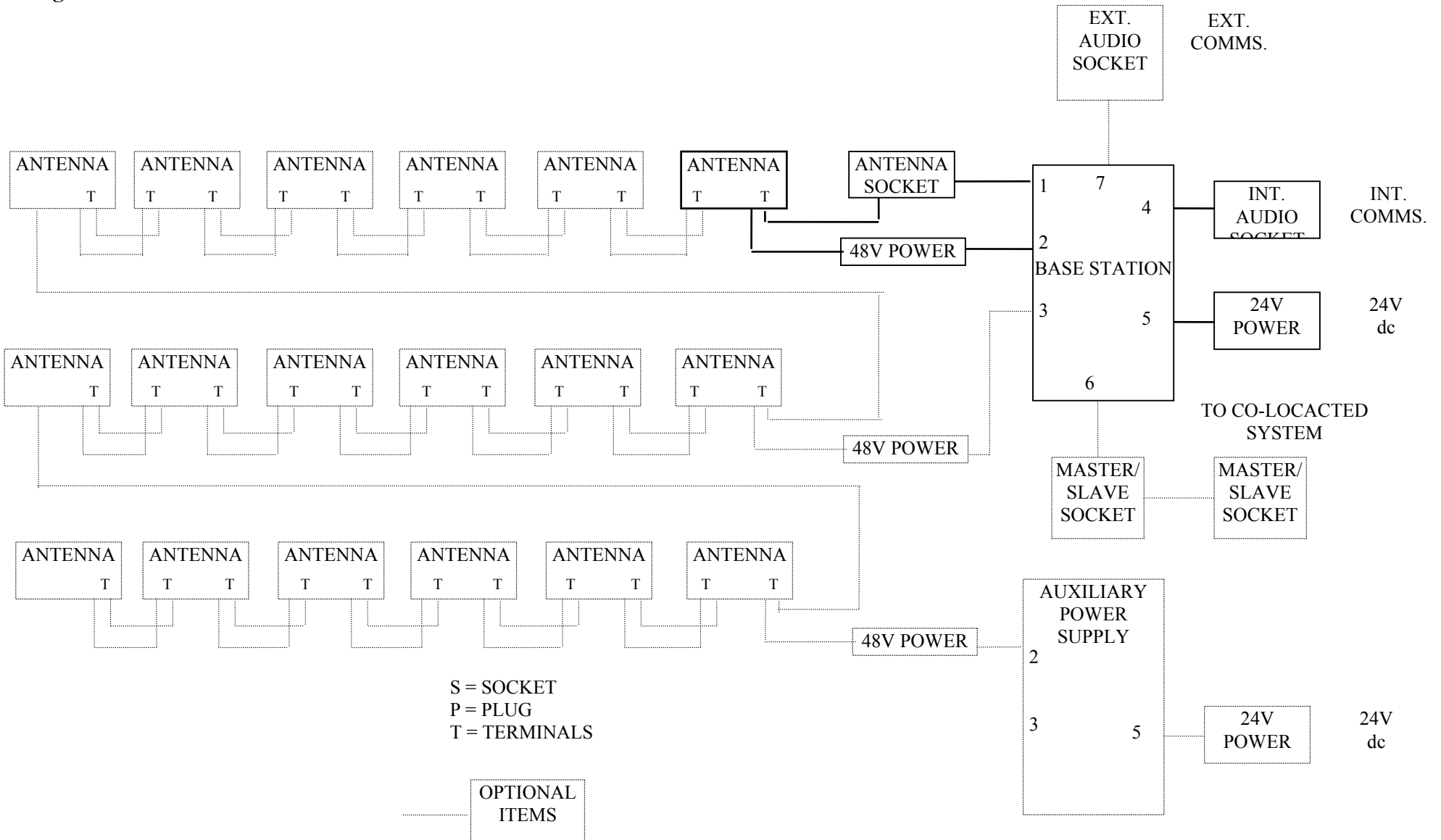


Figure 10 Antenna Area

Note: to ensure high quality coverage of the area the individual antenna plots should overlap by 2m or more.

