P310
L-Band Turbo Satellite Modem

PARADISE DATACOM

General Description

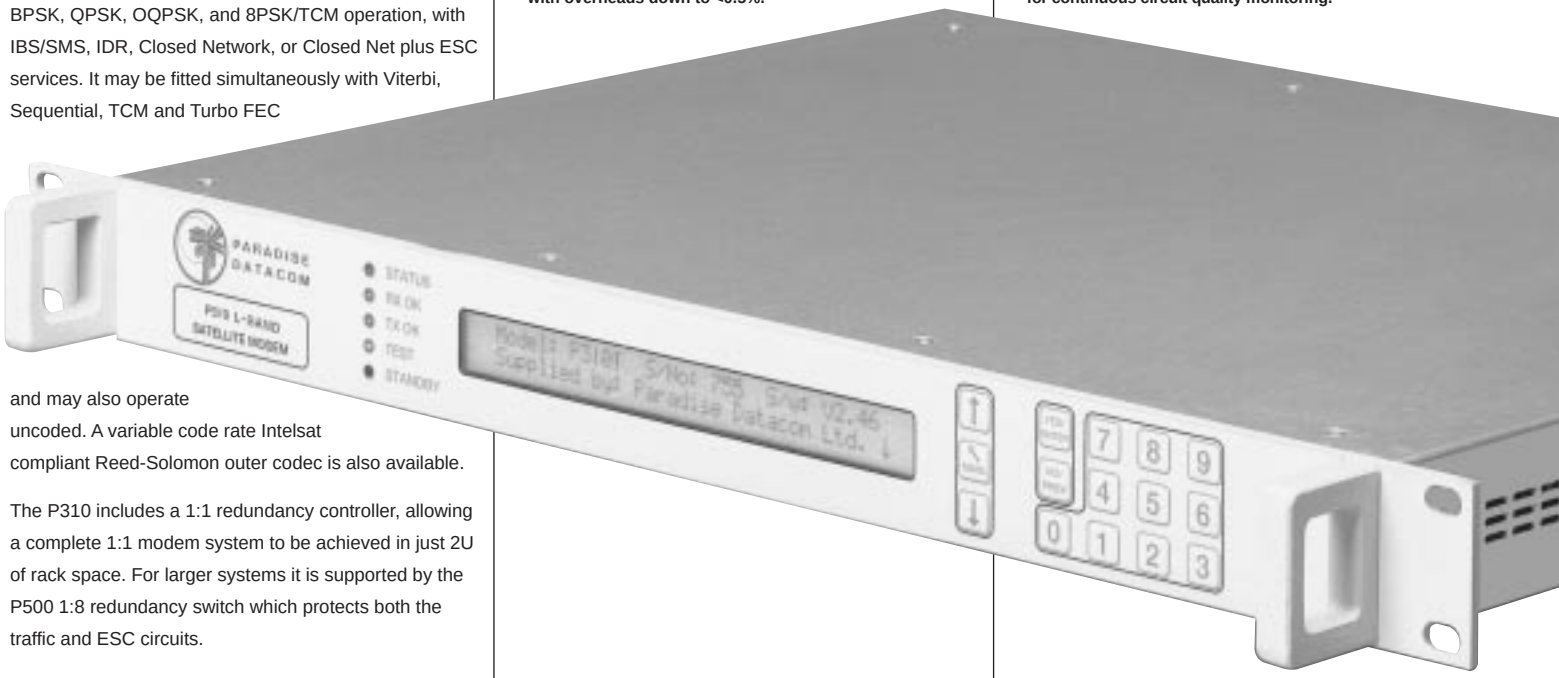
The P310 represents the pinnacle of achievement in modem engineering and integration from Paradise Datacom. It provides the full & rich feature set of the popular and cost effective P300 Series modem, together with a direct L-Band `radio` interface and optional Turbo FEC. Coupled with a suitable L-Band radio the P310 provides an absolute minimal solution for a complete earth station, with the single P310 unit indoors, supplying DC power & references to the single outdoor unit (ODU) comprising LNB, BUC, and SSPA.

The P310 L-Band Modem can be supplied equipped to suit applications ranging from low rate VSAT, to higher rate 8PSK TCM/IDR. It can provide any combination of BPSK, QPSK, OQPSK, and 8PSK/TCM operation, with IBS/SMS, IDR, Closed Network, or Closed Net plus ESC services. It may be fitted simultaneously with Viterbi, Sequential, TCM and Turbo FEC and may also operate uncoded. A variable code rate Intelsat compliant Reed-Solomon outer codec is also available.

