OUM-71-6920-924-10

TECHNICAL MANUAL
OPERATOR USER'S MANUAL
FOR
STANDALONE INTEGRATED PLAYER UNIT
COMMON THROUGH SIGHT VIDEO
CREW MODULE UNIT RECORDER (CMUR)

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26 APRIL 2013

SAFETY SUMMARY

This summary contains general safety warnings that must be understood and applied during operation and maintenance of the equipment. Failure to observe the warnings could result in serious injury or death to personnel.

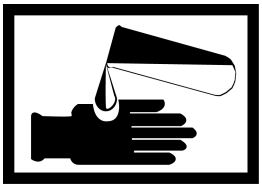
The summary also contains general cautions that will help you avoid damage to equipment.

GENERAL SAFETY PRECAUTIONS

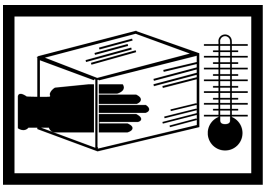
WARNINGS, CAUTIONS, NOTES and Safety Icons may be found throughout work spaces, on equipment, or in publications. It is important that the significance of each type of instruction is thoroughly understood by operators or maintenance personnel. The following are samples of each with explanations.

EXPLANATION OF SAFETY WARNING ICONS

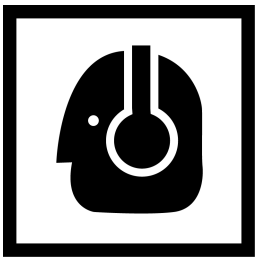
BIOLOGICAL
Abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



CHEMICAL
Drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



CRYOGENIC
Hand in block of ice shows that material is extremely cold and can injure human skin or tissue.



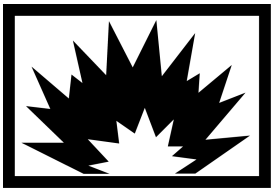
EAR PROTECTION
Headphones over ears show that noise level will harm ears.

SAFETY SUMMARY – Continued

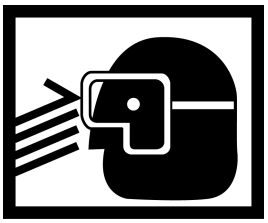
ELECTRICAL
Electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.

ELECTRICAL
Electrical wire to arm with electricity symbol running through human body shows that high voltage is present.

ELECTROSTATIC DISCHARGE (ESD)
The symbol showing a hand with a diagonal line through it indicates that the device is sensitive to ESD. ESD precautions should be taken to prevent equipment damage.



EXPLOSION
Rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.

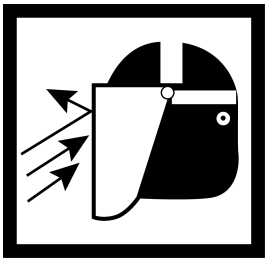


EYE PROTECTION
Person with goggles shows that the material will injure the eyes.

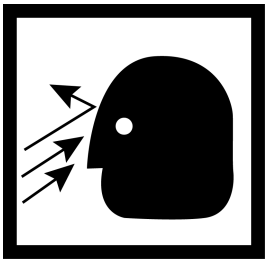
SAFETY SUMMARY – Continued

FALLING PARTS
Arrow bouncing off human shoulder and head shows that falling parts present a danger to life or limb.

FIRE
Flame shows that a material may ignite and cause burns.



FLYING PARTICLES
Arrows bouncing off face shield show that particles flying through the air will harm face.



FLYING PARTICLES
Arrows bouncing off face show that particles flying through the air will harm face.

HEAVY OBJECT
Human figure stooping over heavy object shows physical injury potential from improper lifting technique.

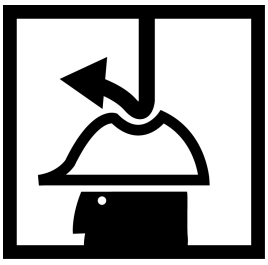
SAFETY SUMMARY – Continued

HEAVY PARTS
Heavy object on human figure shows that heavy parts present a danger to life or limb.

HEAVY PARTS
Foot with heavy object on top shows that heavy parts can crush and harm.

HEAVY PARTS
Hand with heavy object on top shows that heavy parts can crush and harm.

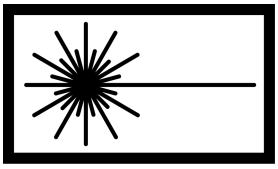
HEAVY PARTS
Heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.



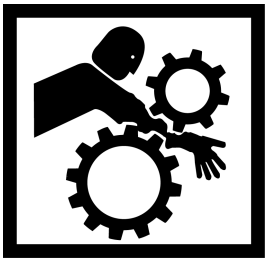
HELMET PROTECTION
Arrow bouncing off head with helmet shows that falling parts present a danger.

SAFETY SUMMARY – Continued

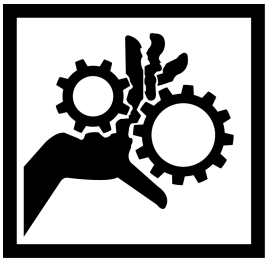
HOT AREA
Hand over object radiating heat shows that part is hot and can burn.



LASER LIGHT
Laser light hazard symbol indicates extreme danger for eyes form laser beams and reflections.



MOVING PARTS
Human figure with arm caught between gears shows that the moving parts of the equipment present a danger to life or limb.

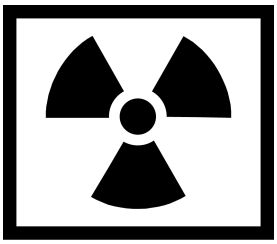


MOVING PARTS
Hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.

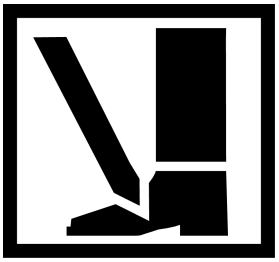
PINCH HAZARD
Hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb.

SAFETY SUMMARY – Continued

POISON
Skull and crossbones shows that a material is poisonous or is a danger to life.



RADIATION
Three circular wedges shows that the material emits radioactive energy and can injure human tissue.

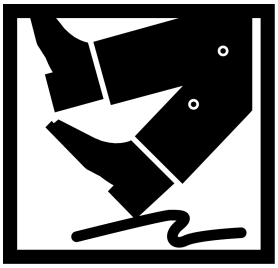


SHARP OBJECT
Pointed object in foot shows that a sharp object presents a danger to limb.

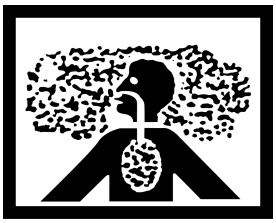
SHARP OBJECT
Pointed object in hand shows that a sharp object presents a danger to limb.

SHARP OBJECT
Pointed object in hand shows that a sharp object presents a danger to limb.

SAFETY SUMMARY – Continued



SLICK FLOOR
Wavy line on floor with legs prone shows that slick floor presents a danger for falling.



VAPOR
Human figure in a cloud shows that material vapors present a danger to life or health.

WARNINGS, CAUTIONS, AND NOTES

WARNINGS, CAUTIONS, and NOTES may be found throughout workspaces, on equipment, or in publications. It is important that the significance of each type of instruction is thoroughly understood by operators or maintenance personnel. The following are samples of each with explanations.

WARNING

Warnings indicate a procedure or practice that could result in personal injury or loss of life if not followed correctly.

CAUTION

Cautions indicate a procedure or practice that, if not strictly observed, could result in damage or destruction of equipment.

NOTE

Notes highlight an essential procedure that ensures correct operation and/or maintenance. These markings, when found in publications or on equipment, must be read carefully. In addition, instructions must be understood before personnel proceed with the action, operation, or process.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: Zero in the "Change No." column indicates an original page or work package.

Date of issue for original manual is:

Draft Final: 26 April 2013

Total number of pages for front and rear matter is 29 and total number of work packages is 23, consisting of the following:

Page/WP No.	Change No.	Page/WP No.	Change No.
FRONT COVER	0	WP 0011 (2 PGS)	0
BLANK	0	CH 3 TITLE PAGE	0
SAFETY SUMMARY (8 PGS)	0	BLANK	0
TITLE BLOCK PAGE	0	CH 3 WP INDEX	0
BLANK	0	BLANK	0
I-VIII	0	WP 0012 (2 PGS)	0
CH 1 TITLE PAGE	0	WP 0013 (4 PGS)	0
BLANK	0	CH 4 TITLE PAGE	0
CH 1 WP INDEX	0	BLANK	0
BLANK	0	CH 4 WP INDEX	0
WP 0001 (6 PGS)	0	BLANK	0
WP 0002 (8 PGS)	0	WP 0014 (2 PGS)	0
WP 0003 (4 PGS)	0	WP 0015 (4 PGS)	0
CH 2 TITLE PAGE	0	WP 0016 (30 PGS)	0
BLANK	0	WP 0017 (22 PGS)	0
CH 2 WP INDEX	0	WP 0018 (10 PGS)	0
BLANK	0	WP 0019 (12 PGS)	0
WP 0004 (6 PGS)	0	WP 0020 (4 PGS)	0
WP 0005 (4 PGS)	0	WP 0021 (2 PGS)	0
WP 0006 (6 PGS)	0	CH 5 TITLE PAGE	0
WP 0007 (4 PGS)	0	BLANK	0
WP 0008 (2 PGS)	0	CH 5 WP INDEX	0
WP 0009 (12 PGS)	0	BLANK	0
WP 0010 (2 PGS)	0	WP 0022 (2 PGS)	0

LIST OF EFFECTIVE PAGES/WORK PACKAGES - CONTINUED

NOTE: Zero in the "Change No." column indicates an original page or work package.