Figure 11 - Interface Connectors



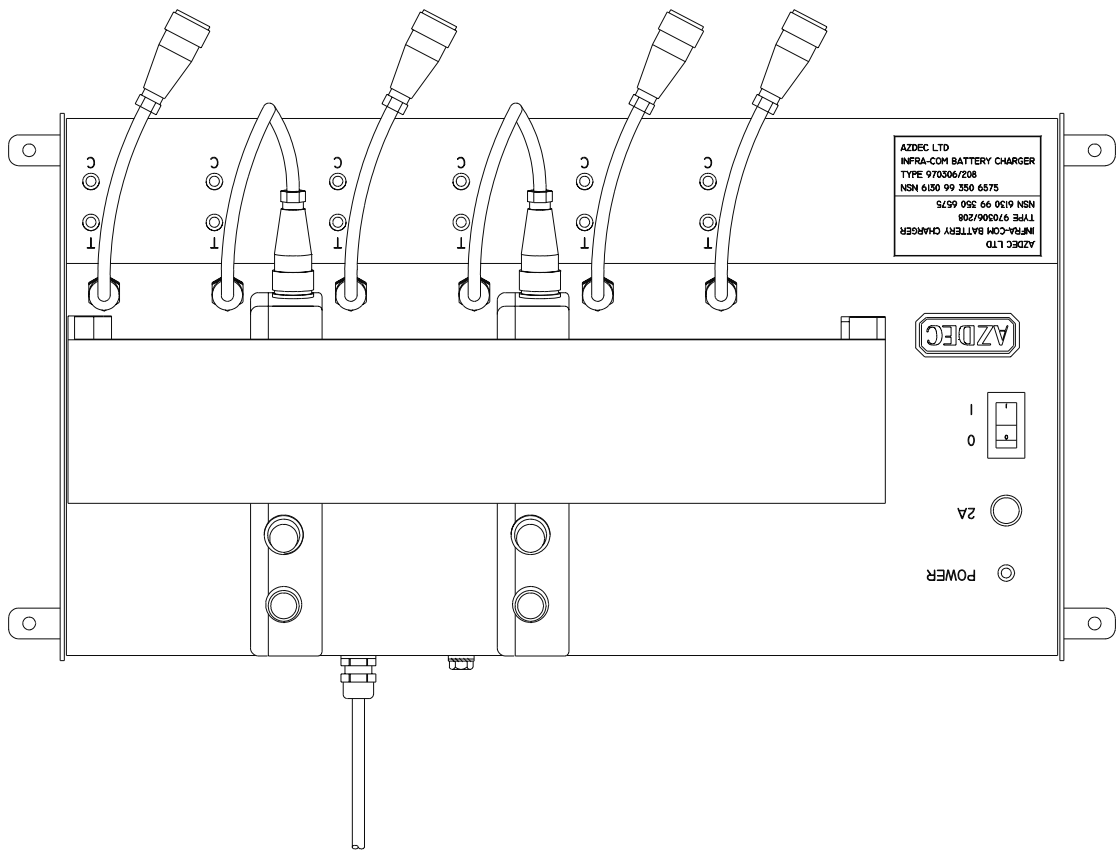


Figure 12 Battery Charger with 2 Battery Packs loaded

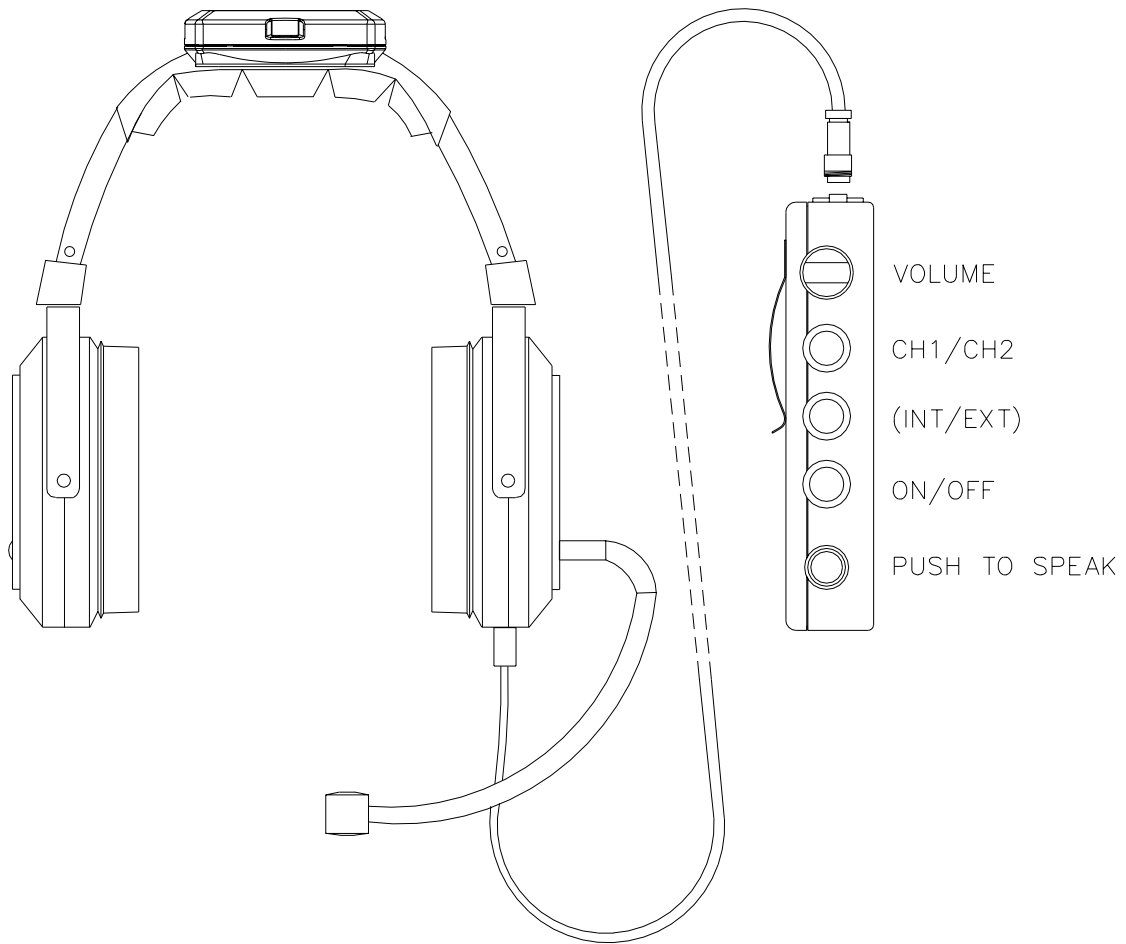
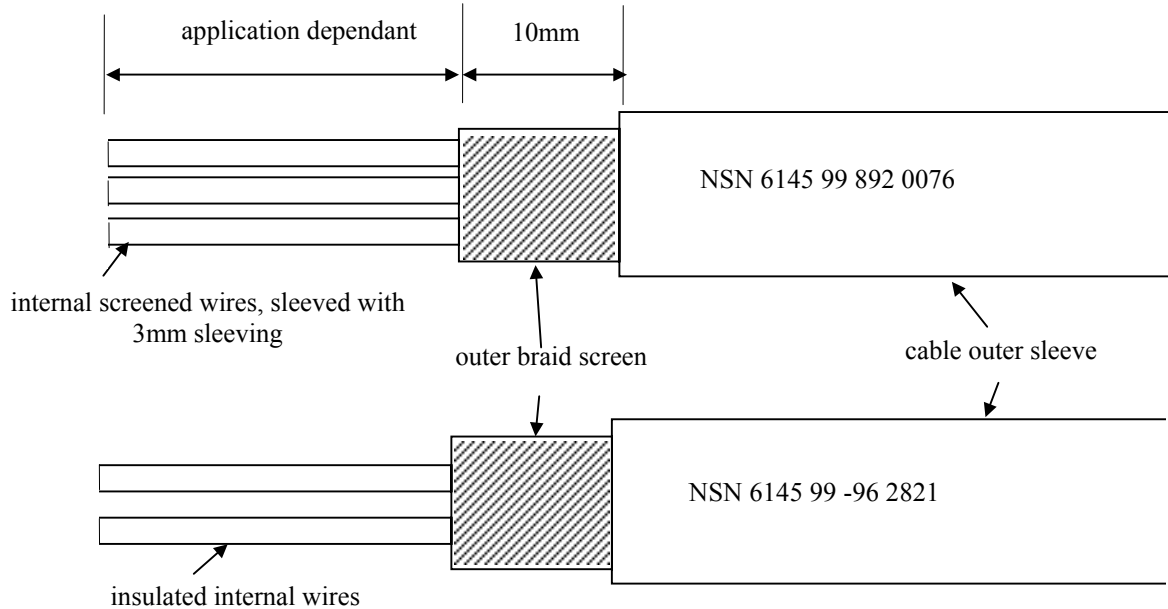


Figure 13 Mobile Equipment

Figure 14 Cable Gland - EMC Outer Braid Screen Terminated

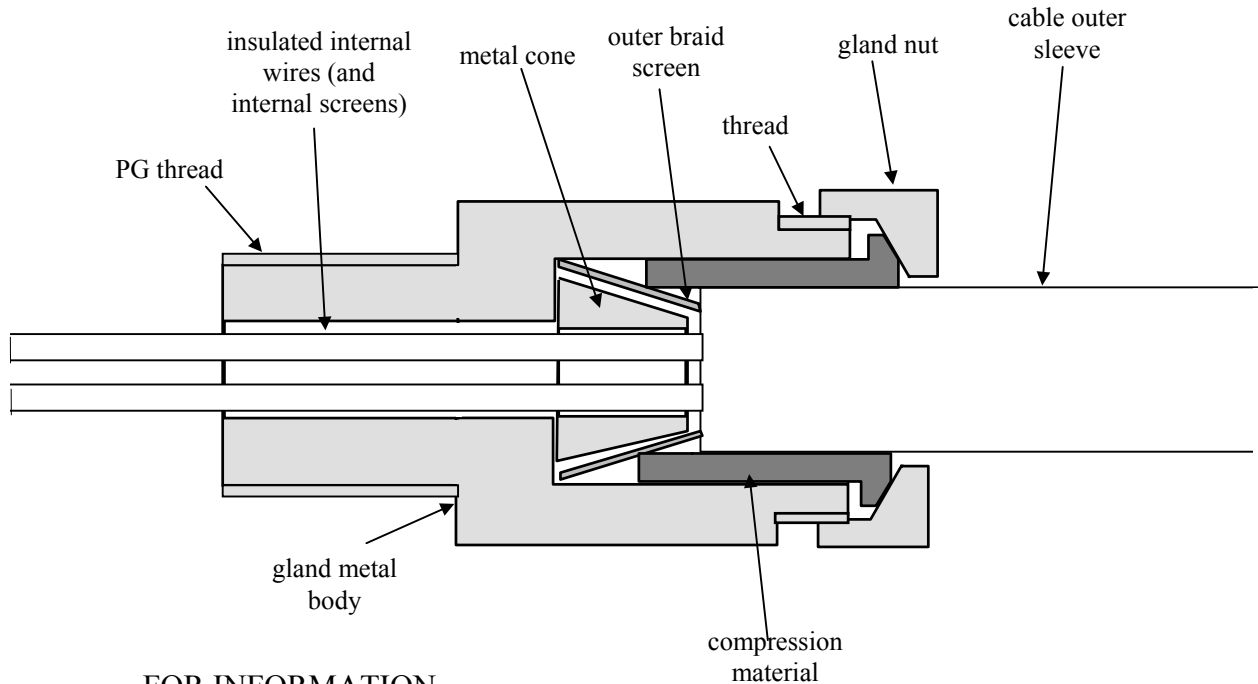
Strip the Cable as follows:



The following sketch shows a cross section of Cable inserted in Cable Gland.

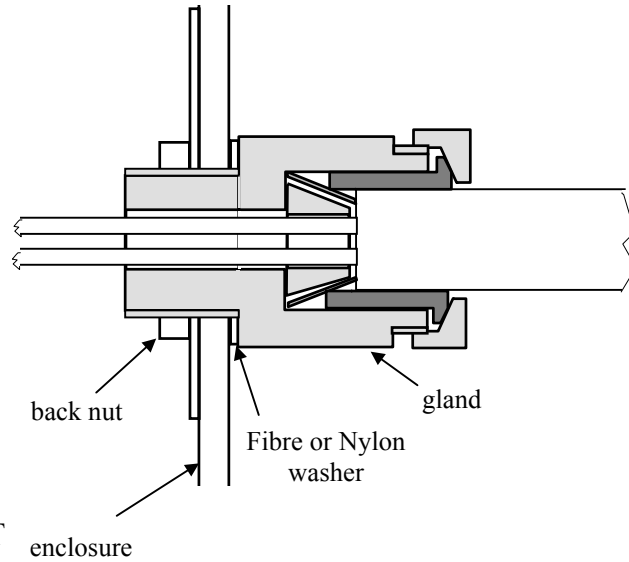
Note that the outer braid screen must be carefully spread in order that the metal cone may be inserted as shown.

