



TECHNICAL REPORT RDMR-SS-11-32

PATRIOT ADVANCED CAPABILITY-3 (PAC-3) VIRTUAL ENGAGEMENT SIMULATION TESTBED (VEST) SHELTER REQUIREMENTS DOCUMENT

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Aviation and Missile Research, Development,
and Engineering Center**

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13. ABSTRACT (Maximum 200 Words) This report specifies the requirements to design and fabricate the Aviation and Missile Research, Development, and Engineering Center (AMRDEC) Systems Simulation and Development Directorate (SSDD) Patriot Advanced Capability-3 (PAC-3) Virtual Engagement Simulation Testbed (VEST) shelter.				
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I. INTRODUCTION

The Patriot Advanced Capability-3 (PAC-3) Virtual Engagement Simulation Testbed (VEST) shelter is to be a mobile test unit capable of interfacing with the tactical Patriot ground system in a field test environment. The shelter is to provide the capability to house all of the equipment and personnel necessary to conduct live PAC-3 virtual engagements. As such, the following sections outline the physical requirements necessary to meet this objective.

II. MECHANICAL REQUIREMENTS

The mechanical requirements for the shelter are listed in Table 1.

Table 1. Mechanical Requirements

Number	Requirement
1	The shelter shall be a standard 53-foot trailer configuration.
2	One Belly Box shall be mounted on the underside of the trailer to provide storage space.
3	One U-Bolt Global Positioning System (GPS) antenna mount sized for 0.75-inch pipe shall be installed on the side of the trailer with the patch panel (Requirement 48).
4	One ladder shall be mounted on the exterior rear of the trailer providing roof access.
5	One Heating, Ventilation, and Air Conditioning (HVAC) unit shall be mounted on the forward exterior wall. HVAC shall be routed to control temperature of storage room and main room/galley separately. HVAC shall maintain temperature of all rooms between 65 °F and 76 °F.
6	The rear access door and equipment door shall be made exit only.
7	One shore power cable shall be housed on a reel on the underside of the body.
8	Two entry/exit platforms shall be installed: one below the rear exit door and one below the side entrance/exit door. Both platforms shall fold away, securely, to the underside of the trailer during transport.

III. ARCHITECTURAL REQUIREMENTS

The architectural requirements are shown in Table 2.

Table 2. Architectural Requirements

Number	Requirement
9	The interior layout of the shelter shall be customized In Accordance With (IAW) Figure 1.
10	The shelter shall be divided into three separate rooms, walled appropriately, with doors providing access between rooms. The doors shall be 28 inches in width.
11	All three rooms shall have fluorescent 120 Voltage Alternating Current (VAC) light fixtures mounted on the ceilings, with separate light switches in each room.
12	Five exterior lights shall be securely mounted providing nighttime illumination: one in the rear, two in front, and one on both sides of the trailer. Two switches shall be installed: one in the main room and one in the aft room.
13	The floor shall be tiled.

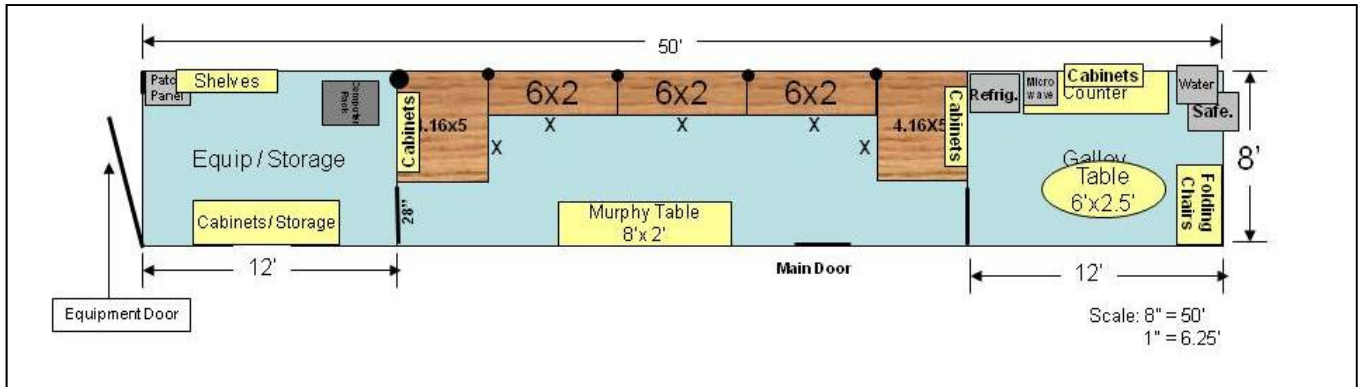


Figure 1. Interior Layout

A. Storage Room

The storage room requirements are shown in Table 3.

