MWAA Primary F/O Head End Documentation
BDA Shelf 60-214802
User Handbook

for

Communications Technology Services

AWL Works Order Q117141

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1. Introduction

1.1. Scope and Purpose of Document

This handbook is for use solely with the equipment identified by the Axell Wireless Limited (AWL) Part Number shown on the front cover. It is not to be used with any other equipment unless specifically authorised by AWL. This is a controlled release document and, as such, becomes a part of the Axell Wireless Total Quality Management System. Alterations and modification may therefore only be performed by Axell Wireless.

AWL recommends that the installer of this equipment familiarise themselves with the safety and installation procedures contained within this document before installation commences.

The purpose of this handbook is to provide the user/maintainer with sufficient information to service and repair the equipment to the level agreed. Maintenance and adjustments to any deeper level must be performed by AWL, normally at the company's repair facility in Chesham, England.

This handbook has been prepared in accordance with BS 4884, and AWL's Quality procedures, which maintain the company's registration to BS EN ISO 9001:2000 and to the R&TTE Directive of the European Parliament. Copies of the relevant certificates and the company Quality Manual can be supplied on application to the Operations Support Director (see section 2.7.).
This document fulfils the relevant requirements of Article 6 of the R&TTE Directive.

1.2. Limitation of Liability Notice

This manual is written for the use of technically competent operators/service persons. No liability is accepted by AWL for use or misuse of this manual, the information contained therein, or the consequences of any actions resulting from the use of the said information, including, but not limited to, descriptive, procedural, typographical, arithmetical, or listing errors.

Furthermore, AWL does not warrant the absolute accuracy of the information contained within this manual, or its completeness, fitness for purpose, or scope.

AWL has a policy of continuous product development and enhancement, and as such, reserves the right to amend, alter, update and generally change the contents, appearance and pertinence of this document without notice.

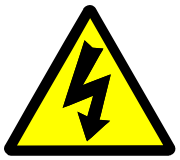
All AWL products carry a twelve month warranty from date of shipment. The warranty is expressly on a return to base repair or exchange basis and the warranty cover does not extend to on-site repair or complete unit exchange.

2. Safety Considerations

2.1. Earthing of Equipment

Equipment supplied from the mains must be connected to grounded outlets and earthed in conformity with appropriate local, national and international electricity supply and safety regulations.

2.2. Electric Shock Hazard



The risk of electrical shocks due to faulty mains driven power supplies whilst potentially ever present in any electrical equipment, would be minimised by adherence to good installation practice and thorough testing at the following stages:

a) Original assembly.
b) Commissioning.
c) Regular intervals, thereafter.

All test equipment must be in good working order prior to its use. High current power supplies can be dangerous because of the possibility of substantial arcing. Always switch off during disconnection and reconnection.

2.3. RF Radiation Hazard

RF radiation, (especially at UHF frequencies) arising from transmitter outputs connected to AWL's equipment, must be considered a safety hazard.

This condition might only occur in the event of cable disconnection, or because a 'spare' output has been left un-terminated. Either of these conditions would impair the system's efficiency. No investigation should be carried out until all RF power sources have been removed. This would always be a wise precaution, despite the severe mismatch between the impedance of an N type connector at 50Ω, and that of free space at 377Ω, which would severely compromise the efficient radiation of RF power. Radio frequency burns could also be a hazard, if any RF power carrying components were to be carelessly touched!

Antenna positions should be chosen to comply with requirements (both local & statutory) regarding exposure of personnel to RF radiation. When connected to an antenna, the unit is capable of producing RF field strengths, which may exceed guideline safe values especially if used with antennas having appreciable gain. In this regard the use of directional antennas with backscreens and a strict site rule that personnel must remain behind the screen while the RF power is on, is strongly recommended.

Where the equipment is used near power lines or in association with temporary masts not having lightning protection, the use of a safety earth connected to the case-earthing bolt is strongly advised.

2.4. Lifting and other Health and Safety Recommendations

Certain items of AWL equipment are heavy and care should be taken when lifting them by hand. Ensure that a suitable number of personnel, appropriate lifting apparatus and appropriate personal protective equipment is used especially when installing Equipment above ground e.g. on a mast or pole and manual handling precautions relevant to items of the weight of the equipment being worked on must be observed at all times when handling, installing or dismounting this equipment.

2.5. Chemical Hazard

Beryllium Oxide, also known as Beryllium Monoxide, or Thermalox™, is sometimes used in devices within equipment produced by Axell Wireless Ltd. Beryllium oxide dust can be toxic if inhaled, leading to chronic respiratory problems. It is harmless if ingested or by contact.

Products that contain beryllium are load terminations (dummy loads) and some power amplifiers. These products can be identified by a yellow and black “skull and crossbones” danger symbol (shown above). They are marked as hazardous in line with international regulations, but pose no threat under normal circumstances. Only if a component containing beryllium oxide has suffered catastrophic failure, or exploded, will there be any danger of the formation of dust. Any dust that has been created will be contained within the equipment module as long as the module remains sealed. For this reason, any module carrying the yellow and black danger sign should not be opened. If the equipment is suspected of failure, or is at the end of its life-cycle, it must be returned to Axell Wireless Ltd. for disposal.

To return such equipment, please contact the Operations Support Department, who will give you a Returned Materials Authorisation (RMA) number. Please quote this number on the packing documents, and on all correspondence relating to the shipment.

PolyTetraFluoroEthylene, (P.T.F.E.) and P.T.F.E. Composite Materials
Many modules/components in AWL equipment contain P.T.F.E. as part of the RF insulation barrier.
This material should never be heated to the point where smoke or fumes are evolved. Any person feeling drowsy after coming into contact with P.T.F.E. especially dust or fumes should seek medical attention.

