UHF 10W Fibre

Fed Remote Site

User Handbook
For
EMS Wireless
AFL Works Order Nō.: Q112299
AFL product part Nō.: 60-137701 (10W FO Remote)

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AMENDMENT LIST RECORD SHEET

Issue Nō.	Date	Incorporated by	Page No.'s Amended	Reason for new issue
A	03/02/05	CMH		1st Draft
1	25/05/2005	CMH		1st Issue

Document Ref:-60-137701HBK

INTRODUCTION

Scope

This handbook is for use solely with the equipment identified by the AFL Part Number shown on the front cover. It is not to be used with any other equipment unless specifically authorised by Aerial Facilities Limited.

Purpose

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 AFL, normally at the company's repair facility in Chesham, England.

This handbook has been prepared in accordance with BS 4884, and AFL'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 Quality Manager.
This document fulfils the relevant requirements of Article 6 of the R&TTE Directive.

Limitation of Information Notice

This manual is written for the use of technically competent operators/service persons. No liability is accepted by AFL 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, AFL does not warrant the absolute accuracy of the information contained within this manual, or it's completeness, fitness for purpose, or scope.

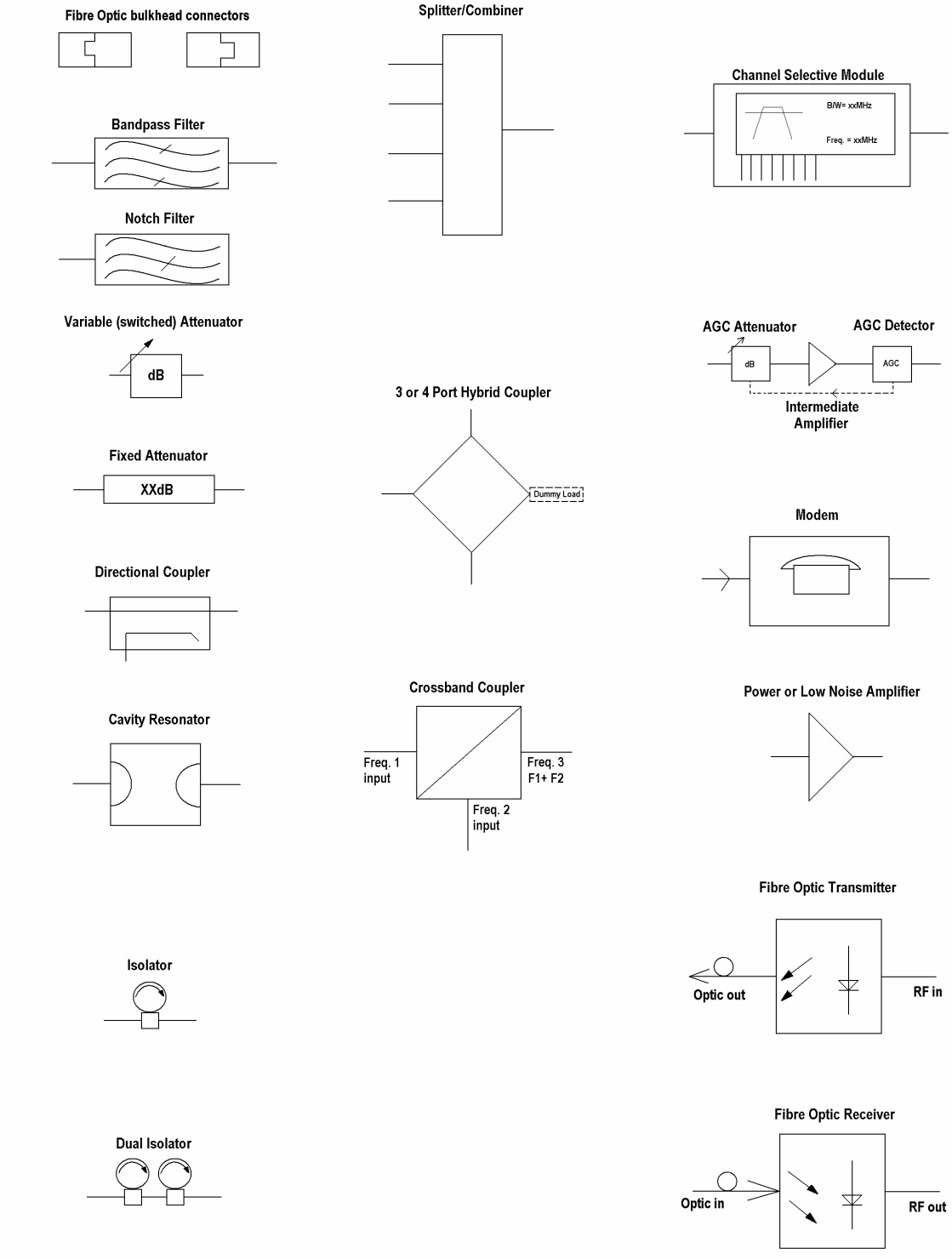
AFL has a policy of continuous product development and enhancement, and as such, reserves the right to amend, alter, update and generally change the contents, appearance and pertinence of this document without notice.

All AFL 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.

Glossary of Terms

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 Cell Enhancer designed for operation on a range of channels within a specified frequency band.
Channel Selective Repeater	A Cell Enhancer, designed for operation on specified channel(s) within a specified frequency band. Channel frequencies may be factory set or on-site programmable.
BTS	Base Transceiver Station
C/NR	Carrier-to-Noise Ratio
Downlink (D.L.)	RF signals transmitted from the BTS and to the MS
Uplink (U.L.)	RF signals transmitted from the MS to the BTS
EMC	Electromagnetic Compatibility
GND	Ground
DC	Direct Current
AC	Alternating Current
ID	Identification Number
OIP3	Output Third Order Intercept Point = RF_{out} +(C/I)/2
LED	Light Emitting Diode
M.S.	Mobile Station
N/A	Not Applicable
N/C	No Connection
NF	Noise Figure
RF	Radio Frequency
Rx	Receiver
Tx	Transmitter
S/N	Serial Number

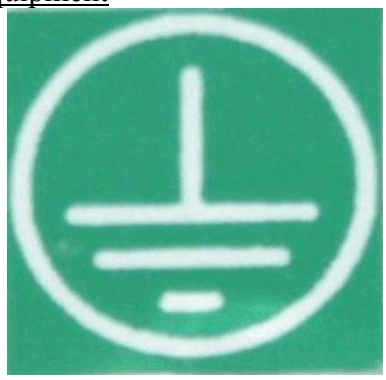
Key to AFL RF Module Drawing Symbols



Key to AFL RF Modules

1. SAFETY CONSIDERATIONS

1.1 Earthing of Equipment



Cell Enhancers 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.

1.2 Electric Shock Hazard

Electrical shocks due to faulty mains driven power supplies.
Whilst ever potentially present in any electrical equipment, such a condition would be minimised by quality installation practice and thorough testing at:

a) Original assembly

b) Commissioning

c) Regular intervals, thereafter.

All test equipment to 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.

1.3 RF Radiation Hazard

RF radiation, (especially at UHF frequencies) arising from transmitter outputs connected to AFL'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 unterminated. 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 mitigate against 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.

1.4 Chemical Hazard

Beryllium Oxide, also known as Beryllium Monoxide, or Thermalox™, is sometimes used in devices within equipment produced by Aerial Facilities 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 Aerial Facilities Ltd for disposal.

To return such equipment, please contact the Quality 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 AFL 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.

1.5 Laser safety

General good working practices adapted from EN60825-2: 1994

"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

Do not allow any dirt/foreign material ingress on the optical connector bulkheads.

The optical fibre jumper cable maximum bend radius is 3cm, any smaller radii may result in optical cable breakage or excessive transmission losses.

Caution: Do not get them wet, the FO units are *NOT* weather proof.