The P310 includes a 1:1 redundancy controller, allowing a complete 1:1 modem system to be achieved in just 2U of rack space. For larger systems it is supported by the P500 1:8 redundancy switch which protects both the traffic and ESC circuits.

The P310 may be purchased with features optimised for specific services such as P310-VSAT, P310-IBS (IESS 309), P310-IDR (IESS 308 & 309), and P310-TCM (IESS 308, 309, & 310). Alternatively any mix of features can be provided to meet user requirements. All equipment can be upgraded in the field from any feature set to any other.

- **L-Band interface 950MHz to 1750MHz with option to 2150MHz**
- **Operation at rates from 4.8kbps to 5Mbps.**
- **BPSK, QPSK, or OQPSK uncoded or with $^{1}/_{2}$, $^{3}/_{4}$, or $^{7}/_{8}$ rate Viterbi, Sequential or Turbo FEC, 8PSK with TCM rate $^{2}/_{3}$.**
- **Internet version (P300i) available including 10/100BaseT Ethernet interface, TCP/IP protocol accelerator over satellite and Router (see seperate data sheet).**
- **Intelsat compliant Reed-Solomon outer codec with variable code rate (variable n, k, & depth)**
- **LNB supply of 500mA at 15/24V DC, with option for 4A at 24V for Block Up Converter/Solid State Power Amplifier (BUC/SSPA). LNB current fault detector and an adjustable window current monitor for BUC/SSPA. Independently switchable 10MHz references to LNB and BUC/SSPA.**
- **IBS/SMS, IDR, Closed Network and Closed Net plus ESC operating modes. Closed Net plus ESC can provide variable rate ESC, along with an error reducing synchronous scrambler and an optional backward alarm, with overheads down to <0.5%.**
- **Drop/Insert multiplexer supporting CAS (E1) and RBS (T1) signalling with terrestrial CRC processing, including timeslot re-ordering, and timeslot identity maintenance for N=1 to 31.**
- **Fast carrier acquisition even at low data rates, 25dB Tx carrier control with 0.1dB resolution, 0-99ms Rx buffer in 1ms steps (slips multiframes T1/E1).**
- **Flexible clocking/reference handling allows the modem to provide clocking and LNB/BUC/SSPSA references from the standard internal 10 MHz, 1 x 10^{-6} oscillator (with options to 1 x 10^{-9} available) or from a high stability/low phase noise external reference signal on the Station Clock input.**
- **Distant end M&C (including remote traffic log retrieval) and AUPC via high rate ESC channel on IBS/SMS, IDR, & Closed Net plus ESC services.**
- **Built in PRBS tester may run continuously within any format overhead or main traffic channel. Traffic log records every traffic event and can record PRBS tester results, buffer fill status, min/average Eb/No and user BER at preset intervals for continuous circuit quality monitoring.**



Paradise Datacom LLC
1012 E. Boal Avenue, Boalsburg, PA 16827, U.S.A.
Telephone +1 814 466 6275 Facsimile +1 814 466 3341
E-Mail sales@paradisedata.com
WWW http://www.paradisedata.com

An ISO 9001 Approved Company

CE **EN 60950 (Safety)**
EN 55022 Class B (Emissions)
EN 55082 Part 1 (Immunity)

Paradise Datacom Limited
Tower Business Park, Tiptree, Essex, CO5 0LX England
Telephone +44(0)1621 816655 Facsimile +44(0)1621 819929
E-Mail sales@paradise.co.uk
WWW http://www.paradise.co.uk

Front Panel

Common Main Specifications

Optional features are enclosed within [square brackets]

Modulation BPSK, QPSK, OQPSK, [8PSK]

Frequency/Resolution 950 MHz - 1750MHz, 100Hz steps
[Option 950 MHz - 2150 MHz]

Traffic Interface

Electrical: RS422, V.35 and RS232 software selectable (clocking can provide X.21 DCE or DTE mode)

Mechanical: Both EIA530 DCE and RS449 DCE connectors (25 pin and 37 pin 'D' female respectively).

Options: G.703 *in addition* to RS422, V.35, & RS232 (software selectable)
For special requirements a customer specific interface card may be fitted.

