3. MASTER SITE 60-212701

The Master Site Shelf is a 3U Rack mount shelf and provides two separate RF paths, uplink and downlink with provision to vary the gain of either path using a switched variable attenuator, one in each path. The active Fibre Optic modules in the unit are powered from an internal 12V PSU which runs from a mains feed of 110V AC

The downlink signal is received from the antenna and enters the master site via the port labelled “TX”, the signal passes through a switched variable attenuator (10-000801) providing up to 30dB of attenuation 2dB steps. After leaving the attenuator the signal is split into two equal paths by a 3dB splitter/combiner (05-002603) and each path is passed into a Fibre Optic Transmitter (20-005401) where the signal is modulated onto a laser as an optical signal for transmission to the remote site via fibre optic cable. The fibre optic signal leaves the master site via the ports labelled “F/O DL” (Fibre Optic Downlink). Only one “F/O DL” port is used, the second one being available for future expansion.

Uplink signals are received at the master site as optical signals sent from the remote site, the fibre optic cable carrying the optical signals enter the master site via the ports labelled “F/O UL” (Only one “F/O UL” port is used, the second one being available for future expansion). Upon entering the master site the optical signal is passed to a fibre optic receiver (20-005501) where the signal is demodulated into an RF signal. After leaving the fibre optic receivers the two RF signal paths are combined by a 3dB splitter/combiner (05-002603) to produce a single path which then passes through a switched variable attenuator (10-000701) providing up to 30dB of attenuation 2dB steps. After leaving the attenuator the RF signal leaves the master site via the port labelled “RX”

3.1. 60-212701 Parts List (Major Components)

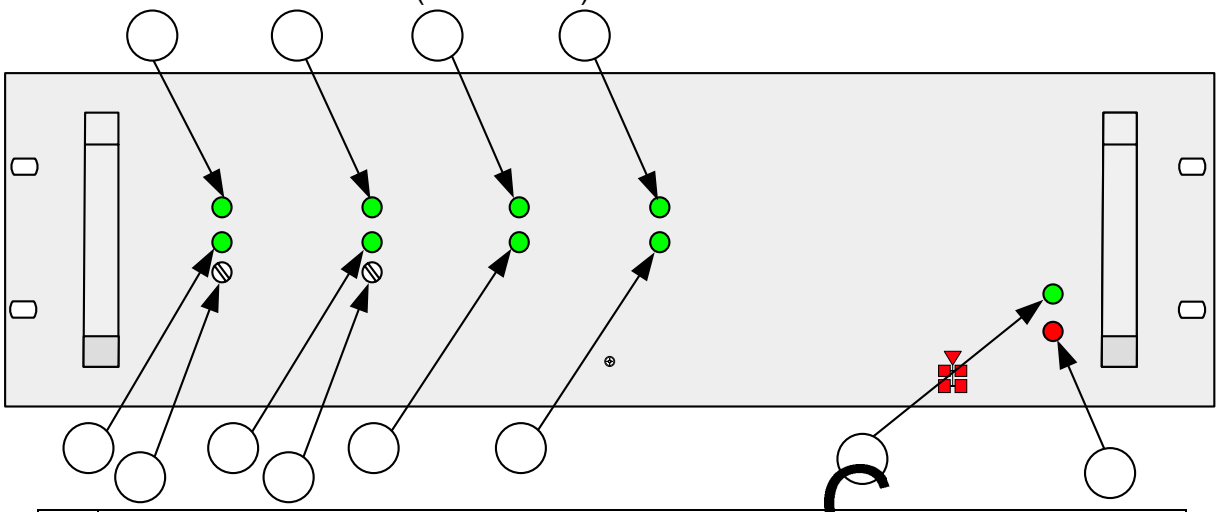
Component Part	Component Part Description	Qty Per Assembly
05-002603	UHF 3dB Splitter/Combiner	2
10-000701	Switched Attenuator 0-30dB 0.25W	1
10-000801	Switched Attenuator 0-30dB 1W	1
20-005401	Fibre Optic Transmitter (2.7GHz)	1
20-005501	Fibre Optic Receiver (2.7GHz)	1
80-008901	12V Relay Assembly	1
96-300048	PSU 50W (12V 5A)	1
96-920022	Circuit Breaker (3A)	1

The individual fibre optic TX and RX units are fitted with a pair of status indicators on their front panels. One is a green LED, which indicates that the unit is connected to a 12 Volt DC power supply. This indicator is common to both transmit and receive units. The second LED on the TX module indicates that the laser is operating (transmitting). On the RX unit the second LED indicates that a laser-light signal is being received.

When all the fibre connections are completed and power to each site is connected each fibre unit must show two illuminated indicators.

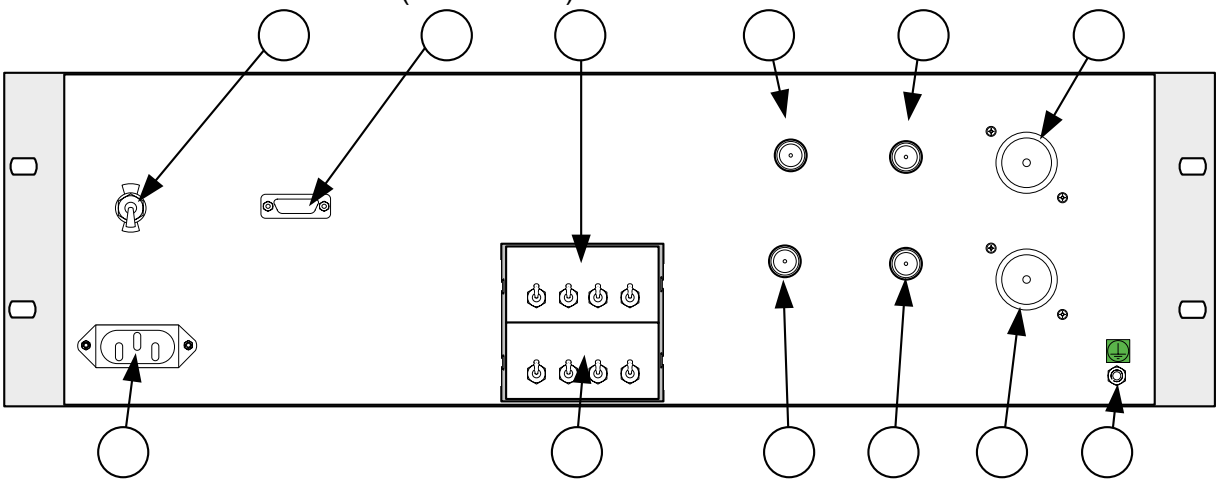
3.2. 60-212701 Diagrams

Master Site 60-212701 Front Panel (Not to scale)



A	Green LED “Power On”
B	Red LED “Alarm”
C	Green LED Fibre Optic Receiver 1 “Power On”
D	Green LED Fibre Optic Receiver 1 “Laser On”, LED not illuminated = Alarm
E	Fibre Optic Receiver 1 Gain Adjust
F	Green LED Fibre Optic Receiver 2 “Power On”
G	Green LED Fibre Optic Receiver 2 “Laser On”, LED not illuminated = Alarm
H	Fibre Optic Receiver 2 Gain Adjust
I	Green LED Fibre Optic Transmitter 1 “Power On”
J	Green LED Fibre Optic Transmitter 1 “Laser On”, LED not illuminated = Alarm
K	Green LED Fibre Optic Transmitter 2 “Power On”
L	Green LED Fibre Optic Transmitter 2 “Laser On”, LED not illuminated = Alarm

Master Site 60-212701 Rear Panel (Not to scale)



A	RX Port – Uplink RF out to antenna	G	Earth connection
B	Fibre Optic input 2 (uplink from remote site)	H	Uplink Switched Attenuator
C	Fibre Optic input 1 (uplink from remote site)	I	Downlink Switched Attenuator
D	TX Port – Downlink RF in from antenna	J	Alarm Output
E	Fibre Optic output 2 (downlink to remote site)	K	AC Trip Switch
F	Fibre Optic output 1 (downlink to remote site)	L	AC input (110V)

3.4. 60-212701 Major Sub Components

3.4.1. UHF 3dB Splitter/Combiner (05-002603)

The 3dB Splitter/Combiner (05-002603) is a device for accurately matching two RF signals to a single port or splitting an RF signal to two ports whilst maintaining an accurate 50 load to all inputs/outputs and ensuring that the VSWR and insertion losses are kept to a minimum.

05-002603 Specification

PARAMETER		SPECIFICATION
Frequency range		380 - 520 MHz
Bandwidth		140 MHz
Ports	As Combiner	2 inputs 1 output
	As Splitter	1 input 2 outputs
Insertion loss		3.5 dB (typical)
Isolation		>18 dB
Return Loss (VSWR) – Input		Better than 1.3:1
Return Loss (VSWR) – Output		Better than 1.3:1
Impedance		50 ς
Power Rating – Combiner		0.5 Watt
Power Rating – Splitter		20 Watts
Connectors		SMA female
Size		54 x 44 x 21 mm
Weight		200 gm (approximately)

3.4.2. Switched Attenuator 0-30dB 0.25W (10-000701)

10-000701 provides attenuation from 0 - 30dB in 2 dB steps, the attenuation is simply set using the four miniature toggle switches on the top 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.

10-000701 Specification

PARAMETER		SPECIFICATION
Attenuation Values		0-30dB
Attenuation Steps		2, 4, 8 and 16dB
Power Handling		0.25 Watt
Attenuation Accuracy		± 1.0 dB
Frequency Rang		DC to 1GHz
Impedance		50Ω
Connectors		SMA
VSWR		1.3:1
Weigh		0.2kg
Temperature range	operation	-20°C to +60°C
	storage	-40°C to +70°C

3.4.3. Switched Attenuator 0-30dB 1W (10-000801)

10-000801 provides attenuation from 0 - 30dB in 2 dB steps, the attenuation is simply set using the four miniature toggle switches on the top 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.

10-000801 Specification

PARAMETER		SPECIFICATION
Attenuation Values		0-30dB
Attenuation Steps		2, 4, 8 and 16dB
Power Handling		1 Watt
Attenuation Accuracy		± 1.0 dB
Frequency Rang		DC to 1GHz
Impedance		50Ω
Connectors		SMA
VSWR		1.3:1
Weigh		0.2kg
Temperature range	operation	-20°C to +60°C
	storage	-40°C to +70°C

3.4.4. Fibre Optic Transmitter (2.7GHz) (20-005401)

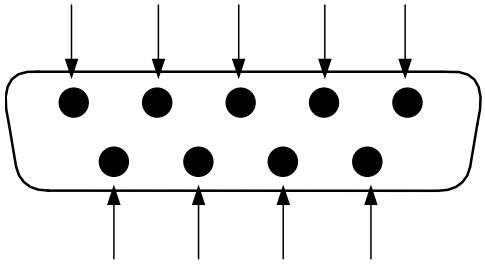
The transmitter modulates the RF signal on to a laser, which is then transmitted over a fibre optic cable to a receiver. The laser current is monitored and compensated for constant optical out put power against temperature variation and aging. Laser over-current alarm function is provided as LED output as well as open collect and voltage-free relay contacts on 9 way D-type connector.

20-005401 specification

PARAMETER	SPECIFICATION
Frequency Range (RF path)	70 - 3000 MHz
Frequency Range (Data path)	20 – 35 MHz
Available Link Gain (RF Path)	18 dB
Link Gain (DATA Path)	0 dB
Gain Flatness (entire frequency range)	±1.5 dB p-p
ΔGain vs. Temperature -20 to 70 ºC	3.5 dB
Gain adjustment range (RF Path)	30 dB
In/Out Return Loss (RF path)	10 dB Min
Output IP3 @ max gain *	37 dBm
In/Output IP3 @ 0dB Gain *	33 dBm
RF impedance	50 Ohm
Noise Figure @ 0dB gain (400MHz)	36 dB
Optical Transmit Power	2.7±0.3 dBm
Optical return loss	>50 dB
Received Power Alarm Threshold	-10 dBm(optic)
Optical wavelength	1310 nm
DC Supply Voltage	10-12 Vdc
DC Supply Current	120 mA
Operating Temperature	-20 to 70 ºC
Storage Temperature	-30 to 85 ºC
RF Connector type	SMA
Fibre optic connector type	FC/APC

Fibre Optic Transmitter (20-005401) 'D' Type Female Connector Pinouts

Pin No.	Signal Description
1	+10-12V DC Power
2	0V DC, Power Ground
3	0V DC, Power Ground
4	No Connection
5	No Connection
6	TTL Alarm, (0V=good, open coll.= fail)
7	Relay Alarm Contact (N.C)
8	Relay Alarm Contact (Common)
9	Relay Alarm Contact (N.O)



3.4.5. Fibre Optic Receiver (2.7GHz) (20-005501)

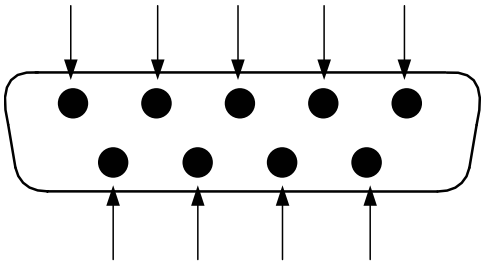
The receiver demodulates RF signals from the laser with a typical gain of 18dB and with 30dB adjustability in the RF domain. The received optical power is monitored for alarm function in case of fibre damage.

20-005501 Specification

PARAMETER	SPECIFICATION
Frequency Range (RF path)	70 - 3000 MHz
Frequency Range (Data path)	20 – 35 MHz
Available Link Gain (RF Path)	18 dB
Link Gain (DATA Path)	0 dB
Gain Flatness (entire frequency range)	±1.5 dB p-p
ΔGain vs. Temperature -20 to 70 ºC	3.5 dB
Gain adjustment range (RF Path)	30 dB
In/Out Return Loss (RF path)	10 dB Min
Output IP3 @ max Gain	37 dBm
In/Output IP3 @ 0dB Gain	33 dBm
RF impedance	50 Ohm
Noise Figure @ 0dB gain (400MHz)	36 dB
Optical Transmit Power	2.7±0.3 dBm
Optical return loss	>50 dB
Received Power Alarm Threshold	-10 dBm(optic)
Optical wavelength	1310 nm
DC Supply Voltage	10-12 Vdc
DC Supply Current	350 mA
Operating Temperature	-20 to 70 ºC
Storage Temperature	-30 to 85 ºC
RF Connector type	SMA
Fibre optic connector type	FC/APC

Fibre Optic Receiver (20-005501) 'D' Type Female Connector Pinouts

Pin No.	Signal Description
1	+10-12V DC Power
2	0V DC, Power Ground
3	0V DC, Power Ground
4	No Connection
5	No Connection
6	TTL Alarm, (0V=good, open coll.= fail)
7	Relay Alarm Contact (N.C)
8	Relay Alarm Contact (Common)
9	Relay Alarm Contact (N.O)



3.4.6. 12V Relay Assembly (80-008901)

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. Its common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

80-008901 Specification

PARAMETER		SPECIFICATION
Operating voltage		8 to 30V (floating earth)
Alarm threshold		Vcc - 1.20 volt +15%
Alarm output relay contacts		
Max. switch current		1.0Amp
Max. switch volts		120Vdc/60VA
Max. switch power		24W/60VA
Min. switch load		10.0µA/10.0mV
Relay isolation		1.5kV
Mechanical life		>2x10^7 operations
Relay approval		BT type 56
Connector details		Screw terminals
Temperature range	operational	-10°C to +60°C
	storage	-20°C to +70°C

3.4.7. PSU 50W (12V 5A) (96-300048)

The power supply unit is a switched-mode type capable of supplying 12V DC at 5Amps continuously. 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 12.2V. The adjustment potentiometer will be found close to the DC output terminals.

All the PSUs 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.

96-300048 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:	12V DC (nominal)
	10.5-13.8V (absolute limits)
Current:	5.0A

4. REMOTE SITE 60-212801

The Remote Site 60-212801 is composed of two rack mount chassis, one containing the filtering, and amplification modules along with the fibre optic transmitter and receiver (60-212802), the second tray is a 100 W amplifier (80-245101), part of the Downlink signal path.

60-212801 sub components

section	Component Part	Component Part Description	Qty Per Assembly
4.1.	80-245101	100W Linearised Amplifier	1
4.2.	60-212802	Remote Uplink/Downlink Tray	1

4.1. 100W Linearised Amplifier (80-245101)

100W Linearised Amplifier (80-245101) shelf is a Class A 100W TETRA Linearised Class A amplifier where 4 linearised power amplifiers are combined together in a 'phased-parallel' arrangement. Its housing is a 4U 19" Rack-mount shelf with SMA connectors for the RF input/output, 2 D-Type connectors for the alarm function and 2 DC connectors with fuses for the 24 DC supplies. Cooling is effected by fans mounted on the front panel.