2.6. Laser Safety

General good working practices adapted from
EN60825-2: 2004/ EC 60825-2:2004

Do not stare with unprotected eyes or with any unapproved optical device at the fibre ends or connector faces or point them at other people, Use only approved filtered or attenuating viewing aids.
Any single or multiple fibre end or ends found not to be terminated (for example, matched, spliced) shall be individually or collectively covered when not being worked on. They shall not be readily visible and sharp ends shall not be exposed.
When using test cords, the optical power source shall be the last connected and the first disconnected; use only approved methods for cleaning and preparing optical fibres and optical connectors.
Always keep optical connectors covered to avoid physical damage and do not allow any dirt/foreign material ingress on the optical connector bulkheads.
The optical fibre jumper cable minimum bend radius is 3cm; bending to a smaller radius may result in optical cable breakage and excessive transmission losses.
Caution: The FO units are NOT weather proof.

2.7. Emergency Contact Numbers

The AWL Operations Support Department can be contacted on:
Telephone +44 (0)1494 777000
Fax. +44 (0)1494 777002
e-mail qa@axellwireless.com

3. BDA Shelf 60-214802

There are five BDA 60-214802 shelves in Main Terminal Bag Claim Room Rack 60-214801. Each BDA shelf 60-214802 is built into a 4U, 19" rack mount chassis and houses amplification and filtering modules.

Downlink signals are receive from Interface Shelf 60-214803, filtered and amplified and sent on to the Main Terminal SRS, the Downlink output of BDA 5 is fed back into Interface Shelf 60-214803 where it is split into two equal paths and each path is then fed back out to the Main Terminal SRS.

Uplink signals from the Main Terminal SRS enter BDAs 1, 2, 3 & 4 where they are filtered and amplified and sent on to the main RF line from the Primary Head End via Interface Shelf 60-214803. Two uplink paths from the Main Terminal SRS enter Interface Shelf 60-214803 where they are combined into a single path which is then fed out to the Uplink Input of BDA 5 where they are filtered and amplified and sent on to the main RF line from the Primary Head End via Interface Shelf 60-214803

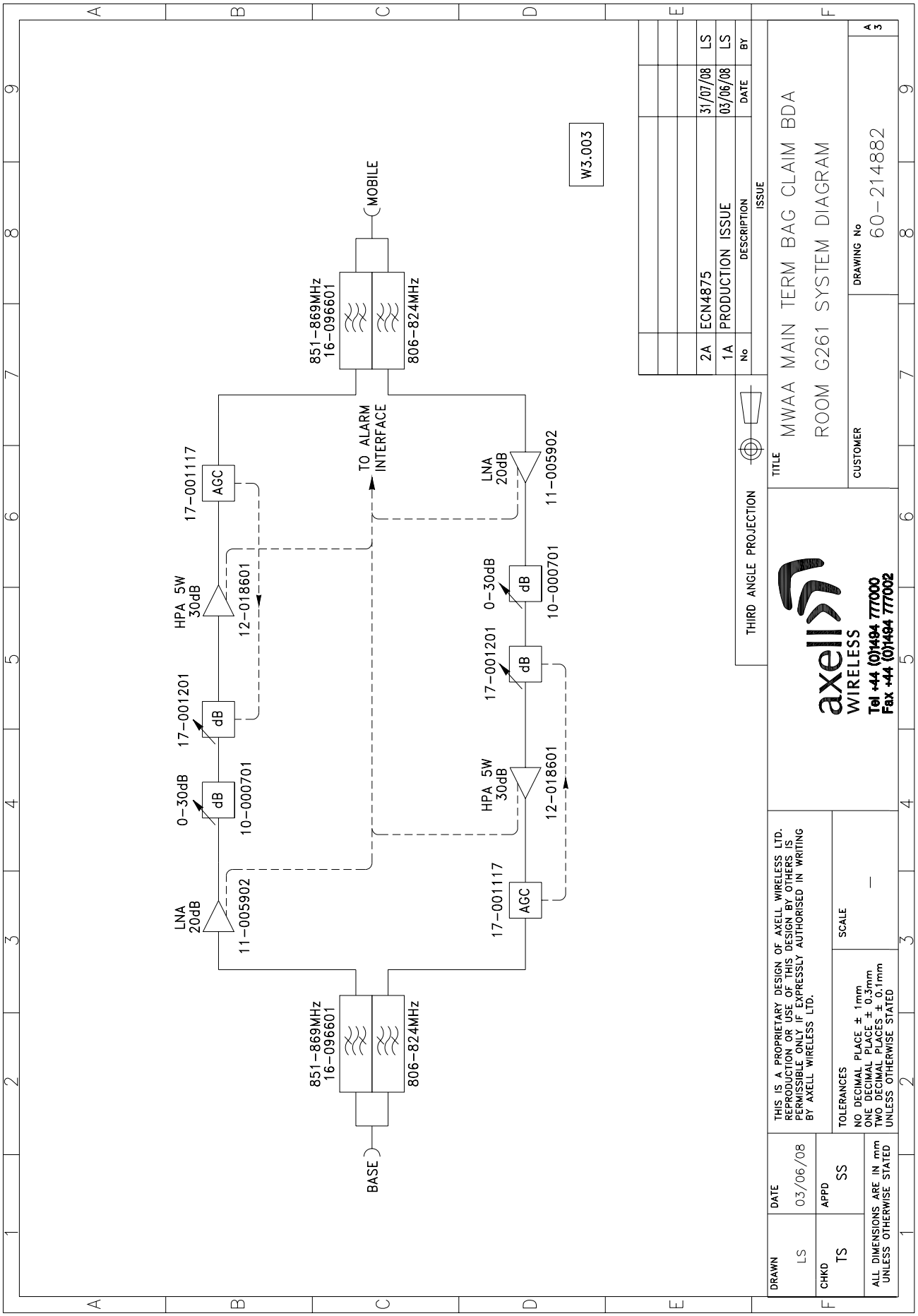
Alarm reporting data from amplifier modules in the BDA shelves is fed to Interface Shelf 60-214803.