User Data Rates

Closed Network: Resolution of 1 bps

		Viterbi, Sequential & Turbo				Trellis
		Rate 1/2	**Rate 3/4**	**Rate 7/8**	**Uncoded**	**Rate 2/3**
BPSK	min	4.8k	7.2k	8.4k	9.6k	
	max*	1250k	1875k	2187k	2500k	
QPSK/OQPSK	min	9.6k	14.4k	16.8k	19.2k	
	max*	2.5M	3.75M	4.375M	5.0M	
[8PSK]	min					19.2k
	max*					5.0M

[Closed Net plus ESC] As Closed Net above but limits inclusive of overhead of approx 1.4 x ESC Baud rate. Resolution of 1 bps. ESC from 50Baud to 38.4kBaud

[IBS/SMS Mode] <9.6k to >2048k* (6.7% overhead added) Resolution of 1bps

[IDR Mode] <64k to >2048k* (96k overhead added) Resolution of 8k (limitation of frame structure)

*Note: Maximum data rate is 512kbps in all modes before overheads unless the High Data Rate option is fitted.

Forward Error Correction [Turbo Product Code (TPC), fixed preset rates including 1/2, 3/4 & 7/8 rate]
[INTELSAT Turbo Convolutional Code (TCC), subject to INTELSAT approval of preliminary TCC specification]
[Trellis, TCM rate 2/3 to IESS 310]
[Viterbi, rate 1/2, 3/4 & 7/8, k = 7 to IESS 308/309, 3 bit soft decision decoding]
[Sequential rate 1/2, 3/4 & 7/8 to IESS 312, 2 bit soft decision decoding]

Reed-Solomon outer FEC [Concatenated Reed Solomon outer codec to IESS 308/310]
[Optional variable code rate]

Reed-Solomon, TCM, Viterbi, & Sequential are independent FEC options, all may be fitted simultaneously.

Scrambling

IBS/SMS: Synchronised to framing, per IESS 309

IDR & Closed Net: With RS Coding: synchronised to RS overhead, No RS Coding, non Turbo (TPC) FEC: V.35 self synchronising.
No RS Coding with Turbo (TPC) FEC: 2^{12}-1 synchronised to TPC block alignment

Closed Net plus ESC: 32kbps or above, synchronised to ESC overhead Less than 32kbps, as per Closed Network.

V.35 scrambler has CCITT, Intelsat `FDC` & `Linkabit` modes

L-Band Ports N type female, 50Ω.

Return loss 14 dB typical.

Internal Reference 1 x 10 (1ppm) per year
[P313B: 7 x 10^{-7} per year]
[P313C: 1 x 10^{-7} per year]
[P313D: 7.5 x 10^{-8} per year]
[Others, to 1 x 10^{-9} available]
All with front panel frequency adjustment to compensate for greater than 10 years drift.

External Reference Clocking only: 1-10 MHz in 1kHz steps.
Clocking & Frequency: 10 MHz, 0dBm ± 1dB.

External Power Supply Receive 24/15V (selectable) @ 0.5A with open/short circuit detect.
[Transmit: option for 24 V @ 4A with adjustable high/low current trips]
All selectable from front panel.

Modulator Specifications

Output Power Level -5 to -30 dBm
Continuously variable in 0.1 dB steps from front panel or via remote control

Output Level Stability ± 0.5 dB at 0 to 40°C
± 0.5 dB 950 - 1750 MHz.

Transmit Filtering 6th order Butterworth, aperture and group delay equalised, Intelsat IESS complaint

Filter Implementation 257 tap FIR digital filter

Occupied Bandwidth 1.2 times symbol rate

Recommended Channel Spacing 1.4 times symbol rate

Phase and Amplitude Accuracy ± 2 degrees, ± 0.2 dB, max

Carrier Suppression -30 dBc, min.

Output Phase Noise As IESS 308, nominally 3 dB better

Output Frequency Stability 1 x 10^{-6} standard options to 1 x 10^{-9} (using iternal ref, see Station Reference)

Harmonics Better than - 55 dBc/4 kHz in band

Spurious Better than -70 dBm up to 5 GHz

Transmit On/Off Ratio 55 dB minimum

External Transmit Inhibit By external contact closure or by TTL signal applied to rear panel connector. Hardware function overrides processor control

Demodulator Specifications

L-Band Input Range -20 to -70 dBm wanted signal

Maximum Composite Signal -10 dBm

Frequency Acquisition Range Selectable from ± 1 kHz to ± 32 kHz

Acquisition Threshold
Acquisition Time (rate 1/2 FEC)
< 5 dB Eb/No (< 2 dB Ebt/No)
@ 9.6 kbps < 3 seconds at 6 dB Eb/No,
@ 64 kbps < 2 seconds at 6 dB Eb/No,
@ 2048 kbps < 500ms at 6 dB Eb/No,

Clock Tracking Range ± 100 PPM min

Receive Filtering Equivalent to group delay equalised 6th order Butterworth, (Intelsat IESS compliant)

BER Performance In all cases met in the presence of two adjacent carriers each 10 dB higher than the desired carrier, with V.35 scrambling

These figures meet or exceed the relevant IESS performance specifications.