1.6 Emergency Contact Numbers

The AFL Quality Department can be contacted on:

Telephone	+44 (0)1494 777000
Fax	+44 (0)1494 777002
e-mail	qa@aerial.co.uk

2. SYSTEM OVERVIEW

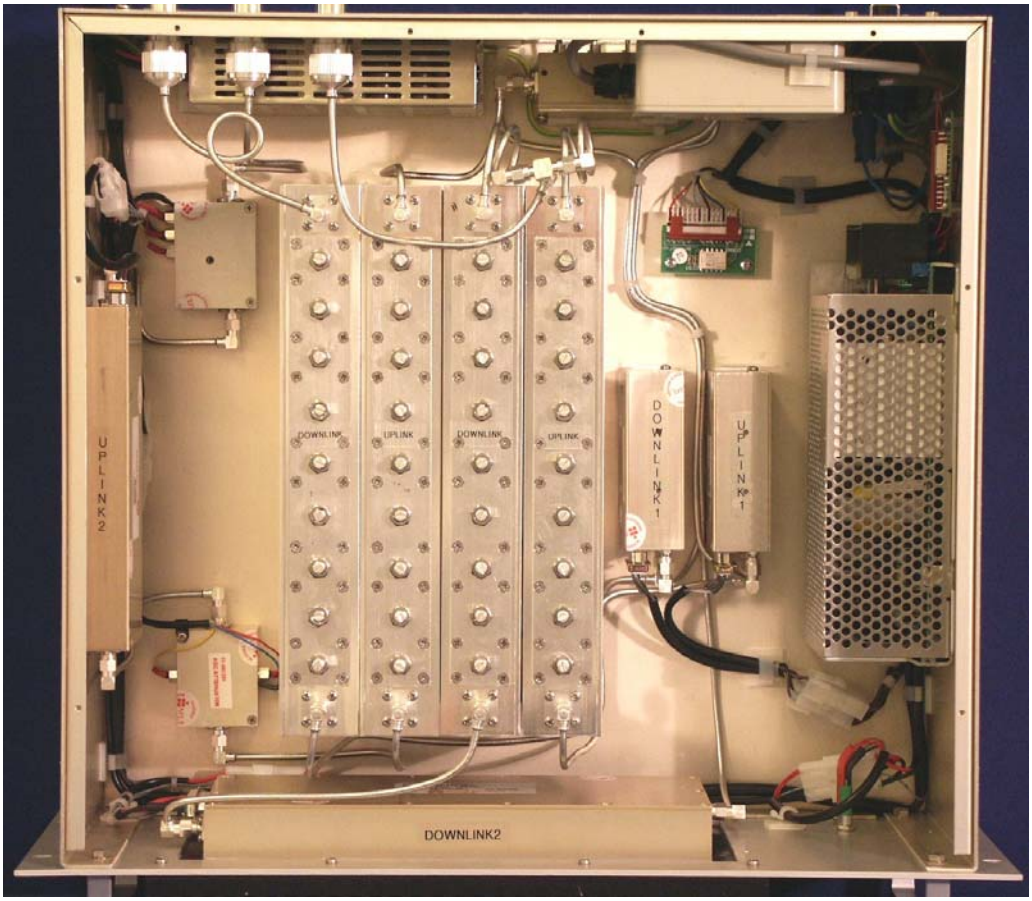
The equipment is manufactured in standard IP54 19" rack shelves and is powered by the local mains supply. No battery backup is fitted.

The remote site receives the master site RF data via a dedicated fibre link. The downlink fibre signals are transmitted to the remote site using 1310nm wavelength laser and the uplink wavelength from remote to master site is 1550nm, using wave division multiplexing to differentiate between the wavelengths. This means that a single fibre cable can be used for both uplink and downlink, saving the considerable cost of an extra fibre cable between master and each remote site.
The 10Watt output power remote BDA drives an air interfaced antenna for the local mobile coverage.

3. REMOTE SITE BDA (60-137701)

3.1 Remote Site 10Watt BDA Shelf (60-137702)

3.1.P Remote Site 10W BDA Shelf Photographs



3.1.1 Remote Site 10W BDA Description

The remote site 10W **B**i-**D**irectional **A**mplifier receives downlink signals from the Fibre Optic shelf at port **A** and passes them through a bandpass filter tuned to the downlink passband (408-411MHz). From there the signal is amplified by a **L**ow **N**oise **A**mplifier (+31dB) and a 0-15dB switched attenuator to a 10Watt power amplifier (22dB). A final bandpass filter completes the downlink path to the off-air antenna (port **C**).

The uplink path starts at the off-air antenna (port **C**)and is passed first through a bandpass filter tuned to the uplink band (417-420MHz). A 20dB amplifier and switched attenuator amplify the signal by 20dB and the signal then passes through a final bandpass filter to the AGC attenuator. After the attenuator the signal is amplified to one Watt power to the AGC logarithmic detector giving this path a dynamic range of approximately 30dB. After the AGC detector the signal exits the shelf to the FO shelf at port **B**.

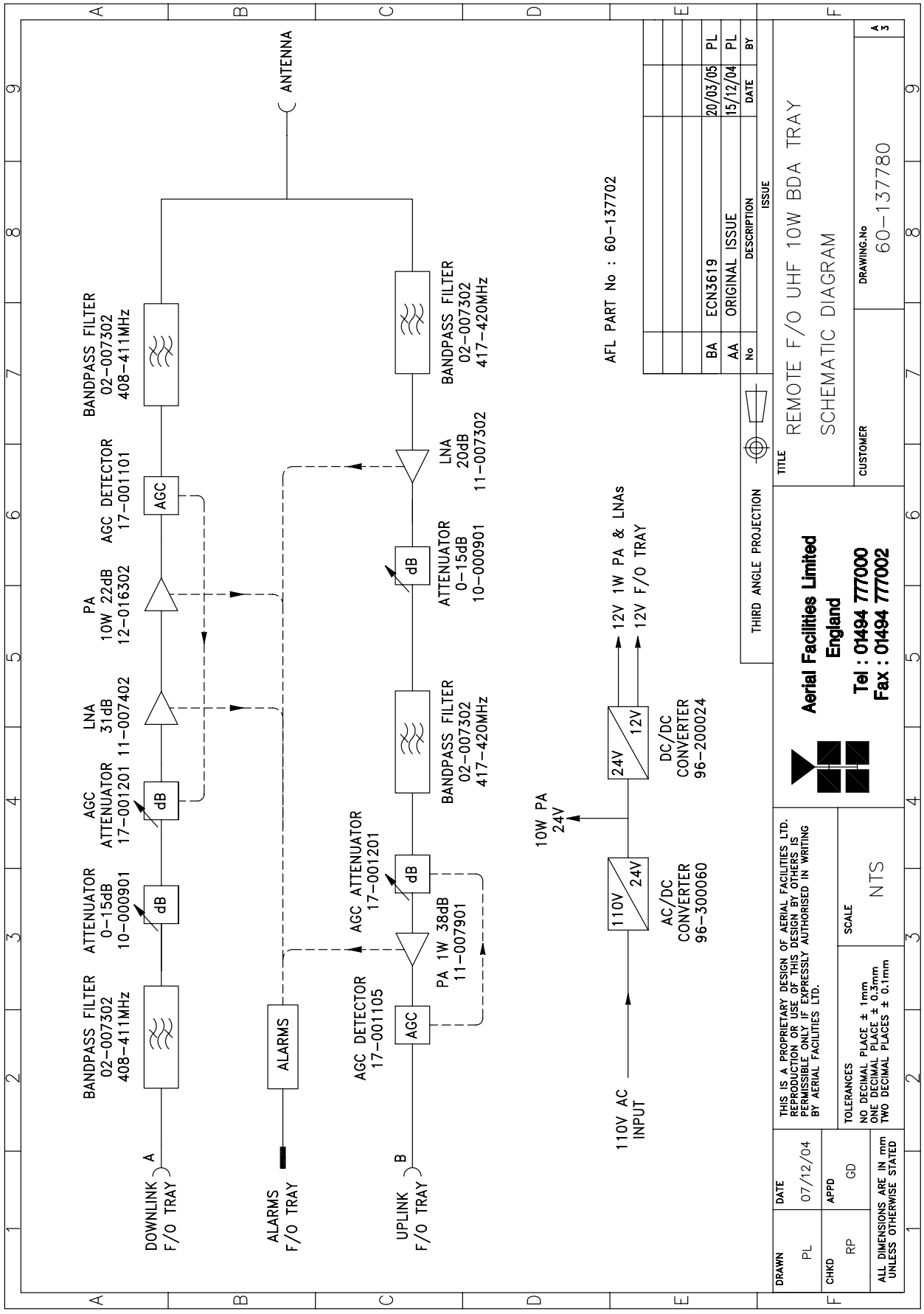
3.1.2 Remote Site 10W BDA Electrical/Mechanical Specification

PARAMETER		SPECIFICATION
Downlink frequency range:		408–411MHz
Uplink frequency range:		417-420MHz
Approximate RF levels (BDA shelf):	Port A:	-10dBm (downlink input)
	Port B:	0dBm (uplink output)
	Port C:	+38dBm (antenna output)
Approximate RF levels (FO shelf):	Port A:	0dBm (downlink output)
	Port B:	0dBm (uplink output)
Power supply consumption:		6A max.@ 24V DC
		1.0A max @ 12V DC
Chassis height:		4U
Chassis depth:		400mm (excluding handles & connectors
IP protection:		IP54
Impedance:		50Ω
AGC level:		0dB
Relative humidity range:		5-95%
Alarms:		2 x LNA, 1W LPA, & 1 x 10W PA
Alarm connector outputs:		1 & 2 (2 x LNA's & LPA)
		3 & 4 (1 x 10W PA)
Temperature Range:	operation:	-10°C to +60°C
	storage:	-20°C to +70°C

3.1.3 Remote Site 10W BDA Electrical/Mechanical Specification

PARAMETER		SPECIFICATION
Downlink frequency range:		408-411MHz
Uplink frequency range:		417-420MHz
Approximate RF levels:	Port A:	-10dBm (downlink BDA input)
	Port B:	-5dBm (uplink BDA output)
	Port C:	+38dBm (antenna BDA output)
Downlink RF gain:		50dB
Uplink RF gain:		55dB
Power supply consumption:		6A max.@ 24V DC
		1.0A max @ 12V DC
Chassis height:		4U
Chassis depth:		400mm (excluding handles & connectors
IP protection:		IP54
Mains power supply:		150W/24V (6.3A)
Impedance:		50Ω
AGC level:		0dB
Relative humidity range:		5-95%
Alarms:		2 x LNA, 1W LPA, & 1 x 10W PA
Alarm connector outputs:		1 & 2 (2 x LNA's & LPA)
		3 & 4 (1 x 10W PA)
Temperature Range:	operation:	-10°C to +60°C
	storage:	-20°C to +70°C