3.1. 60-214802 List of Major Sub Components

Component Part	Component Part Description	Qty Per Assembly
10-000701	Variable Switched Attenuator 0dB to30dB	2
11-005902	Low Noise Amplifier	2
12-018601	5W Power Amplifier	2
16-096601	Duplexer Module	2
17-001117	AGC Detector Module	2
17-001201	AGC Attenuator Module	2
80-008901	12V Relay Assembly	1

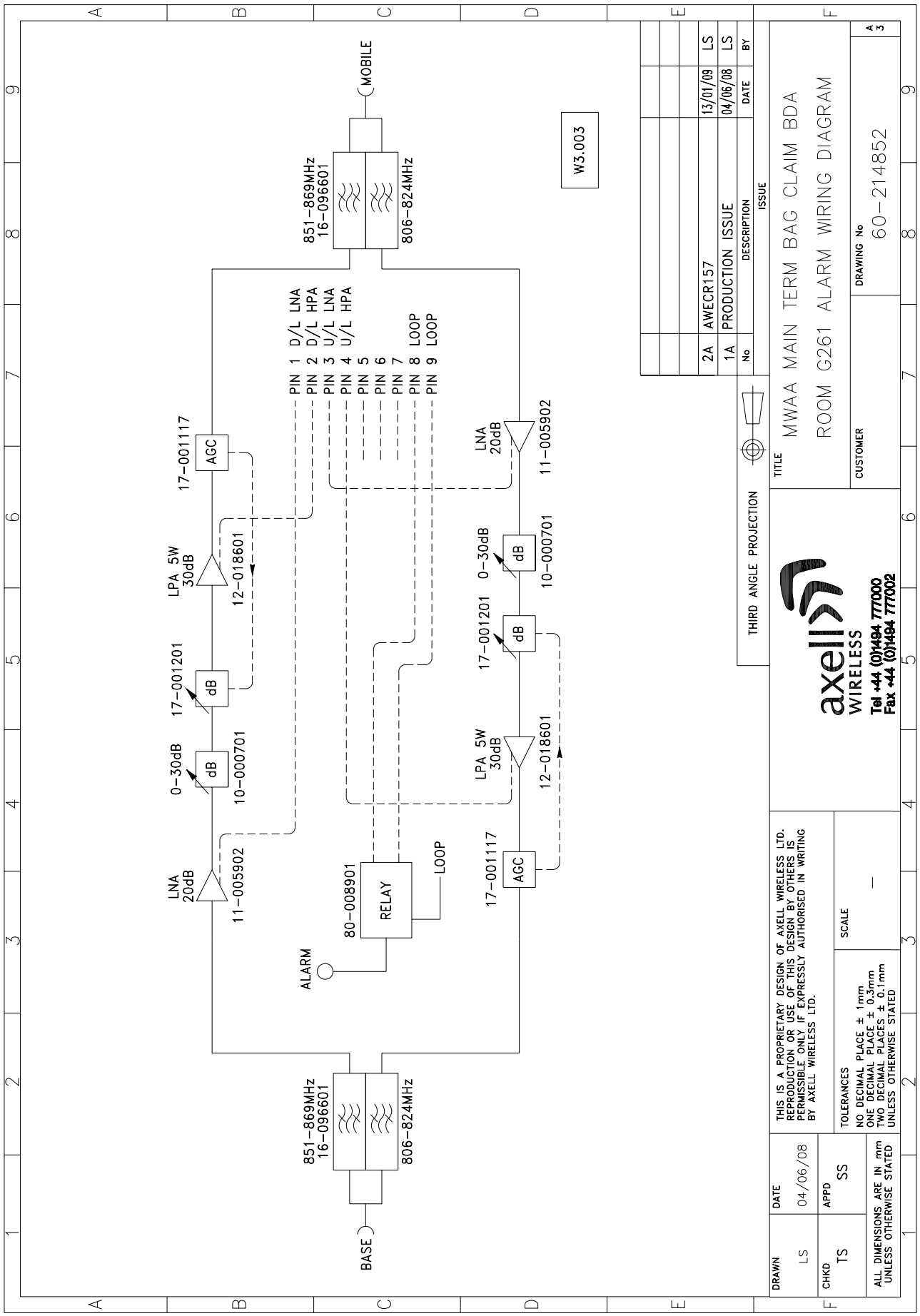
3.2. 60-214802 System Diagram

Drawing Number 60-214882

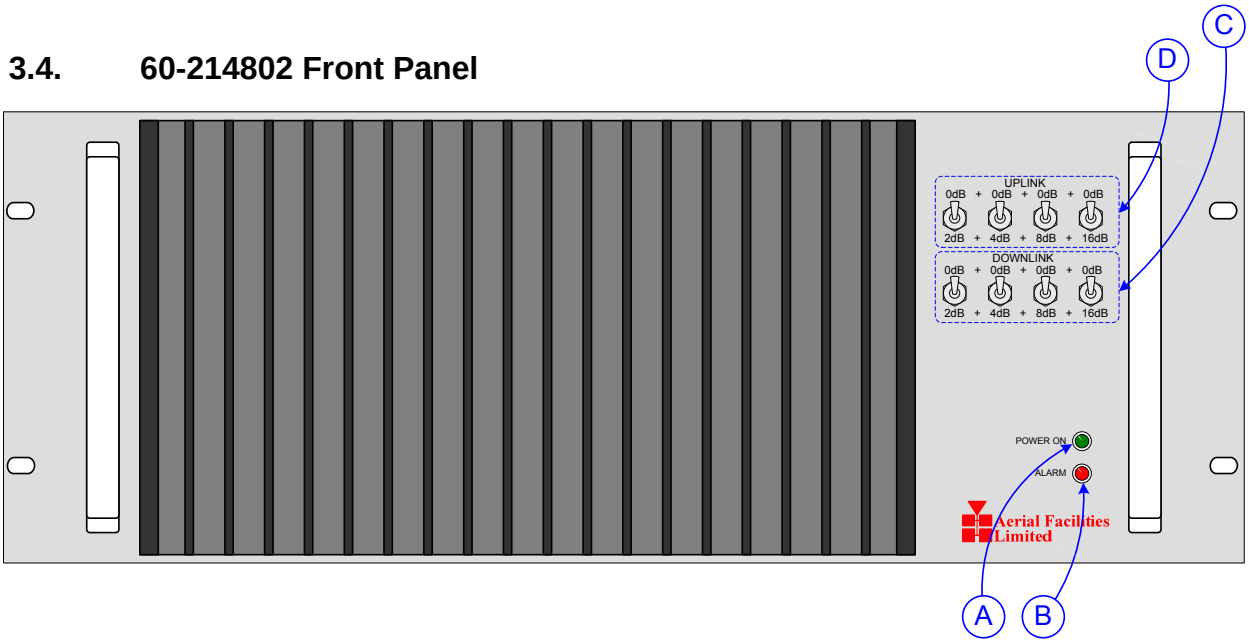


3.3. 60-214802 Alarm Wiring Diagram

Drawing Number 60-214852

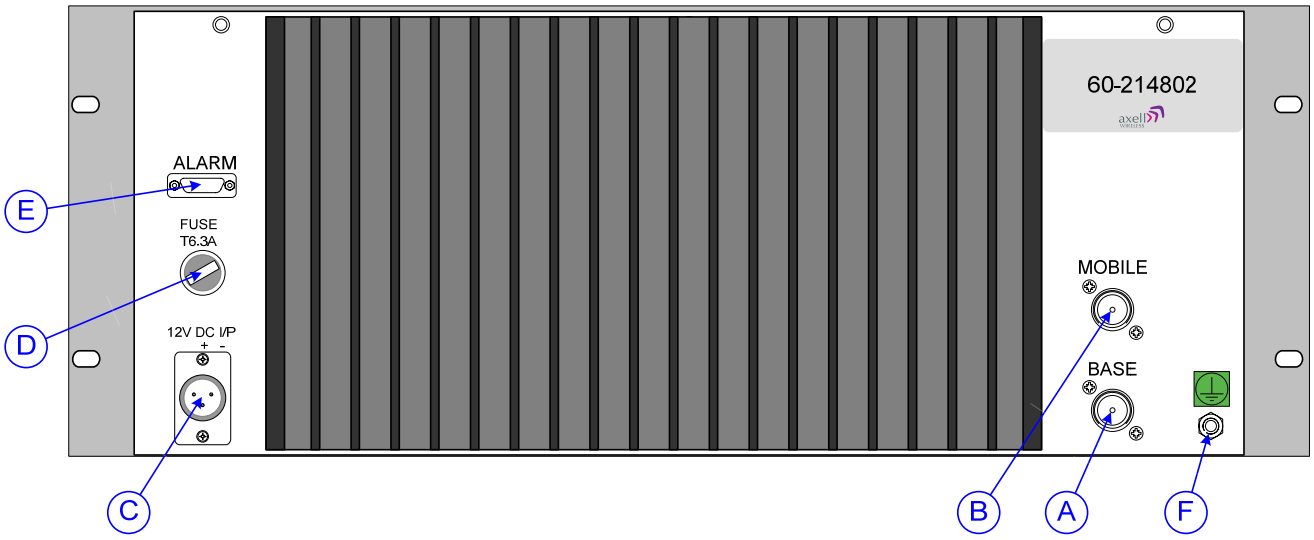


3.4. 60-214802 Front Panel



A	Green LED “POWER ON” Illuminated during normal operation
B	Red LED “ALARM” Illuminated during alarm state
C	Attenuator control switches for Uplink Attenuator
D	Attenuator control switches for Downlink Attenuator

3.5. 60-214802 Rear Panel



A	Combined D/L I/P from and U/L O/P to Interface Shelf 60-214803
B	BDAs 1,2,3 & 4 - Combined D/L O/P to and U/L I/P From Main Terminal SRS
B	BDA 5 - Combined D/L O/P to and U/L I/P From Interface Shelf 60-214803
C	DC Input 12V
D	6.3A Fuse for DC Input
E	Alarm Output to Interface Shelf 60-214803
F	Earth Connection

4. Installation – General Notes

4.1 General Remarks

When this equipment is initially commissioned, please use the equipment set-up record sheet in Appendix B. This will help both the installation personnel and Axell Wireless should these figures be needed for future reference or diagnosis.

Wall Mount equipment
The procedure for installing and commissioning an Axell Wall Mount equipment is generally as follows:

1) Secure the Repeater in the chosen wall position.

2) Fix the antenna and connect its cables to the Amplifier antenna ports.

3) Connect a suitable mains or battery power supply to the Amplifier

4) Calculate the attenuation settings required for the uplink and the downlink paths, and set the attenuators as described elsewhere in this document.

5) Switch the equipment mains on with the small switch located inside the Amplifier on the lower right hand side of the case.

6) If Base Station RF is available, make test calls via the Amplifier to ensure correct operation, if possible monitoring the signal levels during these calls to ensure that the uplink and downlink RF levels are as anticipated.

Rack Mount Equipment

The equipment racks must be located on a flat, level surface that is made from a material suitable for bearing the weight of the rack assembly. If the installer is in any doubt about the suitability of a site it is recommended that he consult with an appropriately qualified Structural Engineer.

It is important in determining the location of the rack within the room that space is allowed for access to the front and rear of the equipment. To enable maintenance to be carried out, the doors must be able to fully open.
The location must be served with a duct to allow the entry of cables into the rack.

4.2 Electrical Connections

It is recommended that the electrical mains connection is made by a qualified electrician, who must be satisfied that the supply will be the correct voltage and of sufficient capacity.

All electrical and RF connections should be completed and checked prior to power being applied for the first time.