It has a built in Current Fault Alarm Function with the four amplifiers in two summary alarm paths. The summary alarm on 'D' connector 'A' will show an alarm for the two amplifiers mounted on the top of the shelf (amplifier pair "A"). The summary alarm on 'D' connector 'B' will show an alarm for the two amplifiers mounted at the bottom of the shelf (amplifier pair "B")

4.1.1. 80-245101 Specification

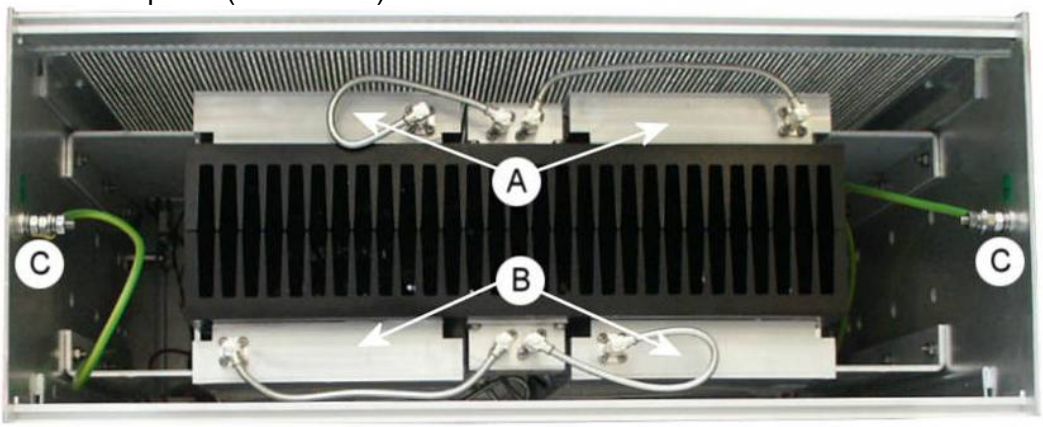
PARAMETER		SPECIFICATION
Frequency range:		440-500MHz
Small signal gain:		37dB
Gain flatness:		±0.5dB
I/O Return loss:		>18dB
1dB compression point:		+50dBm
OIP3:		+69dBm
Supply voltage:		24V DC (x2)
Supply current:		18-19Amps
Impedance:		50Ω
Environmental protection rating:		IP44
Temperature range	operational:	-10°C to +60°C
	storage:	-40°C to +70°C
Weight:		<5kg

4.1.2. 80-245101 Parts List (Major Components)

AFL Part No.	Part Description	Qty.
05-002603	UHF 3dB Splitter/Combiner	6
12-026902	25W Linearised Amplifier Module	4
80-008902	24V Relay PCB Assembly	2
96-400002	Cooling Fan	4

4.1.3. 80-245101 Photographs

100W Linearised Amplifier (80-245101) rear view



A	Amplifier pair “A”
B	Amplifier pair “B”
C	Earthing connections

100W Linearised Amplifier (80-245101) front view

A	Green LED “Power On” Amplifier pair “A”	H	Green LED “Power On” Amplifier pair “B”
B	Red LED “Alarm” Amplifier pair “A”	I	Red LED “Alarm” Amplifier pair “B”
C	RF input from 60-212802	J	RF output to 60-212802
D	Alarm output Amplifier pair “A”	K	Alarm output Amplifier pair “B”
E	DC input Amplifier pair “A”	L	DC input Amplifier pair “B”
F	Fuse holder Amplifier pair “A”	M	Fuse holder Amplifier pair “B”
G	Earth connection for 80-245101	N	Cooling fans

4.1.6. 80-245101 Major Sub Components

4.1.6.1. 25W Linearised Amplifier Module (12-026902)

Linearised Power Amplifier (12-026902) is a multi-stage, solid state power amplifier. Class A circuitry is employed throughout the device to ensure excellent linearity over a wide dynamic frequency range. All the semi-conductor devices are very conservatively rated to ensure low device junction temperatures and a long, trouble free working lifetime.

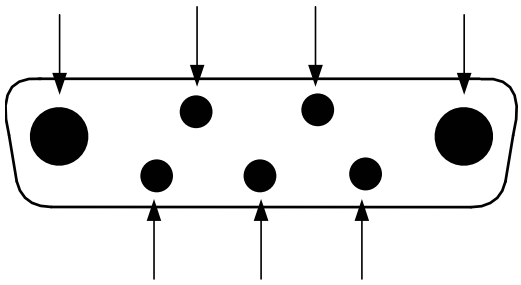
The power amplifier should require no maintenance over its operating life. Under no circumstances should the cover be removed or the side adjustments disturbed unless it is certain that the amplifier has failed; since it is critically aligned during manufacture and any re-alignment will require extensive test equipment. The module housing is an aluminium case (Iridite NCP finish) with SMA connectors for the RF input/output and a D-Type connector for the power supply and the Current Fault Alarm Function.

12-026902 Specification

PARAMETER		SPECIFICATION
Frequency range:		440-500MHz (tuned to spec.)
Bandwidth:		<60MHz (typical)
Maximum RF output:		>25Watt
Small signal gain:		37.5dB (typical)
1dB compression point:		+44dBm
3rd order intercept point:		+61dBm
Noise figure:		N/A
Return input loss:		>15dB
Return output loss:		>15dB
VSWR:		better than 1.5:1
Connectors:		SMA female
Supply:		4.6Amps @ 24V DC
Temperature range:	operation:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		1.5 kg

PA 7-Way Connector Pin-outs

Connector Pin	Signal
A1 (large pin)	+24V DC
A2 (large pin)	GND
1	Alarm relay common
2	TTL alarm/0V good
3	Alarm relay contact (bad)
4	Alarm relay contact (good)
5	O/C good/0V bad (TTL)



4.1.6.2. UHF 3dB Splitter/Combiner (05-002603)

The 3dB Splitter/Combiner (05-002603) is a device for accurately matching two RF signals to a single port or splitting an RF signal to two ports whilst maintaining an accurate 50□ load to all inputs/outputs and ensuring that the VSWR and insertion losses are kept to a minimum.

05-002603 Specification

PARAMETER		SPECIFICATION
Frequency range		380 - 520 MHz
Bandwidth		140 MHz
Ports	As Combiner	2 inputs 1 output
	As Splitter	1 input 2 outputs
Insertion loss		3.5 dB (typical)
Isolation		>18 dB
Return Loss (VSWR) – Input		Better than 1.3:1
Return Loss (VSWR) – Output		Better than 1.3:1
Impedance		50 ς
Power Rating – Combiner		0.5 Watt
Power Rating – Splitter		20 Watts
Connectors		SMA female
Size		54 x 44 x 21 mm
Weight		200 gm (approximately)

4.1.6.3. 24V Relay PCB Assembly (80-008902)

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 screw terminals.

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

80-008902 Technical Specification

Parameter		Specification
Max. switch current		1.0Amp
Max. switch volts		120Vdc/60VA
Max. switch power		24W/60VA
Min. switch load		10.0µA/10.0mV
Relay isolation		1.5kV
Mechanical life		>2x10^7 operations
Relay approval		BT type 56
Connector details		15-way 0.1" pitch
Temperature range	operational	-10°C to +55°C
	storage	-40°C to +70°C

4.2. Remote Uplink/Downlink Shelf (60-212802)

The Remote Uplink/Downlink Shelf is an 8U Rack mount shelf and provides two separate RF paths, uplink and downlink with provision to vary the gain of either path using a switched variable (0 to 30dB) attenuator, one in each path. Each path is also fitted with an Automatic Gain Control (AGC) circuit which consists of two units, a detector/amplifier and an attenuator. Normally the attenuators in the AGC circuit are 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 amplifiers is avoided.

The downlink signal is received from the master site as an optical signal which is demodulated into an RF signal. The RF signal is then passed through a bandpass filter (tuned to pass the downlink bandwidth 502.4MHz to 502.8MHz) to reject out-of-band noise and then passes through the downlink AGC attenuator and into the Downlink Switched Attenuator. From the Switched Attenuator the Downlink signal passes through two low power amplifiers (1W, 15dB gain and 2W, 15dB gain) and then exits 60-212802 to go to the 100W Linearised Amplifier (80-245101). After leaving 60-212802 the downlink signal re-enters 60-212802, passing through the downlink AGC detector and a second bandpass filter before exiting the shelf via the D/L Output port

The uplink RF path enters 60-212802 at the U/L Input port and the signal passes through a bandpass filter (tuned to pass the uplink bandwidth 505.4MHz to 505.8MHz) to reject out-of-band noise. After the bandpass filter the signal passes through a 30dB Low Noise Amplifier and then into the uplink Switched Attenuator followed by the uplink AGC attenuator. After the AGC attenuator the signal passes through a second bandpass filter and then through a low power amplifier (1W, 37dB gain) followed by the uplink AGC detector. From the AGC detector the uplink signal passes into a fibre optic transmitter where the RF signal is modulated into an optical signal for transmission via fibre optic cable to the master site.

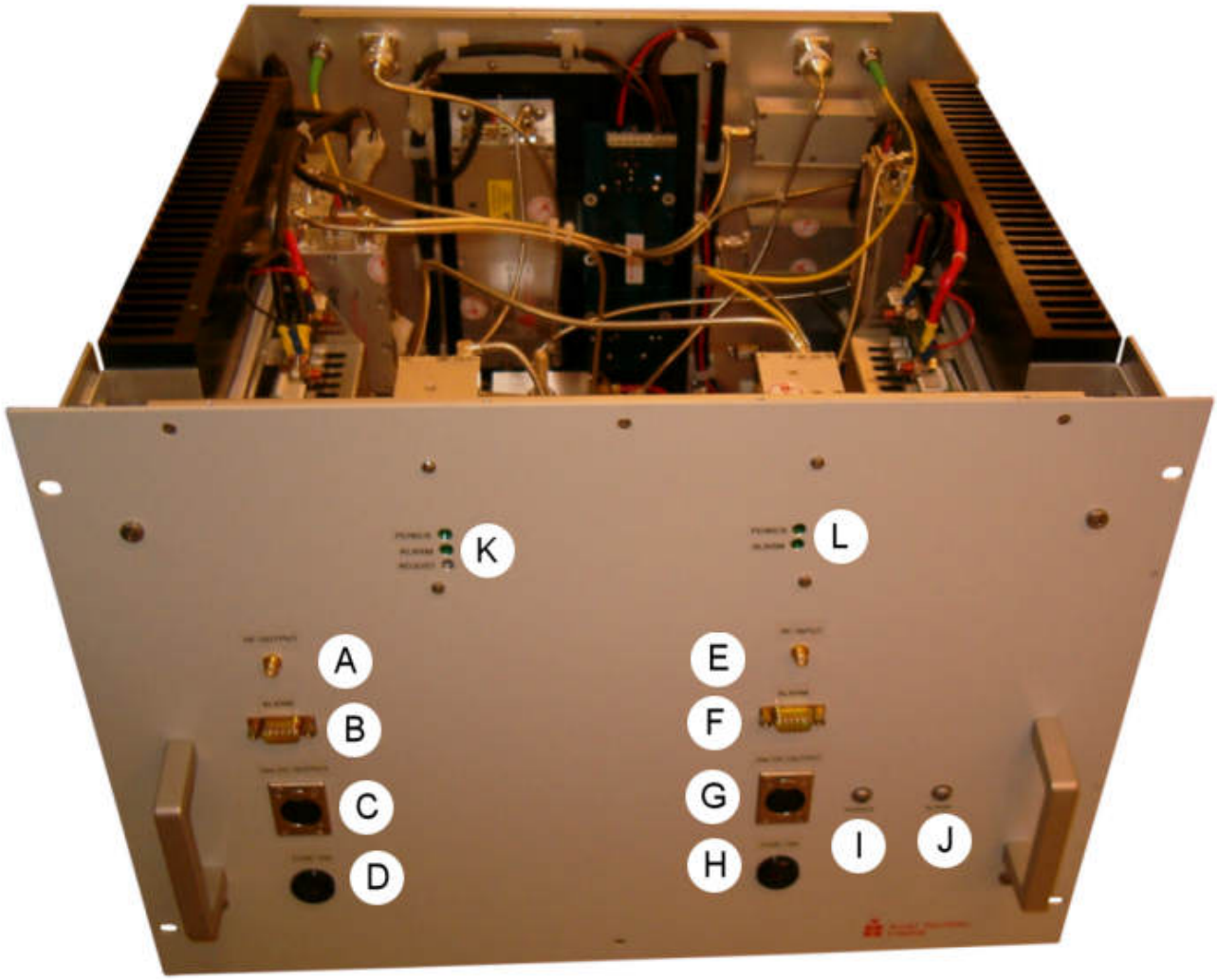
All the amplifier modules in this shelf are alarmed and the summary terminates at the rear panel mounted 9-way ‘D’ alarm connector.

4.2.1. 60-212802 Parts List (Major Components)

Component Part	Component Part Description	Qty Per Assembly
02-010901	Bandpass Filter	3
02-011204	Bandpass Filter	1
10-000701	Switched Attenuator 0-30dB 0.25W	1
10-000801	Switched Attenuator 0-30dB 1W	1
11-007402	Low Noise Amplifier	1
11-007901	Low Power Amplifier (1W)	1
12-021801	Low Power Amplifier (1W)	1
12-021802	Low Power Amplifier (2W)	1
13-003011	DC-DC Converter 24V -12V	1
13-003301	Mains Filter (8 Amp)	1
17-001109	AGC Logarithmic Detector /Amplifier	1
17-001117	AGC Detector /Amplifier	1
17-001201	AGC Attenuator	2
20-001601	12V Relay Board	1
20-001602	24V Relay Board	1
20-005401	Fibre Optic Transmitter (2.7GHz)	1
20-005501	Fibre Optic Receiver (2.7GHz)	1
80-008901	12V Relay Assembly	1
93-510077	0R02 50W Resistor Aluminium Clad	2
94-100004	60A Dual Diode	1
96-300067	PSU 600W (24V 23A)	2
96-920026	Circuit Breaker 10A	1

4.2.2. 60-212802 Photographs

Remote Uplink/Downlink Tray (60-212802) front view



A	RF output to 100W Linearised Amplifier 80-245101
B	Alarm input from amplifier pair “A” in 80-245101
C	DC output to amplifier pair “A” in 80-245101
D	Fuse on DC output to amplifier pair “A” in 80-245101
E	RF input from 100W Linearised Amplifier 80-245101
F	Alarm input from amplifier pair “B” in 80-245101
G	DC output to amplifier pair “B” in 80-245101
H	Fuse on DC output to amplifier pair “B” in 80-245101
I	Green LED “Power On”
J	Red LED “Alarm”
K	Power On LED, Alarm LED and Gain Adjust for Fibre Optic Receiver 20-005501
L	Power On LED and Alarm LED for Fibre Optic Transmitter 20-005401

Remote Uplink/Downlink Tray (60-212802) rear view

A	Uplink Fibre Optic output to Master site
B	Uplink RF input from mobile antenna
C	Downlink Fibre Optic input from Master site
D	Downlink RF output to mobile antenna
E	Uplink switched attenuator 10-000701
F	Downlink switched attenuator 10-000801
G	Alarm Output
H	AC Trip switch
I	AC Input (110V)
J	DC Fuse
K	12V DC Auxiliary Output
L	Earth connection
M	AC power cord
N	DC, RF and Alarm interconnections for Amplifier 80-245101

4.2.4. 60-212802 Major Sub Components

4.2.4.1. Bandpass Filter (02-010901)

Bandpass Filter (02-010901) is a multi-section design 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 helical & combline design respectively, and are carefully aligned during manufacture in order to optimise the insertion loss, VSWR and intermodulation characteristics of the unit. The body and 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.
Being passive devices, the bandpass filters should have an extremely long operational life and require no maintenance.

02-010901 specification

SPECIFICATION	PARAMETER	
Passband Frequency	Uplink	505.4 to 505.8MHz **
	Downlink	502.4 to 502.8MHz **
Bandwidth	Uplink	400kHz **
	Downlink	400kHz **
Insertion Loss	1.2 dB (typical)	
Power Rating	50W	
Impedance	50Ω	
VSWR	Better than 1.2:1	
Connectors	SMA	
Weight	3Kg (approximately)	

**as tuned for use in 60-212802 uplink and downlink paths

4.2.4.2. Bandpass Filter (02-011204)

Bandpass Filter 02-011204 is a 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 cases and 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.

Being passive devices, the bandpass filters should have an extremely long operational life and require no maintenance. Should a filter be suspect, it is usually most time efficient to replace the module rather than attempt repair or re-tuning. No adjustments should be attempted without full network sweep analysis facilities to monitor both insertion loss and VSWR simultaneously.

02-011204 Specification

Passband Frequency	502.4 to 502.8MHz **
Bandwidth	400kHz **
Insertion Loss	<1.0dB
Power Rating	100W
Impedance	50Ω
VSWR	1.2:1 (typical)
Connectors	SMA
Weight	3Kg (approximately)

**as tuned for use in 60-212802 uplink path

4.2.4.3. Switched Attenuator 0-30dB 0.25W (10-000701)

10-000701 provides attenuation from 0 - 30dB in 2 dB steps The attenuation is simply set using the four miniature toggle switches on the top 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.

10-000701 Specification

PARAMETER		SPECIFICATION
Attenuation Values		0-30dB
Attenuation Steps		2, 4, 8 and 16dB
Power Handling		0.25 Watt
Attenuation Accuracy		± 1.0 dB
Frequency Rang		DC to 1GHz
Impedance		50Ω
Connectors		SMA
VSWR		1.3:1
Weigh		0.2kg
Temperature range	operation	-20°C to +60°C
	storage	-40°C to +70°C

4.2.4.4. Switched Attenuator 0-30dB 1W (10-000801)

10-000801 provides attenuation from 0 - 30dB in 2 dB steps The attenuation is simply set using the four miniature toggle switches on the top 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.

10-000801 Specification

PARAMETER		SPECIFICATION
Attenuation Values		0-30dB
Attenuation Steps		2, 4, 8 and 16dB
Power Handling		1 Watt
Attenuation Accuracy		± 1.0 dB
Frequency Rang		DC to 1GHz
Impedance		50Ω
Connectors		SMA
VSWR		1.3:1
Weigh		0.2kg
Temperature range	operation	-20°C to +60°C
	storage	-40°C to +70°C

4.2.4.5. Low Noise Amplifier (11-007402)

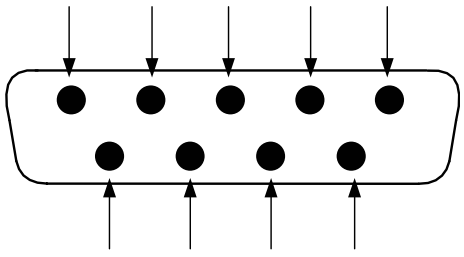
The 30dB gain low noise amplifier used is a double stage solid-state low-noise amplifier. Class A circuitry is used in the unit to ensure excellent linearity over a very wide dynamic range. The two active devices are very moderately rated to provide a long trouble-free working life. There are no adjustments on this amplifier, and in the unlikely event of failure then the entire amplifier should be replaced. The amplifier features a dedicated, in-built alarm monitoring system which gives a TTL 'open collector' type switched signal on alarm, this is then integrated using a built-in relay to give a volt-free contact for summation into the main alarm system.

11-007402 Specification

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 @ 24V DC
Temperature range	operational	-20°C to +60°C
	storage	-40°C to +70°C

LNA 'D' Connector Pin-out details	
Connector pin	**Signal**
1	+ve input (10-24V)
2	GND
3	Alarm relay O/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

9-Way Pin-Out Graphical Representation



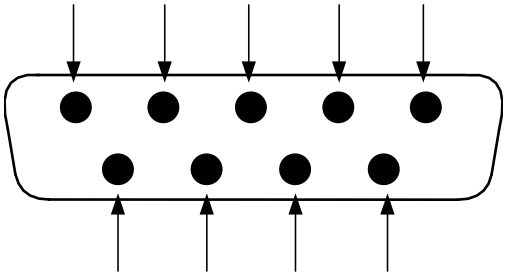
4.2.4.6. Low Power Amplifier (1W) (11-007901)

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 (Iridite NCP finish) with SMA connectors for the RF input/output and a 9way D-type connector for DC and alarm outputs.

