

3.1. UHF Bandselective, BDA (55-199102) List of major sub modules

Component Part	Component Part Description	Qty Per Assembly
02-010701	Bandpass Filter	6
05-002603	3dB Splitter/Combiner	2
10-001725	Remote Attenuator Switch Assembly	2
12-021601	5 Watt Tetra Amplifier	1
12-026901	Linearised Power Amplifier	2
13-001714	Voltage Regulator	2
13-003011	DC/DC Converter	1
17-017301	Bi-Directional Amplifier	1
80-008901	12V (Single) Relay Board	1
96-300054	24V Switch-Mode PSU	1

3.2. UHF Bandselective, BDA (55-199102) Specification.

Parameter		Specification
Passband	Uplink	415 - 418MHz
	Downlink	406 - 409MHz
Passband gain		90dB
Power Amplifier	Uplink	5 Watt
	Downlink	40 Watt
Passband Ripple		<±1.5 dB
I/P Return Loss		> 14dB
1dB Compression	Uplink	+35dB
	Downlink	+45dB
OIP3	Uplink	+48dBm
	Downlink	+62dBm
Noise Figure		<4dB (max.gain)
In Band Spurious Noise 30kHz Bandwidth		< -13 dBm (at 90dB gain)
Uplink ALC Setting		1dB below 1dB Comp.
Switched Attenuator (U/L & D/L)		2 dB steps 2-30dB (± 1dB)
Power Supply Current Rating		400W , 17A @ 24VD.C.
Alarm Output Type		Local Alarms
AC Supply Voltage		110V AC
RF Connectors		N type female
Temperature range:	operation:	-20°C to +60°C
	storage:	-40°C to +70°
Case Size (excludes h/sinks handles etc.)		620x420x250 mm

4. UHF BANDSELECTIVE, BDA (55-199102) SUB MODULES

4.1. Bandpass Filter (02-010701)

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.

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.

02-010701 Specification

PARAMETER		SPECIFICATION
Response type:		Chebyshev
Frequency range:		415 - 418MHz (uplink) 406 - 409MHz (downlink)
Bandwidth:		3 MHz
Number of sections:		5
Insertion loss:		1.7 dB (typical)
VSWR:		better than 1.2:1
Connectors:		SMA
Power Handling:		100W max
Temperature range	operation:	-20°C to +60°C
	storage:	-40°C to +70°C
Weight:		3 kg (typical)

4.2. 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 Ω 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 Ω
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)

4.3. Remote Attenuator Switch Assembly ('10-001725')

The remote attenuator switch assembly is used to control the amount of signal attenuation in the sub-module, Bi-Directional Amplifier (17-017301). The switch assembly is mounted on the inside of the Bandselective BDA (55-199102) case and consists of four miniature toggle switches, one row for uplink and one row for downlink, built around the remote attenuator switch PCB (10-001725)

The switch assembly allows attenuation settings from 0 – 30dB in 2 dB steps. The attenuation is simply set using the four miniature toggle switches. Each switch is clearly marked with the attenuation it provides, and the total attenuation in line is the sum of the values switched in. The attenuators that the switches control are integral to sub-module Bi-Directional Amplifier (17-017301).

4.4. 5 Watt Tetra Amplifier (12-021601)

The power amplifier fitted to this unit 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.

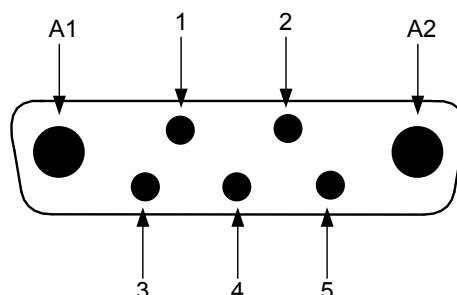
The unit housing is an aluminium case (Iridite NCP finish) with SMA connectors for the RF input/output and a D-Type connector for the power supply and the Current Fault Alarm Function.

12-021601 Specification

PARAMETER		SPECIFICATION
Frequency range:		380-470MHz (as required)
Bandwidth:		10-40MHz (typical, tuned to spec.)
Maximum RF output:		>5Watts
Gain:		>30dB
1dB compression point:		+37.5dBm
3 rd order intercept point:		+50dBm
VSWR:		better than 1.5:1
Connectors:		SMA female
Supply:		1.9Amps @ 12V DC
Weight:		1kg (excluding heatsink)
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C

7-Way Connector Pin-out details	
Connector Pin	Signal
A1 (large pin)	+10-24V 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)

7-Way Pin-Out Graphical Representation



4.5. Linearised Power Amplifier (12-026901)

The power amplifier fitted to (this unit) 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.

