RCS10 / RCS10L

Modem and Redundancy Control System

HIGHLIGHTS

- Ten Modems and a Switch in 10 Rack Units (17.5 inches)
- Up to 30 Modems in One Rack
- Large Display with Easy-to-use Menu Structure
- Built-in M:N Redundancy Switch
- Dual Redundant Power Supplies
- Fewer Cables make Installation Simple
- Fully Compliant with IESS 308/309
- Operation from 9.6 Kbps to 8.448 Mbps
- Options Include: L-Band, 950-1525 MHz (RCS10L), Drop and Insert, Reed-Solomon Codec, Sequential Decoder, Trellis coded Modulation, ESC, OQPSK, 8PSK Modulation and Ethernet Remote M&C

RCS10/RCS10L Modem and Redundancy Control System

OVERVIEW

Radyne ComStream's Models RCS10 and RCS10L are both complete, self-contained modem systems. The modems, terrestrial interfaces, and redundancy switch functions are assembled in a single equipment cabinet that is 10 rack units high (17.5 inches). This compact and versatile common equipment package is unique and offers unsurpassed performance, reliability and flexibility. In addition to full support for Intelsat's IDR/IBS services, the system may be operated in closed networks.

The built-in M:N Redundancy Switch is an intelligent microcomputer controlled system, capable of controlling up to ten DMD10 modems in a variety of configurations.

The switch can be operated automatically, in which case an automatic back-up of a failed on-line modem occurs after a preprogrammed delay. The switch may also be operated manually, allowing the operator to manually switch in the backup unit. Front panel controls and indicators provide for auto/manual configuration, as well as display of online/off-line status information for all modems in the redundancy configuration.

Switch and modem operating parameters, such as ariable data rate and selectable IDR/IBS framing, are easily set and changed by the operator. The modem and redundancy switch monitor and control functions are available at the front panel of the system. Functions may also be accessed through a personal computer via a serial link (RS232, RS485 or Ethernet) for complete remote monitor and control (M&C) capability. Switching functions can be accessed through a terminal.

When the RCS10 (only) is used with the optional IFC10 IF Combiner/Splitter system, the system provides all of the signal combiners and splitters, terminations and interconnecting cables that are necessary to connect any combination of up to nine active modems to nine independent uplink and nine independent downlink transponders.

The external reference module has one external IF reference input which is distributed to all ten DMD1O modems. Each modem can be locked to the external reference.

The external reference module can be equipped with a 10^{-7} high stability reference oscillator which is distributed to all ten DMD10 modems, thus providing a low-cost high-stability option. An External IF reference output is provided for distribution to other equipment.

The external reference has one BNC clock input which is distributed to all ten modems. Each modem control can independently select this external clock as its Tx clock and/or Rx buffered clock source.

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RCS10 / RCS10L Modem and Redundancy Control System

SPECIFICATIONS

System

Number of Modems:	Up to ten (10) DMD10 modem modules
Back-up Modems:	Up to two (2) DMD10 modems may be designated as back-ups.
Possible Redundancy Configurations:	1 to 9 non-redundant modems One configuration, 1:1 through 1:9 One configuration, 2:2 through 2:8 Two independent 1:N configurations
Power:	Two independent fully-redundant AC power supplies

Modulator

Modulation:	BPSK, QPSK (8PSK, OQPSK, Others Optional)
Data Rates:	9.6 Kbps to 8.448 Mbps, 1 bps steps
IF Tuning Range:	50 to 180 MHz in 1 Hz steps, 950 to 1525 MHz (RCS10L)
IF Impedance:	75 Ohms
IF Connector:	BNC (At RCS10 Back Panel)
IF Return Loss:	20 dB Minimum
Output Power:	-20 to + 5.0 dB in 0.1 dB steps @ modulator output
Output Stability:	± 0.5 dB
Output Spectrum:	Meets IESS308/309 Power Spectral mask
Spurious:	< -55 dBc
On/Off Power Ratio:	> 60 dB
Scrambler:	CCITT V.35 or IBS (Others optional)
Encoder:	Viterbi, K=7 (Sequential optional)
Code Rates:	1/2, 3/4 and 7/8
Data Clock Source:	Internal or External
Internal Stability:	± 1 X 10^{-5} ± 1 X 10^{-7} (Optional)