		Rate 1/2	**Rate 3/4**	**Rate 7/8**	**Rate 2/3**
Viterbi (all rates)	1 x 10^{-4}	4.7 dB	6.1 dB	7.1 dB	
	1 x 10^{-8}	7.2 dB	8.8 dB	9.5 dB	
Sequential (64kbps)	1 x 10^{-4}	4.3 dB	5.4 dB	6.4 dB	
	1 x 10^{-8}	6.4 dB	7.3 dB	8.6 dB	
Sequential (2048kbps)	1 x 10^{-4}	5.6 dB	6.1 dB	6.9 dB	
	1 x 10^{-8}	7.5 dB	8.1 dB	8.4 dB	
Turbo (TPC) (all rates)	1 x 10^{-4}	2.6 dB*	3.5 dB	6.0 dB	
	1 x 10^{-8}	3.7 dB	4.5 dB	8.3 dB	
8PSK/TCM (all rates)	1 x 10^{-3}				6.3 dB
	1 x 10^{-8}				10.4 dB
8PSK/TCM + Reed-Solomon (all rates)	1 x 10^{-4}				6.1 dB
	1 x 10^{-10}				7.3 dB

*Note: Operation at this level may be limited by the demodulator carrier lock.

BER performance with concatenated Reed-Solomon Codec in operation BER improvement depends on n and k values chosen, but a typical increase in coding gain of 3 dB is possible

Performance Monitoring Measured FEC input BER (raw channel, not TCM or Turbo)
Estimated FEC output BER (not TCM or Turbo)
Measured Reed-Solomon input BER
Estimated Reed-Solomon output BER
Measured deframer FAW BER
Measured Eb/No (not based on channel BER, range: 3.0 - 15.0 dB, accuracy: ± 0.2 dB)
Measured frequency offset (± 100 Hz resolution)
Current drawn on 24V 4A SSPA supply
Open/Short circuit on 15/24V LNB supply

AGC Output Buffered direct AGC output for antenna tracking etc.

Clocking and Buffering

Clock Loops Frequency locked loops give phase hit immume operation even with poor clock sources such as routers etc.

Tx Clocking Internal - accuracy depends on reference fitted (± 1 PPM standard, options to 1 x 10^{-9}) (see also Station Reference)
External - tracking range ± 100 PPM / min.
Rx Clock - slaves Tx timing from Rx clock (includes full asymmetric operation)

Rx Clocking Buffer disable - clock from satellite
Transmit input clock - plesiochronous (includes full asymmetric operation)
Internal - accuracy depends on reference fitted (± 1 PPM standard, options to x 10^{-9}) (see also Station Reference)
External timing clock (DTE interface only)
Station reference (see below)

Station Reference Inputs 75Ω BNC female, transformer isolated, 1MHz to 10MHz in 1kHz steps (accepts sinusoid >0dBm or squarewave eg G.703 para 10) and 120Ω RS422 compatible input, 1kHz to 10MHz in 1kHz steps

When set to 10MHz, the station reference may replace internal reference to all internal circuitry and reference outputs on the L-Band ports. The unit automatically switches back to the internal reference if the station reference fails.

Buffer Size Selectable in 1ms increments from 0 to 99ms. Automatically adjusted to slip an integer multiple of terrestrial multiframe length for framed rates (T1/E1).
Buffer storage is 32kBytes, so above 2.6Mbps max buffer size reduces linearly from 99ms to 52ms at 5.0Mbps

Framing & Deframing Options

Formats

Closed Network: Unframed, no overhead.

IBS/SMS: [IBS/SMS Option]. Intelsat IBS & Eutelsat SMS (to IESS 309 & IESS 310)

IDR Option: [IDR Option]. Intelsat IDR (to IESS 308 & IESS 310)

Closed Net plus ESC: [Async ESC Option]. Provides variable rate async ESC, optional synchronous scrambler above 32kbps to replace error multiplying V.35 scrambler, optional backward alarm facility, and optional Timeslot ID Maintenance when used with Drop/Insert, all in minimum possible overhead down to <0.5%.

Other Modes: [Custom Option], See handbook

Poor BER performance Deframer includes extended threshold operation which improves performance when used with Reed-Solomon in very poor BER conditions (where a single uncorrectable RS codeword can contain enough corrupt frame alignment words to knock an Intelsat specified deframer out of frame sync).

