

## VIPER/T

### AN/USM-717 Virtual Instrument Portable Equipment Repair/Tester



The AN/USM-717 Virtual Instrument Portable Equipment Repair/Tester (VIPER/T) system is the United States Marine Corps' newest automated test system. Based on the previous generation Third Echelon Test System, the VIPER/T is designed to test and diagnose electronic, electro-mechanical and electro-optical (EO) equipment, assemblies and circuit cards from weapons systems, radar systems and communications gear.

- United States Marine Corps Functional Test System
- Member of the DoD Family of Testers
- Factory to Field Testing
- Designed to Withstand the Harshesht Environments
- Rugged Man-Portable
- Windows XP-based Operating System

VIPER/T



## System Description

The VIPER/T features a modular design based on a variety of instrumentation formats and includes a virtual instrumentation suite with software-defined RF functional test assets. Configurations offered include the RF system with frequency range to 18 GHz, the EO system for testing optical, infrared and laser based systems, and the RF/EO combined system that includes both RF and EO options for the widest range of test capability. The RF and EO configurations consist of four major assemblies: the Instrument Controller, Power Distribution Unit, Primary and Secondary Instrument Chassis.



The new, state-of-the-art EO subsystem developed by Santa Barbara Infrared provides EO test capability in a single, compact, portable module. This system affords a high-performance, turnkey solution for field test and evaluation of IR, visible/TV, Direct View Optics and laser

reduced mass, volume and complexity. The system's reduced size maximizes ease-of-use in space-constrained areas and supports critical EO measurement modes and functions required by the U.S. Marine Corps.

VIPER/T's software environment is a Windows XP-based Operating System with an ATLAS runtime system as the main test executive. Visual Basic is also available to further expand the system's development capabilities. The VIPER/T's software development environment is XML-based utilizing a Common Instrument Control Layer to provide one common interface for software applications to and from the instrumentation. Compatibility with LASAR simulation and boundary scan software tools are standard with VIPER/T.



**EO Subsystem**

Controlled by a powerful, rugged Pentium Mobile equipped notebook and integral docking station, the VIPER/T is designed to withstand the harshest environments, operating in temperature extremes up to +55°C, in dust and wind, and in areas of high Electromagnetic Interference. Since wheeled vehicles will transport the VIPER/T over unimproved roads, the system has been designed to be shock and drop resistant in accordance with stringent military standards.



**Instrument Controller**

A new, high reliability Power Distribution Unit (PDU) powers the VIPER/T. This new PDU provides both fixed power for the controller and instrumentation, as well as programmable power for the units under test, all in a single chassis. The PDU accepts input power from a variety of sources, including single-phase AC, three-phase AC and 28 VDC. With its modular design, all major components of the PDU are field replaceable for easy repair.



**Power Distribution Unit**

The VIPER/T has the capability to operate in a bench top mode through the use of the included Stand Alone Instrument Fixture (SAIF) and the Stand Alone Instrument Software (SAIS), which utilizes a Graphical User Interface (GUI) for user control of individual instruments. This capability allows more flexibility for test, troubleshooting and repair. The SAIF is also used in conjunction with a comprehensive System Self Test program that self diagnoses the VIPER/T when failures are detected. In addition to standalone capability and self test, the SAIF is also used for automated calibration of the entire VIPER/T instrumentation suite.



**Stand Alone Instrument Fixture (SAIF)**

Interface to the VIPER/T SAIF is through an industry standard receiver interface (patch panel) with standard modules and contacts available from multiple suppliers. The majority of VIPER/T assets pass through this receiver with some of the specialized busses provided on the secondary chassis output.