Tightening (3.75Nm) the Gland Nut both seals the gland to moisture and connects the EMC screen to the Enclosure.



FOR INFORMATION
ONLY, ITEMS NOT TO
THE SAME SCALE

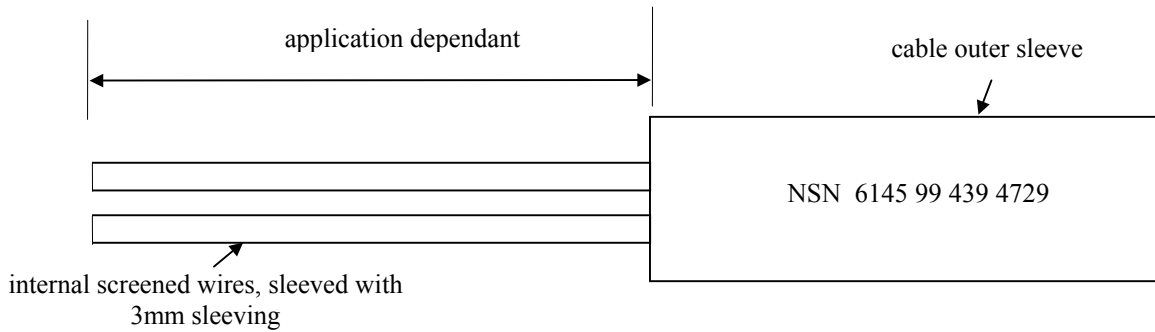
The following sketch shows the gland kit parts assembled on a cable.



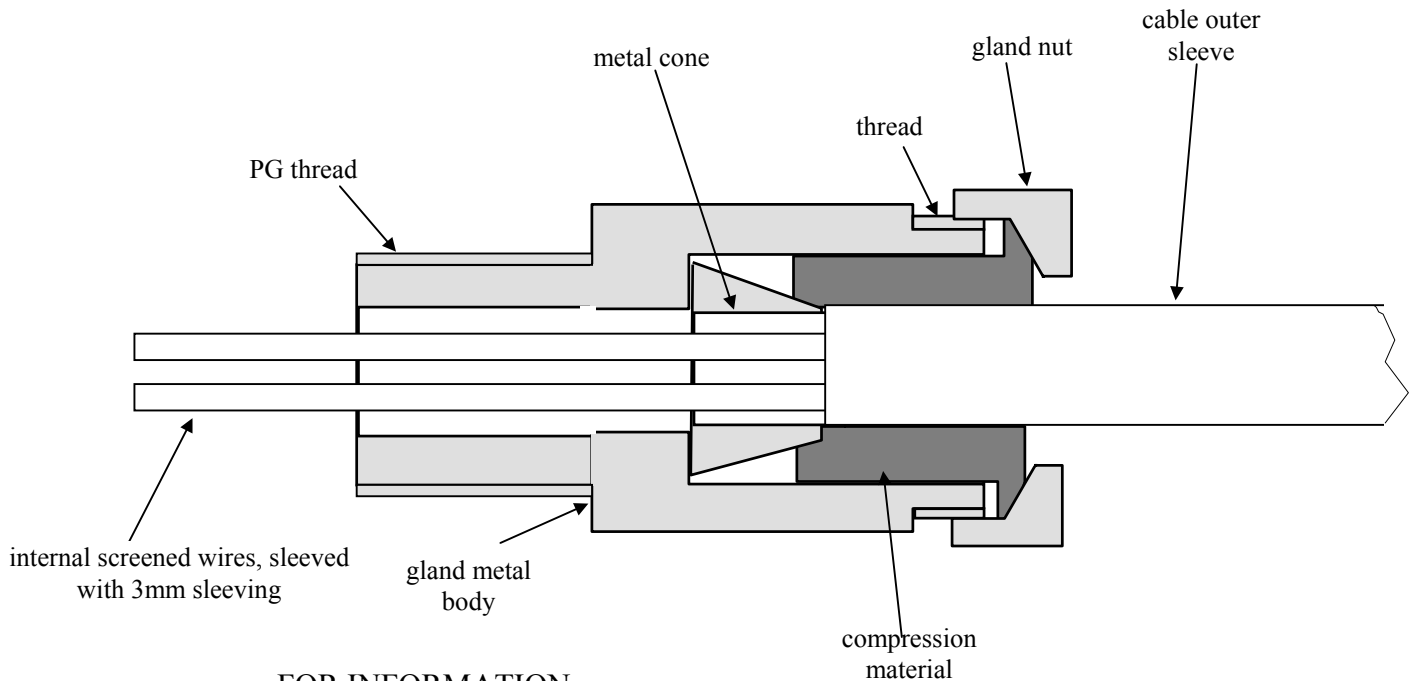
FOR
INFORMATION
ONLY, ITEMS NOT
TO THE SAME
SCALE

Figure 15 Cable Gland - EMC Screen Not Terminated

Strip the Cable as follows:



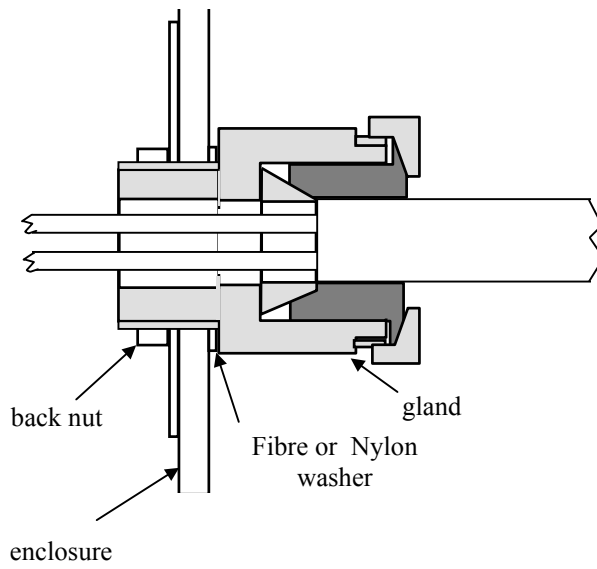
The following sketch shows a cross section of Cable inserted in Cable Gland.
Tightening (3.75Nm) the Gland Nut seals the gland to moisture



FOR INFORMATION
ONLY, ITEMS NOT TO
THE SAME SCALE

The following sketch shows the gland kit parts assembled on a cable.