Table 3. Storage Room Requirements

Number	Requirement
14	The aft room shall be approximately 12 feet in length.
15	One 19-inch computer rack shall be mounted to the floor IAW Figure 1. The rack shall be mounted with the rear facing the interior wall and with enough space to service the rear components.
16	Floor-to-ceiling cabinets with doors shall be installed IAW Figure 1.
17	One Internal Telecommunications Patch Panel shall be installed IAW Figure 1 (Requirement 49). Shelves shall be mounted IAW Figure 1.
18	The bottom corner of the interior wall shall be removed, IAW Figure 1, to provide a pathway for cables in and out of the storage room. The dimensions shall be approximately 5-x-5 inches.
19	The storage room shall be sound dampened to damp out computer equipment noise. If possible, wall thickness should be increased, insulated, and carpeted to maximize damping.

B. Main Room

The main room requirements are shown in Table 4.

Table 4. Main Room Requirements

Number	Requirement
20	The middle room shall be approximately 26 feet in length.
21	Desks/furniture at a standard height of 30 inches shall be installed, IAW Figure 1, to facilitate the use of computer equipment and provide a work area. The furniture need not be segmented as indicated in the figure; a single continuous desk is considered adequate. The two corner pieces of the desk shall be curved, as opposed to the rectangular depiction in the figure. Additionally, the desk shall have cut-outs near the wall to allow cabling to be run IAW Figure 1.

Table 4. Main Room Requirements (Concluded)

Number	Requirement
22	One cabinet with doors shall be installed above each corner desk area IAW Figure 1.
23	Six office-style chairs shall accompany the desk area. A means to secure the chairs during transport shall be provided. The Herman Miller WC420P (BK/BJ/DS/BK) stacking chair shall be used.
24	One 8-x-2 foot Folding Murphy Table shall be installed on the wall IAW Figure 1.
25	One 42-inch Liquid Crystal Display (LCD) High Definition Television (HDTV) monitor shall be mounted on the wall, centered above the desk area. The monitor shall have at least one D-subminiature (D-sub) Video Graphic Array (VGA) input, one Digital Visual Interface (DVI) input, one High Definition Multimedia Interface (HDMI) input, and one component input.

C. Galley

The galley requirements are shown in Table 5.

Table 5. Galley Requirements

Number	Requirement
26	The forward room shall be approximately 12 feet in length.
27	One full-size refrigerator shall be securely installed IAW Figure 1.
28	One microwave shall be securely installed IAW Figure 1.
29	One two-drawer safe shall be provided Government Furnished Equipment (GFE) and securely mounted IAW Figure 1.
30	One water bottle shall be securely installed IAW Figure 1, above, but not on top of, two-drawer safe in Requirement 29.
31	A counter with overhanging cabinets shall be installed, IAW Figure 1, to provide a food preparation and storage area.
32	One 6-x-2.5 foot oval/rounded table shall be securely installed IAW Figure 1.
33	Six folding chairs shall accompany the table and be securely stored during non-use IAW Figure 1.

IV. ELECTRICAL REQUIREMENTS

The electrical requirements are shown in Table 6.

Table 6. Electrical Requirements

Number	Requirement
34	The shore power cable specified in Requirement 7 shall use the Appleton Powertite ACP1044CD connector.
35	The shelter shall be rated for 120/240 VAC, 60 Hertz, 3-Phase, and 200 Amperage (AMPS) power.
36	Wire shall be a minimum of 14-American Wire Gauge (AWG), and all 120 VAC wiring shall be routed in vendor approved cable raceways. A circuit breaker panel shall be installed, housing the circuit breaker for each circuit.

Table 6. Electrical Requirements (Concluded)

Number	Requirement
37	One thermostat shall be installed in the main room.
38	Electrical circuits shall be installed to provide safe and load-balanced electrical power IAW Figure 2. The electrical outlets shall be installed low to the floor, IAW Figure 2, except where indicated.
39	One 110 volt/20 amp Ground Fault Interrupter (GFI) circuit shall be installed for refrigerator/microwave IAW Figure 2.
40	One 110 volt/20 amp circuit shall be installed for external use IAW Requirement 48.
41	One 220 volt/30 amp circuit shall be installed for the rack-mounted Uninterruptible Power Supply (UPS) located in the storage room IAW Figure 2.
42	The shelter shall provide lightning and surge protection for the 220 volt/30 amp circuit in the storage room.