11-007901 Specifications

PARAMETER		SPECIFICATION
Frequency range:		380-470MHz
Small signal gain:		37.5dB
Gain flatness:		±0.5dB
Gain vs. temperature:		1.5dB
Temperature range:	operational:	-20°C to +60°C
	storage:	-40°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

LNA 'D' Connector Pin-out details	
Connector pin	**Signal**
1	+ve input (10-24V)
2	GND
3	Alarm relay O/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



4.2.4.7. Low Power Amplifier (1W) (12-021801)

The low power amplifier used is a 1 stage balanced configuration, solid-state amplifier. Class A circuitry is used in the unit to ensure excellent linearity over a very wide dynamic range. The three active devices are very moderately rated to provide a long trouble-free working life.
Its housing is an aluminium case (Iridite NCP finish) with SMA connectors for the RF input/output and a D-Type connector for the power supply and the Current Fault Alarm Function.
There are no adjustments on this amplifier, and in the unlikely event of failure then the entire amplifier should be replaced.

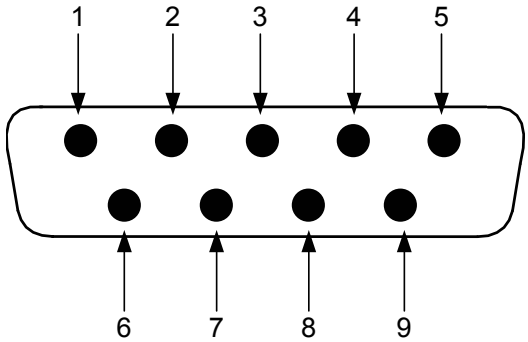
12-021801 Specification

PARAMETER		SPECIFICATION
Temperature		-20 to +70 °C
Frequency Range		380 - 500 MHz
Small Signal Gain		15.5 +/- 0.5 dB
Gain Flatness		0.7 dB p-p Max
ΔGain vs. Temperature		0.7 dB Max
In RL		20 dB Min
Out RL		20 dB Min
Output Power @ 1dB Compression Point		30.5 dBm Min
Output 3rd Order IP		41.5 dBm Min
Noise Figure		6 dB Max
DC Supply Voltage		10-15 Vdc
DC Supply Current		540 mA Max
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
Weight:		<0.5 kg
Size:		110.5 x 66mm x 24.6mm

Low Power Amplifier (12-021801) 9-Way Connector Pin-outs

Connector pin	Signal
1	+ve input (10-24V)
2	GND
3	Alarm relay O/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

9-Way Pin-Out Graphical Representation



4.2.4.8. Low Power Amplifier (2W) (12-021802)

The low power amplifier used is a 1 stage balanced configuration, solid-state amplifier. Class A circuitry is used in the unit to ensure excellent linearity over a very wide dynamic range. The three active devices are very moderately rated to provide a long trouble-free working life.
Its housing is an aluminium case (Iridite NCP finish) with SMA connectors for the RF input/output and a D-Type connector for the power supply and the Current Fault Alarm Function.
There are no adjustments on this amplifier, and in the unlikely event of failure then the entire amplifier should be replaced.

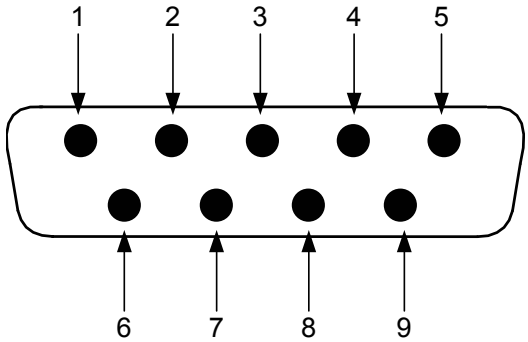
12-021802 Specification

PARAMETER		SPECIFICATION
Temperature		-20 to +70 °C
Frequency Range		380 - 500 MHz
Small Signal Gain		15.5 +/- 0.5 dB
Gain Flatness		0.7 dB p-p Max
ΔGain vs. Temperature		0.7 dB Max
In RL		20 dB Min
Out RL		20 dB Min
Output Power @ 1dB Compression Point		33 dBm Min
Output 3rd Order IP		46 dBm Min
Noise Figure		6 dB Max
DC Supply Voltage		10-15 Vdc
DC Supply Current		850 mA Max
Temperature range	operational	-20°C to +70°C
	storage	-40°C to +100°C
Weight		<0.5 kg
Size		110.5 x 66mm x 24.6mm

Low Power Amplifier (12-021802) 9-Way Connector Pin-outs

Connector pin	Signal
1	+ve input (10-24V)
2	GND
3	Alarm relay O/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

9-Way Pin-Out Graphical Representation



4.2.4.9. DC-DC Converter 24V -12V (13-003011)

The DC/DC converter fitted is an AFL assembled, high power PCB unit with an 8 amp at 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) and smoothing components built onto a printed circuit board with screw block terminations.
In event of failure this unit should not be repaired, only replaced.

13-003011 Specification

PARAMETER		SPECIFICATION
Input Voltage range:		18-28V DC
Output voltage:		12V±0.5V
Max. current load:		8.0Amps
Temperature range:	operation:	-10°C to +60°C
	storage:	-20°C to +70°C
Size(PCB):		190 x 63mm
Weight (Loaded PCB):		291gms

4.2.4.10. Mains Filter (8 Amp) (13-003301)

The 8A Mains Filter Assembly (13-003301) has been designed to remove mains-borne interference caused by external electrical radiation.
Many filters exist which partially satisfy the criteria needed for cell enhancer power supplies (the main criteria being high continuous current) but a more cost efficient solution was realized using AFL's own manufacturing capability.

13-003301 Specification

PARAMETER	SPECIFICATION
Maximum surge current:	6.5kA (8/20)
Maximum leakage current:	<0.3mA (@ working voltage
Maximum continuous current:	8A
Maximum continuous voltage:	253V
Working voltage:	230V (nominal)
Impulse energy absorption:	420J
Ambient temperature limits:	-25°C to +85°C
Humidity:	5-95% RHNC
Case material:	ABS plastic (IP50 rated)
Maximum attenuation:	70dB (common mode 50-60Hz)

4.2.4.11. Downlink AGC Components

AGC Detector /Amplifier (17-001117)
AGC Attenuator (17-001201)

The Remote Site Uplink/Downlink Tray (60-212802) Downlink path is fitted with an Automatic Gain Control (AGC) system. The AGC system consists of two units, a detector/amplifier (part No. 17-001117) and an attenuator (part No. 17-001201). 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 before 1st stage 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 amplifier 1dB compression point. Adjustment of this AGC threshold level is possible to reduce the maximum power; 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 and signal distortion 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.

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.

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.

Technical Specifications

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/amp pcb	54 x 42 x 21mm
Weight	attenuator	90gm
	detector/amp	100gm

4.2.4.12. Uplink AGC Components

AGC Logarithmic Detector /Amplifier (17-001109)
AGC Attenuator (17-001201)

The Remote Site Uplink/Downlink Tray (60-212802) Uplink path is fitted with a wide dynamic range Automatic Gain Control (AGC) system. This is fitted in the Uplink path 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 logarithmic detector/amplifier (17-001109) and an attenuator (17-001201). The logarithmic 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.

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 at the 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.

Wide Dynamic Range AGC 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/amp pcb	54 x 42 x 21mm
Weight	attenuator	90gm
	detector/amp	100gm

4.2.4.13. 12V Relay Board (20-001601)

The General Purpose Relay Board allows the inversion of signals and the isolation of circuits. It is equipped with two dual pole change-over relays with completely isolated wiring, accessed via screw terminals. Both relays are 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. Its common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

20-001601 Specification

PARAMETER		SPECIFICATION
Operating voltage		8 to 30V (floating earth)
Alarm threshold		Vcc - 1.20 volt ±15%
Alarm output relay contacts:		
Max. switch current		1.0Amp
Max. switch volts		120Vdc/60VA
Max. switch power		24W/60VA
Min. switch load		10.0µA/10.0mV
Relay isolation		1.5kV
Mechanical life		>2x10^7 operations
Relay approval		BT type 56
Connector details		Screw terminals
Temperature range	operational	-10°C to +60°C
	storage	-20°C to +70°C

4.2.4.14. 24V Relay Board (20-001602)

The General Purpose 24V Relay Board (20-001602) allows the inversion of signals and the isolation of circuits. It is equipped with two dual pole change-over relays RL1 and RL2, with completely isolated wiring, accessed via screw terminals. Both relays are 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. Its common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

20-001602 Specification

PARAMETER		SPECIFICATION
Operating voltage		8 to 30V (floating earth)
Alarm Threshold		Vcc - 1.20 volt +15%
Alarm output relay contacts:		
Max. switch current		1.0Amp
Max. switch volts		120Vdc/60VA
Max. switch power		24W/60VA
Min. switch load		10.0µA/10.0mV
Relay isolation		1.5kV
Mechanical life		>2x107 operations
Relay approval		BT type 56
Connector details		Screw terminals
Temperature range	operational	-10°C to +60°C
	storage	-20°C to +70°C

4.2.4.15. Fibre Optic Transmitter (2.7GHz) (20-005401)

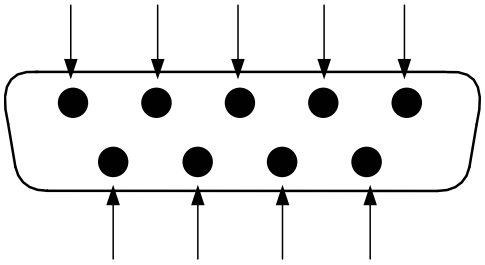
The transmitter modulates the RF signal on to a laser, which is then transmitted over a fibre optic cable to a receiver. The laser current is monitored and compensated for constant optical out put power against temperature variation and aging. Laser over-current alarm function is provided as LED output as well as open collect and voltage-free relay contacts on 9 way D-type connector.

20-005401 specification

PARAMETER	SPECIFICATION
Frequency Range (RF path)	70 - 3000 MHz
Frequency Range (Data path)	20 – 35 MHz
Available Link Gain (RF Path)	18 dB
Link Gain (DATA Path)	0 dB
Gain Flatness (entire frequency range)	±1.5 dB p-p
ΔGain vs. Temperature -20 to 70 ºC	3.5 dB
Gain adjustment range (RF Path)	30 dB
In/Out Return Loss (RF path)	10 dB Min
Output IP3 @ max gain *	37 dBm
In/Output IP3 @ 0dB Gain *	33 dBm
RF impedance	50 Ohm
Noise Figure @ 0dB gain (400MHz)	36 dB
Optical Transmit Power	2.7±0.3 dBm
Optical return loss	>50 dB
Received Power Alarm Threshold	-10 dBm(optic)
Optical wavelength	1310 nm
DC Supply Voltage	10-12 Vdc
DC Supply Current	120 mA
Operating Temperature	-20 to 70 ºC
Storage Temperature	-30 to 85 ºC
RF Connector type	SMA
Fibre optic connector type	FC/APC

Fibre Optic Transmitter (20-005401) ‘D’ Type Female Connector Pinouts

Pin No.	Signal Description
1	+10-12V DC Power
2	0V DC, Power Ground
3	0V DC, Power Ground
4	No Connection
5	No Connection
6	TTL Alarm, (0V=good, open coll.= fail)
7	Relay Alarm Contact (N.C)
8	Relay Alarm Contact (Common)
9	Relay Alarm Contact (N.O)



4.2.4.16. Fibre Optic Receiver (2.7GHz) (20-005501)

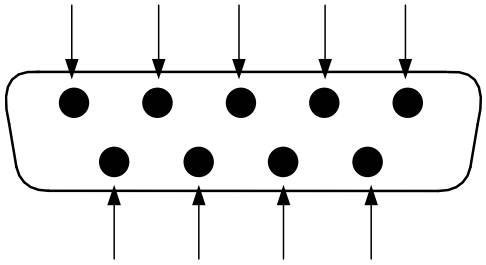
The receiver demodulates RF signals from the laser with a typical gain of 18dB and with 30dB adjustability in the RF domain. The received optical power is monitored for alarm function in case of fibre damage.

20-005501 Specification

PARAMETER	SPECIFICATION
Frequency Range (RF path)	70 - 3000 MHz
Frequency Range (Data path)	20 – 35 MHz
Available Link Gain (RF Path)	18 dB
Link Gain (DATA Path)	0 dB
Gain Flatness (entire frequency range)	±1.5 dB p-p
ΔGain vs. Temperature -20 to 70 ºC	3.5 dB
Gain adjustment range (RF Path)	30 dB
In/Out Return Loss (RF path)	10 dB Min
Output IP3 @ max Gain	37 dBm
In/Output IP3 @ 0dB Gain	33 dBm
RF impedance	50 Ohm
Noise Figure @ 0dB gain (400MHz)	36 dB
Optical Transmit Power	2.7±0.3 dBm
Optical return loss	>50 dB
Received Power Alarm Threshold	-10 dBm(optic)
Optical wavelength	1310 nm
DC Supply Voltage	10-12 Vdc
DC Supply Current	350 mA
Operating Temperature	-20 to 70 ºC
Storage Temperature	-30 to 85 ºC
RF Connector type	SMA
Fibre optic connector type	FC/APC

Fibre Optic Receiver (20-005501) ‘D’ Type Female Connector Pinouts

Pin No.	Signal Description
1	+10-12V DC Power
2	0V DC, Power Ground
3	0V DC, Power Ground
4	No Connection
5	No Connection
6	TTL Alarm, (0V=good, open coll.= fail)
7	Relay Alarm Contact (N.C)
8	Relay Alarm Contact (Common)
9	Relay Alarm Contact (N.O)



4.2.4.17. 12V Relay Assembly (80-008901)

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. Its common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

80-008901 Specification

PARAMETER		SPECIFICATION
Operating voltage		8 to 30V (floating earth)
Alarm threshold		Vcc - 1.20 volt +15%
Alarm output relay contacts		
Max. switch current		1.0Amp
Max. switch volts		120Vdc/60VA
Max. switch power		24W/60VA
Min. switch load		10.0µA/10.0mV
Relay isolation		1.5kV
Mechanical life		>2x10^7 operations
Relay approval		BT type 56
Connector details		Screw terminals
Temperature range	operational	-10°C to +60°C
	storage	-20°C to +70°C

4.2.4.18. 60A Dual Diode (94-100004)

The purpose of these dual diode assemblies is to allow two DC voltage sources to be combined, so that the main DC rail within the equipment can be sourced from either a mains driven PSU, or externally through an XLR connector or from dual mains driven PSUs . They are very heavy-duty diodes and they prevent any reverse current from flowing back to their source or the alternative supply rail. Combining diodes such as these will also be used if the equipment is to be powered from external back-up batteries.

4.2.4.19. PSU 600W (24V 23A) (96-300067)

The power supply unit is a switched-mode type capable of supplying 24V DC at 23.0Amps continuously. Equipment of this type typically requires approximately 10.0 Amps 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 using the multi-turn potentiometer mounted close to the DC output studs on the PSU PCB. All the PSUs 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.

96-300067 Specification

AC Input Supply	
Voltages:	110 or 220V nominal
	90 to 132 or 180 to 264V (absolute limits)
Frequency:	47 to 63Hz
DC Output Supply:	
Voltage:	24V DC (nominal)
	20 to 28V (absolute limits)
Maximum current:	23A

17-001101, Det. & 17-001201, Atten. Automatic Gain Control

Description

The equipment is fitted with an 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.

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.

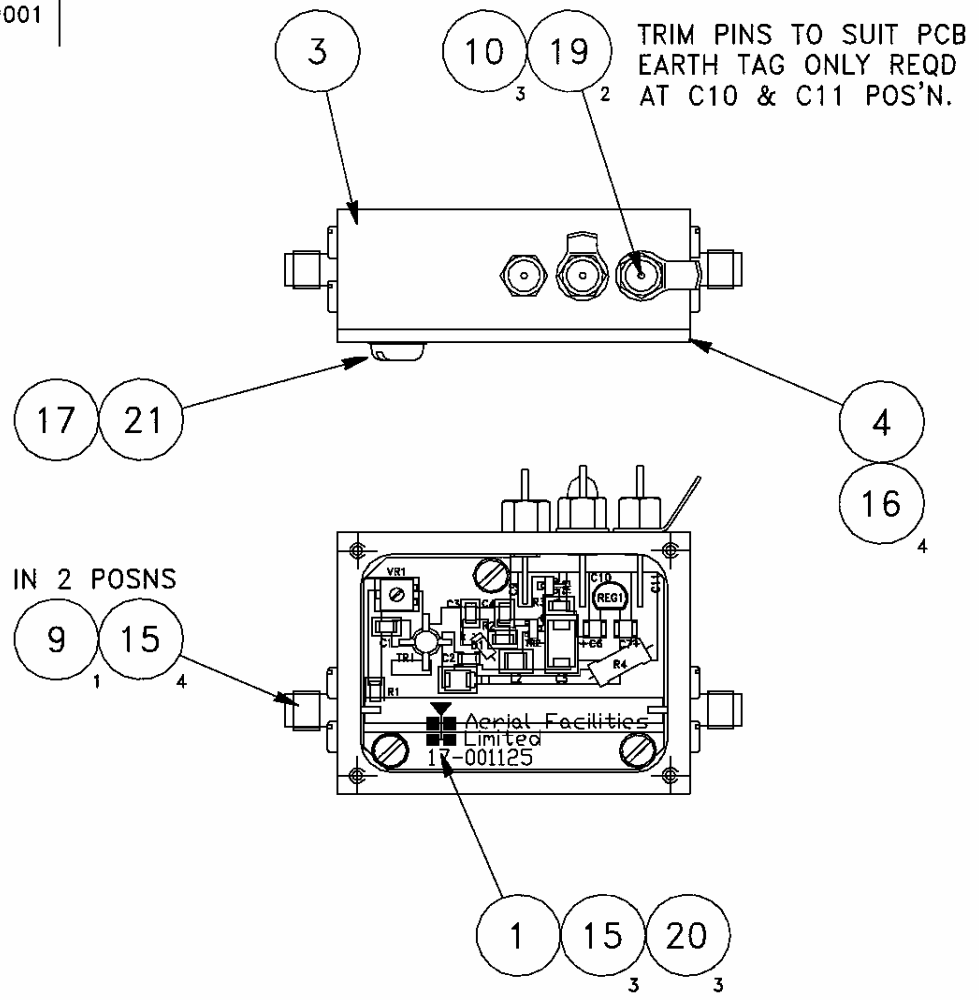
For small signals, below AGC onset, the output control line will be close to 12V and the AGC attenuator will have minimum attenuation. As the signal level increases the control line voltage will fall, increasing the attenuator value and keeping the system output level at a constant value.
The AGC onset level is adjusted by the choice of sampler resistor R1 and by the setting of potentiometer VR1.
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.

