

# RIR 980

## RANGE INSTRUMENTATION RADAR



### FEATURES

- INTERACTIVE COMPUTER
- TOUCHSCREEN BASED OPERATOR'S CONSOLE
- COHERENT ON-RECEIVE, DIGITAL SIGNAL PROCESSING
- VMEBUS ARCHITECTURE
- AUTOMATIC TEST AND CALIBRATION
- PROVABLE STATIC AND DYNAMIC CALIBRATION
- REAL-TIME CORRECTED OUTPUT DATA
- MOBILE, TRANSPORTABLE, OR FIXED CONFIGURATION
- SUPPLIED PEDESTAL OR CUSTOMER-PROVIDED NIKE-HERCULES PEDESTAL

The RIR 980 Range Instrumentation Radar is a state-of-the-art, computer-based autotracking radar, available in C- and X-Band frequencies and in mobile, transportable, or fixed installation configurations. This data sheet describes a typical configuration. The RIR 980 basic design is customized and tailored to meet specific requirements.

The RIR 980 Radar System consists of an antenna/pedestal, transmitter, receiver, touchscreen-based operator's console, three to six racks of equipment, a VME architecture computer, Windows-based PC terminal, and optional equipment.

The radar RF functions are performed with modern, conventional radar equipment but the radar calibration, digital signal processing, computation, and control functions are performed with an interactive computer. This technique greatly reduces the number of hardware circuits performing radar system functions, thereby eliminating the balance, gain, and stability problems inherent in hardware circuits and greatly improving system reliability. System operation is also enhanced by computer interaction with the mode control touchscreen to provide operator feedback.

With the interactive computer technique:

- Console alphanumeric are generated and controlled by the computer.
- Radar system status, test, and calibration features are provided.
- Smooth output data in Cartesian coordinates to the second order are provided.
- Subsystem maintenance diagnostics are provided.
- Encoder biases are removed with the computer.
- Mount anomalies such as nonorthogonality, droop, RF skew, and mislevel are compensated for in a manner that provides instantaneous verification.
- All angle servo inputs are either developed or processed by the computer.
- System reconfiguration and calibration after relocation can be rapidly accomplished.
- Permission setup and calibration are more automated.

**BAE SYSTEMS**

# SUBSYSTEM SPECIFICATIONS

## TRANSMITTER

Type	Magnetron with solid state modulator.
Pulse Width	0.25, 0.5, and 1.0 $\mu$ s
Duty Cycle	0.001 maximum.
Pulse coding	Up to four 0.25 $\mu$ s pulses not to exceed the duty cycle.
Detected Pulse Droop	Less than 1 dB for a group of four 0.25 $\mu$ s pulses

## RECEIVER

Microwave	Three-channel monopulse system with low noise RF amplifiers and built-in switchable RF attenuators and noise diodes.
Mixers	Double balanced image reject
Local Oscillators	Two solid state, digitally controlled synthesizers that can be operated either singly or simultaneously. Tunable and frequency monitored from console
AFC	Skin and beacon.
IF Receiver Type	Three-channel DMTI.

## ANTENNA

Type	Cassegrain
Polarization	Vertical linear
Construction	One piece fiberglass or aluminum
Feed	Four-horn monopulse

## PEDESTAL

Azimuth Motion	Continuous
Elevation Motion	-5 to 185 degrees
Angular Rates*	30°/s
Angular Acceleration*	30°/s <sup>2</sup>
Leveling	Computer corrected
Encoders	LED -19 Bits

## INTELLIGENT RANGE TRACKER (IRT)

Type	Fully digital, obtainable in Metric or IRIG units	
	METRIC	IRIG
Coverage	0 to 512 km	0 to 512 kyds.
	@286 PRF	@320 PRF
PRFs Available	143	160
	286	320
	572	640
	1144	1280
Tracking Rates	0-20 km/s	0-20 kyds./s
Tracking Acceleration	0-2 km/s <sup>2</sup>	0-2 kyds./s <sup>2</sup>
Resolution	Floating Point	Floating Point
	< 0.5 meters	< 0.5 IRIG
Tracking Bandwidths	Programmable, Default 24, 12, 6, 3, 1.5, 0.75, 0.375, 0.1875 Hz	

\*Higher performance pedestals available

## COMPUTER

Type	VME
Word length	Floating point processor
Features	Removable disk
	Magnetic tape
	High-Speed printer

## SOFTWARE

Language "C"	
Totally Modular	Descriptive text, algorithms, flow charts, and annotated listings
Documentation	

## DATA (OUTPUTS & INPUTS)

Type	Time-tagged Cartesian position, velocity, and acceleration data
Sample Rate	Normally, 50 complete messages per second
Data Granularity	0.5 yard

Other rates and formats available

## DISPLAYS

Color A-scope	Top Trace—Full range or expanded
	Center Trace—64 kyds sweep around range gate
	Lower Trace $\pm$ 4000 or 8000 yards about center of primary gate
Alphanumeric	Video Display
Boresight Television	Video with A,E,R,T,H alphanumeric displayed
Optical System	Zoom optics coupled to 1/2 inch CCD high sensitivity camera

## VIDEO TRACKER (VME-based)

Resolution	H	V
RS-170:	640	480
CCIR:	768	572
Tracking Error Update Rate	TV field rate	
Digital Filter	Second Order (variable)	
Gray Band Sensitivity	256 shades of Gray	
Signal-to-Noise	2:1	
Outputs	16 data bits	
Display	AERTH mixed with video	

## ACCURACY

(12 dB S/N ratio, excluding glint, scintillation, and multipath and weak signal errors).

Angles	0.1 Mil RMS
Range	< 3 Yards RMS

For more information, please contact Business Development  
 Technical Services 557 Mary Esther Cutoff Fort Walton Beach, FL 32548-4090  
 Telephone (850) 244-7752 Fax (850) 244-7782

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