Demodulator

Demodulation:	BPSK, QPSK (8PSK, OQPSK optional)
Data Rates:	9.6 Kbps to 8.448 Mbps, 1bps steps
IF Tuning Range:	50 to 180 MHz in 1 Hz steps, 950 to 1525 MHz (RCS10L)
IF Impedance:	75 Ohms
IF Connector:	BNC (at RCS10 Back Panel)
IF Return Loss:	20 dB Minimum
Spectrum:	INTELSAT IESS-308/309 Compliant
Signal Input Range:	-20 to -45 dBm
Adjacent Channel Rejection Ratio:	> +14 dBc
Absolute Maximum Total Input Power:	Maximum Composite Power
Decoder:	Viterbi, K=7 (Sequential optional)
Code rates:	1/2, 3/4, and 7/8 Rate
Descrambler:	CCITT V.35 or IBS (Others optional)
Acquisition Time for 90% Probability of Lock @ 5 dB Eb/No	< 2 seconds for data rates > 512 Kbps < 60 seconds for data rates < 512 Kbps
Acquisition Range:	Programmable ± 1 KHz to ±42 KHz
Sweep Delay Value:	100 msec to 299.9 sec. 100 msec. steps

DMD10 Modem BER Performance (Guaranteed)

BER vs. Eb/No	Eb/No (dB)			Sequential (1.544 Mbps) (dB)			
Viterbi	R 1/2	R 3/4	R 7/8	BER	R 1/2	R 3/4	R 7/8
10^{-3}	4.1	5.2	6.2	10^{-3}	4.7	5.1	5.9
10^{-6}	6.0	7.5	8.6	10^{-4}	5.1	5.6	6.3
10^{-7}	6.6	8.2	9.3	10^{-5}	5.5	6.0	6.8
10^{-8}	7.1	8.7	10.2	10^{-6}	5.8	6.4	7.3

Plesiochronous Buffer

Size:	2 Kbits to 256 Kbits
Centering:	Automatic on underflow/overflow
Centering Modes:	IBS: Integral number of frames IDR: Integral number of multiple frames
Clock:	Transmit clock bit rate, External BNC input clock, recovered demodulator clock, or SCT clock.

Monitor and Control

Signals that are monitored and/or controlled from the front panel or remotely using the RS485 or Ethernet Remote Port:

- Transmit and Receive Frequencies
- Transmit and Receive Data Rates
- Transmit and Receive Code Rate
- Differential Encoding On/Off
- Scrambler on/off, IBS or V.35 Mode, Others
- Spectrum normal/inverted
- Clock Source, Polarity and Frequency
- Transmit Carrier on/off
- Transmit Carrier Level
- CW, Dual, or Offset
- Demodulator Input Level
- Eb/No, BER, Corrected BER
- Buffer Size, Clock, Center Buffer
- Event Buffer
- Faults
- Sweep Range and Delay
- IDR/IBS Backward Alarms, Modem/Switch Alarms
- IDR/IBS Framing, Drop and Insert Mode and Flags
- Loopback; Terrestrial, Baseband and IF Redundancy Switch
- Auto/Manual, Backup Delay

Environmental

Prime Power:	100-240 Vac, 50-60 Hz, 480 Watts
Operating Temp.:	0 to 50° C, 95% humidity, noncondensing
Storage Temp.:	-20 to 70° C, 99% humidity, noncondensing

Physical

Weight (fully loaded):	100 pounds (45.45 kg.)
Size:	17.25 x 19 x 19 inches (44.45 x 48.26 x 48.26 cm.)
Shipping Weight:	120 pounds (54.54 kg.)
Shipping Size:	26 x 25 x 24 inches (65 x 63 x 60 cm.)