[Intelsat Reed Solomon Codec & Custom Options]

Format Concatenated Reed Solomon outer codec to IESS 308/310

Code Rate Default n, k, t = (126, 112, 7) depth 4, automatically switching to:
(225, 205, 10) depth 4 for 1544kbps IDR mode,
(219, 201, 9) depth 4 for 2048 kbps IDR mode & TCM <=1544kbps, and (219, 201, 9) depth 8 for TCM >1544kbps

Processing Delay Combined Encoder & Decoder: 8 x (2n - k + 60)
Combined Interleaver & De-interleaver:
8 x n x depth (Calculate delay time using data rate including RS overhead)

[Custom Option] When fitted allows arbitrary selection of `n` & `k` to provide fully variable code rate.
`n` = 60-255
`k` = n-2 to n-20 step 2
Interleaving depth of four or eight

The Custom option allows use of shorter codewords to reduce interleaver/de-interleaver delay on low data rate circuits. For example switching from (n, k, t) = (126, 112, 7) to (64, 56, 4) provides approximately the same correction ability (7 in 126 = 5.5% and 4 in 64 = 6.25% respectively), with similar overheads (126/112=12.5%, 64/56=14.3%), but with interleaving & decoder delays reduced from 5632 to 3104 bits (156ms to 85ms at 32kbps).

[Drop/Insert Option]

Bearer Types T1-D4, T1-ESF, and G.732.

Timeslot Selection Independent selection of arbitrary timeslots for both Drop and Insert.

Bearer Generation The terrestrial bearer may be looped through the Drop mux then Insert mux, or terminated after the Drop mux and a new blank bearer generated by the Insert mux. The bearer generated within the Insert mux provides full multiframe and CRC support and may be generated from the Tx Clock, Station Reference, Satellite Clock or Internal reference.

Rear Panel

Bearer Backup — In the event that the Insert mux bearer clock is lost, or AIS is supplied, then the Insert mux will switch temporarily to bearer generation mode in order to preserve the receive traffic. The backup bearer may be generated from the Station Reference, Satellite Clock or Internal reference.

Terrestrial CRC — Fully supported, with front panel display of terrestrial error rate based on CRC (T1-ESF and G.732) or Frame Alignment Word errors (all bearer types)

Timeslot ID Maintenance — The IBS/SMS or Closed Net plus ESC overhead maintains the identity of individual D/I timselots for N=1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 20, 24, 30 (see Extended D/I Option below).

[Extended Drop/Insert Option]

Timeslot Re-ordering — Selected timeslots may be independently re-ordered on both Tx and Rx paths.

Multi-destinational working — All or only a subset of the received data may be inserted into the terrestrial bearer on the receive path for multi-destinational working.

Timeslot ID Maintenance — The IBS/SMS or Closed Net plus ESC overhead is extended to maintain the identity of individual D/I timeslots for *all values* of N from 1 to 31, including the previously unavailable values N=7, 9, 11, 13, 14, 17 - 19, 21 - 23, 25 - 29, and 31.

Signalling — Both Channel Associated Signalling (CAS), and Robbed Bit Signalling (RBS) are fully supported

For G.732 Drop/Insert, CAS signalling is extracted from terrestrial TS16 and carried over the satellite in IBS/SMS TS16 and TS48 before re-inserting into the distant terrestrial TS16

For RBS the IBS or Closed Net plus ESC overheads maintain the identity of the in band signalling, and it is re-inserted into the terrestrial multiframe in the correct positions to maintain the RBS.

[Async ESC Option] & Aux Data Channel

ESC/Aux Port — A single port provides the interface for optional high rate async ESC (IBS/SMS or Closed Net plus ESC), or the Intelsat low rate async IBS ESC channel.

Electrical Interface — RS232, RS422, or RS485 external interfaces or internal link to Remote M&C port (software selected). No external cabling required between the ESC and M&C ports for M&C via ESC channel within overhead. Other devices externally wired in parallel with M&C port can also be accessed remotely.

[Async ESC Option]:

Closed Net plus ESC — Overhead scales to provide any user specified async ESC Baud rate whatever the satellite data rate. ESC limit is approx 70% of main channel rate, overhead varies from <0.5% to >70%

IBS — High rate async data using from 1/32nd to 22/32nd of the IBS overhead, providing async baud rates from 0.2% to 5.1% of the terrestrial rate (eg up to >2400 Baud at 64 kbps). Includes modes compatible with the P400 Series, P230 & P1300/P1361 (using 20/32nd of the overhead).