**Receiver Interface**

## System Specifications (RF Variant)

### GENERAL

Computer: Laptop/Docking Station configuration  
Pentium Mobile 4M 1.5 GHz  
512 Mb RAM (expandable to 1 Gb)  
32 Mb Video  
60 Gb Hard Drive  
CD-RW/DVD-ROM  
PCI VXI-MXI-2 Interface  
GPIB Interface  
13.3" anti-reflective TFT LCD display

Operating System  
Windows XP

Test Languages  
ATLAS, Visual Basic

Cooling/Monitoring  
Cooling fans integral to VXI chassis; monitoring of chassis temperature, fan speed, power supply voltage/current

Input Power Options  
28 VDC, 100A  
115 VAC, single-phase, 35A  
208 VAC, three-phase, 15A per phase

### DC POWER SUPPLIES

Ten Programmable DC Power Supplies  
(9) 0-40V, 0-5A  
(1) 0-65V, 0-5A

### PRECISION PLL WAVEFORM SYNTHESIZER

Frequency Range  
100uHz to 50 MHz

Amplitude  
10mV to 16Vpp (50 ohms)

Waveforms  
Triangle, Sine, Sinc, Square, Ramp, Pulse, Arbitrary

Modes  
Normal, Sequenced, Triggered, Gated, Burst, Phase

### ARBITRARY FUNCTION GENERATOR

Frequency Range  
0.01 Hz to 10 MHz

Amplitude  
Up to 5.1V (50 ohms)

Waveforms  
Arbitrary, Sine, Square, Ramp, Triangle

### SYNCHRO/RESOLVER SIMULATOR

Single VXI card capable of both angle position indication and simulation

Channels/Functions  
Two fully independent synchro-resolver to digital and two fully independent digital to synchro-resolver

Stimulus/Measurement Accuracy  
+/- 0.005°

## DIGITAL MULTIMETER

### RESISTANCE MEASUREMENTS

Type  
Two-wire/Four-wire measurements

Range  
0 to 100 Mohms

### DC VOLTAGE MEASUREMENTS

Range  
-300 to +300 V

### AC VOLTAGE MEASUREMENTS

Range  
0 to 300 Vrms

### COUNTER/TIMER

Frequency Range  
0.001 Hz to 200 MHz

Frequency Resolution  
9 digits (for a 1 ns gate time)

Period Range  
5 ns to 1000 S

Time Interval Range  
1 ns to 1000 S

Resolution  
9 digits in 1 ns gate time

### DIGITAL STORAGE OSCILLOSCOPE

Number of channels  
2

Bandwidth  
DC to 250 MHz

Maximum Sample Rate  
1 GS/s

Resolution  
8 bits

Record Length  
1 MS

### DIGITAL TEST SUBSYSTEM

Number of channels  
192 bi-directional digital channels

Data Rate  
25 MHz

External Clock Input  
DC to 50 MHz

Pattern Depth  
32K per channel  
LASAR and Boundary Scan Compatible

### SWITCHING

DC Power Switching  
(10) DPST, 10A @ 220VDC, 250VAC  
Standard Relay Switching  
(96) 1 x 1, 1.0A @ 220VDC, 250VAC

Low Frequency Switching  
(6) 1 x 4, 1.0A @ 220VDC, 250VAC, 10 MHz  
(10) 2 x 8, 2.0A @ 220VDC, 250VAC, 10 MHz  
(12) 1 x 2, 2.0A @ 220VDC, 250VAC, 10 MHz

High Density Multiplexer  
(2) 2 x 24, 2-wire, 2.0A @ 220VDC, 250VAC, 10 MHz  
(1) 1 x 24, 2-wire, 2.0A @ 220VDC, 250VAC, 10 MHz  
(1) 1 x 8, 2-wire, 2.0A @ 220VDC, 250VAC, 2 MHz

Medium Frequency RF Multiplexer  
(4) 1 x 8, coax, 1 W, 1 GHz

High Frequency RF Switching  
(6) 1 x 6 multiplexer front panel replaceable modules

Bandwidth  
> 18 GHz

### RF COUNTER

Frequency Range  
0.1 to 18 GHz

Frequency Resolution  
≤ 100 Hz

Period Range  
50 ns to 1 S

Input Sensitivity  
≤ -15 dBm

SWR  
≤ 2:1

Timebase Accuracy  
≥ 2.2 ppm

## BUS TEST CAPABILITY

### MODULAR INTERFACE CONTROLLER (MIC)

Ports  
2 (bus control and monitoring)  
Maximum Transfer Rate  
1.33 Mb/sec

### CONTROLLER AREA NETWORK II (CAN II)

Ports  
Two independent CAN controllers each supporting CAN 2.0B

### COPPER DISTRIBUTED DATA INTERFACE

Dual Attachment Station (DAS) capable  
Ports  
Dual Port with Bypass Switch  
Data Rate  
100 Mbps over twisted pair up to 100 Meters

