

Radar Active Target Training System (add-on to the Radar Tracking Training System)

8112504 (8097-40)

FESTO

LabVolt Series

Datasheet



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Table of Contents

General Description	3
List of Equipment	3
List of Manuals	4
Table of Contents of the Manual(s)	4
Equipment Description	4

General Description

Radar Active Target (RAT) Training System is used in conjunction with the three previous subsystems to train students in the principles and scenarios of EW. This is a truly unique system that places real-time, safe, and unclassified EW demonstrations into the hands of students. The RAT Training System consists of an active jamming pod trainer, an elaborate set of accessories, and a comprehensive student manual.

* WARNING: This equipment is subject to export control. Please contact your sales representative to know if this product can be imported in your region.

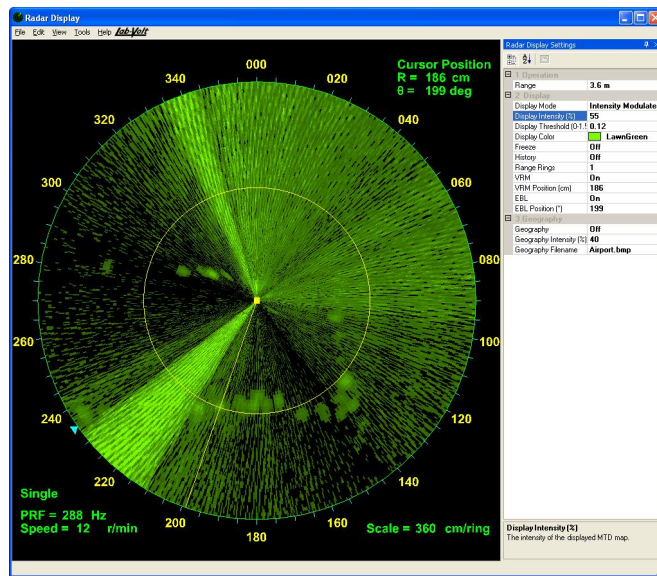
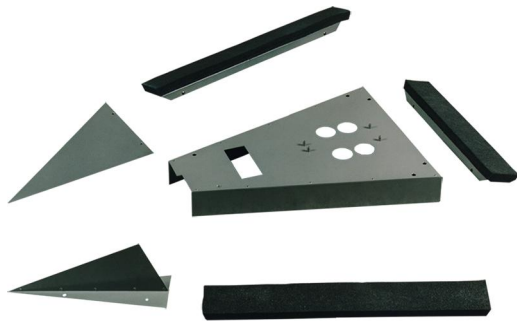


Figure 13. Effect of barrage noise jamming produced by the jamming pod trainer of the RAT Training System as observed on the Radar PPI display.

The jamming pod trainer is a Self-Screening Jammer (SSJ) target that can perform direct or modulated noise jamming (see Figure 13) as well as repeater jamming. It includes a remote controller to select the type of jamming and set the jamming parameters. The jamming pod trainer and the included accessories are designed for use with the Radar to implement real EW situations. This provides an effective means of introducing students to a real-time jamming situation that necessitates a response, that is, the use of an appropriate ECCM to prevent losing track of the target.



Stealth accessories in the RAT Training System allow reduction of the jamming pod trainer's radar cross section.

List of Equipment

Qty	Description	Model number
1	Electronic Warfare (Reference Book) _____	580343 (32254-80)
1	Radar in an Active Target Environment (Student Manual) _____	580425 (38546-00)
1	Horn Antenna _____	581847 (9535-00)
1	Radar Jamming Pod Trainer Support _____	581916 (9595-10)
1	Radar Jamming Pod Trainer _____	581949 (9608-10)
1	Power Supply (Radar Electronic Warfare) _____	8095962 (9609-10)
1	Accessories for the Radar Active Target Training System _____	581985 (9690-C0)

