

**ANNEX D
APPENDIX A**

M1083A1, Medium Tactical Vehicle (MTV) KIT

SPECIFIC REQUIREMENTS

Revision	Date	Pages	Description
Draft 1.0	9 April 2012	ALL – Ron Swanson	Formating, insert revision table and acronyms. Verified references.
Draft 1.1	30 April 2012	Multiple – Don Jones	M1083A1 typo correction.
Draft 1.1	23 May 2012	ALL- Ron Swanson	Corrected SRD references
1.2	23Aug 2012	CDT Team	CDT Team input from Draft RFP
1.3	22 Jan 2013	2.0 Reference	Pat Hart - Update Common SRD reference
2.0	27 Jan 2016	ALL – Pat Hart	Match Currently fielded TWV vehicle variants

A-1.0 Scope

This appendix to the CDT TWV SRD describes the requirements for the M1083A1 MTV specific kit. Each kit includes the vehicle specific driver's compartment hardware and simulation software needed to convert the base CDT TWV to match a specific vehicle's physical and functional characteristics.

A-2.0 Applicable Documents

- TM 9-2320-392-10 (Vol. 1-3), Technical Manual Operator's Manual, The M1083A1 Series 5 Ton, 6 X 6 Medium Tactical Vehicles (MTV) dated Jan 2005.
- TM 9-2330-394-13&P, Operator's, Field Level Manual for the M1082 Series, 2 ½ Ton Light Tactical Vehicle Trailer (LTVT) and the M1095 Series, 5 Ton Medium Tactical Vehicle Trailer (MTVT), dated January 2005.
- System Requirements Document for the Common Driver Trainer System, PRF-PT-00430, Version 6.0, dated 27 Jan 2016.
- System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580, Version 2.0, dated 27 Jan 2016.

In the event of a conflict between the requirements of this document and those contained in the documents above, the requirements contained in this document take precedence.

A-3.0 Requirements

A-3.1 System Level Requirements

The M1083A1 MTV kit shall consist of hardware and software components which will reconfigure the CDT TWV to support driver training for drivers of the M1083A1 MTV vehicle. The M1083A1 MTV specific modules shall consist of the simulated reconfigurable driver's compartments, the instruments and controls for the driver, the software required to operate the driver's compartment, and the software to provide the specific vehicle performance in response to driver inputs and interaction with the Common Modules.

Unless specifically modified in this appendix, the requirements specified for the CDT TWV baseline vehicle shall apply when the CDT TWV is configured as a M1083A1 MTV. In case of a conflict between the requirements of the CDT TWV SRD and the requirements of this appendix for the M1083A1 MTV, the requirements of this appendix shall take precedence when testing the M1083A1 MTV configuration.

A-3.1.1 Common Module Requirements

A-3.1.1.1 Instructor Operator Station (IOS)

The IOS shall control the operation of the CDT TWV, select/modify training scenarios, monitor simulated vehicle status (e.g., instruments, switches, etc.) monitor driver trainee performance and manage student records in accordance with the requirements of the System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2 Variant Requirements

The M1083A1 MTV kit shall include simulation hardware and software that replicates the controls, instruments, vehicle operation and vehicle dynamics of the M1083A1 MTV and the M1095 MTVT (trailer). The main components of the driver's compartment are the controls, instruments, switches, panels, seating and physical structure of the M1083A1 MTV necessary to accomplish the required training tasks. When configured as a M1083A1 MTV driver's compartment, the simulation software shall provide the driver's compartment control and switch interaction and simulator response for the controls, instruments, switches and panels necessary to accomplish the required TWV training tasks. The simulation software shall provide realistic vehicle dynamic responses to driver control inputs and simulated training environment interactions. The driver's compartment shall provide the status of hardware and software to the CDT system through the defined interfaces during CDT daily readiness tests. During initialization, the system shall check the installed configuration and provide an indication to the instructor/operator at the IOS of the specific TWV configuration, and the the loading condition of the primary vehicle, and any trailer loading if attached. Loading conditions shall be adjustable for discrete loading of empty, half full and full states. The default condition shall be empty loading for all adjustable loads. An error message shall be displayed if there are any reconfigurable component mismatches or components not installed.