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/amp pcb	54 x 42 x 21mm
Weight:	attenuator:	90grams
	detector/amp:	100grams

Drg. Nō. 17-001101, ACG Detector Assembly

USED ON
55-019001



SOLDERING TO BE COMPLETED USING ITEM (26)

FIT ITEMS (8) TO COVER 2 LID FIXING SCREWS

No	DESCRIPTION	DATE	BY
1A	(CR1679)	3/5/00	CCP

ISSUE

THIRD ANGLE PROJECTION

Aerial Facilities Limited

TOLERANCES

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

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

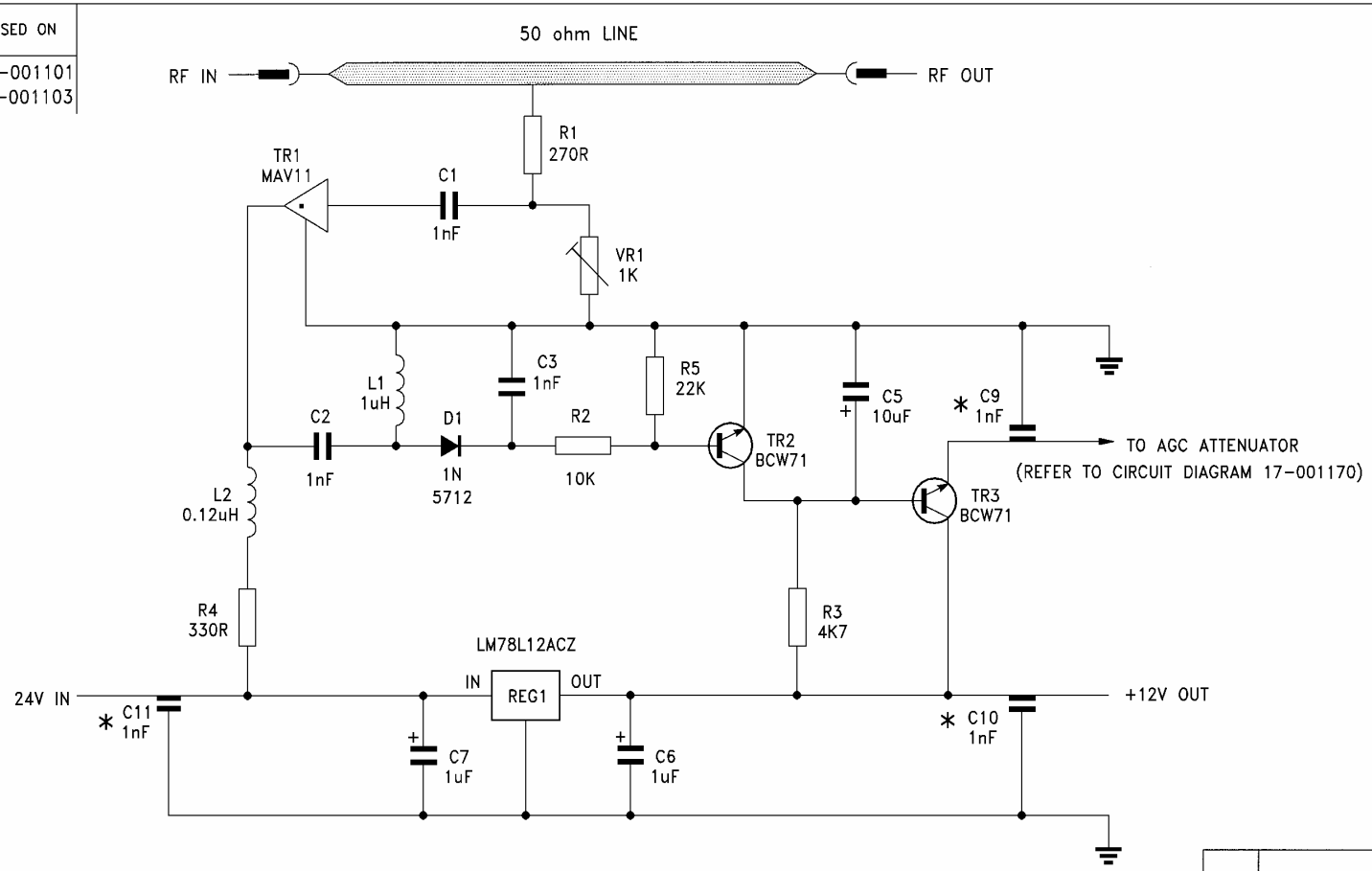
TITLE: CELL ENHANCER AGC UNIT DETECTOR/AMP. ASSEMBLY

DRAWN	DATE	CHKD	APPD	SCALE	CUSTOMER	DRAWING No	ISS
CCP	3/5/00	GB	BB	1:1		17-001101	1A

Drg. Nō. 17-001171, AGC Detector Circuit Diagram

Drg. No. 17-001171C AGC Detector Parts List

USED ON
17-001101
17-001103



FOR FURTHER INFORMATION REFER TO PCB SUB-ASSEMBLY 17-001111
ITEMS MARKED * TO BE FITTED AT GA STAGE (17-001101)

No	DESCRIPTION	DATE	BY
1C	CR1679	3/5/00	CCP
1A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
1	PRODUCTION ISSUE	7/7/94	DBS

ISSUE

DRAWN	DATE
DBS	19/05/93
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

SCALE

Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
DETECTOR/AMPLIFIER CIRCUIT DIAGRAM

CUSTOMER	DRG.No	ISS
	17-001171	1C

USED ON	CIRC. REF.	AFL STOCK REF.	DESCRIPTION
17-001103	C1	93-200020	1nF 63V 10% CHIP CAPACITOR
	C2	93-200020	1nF 63V 10% CHIP CAPACITOR
	C3	93-200020	1nF 63V 10% CHIP CAPACITOR
	C5	93-240007	10uF 25V TANTALUM CHIP CAPACITOR SMD
	C6	93-240004	1uF 35V TANTALUM CHIP CAPACITOR SMD
	C7	93-240004	1uF 35V TANTALUM CHIP CAPACITOR SMD
	C9	93-150001	1nF FEED THROUGH CAPACITOR
	C10	93-150001	1nF FEED THROUGH CAPACITOR
	C11	93-150001	1nF FEED THROUGH CAPACITOR
	D1	94-120004	1N 5712 SCHOTTKY BARRIER DIODE
	L1	93-400018	1.0uH INDUCTOR 3613 SERIES SMD
	L2	93-400019	0.12uH SMD INDUCTOR
	R1	93-6300037	1KR 0.125W 2% CHIP RESISTOR
	R2	93-6300053	10KR 0.125W 2% CHIP RESISTOR
	R3	93-6300049	4.7KR 0.125W 2% CHIP RESISTOR
	R4	93-510050	330R 1.6W % H:P PR37 RESISTOR
	R5	93-630057	22KR 0.125W 2% CHIP RESISTOR
	REG1	94-300006	LM78L12ACZ VOLTAGE REGULATOR
	TR1	94-200007	MONOLITHIC AMP. MAV 11.
	TR2	94-020007	BCW71 TRANSISTOR SMD
	TR3	94-020007	BCW71 TRANSISTOR SMD
	VR1	93-610002	1KR 0.25W SMD POT 4mm

ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No
2A	3/5/00	CR1679									
1A	2/2/99	CR0962									
1	7/7/94	Prod.Issue									

Aerial Facilities Limited

TITLE
CELL ENHANCER AGC UNIT
DETECTOR/AMP.CIRCUIT COMP.LIST

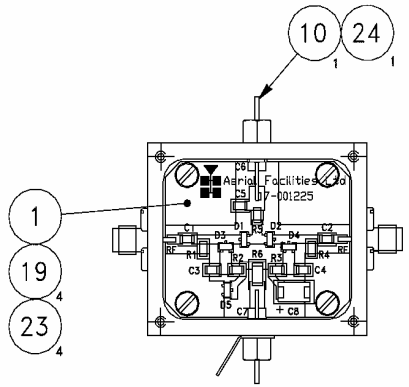
DRAWN	DATE	CHKD	APPD	CUSTOMER	COMPONENT LIST FOR	ISS
DBS	19/05/93	GB	BB		17-001171C	2A

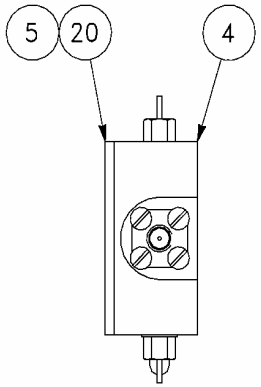
Drg. Nō. 17-001201, AGC Attenuator Assembly Drawing

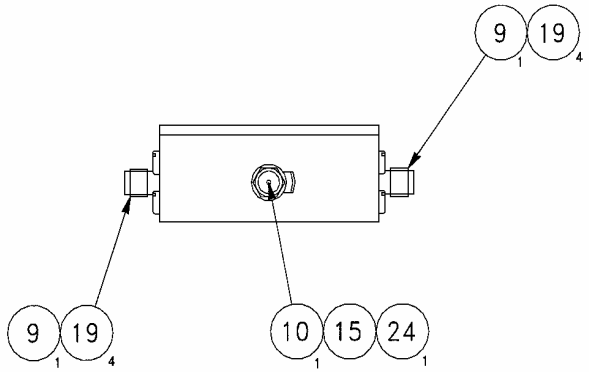
Drg. No. 17-001270, AGC Attenuator Circuit Diagram

USED ON

THIRD ANGLE PROJECTION







TRIM CONDUCTOR TO SUIT BOARD

COMPLETE ALL SOLDERING USING ITEM: 26

No	DESCRIPTION	DATE	BY
	ISSUE		
1B	CR1679	12/6/00	DBS
1A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
1	CR0563	1/7/94	DBS

DRAWN	DATE
DBS	01/07/94
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

SCALE 1:1

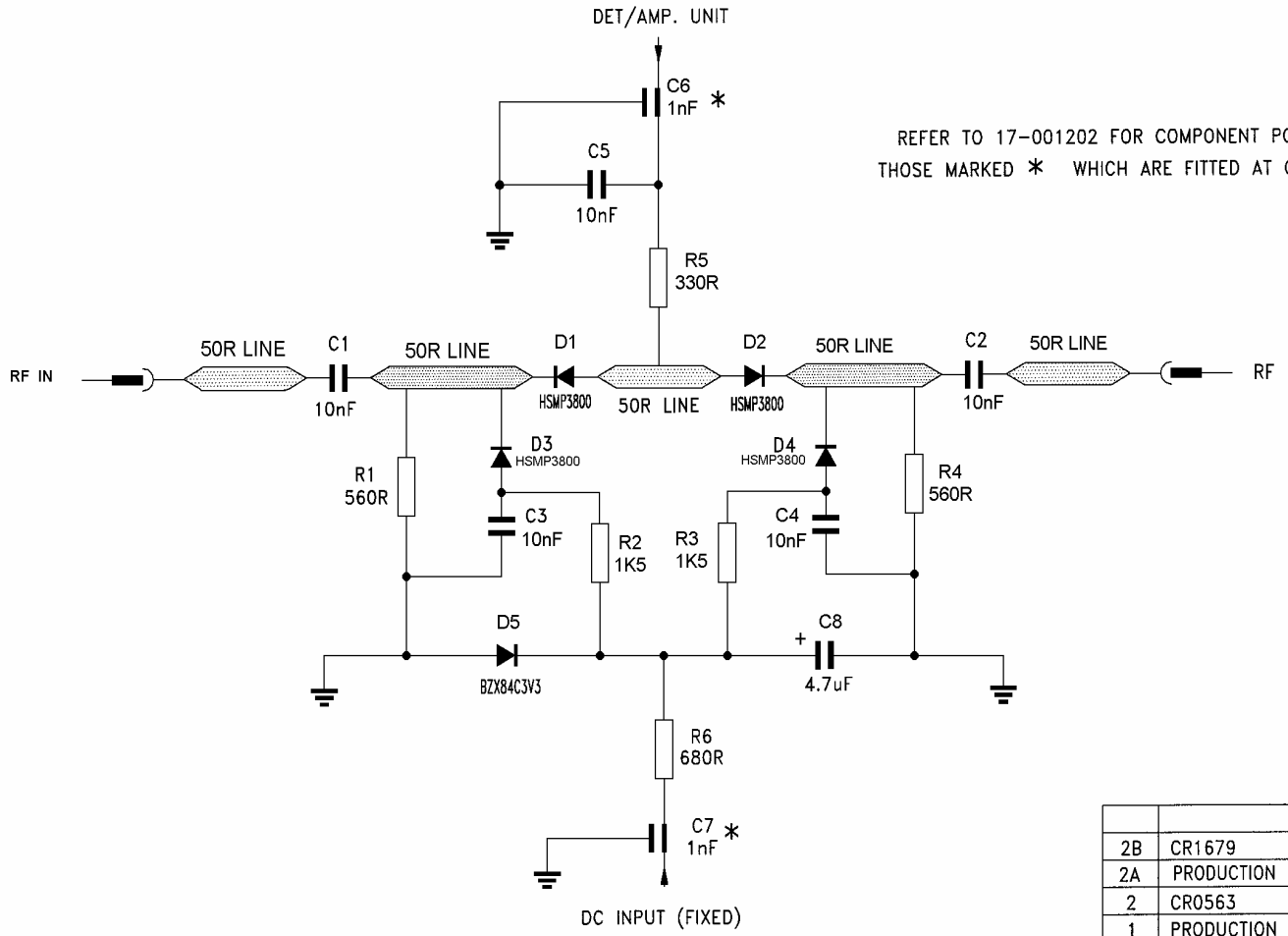
Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
ATTENUATOR ASSEMBLY

CUSTOMER	DRG.No	ISS
	17-001201	1B

Drg. No. 17-001270C AGC Attenuator Parts List

USED ON
17-001202



REFER TO 17-001202 FOR COMPONENT POSITIONS EXCEPT FOR THOSE MARKED * WHICH ARE FITTED AT GA STAGE (17-001201)

No	DESCRIPTION	DATE	BY
2B	CR1679	12/6/00	DBS
2A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
2	CR0563	29/6/94	DBS
1	PRODUCTION ISSUE	23/6/93	DBS

ISSUE

DRAWN	DATE
DBS	23/06/93
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

SCALE

Aerial Facilities Ltd
England

Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
ATTENUATOR CIRCUIT DIAGRAM

CUSTOMER	DRG.No	ISS
	17-001270	2B

USED ON	CIRC. REF.	AFL STOCK REF.	DESCRIPTION
17-001201	C1	93-200019	10nF 63V 10% CHIP CAPACITOR
	C2	93-200019	10nF 63V 10% CHIP CAPACITOR
	C3	93-200019	10nF 63V 10% CHIP CAPACITOR
	C4	93-200019	10nF 63V 10% CHIP CAPACITOR
	C5	93-200019	10nF 63V 10% CHIP CAPACITOR
	C6	93-150001	1nF FEED THROUGH CAPACITOR
	C7	93-150001	1nF FEED THROUGH CAPACITOR
	C8	93-240006	4.7uF 35V TANTALUM CHIP CAPACITOR
	D1	94-190001	PIN DIODE HSMP 3800 SMD
	D2	94-190001	PIN DIODE HSMP 3800 SMD
	D3	94-190001	PIN DIODE HSMP 3800 SMD
	D4	94-190001	PIN DIODE HSMP 3800 SMD
	D5	94-160001	BZX84C3V3 ZENDER DIODE SMD
	R1	93-630033	560R 0.125W 2% CHIP RESISTOR
	R2	93-630039	1.5KR 0.125W 2% CHIP RESISTOR
	R3	93-630039	1.5KR 0.125W 2% CHIP RESISTOR
	R4	93-630033	560R 0.125W 2% CHIP RESISTOR
	R5	93-630030	330R 0.125W 2% CHIP RESISTOR
	R6	93-650013	680R 0.75W 2% CHIP RESISTOR

ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No	ISSUE	DATE	CHANGE No
1B	2/5/00	CR1679									
1A	3/2/99	CR0962									
1	29/6/94	CR0563									

Aerial Facilities Limited

TITLE

CELL ENHANCER AGC UNIT

ATTENUATOR CIRCUIT DIAGRAM

DRAWN	DATE	CHKD	APPD	CUSTOMER	COMPONENT LIST FOR	ISS
DBS	29/06/94				17-001270C	1B

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

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.