Ensure that connections are kept clean and are fully tightened.

4.3 RF Connections

Care must be taken to ensure that the correct connections are made with particular attention made to the base station TX/RX ports. In the event that the base transmitter is connected to the RX output of the equipment, damage to the equipment will be done if the base station transmitter is then keyed.

4.3.1. Termination of Unused Ports

In the event that any RF ports are unused (available for future expansion) these ports must be kept terminated with the load terminations supplied by Axell for that purpose
Ensure that connections are kept clean and are fully tightened.

4.4 Optical Connections

The optical input and output ports will be shown in the system drawings. The ports are supplied with a green plastic cover, which must be removed prior to the connection of the fibre cable. Ensure that transmitter and receiver fibre cable are identified to prevent misconnection. At the master site, the fibre transmitters are in the downlink path with the receivers in the uplink. At the remote sites the fibre transmitters are in the uplink with the receivers in the downlink.
Always ensure that connections are kept clean and are fully tightened.

4.5 Commissioning

Once all connections are made the equipment is ready for commissioning.

To commission the system the test equipment detailed in Section 5.2. will be required.
Using the system diagrams and the end-to-end test specification (supplied with the equipment), the equipment should be tested to ensure correct operation. Typical RF levels that are not listed in the end-to-end specification, such as input levels to the fibre transmitters are detailed in the maintenance section of this manual.

On initial power up the system alarm indicators on the front door of the equipment should be checked. A green LED on each unit with a power supply to it illuminates to indicate that the power supply is connected to the unit A red LED illuminated indicates a fault in that particular unit that must be investigated before proceeding with the commissioning.

In the event that any part of the system does not function correctly as expected, check all connections to ensure that they are to the correct port, that the interconnecting cables are not faulty and that they are tightened. The majority of commissioning difficulties arise from problems with the interconnecting cables and connectors.

4.6 Antenna Installation & Gain Calculations

1) The equipment requires two antennas, one a highly directional Yagi or similar directed towards the donor cell base station, and one a leaky feeder, omni-directional antenna or Yagi to cover the area in which the mobiles are to be served.

2) The maximum gain at which the equipment can be set is limited by the isolation that can be achieved between these two antennas. Therefore when the antennas have been installed, inject a signal (at a known power level) into one of them and measure the signal level received by the other antenna on a spectrum analyser. The isolation can then be calculated as the difference between these two figures. The gain in each path of the equipment should be set at least 10 dB below this figure, using attenuators as described below in paragraph 5.

3) Also measure the received signal from the donor cell at the input to the equipment (base port). The gain of the equipment downlink path should be set such the donor site will not overload the equipment amplifiers. It is recommended that the input level should be less than -50dBm at the input of the equipment (Base Port). (This figure is assuming maximum gain, and may be increased by the value of the attenuator fitted in the downlink path.)

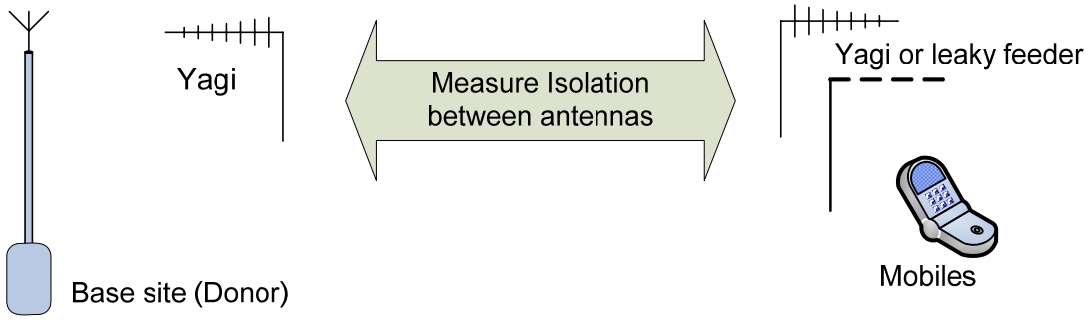
4) Ensure that the mobile facing antenna has at least 70dB isolation from the nearest mobile. (This is usually easily achieved when using a leaky feeder.)

5) The equipment gain is set by setting the variable switched attenuators in each path (uplink and downlink) refer to the photographs and layout drawings for the exact attenuator locations). Note that the uplink (mobile to base) and downlink (base to mobile) path gains are set independently. This allows the paths to have different gains if required to set the correct output power levels.

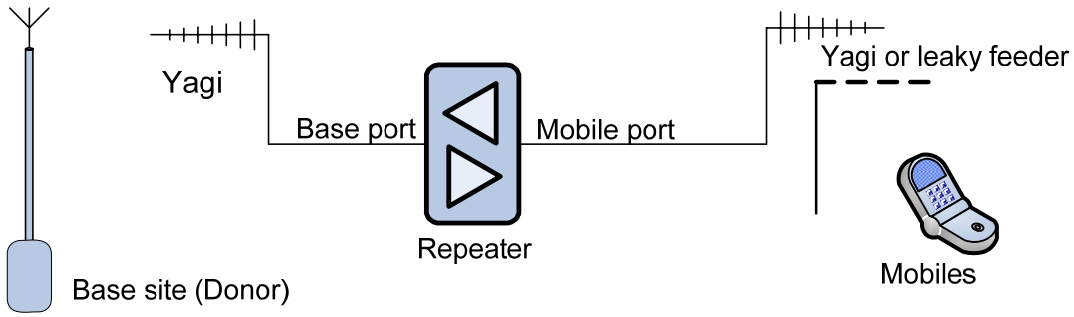
6) It is recommended that the gains are set such that the Downlink channel output levels from the equipment are typically +30dBm per channel
(Input level + Gain = Output level).