Page/WP No.	Change No.	Page/WP No.	Change No.
WP 0023 (4 PGS)	0		

**U. S. ARMY PROGRAM EXECUTIVE OFFICE (PEO),
SIMULATION TRAINING AND INSTRUMENTATION (STRI)
ORLANDO, FL
26 APRIL 2013**

TECHNICAL MANUAL
OPERATOR USER'S MANUAL
FOR

STANDALONE INTEGRATED PLAYER UNIT
COMMON THROUGH SIGHT VIDEO
CREW MODULE UNIT RECORDER (CMUR)

Reporting Errors and Recommended Improvements

You can help improve this manual. If you find any mistakes or if you know a way to improve the procedures, please let us know. Service should be submitted as follows:

(A) Army – Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), located in the back of this manual, directly to: Program Executive Office, Simulation Training and Instrumentation (PEO STRI), ATTN: PEO STRI SFAE-PS-Q, 12350 Research Parkway, Orlando, FL 32826-3276. Recommendations may be e-mailed to PEOSTRI_2028@peostri.army.mil. A reply will be sent to you.

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WP Sequence No./Page No.

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WP Sequence No./Page No.

TABLE OF CONTENTS – Continued

HOW TO USE THIS MANUAL

HOW TO USE THIS MANUAL

This manual provides information about operating and maintaining the Crew Module Unit Recorder (CMUR).

The manual is organized in chapters, as shown below in Format. Each chapter is functionally divided into individual Work Packages (WPs) based on the subsystem of CMUR, in a logical order of work sequence.

Work packages may contain a scope of tasks, initial setup, descriptive information, operating tasks, and maintenance tasks. These data types are further divided into paragraphs, procedural steps, tables, listings, warnings, cautions, notes, and supporting illustrations.

The WPs are general information, equipment description, location description, operation, maintenance, and supporting information units containing all information required for directing task performance.

WPs are numbered using four digits starting with 0001 (that is, work package 1). If it becomes necessary to insert an additional WP during a revision cycle, it will be indicated by a decimal point and a number. For example, 0001.1 would indicate the first WP inserted between WP 0001 and WP 0002. This permits adding one or more WPs between any two existing WPs during any revision cycle.

Page numbers within each WP are indicated by -1, -2, -3 (that is, 0001-1 indicates WP 1, page 1). Each WP starts at page 1. Figures and tables within each WP also start at 1.

Format

This Technical Manual (TM) contains the following five :

- CHAPTER 1 GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION
- CHAPTER 2 OPERATION INSTRUCTIONS
- CHAPTER 3 TROUBLESHOOTING PROCEDURES
- CHAPTER 4 MAINTENANCE INSTRUCTIONS
- CHAPTER 5 SUPPORTING INFORMATION

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

CREW MODULE UNIT RECORDER (CMUR)

CHAPTER 1

GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND THEORY OF OPERATION

WORK PACKAGE INDEX

MAINTAINER

General Information For The Digital Range Training Systems Crew Module Unit Recorder (CMUR)

SCOPE

The purpose of the Crew Module Unit Recorder (CMUR) operation and maintenance manual is to describe each operation and maintenance task in detail and in logical, systematic steps for the work to be accomplished. The operations and maintenance instructions shall accurately provide the operator and maintainer with all the necessary information to keep the equipment operational. It provides system and subsystem oriented instructions for installation, operation and maintenance. All tools, test equipment and consumable items required to accomplish any maintenance or installation are identified.

The CMUR consists of the following equipment:

- CMUR
- Vehicle Accessory Kit (VAK)
- After Action Review (AAR)/Take Home Package (THP) Laptop and drivebay

The CMUR is an on-board recording device used to support ranges without the infrastructure to support a fully instrumented range and is able to support up to eight video feeds from the Thru-Sight and Crew cameras. The CMUR records the audio, video, and data during the training event. This data is saved to a removable Solid State Drive (SSD) and is used later to create the AAR Presentation by using the AAR/THP laptop. The laptop is able to interface to the SSD by using a four-bay hard drive drivebay.

When using the CMUR configuration, the AAR/THP functions are performed by a Dell ruggedized laptop and drivebay. The drivebay allows the user to connect up to four SATA hard drives at once, allowing the AAR/THP laptop software to access the data needed to create the AAR Presentation and THP disk.

MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual; DA PAM 738-751, Functional Users Manual for the Army Maintenance Management Systems - Aviation (TAMMS-A); or AR 700-138, Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA PAM 750-8, TAMMS Users Manual; DA PAM 738-751, Functional Users Manual for TAMMS; or AR 700-138, Army Logistics Readiness and Sustainability.

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Send your comments and desired changes to: Program Executive Office for Simulation, Training, and Instrumentation, (PEO-STRI), ATTN: PEO-SFAE-PS-Q, 12350 Research Parkway, Orlando, Florida, 32826-3276.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion is an electrochemical process that causes degradation such as the rusting of iron. Corrosion is commonly caused by exposure to moisture, acids, bases, or salts. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking. Plastics, composites, and rubbers can also degrade, most commonly from exposure to excessive heat or sunlight. Damage to plastics, composites, and rubbers will appear as cracking, softening, swelling, and/or breaking. The Product Quality Deficiency Report should be submitted to PEO STRI for Army personnel or TM 4700-15/1 for Marine Corps personnel.

DESTRUCTION OF MATERIAL TO PREVENT ENEMY USE

For information on destruction of materiel to prevent enemy use, refer to TM 750-244-2 (Procedures for Destruction of Electronic Materiel to Prevent Enemy Use).

PREPARATION FOR STORAGE OR SHIPMENT

None Required

LIST OF ABBREVIATIONS/ACRONYMS

AAL	Additional Authorization List
AAR	After Action Review
AUX	Auxillary
AV	Audio Video
BFV	Bradley Fighting Vehicle
BII	Basic Issue Items
BIT	Built-in-Test
BOI	Basis Of Issue
CAGEC	Commercial and Government Entity Code
CB	Citizen Band
CDP	Commander’s Display Panel
CDRL	Contract Data Requirements List
CDU	Central Display Unit
CIC	Command Interface Control
CIV	Commander's Independent Viewer
CMUR	Crew Module Unit Recorder
COEI	Components of End Item
COTS	Commercial Off-the-Shelf
CPC	Corrosion Prevention and Control
CSE	Commanders Sight Extension
CVC	Combat Vision Center
DA	Department of the Army
DMT	Dismounted Player Unit
DRTS	Digital Range Training Systems
DVD	Digital Video Disk
EIR	Equipment Improvement Recommendations
EMP	Electromagnetic Pulse
ESD	Electrostatic Discharge
ETDP	External Training Development Interface Panel
FFCS	Full Functional Crew Station
FGC	Functional Group Code
FSE	Field Support Equipment
GAS	Gunner’s Auxiliary Sight
GPS	Global Positioning System
GPSE	Gunner’s Primary Sight Extension
GTL	Lockheed Martin Global Training and Logistics
HCI	Hardness Critical Item
HG	Inches of Mercury

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

HHM	Hand Held Monitor
IBAS	Improved Bradley Acquisition System
IP	Internet Protocol
IPU	Integrated Player Unit
LED	Light Emitting Diode
MAC	Maintenance Allocation Chart
MAT	Moving Armor Target
Mbps	Megabit per second
M-FIAM	Military Filter And Input Attenuator Module
MRU	Maximum Receive Unit
MTOE	Modified Table of Organization and Equipment
NEMA	National Electronic Manufacturers Association
NHA	Next Higher Assembly
NIIN	National Item Identification Number
NSN	National Stock Number
ODS	Operation Desert Storm
OSD	On Screen Display
P/N	Part Number
P/S	Principal/Secondary Item Code
PC	Personal Computer
PCB	Printed Circuit Board
PEO-STRI	Program Executive Office Simulation, Training and Instrumentation
PMCS	Preventive Maintenance Checks And Services
PoE	Power Over Ethernet
PU	Player Unit
PWR	Power
RCU	Radio Control unit
ROC	Range Operations Center
RPSTL	Repair Parts and Special Tools List
RTNB	Re-worked Turret Network Box
RTV	Room Temperature Vulcanizing
SATA	Serial Advanced Technology Attachment
SD	Secure Digital
SEP	System Enhancement Package
SMR	Source, Maintenance, and Recoverability
SRA	Shop Repairable Assembly
SSD	Solid State Drive
SYSCON	Systems Control