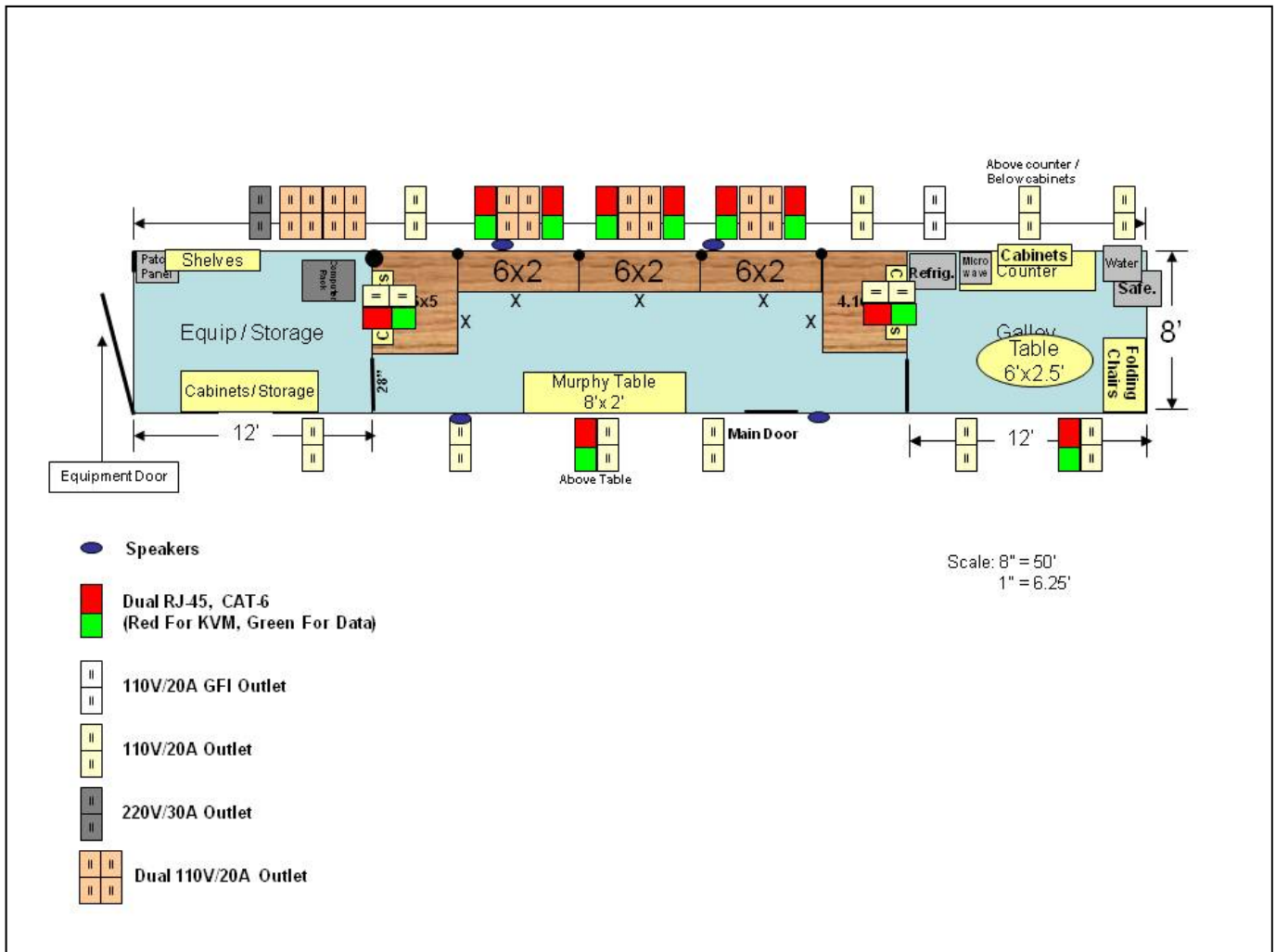


Figure 2. Electrical/Data Layout

V. DATA AND COMMUNICATIONS REQUIREMENTS

The data and communications requirements are shown in Table 7.