FOR
INFORMATION
ONLY, ITEMS NOT
TO THE SAME
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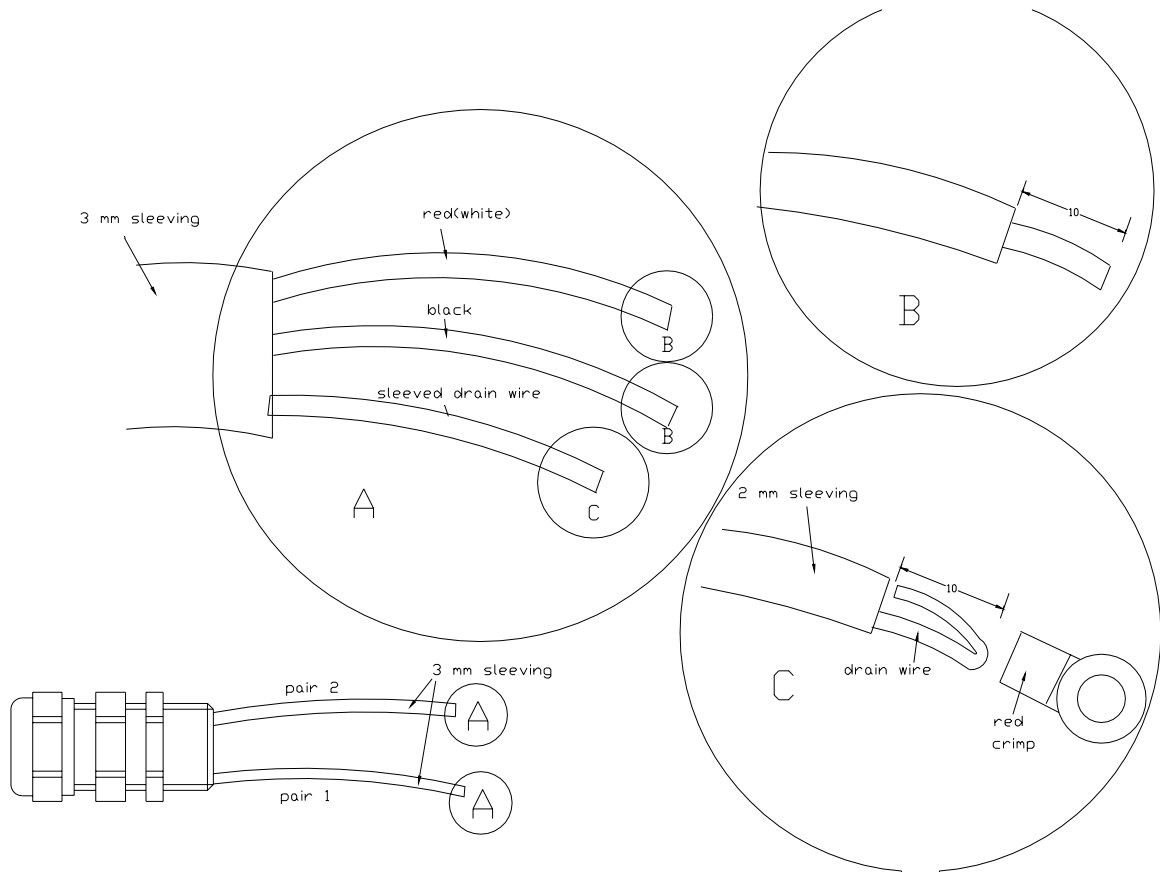


Figure 16 Data Cable

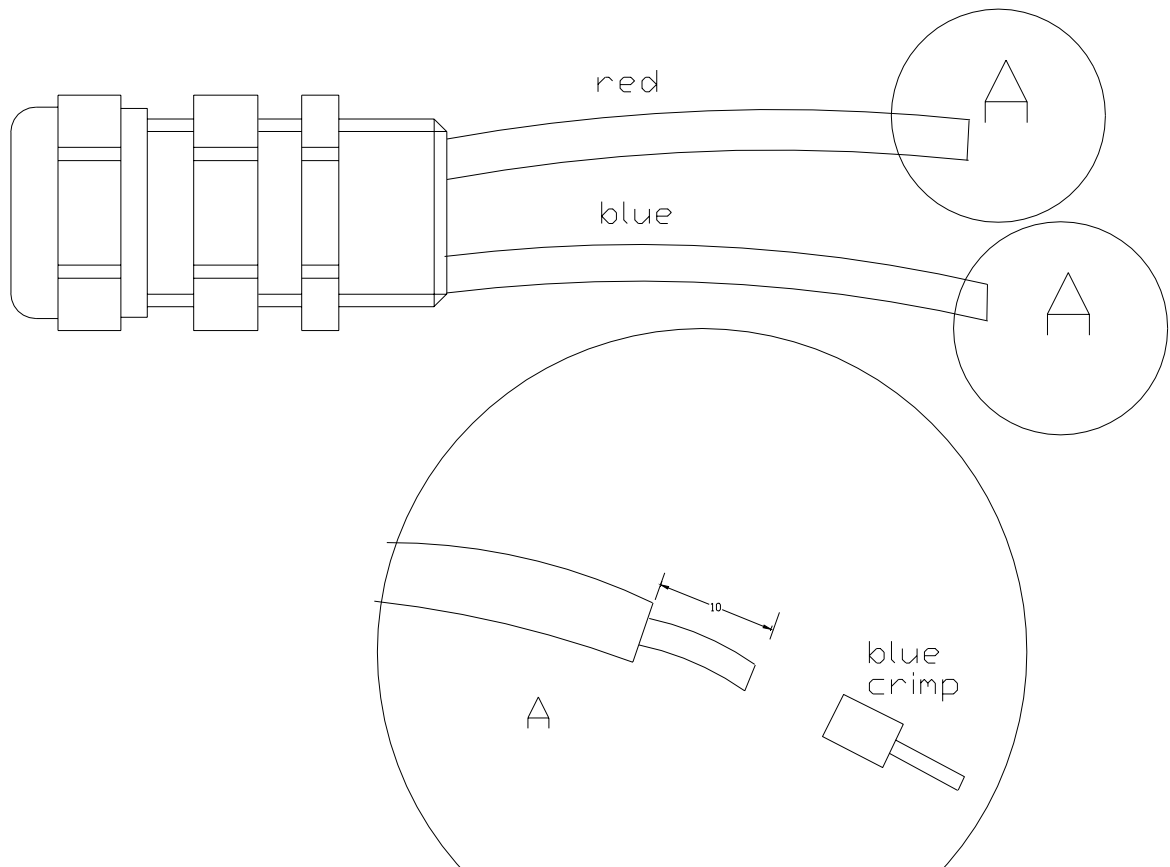


Figure 17 Power Cable

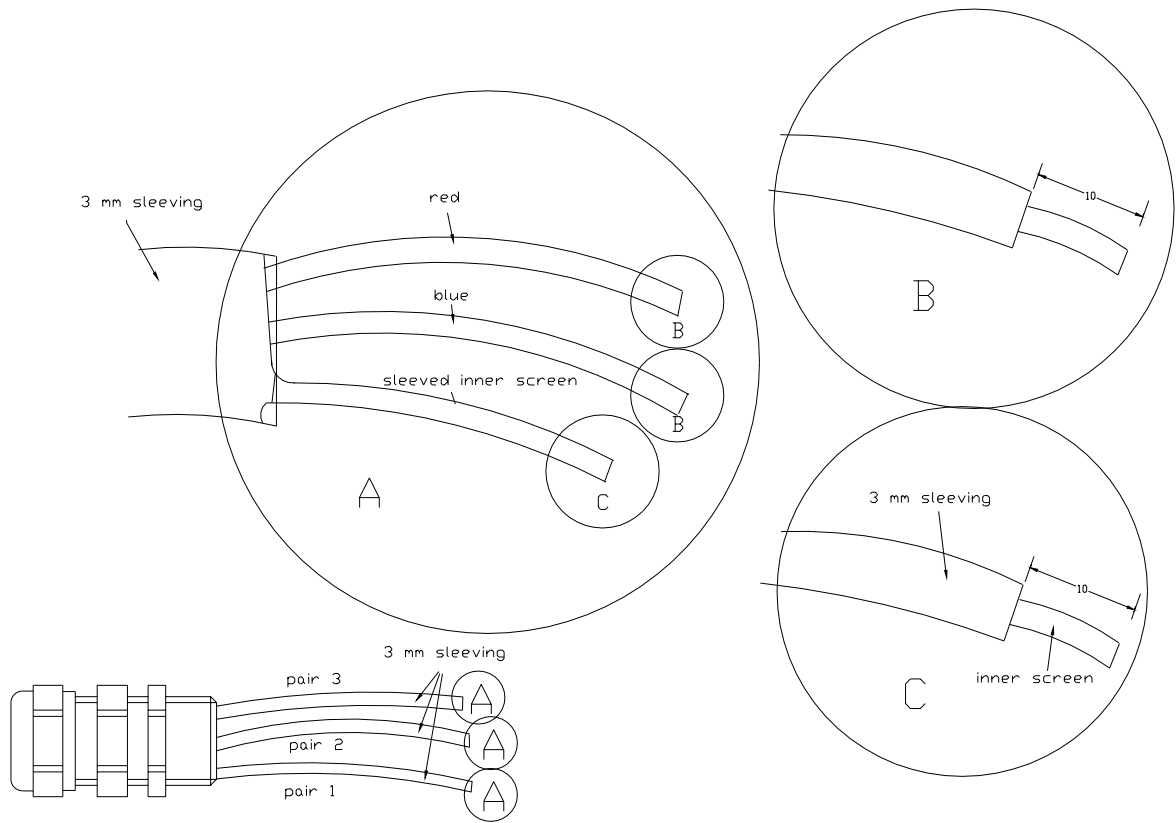
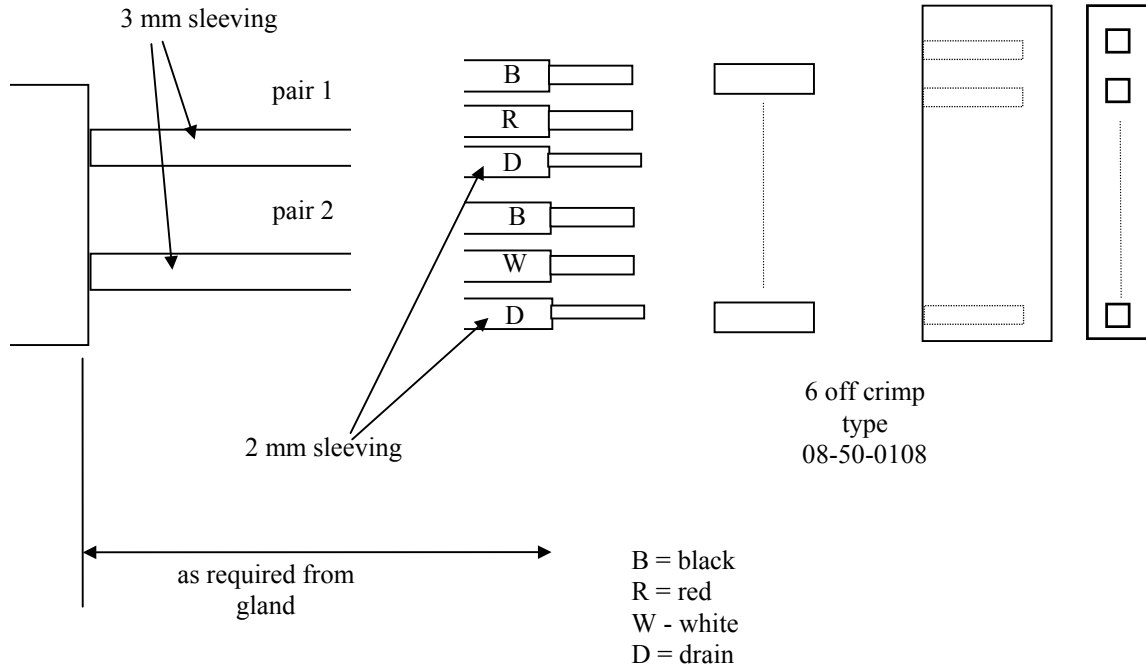