List of Manuals

Description	Manual number
Electronic Warfare (User Guide) _____	580343 (32254-80)
Radar in an Active Target Environment (Workbook) _____	580425 (38546-00)
Radar Training System (User Guide) _____	8112390

Table of Contents of the Manual(s)

Radar in an Active Target Environment (Workbook) (580425 (38546-00))

- 1-1 Familiarization with the Radar Jamming Pod Trainer
- 1-2 Spot Noise Jamming and Burn-Through Range
- 1-3 Frequency Agility and Barrage Noise Jamming
- 1-4 Video Integration and Track-On-Jamming
- 1-5 Antennas in EW: Sidelobe Jamming and Space Discrimination
- 2-1 Deception Jamming Using the Radar Jamming Pod Trainer
- 2-2 Range Gate Pull-Off
- 2-3 Stealth Technology: The Quest for Reduced RCS
- 3-1 Deceptive Jamming Using Amplitude-Modulated Signals
- 3-2 Cross-Polarization Jamming
- 3-3 Multiple-Source Jamming Techniques
- 4-1 Chaff Clouds
- 4-2 Chaff Clouds used as Decoys

Equipment Description

Horn Antenna 581847 (9535-00)



The Horn Antenna is used to perform experiments related to a variety of topics, such as FM-CW radar, antenna gain, and microwaves. When used in conjunction with the Radar Antenna, the Horn Antenna allows separate transmission and reception of RF signals. It is also used in certain EW demonstrations.

Specifications

Parameter	Value
Gain	14.5 dB
Distance	Between the transmitting and receiving horn antennas: 40 cm (16 in).

Radar Jamming Pod Trainer Support 581916 (9595-10)



This support is a mast designed to support the Radar Jamming Pod Trainer when it is used to perform electronic jamming against the Radar. The large base of the mast provides stable support of the Radar Jamming Pod Trainer. Soft pads attached under the base allow the mast to glide softly over the surface of the Target Positioning System.

Radar Jamming Pod Trainer 581949 (9608-10)



The Radar Jamming Pod Trainer is a Self-Screening Jammer (SSJ) target in a compact enclosure. It is designed to be placed on the Target Positioning System to electronically attack the Radar Training System by masking the target echo signal with noise or causing either range or angle deception. The Radar Jamming Pod Trainer mainly consists of an RF signal source, a variable attenuator, transmitting and receiving horn antennas, a signal repeater, an amplitude modulator, and a remote controller.

The RF signal source is a Voltage-Controlled Oscillator (VCO) whose frequency range is approximately twice that of the Radar Training System. The VCO frequency can be adjusted to perform radar jamming using spot noise. The VCO can also be modulated in frequency, either internally or externally, to produce barrage noise jamming. The variable attenuator decreases the VCO signal level before it is sent to the transmitting horn antenna. This allows the amount of noise introduced in the victim radar (i.e., the Radar) to be adjusted. The maximum transmitted power is low, thereby providing safe operation in a laboratory environment.

The receiving horn antenna intercepts the pulse signal transmitted by the Radar. The repeater, which consists of an amplifier and a programmable delay line, amplifies and delays the intercepted signal. By transmitting this signal back to the radar and gradually increasing the delay, the range gate in the radar tracking system can be captured and pulled away from the target echo, thereby producing range deception. This technique is usually referred to as Range Gate Pull Off (RGPO).

The amplitude modulator consists of an electronic RF switch which can be controlled either internally or externally. It is used to modulate the amplitude of the VCO output signal or repeated signal (on-off modulation). The amplitude modulator allows implementation of AM noise jamming and asynchronous inverse gain jamming. It also allows blinking jamming when a second transmitting horn antenna is connected to an auxiliary RF output

on the Radar Jamming Pod Trainer. These three jamming techniques are used to cause angle deception in the radar tracking system.