A-3.2.1 Variant Training Requirements

The training requirements for the M1083A1 MTV shall be the same as the training requirements specified in paragraph 3.2.1 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.1.1 Malfunction/Emergency Condition Training Requirements

The malfunction/emergency condition training requirements for the M1083A1 MTV shall be the same as the malfunction/emergency condition training requirements specified in paragraph 3.2.1.1 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2 Specific Reconfigurable TWV Module Requirements

A-3.2.2.1 Simulated Driver Compartment

The simulated driver compartment for the M1083A1 MTV shall be the same as the simulated driver compartment specified in paragraph 3.2.2.1 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1 Driver's Compartment Subsystem Common Components

The driver's compartment subsystem common components for the M1083A1 MTV shall be the same as the driver's compartment subsystem common components specified in paragraph 3.2.2.1.1 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.1 Driver's Door

The driver's door for the M1083A1 MTV shall be the same as the driver's door specified in paragraph 3.2.2.1.1.1 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.2 Steering Column and Wheel

The steering column and wheel for the M1083A1 MTV shall be the same as the steering column and wheel specified in paragraph 3.2.2.1.1.2 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580. The turn signal control stalk shall move up for right turns and down for left turns. The pull switch capability of the turn signal stalk shall be programmed to switch between high and low beam service lights (i.e., service light dimmer switch). The turn stalk end button shall be programmed to activate the vehicle horn when pushed.

A-3.2.2.1.1.3 Throttle

The throttle for the M1083A1 MTV shall be the same as the throttle specified in paragraph 3.2.2.1.1.3 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.4 Service Brake Pedal

The service brake pedal for the M1083A1 MTV shall be the same as the service brake pedal specified in paragraph 3.2.2.1.1.4 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.5 Driver's Seat

The driver's seat for the M1083A1 MTV shall be the same as the driver's seat specified in paragraph 3.2.2.1.1.5 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.6 DVE Night Vision Device

The DVE night vision device for the M1083A1 MTV shall be the same as the DVE night vision device specified in paragraph 3.2.2.1.1.6 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.1.1.7 Interchangeable Dashboard Panels and Equipment

The Driver's panel for the M1083A1 MTV shall consist of one or more removable assemblies that replicate the form and function of the M1083A1 MTV vehicle as described in TM 9-2320-392-10 (Vol. 1-3), Technical Manual Operator's Manual, The M1083A1 Series 5 Ton, 6 X 6 Medium Tactical Vehicles (MTV), dated Jan 2005. Unless specified, the items below are to be functional. The panels/clusters that are replicated are as follows:

- a. Voltmeter, 24Volt
- b. Voltmeter, 12 Volts
- c. Check Engine Indicator
- d. Engine Oil Pressure Gauge
- e. Water Temperature Gauge
- f. Speedometer / Odometer
- g. Front Brake Air Pressure Gauge
- h. Rear Brake Air Pressure Gauge
- i. Air Filter Restriction Indicator
- j. Fuel Gauge
- k. Fan Switch (non-functional mock-up)
- l. Heat Control (non-functional mock-up)
- m. Vent Control (non-functional mock-up)