3.1.4 Remote Site 10W BDA System Diagram, Drg. Nō. 60-137780



3.1.5 Remote Site 10W BDA Shelf 60-137702 Parts List

AFL Part Nō.	Part Description	Qty.
02-007302	SDF C/L5P VAR.BW TOP SMA 40mm POST	4
10-000901	SW. ATTENUATOR 0.25W 0-15dB	2
11-007302	LNA. 380-500MHz 20dB (C/W RELAY) GA	1
11-007402	LNA. 380-500MHz 30dB (C/W RELAY) GA	1
11-007901	AMPLIFIER TETRA 1W 37dB GAIN ASS	1
12-005921	4U 10W PWR AMP HEATSINK	1
12-016302K	PA 380-470MHz 10W CLASS A KIT	1
17-001105	CE AGC UNIT LOG DET/AMP ASSY (24v)	2
17-001201	C/E AGC UNIT ATTENUATOR ASSY	2
19-001021K	4U CHASSIS KIT (400mm deep)	1
80-008902	24V RELAY PCB ASSEMBLY	1
91-030002	N ADAPTOR PANEL FEMALE:FEMALE	3
91-130001	SMA ADAPT 'T' ALL FEMALE 3 GHz	1
91-500025	3 PIN RIGHT ANGLE FREE PLUG NC-X	1
91-510004	3 PIN PNL.MOUNT SOCKET NC-X	1
91-520001	PWR MAINS INL FIXED/SOLD.TERMS	1
91-600014	'D' 9 WAY SOCKET S/B (NON FILTERED)	3
91-600015	'D' 9 WAY PLUG S/B (NON FILTERED)	1
96-200024	DC/DC CONVERTER 18-36Vin/12Vout 5A 60W	1
96-300060	JWS150-24/A PSU	1
96-600003	INSULATING BOOT D.C.	1
96-700034	LED RED 5mm IP67	1
96-700035	LED GREEN 5mm IP67	1
96-920022	3A CIRCUIT BREAKER (ETA)	1

4. SUB-UNIT MODULES

4.1 Bandpass Filters (02-007302)

4.1.1 Description

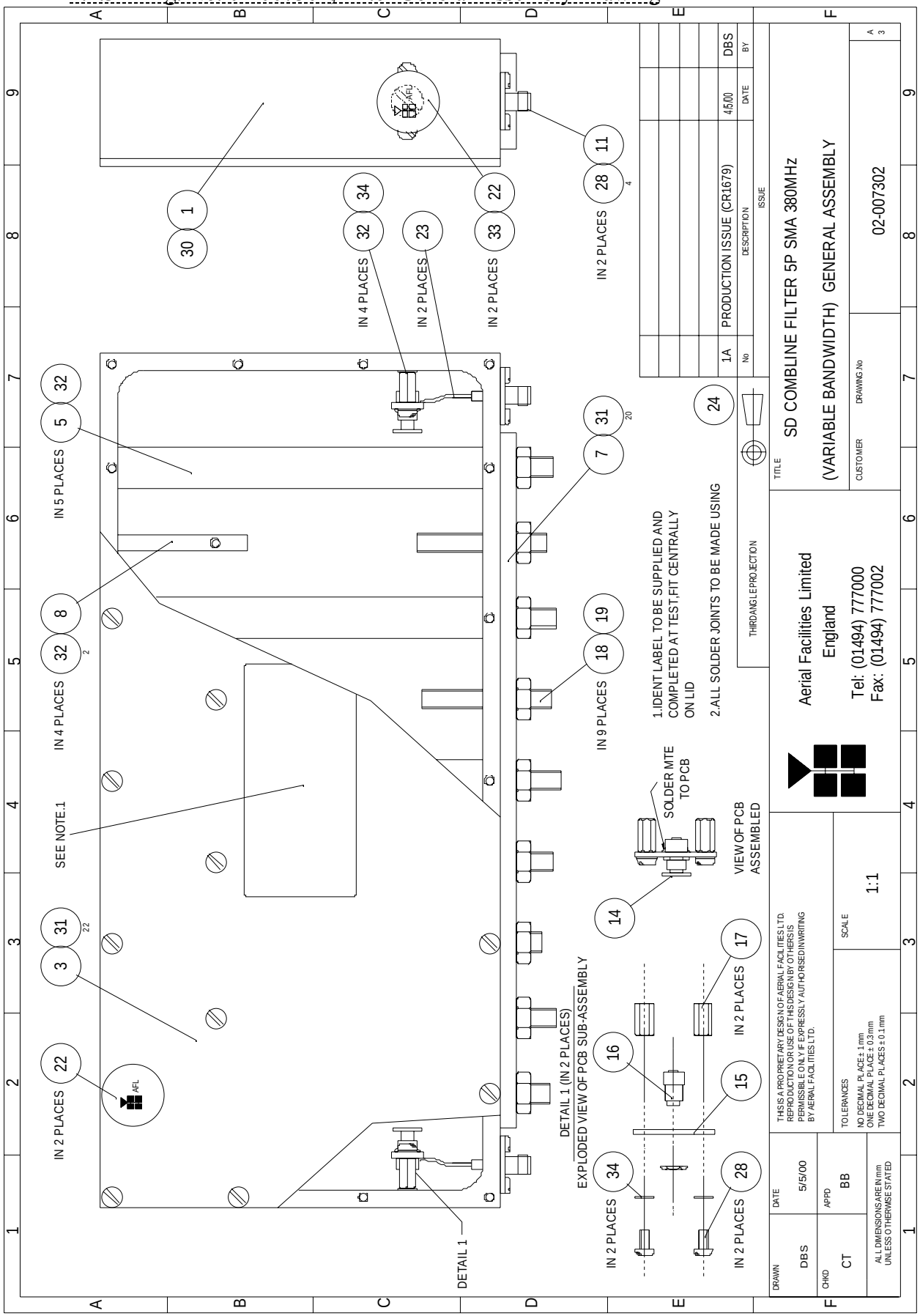
The bandpass filters are multi-section designs with a bandwidth dependent upon the passband frequencies, (both tuned to customer requirements). The response shape is basically Chebyshev with a passband design ripple of 0.1dB. The filters are of combline design, and are carefully aligned during manufacture in order to optimise the insertion loss, VSWR and intermodulation characteristics of the unit. The tuned elements are silver-plated to reduce surface ohmic losses and maintain a good VSWR figure and 50Ω load at the input and output ports.

No adjustments should be attempted without full network sweep analysis facilities to monitor both insertion loss and VSWR simultaneously.

4.1.2 Technical Specification

PARAMETER		SPECIFICATION
Response type:		Chebyshev
Frequency range:		350 – 500MHz (tuned to spec.)
Bandwidth:		3.5 MHz (tuned to spec.)
Number of sections:		5
Insertion loss:		1.2 dB
VSWR:		better than 1.2:1
Connectors:		SMA
Power handling:		100W max
Temperature range	operation:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		3 kg
Size:		266 x 143 x 39.5mm