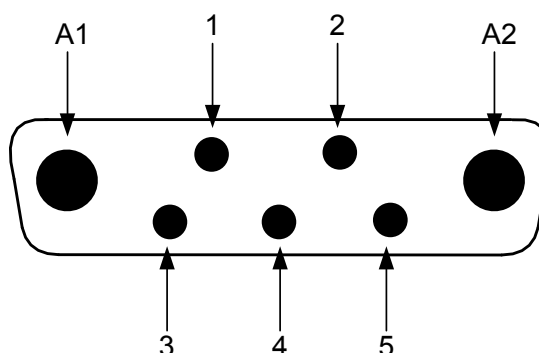
The power amplifier should require no maintenance over its operating life. Under no circumstances should the cover be removed or the side adjustments disturbed unless it is certain that the amplifier has failed; since it is critically aligned during manufacture and any re-alignment will require extensive test equipment. The amplifier has a D-Type connector for the power supply and a Current Fault Alarm Function.

12-026901 Specification

PARAMETER		SPECIFICATION
Frequency range:		380-440MHz (tuned to spec.)
Bandwidth:		<60MHz (typical)
Maximum RF output:		>25Watt
Small signal gain:		37.5dB (typical)
1dB compression point:		+44dBm
3 rd order intercept point:		+61dBm
Noise figure:		N/A
Return input loss:		>15dB
Return output loss:		>15dB
VSWR:		better than 1.5:1
RF 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

12-026901 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)

7-Way Connector Graphical Representation



4.6. Voltage Regulator Board 9.0V (13-001714)

This unit it is used to derive a fixed voltage power supply rail from some higher voltage. In this instance it is used to derive 9V from a 12V input.

The circuit is based upon a fixed voltage regulator, which is capable of supplying a maximum of 2.0 A output current. Note that at full output current the dissipation of the device must remain in limits, bearing in mind the voltage which is being dropped across it. The maximum allowable dissipation will also depend on the efficiency of the heatsink on which the device is mounted.

13-001714 Specification

PARAMETER		SPECIFICATION
Operating voltage:		12V DC
Output voltages:		9.0V
Output current:		2.0A (maximum per o/p)
Connections:		Screw Terminal Block
Temperature range:	operational:	-10°C to +60°C
	storage:	-20°C to +70°C
PCB Size:		30.5 x 38.1mm

4.7. DC/DC Converter, 24V in, 12V 8A out (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

4.8. Bi-Directional Amplifier (17-017301)

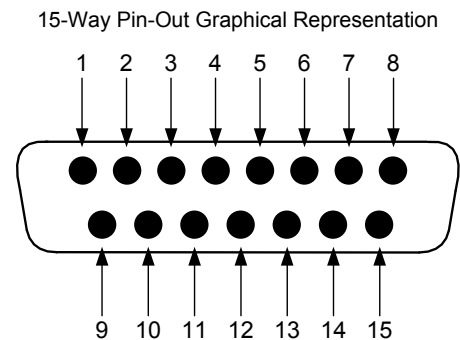
This module is a Bi-Directional Amplifier (up-link and down-link). All the amplifier stages are of balanced type and there is additionally digital attenuation, automatic level control (ALC) in the uplink path and also Current Fault Alarm Function circuitry, which indicates failure of each RF transistor in various ways – open collector, closed collector (TTL) and a relay to indicate the failure by voltage free change over contacts.

The module is housed in an aluminium case (Iridite NCP finish) with SMA connectors for the RF input/output and a D-type connector for power supply and Current Fault Alarm Function.

Specification 17-017301

PARAMETER	SPECIFICATION
Frequency Range MHz	380-430
Gain	64 - 66 dB
Gain Flatness	2.0 dB
ΔGain vs. Temp.	2.5 dB Max
ALC dynamic Range	≥ 28 dB Min
ALC o/p power level	29 ± 0.5 dBm Min
Input Return Loss	≤ 15 dB Min
Output Return Loss	≤ 18 dB Min
P1dB	≥ 30 dBm Min
OIP3	≥ 41 dBm Min
Noise Figure	≤ 1.7 dB Max
DC Supply	9.0V ± 0.5 at 1120 mA Max
Max RF Input	+15dBm
Storage temperature	-40 to +100 °C
Operating temperature	-20 to +70 °C
Dimensions	291.0 x 165.6 x 28.5 mm

BDA 'D' Connector Pin-out details	
Connector pin	Signal
1	+ve input (9V)
2	+ve input (9V)
3	GND
4	GND
5	Alarm relay good
6	Alarm relay common
7	Alarm relay O/P bad
8	Attenuator In
9	Detector Out
10	Digital Attenuator Bit 1
11	Digital Attenuator Bit 2
12	Digital Attenuator Bit 3
13	Digital Attenuator Bit 4
14	Not Used
15	Not Used



4.9. 12V (Single) Relay Board (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. It's common use is to amalgamate all the alarm signals into one, volts-free relay contact pair for the main alarm system.

Specification 80-008901

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

4.10. 24V Switch-Mode PSU (96-300054)

The power supply unit is a switched-mode type capable of supplying 24V DC at 17.0Amps 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.

96-300054 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:	17A