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DMD10 Drop and Insert

Terrestrial Data:	T1 (1.544 Mbps) or E1 (2.048 Mbps) G.732/733 format
Line Coding:	AMI or B8ZS for T1 and HDB3 for E1
Framing:	D4 or ESF for T1 and PMC30 (30 channels) or PMC31 (31 channels) for E1
Time Slot Selection:	n x 64 contiguous or arbitrary blocks for Drop or Insert; Drop TS16.
Data Rates:	64, 128, 256, 384, 512, 768, 1024, 1,536, and 1,920 Kbps

Reed-Solomon Codec

An optional Intelsat compliant Reed-Solomon codec is available for the DMD10 modem. The composite data rate E_b/N_0, performance for Reed-Solomon outer coding with inner convolutional encoding and Viterbi decoding is:

BER vs. Eb/No	Eb/No (dB)	Guaranteed Performance
	Rate 1/2 FEC	Rate 2/4 FEC
10^{-6}	4.1	5.6
10^{-7}	4.2	5.8
10^{-8}	4.4	6.0
10^{-10}	5.0	6.3

External Clock Distribution Module

The clock distribution module has one clock input and nine clock driver outputs that are distributed to the DMD10 modem modules.

Input:	BNC
Clock Rates:	8 KHz to 10 MHz, in 8 KHz steps, normally set at 1.0, 1.544, 2.048, 5.0, or 10 MHz.

The external reference module has one IF reference input that is distributed to DMD10 modems

Input:	BNC
Frequencies :	1, 5, 10, 20 MHz

Internal High Stability Clock

Internal High Stability Clock:	Optional 10^{-7}

Terrestrial Interfaces

A variety of standard interfaces are available for the RCS10 System. The total maximum number of interfaces is nine.

Universal I/0:	User-selectable RS422/449, T1 (DSX1), T2 (DSX2), E1 (G.703), and E2 (G.703) and V.35.
E1(G.703):	1.544 and 2.048 Mbps, 75 Ohms
T1(DSXI):	BNC unbalanced or 120 Ohms balanced, HDB3 and B8ZS Line Codes.
E2(G.703):	6.312 and 8.448 Mbps, 75 Ohms
T2(DSX2):	BNC Unbalanced or 120 Ohms balanced, HDB8 and B6ZS Line Codes.
ITU V.35:	All Rates, Differential, Clock and Data only.
EIA RS422/449:	All Rates, Differential, Clock and Data only, DTE or DCE operation

Engineering Services Channel Unit

Radyne's Engineering Service Channel Unit provides Intelsat compliant ESC for IDR operation. The DMD10 modem also directly supports IBS ESC requirements.

IDR:	Voice:	2-ADPCM
	Data:	8 Kbps
	Backward Alarms:	Four Form-C
	Total Overhead:	96 Kbps
IBS:	Async. Data:	Per IESS 308/309/403
	Total Overhead:	1/15 x Data Rate

Other System/Product Options

In addition to standard plug-in options, the following external units are available to complement the RCS10 Modem and Redundancy System. Please refer to the individual data sheets for more information.

IFC10 Combiner/Splitter (RCS10 only)

The IFC10 provides all necessary combiners, dividers, terminations and cables to connect up to ten modems to ten independent uplink and downlink transponders.