4.1.3 Drg. Nō. 02-007302, Filter General Assembly Drawing



4.2 Switched Attenuator (10-000901)

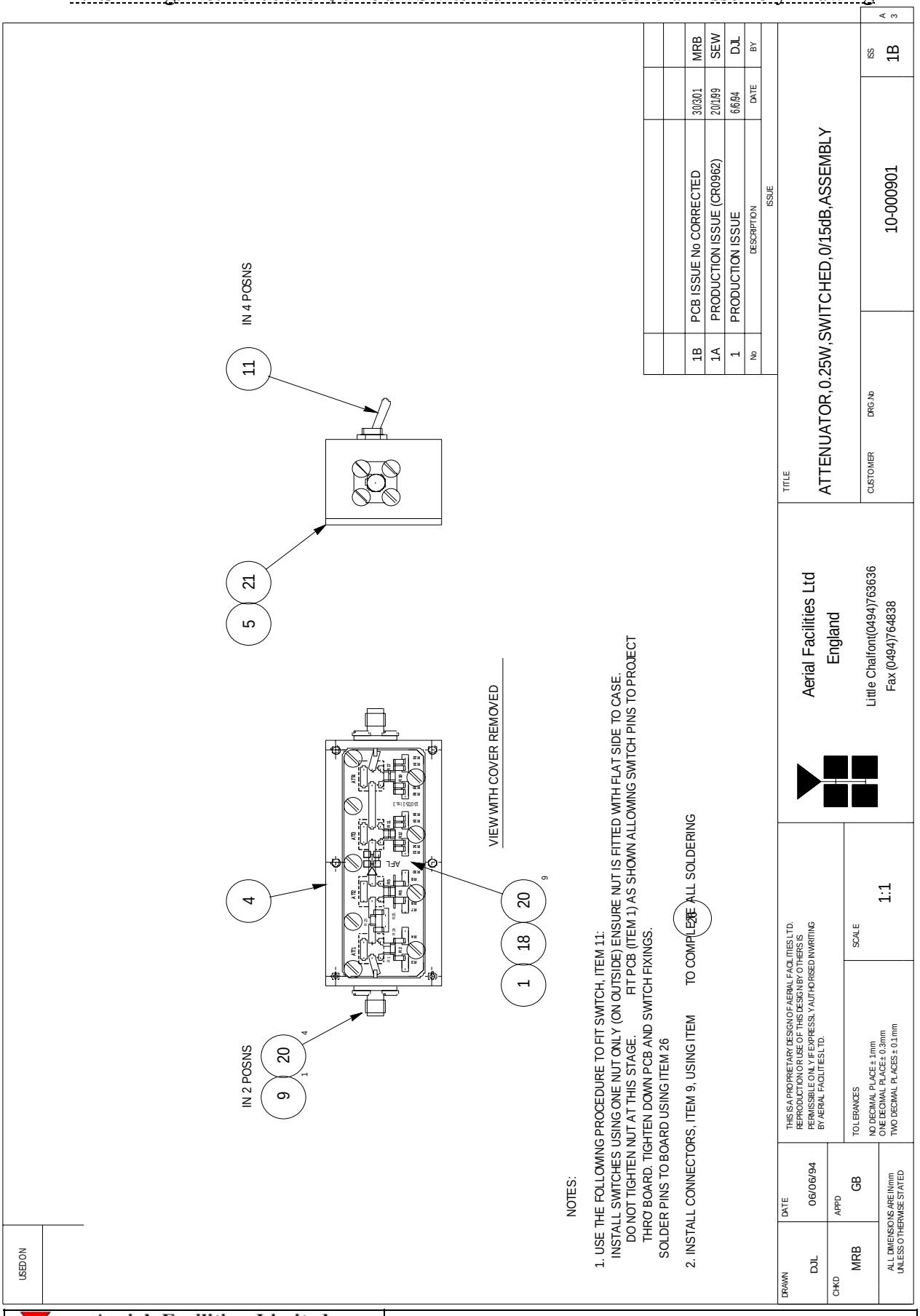
4.2.1 General Application

In many practical applications for Cell Enhancers etc., the gain in each path is found to be excessive. Therefore, provision is made within the unit for the setting of attenuation in each path, to reduce the gain. The attenuators are located between the first and second stage amplifiers, (fitting the attenuators in any other position would be detrimental to the noise and/or output power performance of the Cell Enhancer).

4.2.2 Switched Attenuators

The AFL switched attenuators are available in two different types; 0 – 30dB in 2 dB steps, or 0 – 15dB in 1 dB steps (as in this case). The attenuation is simply set using the four miniature toggle switches on the top/side of each unit. Each switch is clearly marked with the attenuation it provides, and the total attenuation in line is the sum of the values switched in. They are designed to maintain an accurate 50Ω impedance over their operating frequency at both input and output and have a low '0dB' insertion loss, typically less than 0.3dB.

4.2.3 Drg. Nō. 10-000901, 0-15dB Switched Attenuator General Assembly Drawing



4.3 Low Noise Amplifiers (11-007302 & 11-007402)

4.3.1 Description

The low noise amplifier used is a double stage solid-state low-noise amplifier. Class A circuitry is used in the unit to ensure excellent linearity over a very wide dynamic range. The two active devices are very moderately rated to provide a long trouble-free working life. There are no adjustments on this amplifier, and in the unlikely event of failure then the entire amplifier should be replaced. Note that the two amplifiers use similar DC/bias circuits.

4.3.2 Technical Specification (11-007302)

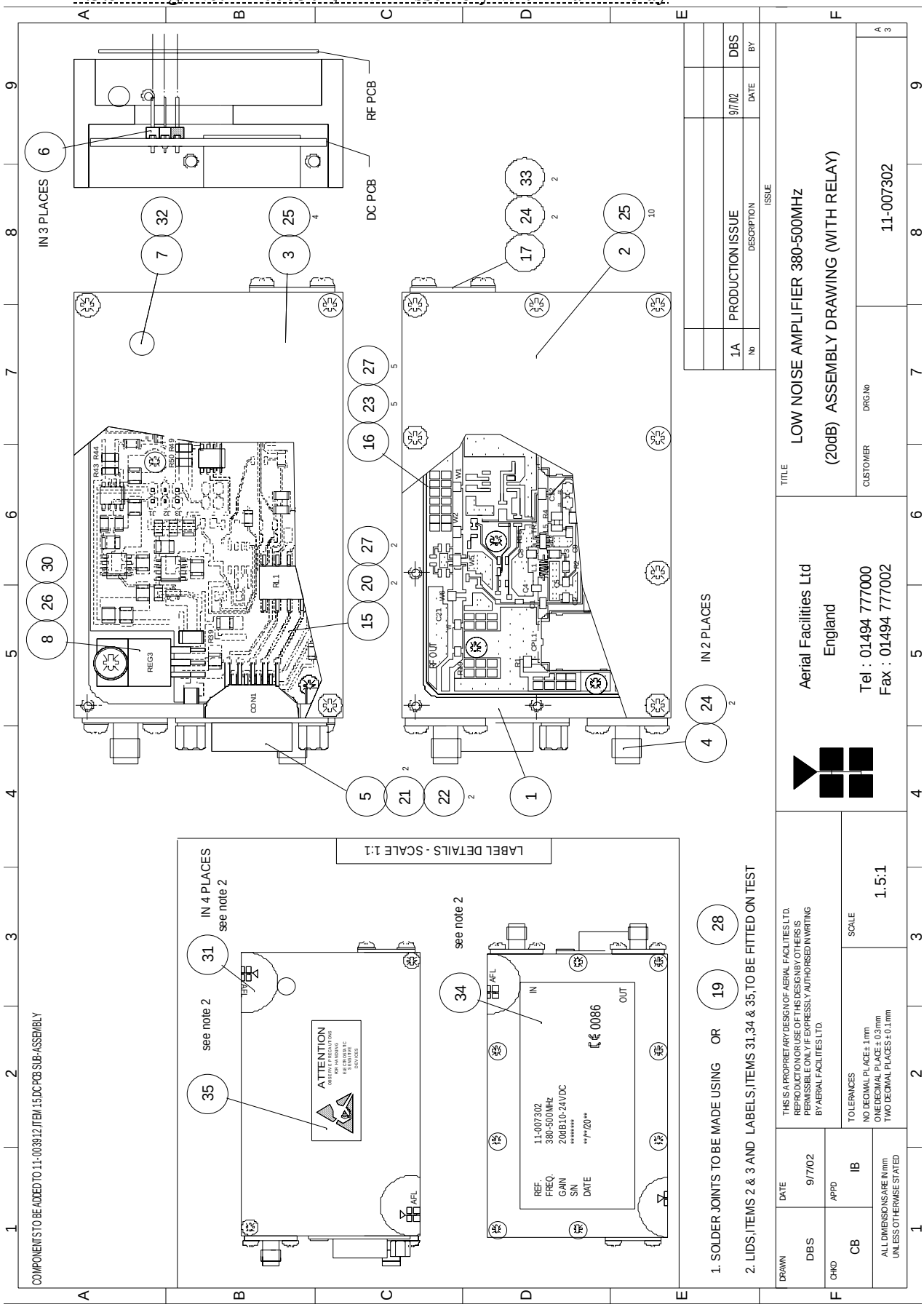
PARAMETER		SPECIFICATION
Frequency range:		380-500MHz
Bandwidth:		<140MHz
Gain:		20-22dB
1dB Compression Point:		+23.5dB (typical)
3rd order intercept:		+36dB (typical)
Input/Output return loss:		>20dB
Noise figure:		<1.3dB
Connectors:		SMA female
Supply:		200-230mA @ 10-24V DC
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		<300gm
Size:		90 x 55 x 30.2 (case only)

