

Installation and Operating handbook

PBU Series II Block UpConverter

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**IMPORTANT NOTE: THE INFORMATION AND SPECIFICATIONS
CONTAINED IN THIS DOCUMENT SUPERSEDE ALL PREVIOUSLY
PUBLISHED INFORMATION CONCERNING THIS PRODUCT**

Peak Communications Ltd maintains a continuing programme of product improvement and therefore reserves the right to change specifications without notice

PBUseries L-Band to SHF Band remote mounted Block Up Converter



Unit description

The PBU Series II remote mounted Block Up Converters from Peak Communications are designed to be fully compatible with a wide range of L-Band modulators and frequency converters. These high grade units are designed to accept the signal at L-band and provide a further conversion to the appropriate SHF band. The PBU Series II units will connect to any system providing the correct DC, Reference and Input parameters such as the P7000 range of frequency converters.

The output power is normally sufficient to fully drive a Power Amplifier unit and is frequency locked to the indoor unit by the 10MHz reference typically provided by a P7000 series unit. The unit is packaged in a diecast IP67 box with integral mounting lugs for easy mounting.

The PBU series are designed to operate over a wide range of L-Band and 10MHz power level inputs. The unit is temperature compensated to avoid long warm up periods.

The internal construction of the unit is modular which give some flexibility in accommodating customers' requirements such as gain and frequency. The unit is powered from the RF cable which carries the DC, 10MHz reference signal and L-band. Levels of these are given in the unit specification. Where very long lengths of cable are used an additional gain can be incorporated as an option.

The incoming RF and DC are split into their components inside the unit to give DC to power the DRO unit and the amplifier. The 10 MHz is passed to the DRO to lock the frequency and the L-Band is passed on to the mixer. At all stages the components have isolators or attenuators to ensure correct matching is maintained. The L-band signal is combined with the LO in the mixer and is passed out to the filter.

The bandpass filter used in this unit is a waveguide filter which gives an excellent performance of low loss, good rejection of the LO other mixer products and a flat response. The output of the filter is passed out to the low noise amplifier via an isolator.

The 25dB amplifier fitted is a standard low noise unit and is output via an isolator to the N-type socket. With the losses incurred in the RF strip the gain of the whole system with the amplifier is typically 17dB.

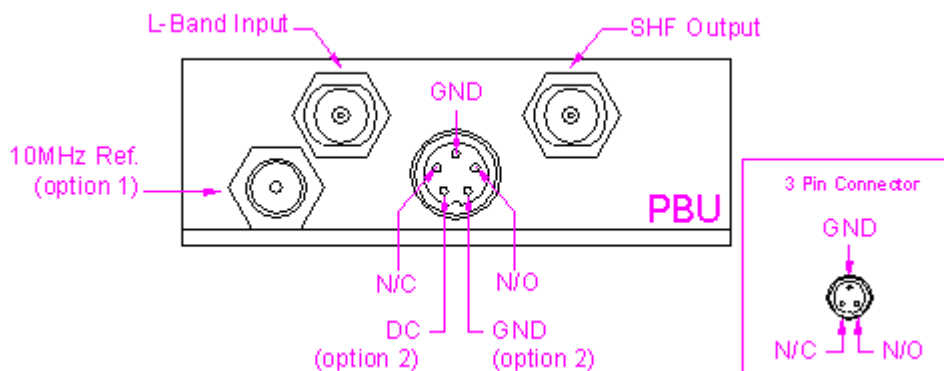
The third socket on the base of the unit is for an alarm cable. The alarm output is normally configured as a summary of 'external reference disconnected' and 'LO alarm' ('DRO out of lock') and 'no power to the unit'. Special configurations are available for applications where the user does not want 'external reference disconnected' to trigger an alarm.

Both the NO and NC sides of the relay are available on this connector.

The PBU series was designed to be operated, using an external 10MHz reference signal generated by the P7000 series UpConverter or a station reference signal. This ensures the output frequency is as accurate as the external reference and that the stability is very high. In some cases it is not possible to supply the external reference signal to the PBU or if the external reference signal is lost during transmission, there is an automatic reference detection system within the unit that detects a missing reference and enables the internal reference. The internal reference is in itself very stable and suitable for professional broadcast applications, details of performance are provided on the data sheet.

As an option a fourth socket can be fitted which is for an external 10MHz reference and is usually a TNC connector. The operation for the 10MHz system is the same for a standard unit with the same alarms and internal reference detection circuitry. Also as an option the DC can be supplied on the alarms socket. The DC and ground connections are placed on the extra pins, as shown in the diagram. If the above options are fitted the composite arrangement of L-Band, 10MHz and DC being fed up the RF cable does not apply to the unit.

Installation



Connection panel view of PBU Units

The unit has integral brackets on the box for attachment to a suitable fixture. The cables are all connected to one face which is the shorter side and the spacing of the four 5mm holes are 80mm apart and 190mm apart. The unit is cast aluminium and will break if excessive force is used.

Attach the N-type feed wire carrying the L-Band signal (plus 10MHz reference and DC, as appropriate) to the socket marked 'RF IN'. Note that in very sensitive applications a clip-on ferrite on this line will ensure minimisation of any spurious signals. EMC tests show the unit to be very 'quiet' for radiation with the highest detectable single frequency to be 50MHz.