Configurations:	Two - 4:1 Combiner/Splitter (unequal split with 2 at 9.9 dB and 2 at 4.5 dB) Two - 3:1 Combiner/Splitter (5.5 dB loss) One - 3:1 Combiner/Splitter (11.0 dB loss)

Monitor and Control (M&C) System

The MCS10 provides a remote or local monitor and control capability for the RCS10. The system operates on a PC-based workstation. User-friendly interactive software is easily customized to accommodate virtually any service arrangement

RCS10/DMD10 Ordering Information

When ordering the RCS10 with DMD10 modems, please specify the following:

Switch Configuration:
M = Number of Back-up Modems (zero to two) N = Number of online Modems (one to nine) (Note that M+N cannot exceed 10 modems)

Terrestrial Interfaces:
Specify type and number of interfaces. One interface is required for each modem 1 through 9.

Modem Options:
Specify if Drop and Insert and Reed-Solomon are required for the DMD10 Modem Modules.

Specify 8PSK or OQPSK modulation if required.

Specify Sequential if required.

Specify the Internal High Stability Clock if required.

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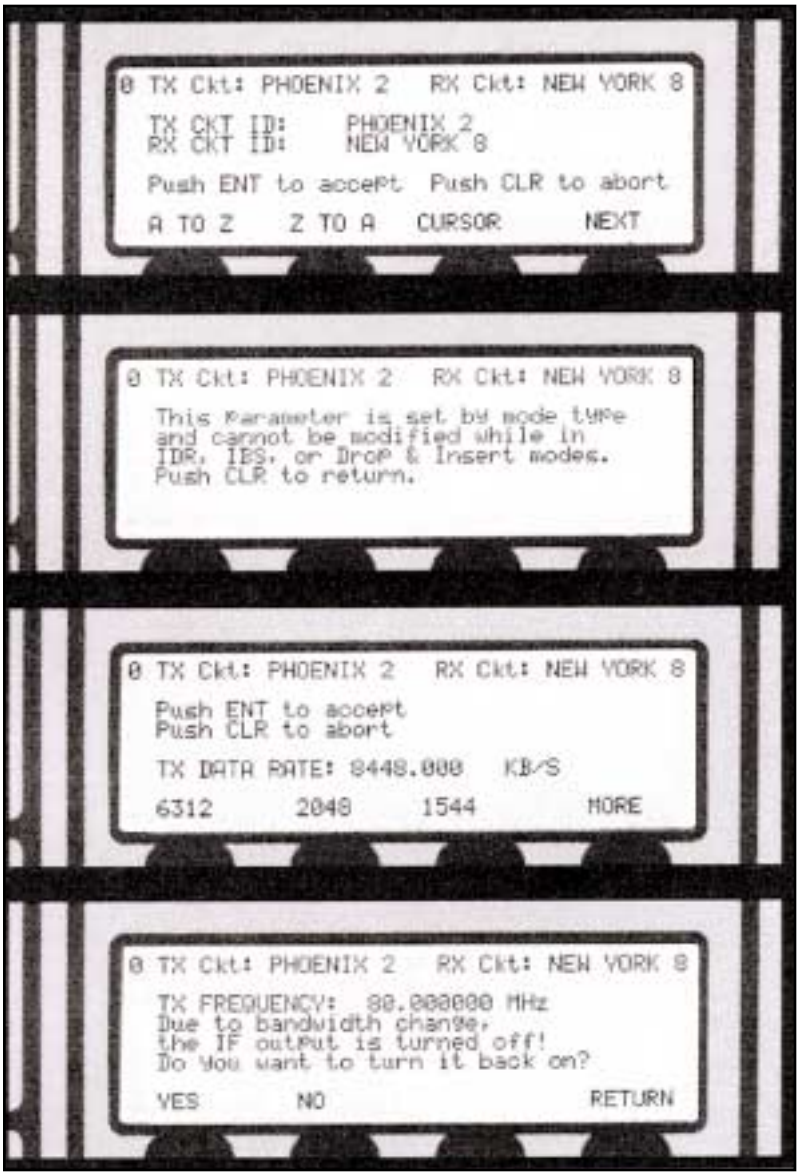
TYPICAL RCS10 / RCS10L CONTROL PANEL SCREENS



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