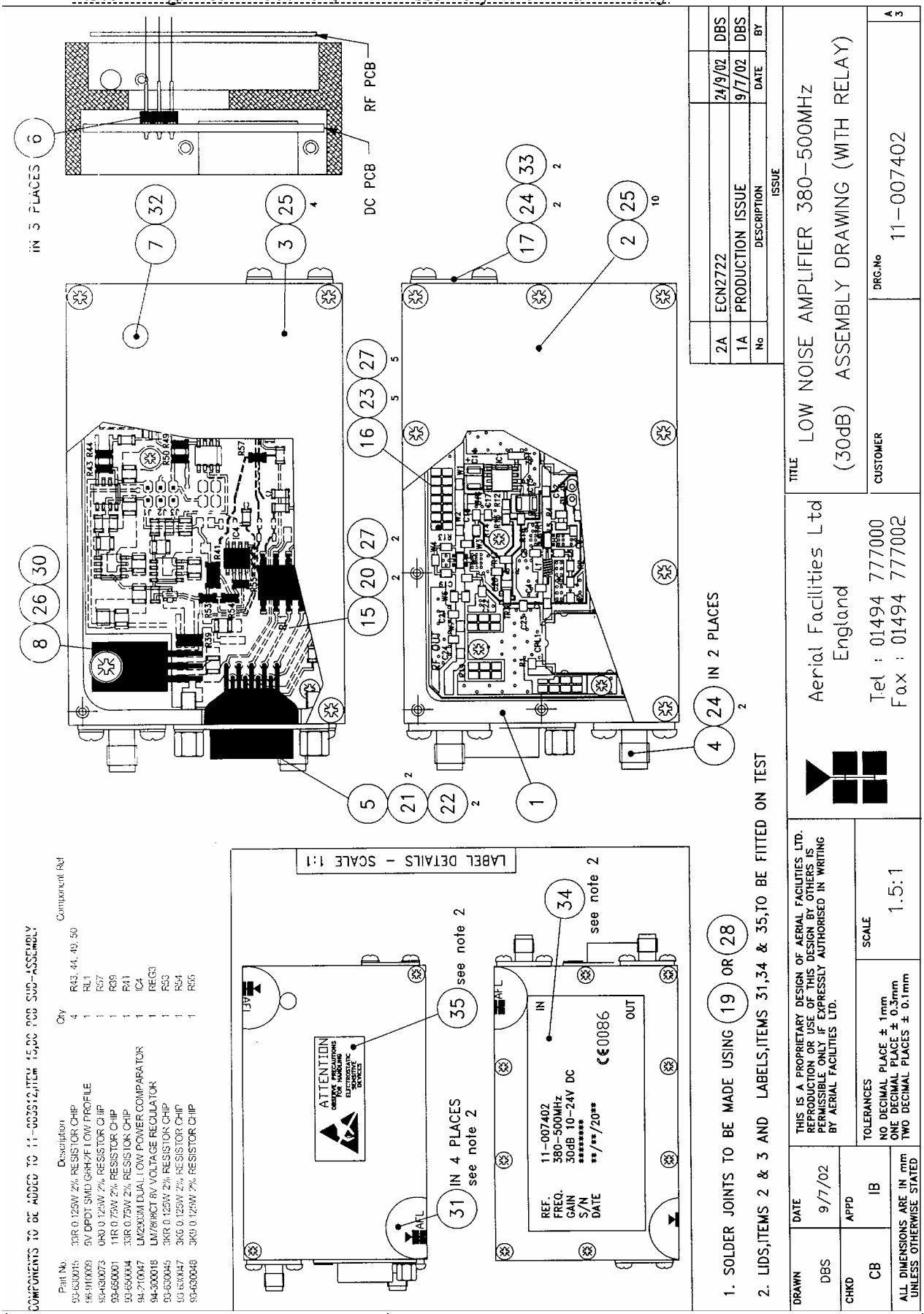
4.3.3 Technical Specification (11-007402)

PARAMETER		SPECIFICATION
Frequency range:		380-500MHz
Bandwidth:		<140MHz
Gain:		30-32dB
1dB Compression Point:		+22dBm (typical)
3rd order intercept:		+34-35dBm (typical)
Input/Output return loss:		>20dB
Noise figure:		<1.3dB
Connectors:		SMA female
Supply:		300-330mA @ 10-24V DC
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		0.38kg
Size:		90 x 55 x 30.2 (case only)

4.3.4 LNA 'D' Connector Pin-out details

Connector pin	Signal
1	+Ve input (10-24V)
2	GND
3	Alarm RelayO/P bad
4	Alarm Relay common
5	Alarm Relay good
6	No connection
7	TTL voltage set
8	TTL alarm/0V (good)
9	O/C good/0V bad


RF PCB
DC PCB
IN 3 PLACES
IN 2 PLACES
IN 4 PLACES
see note 2
LABEL DETAILS - SCALE 1:1
ATTENTION
REF. 11-007302
FREQ. 380-500MHz
GAIN 20dB10-24VDC
S/N *******
DATE **/**/20**
0086
IN
OUT
1. SOLDER JOINTS TO BE MADE USING OR
2. LIDS,ITEMS 2 & 3 AND LABELS,ITEMS 31,34 & 35,TO BE FITTED ON TEST
COMPONENTS TO BE ADDED TO 11-003912,ITEM 15,DC PCB SUB-ASSEMBLY
1A PRODUCTION ISSUE 9/7/02 DBS
No DESCRIPTION DATE BY
ISSUE
TITLE
LOW NOISE AMPLIFIER 380-500MHz
(20dB) ASSEMBLY DRAWING (WITH RELAY)
CUSTOMER
DRG.No
11-007302
A3
Aerial Facilities Ltd
England
Tel : 01494 777000
Fax : 01494 777002
DRAWN DBS DATE 9/7/02
CHKD CB APPD IB
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED
THIS IS A PROPRIETARY DESIGN OF AERIAL FACILITIES LTD. REPRODUCTION OR USE OF THIS DESIGN BY OTHERS IS PERMISSIBLE ONLY IF EXPRESSLY AUTHORISED IN WRITING BY AERIAL FACILITIES LTD.
TOLERANCES
NO DECIMAL PLACE ± 1mm
ONE DECIMAL PLACE ± 0.3mm
TWO DECIMAL PLACES ± 0.1mm
SCALE
1.5:1


IN 3 PLACES
RF PCB
DC PCB
IN 2 PLACES
LABEL DETAILS - SCALE 1:1
ATTENTION
REF. 11-007402
FREQ. 380-500MHz
GAIN 30dB 10-24V DC
S/N ********
DATE **/**/20**
IN
OUT
AFL
see note 2
IN 4 PLACES
see note 2
1. SOLDER JOINTS TO BE MADE USING 19 OR 28
2. LIDS,ITEMS 2 & 3 AND LABELS,ITEMS 31,34 & 35,TO BE FITTED ON TEST
COMPONENTS TO BE ADDED TO 11-003912,ITEM 15,DC PCB SUB-ASSEMBLY
Part No Description Qty Component Ref
93-630015 33R 0.125W 2% RESISTOR CHIP 4 R43, 44, 49, 50
94-1900069 5V DPDT SMD GRH-2F LOW PROFILE 1 RL1
93-630073 0R0 0.125W 2% RESISTOR CHIP 1 R57
93-650001 11R 0.75W 2% RESISTOR CHIP 1 R39
93-650004 33R 0.75W 2% RESISTOR CHIP 1 R41
94-2100047 LM2903M DUAL LOW POWER COMPARATOR 1 IC4
94-3000018 LM78L08ACT 8V VOLTAGE REGULATOR 1 REG3
93-630045 3KR 0.125W 2% RESISTOR CHIP 1 R53
93-630047 3K6 0.125W 2% RESISTOR CHIP 1 R54
93-630048 3K9 0.125W 2% RESISTOR CHIP 1 R55
No DESCRIPTION ISSUE DATE BY
2A ECN2722 24/9/02 DBS
1A PRODUCTION ISSUE 9/7/02 DBS
Aerial Facilities Ltd
England
Tel : 01494 777000
Fax : 01494 777002
TITLE LOW NOISE AMPLIFIER 380-500MHz (30dB) ASSEMBLY DRAWING (WITH RELAY)
CUSTOMER
DRG.No 11-007402
A3
DRAWN DBS DATE 9/7/02
CHKD CB APPD IB
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED
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TOLERANCES
NO DECIMAL PLACE ± 1mm
ONE DECIMAL PLACE ± 0.3mm
TWO DECIMAL PLACES ± 0.1mm
SCALE 1.5:1

4.4 1Watt Low Power Amplifier (11-007901)