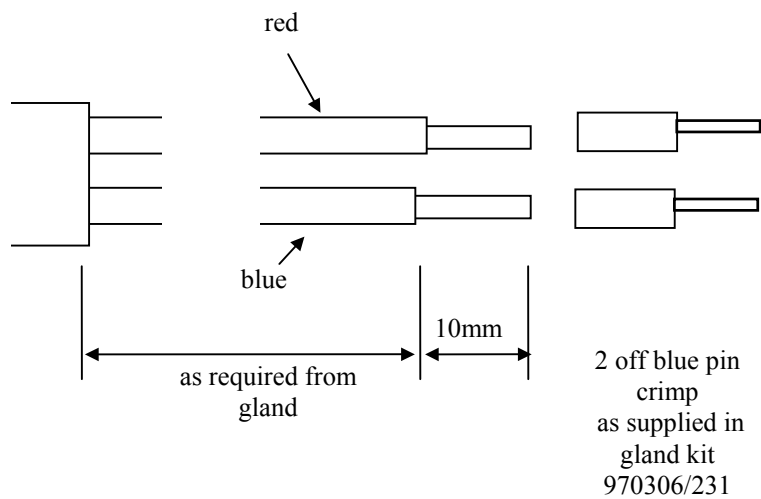
Figure 18 Audio Cable

Figure 19 Cable Assembly - Base Station & Auxiliary Power Supply

Data Cable



Power Cable



Audio Cable

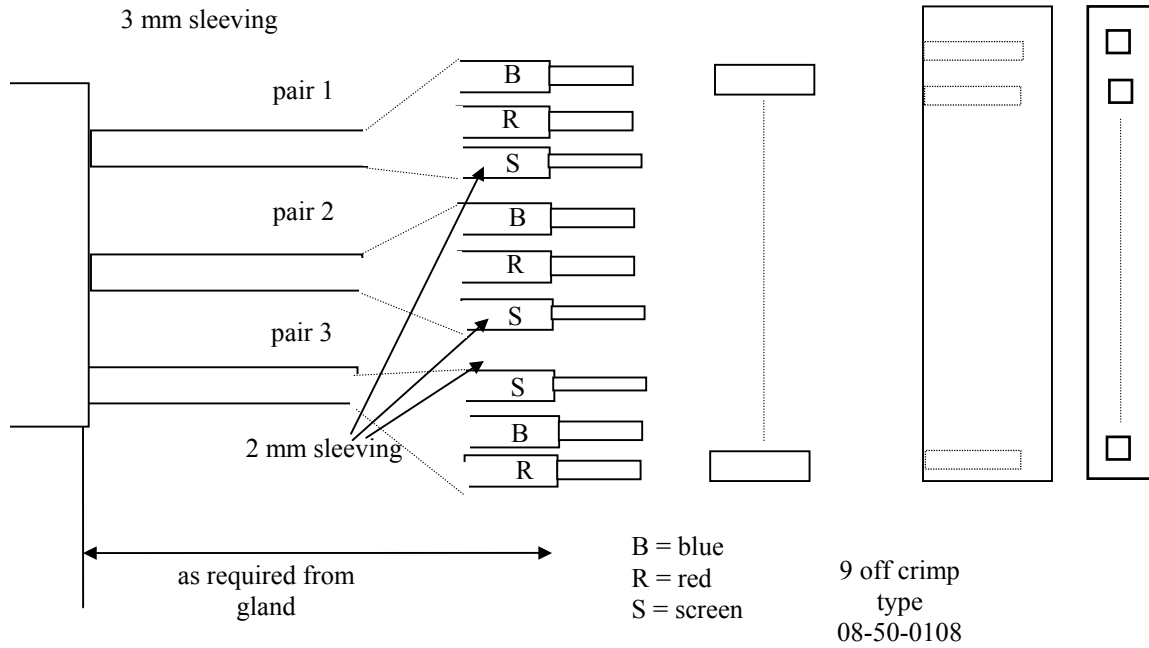
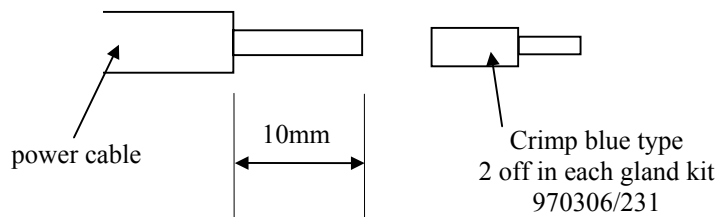
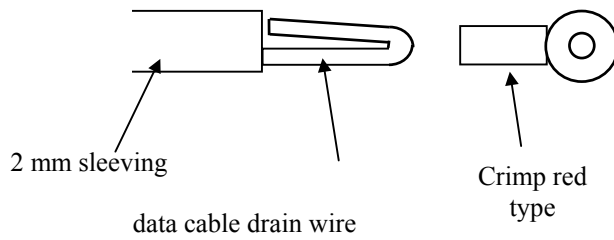
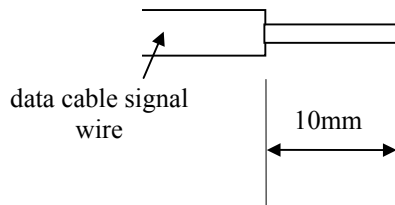
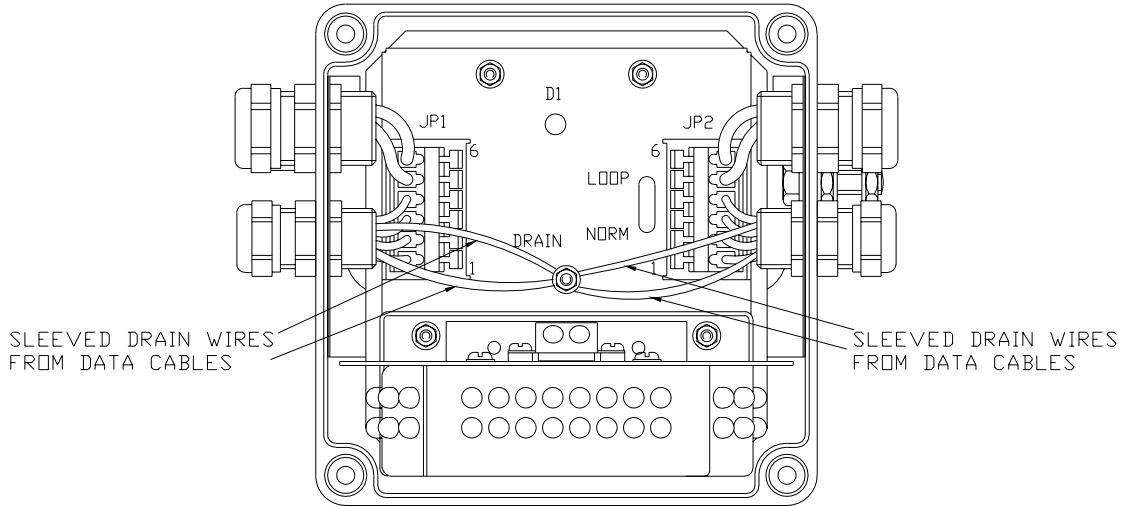