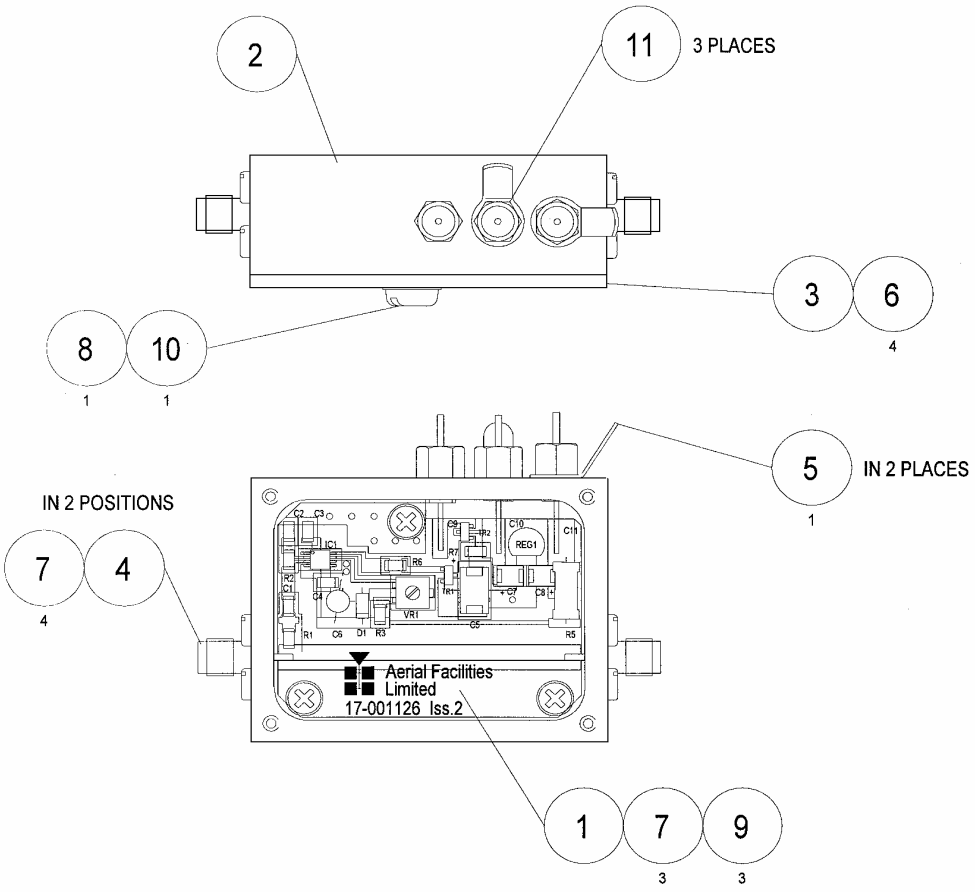
This DC voltage is passed via an inverting DC amplifier with integrating characteristics, to the output, which drives the attenuation control line of the corresponding AGC attenuator. This unit is fitted at some earlier point in the RF circuit.

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.

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



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

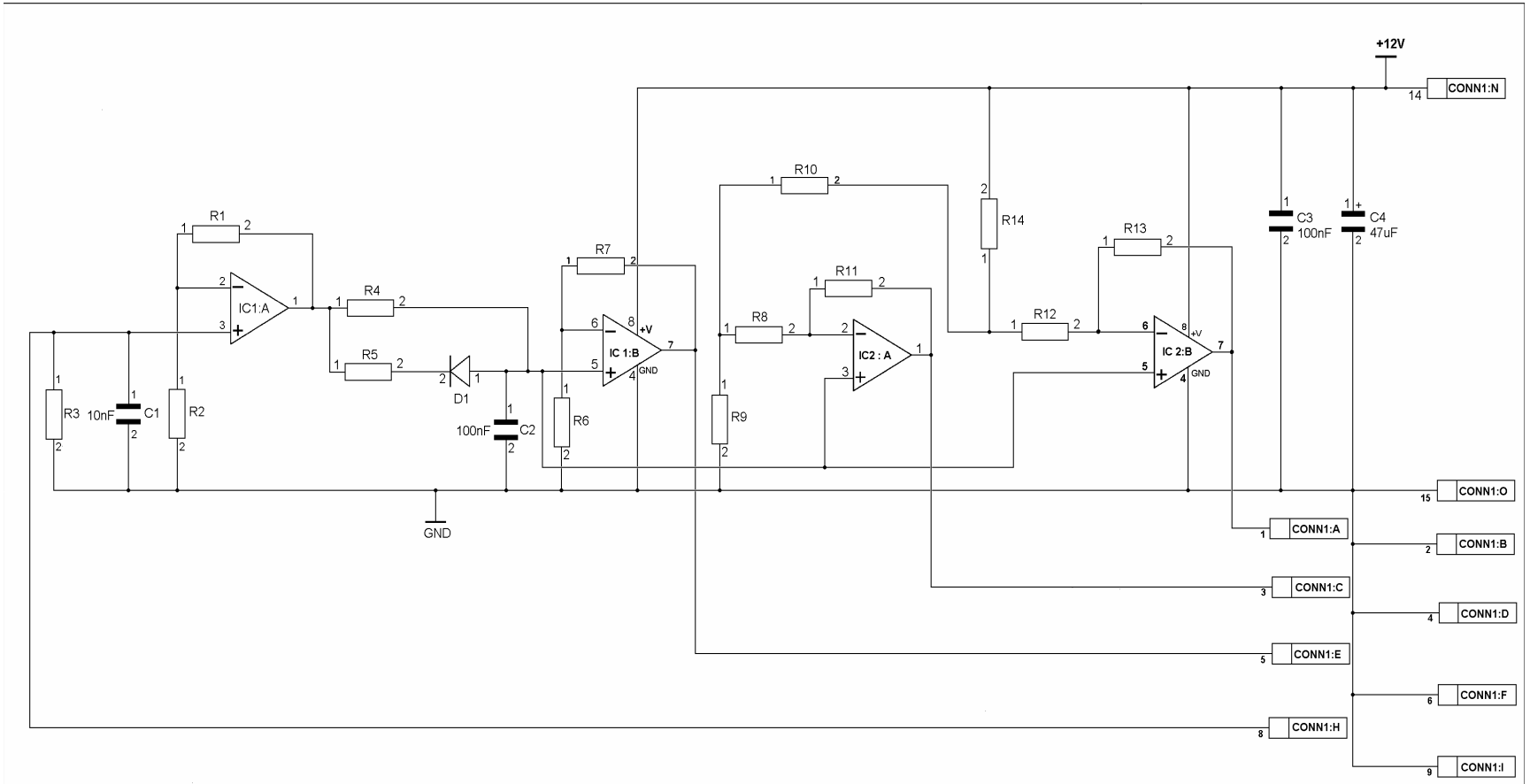
NO DECIMAL PLACE ± 1mm
ONE DECIMAL PLACE ± 0.3mm
TWO DECIMAL PLACES ± 0.1mm

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



No.	DESCRIPTION	DATE	BY
AA	PROTOTYPE ISSUE	19/11/02	MNR
	ISSUE		

DRAWN	DATE
MNR	19/11/02
CHKD	APPD
JD	RB

ALL DIMENSIONS ARE IN mm
UNLESS OTHERWISE STATED

TOLERANCES
NO DECIMAL PLACE : ± 0.040"
ONE DECIMAL PLACE : ± 0.010"
TWO DECIMAL PLACES : ± 0.005"

SCALE

Aerial Facilities Ltd
England
Tel (01494)777000
Fax (01494)777002

TITLE

ALC CONTROL AMPLIFIER PCB
BOARD CIRCUIT DIAGRAM
(WIDE DYNAMIC RANGE)

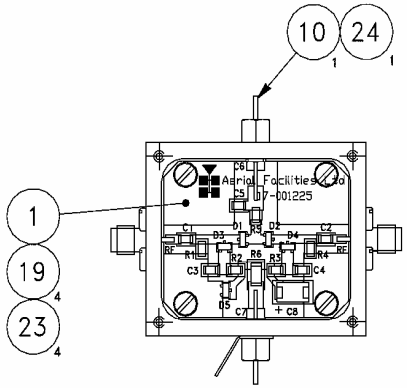
CUSTOMER	DRG.No	Iss.
	17 - 001175	AA

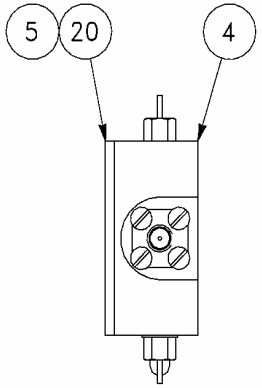
Drg. No. 17-001201, AGC Attenuator Assembly Drawing

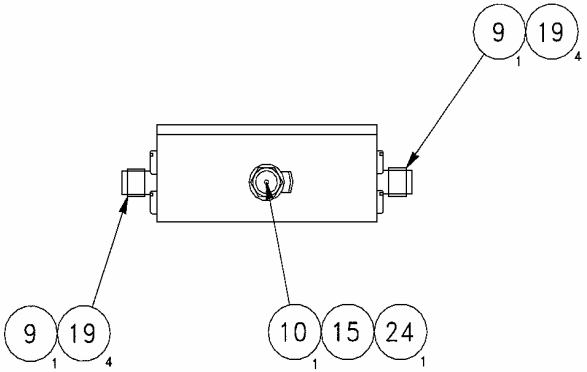
Drg. No. 17-001270 AGC Attenuator Circuit Diagram

USED ON

THIRD ANGLE PROJECTION







TRIM CONDUCTOR TO SUIT BOARD

COMPLETE ALL SOLDERING USING ITEM: (26)

No	DESCRIPTION	DATE	BY
	ISSUE		
1B	CR1679	12/6/00	DBS
1A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
1	CR0563	1/7/94	DBS

DRAWN	DATE
DBS	01/07/94
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

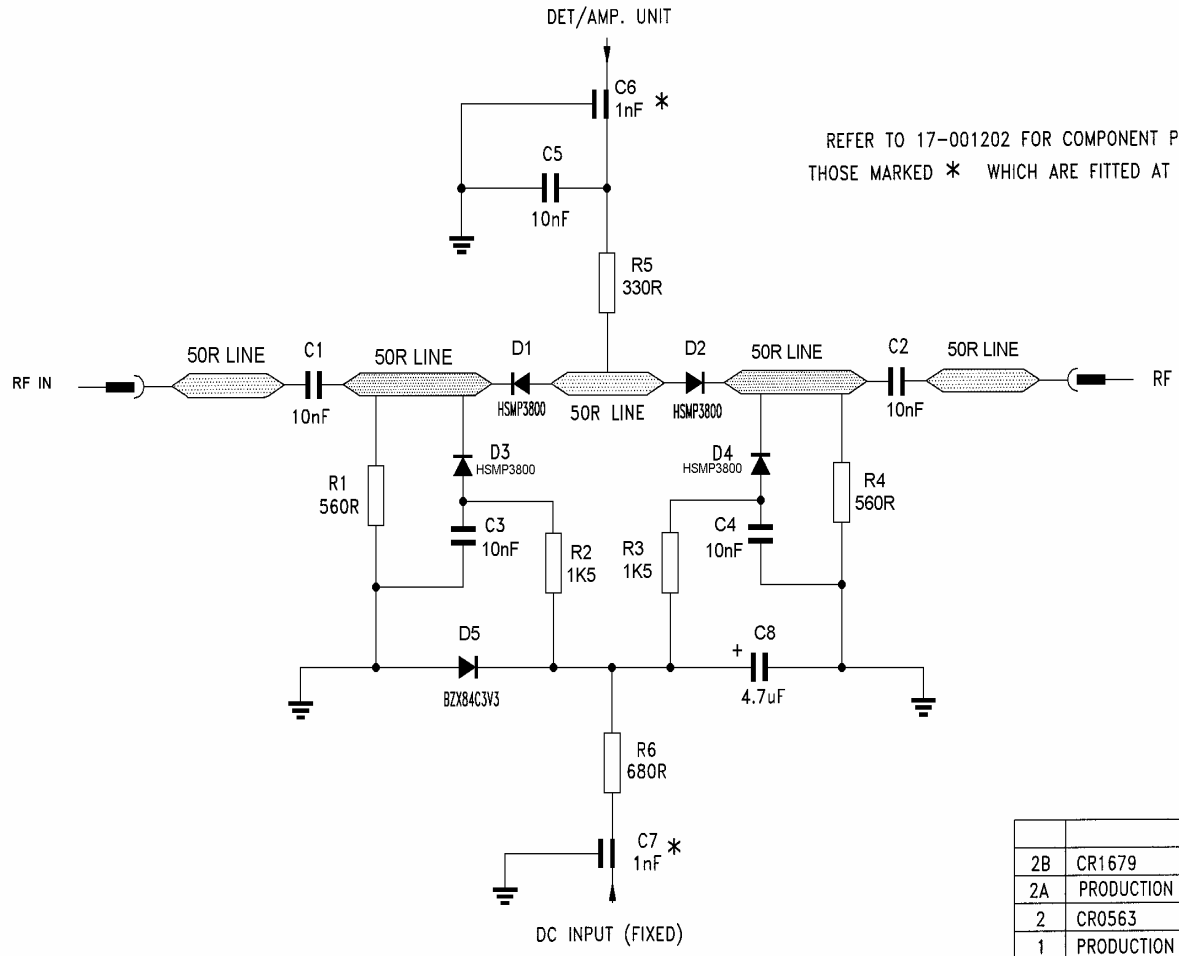
SCALE
1:1

Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
ATTENUATOR ASSEMBLY

CUSTOMER	DRG.No	ISS
	17-001201	1B

USED ON
17-001202



REFER TO 17-001202 FOR COMPONENT POSITIONS EXCEPT FOR THOSE MARKED * WHICH ARE FITTED AT GA STAGE (17-001201)

No	DESCRIPTION	DATE	BY
	ISSUE		
2B	CR1679	12/6/00	DBS
2A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
2	CR0563	29/6/94	DBS
1	PRODUCTION ISSUE	23/6/93	DBS

DRAWN	DATE
DBS	23/06/93
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

SCALE

Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
ATTENUATOR CIRCUIT DIAGRAM

CUSTOMER	DRG.No	ISS
	17-001270	2B

24V Relay Board (20-001602)

Description

The General Purpose Relay Board allows the inversion of signals and the isolation of circuits. It is equipped with two dual pole change-over relays RL1 and RL2, with completely isolated wiring, accessed via screw terminals.

Both relays are 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 relays fitted at RL1 and RL2.

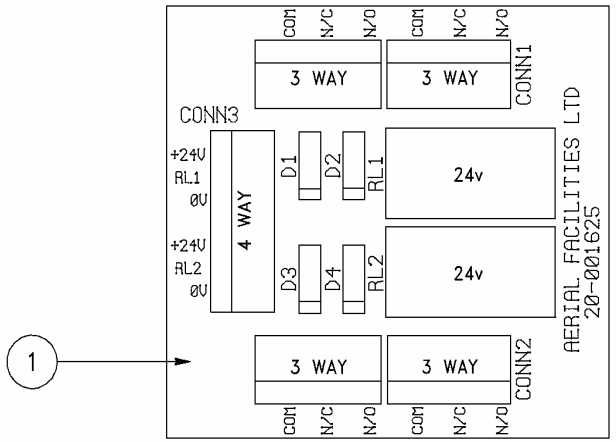
Technical Specification

PARAMETER		SPECIFICATION
Operating voltage:		8 to 30V (floating earth)
Alarm Threshold:		Vcc - 1.20 volt ±15%
Alarm output relay contacts:		
Max. switch current:		1.0Amp
Max. switch volts:		120Vdc/60VA
Max. switch power:		24W/60VA
Min. switch load:		10.0µA/10.0mV
Relay isolation:		1.5kV
Mechanical life:		>2x10^7 operations
Relay approval:		BT type 56
Connector details:		Screw terminals
Temperature range	operational:	-10°C to +60°C
	storage:	-20°C to +70°C

Drg. No. 20-001602, 24V Relay Board Assembly Drawing

CIRC. REF.	AFL STOCK REF.	DESCRIPTION
D1	94-100001	1N4148 SIGNAL DIODE
D2	94-100001	1N4148 SIGNAL DIODE
D3	94-100001	1N4148 SIGNAL DIODE
D4	94-100001	1N4148 SIGNAL DIODE
RL1	96-900005	24V DC DP CHANGEOVER RELAY
RL2	96-900005	24V DC DP CHANGEOVER RELAY
CONN1	91-700003	3 WAY PRINTED CIRCUIT CON.
	91-700003	3 WAY PRINTED CIRCUIT CON.
CONN2	91-700003	3 WAY PRINTED CIRCUIT CON.
	91-700003	3 WAY PRINTED CIRCUIT CON.
CONN3	91-700004	4 WAY PRINTED CIRCUIT CON.

USED ON



ALL SOLDERED CONNECTIONS TO BE MADE USING ITEM (6)

REFER TO BOM 20-001602 FOR BALLOONED ITEMS

No	DESCRIPTION	DATE	BY
	ISSUE		
1A	PRODUCTION ISSUE (CR1679)	12/5/00	CCP

DRAWN	DATE
CCP	12/5/00
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

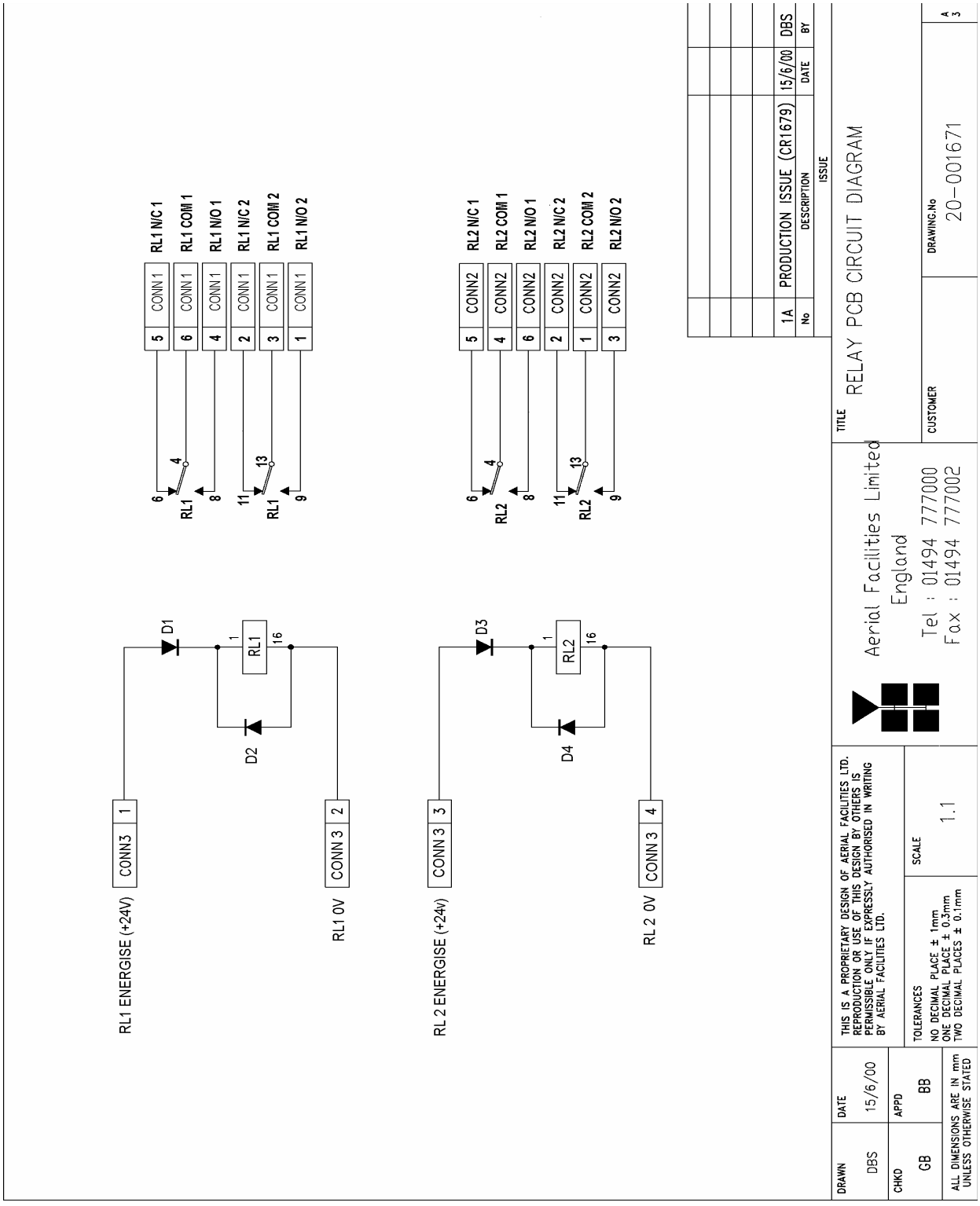
SCALE 2:1

Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
24V RELAY PCB ASSEMBLY

CUSTOMER	DRG.No	ISS
	20-001602	1A

Drg. Nō. 20-001671, Relay Board Circuit Diagram



12V Relay Board (20-001601)

Description

The General Purpose Relay Board allows the inversion of signals and the isolation of circuits. It is equipped with two dual pole change-over relays RL1 and RL2, with completely isolated wiring, accessed via screw terminals.