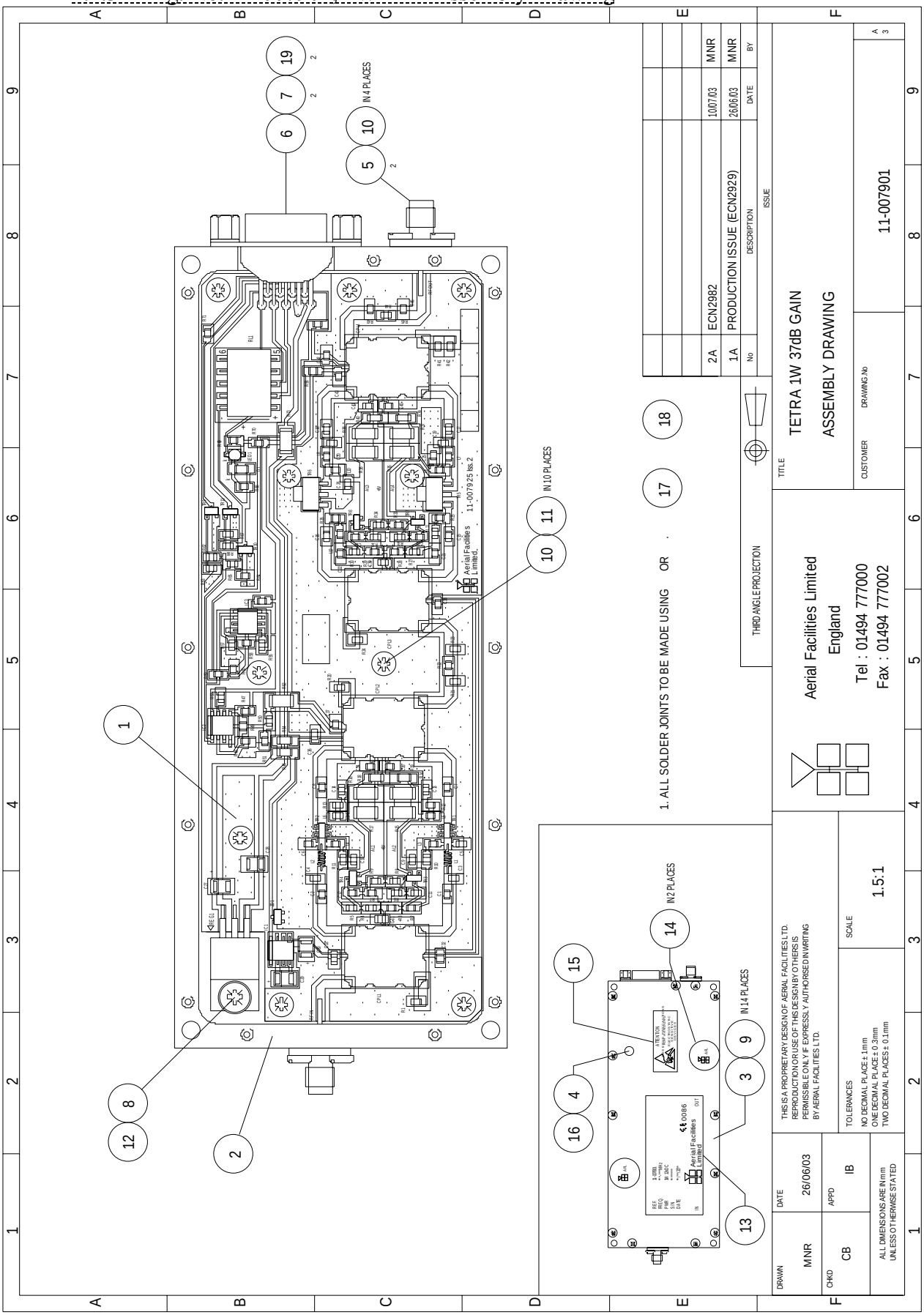
4.4.1 Description

This amplifier is dedicated to be a 1.0 W driver from 380 MHz to 470 MHz. It is a 2 stage amplifier where each stage is in balanced configuration. It demonstrates very high linearity and good input/output VSWR. There is a Current Fault Alarm Function, which indicates failure of each one of the RF transistors by various alarm output options. The amplifier is housed in an aluminium case (Alocrom 1200 finish) with SMA connectors for the RF input/output and a 9way D-type connector for DC and alarm outputs.

4.4.2 Technical Specifications

PARAMETER		SPECIFICATION
Frequency range:		380-470MHz
Small signal gain:		37.5dB
Gain flatness:		±0.5dB
Gain vs. temperature:		1.5dB
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
Input/output return loss:		18dB
Maximum output power:		30.4dBm (@ 1dB comp. point)
OIP3:		43dBm
Supply voltage:		10-15V DC
Current consumption:		780mA (typical)
Noise Figure:		<1.75dB

4.4.3 Drg. Nō. 11-007901, 1W LPA Assembly Drawing



4.5 10W Power Amplifier (12-016302)

4.5.1 Description

This amplifier is a Class A 10W power amplifier from 380MHz to 470MHz in a 1 stage balanced configuration. It demonstrates a very high linearity and a very good input/output return loss (RL). It has built in a Current Fault Alarm Function.
Its housing is an aluminium case (Alocrom 1200 finish) with SMA connectors for the RF input/output and a D-Type connector for the power supply and the Current Fault Alarm Function.

4.5.2 Technical Specification

PARAMETER		SPECIFICATION
Frequency range:		380-470MHz
Small signal gain:		22.8dB
Gain flatness:		±1.5dB
I/O Return loss:		>18dB
1dB compression point:		+40.5dBm
OIP3:		+53dBm
Supply voltage:		24V DC
Supply current:		2.5Amps (Typical)
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		<2kg (no heatsink)

4.6 Wide Dynamic Range AGC (17-001105, Det. & 17-001201, Atten.)

4.6.1 Description

The equipment is fitted with a wide dynamic range Automatic Gain Control (AGC) system. This is generally fitted in the Uplink path (not usually needed in the downlink path, as the signal here is at an almost constant level), to avoid overloading the amplifiers (with the associated performance degradation) should a mobile be operated very close to the unit.

The AFL wide dynamic range Automatic Gain Control system consists of two units, a detector/amplifier and an attenuator. The detector/amplifier unit is inserted in the RF path on the output of the power amplifier, and the attenuator is situated in the RF path between the 1st and 2nd stages of amplification.

Normally the attenuator is at minimum attenuation. The detector/amplifier unit monitors the RF level being delivered by the power amplifier, and when a certain threshold is reached it begins to increase the value of the attenuator to limit the RF output to the (factory set) threshold. Therefore overloading of the power amplifier is avoided.

The factory set threshold is 1dB below the Enhancer 1dB compression point. Some adjustment of this AGC threshold level is possible, a 10dB range is mostly achieved. It is not recommended under any circumstances to adjust the AGC threshold to a level greater than the 1dB compression point as system degradation will occur.

The detector comprises of a 50Ω transmission line with a resistive tap which samples a small portion of the mainline power. The sampled signal is amplified and fed to a conventional half wave diode rectifier, the output of which is a DC voltage proportional to the RF input signal.

This DC voltage is passed via an inverting DC amplifier with integrating characteristics, to the output, which drives the attenuation control line of the corresponding AGC attenuator. This unit is fitted at some earlier point in the RF circuit.

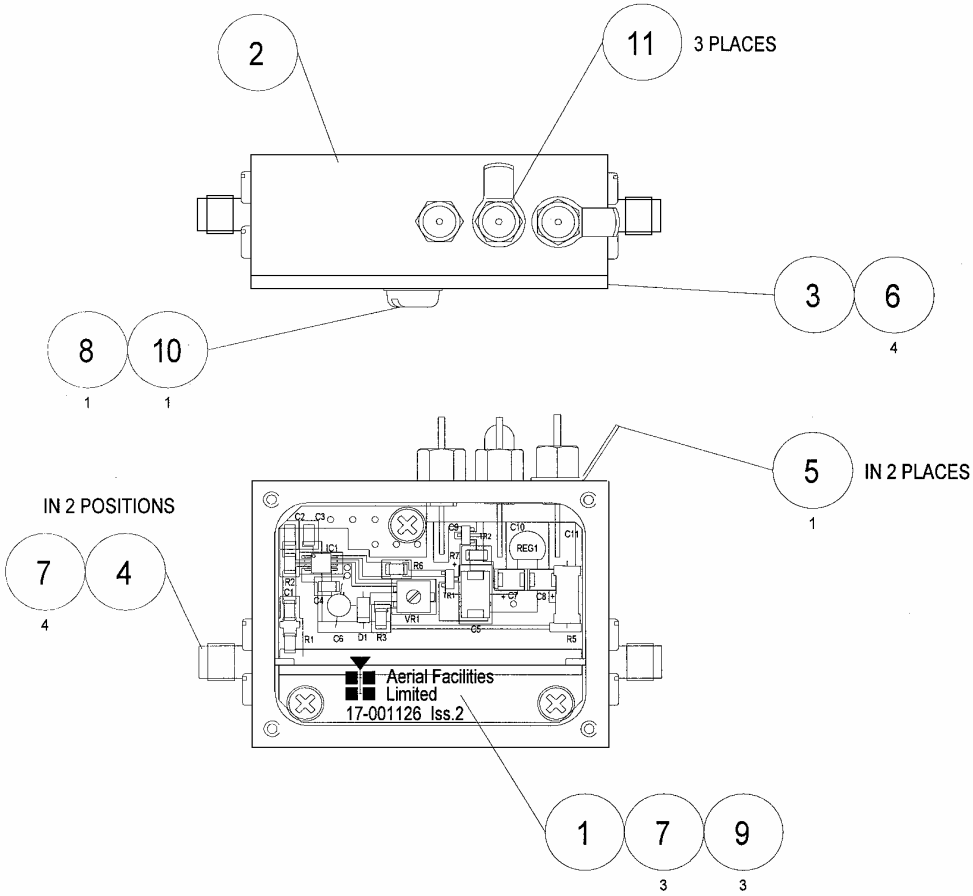
The unit contains a 12V DC regulator in the detector module, which supplies stabilised voltage to the DC amplifier and via an external cableform to the AGC attenuator.

For small signals, below AGC onset, the output control line will be close to 12V and the AGC attenuator will have minimum attenuation. As the signal level increases the control line voltage will fall, increasing the attenuator value and keeping the system output level at a constant value.
The AGC onset level is adjusted by the choice of sampler resistor R1 and by the setting of potentiometer VR1, (factory set @ time of system test) do not adjust unless able to monitor subsequent RF levels.
The attenuator comprises a 50Ω P.I.N diode, voltage-variable attenuator with a range of 3 to 30dB. The attenuation is controlled by a DC voltage which is derived from the associated AGC detector unit.