### SECURE PROTOCOL TACTICAL COMMUNICATIONS INTERFACE MODEM

Channels  
Two channel tactical modem/router  
Message Protocols  
MTS, AFAPD, TACFIRE and IDL  
Supports  
NRZ Synchronous Data Mode, Packet X.21, Amplitude Shift Key (ASK), Continuous Phase Frequency Shift Key (PFSK)

### MIL-STD-1553

Channels  
Two channels, 64K words per channel  
Capability  
Bus Monitor, Bus Controller and Remote Terminal

### SERIAL BUS

RS-232, EIA-422, RS-485  
Asynchronous and synchronous capability  
Baud Rate  
Programmable

### GIGABIT ETHERNET

Complies with IEEE802.3 specification for 10BaseT, 100 BaseTX and 1000BaseT over category 5 twisted pair cable  
Ports  
Dual Port  
Data Rate  
10 Mb/sec, 100 Mb/sec and 1000 Mb/sec (half duplex)  
20 Mb/sec, 200 Mb/sec and 2000 Mb/sec (full duplex)

### RF SYNTHESIZER

Frequency Range  
1 MHz to 20 GHz  
Frequency Resolution  
1 Hz  
Modulation  
External Amplitude Modulation (AM), Frequency Modulation (FM), Pulse Modulation (PM) and Complex Modulation  
Power Range  
+13 to -90 dBm  
Power Resolution  
0.1 dB  
Level Accuracy  
+/- 2dB

### SPECTRUM ANALYZER

Frequency Range  
0.01 to 18 GHz  
Frequency Resolution  
2 Hz  
Resolution Bandwidth  
300 Hz to 3 MHz  
Reference Level Range  
-120 dBm to +30 dBm  
Absolute Level Accuracy  
 $\pm 0.5$  dB (-20 dBm input, 100 MHz)  
VSWR  
1.5:1 (<1.5 GHz,  $\pm 10$  dB input Atten)  
imebase Stability  
 $5 \times 10^{-7}$   
Frequency Aging  
 $\pm 1 \times 10^{-6}$

### RF POWER METER

Frequency Range  
0.01 to 18 GHz  
Power Range  
-70 dBm to +13 dBm  
Uncertainty  
 $\leq \pm 1$  dB absolute mode (3% sensor correction factors)  
Zero Set  
 $\pm 0.5\%$  of Full Scale  
Power Reference  
50 MHz, 1.00 mW (Power level uncertainty 1.2%)

### MODULATION ANALYZER

AM Measurement  
10 Hz to 10 KHz at  $F_c$ , Modulation Depth of 0% to 99%  
FM Measurement  
30 Hz to 200 KHz at  $F_c$ , Deviation of 0 Hz to 400 KHz  
PM Measurement  
200 Hz to 30 KHz at  $F_c$ , Deviation of 0.1 to 180 Degrees

### ELECTRO OPTICAL TEST OPTION

Compact, portable collimator with Integrated EO Test Module  
System Frequency Spectrum  
0.4 micrometer to 12 micrometer  
Visible Source  
Range 20-5,000 mW/cm<sup>2</sup>/sr, Resolution 1mW/cm<sup>2</sup>/sr, or 1%  
IR Source  
dT Range -10°C to +40°C, Resolution 0.01°C  
Laser Sources  
1064, 1540, 1570 nanometers  
Laser Camera  
Array 320 x 240, Spectral Response 900-1700 nm  
Range Simulation  
20m to 60km, Accuracy 5m  
Visible/IR Targets  
15  
Aperture Size  
20.32 cm (8 inches)  
Effective Focal Length  
656 mm (25.83 inches)  
Visible, FLIR Supported Tests  
Boresight, MTF, MRTD, NETD, MRC  
Laser Supported Tests  
Boresight, Range Accuracy, Receiver

\* Note: All specification at user interface



**Astronics DME Corporation**

12889 Ingenuity Dr.

Orlando, FL 32826

USA

Phone: + 1.407.381.6062

Fax: + 1.407.381.6063

E-mail: ORLSales@astronics.com

**[www.astronics.com](http://www.astronics.com)**

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