4.7 Antenna Isolation

A). First set up the antennas and measure the isolation between them



B). Install the equipment with gain set 10dB below the isolation figure obtained above



5. Maintenance

5.1. Fault Finding

5.1.1. Quick Fault Checklist

All Axell equipment is individually tested to specification prior to despatch. Failure of this type of equipment is not common. Experience has shown that a large number of fault conditions relating to tunnel installations result from simple causes often occurring as result of transportation, unpacking and installation. Below are listed some common problems which have resulted in poor performance or an indicated non-functioning of the equipment.

- Mains power not connected or not switched on.
- External connectors not fitted or incorrectly fitted.
- Internal connectors becoming loose due to transport vibration.
- Wiring becoming detached as a result of heavy handling.
- Input signals not present due to faults in the antenna and feeder system.
- Base transmissions not present due to fault at the base station.
- Modems fitted with incorrect software configuration.
- Changes to channel frequencies and inhibiting channels.
- Hand held radio equipment not set to repeater channels.
- Hand held radio equipment not set to correct base station.

5.1.2 Fault Isolation

In the event that the performance of the system is suspect, a methodical and logical approach to the problem will reveal the cause of the difficulty.

Transmissions from the main base stations are passed though the system to the mobile radio equipment; this could be a handheld radio or a transceiver in a vehicle. This path is referred to as the downlink. The return signal path from the mobile radio equipment to the base station is referred to as the uplink.

The first operation is to check the alarms of each of the active units and determine that the power supplies to the equipment are connected and active.
This can be achieved remotely (via CEMS, the RS232 Coverage Enhancement Management System, if fitted), or locally with the front door LEDs. The green LED on the front doors or front panels should be illuminated, while the red alarm indicators should be off. If an Alarm is on, then that unit must be tested against the original test specification.

If an amplifier is suspect, check the power supply to the unit. If no other fault is apparent use a spectrum analyser to measure the incoming signal level at the input and then after reconnecting the amplifier input, measure the output level. Consult with the system diagram to determine the expected gain and compare result.

In the event that there are no alarms on and all units appear to be functioning it will be necessary to test the system in a systematic manner to confirm correct operation.

5.1.3 Downlink

Confirm that there is a signal at the expected frequency and strength from the base station. If this is not present then the fault may lay outside the system. To confirm this, inject a downlink frequency signal from a known source at the master site BTS input and check for output at the remote site feeder output.

If a signal is not received at the output it will be necessary to follow the downlink path through the system to find a point at which the signal is lost. The expected downlink output for the given input can be found in the end-to-end test specification.

5.1.4 Uplink

Testing the uplink involves a similar procedure to the downlink except that the frequencies used are those transmitted by the mobile equipment.

5.1.5 Checking service

Following the repair of any part of the system it is recommended that a full end-to-end test is carried out in accordance with the test specification and that the coverage is checked by survey.
It is important to bear in mind that the system includes a radiating cable network and base stations that may be faulty or may have been damaged.

5.1.6 Fault repair

Once a faulty component has been identified, a decision must be made on the appropriate course to carry out a repair. A competent engineer can quickly remedy typical faults such as faulty connections or cables. The exceptions to this are cable assemblies connecting bandpass filter assemblies that are manufactured to critical lengths to maintain a 50-ohm system.

Care should be taken when replacing cables or connectors to ensure that items are of the correct specification. The repair of component modules such as amplifiers and bandpass filters will not usually be possible in the field, as they frequently require specialist knowledge and test equipment to ensure correct operation. It is recommended that items of this type are replaced with a spare unit and the faulty unit returned to Axell Wireless for repair.

5.1.7 Service Support

Advice and assistance with maintaining and servicing this system are available by contacting Axell Wireless Ltd., see section 2.7.

NOTE

Individual modules are not intended to be repaired on site and attempts at repair will invalidate active warranties. Company policy is that individual modules should be repaired by replacement. Axell Wireless Ltd. maintains a level of stock of most modules which can usually be despatched at short notice to support this policy.

5.2 Tools & Test Equipment

The minimum tools and test equipment needed to successfully service this Axell Wireless product are as follows:-

Spectrum analyser	100kHz to 2GHz (Dynamic range = 90dB).
Signal Generator	30MHz to 2GHz (-120dBm to 0dBm o/p level).
Attenuator	20dB, 10W, DC-2GHz, (N male – N female).
Test Antenna	Yagi or dipole for operating frequency.
Optical Power Meter	1300 – 1560nM (-40 - +10dB)
Digital multi-meter	Universal Volt-Ohm-Amp meter.
Test cable x 2	N male – N male, 2M long RG214.
Test cable x 2	SMA male – N male, 1m long RG223.
Hand tools	Philips #1&2 tip screwdriver.
	3mm flat bladed screwdriver.
	SMA spanner and torque setter.

5.3 Care of Modules

5.3.1 General Comments

Many of the active modules contain semiconductor devices utilising MOS technology, which can be damaged by electrostatic discharge. Correct handling of such modules is mandatory to ensure their long-term reliability.

To prevent damage to a module, it must be withdrawn and inserted with care. The module may have connectors on its underside, which might not be visible to the service operative.

5.3.2 LNA Replacement (general procedure)

The following *general* instructions should be followed to remove a module:

1) Remove power to the unit
2) Remove all visible connectors (RF, DC & alarm)
3) Release module retaining screws.
4) Slowly but firmly, pull the module straight out of its position. Take care not to twist/turn the module during withdrawal. (When the module is loose, care may be needed, as there may be concealed connections underneath).

5.3.3 Module Replacement (general procedure)

1) Carefully align the module into its location then slowly push the module directly straight into its position, taking care not to twist/turn it during insertion.
2) Reconnect all connectors, RF, alarm, power etc., (concealed connectors may have to be connected first).
3) Replace retaining screws (if any).
4) Double-check all connections before applying power.

5.3.4 Power Amplifier Replacement (general procedure)

1) Remove power to the unit. (Switch off at mains/battery, or remove DC in connector)

2) Remove alarm wires from alarm screw terminal block or disconnect multi-way alarm connector.