Table 7. Data and Communications Requirements

Number	Requirement
43	Two separate networks shall be distributed from the rack area in the storage room. One network shall distribute either Belden DataTwist 350 Unshielded Twisted Pair (UTP) Number 1700A Solid (Category (CAT)-5e) cable, Belden DataTwist 350 patch Number 1752A Stranded (CAT-5e) cable, or Belden MediaTwist Number 1872A Solid (CAT-6) cable to Registered Jack (RJ)-45 sockets, IAW Figure 2, providing a Keyboard-Video-Mouse (KVM) network; one network shall distribute plenum-rated CAT-6 UTP cable to RJ-45 sockets, IAW Figure 2, providing a data network.
44	Dual RJ-45 sockets shall be installed low to the floor and external to the wall (not built-in) IAW Figure 2, except where indicated.
45	Panduit raceways shall distribute cabling from the rack area, through the wall cut-out, to the RJ-45 sockets along the bottom of the walls. Where necessary (for example, Murphy Table, Galley), Panduit raceways shall be run along the top of the walls. All cabling shall be color coded and marked appropriately on the ends.
46	Four 6-x-9 inch speakers shall be installed and recessed in the walls near the ceiling IAW Figure 1. If impossible to recess, speakers shall be mounted securely to walls.
47	The computer racks specified in Requirement 15 shall have at least one Alternating Current (AC) power strip mounted vertically near the rear. Horizontal and vertical cable management shall be installed.
48	One External Telecommunications Patch Panel shall be installed on the outside of the trailer. It shall be equipped with a weatherproof door that latches and locks. The panel shall be sized for 50-percent growth. The panel shall contain the following female connections: six CAT-6 RJ-45 (data) ports, six RJ-11 (voice) ports, two pair Straight Tip (ST) (fiber optic) connectors, two pair Standard Connector (SC) (fiber optic) connectors, eight Bayonet Neill-Concelman (BNC) connectors four of which are 50 ohm and four of which are 75 ohm, two tactical Patriot Radar Weapon Control Interface Unit (RWCIU) sockets, one VGA DE15F port, one DE9F Recommended Standard (RS)-232 port, one DVI port, two stereo Radio Corporation of America (RCA) jacks, two Universal Serial Bus (USB) ports, two Institute of Electrical and Electronic Engineers (IEEE) 1394 Firewire ports, and two 110 volt/20 amp sockets. A recommended layout for the patch panel is given in Figure 3.
49	One Internal Telecommunications Patch Panel shall be installed IAW Requirement 17 providing the same female connections as specified in Requirement 48 (pin-to-pin), except for the two tactical Patriot RWCIU plugs, which shall be replaced with two female DE9 connectors wired IAW Table 8. Additionally, one stereo receiver shall be installed providing access to the speakers in Requirement 46. If impossible to install in patch panel, receiver shall be installed securely in immediate vicinity.