Both relays are 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.

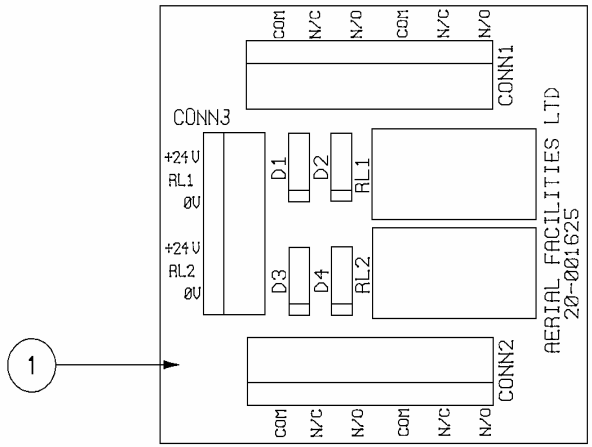
Note that the board is available for different voltages (12 or 24V) depending on the type of relays fitted at RL1 and RL2.

Technical Specification

PARAMETER		SPECIFICATION
Operating voltage:		8 to 30V (floating earth)
Alarm threshold:		Vcc - 1.20 volt ±15%
Alarm output relay contacts:		
Max. switch current:		1.0Amp
Max. switch volts:		120Vdc/60VA
Max. switch power:		24W/60VA
Min. switch load:		10.0µA/10.0mV
Relay isolation:		1.5kV
Mechanical life:		>2x10^7 operations
Relay approval:		BT type 56
Connector details:		Screw terminals
Temperature range	operational:	-10°C to +60°C
	storage:	-20°C to +70°C

Drg. No. 20-001601, 12V Relay Board Assembly Drawing

USED ON	CIRC. REF.	AFL STOCK REF.	DESCRIPTION
	D1	94-100001	1N4148 SIGNAL DIODE
	D2	94-100001	1N4148 SIGNAL DIODE
	D3	94-100001	1N4148 SIGNAL DIODE
	D4	94-100001	1N4148 SIGNAL DIODE
	RL1	96-900007	12V DC DPCO NON-LATCHING RELAY
	RL2	96-900007	12V DC DPCO NON-LATCHING RELAY
	CONN1	91-700005	6 WAY PRINTED CIRCUIT CON.
	CONN2	91-700005	6 WAY PRINTED CIRCUIT CON.
	CONN3	91-700004	4 WAY PRINTED CIRCUIT CON.



ALL SOLDERED CONNECTIONS TO BE MADE USING ITEM (6)

REFER TO B.o.M. 20-001601 FOR BALLOONED ITEMS

USED ON

ISSUE	DATE	CHANGE No
1B	12/5/00	CR1679
1A	3/2/99	CR0962
1	29/6/96	Prod.Iss.

Aerial Facilities Limited

TITLE: 12V RELAY PCB (GENERAL PURPOSE) CIRCUIT & COMPONENT LIST

DRAWN	DATE	CHKD	APPD	CUSTOMER	COMPONENT LIST FOR	ISS
MRB	29/5/96	GB	BB		20-001670C	1B

No	DESCRIPTION	DATE	BY
1B	CR1679	14/6/00	DBS
1A	PRODUCTION ISSUE (CR0962)	26/1/99	SEW
1	PRODUCTION ISSUE	29/5/96	MRB

ISSUE

DRAWN	DATE
DBS	29/5/96
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

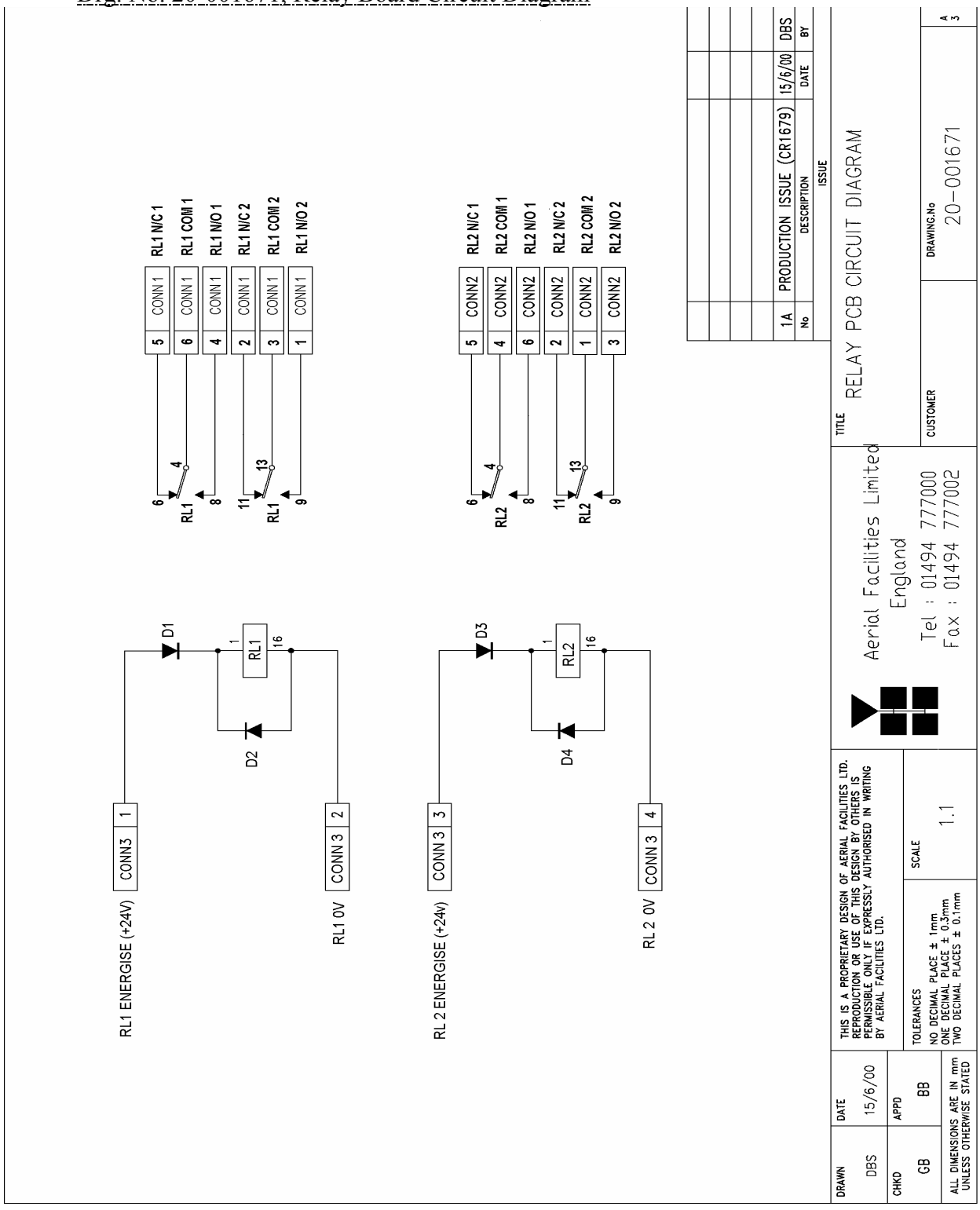
SCALE: 2:1

Aerial Facilities Ltd
England
Tel: (01494)777000
Fax: (01494)777002

TITLE: 12V RELAY PCB,GENERAL PURPOSE ASSEMBLY

CUSTOMER	DRG.No	ISS
	20-001601	1B

Drg. Nō. 20-001671, Relay Board Circuit Diagram



AGC Attenuator Module (17-001201)

The AFL 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. However, in this case only the attenuator is employed as part of the simplex control system.

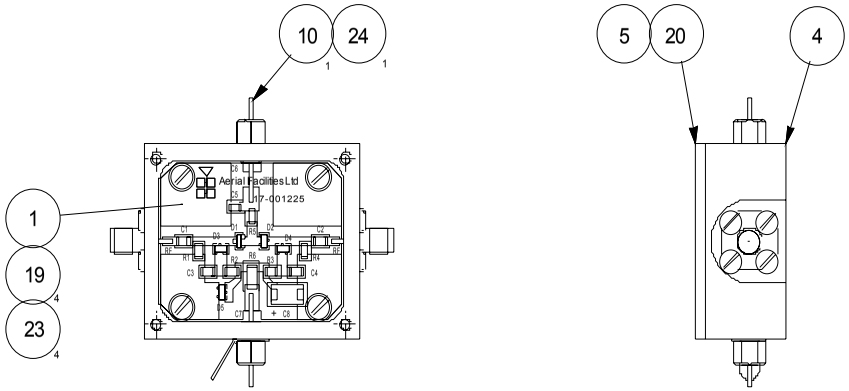
The attenuator comprises a 50Ω P.I.N diode, voltage-variable attenuator with a range of 3 to 30dB. The attenuation is controlled by a DC voltage which is derived in this instance from the associated Simplex controller board.

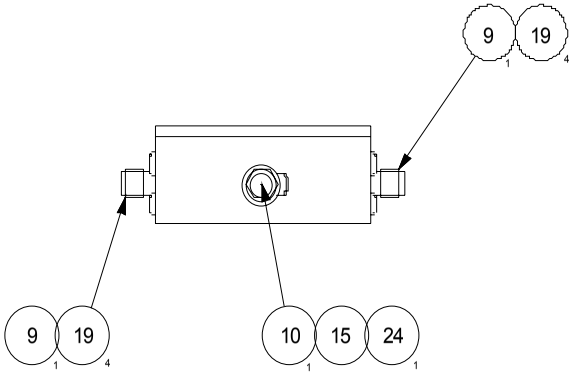
Drg. Nō. 17-002270, AGC Attenuator Circuit Diagram

Drg. Nō. 17-002201, AGC Attenuator Assembly Drawing

USED ON

THIRD ANGLE PROJECTION





TRIM CONDUCTOR TO SUIT BOARD

COMPLETE ALL SOLDERING USING ITEM: 26

No	DESCRIPTION	DATE	BY
1B	CR1679	12/6/00	DBS
1A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
1	CR0563	1/7/94	DBS

ISSUE

DRAWN	DATE
DBS	01/07/94
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm
UNLESS OTHERWISE STATED

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

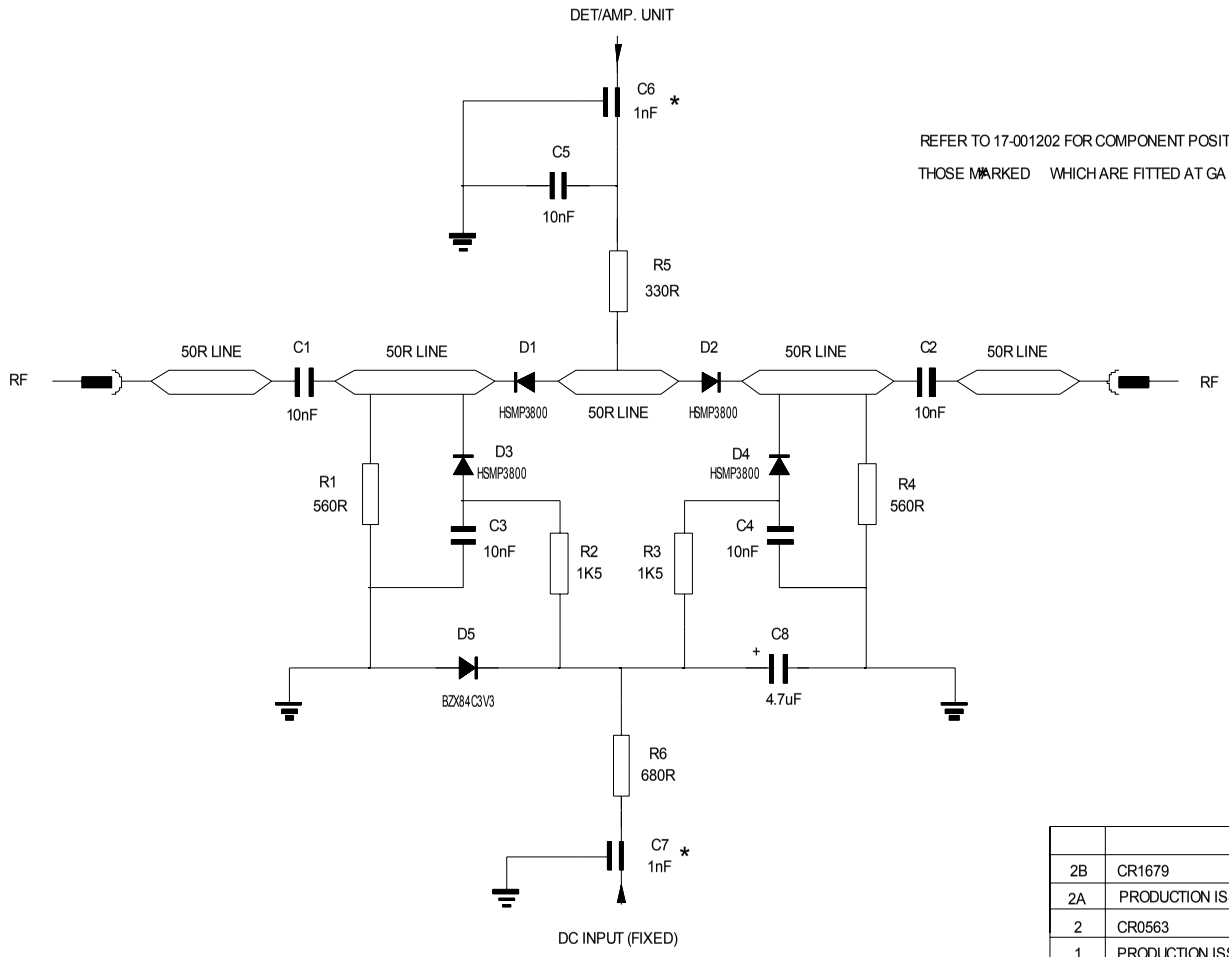
SCALE
1:1

Aerial Facilities Ltd
England
Tel: (01494) 777000
Fax: (01494) 777002

TITLE
CELL ENHANCER AGC UNIT
ATTENUATOR ASSEMBLY

CUSTOMER	DRG.No	ISS
	17-001201	1B

USED ON
17-001202



REFER TO 17-001202 FOR COMPONENT POSITIONS EXCEPT FOR THOSE MARKED * WHICH ARE FITTED AT GA STAGE (17-001201)

No	DESCRIPTION	DATE	BY
	ISSUE		
2B	CR1679	12/6/00	DBS
2A	PRODUCTION ISSUE (CR0962)	25/1/99	SEW
2	CR0563	29/6/94	DBS
1	PRODUCTION ISSUE	23/6/93	DBS

DRAWN	DATE
DBS	23/06/93
CHKD	APPD
GB	BB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

TOLERANCES

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

SCALE

Aerial Facilities Ltd
England

Tel: (01494) 777000
Fax: (01494) 777002

TITLE

CELL ENHANCER AGC UNIT

ATTENUATOR CIRCUIT DIAGRAM

CUSTOMER	DRG No	ISS	
	17-001270	2B	A3

11-007901 1Watt Low Power Amplifier

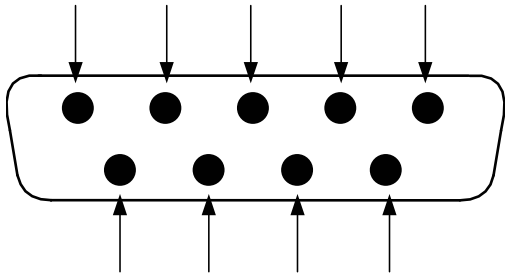
This amplifier is dedicated to be a 1.0 W driver from 380 MHz to 470 MHz. It is a 2 stage amplifier where each stage is in balanced configuration. It demonstrates very high linearity and good input/output VSWR. There is a Current Fault Alarm Function, which indicates failure of each one of the RF transistors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