Figure 20 Cable Termination - Antenna



7. Installation Tools

The following general purpose tools will be need for the installation of the Two Way Infra Red Communications system.

Item	Description	Where Used	
1	Crimp tool type e.g. Farnell 150-352	Power Cable blue & red crimps	Antenna Base Station Auxiliary Power Supply
2	Crimp tool type e.g. Farnell 285-500	Signal Connectors	Base Station
3	Screw driver Superdrive No 2.	Enclosure access	Antenna
4	Spanner M3 nut/bolt	Drain wire stud	Antenna
5	Spanner M10 nut/bolt	Antenna to Universal Joint	Antenna
6	Spanner 10mm across flats	NEMP Earth Studs	Base Station Antenna Auxiliary Power Supply
7	Spanner 13mm across flats	Universal Joint Locking Nuts	Antenna
8	Spanner 17mm across flats	PG9 Gland front nut	Antenna Base Station
9	Spanner 18mm across flats	PG9 Gland back nut	Antenna Base Station
10	Spanner 20mm across flats	PG11 Gland front nut	Antenna Base Station Auxiliary Power Supply
11	Spanner 21mm across flats	PG11 Gland back nut	Antenna Base Station Auxiliary Power Supply
12	Spanner 22mm across flats	PG13.5 Gland front nut	Base Station
13	Spanner 23mm across flats	PG13.5 Gland back nut	Base Station
	Wire cutters		General
	Pliers		General
	Screwdrivers		General
	Spanners		General

8. Installation Records

Base Station	Type	Serial number	Number of Power Bus Used	Date Installed	Engineer

Auxiliary Power Supply	Type	Serial number	Number of Power Bus Used	Date Installed	Engineer

Antenna	Base Station	Location on Data Bus	Power Bus From	Serial Number	Date Installed	Engineer

Battery Charger		Serial Number	Date Installed	Engineer

Headset & Mobile Unit	Type	Serial Number	Date Installed	Engineer

Battery Pack	Type	Serial Number	Date Installed	Engineer

Battery Pack	Type	Serial Number	Date Installed	Engineer

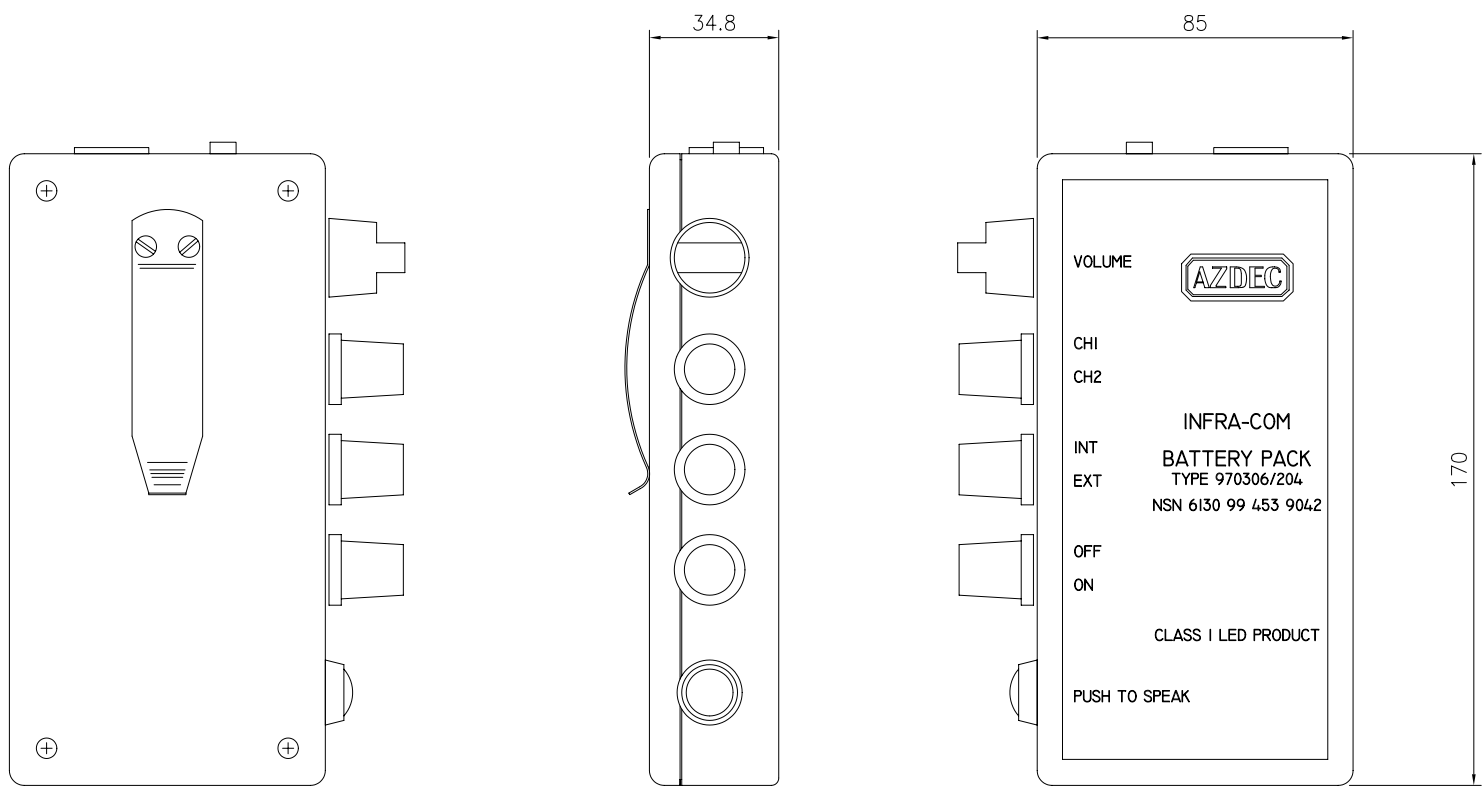
CLASSIFICATION
UNCLASSIFIED

SERVICE
DRG. NO. 970306/204

SHT 1
OF 1

3RD ANGLE PROJECTION 

THIS DRAWING COMPLIES WITH BS.308.



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Colour	Black
Weight	500g nominal
Material	ABS
Content	Steel Belt Clip NiCd Battery & Electronics


NSN 6130 99 453 9042

NO. 10
MM 10 20 30 40 50 60 70 80 90 100

CERTIFIED					
CHECKED					
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C.Morris		30.11.97	A		
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DIM IN	
TOLERANCES	

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FILE NAME 204_1_1

 32 Gladstone Road,
Southampton, England. SO19 8GT

TITLE TWIRC BATTERY
PACK – ENHANCED
GENERAL VIEW

NS.NO.