The remote controller is used to operate the Radar Jamming Pod Trainer. Communication between the remote controller and the Radar Jamming Pod Trainer is through an infra-red link. Buttons and an LCD display on the remote controller provide access to the various functions of the Radar Jamming Pod Trainer.

The Radar Jamming Pod Trainer can be tilted 90° to perform cross-polarization jamming, another technique used to cause angle deception in the radar tracking system. It can also be used with accessories to demonstrate other jamming techniques such as sidelobe jamming, formation jamming, and jammer illuminated chaff (JAF), as well as the fundamentals of stealth technology.

The Radar Jamming Pod Trainer operates from unregulated DC voltages. A cable allows the Radar Jamming Pod Trainer to be connected to a standard unregulated DC power bus (available on the Power Supply / Antenna Motor Driver and the Power Supply).

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Specifications

Parameter	Value
Frequency Range	8 to 12 GHz
Output Power	-30 to +10 dBm, adjustable in 1 dB steps
Internal Frequency Modulation	
Waveform	Selectable, 980-Hz synthesized triangular wave or 30-kbps pseudo-random bit sequence
Deviation	Selectable, 50 MHz, 1, 2, 3, and 4 GHz
Frequency Modulation Input	
Voltage Range	-10 to +10 V (to cover 8 to 12 GHz)
Modulating Frequency Range	DC to 130 kHz
Impedance	10 kΩ
Internal Amplitude Modulation	
Type	On-Off
Frequency	Selectable, 0.25, 0.5, 1, 2, 3, 4, 5, 140, 141, 142, 143, 144, 145, 146, 147, and 148 Hz
Amplitude Modulation Input (on-off modulation)	
Level	TTL
Delay Time / Transition Time	150 ns / 50 ns
Auxiliary RF Output	
Frequency Range	8 to 12 GHz
Output Power	-30 to +10 dBm, adjustable in 1 dB steps
Impedance	50 Ω
Signal Repeater (Programmable Delay Line)	
Maximum Input Power	+10 dBm
Range of Delay	2.66 to 5.60 ns (40 to 84.2 cm), adjustable in 7 steps of 0.42 ns (6.3 cm)
RGPO Walk-Off Time	Selectable, 0.8, 1.6, 4.0, and 8.0 s
Physical Characteristics	
Dimensions (H x W x D)	150 x 170 x 440 mm (5.9 x 6.7 x 17.3 in)
Net Weight	3.4 kg (7.5 lb)

Power Supply (Radar Electronic Warfare) 8095962 (9609-10)



The Power Supply can be installed under the surface of the Target Positioning System to provide power to the Radar Jamming Pod Trainer. It provides the same unregulated DC voltages as the Power Supply / Antenna Motor Driver through a multi-pin connector located on its top panel. This connector is

identical to the power connector used on several other modules of the system and has the same pin configuration.

Specifications

Parameter	Value
Power Requirement	
Current	1.5 A (for 120 V)
Service Installation	Standard single-phase ac outlet
Unregulated DC Outputs	-25 V typ. -1.0 A max.; +11 V typ. -1.5 A max.; +25 V typ.-1.0 A max.
Line Input Protection	2 A / 1 A circuit breaker
Unregulated DC Output Protection	1.0 A and 1.5 A circuit breaker
Physical Characteristics	
Dimensions (H x W x D)	112 x 330 x 300 mm (4.4 x 13 x 11.8 in)
Net Weight	6.7 kg (14.8 lb)

Accessories for the Radar Active Target Training System 581985 (9690-C0)



The Accessories for the Radar Active Target Training System contain a chaff cloud simulation device, a multifunction stand, a triangular (stealth) shield to cover the Radar Jamming Pod Trainer, Radiation Absorbing Material (RAM), a set of microwave components and cables, and a sample of actual chaff.

Reflecting the commitment of Festo Didactic to high quality standards in product, design, development, production, installation, and service, our manufacturing and distribution facility has received the ISO 9001 certification.

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