4.6.2 Technical Specification

PARAMETER		SPECIFICATION
Frequency Range:		up to 1000MHz
Attenuation Range:		3 to 30dB
Attenuation Steps:		continuously variable
VSWR:		better than 1.2:1
RF Connectors:		SMA female
Power Handling:	attenuator:	1W
	detector/amp:	>30W (or as required)
Temperature Range:	operation:	-10°C to +60°C
	storage:	-20°C to +70°C
Size:	attenuator (pcb)	50 x 42 x 21mm
	Detector (pcb)	54 x 42 x 21mm
Weight:	attenuator:	90grams
	detector/amp:	100grams

4.6.3 Drg. Nō. 17-001105, ACG Detector Assembly



SOLDERING TO BE COMPLETED USING ITEMS 13 & 14

FIT ITEMS 12 TO COVER 2 LID FIXING SCREWS; ITEM 6

No	DESCRIPTION	DATE	BY
3A	ECN2741	18/10/02	MNR
2A	ECN2638	10/6/02	DJL
1A	PRODUCTION ISSUE(ECN2361)	20/11/01	TAS

ISSUE

THIRD ANGLE PROJECTION

Aerial Facilities Limited
Tel : 01494 777000 Fax : 01494 777002

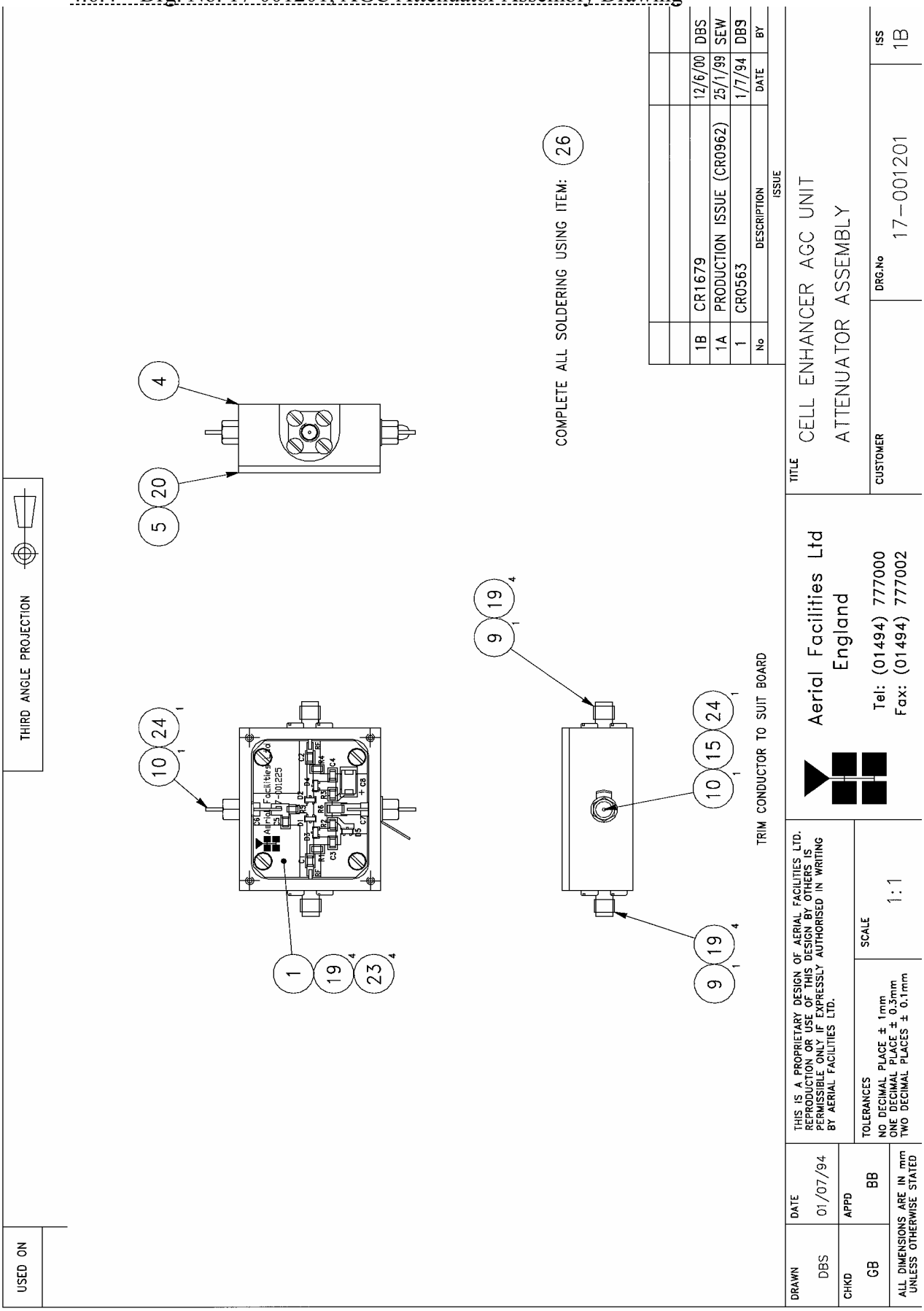
TOLERANCES

NO DECIMAL PLACE ± 1mm
ONE DECIMAL PLACE ± 0.3mm
TWO DECIMAL PLACES ± 0.1mm

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

TITLE: CELL ENHANCER AGC UNIT LOG DETECTOR AMPLIFIER ASSEMBLY

DRAWN	DATE	CHKD	APPD	SCALE	CUSTOMER	DRAWING No	A
TAS	20/11/01	DS	BB	1:1		17-001105	4


THIRD ANGLE PROJECTION
USED ON
COMPLETE ALL SOLDERING USING ITEM: 26
TRIM CONDUCTOR TO SUIT BOARD
1B CR1679 12/6/00 DBS
1A PRODUCTION ISSUE (CR0962) 25/1/99 SEW
1 CR0563 1/7/94 DBS
No DESCRIPTION DATE BY
ISSUE
TITLE CELL ENHANCER AGC UNIT
ATTENUATOR ASSEMBLY
CUSTOMER
DRG.No 17-001201
ISS 1B
Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002
DRAWN DBS DATE 01/07/94
CHKD GB APPD BB
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TWO DECIMAL PLACES ± 0.1mm
SCALE 1:1
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

4.7 24V Single Relay Board (80-008901)