3) Carefully disconnect the RF input and output coaxial connectors (usually SMA)

If alarm board removal is not required, go to step 5.

4) There is (usually) a plate attached to the alarm board which fixes it to the amplifier, remove its retaining screws and the alarm board can be withdrawn from the amplifier in its entirety. On certain types of amplifier the alarm board is not mounted on a dedicated mounting plate; in this case it will have to firstly be removed by unscrewing it from the mounting pillars, in most cases, the pillars will not have to be removed before lifting the amplifier.

5) If the amplifier to be removed has a heatsink attached, there may be several different ways it can have been assembled. The most commonly used method, is screws through the front of the heatsink to threaded screw holes (or nuts and bolts), into the amplifier within the main case. If the heatsink is mounted on the rear of the main case (e.g., against a wall in the case of wall mounted enclosures), then the fixing method for the heatsink will be from within the case, (otherwise the enclosure would have to be removed from the wall in order to remove the heatsink).

When the heatsink has been removed, the amplifier may be unscrewed from the main casing by its four corner fixings and gently withdrawn.

Fitting a new power amplifier module will be the exact reverse of the above.

Note: Do not forget to apply fresh heatsink compound to the heatsink/main case joint and also between the amplifier and the main case.

5.3.5 Low Power Amplifier Replacement (general procedure)

1) Disconnect the mains power supply and disconnect the 24V dc supply connector for the LPA.
2) Disconnect the RF input and output cables from the LPA.
3) Disconnect the alarm connector.
4) Remove the alarm monitoring wires from (D type connector) pins 9 and 10.
   Remove the LPA module by removing the four retaining screws, replace with a new LPA module and secure it with the screws.
5) Connect the RF cables to the LPA input and output connectors. Reconnect the wires to the alarm board connector pins 9 and 10.
6) Reconnect the DC supply connector and turn the mains switch on.

Note: Tighten SMA connectors using only a dedicated SMA torque spanner. If SMA connectors are over-tightened, irreparable damage will occur. Do not use adjustable pliers to loosen/tighten SMA connectors.

Also take care not to drop or knock the module as this can damage (or misalign in the case of tuned passive modules) sensitive internal components. Always store the modules in an environmentally friendly location

5.3.6 Module Transportation:

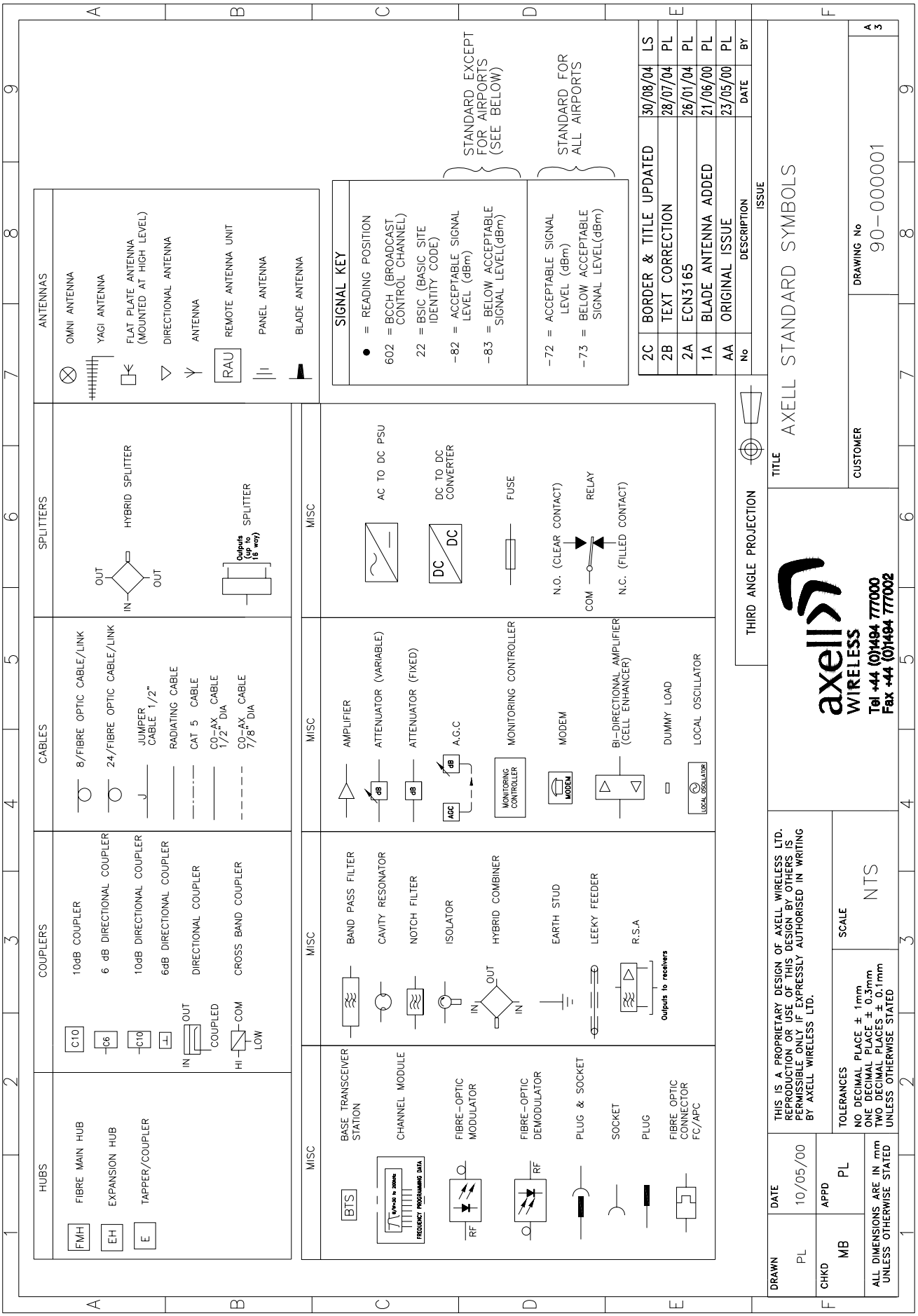
To maintain the operation, performance and reliability of any module it must be stored and transported correctly. Any module not installed in a whole system must be kept in an anti-static bag or container. These bags or containers are normally identified by being pink or black, and are often marked with an ESD label. Any module sent back to Axell Wireless for investigation/repair must be so protected. Please contact the Axell Wireless Operations Support Department before returning a module, see section 2.7.