LIST OF ABBREVIATIONS/ACRONYMS – CONTINUED

TAMMS	The Army Maintenance Management System
TAMMS-A	The Army Maintenance Management System-Aviation
TCP/IP	Transmission Control Protocol/Internet Protocol
TDIP	Training Device Interface Panel
THP	Take Home Package
TIS	Tactical Information System
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostic Equipment
TNB	Turret Network Box
TOMC	Technical Operations and Maintenance Console
TRU	Target Reporting Unit
TRU	Thermal Receiving Unit
TSC	Tactical Support Center
TSC	Thru-Sight Camera
TSV	Thru-Sight Video
TSVR	Thru-Sight Video Recorder
UOC	Usable On Code
USB	Universal Serial Bus
UUT	Unit Under Test
VAK	Vehicle Accessory Kit
VDC	Voltage Direct Current
VDP	Video Display Panel
VGA	Video Graphics Adaptor
VIS	Vehicle Information System
WP	Work Package

END OF WORK PACKAGE

MAINTAINER

Equipment Description And Data — Crew Module Unit Recorder (CMUR)

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

This section provides a general description of the CMUR equipment. This includes type of equipment, general capabilities, features, components, and use.

Standalone Integrated Player Unit

The standalone integrated player unit is a recording system that collects and records data, audio and video from the vehicle.

CMUR

The standalone integrated player unit consists of the CMUR, an eight channel encoder, Thru-Sight Cameras (TSCs), crew cameras, and various cables and adapters. The CMUR is able to record up to eight video and two audio feeds simultaneously, which are then stored on a removable solid-state hard drive. Each video feed records for six hours. Previously captured data is automatically overwritten once available space has been exhausted.

An external audio adapter found in the Vehicle Accessory Kit (VAK) connects the vehicle's internal radio to the CMUR. Incoming and outgoing communications made over all radios are captured through the audio cable and are stored on the CMUR solid-state hard drive.

Video captured by the CMUR includes crew gunnery operations, a feed from the Commander's Display Unit and a stream from the Thermal Imaging System. Crew cameras mounted within the vehicles record the ammunitions loader and gunner during operations. Thru-site cameras record the gunner's primary and secondary sight. Video adapters, included in the VAK, attach to the Commander's Display Unit and Thermal Imaging System which connect to the CMUR to capture a live view of the displays. The CMUR video encoder processes the video from the vehicle and the crew cameras. The encoder processes the analog feeds from the individual cameras and maintenance ports and converts them into a digital stream of packets.

The dual 1553 bus module collects and analyzes sensor data generated by different activities occurring during training, such as trigger pulls, turret rotations, Laser Range Finder data, and ammunition selection.

The CMUR utilizes a Garmin 18x receiver with external antenna to collect and tag audio, video, and 1553 data with a GPS location.

The CMUR connects directly to the vehicles 24 VDC power through the vehicle turret's power connector.

Vehicle Accessory Kit (VAK)

The Vehicle Accessory Kit (VAK) contains the required cabling, adapters, brackets, and cameras used to interface the CMUR with the combat vehicles. As the CMUR is a temporary installation, the kit is designed to safely and securely install sensors used to acquire training data for the CMUR without permanently altering the vehicle. For example, magnetic mounts are included for the crew cameras so that they can be installed without modifying the combat vehicle with permanent mounts. Each item in the VAK is labelled with a number that corresponds to a laminated key naming each component within the VAK. The laminated key is located on the underside of the VAK case lid.

The Stryker MGS and ICV vehicle types require an additional VAK with mounts, adapters, and cables used only on those vehicles. The Stryker Vehicle Accessory Kits (VAK) are designed to be used in addition to the VAK.

AAR/THP Laptop

The AAR/THP Laptop is a Dell Latitude E6420 XFR ruggedized laptop, which is used to create the AAR Presentation and THP disk. Using a four bay hard drive drivebay, the removable CMUR hard drive is connected to the AAR/THP laptop.

The Sight software loads video, audio, and 1553 data for the time segment contained in the replay slide metadata. Data from all attached storage devices are incorporated in the AAR and viewed using appropriate Video Display Panel

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES – CONTINUED

(VDP) layouts. The recording software stores all data in a manner that may be quickly accessed and utilized by the AAR presentation software following a strict directory structure. The Sight software also supplies the ability to include a IPU Data Viewer as a VDP source. The IPU Data Viewer will replay recorded 1553 data time synchronized with the recorded video and audio sources. The user will be able to interact with the IPU Data Viewer like any other player unit video source. Replay controls are provided that allows the user to play, pause, stop, change replay speed, change layout, and add bookmarks.

Using the After Action Review (AAR)/Take Home Package (THP) laptop, the collected data can be accessed. The Startech four-bay drivebay allows four drives to be connected simultaneously. Once the drive is accessed, the data can be used to create an AAR presentation.

AAR Presentation. The AAR Presentation Software uses GPS time tagged video, audio, and 1553 data to compile and create a PowerPoint presentation. The data collected by the CMUR is stored on the removable Solid State Disk (SSD). The user is able to read the data by connecting the hard drive to a four-bay hard drive drivebay. The CMUR AAR PowerPoint Plug-in is able to use templates to generate slides which consist of both user generated and Sight software data. During a presentation, the user is able to interact with the Sight software which loads audio, video, and 1553 data for the time segment designated in the slide. If more than one hard drive is being used for the presentation, data from each attached hard drive is collected and used during the presentation.

THP Generation. The THP Generation tool creates an HTML page containing audio, video, and 1553 data for selected time periods. The THP tool also includes the generated AAR PowerPoint presentation which is launched by selecting HTML links. The user is able to burn the THP to a DVD for later review and distribution.

Field Support Equipment (FSE) Software

The FSE software application is used to verify that the CMUR settings are correct and to troubleshoot connectivity problems. The FSE software includes 1553 data capture, GPS and audio/video channel verification software.

CMUR Test Station

The test station is used verify the CMUR and 8-Channel Encoder are operating properly after performing a maintenance procedure. The CMUR Test Station contains the required cabling, the Eight Camera Station, a test laptop and support equipment (i.e. cables, MP3 Player, PoE, network switch and power strips) to simulate all connections to a vehicle. The Eight Camera Station supplies eight video inputs used to verify proper video functionality for each of the eight video channels. The MP3 player supplies audio to verify the audio streaming capabilities. The test laptop is used to view the eight video feeds, hear the audio provided by the MP3 player, and verify CMUR and 8-Channel Encoder connectivity.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

This section provides the location of the CMUR equipment. This includes external views of where the equipment is used to show general features and major components.

CREW MODULE UNIT RECORDER (CMUR)

For the Abrams tank the CMUR is mounted inside the vehicle crew cabin. For the Bradley Fighting Vehicle, the CMUR is mounted on the outside of the vehicle. Both installations are configured to not hinder crew or vehicle operation.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Figure 1-1. Crew Module Unit Recorder (CMUR)

CMUR ENCODER

For the Abrams tank, the CMUR Encoder is mounted next to the CMUR inside the vehicle crew cabin. For the Bradley Fighting Vehicle, the CMUR Encoder is mounted on the outside of the vehicle next to the CMUR. Both installations are configured to not hinder crew or vehicle operation.

Figure 1-2. CMUR Encoder

AAR/THP LAPTOP (DELL LATITUDE E6420XFR RUGGEDIZED LAPTOP)

The AAR/THP Laptop is located at each fielded site.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Figure 1-3. AAR/THP Laptop

STARTECH DRIVEBAY

The Startech four bay drivebay allows four hard drives to be connected to the AAR/THP Laptop simultaneously.

Figure 1-4. Startech Drivebay

CMUR/BMUE VAK

The CMUR/BMUE Vehicle Accessory Kit (VAK) comes with the system and is designed to be portable. Cameras, mounts, adapters, and cables within the VAK are used throughout the combat vehicle.

Figure 1-5. CMUR/BMUE VAK

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

STRYKER MGS VAK

The Stryker MGS Vehicle Accessory Kit (VAK) comes with the system and is designed to be portable. Mounts, adapters, and cables within the VAK are used throughout the combat vehicle. See Figure 1-6.