Aux Data Channel

IBS — Intelsat low rate async ESC definition carried in bit 1 of TS32 providing a synchronous channel at 1/480th of the data rate, allowing up to one quarter of this rate for oversampled async data. Compliant with Intelsat IESS 403 low rate ESC definition.

[IDR Option]

IDR ESC Audio Interface — Two 32 kbps ADPCM channels
4 wire, 600Ω, +7dBm to -16dBm
(software programmable in 0.1dB steps)

Backward Alarms — Outputs: Four `form c` relays
Inputs: Four protected inputs, short to 0 V to send alarm, with matching summary Rx fail output. Alarm inputs software configurable for:
a) all external patch
b) 1=Rx fail & 2-4=External Patch
c) 1=Rx Fail & 2-4=OK
d) 1-4=Rx Fail.

ESC/Aux Ports — When the IDR option is fitted, independent ESC & Aux ports on the IDR option replace the single shared ESC/Aux port of the base unit.

ESC Port — RS232, RS422, or RS485 external interfaces or internal link to Remote M&C port (software selected). No external cabling required between the ESC and M&C ports for M&C via ESC channel within overhead. Other devices externally wired in parallel with M&C port can also be accessed remotely. Provides Clock, Data, & Sync (Octet timing) lines.

IDR — Synchronous access to 8kbps IDR ESC.
With the Async ESC option async ESC access to the 8kbps IDR ESC is provided, giving up to a 9600Baud async channel

Others — IBS & Closed Net plus ESC facilities as before installation of IDR option, but now on ESC port on IDR card not shared ESC/Aux port of base unit.

Aux Port — RS232 or RS422 (software selected). Provides Clock and Data lines.

IDR — Provides 32 or 64kbps access in place of one or both Audio ESC channels.

IBS — Intelsat low rate ESC mode as previously but now via Aux port on IDR card not shared ESC/Aux port of base unit. IDR option also adds sync IBS mode, configurable to use between 1/32nd and 21/32nd of the IBS overhead providing a full sync Aux port at between 0.2% and 4.3% of main data rate.

Aux port provides satellite timing information for P1500 Slave Frequency Standard when not configured for Aux data access.

P1348 Emulation — The IDR Option includes the facility to emulate the more common modes of our popular P1348 / P1448 voice / data mux cards which are used extensively in SNG applications. It uses the IDR audio ESC ports for the audio interfaces and can generate a 64kbps carrier consisting solely of two 32kbps ADPCM encoded audio channels, or a 128kbps carrier comprising the two audio channels plus 64kbps data from the main interface. This is compatible with a P400 Series modems fitted with P1448 card or a P230 Modem with a P1348 card, alternatively Drop/Insert can be used at the distant end to place the two 32kbps ADPCM audio channels in one timeslot and the 64kbps data in another.

[PRBS Tester Option]

BER Channel — PRBS tester may operate through either main traffic, ESC data, or AUX data channels. Use of ESC & AUX data channels allow continuous real traffic BER performance monitoring

Test Patterns — 2047, 2^{15}-1, 2^{20}-1, compatible with common stand alone BER testers.

Results — Display of error count & average BER

Autolog — Automatic logging of average BER at user specified intervals (1min - 24hours)

[Automatic Uplink Power Control (AUPC) Option]

Modes of Operation — Monitor of distant Eb/No & BER only, Full distant Eb/No maintenance, & Self monitor (broadcast) modes. Unidirectional or bidirectional operation.

Communication Link — Utilises async ESC channel on IBS/SMS, IDR and Closed Net Plus ESC carriers (ESC from 300Baud, ie overheads down to < 1%).

User Parameters — Target Eb/No, Tolerance window, Max & Min delta powers, Slew rate limit, comms loss action (freeze, max or nominal power).

Ancillary Features — Automatic logging of distant Eb/No and local AUPC delta power at user controlled intervals in traffic log.

Automatically interleaves AUPC messages with distant end remote M&C (if active) on ESC channel.

Independant Max & *Min* delta powers (ie facility to *reduce* power & still maintain quality of service with good atmospherics) allows power balancing on transponders with traffic to varied destinations.