11-007901 Specifications

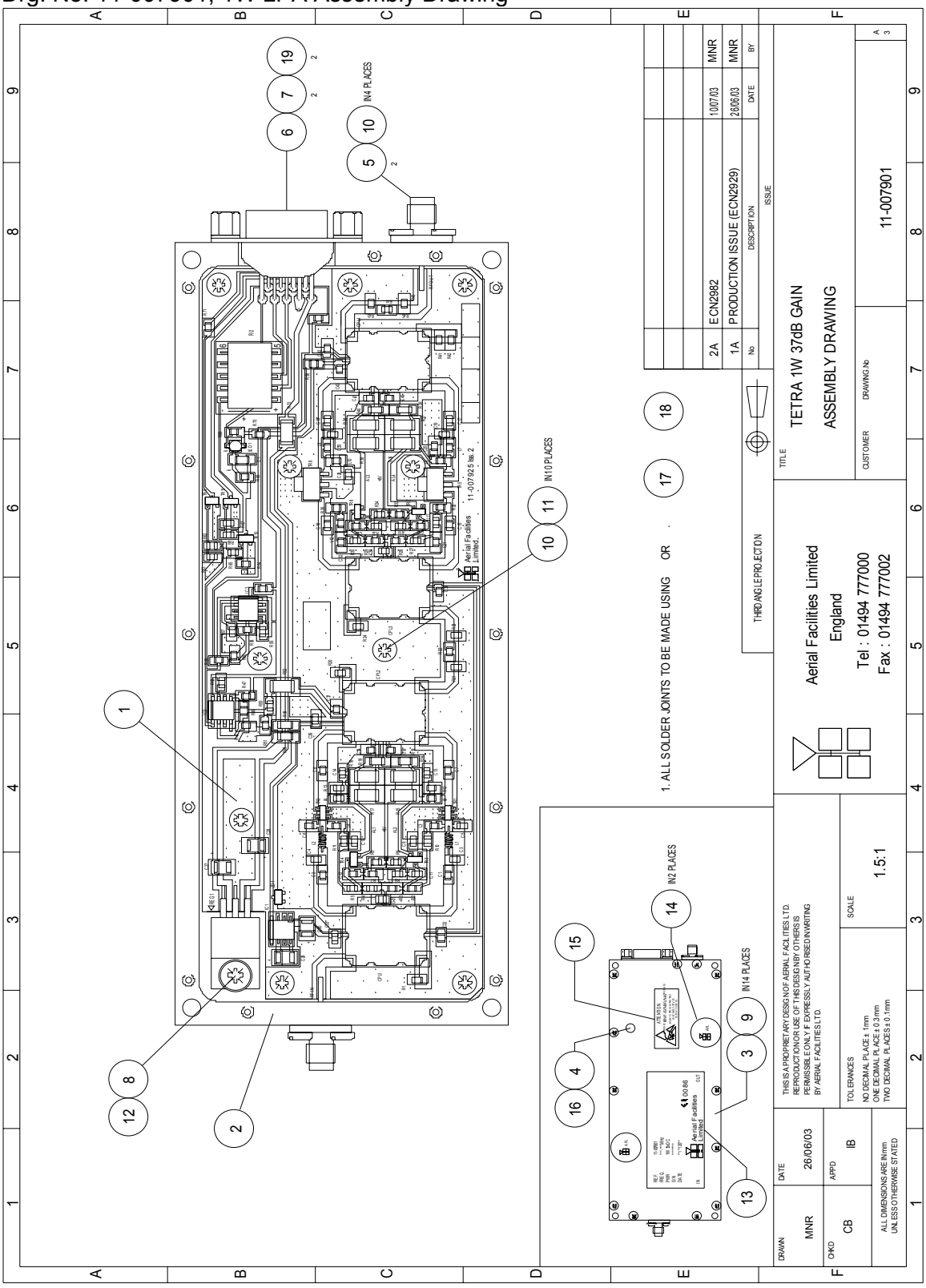
PARAMETER		SPECIFICATION
Frequency range:		380-470MHz
Small signal gain:		37.5dB
Gain flatness:		±0.5dB
Gain vs. temperature:		1.5dB
Temperature range:	operational:	-20°C to +60°C
	storage:	-40°C to +70°C
Input/output return loss:		18dB
Maximum output power:		30.4dBm (@ 1dB comp. point)
OIP3:		43dBm
Supply voltage:		10-15V DC
Current consumption:		780mA (typical)
Noise Figure:		<1.75dB

11-007901 'D' Connector Pin-out details

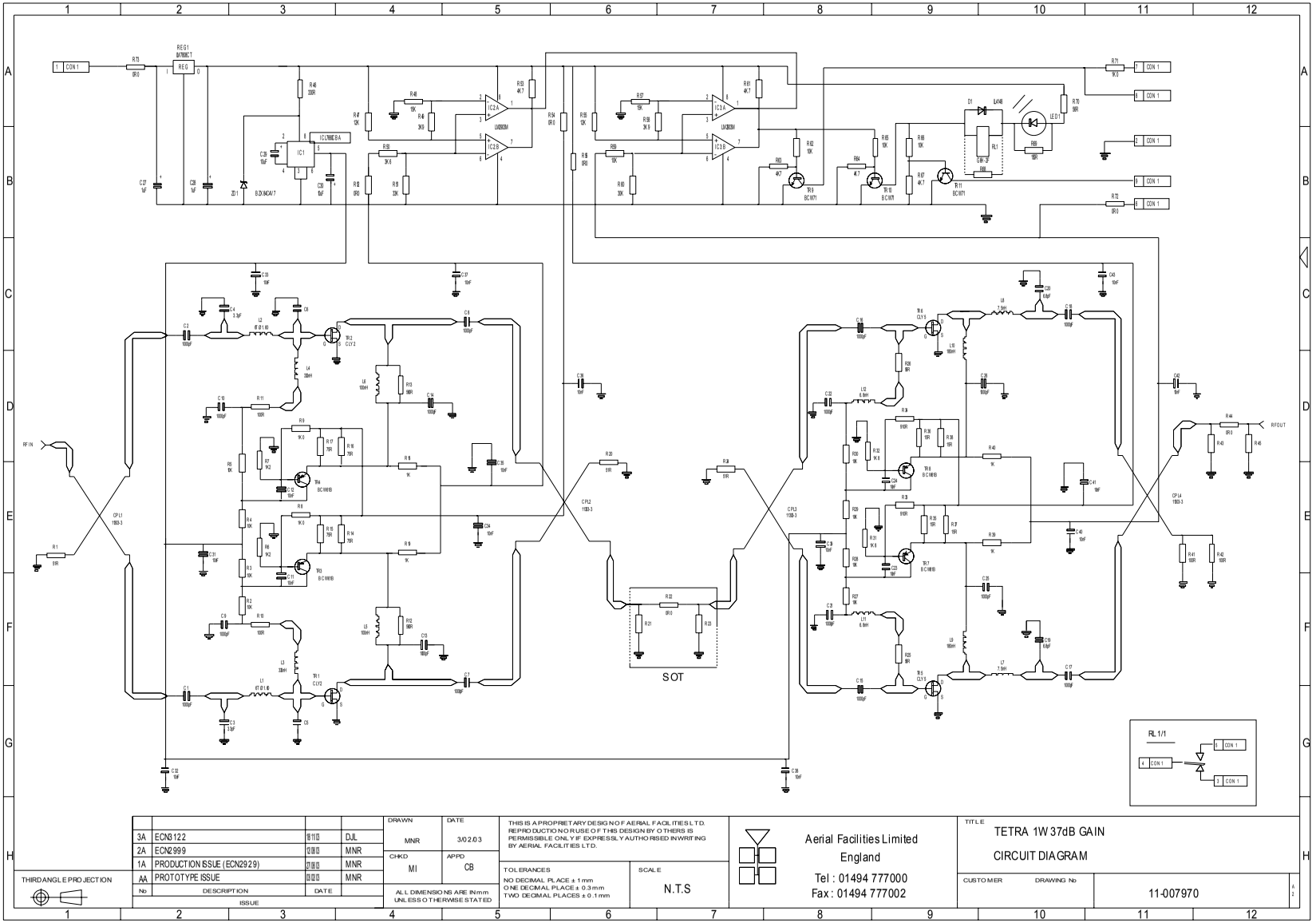
Connector pin	Signal
1	+Ve input (10-24V)
2	GND
3	Alarm relay O/P bad
4	Alarm relay common
5	Alarm relay good
6	No connection
7	TTL voltage set
8	TTL alarm/0V (good)
9	O/C good/0V bad



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



Drg. Nō. 11-007970, 1W LPA Circuit Diagram



3A	ECN3122	16.11.03	DJL
2A	ECN2999	13.08.03	MNR
1A	PRODUCTION ISSUE (ECN2929)	27.06.03	MNR
AA	PROTOTYPE ISSUE	03.02.03	MNR
No	DESCRIPTION	DATE	

ISSUE

THIRD ANGLE PROJECTION

DRAWN: MNR | DATE: 3/02/03
CHKD: MI | APPD: CB

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

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

SCALE: N.T.S

Aerial Facilities Limited
England
Tel : 01494 777000
Fax : 01494 777002

TITLE
TETRA 1W 37dB GAIN
CIRCUIT DIAGRAM

CUSTOMER | DRAWING No: 11-007970

A1

11-007402 Low Noise Amplifier

Description

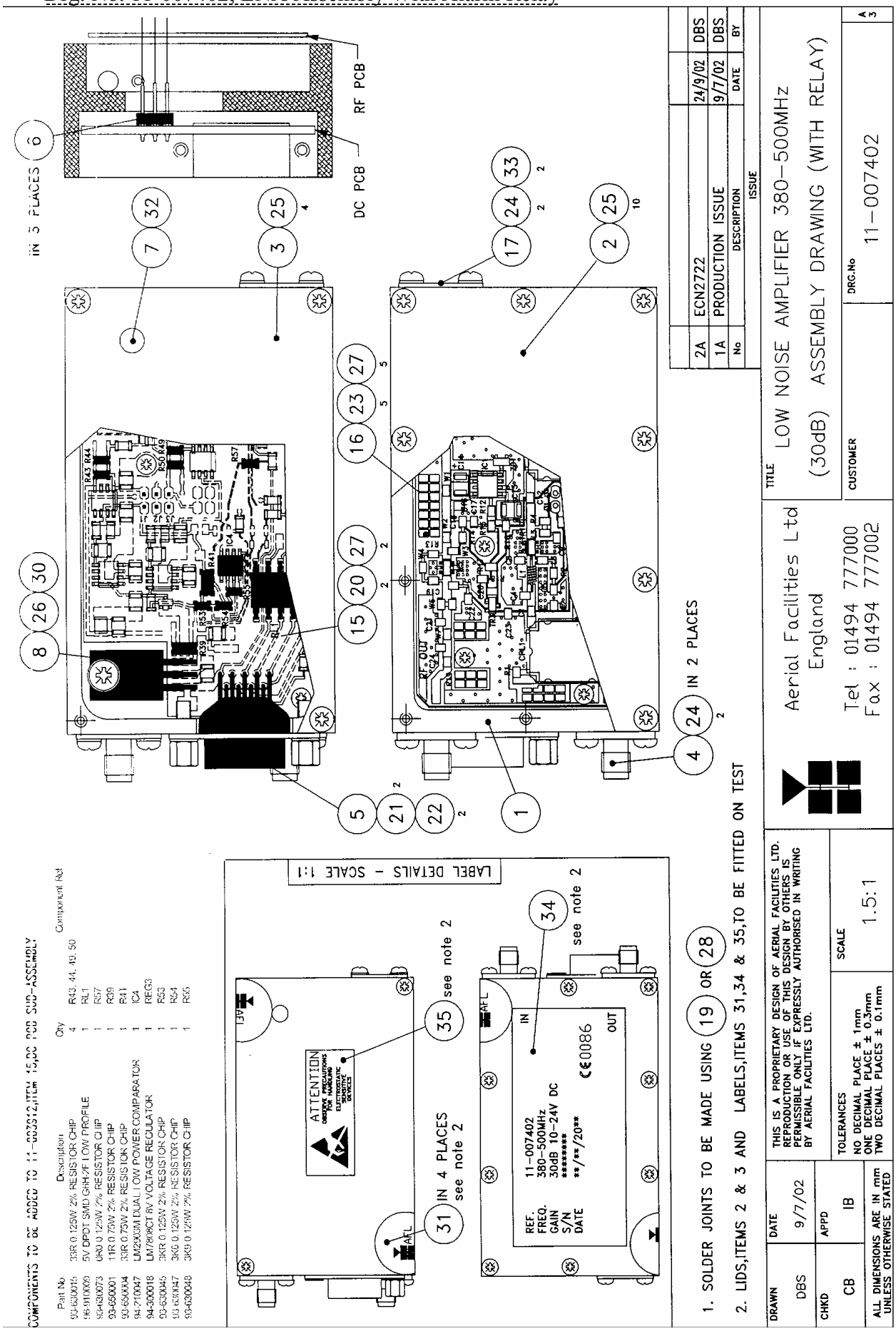
The low noise amplifier used is a double stage solid-state low-noise amplifier. Class A circuitry is used in the unit to ensure excellent linearity over a very wide dynamic range. The two active devices are very moderately rated to provide a long trouble-free working life. There are no adjustments on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

Technical Specification, 11-007402

PARAMETER		SPECIFICATION
Frequency range:		380-500MHz
Bandwidth:		<140MHz
Gain:		30dB
1dB Compression point:		+22dB (typical)
3rd order intercept:		+34.8dB (typical)
Input/Output return loss:		>19dB
Noise figure:		<1.3dB
Connectors:		SMA female
Supply:		300-330mA @ 10-24V DC
Temperature range	operational:	-20°C to +60°C
	storage:	-40°C to +70°C
Weight:		<300gm
Size:		90 x 55 x 30.2 (case only)

LNA 'D' Connector Pin-out details

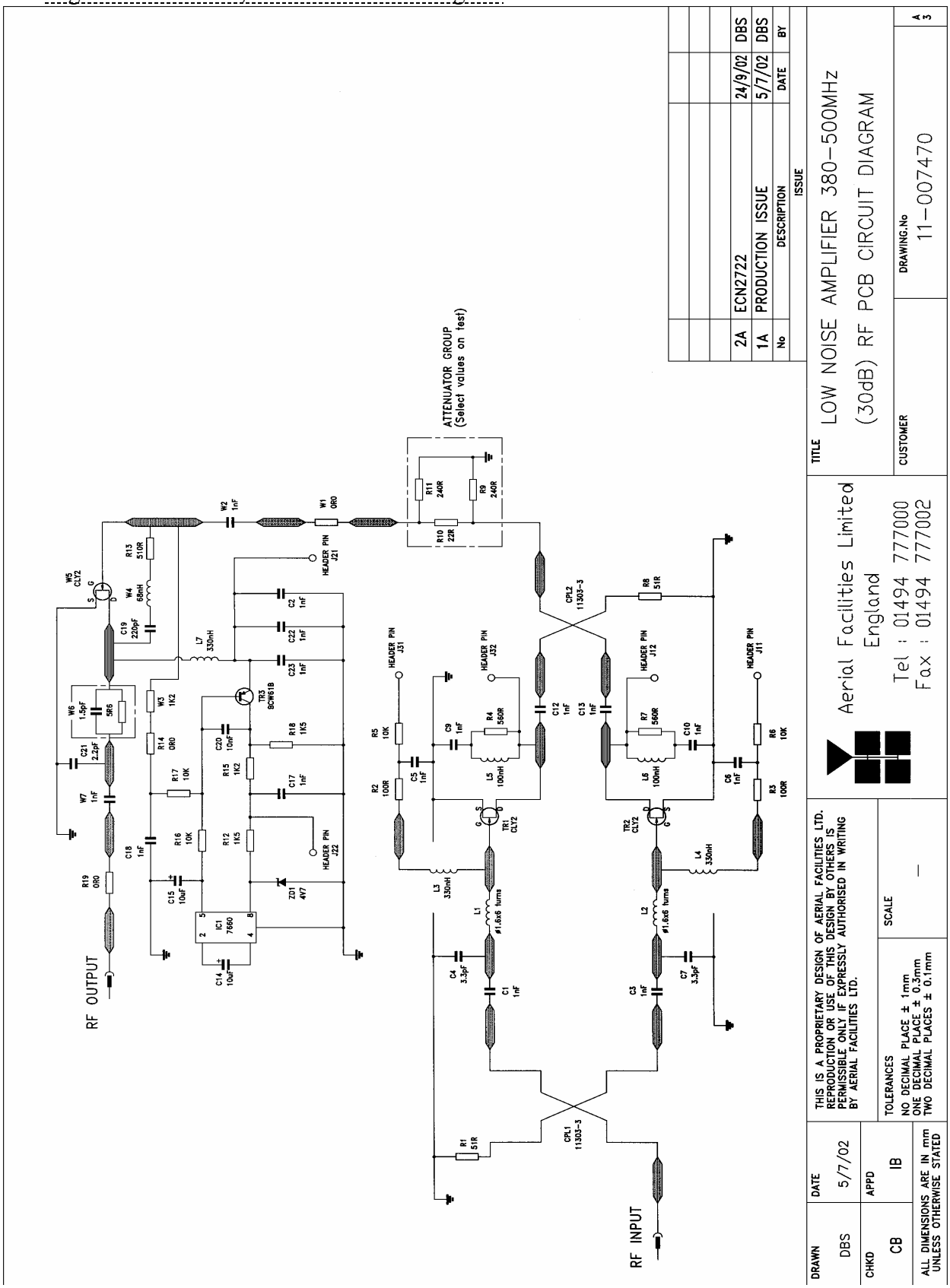
Connector pin	Signal
1	+Ve input (10-24V)
2	GND
3	Alarm RelayO/P bad
4	Alarm Relay common
5	Alarm Relay good
6	No connection
7	TTL voltage set
8	TTL alarm/0V (good)
9	O/C good/0V bad



COMPONENTS TO BE ADDED TO 11-007312,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
46-910009	5V DPDT SMD G6H-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
94-210047	LM2903M DUAL LOW POWER COMPARATOR	1	IC4
94-300018	LM78M08CT 8V VOLTAGE REGULATOR	1	REG3
93-630045	3K3 0.125W 2% RESISTOR CHIP	1	R53
93-650047	3K6 0.125W 2% RESISTOR CHIP	1	R54
93-630048	3K9 0.125W 2% RESISTOR CHIP	1	R56