Figure 1-6. Stryker MGS Vehicle Accessory Kit (VAK)

STRYKER ICV VAK

The Stryker ICV Vehicle Accessory Kit (VAK) comes with the system and is designed to be portable. Mounts, adapters, and cables within the VAK are used throughout the combat vehicle. See Figure 1-7.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Figure 1-7. Stryker ICV Vehicle Accessory Kit (VAK)

CMUR TEST STATION

The CMUR Test Station is located at each depot where CMUR maintenance is performed and consists of a laptop, a camera station and support equipment (i.e. cables,MP3 Player, PoE, network switch and power strips) used to test the operation of the CMUR and 8-Channel Encoder. See Figure 1-8 andFigure 1-9.

Figure 1-8. Test Station Laptop and Support Equipment

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS – CONTINUED

Figure 1-9. 8 Camera Station

EQUIPMENT DATA

This section provides the characteristics of the Player Unit equipment. This may include equipment performance, environmental limitations, equipment dimensions, and any additional information that may be useful during equipment operation.

Equipment Characteristics

Equipment characteristics are listed in the following tables.

Table 1-1. Crew Module Unit Recorder Characteristics

SPECIFICATION	CHARACTERISTIC
Length	19.5 inches
Height	4.5 inches
Width	9.5 inches
Weight	16.7 lbs.
Video/Audio Channels	8 simultaneous recordings
Event Recording	Pre/Post set in 1s increments
Record Time	24 Hrs. (8ch/640x480/30FPS)
Data	1553 and GPS Record capable
Processor	Intel Core 2 Duo (Penryn)
Internal Fixed SSD	SATA 32 GB
Removable SSD	SATA 128 GB

EQUIPMENT DATA – CONTINUED

Table 1-1. Crew Module Unit Recorder Characteristics - Continued

SPECIFICATION	CHARACTERISTIC
Memory	4GB of memory (2.96GB usable)
LAN	8 PoE, 48 VDC, 802.3af (modified); 350mA each
USB	1 USB 2.0
Serial	1 RS-232
Audio	Line-in/Speaker out
Aux Power	12 VDC Output @ 500mA max
Monitor Out	1 VGA

Table 1-2. Crew Module Unit Recorder Encoder Characteristics

SPECIFICATION	CHARACTERISTIC
Length	14 inches
Height	3 inches
Width	4.5 inches
Weight	5.6 lbs.
Up to Eight Analog Video Inputs	Four Channels Camera and Power
	Four Channels Video Input Only
LAN	Two PoE, Power over Ethernet Inputs
Audio	One line-in (optional additional input)
Recording Frame Rate:	Max 30FPS, per channel
Max resolution	1080P or higher (limited by camera)

Table 1-3. AAR/THP Laptop (Dell Latitude E6420XFR Ruggedized Laptop)

SPECIFICATION	CHARACTERISTIC
Height	26.90 mm to 32.40 mm (1.06 inches to 1.27 inches)
Width	352.00 mm (13.86 inches)
Depth	241.00 mm (9.49 inches)
Weight (with 4-cell battery)	2.07 kg (4.56 lb)
Operating Temperature	0 °C to 35 °C (32 °F to 95 °F)
Storage Temperature	-40 °C to 65 °C (-40 °F to 149 °F)
Relative humidity – Operating	10% to 90% (noncondensing)
Relative humidity – Storage	5% to 95% (noncondensing)
Input voltage	100 VAC to 240 VAC
Input current (maximum)	1.50A/1.60A/1.70A/2.10A

EQUIPMENT DATA – CONTINUED

Table 1-3. AAR/THP Laptop (Dell Latitude E6420XFR Ruggedized Laptop) - Continued

SPECIFICATION	CHARACTERISTIC
Input frequency	50 Hz to 60 Hz
Output power	65W, 90W, and 150W
Output current	3.34A, 4.62A and 7.70A (continuous)
Rated output voltage	19.5 +/- 1.0 VDC

END OF WORK PACKAGE

MAINTAINER

Theory Of Operations For the Crew Module Unit Recorder (CMUR)

THEORY OF OPERATION

Crew Module Unit Recorder (CMUR) Theory of Operation

The CMUR system is made up of the CMUR, CMUR Video Encoder, and Vehicle Accessory Kit (VAK). The CMUR is designed to collect audio, video, and sensory data during training operations. The CMUR is able to connect up to eight video sources (4 12V Powered/4 Non-Powered), including a combination of Crew Cameras; weapons platform video signals; and any vehicle optics via the Thru-Sight Cameras (TSC). The CMUR is also capable of recording up to eight audio channels (one per each video channel). While backwards compatible with instrumented ranges, the CMUR is primarily designed for training ranges that may not have all the required instrumentation to accommodate an Integrated Player Unit (IPU). The CMUR records the audio, video, and data during the training event for later transfer to the After Action Review (AAR)/Take Home Package (THP) Laptop using a removable hard drive. See Figure 1-10.

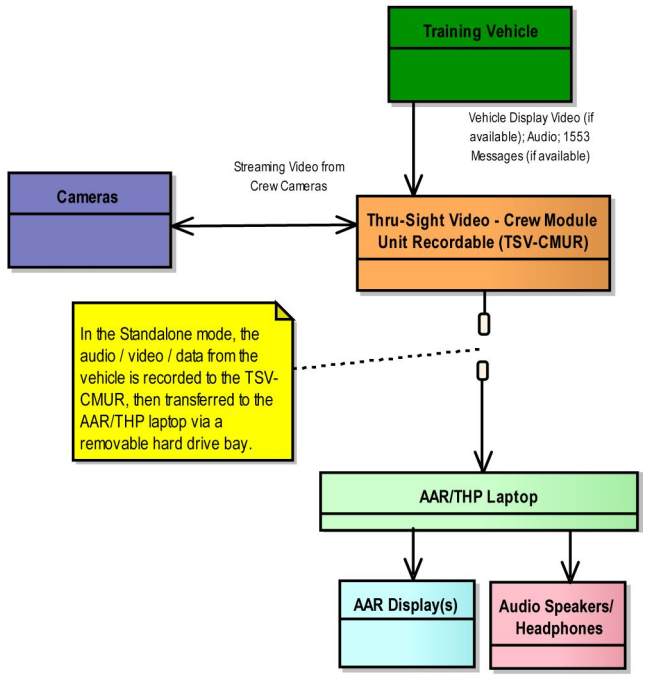

Figure 1-10. CMUR Interconnect Diagram

CMUR Operation

The CMUR is designed to collect data regarding operations from within the vehicle and record the data to a removable hard drive. It is powered by the vehicle's 24VDC connector in the vehicle's turret and is able to record eight feeds simultaneously. See Figure 1-11.

THEORY OF OPERATION – CONTINUED

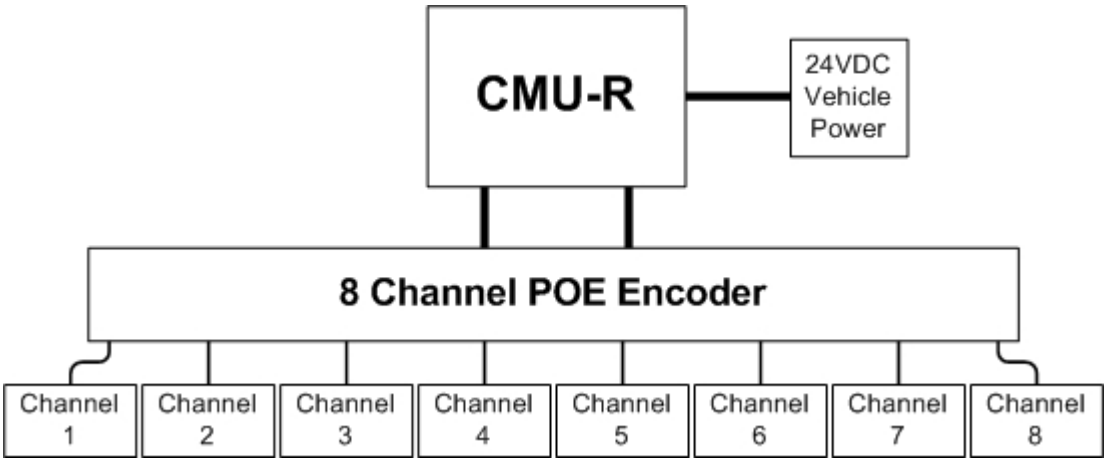

Figure 1-11. CMUR Interconnection Diagram

The CMUR is designed to be used on the following vehicles:

- M1A1 Abrams
- M1A2 Abrams SEP V1, V2, and V3
- M2/3A2 BFV
- M2/3A2 BFV Operation Desert Storm (ODS)
- M2/3A3 BFV
- Stryker ICV
- Stryker MGS