- n. System Park Switch
- o. Trailer Air Supply Control

- p. Lamp Test Switch
- q. Warning Light Switch
- r. Hazard Light Switch
- s. Engine Fan Off Switch
- t. Lo Idle/High Idle Switch
- u. Warmup/Off/Retard Switch
- v. Main Light Switch (New Style)
- w. Windshield Washer Switch (non-functional mock-up)
- x. Turn signal/headlight dimmer control
- y. Windshield Wiper Switch (non-functional mock-up)
- z. Master Power Switch
- aa. Starter Button Switch
- bb. Parking Brake Indicator
- cc. ABS Indicator Light
- dd. Trailer ABS Indicator Light
- ee. High Beam Indicator Light
- ff. Check Trans Indicator
- gg. Stop Engine Warning Light
- hh. Check Engine Warning Light
- ii. Low Air Pressure Warning Light
- jj. WTEC III Tran Pushbutton Shift Selector
- kk. Left Turn Signal Indicator
- ll. Right Turn Signal_Indicator
- mm. Coolant Temp Indicator
- nn. CTIS Overspeed Indicator
- oo. Low Oil Pressure Indicator
- pp. Engine Fan Off Indicator
- qq. Battery Disconnect Indicator (non functional)
- rr. Inlet Air Heater (non functional)
- ss. Exhaust Brake Indicator
- tt. CTIS Off Indicator
- uu. No Charge Indicator
- vv. Audible Alarm
- ww. CTIS Panel

A-3.2.2.1.2 M1083A1 MTV Specific Driver's Compartment Components

The CDT TWV M1083A1 MTV cab shall replicate the M1083A1 MTV cab.

A-3.2.2.1.2.1 Specific Driver's Compartment Hardware Components

The M1083A1 MTV kit shall include the specific hardware components listed in paragraph 3.2.2.1.1.7, Interchangeable Dashboard Panels and Equipment above.

A-3.2.2.1.2.2 Specific Driver's Compartment Software Components

The reconfigurable Driver's assembly software stimulates or simulates all required M1083A1 MTV dashboard controls and indicators through the cab I/O subsystem, as specified in paragraph 3.2.2.1.2.2.

All controls and indicators shall operate in accordance with TM 9-2320-392-10 (Vol. 1-3) dated Jan 2005 operator's manual.

A-3.2.2.2 Vehicle Simulation

A-3.2.2.2.1 Vehicle Dynamics Performance

The M1083A1 MTV kit software shall simulate the M1083A1 MTV vehicle dynamics to the level of detail required to support the training tasks in paragraph 3.2.1. Vehicle dynamics shall include steering feel, steering response, acceleration, deceleration, braking and suspension response. The vehicle dynamics simulation shall provide models of the power train (e.g., engine, transmission, etc.), suspension (e.g., springing, damping, range of travel, etc.), and the hull of the M1083A1 MTV vehicle. The default M1083A1 MTC configuration shall be unloaded vehicle. The parameters for these models shall be evaluated at 60 Hz to assure smooth and accurate simulation. Terrain topography and surface characteristics shall be determined and combined with control inputs from the driver compartment to provide inputs to the models of the engine, transmission, steering, brakes, suspension, and hull. The vehicle dynamics simulation results shall drive the visual displays, motion cues, aural cues, and instrumentation in the driver compartment.

A-3.2.2.2.1.1 Engine Model

The engine model for the M1083A1 MTV shall be the same as the engine model specified in TM 9-2320-392-10 (Vol. 1-3), Technical Manual Operator's Manual, The M1083A1 Series 5 Ton, 6 X 6 Medium Tactical Vehicles (MTV), dated Jan 2005.

A-3.2.2.2.1.2 Transmission Model

The transmission model for the M1083A1 MTV shall be the same as the transmission model specified in TM 9-2320-392-10 (Vol. 1-3), Technical Manual Operator's Manual, The M1083A1 Series 5 Ton, 6 X 6 Medium Tactical Vehicles (MTV), dated Jan 2005.

A-3.2.2.2.1.3 Steering and Brake Model

The steering and brake model shall be a physics-based model of the actual real world performance of the M1083A1 MTV vehicle. The position of the service brake pedal and the engaged/disengaged status of the parking brake shall be input to the brake model.

Appropriate real time brake force parameters shall be determined and applied to the CDT motion control software.

