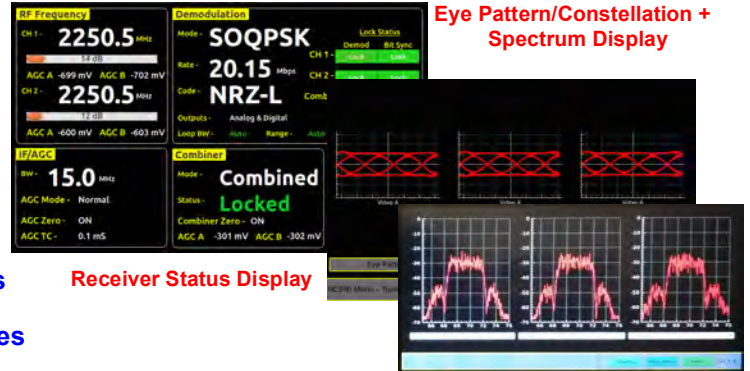




R300 SERIES TELEMETRY RECEIVER

FEATURES

- ❖ Non-Windows OS
- ❖ All Legacy & IRIG Demodulation Modes +
 - NASA Spread Spectrum
 - Adaptive Equalization
 - Data Quality Encapsulation/Metric
 - SOQPSK-STC & SOQPSK-LDPC
- ❖ Built-In-Self-Test (BIST) with Bit Sync/Frame Sync and BERT
- ❖ Multi-Channel TM over IP
- ❖ Dual 7" Touch Screens for Command and Status
- ❖ Dual Redundant "Hot Swappable" Power Supplies
- ❖ Fully Compatible with all SEMCO Legacy Receivers



DESCRIPTION - SEMCO's 3U R300 Series Telemetry Receivers are IRIG 106-17 Tier II phase noise compliant and offer state-of-the-art demodulation capabilities in RF tuning bands from 70 MHz to 5250 MHz. The R300 is fully compatible with and designed to operate side-by-side SEMCO legacy receivers.

Built-In-Self-Test (BIST), Bit Sync/Frame Sync/BERT – The BIST provides for an embedded P/L/S/C Band RF source and, when coupled with the embedded bit sync/frame sync/BERT and PN Generator, provides for BER and other critical IRIG 118 testing, + background health and diagnostics testing.

STC & LDPC Feature - SEMCO's current demodulator technology supports all current IRIG modulation modes, including Space Time Coding (STC) & Low Density Parity Check (LDPC). STC is offered in SOQPSK-STC format, while SOQPSK-LDPC FEC includes user-selectable IRIG block sizes, coding rates and both IRIG and CCSDS de-randomization.

Adaptive Equalization and Data Quality Encapsulation/Metric - Additional R300 Series features include Adaptive Equalization (AE) for improved receiver performance in selective multi-path environments; Data Quality Encapsulation (DQE)/Data Quality Metric (DQM) supporting Best Source Selection by embedding data quality information within PCM/FM and SOQPSK-TG formats; as well as true analog I and Q outputs for BSS applications

NASA Spread Spectrum Capability – Constellation program crew vehicle support including the Forward SS-UQPSK link and the Return DG1 Modes 1, 2 & 3 links.

TM over IP – Multi-CH TM over IP provides IRIG 218 or CH 10 compatible packetized baseband video data via Ethernet.

Operating Environment and IA Compliance - The R300 uses a hardened operating environment and "DMZ Buffer" design technology (Ethernet-to-Serial Adapter with Secure Shell (SSH) protocol) for secure Ethernet connection to isolate the embedded ARM Processors from the outside world. This ensures DSIA IA compliance. However, migrating to this environment does not limit the abilities of the local or remote user. Remote control via Ethernet is still available and using optional AES encryption on the remote message data can provide additional enhanced security.

Local and Remote Control Features - Local control has been enhanced by the use of dual 7" LCD touch screens. The user can always view status and configuration of the unit while controlling options and set-ups using the second touch screen for data entry. Eye Pattern, Constellation and Spectrum displays are available while the unit is operating. Remote (Network) control capability is available using the System Level Telemetry Software (SLTS) Program.