For data acquisition, the combat vehicles are equipped with various sensors used by the CMUR to acquire training data. Crew cameras are positioned to record the duties of the loader and the gunner during gunnery operations. Two Thru-Site cameras are installed to record the Gunner's sights. One records the gunner's primary sight whereas the second records the gunner's auxiliary sight. Using video adapters, the CMUR also records video from the Commander's Display Unit and the Thermal Imaging System. The Thermal Imaging System is only used during vision-impaired scenarios and captures the heat signatures generated from the target's thermal source. The video obtained by each of these individual streams is converted from analog streams to digital streams of packets. An external audio adapter is connected to the vehicle's radio which records incoming and outgoing radio transmissions. A 1553 data bus module is connected to sensors within the vehicle to collect data from the Laser Range Finder, trigger pulls, turret turns, and ammunition selection. The CMUR also has an externally-connected Garmin 18x GPS antenna/receiver module which is provided with each CMUR for acquiring GPS position data. The VAK contains the required cabling, mounting brackets, adapters, and crew cameras used to install these components. Using these sensors, the CMUR is able to acquire a comprehensive data sample of crew activities during the training session. For example, if the crew within an Abrams Tank were to fire at a target, the crew cameras would capture the crew's gunnery actions within the vehicle while the thru-site cameras capture how the gunner aims at the targets as well as how the equipment fires and affects the targets. The type of ammunition selected, turret turns, trigger pulls, and Laser Range Finder data is collected by the 1553 data bus. Incoming radio transmissions, such as orders from the ROC and outgoing radio transmissions such as target confirmations is collected. The collected data is then transferred to the AAR/THP Laptop by connecting the removable SSD to a computer using the hard drive dock or USB hard drive cable.

The CMUR has an external encoder which gets mounted near the CMUR. The encoder converts analog video signals from the cameras to a video signal compatible with IP based hardware for the AAR Presentation and THP.

AAR/THP Laptop. The AAR/THP Laptop is used to read the data off the CMUR removable drive and compile it into an AAR presentation and THP. The recorded audio, video, and 1553 data is time tagged using the GPS data. Using these time tags, segments of the collected data are imported to the AAR presentation.

THEORY OF OPERATION – CONTINUED

The IPU Data Viewer graphical user interface (GUI) provides the means to load player unit data from a drive and then to play the file or files in the desired layout configuration. The IPU Data Viewer operates in Drive Data Selector mode for selecting and loading drive data or in Data Replay mode for displaying and playing the selected video data.

Sight is used to generate the AAR presentation through a PowerPoint plugin. When viewed in the AAR presentation, the Sight software loads and displays the collected data within the specified time segment. Once the AAR Powerpoint is made, the THP Client is used to create a THP disk. When generating a THP, the user is able to pull collected data into a HTML page for a selected time period. Along with the AAR presentation, this information can be saved to a DVD for later review.

END OF WORK PACKAGE

CHAPTER 2

OPERATION INSTRUCTIONS

CREW MODULE UNIT RECORDER (CMUR)

CHAPTER 2

OPERATION INSTRUCTIONS

WORK PACKAGE INDEX

Description and Use of Controls and Indicators — Crew Module Unit Recorder (CMUR)

Controls and Indicators for the CMUR

The following describes the controls and indicators for the equipment, assemblies, and control panels of the Crew Module Unit Recorder (CMUR). Each section consists of a figure and a corresponding table defining the controls and indicators identified in the figure, and listing their functions.

CMUR Top View

CMUR Right Side View

CMUR Left Side View

Figure 2-1. CMUR Controls and Indicators

Table 2-1. CMUR Controls and Indicators

Key	Control/Indicator	Function
1	Record (RCD) LED	Displays if unit is ready to record or not. If LED is lit, the CMUR is recording. If the LED is not lit, the SSD may not be inside the unit or the computer may be missing configuration files. NOTE: When installing the SSD, it may take up to two minutes for the RCD LED to light up.
2	Hour Meter	Displays how many hours of service/use time of the CMUR.
3	On/Off Switch	Turns the CMUR on and off.
4	Power LED	Lit if CMUR is on. Off if CMUR is off.
5	Computer Status LED	Displays the status of the computer. If green, computer is ready. If amber, the Riptide software is not active.
6	Computer Power Button/LED	Turns the CMUR computer on and off. If lit, computer is on.

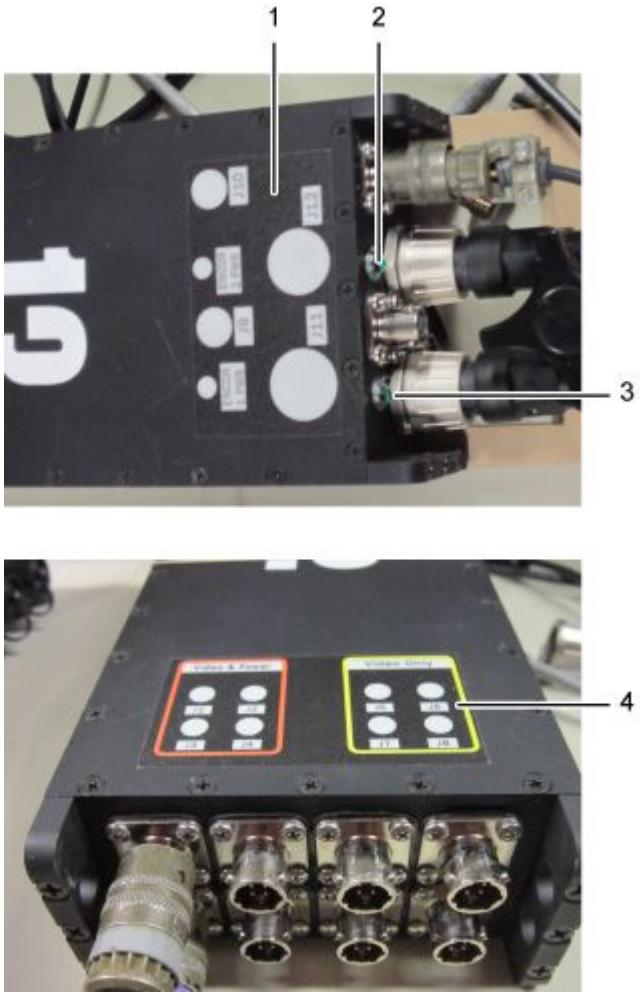

Figure 2-2. CMUR Encoder Controls and Indicators

Table 2-2. CMUR Encoder Controls and Indicators

Key	Control/Indicator	Function
1	Label Block	Identifies connectors J9 through J12
2	Power LED	Power LED for encoder board 2. When lit, encoder board 2 is powered on.
3	Power LED	Power LED for encoder board 1. When lit, encoder board 1 is powered on.
4	Label Block	Identifies connectors J1 through J8

Figure 2-3. Four Bay HDD Drivebay Controls and Indicators

Table 2-3. Four Bay HDD Drivebay

Key	Control/Indicator	Function
1	Drive Bay 4 Eject Button	Ejects the hard disk drive from bay 4.
2	Drive Bay 3 Eject Button	Ejects the hard disk drive from bay 3.

Table 2-3. Four Bay HDD Drivebay – Continued

Key	Control/Indicator	Function
3	Bay 4 Power Button/Activity LED	Button powers on bay 4 hard drive. When the activity power LED is solid blue, the hard drive is powered on. When blinking red, the hard drive is being accessed.
4	Bay 3 Power Button/Activity LED	Button powers on bay 3 hard drive. When the activity power LED is solid blue, the hard drive is powered on. When blinking red, the hard drive is being accessed.
5	Bay 2 Power Button/Activity LED	Button powers on bay 2 hard drive. When the activity power LED is solid blue, the hard drive is powered on. When blinking red, the hard drive is being accessed.
6	Bay 1 Power Button/Activity LED	Button powers on bay 1 hard drive. When the activity power LED is solid blue, the hard drive is powered on. When blinking red, the hard drive is being accessed.
7	Drive Bay 1 Eject Button	Ejects the hard disk drive from bay 1.
8	Drive Bay 2 Eject Button	Ejects the hard disk drive from bay 2.
9	Fan 1 Speed Control	Controls the speed of cooling fan 1.
10	Fan 2 Speed Control	Controls the speed of cooling fan 2.

Figure 2-4. AAR/THP Laptop Controls and Indicators

Table 2-4. AAR/THP Laptop

Key	Control/Indicator	Function
1	Storage LED	When blinking, indicates hard drive is being accessed.
2	Battery LED	When solid blue, the battery in charge mode with AC adapter present. Alternately blinking amber light and blue light indicates an unauthenticated or unsupported non-Dell AC adapter is attached to the laptop. Alternately blinking amber light with steady blue light indicates temporary battery failure with AC adapter present. Constantly blinking amber light indicates fatal battery failure with AC adapter present. If the LED is off, the battery is in full charge mode with AC adapter present.