Output of the unit is an N-type socket marked 'RF OUT'. Check out all cables for shorts before connecting and ensure the connections are weatherproofed. The output of the unit has an isolator fitted which has a low DC tolerance and connecting the cables round the wrong way may cause damage.

Notes;

- Units are normally supplied with a 5-pin alarms connector, but older units may carry a 3-pin connector which is shown in the diagram above.
- N/C (NORMALLY CLOSED) defined as; shorted to ground with no power, open circuit when working OK.
- N/O (NORMALLY OPEN) defined as; open circuit with no power, short to ground when working OK.

The rating of the relay contacts is as follows;

Switch Voltage (Max)	100V
Switch Current (Max)	0.5A
Switch Power (Max)	10W
Contact resistance	0.2 Ω
Operate/release	0.5 ms

Connections to a Peak P7000 series Synthesised Converter

It is recommended that connections between the Block UpConverter and the P7000 series units are made with the connections as shown below;

Block Up Converter (with 3-pin connector)	P7000 series Alarms connector	
Function	Pin Number	Function
Ground	15	Ground
N/O	11	Ext Alarm (1)

Block Up Converter (with 5-pin connector)	P7000 series Alarms connector	
Function	Pin Number	Function
Ground	15	Ground
Ground (option 2)	User to supply	
DC Input (option 2)	User to supply	
N/O	11	Ext Alarm (1)

With this configuration a power failure or out of lock situation will give a non-grounding signal to pin 11 of the alarms D-Type connector which will cause the summary 'ALARM LED' to flash and show 'EXT ALARM' on the P7000 series display. See the P7000 series manual for more details of alarms.

Operation

Refer to the specification of the Block UpConverter with specific regard to signal levels. Ensure the TX alarm is not flashing on the P7000 series display.

All PBU series units are designed so that 950 MHz converts to the lowest SHF frequency of the block.

For convenience an SHF frequency can be input directly on the P7000 series. Ensure the SHF is turned ON to allow this frequency to be entered. The frequency limits will depend on the Local Oscillator frequency set. Please refer to the P7000 series manual for details of the SHF display facility.

With a gain of 17dB and a maximum output of +8dBm the maximum composite input power is -9dBm.

The 10MHz reference signal, if provided, should be 0dBm +/-3dB. Lock can be achieved down to -10dBm, but this gets progressively more susceptible to interference.

The Alarm output is normally configured as a summary of 'external reference disconnected' and 'LO alarm' ('DRO out of lock') and 'no power to the unit'. Special configurations are available for applications where the user does not want 'external reference disconnected' to trigger an alarm.

Maintenance

The unit is maintenance free but the following should be considered.

If the unit has been opened for any reason and the unit is in a hostile atmosphere additional sealing of the box is advised.

The only monitoring position on the DRO is the monitor pin which should read 6 volts in lock position. Adjustment is made by the tune screw in the top of the DRO unit but the tuning is coarse and caution should be exercised as it is possible to make the unit lock to another frequency. For example the 12.80 GHz DRO used for the Ku band unit can be locked 50 MHz either way. A spectrum analyser or frequency counter is required for this adjustment. On some DRO units the tune screw is glued to prevent movement during transit.

Typical PBUseries Specification

Note this typical specification may not match exactly the specification on which a unit is sold or the current data sheet, please see web site for latest specification.

L-Band Input

Frequency	950-1700MHz
Connection	50Ω N-type
Return loss	>15dB

Output

Frequency	dependant upon SHF frequency range
Connector	50Ω N-type
Return loss	>18dB
1 dB GCP	+ 8dBm

Transfer Characteristics

Conversion gain	17dB ±1dB at band centre
Gain stability	±0.5dB from 0 to 40°C (-0.026dB per +°C)
Gain flatness	±1dB full band ±0.5dB across any 40MHz in band.
LO Frequency	dependant upon SHF frequency range

RF Performance

LO Phase noise (typical with good phase noise 10MHz ref)	-75dBc/Hz at 100Hz -92dBc/Hz at 1kHz -100dBc/Hz at 10kHz -107dBc/Hz at 100kHz -125dBc/Hz at 1MHz
Spurious	<-80dBm (in band non-carrier related) <-75dBc (in band carrier related)
3rd Order Intercept	>+18 dBm

LO leakage <-80 dBm (always out of band)

External Reference Input

Frequency 10MHz
Connection Fed in on L-band cable
(option 1; separate 50Ω TNC)
Level -10 to +3dBm
Locking delay <2 minutes to stabilise

Internal back-up reference;

Stability $<\pm 5 \times 10^{-8}$ (0 to +60°C)
Ageing $<\pm 5 \times 10^{-9}$ per day

Mechanical

Width 123mm (4.85")
Height 172mm (6.8"), plus connections & mounting flanges
Depth 48mm (1.89")
Construction Diecast Aluminium, IP67 rated
Weight 1.35 kgs (3lbs)

Environmental

Operating temp. -25°C to +70°C
EMC EN 55022 part B & EN 50082-1
Safety EN 60950

Power Supply

Voltage +16.5 to +35VDC
Current 500mA nom.
Connection Fed in on L-band cable
(option 2; Fed in on separate 5-pin alarms connection)

Control Interface

Alarms Summary alarm contacts
Connection 5-pin circular weatherproof (mating part supplied)

Options

- 1) Separate external 10MHz reference input (using a TNC connector)
- 2) Separate DC input connection (using a 5-pin alarms interface connector)