[Monitor/AGC Option]

Facilities Provided — Demodulator Rx carrier signal monitoring & level display (±5dB)
0-10V Analog output (Signal level, Eb/No or Rx offset frequency)
Buffered constellation monitor port

Traffic Log

Capacity — Total 1000 entries

Entry Format — Fault message with time & date
Separate entry when fault clears/changes

Automatic Entries (user defined interval) — Average & minimum Eb/No
Average & minimum estimated user BER
Buffer fill status
Average & minimum measured BER from PRBS tester (may run continuously through ESC or Aux channel for continuous traffic quality monitoring)

Interrogation Method — View on front panel LCD
Print to rear panel serial port (`D` type) either all entries or just unprinted entries read over remote M&C bus

Common Specifications

Loopbacks — Interface Loop (local & remote)
Drop/Insert Loop (local)
Framer Loop (local)
RS Loop (local)
FEC Loop (local)
Deframer/Framer Loop (remote)

Test Modes — Transmit CW (pure carrier)
Transmit alternate 1,0 pattern
(for carrier suppression test)

Alarm Relays — 3 independent changeover contacts:
Unit fault
Tx or Rx traffic fault (prompt alarm)
Deferred Alarm (backward alarm, BER or Eb/No below user set threshold)

Controller — Intel 8032 micro controller provides all M&C functions

Embedded Software — Revised embedded software may be downloaded to FLASH memory with modem still in equipment racks. No EPROMs, no opening the case.

Configuration Memories — Up to 10 different configurations can be stored & recalled from the front panel or remote M&C

User Interface — Clear & intuitive operator interface with plain English dialogue. Not forced to use hard to learn acronyms because of absurdly small display or enter parameters such as 9 digit IF frequencies with only left/right and up/down keys.
80 Character, backlit, high contrast, wide angle LCD, 15 Key tactile full keyboard.

Remote Monitor And Control — For multi-drop applications, RS485 interface, for direct-to-PC applications RS232 interface (front panel selectable). M&C port may be directly internally linked to ESC port for `over the satellite` M&C without cabling.

Redundancy Features — 1:1 redundancy controller built in. `Y` cables passively split data, maintaining impedances. L-Band inputs/outputs are passively split/combined outside the units. Offline unit tri-states data outputs & mutes Tx carrier.

Mechanical — 1 U chassis - 440 mm deep

Weight — 8.4 lbs (3.8 kg) without SSPA PSU or reference options

Power Supply — 100-240 Volts AC + 10% - 15%
47 - 63 Hz
Fused IEC connector
75 watts without SSPA PSU or reference options

Safety — EN 60950

EMC — EN 55022 Class B (emissions)
EN 55082 Part 1 (immunity)

Environmental — Operating temperature range 0 to 50 deg C

Supporting Products

The P310 Series are supported by the following products:

P500 series 1:8 redundancy controller, which includes the facility to mix electrical interfaces within a redundancy group.

Windows S2000 Monitor & Control software allows monitor and control of multiple different products (including non-Paradise products) on 1-7 shared RS485 busses.

Various FSK signalling interfaces for communication with ODU/Radio via co-ax.

Options for 100W PSU for BUC/SSPA & internal frequency references to 1 x 10^{-9}.

