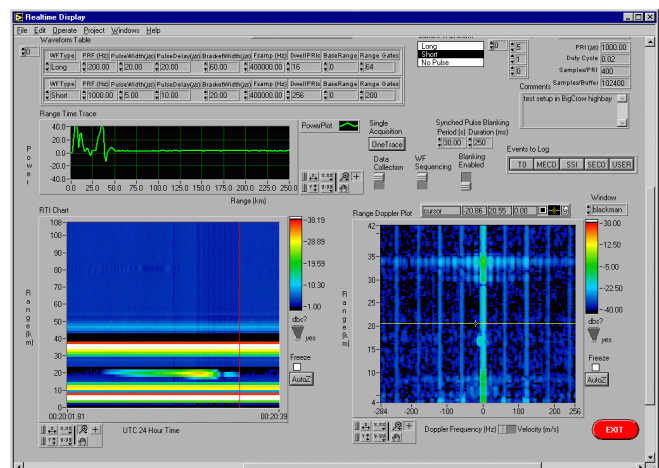
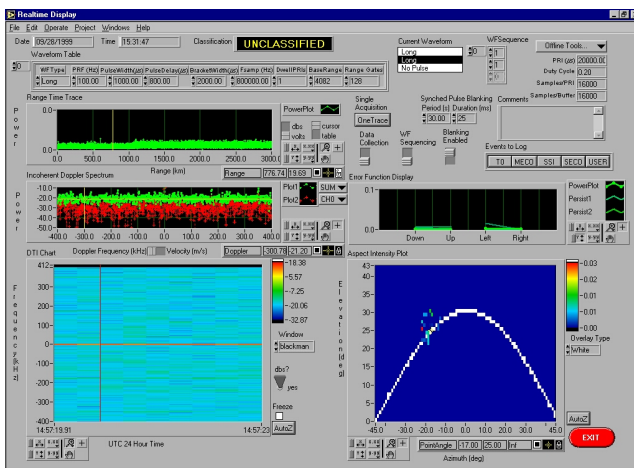




VERSATILE INEXPENSIVE PULSED RADAR (VIPER)

SPC has developed a low-cost, rapidly deployable PC-based control station for pulse-Doppler radars. The Versatile Inexpensive Pulsed Radar (VIPER) provides pulse control, sampling, real-time processing, and display functions. The system was originally developed to observe phenomena associated with atmospheric reentry of orbiting bodies, but is flexible enough to be useful for a variety of long-range detection applications. VIPER is comprised entirely of commercial-off-the-shelf (COTS) hardware and custom-built software contained in a ruggedized, rack-mountable computer chassis. The system acts as a flexible, versatile, and compact control system, and, when configured with suitable transmitters, receivers, and antennas, functions as a substantially well-featured radar system. Continuous digital data storage is achieved by using SPC's accompanying Analog/Digital Data Recorder (ADDR).

The feature that sets VIPER apart from ordinary "pulse generator and O-scope" radars is the onboard real-time analysis and display. Each system also uses a GPS/IRIG time card to synchronize events with a universal time reference.



Operation

The main component of the VIPER processor station is an industrial PC with one or two PCI multifunction I/O boards inside. The I/O board currently employed uses twin 20MHz counters for transmit brackets and an analog-to-digital converter that can sample analog signal returns on up to four channels in phase at up to 5MHz. In typical operation, the two counters produce a pulse bracket and a transmitter bracket which are cabled to the transmitter. Down-converted video signals from the receiver are then sampled using a triggered acquisition starting at the transmit bracket. A number of range gates are then sampled, as governed by the user-specified sampling rate, and then the card is reset for another pulse. All pulse timing and sampling rates are controlled from the main display screen and can be stored in setup files.

Software

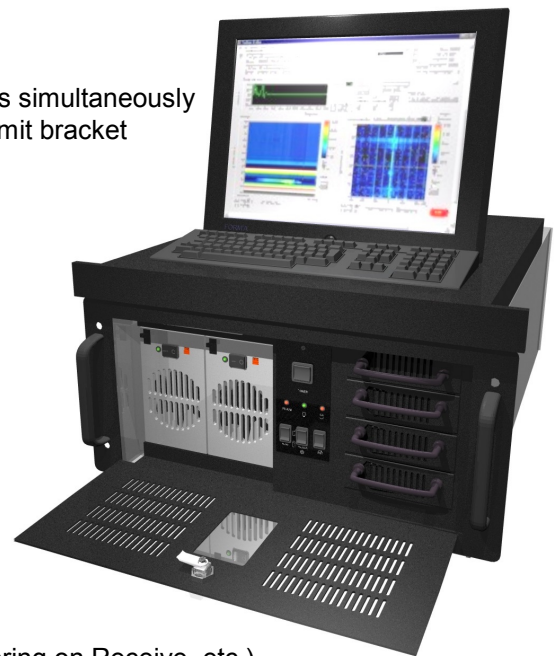
<u>Radar Control</u>	<u>Real-time Processing and Display</u>	<u>Platform Interface</u>
<ul style="list-style-type: none"> • Programmable number of simultaneous receive channels (up to 4) • Real-time Waveform Modification • Adjustable PRF • Pulse Width • Transmit/Receive (T/R) Bracket Width • Sample Rate • Setup files allow for simple configuration of parameters • "Round-robin" sequencing of multiple waveforms 	<ul style="list-style-type: none"> • Displays <ul style="list-style-type: none"> • Range-Amplitude traces • Range-Time-Intensity (RTI) plots • Range-Doppler Intensity (RDI) plots • Doppler-Time-Intensity (DTI) plots • Doppler spectra • Processing Options <ul style="list-style-type: none"> • Doppler Processing • Matched Filter Correlation • Windowing (Hanning, Hamming, Blackman, etc.) 	<ul style="list-style-type: none"> • Antenna pointing/GPS/INS data strings can be read via TCP/IP messaging

Hardware

- **Ruggedized rack-mountable computer chassis**
- **PCI Multifunction I/O cards**
 - Provides two digital T/R brackets
 - Up to 5 MHz analog-to-digital sampling on up to 8 channels simultaneously
 - Triggered acquisition ensures that sampling starts at transmit bracket
- **GPS/IRIG Time card**
 - Allows computer to run with an external time source

Specifications

- **A/D Sampling**
 - Number of Channels: 4 or 8 (2 or 4 I/Q pairs)
 - Maximum Sampling Rate: 5 MHz per channel
 - Sampling Resolution: 12 bit
- **Timing/Pulse Forming**
 - Number of Counters: 2 (one pulse, one bracket)
 - Pulse Width Resolution: 1 microsecond steps
 - Maximum Pulse Repetition Frequency: 1MHz
- **Upgrade Options**
 - Number of Channels
 - A/D Sampling Resolution
 - Customized Real-time Data Processing (FFTs, Beam Steering on Receive, etc.)
 - Customized Positioner Interface (TCP/IP, GPIB, serial, ARINC)
 - Frequency Control with Synthesizer (parallel, GPIB)



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