Drg. Nō. 11-007470, LNA RF Circuit Diagram



No	DESCRIPTION	DATE	BY
2A	ECN2722	24/9/02	DBS
1A	PRODUCTION ISSUE	5/7/02	DBS

ISSUE

TITLE: LOW NOISE AMPLIFIER 380–500MHz (30dB) RF PCB CIRCUIT DIAGRAM

CUSTOMER

DRAWING.No: 11–007470

A3

Aerial Facilities Limited
England
Tel : 01494 777000
Fax : 01494 777002

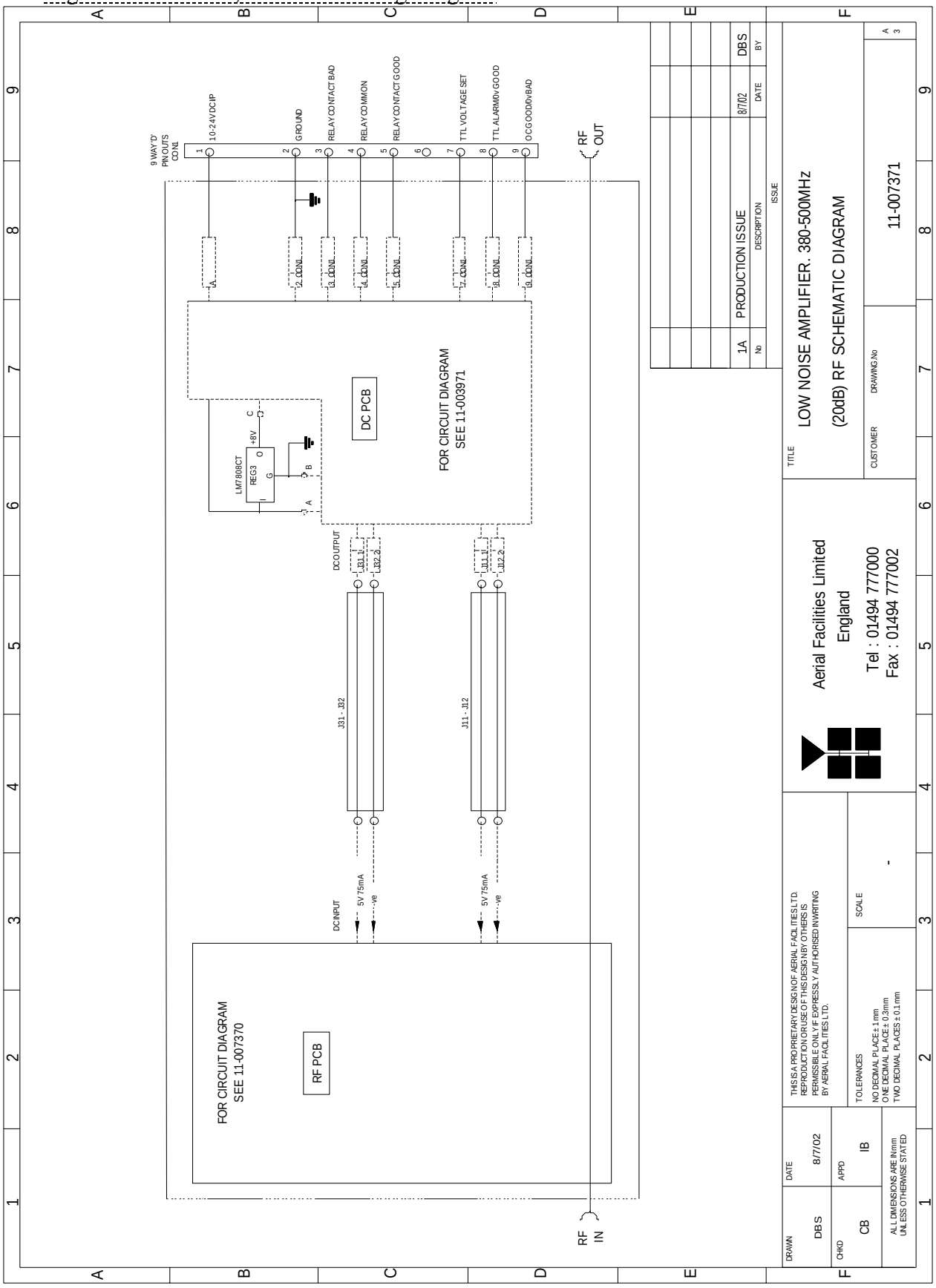
DRAWN	DATE
DBS	5/7/02
CHKD	APPD
CB	IB

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

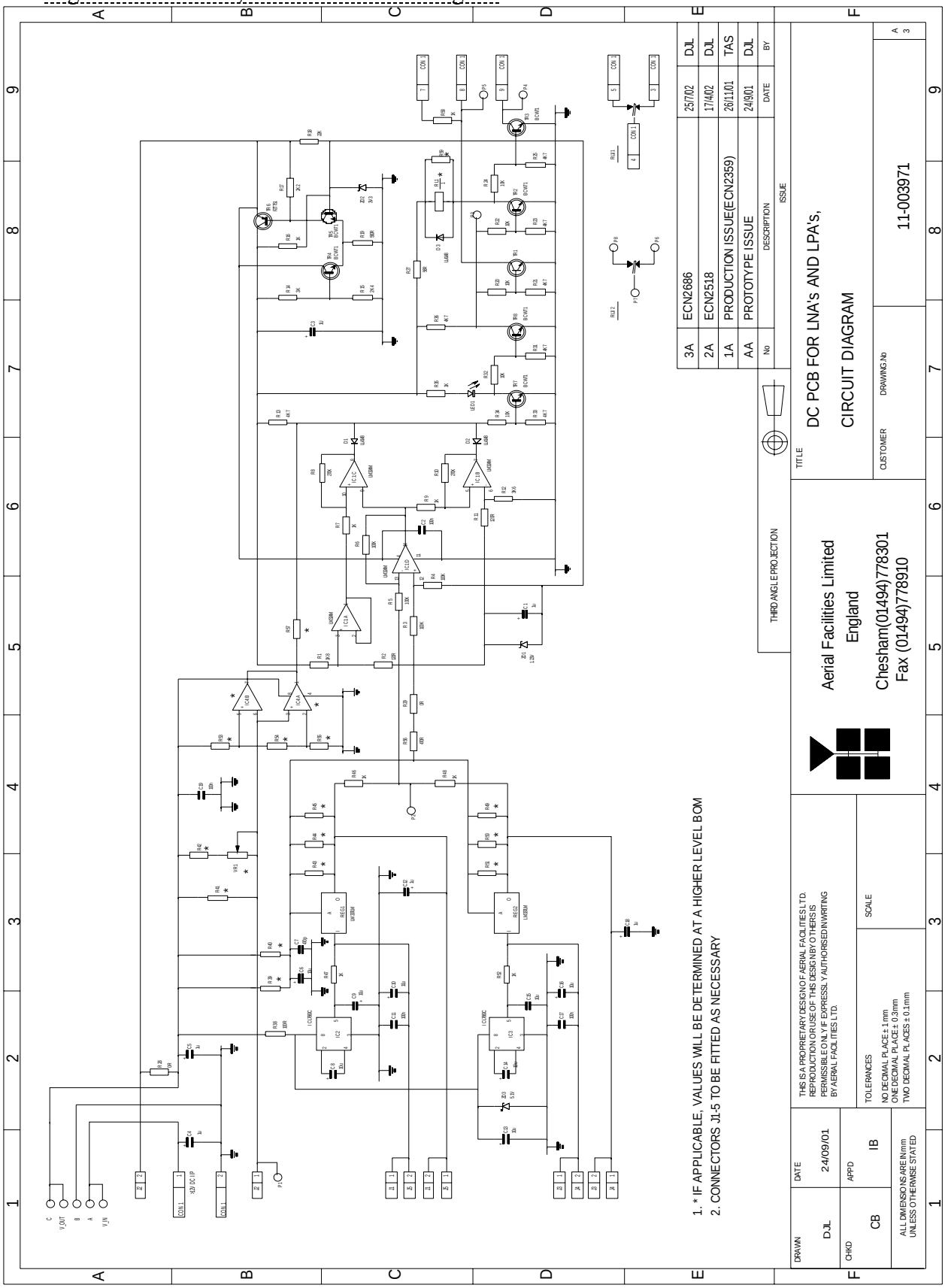
SCALE: —

ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED

Drg. Nō. 11-007371, LNA DC Wiring Diagram



Drg. Nō. 11-003971, LNA DC Circuit Diagram



Switched Attenuator 0-30dB 0.25W (10-000701)

10-000701 provides attenuation from 0 - 30dB in 2 dB steps The attenuation is simply set using the four miniature toggle switches on the top 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.

10-000701 Specification

PARAMETER		SPECIFICATION
Attenuation Values		0-30dB
Attenuation Steps		2, 4, 8 and 16dB
Power Handling		0.25 Watt
Attenuation Accuracy		± 1.0 dB
Frequency Rang		DC to 1GHz
Impedance		50Ω
Connectors		SMA
VSWR		1.3:1
Weigh		0.2kg
Temperature range	operation	-20°C to +60°C
	storage	-40°C to +70°C

0.25Watt 0- -30dB Switched Attenuator (10-000701)

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.

Switched Attenuators

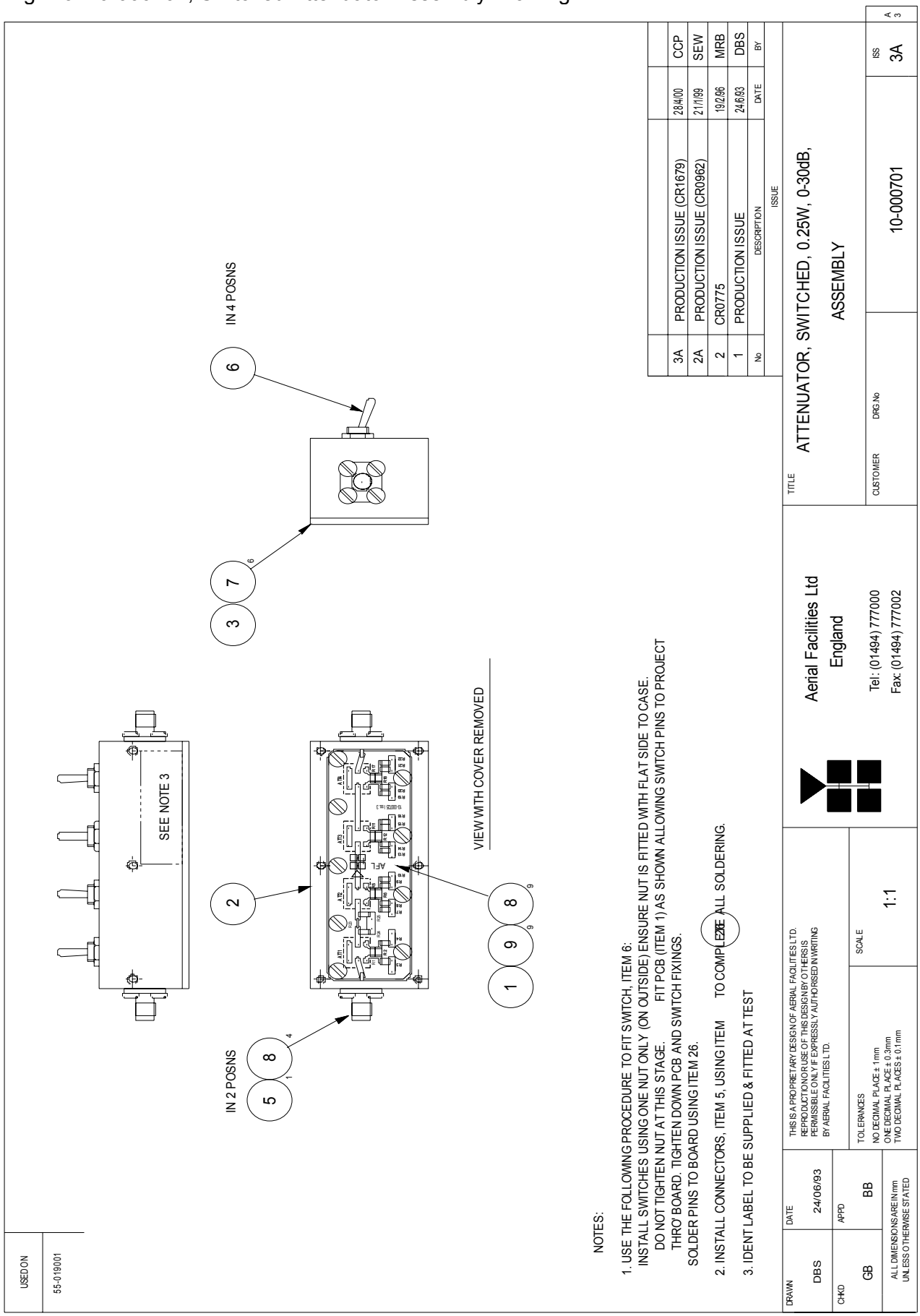
The AFL switched attenuators are available in two different types; 0 – 30dB in 2 dB steps (as in this case), or 0 – 15dB in 1 dB steps. The attenuation is simply set using the four miniature toggle switches on the top of each unit. Each switch is clearly marked with the attenuation it provides, and the 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.

10-000703 extended lid

10-000701 provides attenuation from 0 – 30dB in 2 dB steps The attenuation is simply set using the four miniature toggle switches on the top 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.

Attenuation Values:	0-30dB part number 10-000701 & 10-000703
Attenuation Steps:	2,4,8 and 16dB
Power Handling:	0.25 Watt
Attenuation Accuracy:	± 1.0 dB
Frequency Range	DC to 1GHz
Connectors:	SMA
VSWR:	1.3:1
Weight	0.2kg

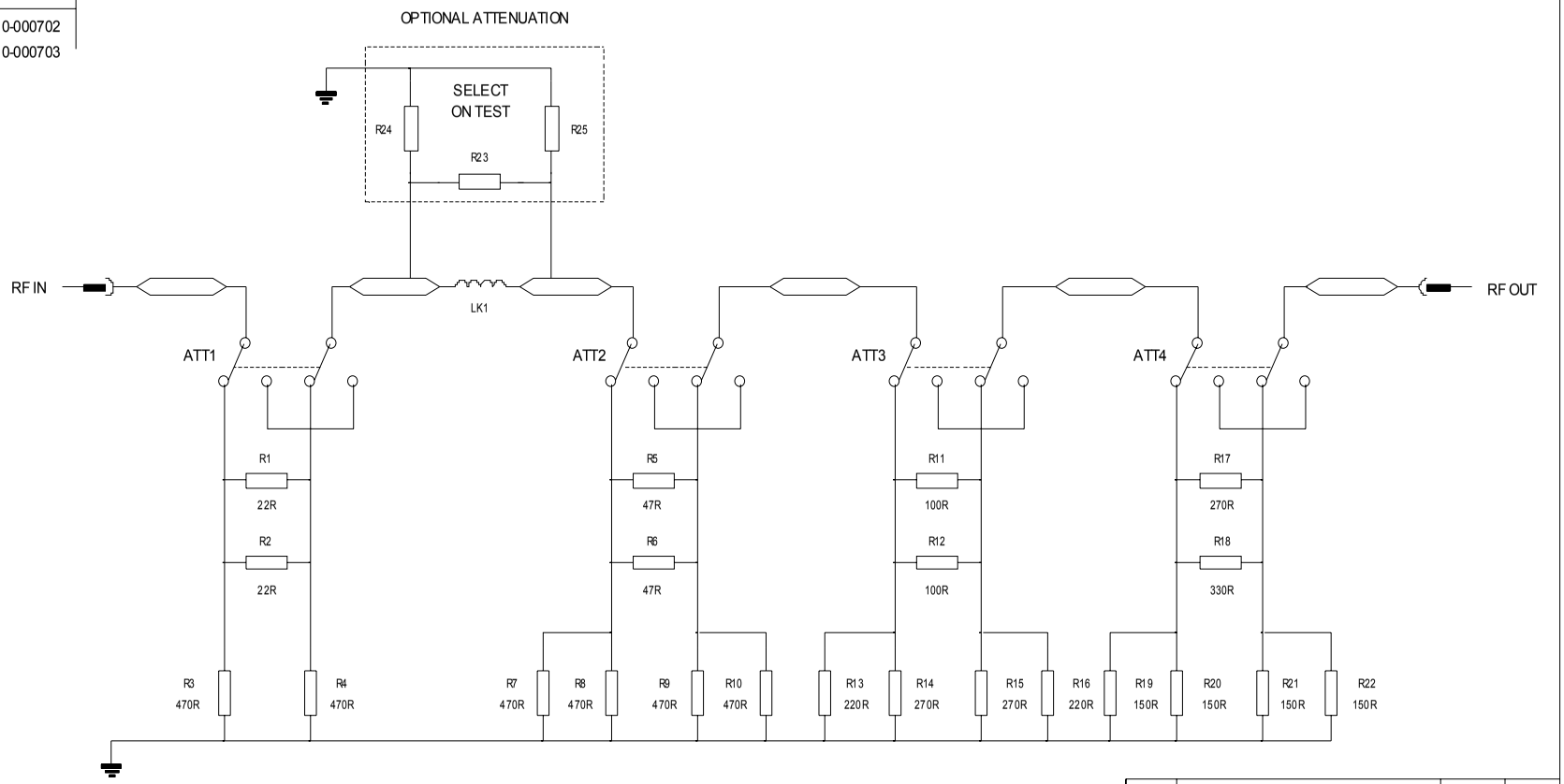
Drg. Nō. 10-000701, Switched Attenuator Assembly Drawing



Drg. Nō. 10-000770, 0-30dB Attenuator Circuit Diagram

USEDON

10-000702
10-000703



REFER TO PCB SUB-ASSEMBLY FOR FURTHER COMPONENT INFORMATION

AREAS SHOWN THUS: SIGNIFY 50 ohm STRIPLINE.

No	DESCRIPTION	DATE	BY
1A	PRODUCTION ISSUE (CR0962)	21/1/99	SEW
1	PRODUCTION ISSUE (CR0482)	25/6/93	DBS

ISSUE

DRAWN	DATE
DBS	25/06/93
CHKD	APPD
ALL DIMENSIONS ARE IN mm UNLESS OTHERWISE STATED	

TOLERANCES

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

SCALE

Aerial Facilities Ltd
England

Tel: (01494) 777000
Fax: (01494) 777002

TITLE

ATTENUATOR, SWITCHED, 0.25W, 0-30dB,

CIRCUIT DIAGRAM

CUSTOMER	DRG.No	ISS	
	10-000770	1A	A3