P310

Standard Configurations and User Options

Option	P310 VSAT	P310 IBS	P310 IDR	P310 TCM	P310 USER	Description
Base Modem	✓	✓	✓	✓	✓	BPSK/QPSK/OQPSK, 4.8kbps to 512 kbps, 1bps variable rate closed network modem. RS422 / V.35 / RS232 selectable interface with 25 pin EIA530 DCE & 37 pin RS449 DCE connectors 950MHz - 1750MHz IF interface with 100Hz resolution (to 2150MHz with Wideband IF option). 1 x 10^{-6} Internal Reference
Viterbi FEC	✓	✓	✓	✓		Viterbi FEC (to IESS 308/309), rate $^1/_2$, $^3/_4$, & $^7/_8$ in BPSK, QPSK and OQPSK.
Turbo FEC (TPC)						P308 Turbo Product Codec (TPC). Preset rates including $^1/_2$, $^3/_4$, & $^7/_8$ rate.
INTELSAT Turbo FEC						P318 INTELSAT specified TCC (Turbo Convolutional Codec) Price TBA as INTELSAT yet to disclose full technical details (as of Aug 2000)
Sequential FEC						Sequential FEC (to IESS 312), rate $^1/_2$, $^3/_4$, & $^7/_8$ in BPSK, QPSK, OQPSK.
INTELSAT Reed-Solomon		✓	✓	✓		Reed-Solomon outer FEC (to IESS 308/310), with (n, k, t) = (126, 112, 7) (switches to (225, 205, 10) or (219, 201, 9) with 4/8 deep interleaving as required for IDR & TCM/IDR if options are fitted).
Wideband IF		✓	✓	✓		Wideband 950 MHz -2150 MHz instead of 950 MHz - 1750 MHz (Tx subject to revised spec above 1750MHz)
High Data Rates		✓	✓	✓		Data rates 512kbps - 5Mbps in addition to Base Modem rates.
Async ESC		✓	✓	✓		Variable rate ESC channel for Closed Net plus ESC operation High rate IBS/SMS ESC (with IBS/SMS option) Async ESC access to IDR 8k sync ESC channel (with IDR option).
IBS/SMS		✓	✓	✓		IBS/SMS framing (to IESS 309) with low rate Intelsat ESC (to IESS 403).
Drop / Insert		✓	✓	✓		Normal T1/E1 linear order Drop/Insert. D/I can operate with any modem interface, although G.703 is typically required (separate option).
IDR			✓	✓		IDR operation (to IESS 308): Two audio ESC channels, Sync 8kbps ESC, Four form `C` backward alarms, 32/64kbps Aux data in place of one/both audio ESC. P1348 Emulation, uses IDR ESC ports to emulate P1348/P1448 cards used in SNG applications. Generates 64kbps carrier of 2 x 32kbps ADPCM audio (using IDR ESC Ports for audio interface), or 128kbps carrier of 64kbps data plus 2 x 32kbps ADPCM audio.
PRBS Tester			✓	✓		Internal Bit Error Rate Tester (BERT) can run through main data channel, or ESC/Aux channels.
8PSK/TCM				✓		8PSK with $^2/_3$ rate Trellis Code Modulation (TCM, to IESS 310).
Extended D/I				✓		Independent timeslot re-ordering on Tx & Rx. Signalling (CAS for E1 & RBS for T1). Rx Partial Insert for multi-destinational working. Timeslot ID maintenance for N=1 to 31 with IBS/SMS or Closed Net plus ESC operation.
Custom Features				✓		Arbitrary `n` & `k` for Reed-Solomon (with Reed-Solomon option). Custom & Min O/H framing modes (with IBS/SMS or IDR options). Custom allocation of IBS/SMS overhead between async ESC / sync Aux channels (requires IBS/SMS option AND IDR option to provide Aux Port).
Monitor/AGC						Demod Rx carrier signal level monitor. 0-10V Analog output of carrier signal level, Eb/No, or Rx offset frequency (in addition to normal AGC output). Constellation monitor port
AUPC						Auto Uplink Power Control (AUPC). Uses part of Async ESC channel bandwidth to communicate with distant modem and monitor distant Rx Eb/No. Automatically adjusts local Tx power within set power and slew rate limits to maintain target distant Eb/No. Requires Async ESC feature in order to operate over Closed Net Plus ESC, IBS, or IDR services.
1544kbps G.703						1544kbps G.703 interface in addition to RS422 / V.35 / RS232 interface (software selectable).
2048kbps G.703						2048kbps G.703 interface in addition to RS422 / V.35 / RS232 interface (software selectable).
Tx IF with Rx						Convert Tx IF to 50-90MHz, with Rx at L-Band (eg for SNG: 70MHz Tx IF combining with Video feed then upconverting, but with simple L-Band interface to LNB for monitoring)
7 x 10^{-7} internal ref						P313B Medium stability Frequency/Clock internal reference, 7 x 10^{-7} per year.
1x 10^{-7} internal ref						P313C High stability Frequency/Clock internal reference, 1 x 10^{-7} per year.
7.5x 10^{-8} internal ref						P313D Very High stability Frequency/Clock internal reference, 7.5 x 10^{-8} per year.
24V 4A ODU PSU						P315 24V 4A Switchable DC to ODU (Tx BUC/SSPA, in addition to standard modems 0.5A on Rx to LNB)

For a user defined mix of options, please mark up the 'P310 USER' column with your requirements and fax to your sales representative or directly to Paradise Datacom. Please also contact us for other options such as a cost reduction for single or dual fixed data rates, or transmit/receive only operation.

A P310i Internet version is also available including a direct Ethernet port with a TCP/IP Router all integrated in a 1U shelf. Please consult the separate P310i data sheet.

P310 Quotation Request

Product: P310 - ..... Quantity/Timescale: .....

Project Name: ..... Delivery/Final Country: .....

Your Name: .....

Title/Dept: .....

Company: .....

Address: .....

Address/Zip: ..... Country: .....

E-Mail: .....

Telephone: ..... Facsimile: .....

Comments or Special Requirements: .....

Fax to: +44 (0)1621 819929 (UK) or +1 814 466 3341 (USA)