R300 SERIES SPECIFICATIONS

RF		DEMODULATORS	
Frequency (MHz)	200-1150, 1415-1585 1650-1850, 2185-2485, 4400-5250 and 1415-2485 (continuous)	Number of Demods	Up to 3 per receiver
LO Tuning Resolution	100 kHz (increments of 1kHz)	Legacy Modes	
Internal Stability	≤ +/- 1.0 ppm	FM, PCM/FM	10 kbps to 23 Mbps
AFC Resolution	1 kHz	PM, PCM/PM	2 kbps to 20 Mbps
Dynamic Range	-10 dBm to Threshold	BPSK	10 kbps to 20 Mbps
Noise Figure	≤ 8 dB (nominal)	QPSK, SQPSK, OQPSK	30 kbps to 40 Mbps
Phase Noise	IRIG 106-17 Tier II Compliant	A/UQPSK	30 kbps to 40 Mbps
Maximum Safe Input	+10 dBm	GMSK	10 kbps to 40 Mbps
VSWR	< 2:1	DSOQPSK	Consult Factory
ACI	40 dB (min.)/1 dB BER Degradation	NTSC/PAL Video	With Switched De-Emphasis
Image Rejection	≥ 60 dB	Coherent AM	For Enhanced Tracking
Spurious Rejection	≥ 60 dB	IRIG 106-17 Modes	
IF Rejection	70 dB minimum, 80 dB typical	Trellis FM (Tier 0)	20 kbps to 20 Mbps
IF SAW Filters	8 from 0.3 to 40 MHz	SOQPSK-TG (Tier I)	50 kbps to 40 Mbps
IF FIR Filters	15 user-selectable per data rate entered + Auto-Set based on data rate; 4 kHz to 37.3 MHz	Multi-h CPM (Tier II)	100 kbps to 37 Mbps
Pre-d (70 MHz) Outputs	Linear, - 10 ±2 dBm, 2 per Channel	Spread Spectrum	SS-UQPSK, SQPN
AGC TC	0.1, 1, 10, 100 and 1000 mS	Acquisition/Tracking	± 250 kHz
AGC Outputs/Channel	2 Scalable ± 10, 20 or 50 dB/V with User-selectable Hi/Lo impedance	PM/PSK Sub-Carrier	2 kbps to 20 Mbps
AGC Modes	Auto, Manual, Freeze, and Zero	FM Subcarrier Frequency	5 kHz to 12 MHz
AM Outputs	Normal and Inverted; 2 Vpp into user-selectable 50/75 Ω (50% AM)	FM Sub-Carrier Data Rate	100 bps to 256 kbps
AM Low Pass Filters	User-selectable 30 Hz – 30 kHz	IRIG Time Code Gen.	IRIG A/B Time Code
AM Frequency Response	0 Hz to 30 kHz	TM over I/P	3 CH10 Compatible Channels and in accordance with IRIG 218-07
AFC	±250 kHz	ERROR CORRECTION	
AFC Loop Speeds	1, 5, 20 and 100 Hz	Adaptive Equalization	CMA Equalization
Record/Playback	Fixed 70 MHz Playback; Select any Channel; Optional Pre-d Record/Playback; 75 kHz to 15 MHz (1 kHz steps)	Data Quality Encapsulation	Supports Best Source Selection in /Data Quality Metric
RF Spectrum Analyzer	3 RF Spectral Sweep Displays w/ CF Measurement & Span Control	Low Density Parity Check	6 SOQPSK-LDPC FEC Codes and de- randomization per IRIG 106-17 and CCSDS
COMBINER		Space Time Coding	SOQPSK-STC Per IRIG 106-17 Appendix S
Modes	User-selectable Pre-d and Post-d AM/AGC Optimal Ratio and Best Source Select	Reed Solomon	Optional
Improvement	> 2.5 dB with Equal Signal Inputs; (10Log(C1/N1+C2/N2))-0.5dB (unequal input)	Viterbi	Optional (Rate ½ K=7)
Break Frequency	≥ 50 kHz	Turbo	Consult Factory
Calibration	CH1/CH2 Balance Feature	BASEBAND VIDEO	
		Number	Four outputs per Channel
		Output	User-selectable Analog or TTL Clock & Data
		Output Voltage	Analog 0 to ≥ 4Vpp, 75Ω
		Coupling	AC or DC
		FIR Filtering	15 user-selectable per data rate entered + Auto-Set based on data rate; 2 kHz to 18.7 MHz + Bypass
		Displays	Up to 3 Eye Pattern and Constellation Displays