CLASSIFICATION **UNCLASSIFIED**

SERVICE DRG. NO. 970306/204

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OF 1

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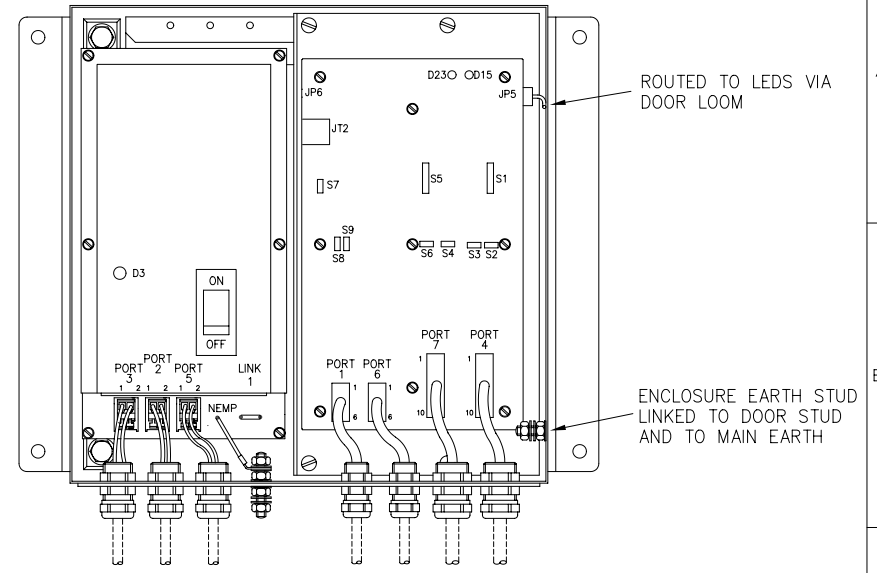
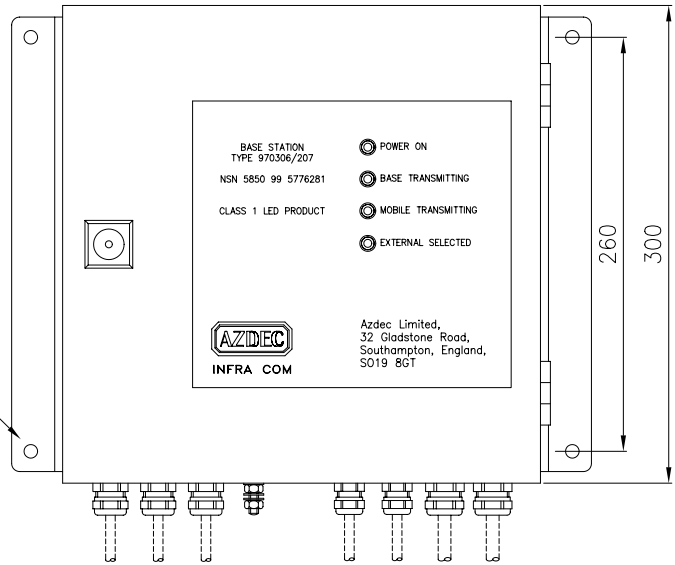
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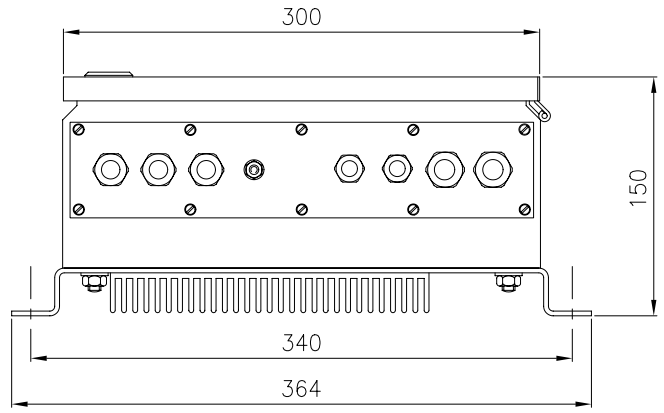
3RD ANGLE PROJECTION

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4 OFF M8 FIXING POSITIONS



VIEW WITH DOOR REMOVED



VIEW ON BOTTOM SHOWING REMOVABLE GLAND PLATE

WEIGHT: LESS THAN 10kg

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MM 10 20 30 40 50 60 70 80 90 100

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FILE NAME 207_1_B

NSN 5850 99 5776281

AZDEC

32 Gladstone Road,
Southampton, England. SO19 8GT

TITLE TWIRC ENHANCED BASE STATION
GENERAL VIEW

NS.NO.

CLASSIFICATION UNCLASSIFIED

SERVICE DRG. NO. 970306/207

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CLASSIFICATION
UNCLASSIFIED

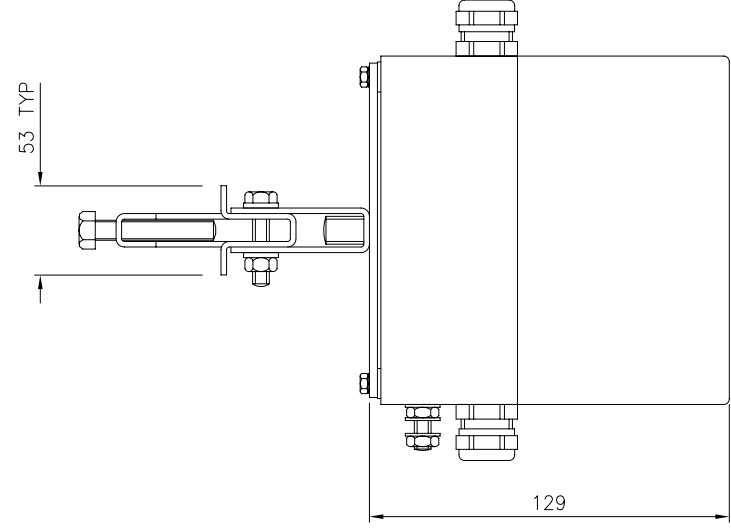
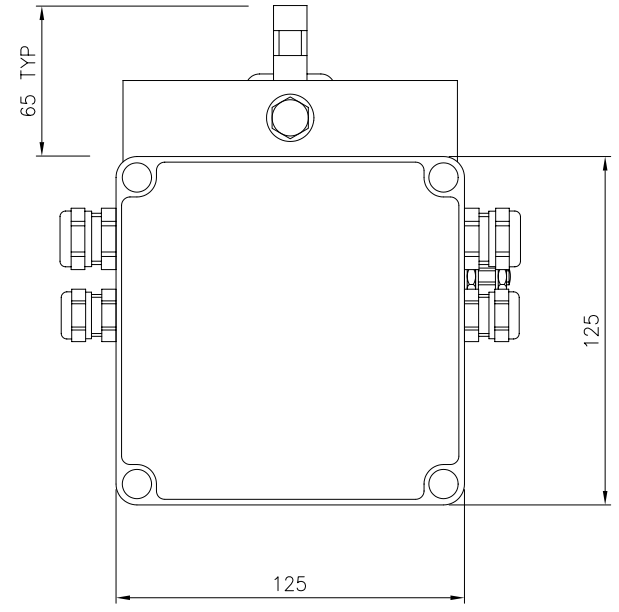
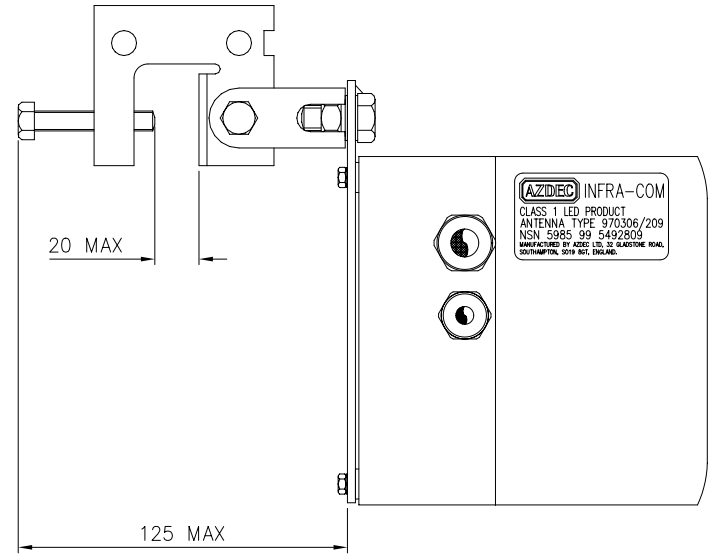
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OF 2

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NSN 5985 99 5492809



32 Gladstone Road,
Southampton, England. SO19 8GT

TITLE **TWIRC ANTENNA LONG
CABLE - GENERAL VIEW**

NS.NO.