Table 2-4. AAR/THP Laptop – Continued

Key	Control/Indicator	Function
3	Wireless LED	Indicates laptop wireless card is powered on.
4	Power Button/LED Button	Turns on computer. When blue, indicates computer is on.
5	Optical Drive LED	Shows when optical discs are being accessed.
6	Wireless Access Point Switch	Turns on and off the wireless access card.
7	Optical Drive Eject Button	Opens optical drive.
8	USB 3.0 (2) E-Media Bay	Swappable with the Optical drive.
9	USB 3.0 (2) E-Media Bay USB Port	Adds connection method for electronics.
10	USB 3.0 (2) E-Media Bay USB Port	Adds connection method for electronics.
11	USB 3.0 (2) E-Media Bay Eject Button	Opens USB 3.0 (2) E-Media Bay.
12	Laptop Lid Power LED	When blue, indicates computer is on.

END OF WORK PACKAGE

Description and Use of Controls and Indicators – CMUR Test Station

Controls and Indicators for the CMUR Test Station

The following describes the controls and indicators for the equipment, assemblies, and control panels of the Crew Module Unit Recorder (CMUR) Test Station. Each section consists of a figure and a corresponding table defining the controls and indicators identified in the figure, and listing their functions.

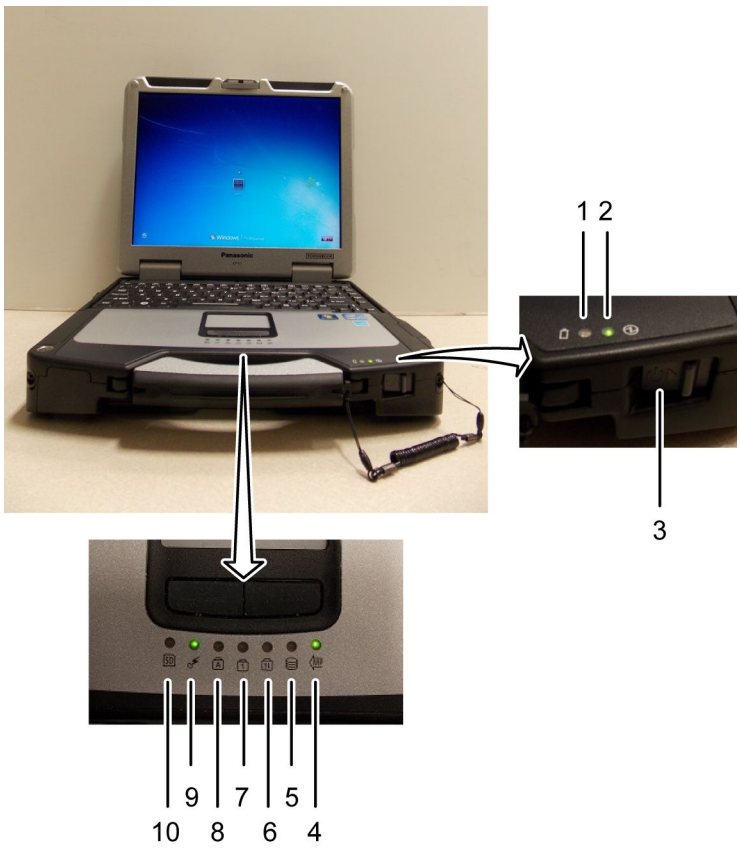

Figure 2-5. Controls and Indicators Test Station Laptop

Table 2-5. Controls and Indicators Test Station Laptop

Key	Control/Indicator	Function
1	Power status	Off: Power off/Hibernation, Green: Power on, Blinking green: Sleep, Blinking green rapidly: Cannot power on or resume due to low temperature.
2	Battery status	Indicates battery power remaining.
3	Power Switch	Turns PC power On/Off.
4	Multimedia pocket device status or the second battery status.	Indicates Multimedia pocket device status or second battery status.
5	Hard disk drive status	Displays hard disk space available.

Table 2-5. Controls and Indicators Test Station Laptop – Continued

Key	Control/Indicator	Function
6	Scroll lock (ScrLk) LED	Indicates scroll lock is on.
7	Numeric key (NumLk) LED	Indicates NumLk is on.
8	Caps lock LED	Indicates Caps is on.
9	Wireless ready LED	This indicator lights when Wireless LAN, Bluetooth, and/or Wireless WAN are connected and ready. It does not necessarily indicate the On/Off condition of the wireless connection.
10	SD Memory Card Indicator LED	Blinking: During access.

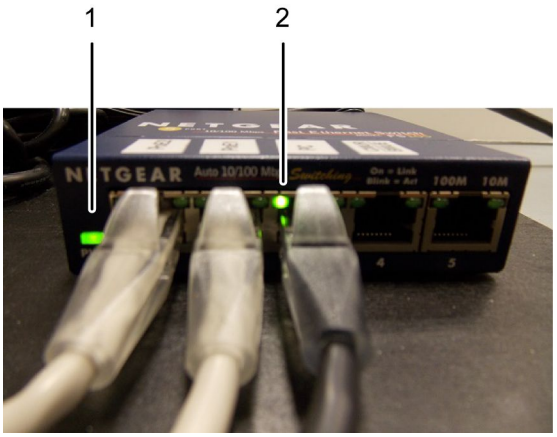

Figure 2-6. Controls and Indicators FS105 Netgear Switch

Table 2-6. Controls and Indicators FS105 Netgear Switch

Key	Control/Indicator	Function
1	Power Light	Solid green when device is receiving power.
2	Link/Activity Light	Solid green when device is connected. Flashes when activity occurs.

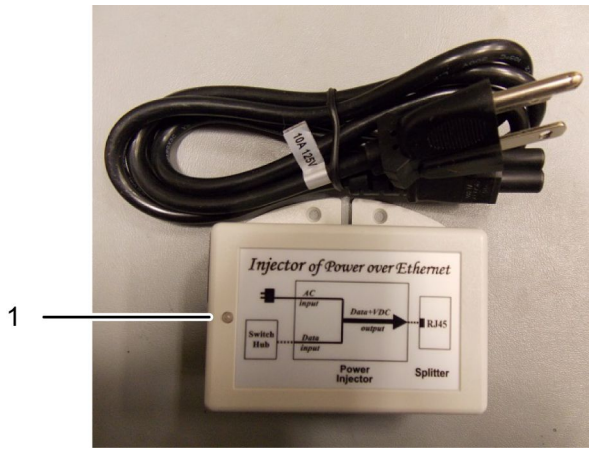

Figure 2-7. Controls and Indicators POE-xxi Power-Over-Ethernet (PoE)

Table 2-7. Controls and Indicators POE-xxi Power-Over-Ethernet (PoE)

Key	Control/Indicator	Function
1	Power LED	Solid green when device is receiving power.

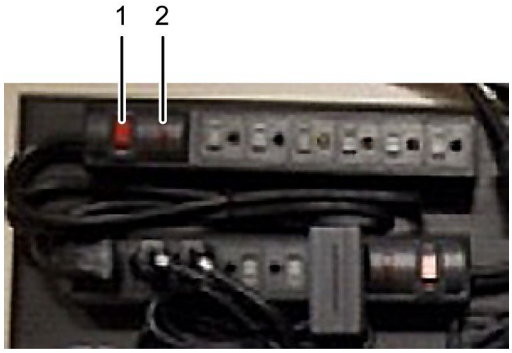

Figure 2-8. Controls and Indicators Power Strip

Table 2-8. Controls and Indicators Power Strip

Key	Control/Indicator	Function
1	Power Switch	Turns power On and Off.
2	Power LED	Lights red when power is applied.