R300 SERIES SPECIFICATIONS *(continued)*

PROGRAMMABLE BIT SYNCHRONIZER

Number of Bit Syncs	Up to 3 User-switchable to any Channel; Up to 3 User-switchable External Inputs
Input Level	0.2 to 20 Vp-p Single-ended; 0.2 to 10 Vp-p Differential
Input Impedance	Switchable 4K/75 Ω Single-ended; 150 Ω Differential
Input and Output Codes	NRZ-L/M/S, Bi-Phase- L/M/S, DM-M/S, MDM-M/S and RNRZL-L
De-Randomizer	RNRZ-9/11/15/17/23; Forward and Reverse
Data Rate Range	100 bps to 40 Mbps NRZ; 100 bps to 20 Mbps (all other codes)
Tuning Resolution	0.1% of Data Rate
Capture Range	3x Programmed Loop Bandwidth
Tracking Range	+/- 12% of Data Rate
Loop Bandwidth Range	0.1 to 3% of Data Rate
Acquisition Threshold	0 dB Eb/No (NRZ); 3 dB Eb/No Bi-Phase
BER/Code Degradation	< 0.5 dB (all codes)
Static Offset	0-100% for 0-10 Vp-p
Data Outputs	2 Outputs: 3.3 V TTL/CMOS and RS-422
Output Impedance	50 Ω
Clock/Data Phase	0°, 90°, 180°, and 270°
Data Polarity	Programmable Normal or Inverted
Clock Source	Internal Programmable Data Rate
Forward Error Correction	Viterbi (k=7, Rate ½); Optional Turbo Codes (consult Factory)
Viterbi Options	Differential Decoding; V.35 Descrambling; G2 Invert
Symbol Formats	Serial, Parallel, and Staggered

FRAME SYNC PERFORMANCE

Number of Frame Syncs	Up to 3 User-selectable to any Selected Channel
Format	Programmable Frame Length and Sync Word
Auto-Detect	I/Q Ambiguity and Polarity
Frame Sync Length	Up to 32 Bits
Frame Sync Mask	Up to 32 Bits
Word Length	Up to 32 Bits
Frame Length	Programmable up to 65k Words

BUILT-IN-SELF-TEST/BERT PERFORMANCE

RF Internal BIT Source	Modulated Multi-Band RF Source for Internal BIT/BERT Loop Testing (all Demod Formats)
PN Generator Patterns	PN7, PN9, PN11, PN15, and PN23; Forward and Reverse
BER Sample Periods	Programmable 1×10^{-3} to 1×10^{-6} bits or Cumulative Average
PN Output	NRZ-L; 3.3 V TTL/CMOS Levels
Pattern Synchronization	Automatic with Polarity Detection
Error Insert	Single Bit or 10^{-3}
Background Diagnostics	Health & Status Monitoring of critical receiver performance parameters

OPERATING ENVIRONMENT

Operating Environment	Arm Processors (Linux) with DMZ Buffer design for IA compliance; Two 7" Front Panel Touch Screens Network Control via Ethernet
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POWER

Input Range	90-264 VAC, Auto-Ranging
Input Frequency	47-63 Hz
Redundancy	Dual "Hot Swappable" redundant Power Supplies
Consumption	<400W

PHYSICAL AND ENVIRONMENTAL

Dimensions	17"W x 5.25" H x 22" D
Mounting	19" Rack (3U)
Weight	\leq 50 lbs.
Operating Temperature	0 to 50°C
Storage Temperature	-20 to 70°C
Humidity	Up to 95%, non-condensing
Altitude	Up to 30,000 feet
EMI	Designed to meet MIL-STD-461

Specifications subject to change without notice