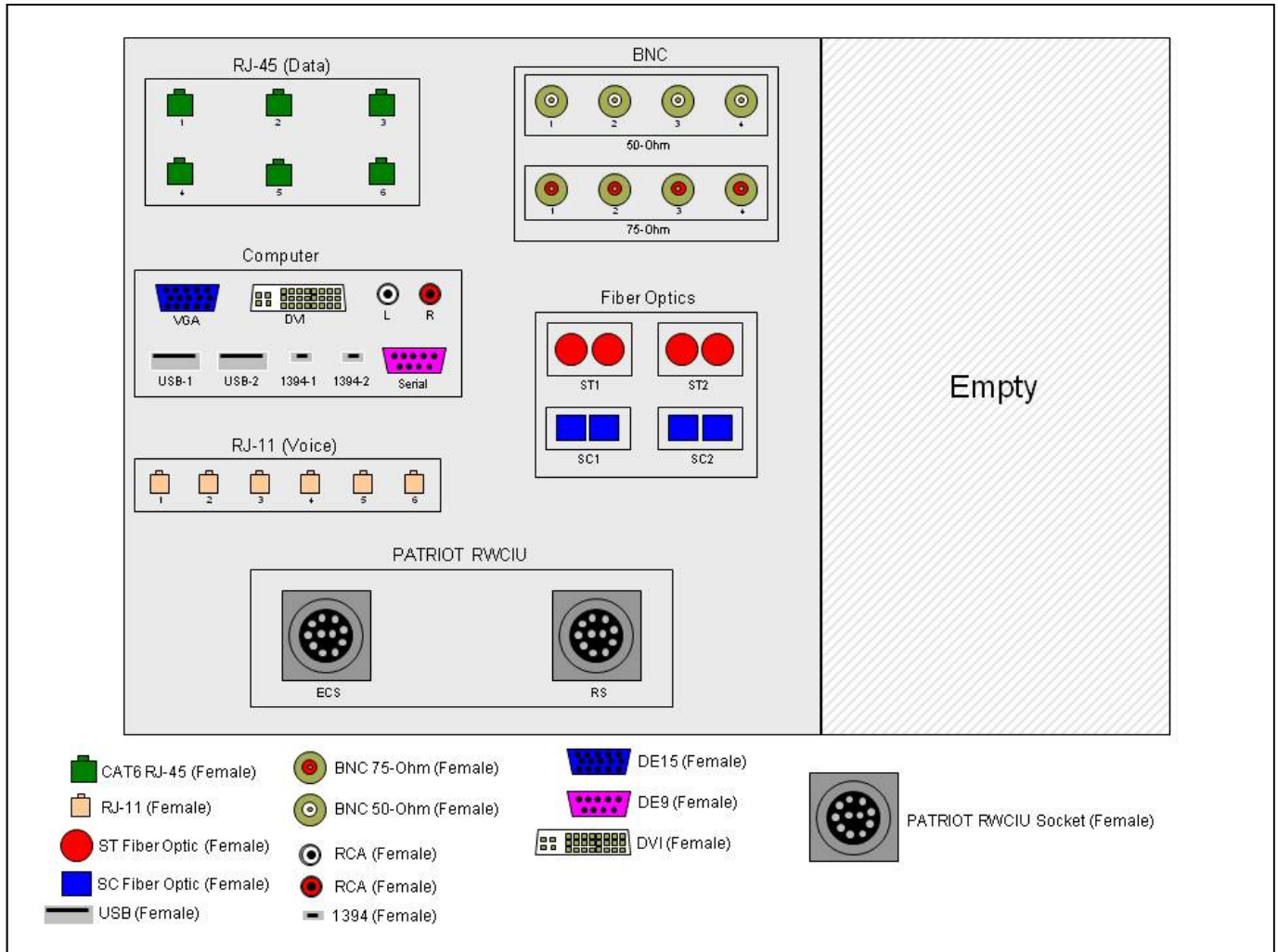


Figure 3. Patch Panel Layout

Table 8. Wiring Diagram for External RWCIU to Internal DE9

ECS Connector Bendix MS17346R20C335	Signal	9-Pin Connector (Female)
C	Voice +	1
D	Voice -	2
E	Voice Shield	3
F	ECS RCV Shield	4
K	ECS TX Shield	5
A	ECS TX +	6
H	ECS TX -	7
B	ECS RCV +	8
J	ECS RCV -	9

Table 8. Wiring Diagram for External RWCIU to Internal DE9 (Concluded)

RS Connector Bendix MS17346R20C335	Signal	9-Pin Connector (Female)
C	Voice +	1
D	Voice -	2
E	Voice Shield	3
F	ECS RCV Shield	4
K	ECS TX Shield	5
A	RS RCV+	6
H	RS RCV-	7
B	RS TX+	8
J	RS TX-	9

VI. SAFETY AND SECURITY REQUIREMENTS

The safety and security requirements are shown in Table 9.

Table 9. Safety and Security Requirements

Number	Requirement
50	Three smoke detectors shall be installed, one in each room.
51	Three fire extinguishers shall be securely mounted, one in each room.
52	The main side entrance door shall have an X-09 lock installed as well as a push-button combination lock, providing a two-step entry.
53	All outside-accessible openings (vents, and so forth) greater than 9-x-9 inches shall have metal bars preventing entry.

LIST OF ACRONYMS AND ABBREVIATIONS

AC	Alternating Current
AMPS/amps	Amperage
AWG	American Wire Gauge
BNC	Bayonet Neill-Concelman
CAT	Category
D-sub	D-subminiature
DVI	Digital Visual Interface
GFE	Government Furnished Equipment
GFI	Ground Fault Interrupter
GPS	Global Positioning System
HDMI	High-Definition Multimedia Interface
HDTV	High Definition Television
HVAC	Heating, Ventilation, and Air Conditioning
IAW	In Accordance With
IEEE	Institute of Electrical and Electronic Engineers
KVM	Keyboard-Video-Mouse
LCD	Liquid Crystal Display
PAC-3	Patriot Advanced Capability-3
RCA	Radio Corporation of America
RJ	Registered Jack
RS	Recommended Standard
RWCIU	Radar Weapon Control Interface Unit
SC	Standard Connector
SSDD	System Simulation and Development Directorate
ST	Straight Tip
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
UTP	Unshielded Twisted Pair
VAC	Voltage Alternating Current
VEST	Virtual Engagement Simulation Testbed
VGA	Video Graphic Array

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