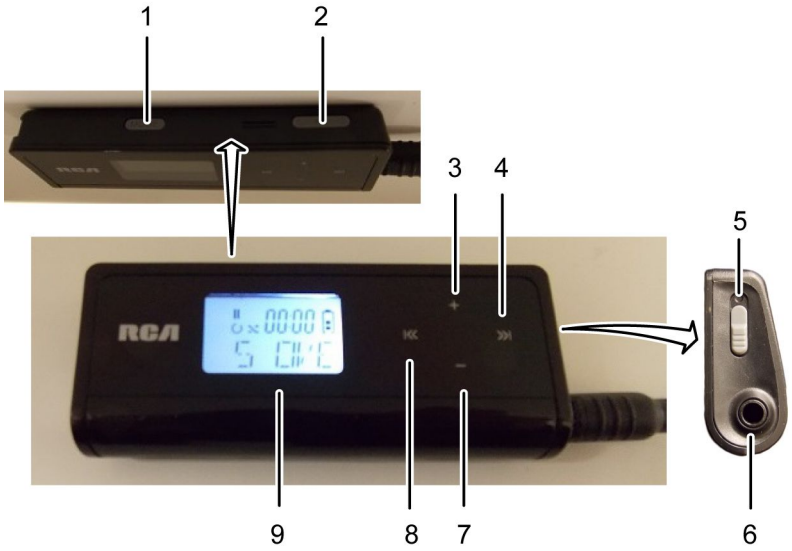

Figure 2-9. Controls and Indicators RCA MP3 Player

Table 2-9. Controls and Indicators RCA MP3 Player

Key	Control/Indicator	Function
1	Mode	Toggles repeat or shuffle mode. Options available: Repeat one, Repeat All, Shuffle, Shuffle repeat and Normal.
2	Power on/off/Play/pause	Starts/pauses playback.
3	Increase volume	Increases the volume during playback.
4	Skip forward	Skips to the next file; press and hold to skip to next artist/playlist.
5	Lock/unlock player controls	Locks/unlocks player controls. When the controls are locked, the lock icon appears on the display.
6	Headphone Jack	Allows for connection of headphones.
7	Decrease volume	Decreases the volume during playback.
8	Skip back	Skips to the previous file; press and hold to skip to previous artist/playlist.
9	Display	Displays battery level and song information.

END OF WORK PACKAGE

Description and Use of Controls and Indicators — Software

Controls and Indicators for Software

The following describes the controls and indicators for the software controlling the Crew Module Unit Recorder (CMUR). Each section consists of a figure and a corresponding table defining the controls and indicators identified in the figure, and listing their functions.

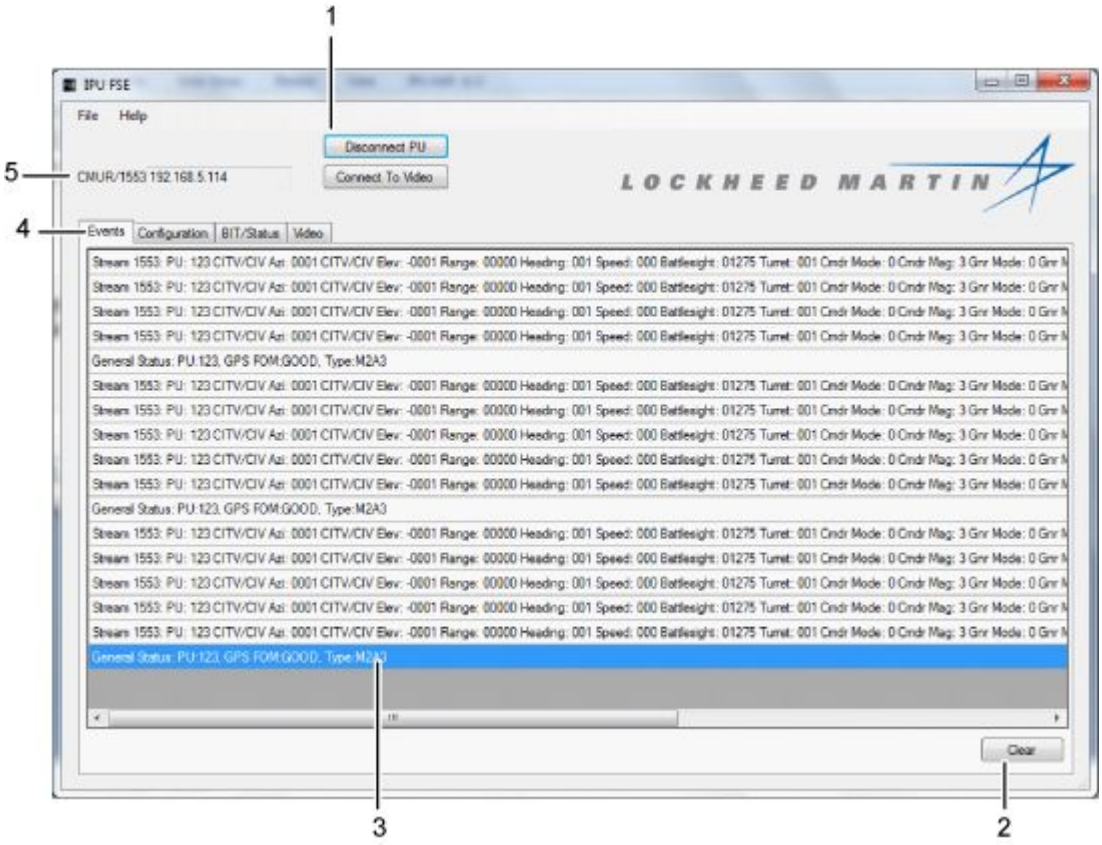

Figure 2-10. Controls and Indicators Software Events Tab

Table 2-10. Controls and Indicators Software Events Tab

Key	Control/Indicator	Function
1	Disconnect PU Button	Click to disconnect from player unit. Once disconnected, button becomes Connect To PU button.
2	Clear Button	Click to clear Event history.
3	Events Screen	Displays event history, including commands, status reports, and test results.
4	Events Tab	Opens events screen which displays events history.
5	CMUR/1553 Address field	Enter path to CMUR (192.168.5.xxx where xxx represents CMUR number) before connecting to PU.

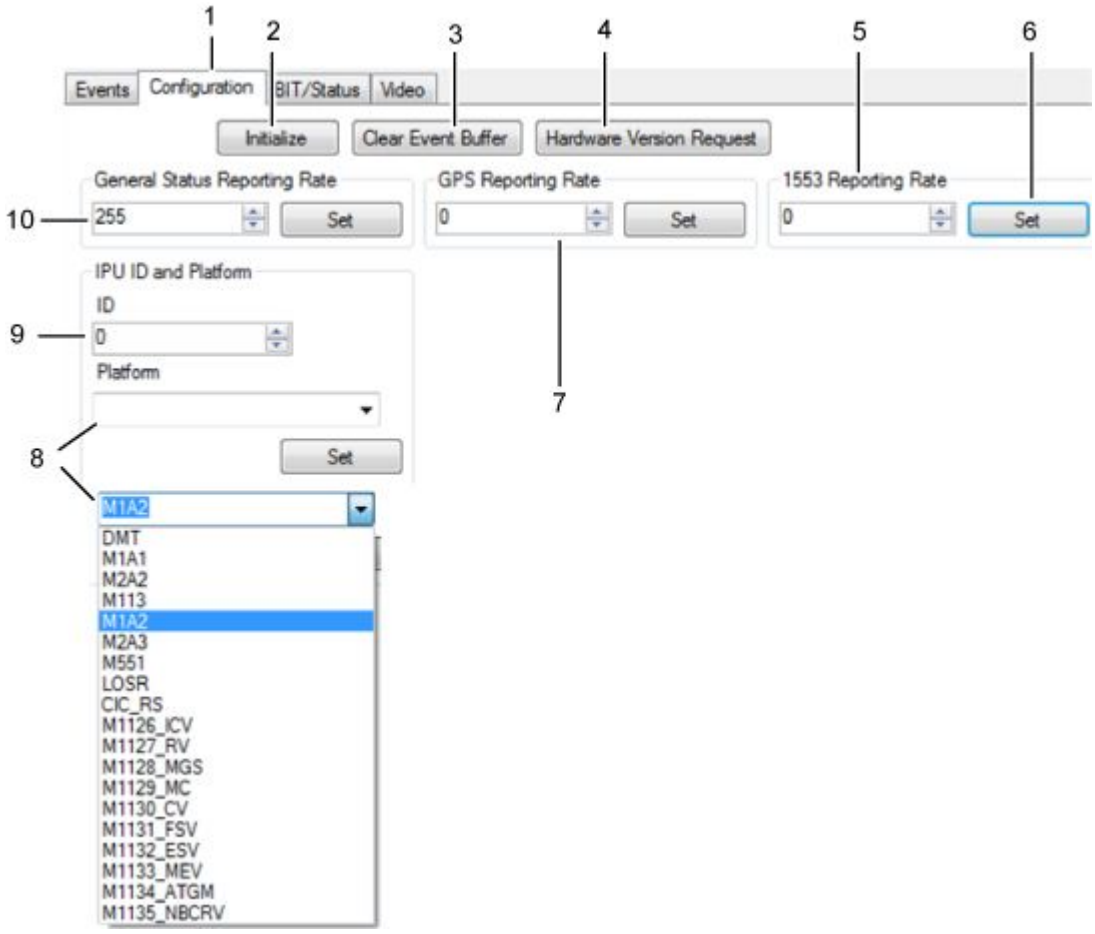

Figure 2-11. Controls and Indicators Software Configuration Tab

Table 2-11. Controls and Indicators Software Configuration Tab

Key	Control/Indicator	Function
1	Configuration Tab	Opens configuration screen. IPU ID and Platform can be entered here. Reporting rates for the events screen are set here. Initialize, Clear Event Buffer, and Hardware Version Request commands are sent from this screen and display on the events screen.
2	Initialize Button	Sends initialize command. This command will display on the Events tab and reset the event message sequence number to 1.
3	Clear Event Buffer Button	Sends clear event buffer command. This command will display on the Events tab and reset the event message sequence number to 1.
4	Hardware Version Request Button	Sends hardware version command. The hardware version will display on the Events tab.
5	1553 Reporting Rate	Used to set the frequency that 1553 reports are sent to the events page. Enter number of seconds desired between reports and click Set.