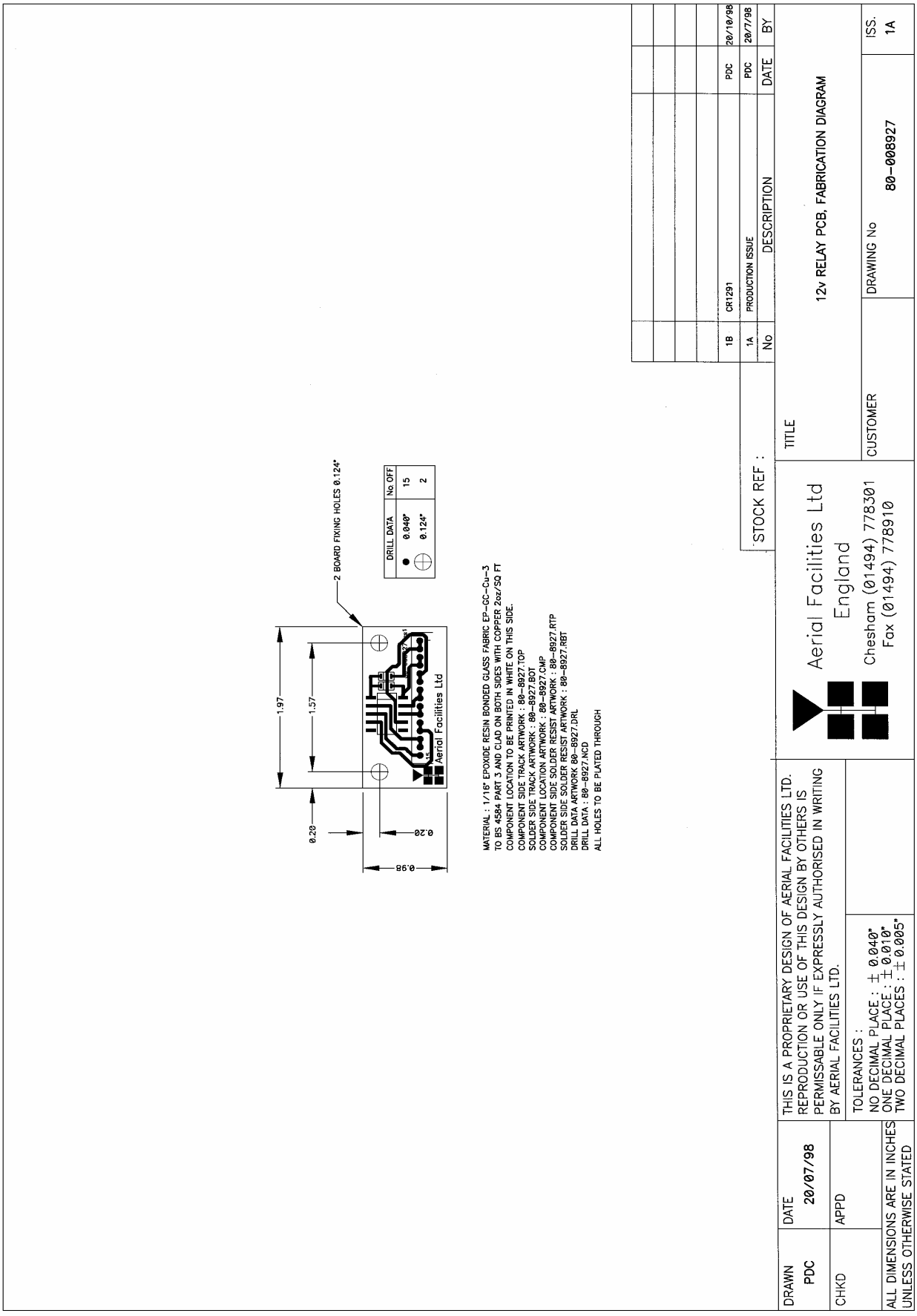
4.7.1 Description

The General Purpose Relay Board allows the inversion of signals and the isolation of circuits. It is equipped with a single dual pole change-over relay RL1, with completely isolated wiring, accessed via a 15 way in-line connector.

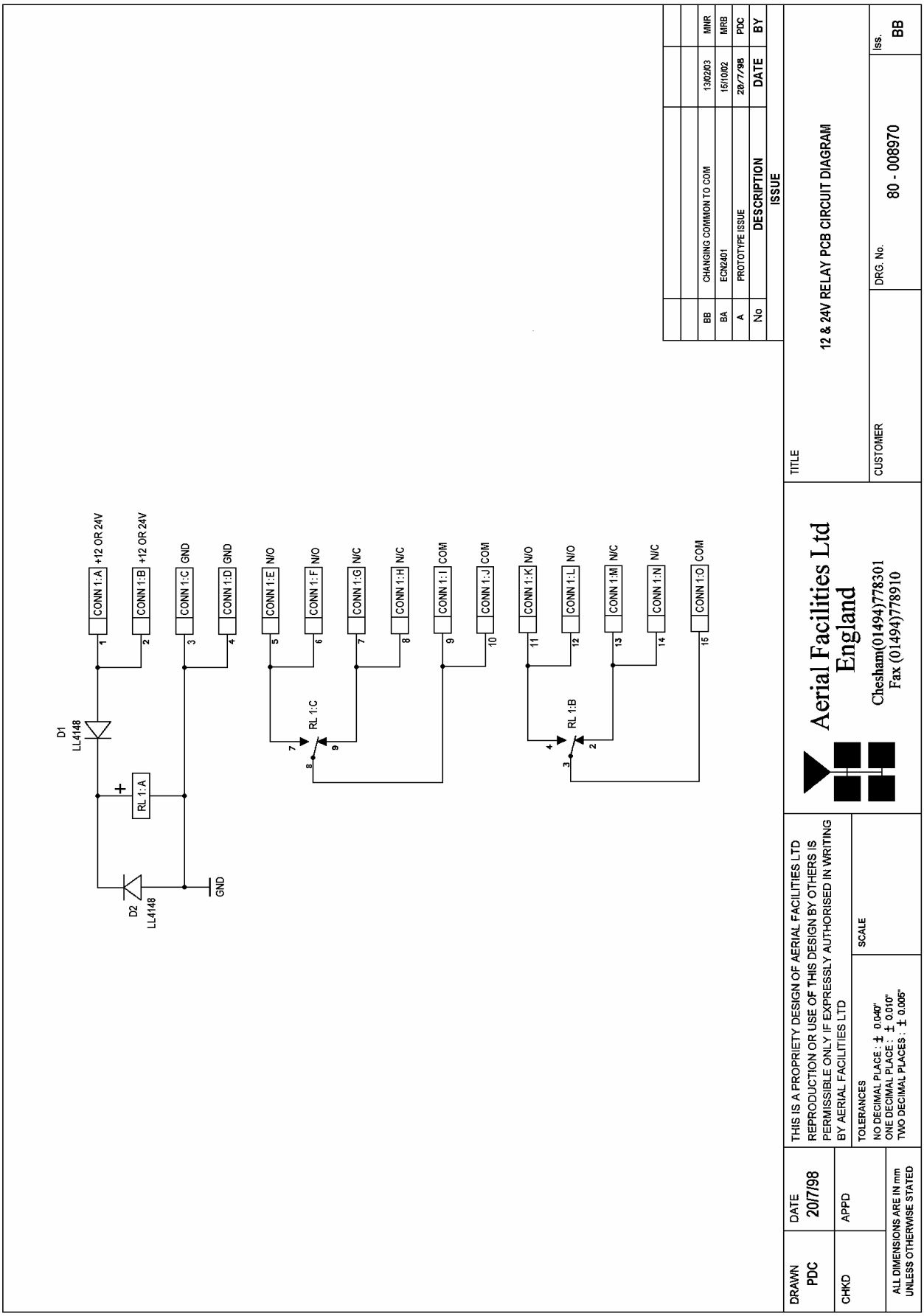
The relay is provided with polarity protection diodes and diodes for suppressing the transients caused by "flywheel effect" which can destroy switching transistors or induce spikes on neighbouring circuits. It's common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

Note that the board is available for different voltages (12 or 24V) depending on the type of relay fitted at RL1.

4.7.2 12V Relay PCB Fabrication Drawing



4.7.3 12V Relay Board Circuit Diagram



4.8 DC/DC Converter, 24V in, 12V 8A out (13-003011)

4.8.1 Description

The DC/DC converter fitted is a high power modular unit with a 5 amp @ 12V output capability. The circuit is basically an O.E.M semiconductor regulator (one side of which has a heatsink mounting plate, usually bolted to the casing of a Cell Enhancer/rack shelf) with screw block terminations.
Note: no circuit diagram of the O.E.M. regulator is available. This unit should not be repaired, only replaced.

4.8.2 Technical Specification

PARAMETER		SPECIFICATION
Input Voltage Range:		18-36V DC
Output Voltage:		12V±0.5V
Max. Current Load:		5.0Amps (100Watts)
Temperature range:	operation :	-10°C to +60°C
	storage:	-20°C to +70°C
Size(PCB):		190 x 63mm
Weight:		300gms

4.9 JWS150-24/A PSU (96-300060)

4.9.1 Description

The power supply unit is a switched-mode type capable of supplying 24V DC at 6.25Amps continuously. Equipment of this type typically requires approximately 2-2.5Amps at 24V DC, so the PSU will be used conservatively ensuring a long operational lifetime.

No routine maintenance of the PSU is required. If a fault is suspected, then the output voltage from the power supply may be measured on its output terminals. This is typically set to 24.5V. The output voltage may be varied using a multi-turn adjustment potentiometer mounted close to the DC output terminals.

All the PSU's used in AFL Cell Enhancers are capable of operation from either 110 or 220V nominal AC supplies. The line voltage is sensed automatically, so no adjustment or link setting is needed by the operator.

4.9.2 Technical Specification

AC Input Supply:	
Voltage:	110 or 220V nominal
	90 to 132 or 180 to 264V (absolute limits)
Frequency:	47 to 63Hz
DC Output Supply:	
Voltage:	24V DC (nominal)
	22 to 26V (absolute limits)
Maximum current:	6.25A (150Watts)

5. INSTALLATION

5.1 Initial Installation Record

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

5.2 Installation & Attenuator Settings

The UHF Fibre Optic System comprises a remote site fibre driven 10Watt bi-direction amplifier. It is fed from a fibre optic tray which links to the master site fibre optic tray via a single fibre optic cable. The Tx and Rx signals use different optical frequencies and are coupled using wave division multiplexers (WDMs). The three BDA will feed either an omni-directional antenna or leaky feeders to provide UHF radio coverage in areas where signal levels and reception from the BTS are poor and in which the mobiles are to be served.

The duplexer, fibre optic and BDA trays are all designed to be mounted in standard 19" equipment racks.

The maximum output from the BDAs is limited by built-in AGC circuits. The gain in both the downlink and the uplink paths can be adjusted using switched attenuators which can be accessed from the rear panels of the BDA trays. The master site is also fitted with attenuators which control the signal levels to and from the master site fibre optic tray. All switched attenuators are switched to maximum attenuation prior to despatch.

The downlink attenuator in the master site should be adjusted so that -14dBm is available from the downlink connector when one channel is being driven at maximum power by the BTS. The uplink attenuator in the master site should be adjusted so that an input signal to the uplink connector of -5dBm will provide a maximum signal to the coupler of -20dBm.

The downlink attenuator on the 10W BDA should be adjusted so that an input signal of -10dBm provides an output to the antenna connector of +25dBm. The uplink attenuator on the 10W BDA should be adjusted so that an input signal of -50dBm will provide an output of 0dBm to the Uplink F/O Tray connector.