Appendix A

A.1. Glossary of Terms used in this document

Repeater or Cell Enhancer	A Radio Frequency (RF) amplifier which can simultaneously amplify and re-broadcast Mobile Station (MS) and Base Transceiver Station (BTS) signals.
Band Selective Repeater	A Repeater designed for operation on a range of channels within a specified frequency band.
Channel Selective Repeater	A Repeater, designed for operation on specified channel(s) within a specified frequency band. Channel frequencies may be factory set or on-site programmable.
AC	Alternating Current
AGC	Automatic Gain Control
BBU	Battery Backup Unit
BDA	Bi-directional Amplifier
BTS	Base Transceiver Station (Base Station)
B/W	Bandwidth
CEMS	Coverage Enhancement Management System
C/NR	Carrier-to-Noise Ratio
DAS	Distributed Antenna System
DC	Direct Current
Downlink (D/L)	RF signals TX from the BTS to the Mobiles
F/O	Fibre Optic
GND	Ground
ID	Identification (Number)
I/P	Input
LCX	Leaky Coaxial Cable (Leaky Feeder).
LED	Light Emitting Diode
LNA	Low Noise Amplifier
LPA	Low Power Amplifier
Mobile(s)	Hand-portable or other “Mobile” RF Transceiver equipment.
MOU	Master Optical Unit
MTBF	Mean Time Between Failures
N/A	Not Applicable
N/C (of Relays)	Normally Closed
N/O (of Relays)	Normally Open
OFR	On Frequency Repeater
OIP3	Output Third Order Intercept Point
O/P	Output
P1dB	1dB Compression Point
PA	Power Amplifier
RF	Radio Frequency
RHNC	Relative Humidity, Non Condensing
RSA	Receiver/Splitter Amplifier
RX	Receiver (Received)
S/N	Serial Number
TX	Transmitter (Transmitted)
Uplink (U/L)	RF signals transmitted from the Mobiles to the BTS
VSWR	Voltage Standing Wave Ratio
WDM	Wave division multiplex
Date Format	Date Format used in this document is dd/mm/yyyy

A.2. Key to Drawing Symbols used in this document



A.3. EC Declaration of Conformity

In accordance with BS EN ISO/IEC 17050-1&-2:2004

Axell Wireless Limited
Aerial House
Asheridge Road
Chesham
Buckinghamshire HP5 2QD
United Kingdom

CE0086

Declares, under our sole responsibility that the following product:

BDA Shelf 60-214802

IN ACCORDANCE WITH THE FOLLOWING DIRECTIVES:

1999/5/EC	The Radio & Telecommunications Terminal Equipment Directive Annex V and its amending directives

HAS BEEN DESIGNED AND MANUFACTURED TO THE FOLLOWING STANDARD[S] OR OTHER NORMATIVE DOCUMENT[S]:

BS EN 60950	Information technology equipment. Safety. General requirements
ETS EN 301 489-1	EMC standard for radio equipment and services. Part 1. Common technical requirements

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

SIGNED

B. S. Barton
Operations Director

DATE: 04/12/2008

A.4. Waste Electrical and Electronic Equipment (WEEE) Notice

The Waste Electrical and Electronic Equipment (WEEE) Directive became law in most EU countries during 2005. The directive applies to the disposal of waste electrical and electronic equipment within the member states of the European Union.

As part of the legislation, electrical and electronic equipment will feature the crossed out wheeled bin symbol (see image at left) on the product or in the documentation to show that these products must be disposed of in accordance with the WEEE Directive.

In the European Union, this label indicates that this product should not be disposed of with domestic or "ordinary" waste. It should be deposited at an appropriate facility to enable recovery and recycling.

A.5. Document Amendment Record

Issue No.	Date	Incorporated by	Section Amended	Reason for new issue
A	23/07/2009	AJS		Draft
1	23/07/2009	AJS		Issue

Appendix B

B.1 Initial Equipment Set-Up Calculations

General Information			
Site Name:		Client Name:	
Date:		AWL Equip. Model No.	

Antenna Systems				
	Model	Gain	Azimuth	Comments
A - Service Antenna				
B – Donor Antenna				
	Type	Loss	Length	Comments
C – Service Feeder				
D – Donor Feeder				

Initial Parameters	
E – CE Output Power	dBm
F – Antenna Isolation	dB
G – Input signal level from donor BTS	dBm
Operating Voltage	V

Downlink Calculations		
Parameter	Comments	Value
Input signal level (G)		dBm
CE max. o/p power (E)		dBm
Gain setting	E - G	dB
Isolation required	(Gain + 10dB)	dB
Service antenna gain (A)		dB
Service antenna feeder loss (C)		dB
Effective radiated power (ERP)	E+A-C	dBm
Attenuator setting	CE gain-gain setting	dB

If the input signal level in the uplink path is known and steady, use the following calculation table to determine the gain setting. If the CE features Automatic Gain Control the attenuator should be set to zero and if not, then the attenuation setting for both uplink and downlink should be similar.

Uplink Calculations		
Parameter	Comments	Value
Input signal level		dBm
CE max. o/p power (E)		dBm
Gain setting		dB
Required isolation		dB
Donor antenna gain (B)		dB
Donor antenna feeder loss (D)		dB
Effective radiated power (ERP)	E+B-D	dBm
Attenuator setting	(CE gain-gain setting)	dB