A-3.2.2.2.1.4 Suspension Model

The model of the suspension system shall include computation of the forces acting on the suspension components. The effects of the terrain, including slope, height and surface roughness shall be combined with the forces due to the mass and momentum of the hull to determine the suspension force at each wheel acting on the hull. Pitch torque and roll torque shall be computed as inputs to the hull model by transferring the combined forces on the own vehicle through the damping and spring characteristics of the suspension.

A-3.2.2.2.1.5 Hull Model

The position, velocity, and acceleration of the own vehicle center of gravity shall be determined in six degrees of freedom by the hull model. Inputs from the power train, suspension, and terrain models shall be combined to resolve the updated vehicle position and derive the velocities and accelerations.

A-3.2.2.2.2 Trailer Dynamics Performance

The M1083A1 MTV kit software shall simulate the vehicle dynamics of the M1095 Series, 5 Ton Medium Tactical Vehicle Trailer (MTVT). The trailer vehicle dynamics shall include the trailer size, weight, center of gravity (CG), suspension characteristics and attachment to tow vehicle. The trailer tracking and turning shall respond correctly to tow vehicle dynamics in both forward and reverse movement. The trailer shall be modeled in an empty, half and full load configurations with the weight evenly distributed. The parameters for the trailer dynamic model shall be evaluated at 60 Hz to assure smooth and accurate simulation. Terrain topography and surface characteristics shall be determined and combined with inputs from the tow vehicle to determine trailer vehicle dynamics. The trailer vehicle dynamics simulation results shall drive the visual displays, motion cues, aural cues, and instrumentation in the driver compartment as applicable.

A-3.2.2.2.3 Malfunctions and Emergency Conditions

The malfunctions and emergency conditions for the M1083A1 MTV shall be the same as the malfunctions and emergency conditions specified in paragraph 3.2.2.2.2 System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.3 Visual Simulation

The visual simulation for the M1083A1 MTV shall be the same as the visual simulation specified in paragraph 3.2.2.3 System Requirements Document for the Tactical Wheeled

Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.3.1 Visual Scenes

The M1083A1 MTV kit shall utilize the CDT visual environment data bases as specified in the System Requirements Document for the Common Driver Trainer System, PRF-PT-00430. When configured as a M1083A1 MTV , the CDT TWV shall have any fixed obstructions (e.g., hull or structural components of the M1083A1 MTV) visible in the driver's field of view (FOV) displayed in the visual scene as a fixed entity. The simulated eye point height of the displayed image shall be the same as that realized by the driver in the operational vehicle.

A-3.2.2.3.2 Display Configuration

The display configuration for the M1083A1 MTV shall be the same as the display configuration specified in paragraph 3.2.2.3.2 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.3.3 Sensor Image Simulation

The sensor image simulation for the M1083A1 MTV shall be the same as the sensor image simulation specified in paragraph 3.2.2.3.3 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.3.4 Visual Effects

The visual effects for the M1083A1 MTV shall be the same as the visual effects specified in paragraph 3.2.2.3.4 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-3.2.2.4 Aural Cue and Communications

The aural cues and communications for the M1083A1 MTV shall be the same as the aural cues and communications specified in paragraph 3.2.2.4 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

Scoring Criteria

The scoring criteria for the M1083A1 MTV shall be the same as the scoring criteria specified in paragraph 3.2.2.5 of System Requirements Document for the Tactical Wheeled Variant (TWV) Including Vehicle Specific Kits for the Common Driver Trainer (CDT) System, PRF-PT-00580.

A-4.0 Acronyms List

CDT	Common Driver Trainer
CG	Center Gravity
FOV	Field of View
Hz	Hertz
I/O	Input / Output
IOS	Instructor Operator Station
LTVT	Light Tactical Vehicle Trailer
MTV	Medium Tactical Vehicle
MTVT	Medium Tactical Vehicle Trailer
SRD	System Requirements Document
TWV	Tactical Wheeled Variant
TM	Technical Manual