CLASSIFICATION **UNCLASSIFIED**

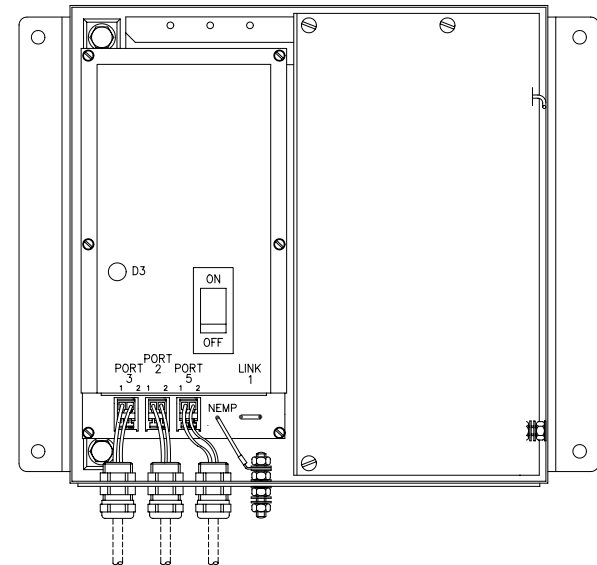
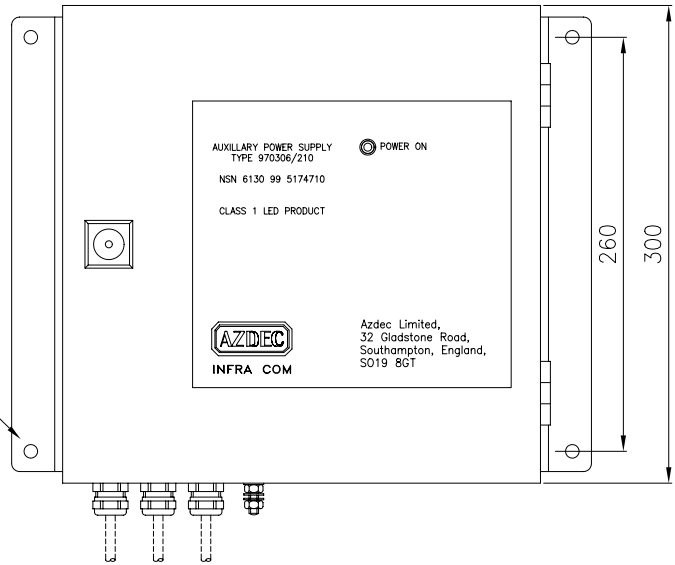
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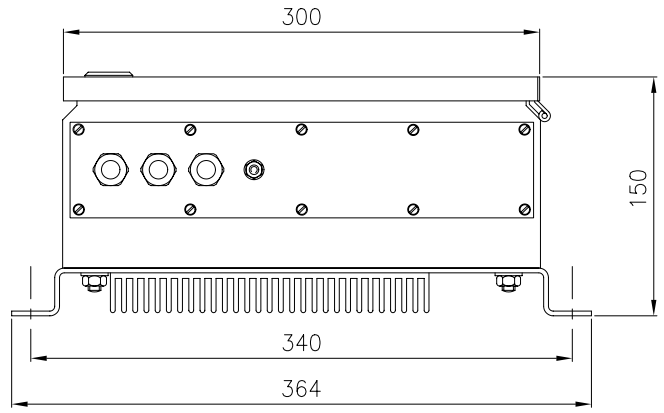
CLASSIFICATION UNCLASSIFIED	
SERVICE DRG. NO. 970306/210	SHT 1 OF 1

3RD ANGLE PROJECTION 

THIS DRAWING COMPLIES WITH BS.308.



VIEW WITH DOOR REMOVED



VIEW ON BOTTOM SHOWING REMOVABLE GLAND PLATE

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MM 10 20 30 40 50 60 70 80 90 100

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CHECKED					
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NSN 6130 99 5174710

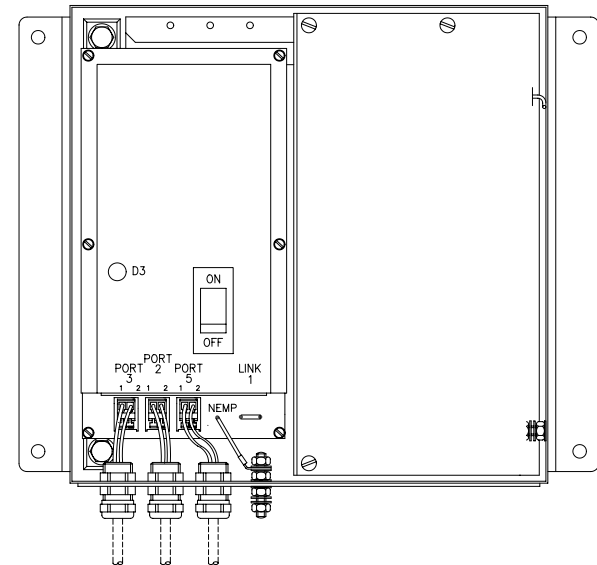
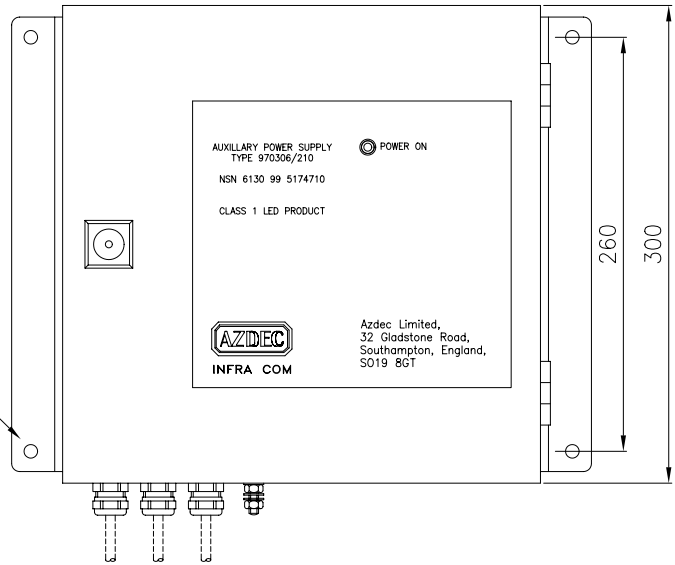
 32 Gladstone Road,
Southampton, England. SO19 8GT

TITLE	TWIRC AUXILLARY POWER SUPPLY GENERAL VIEW	
NS.NO.		
CLASSIFICATION	UNCLASSIFIED	
SERVICE DRG. NO.	970306/210	SHT 1 OF 1

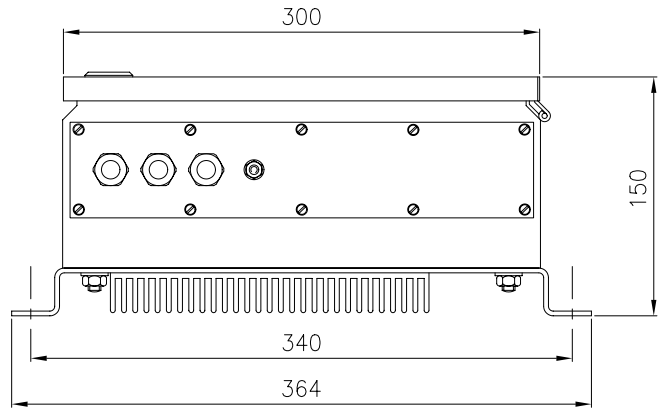
CLASSIFICATION UNCLASSIFIED	
SERVICE DRG. NO. 970306/210	SHT 1 OF 1

3RD ANGLE PROJECTION 

THIS DRAWING COMPLIES WITH BS.308.



VIEW WITH DOOR REMOVED



VIEW ON BOTTOM SHOWING REMOVABLE GLAND PLATE

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100
90
80
70
60
50
40
30
20
10

MM 10 20 30 40 50 60 70 80 90 100

CERTIFIED					
CHECKED					
DRAWN		11.09.98	1		
A.C.H.		10.08.98	B		
		13.03.98	A		
CHANGE NO.	DATE	ISSUE	MP		

MATERIAL	
FINISH	
SURFACE TEXT.	
ORIG. SCALE	N.T.S.
DIM IN	mm
TOLERANCES	0 DEC PLACE ±0.5 1 DEC PLACE ±0.2 2 DEC PLACE ±0.05

DRAWING LOCATION H:\CAD\AUTOCAD\970306
FILE NAME 210_1_1
NSN 6130 99 5174710

 32 Gladstone Road,
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