Table 2-11. Controls and Indicators Software Configuration Tab – Continued

Key	Control/Indicator	Function
6	Set Button	Used to apply IPU ID and Platform entries as well as reporting rates for general status, GPS, and 1553 on this tab and BIT Periodic on the BIT/Status tab.
7	GPS Reporting Rate	Used to set the frequency that GPS reports are sent to the events page. Enter number of seconds desired between reports and click Set. GPS reports are unavailable when operating in CMUR mode.
8	Platform Dropdown Menu	Used to select the platform the IPU is installed on.
9	IPU ID	Used to enter the numeric ID of player unit.
10	General Status Reporting Rate	Used to set the frequency that General Status reports are sent to the events page. Enter number of seconds desired between reports and click Set.

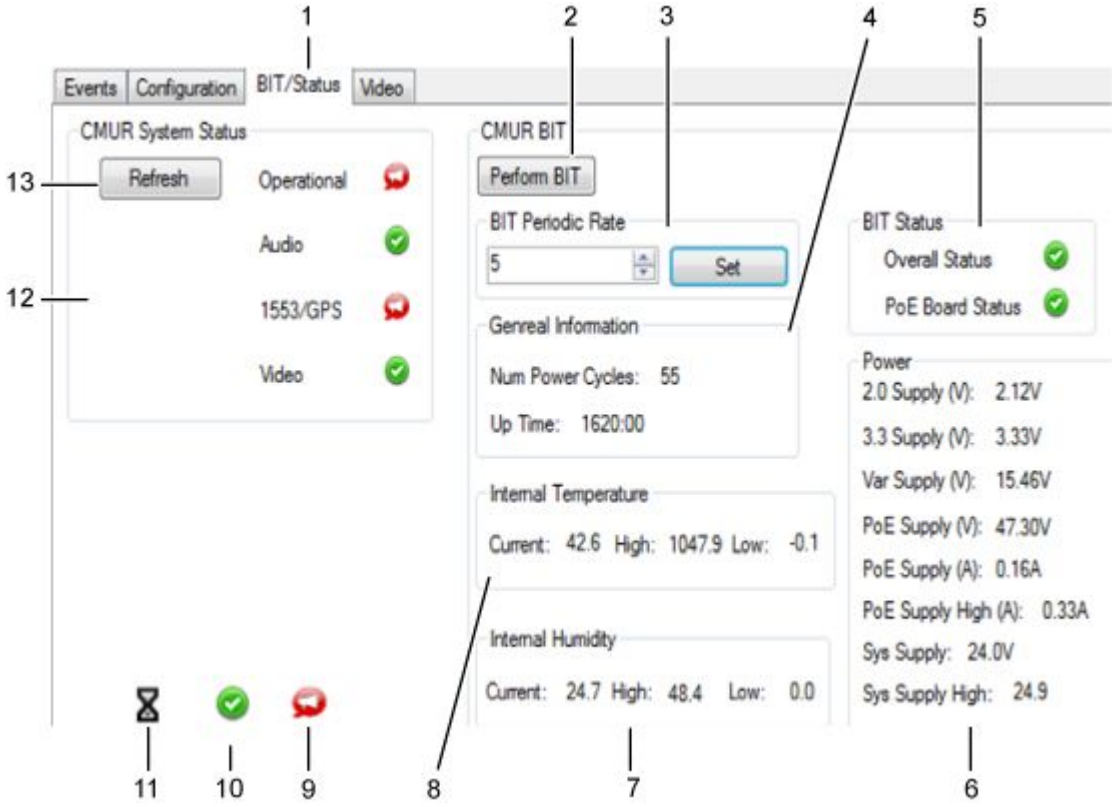

Figure 2-12. Controls and Indicators Software BIT/Status Tab

Table 2-12. Controls and Indicators Software BIT/Status Tab

Key	Control/Indicator	Function
1	BIT/Status Tab	Opens BIT/Status screen. BIT and CMUR System status reports can be performed from this screen. Status information (Internal temperature and humidity, power, and general information) is provided.
2	Perform BIT Button	Click to initiate BIT Status report. System will immediately refer to the last logged BIT report. (See BIT Periodic Rate below.)
3	BIT Periodic Rate	Used to set frequency of BIT report updates. Enter number of minutes desired between reports and click Set. Last report log is referred to when Perform BIT Button is clicked.
4	General Information	Reports number of power cycles the IPU has been through and number of hours operating.
5	Bit Status	Displays indicators signifying results of the BIT.
6	Power Status	Displays power supply information.
7	Internal Humidity	Displays internal humidity information. Including current humidity and the highest and lowest humidity the system has recorded.
8	Internal Temperature	Displays internal temperature information. Including current temperature and the highest and lowest temperatures the system has recorded.
9	Fail Indicator	Displays in BIT Status or CMUR System status when status is not ready for operation.
10	Pass Indicator	Displays in BIT Status or CMUR System status when status is ready for operation.
11	Hourglass Indicator (Default)	Displays in BIT Status or CMUR System status before status has been requested and while status is being checked.
12	CMUR System Status	Displays indicators signifying results of CMUR system status.
13	Refresh Button	Click to rerun CMUR System Status report.

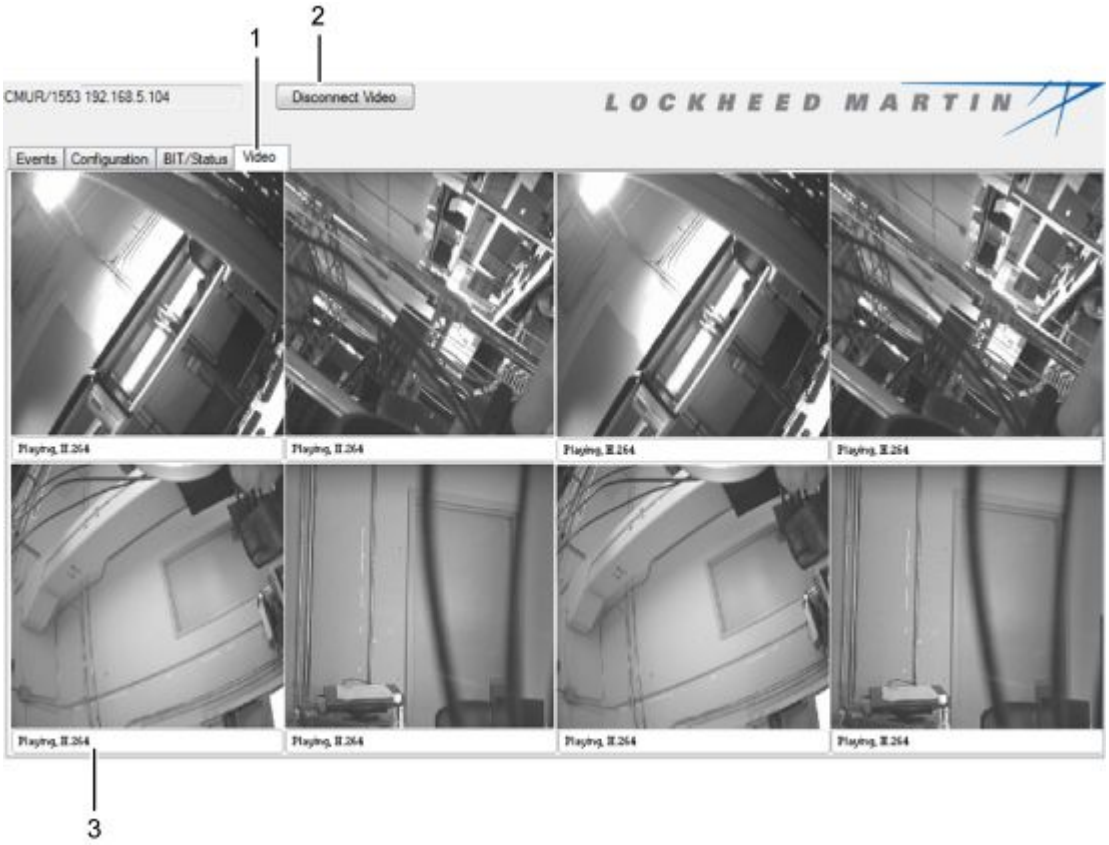

Figure 2-13. Controls and Indicators Software Video Tab

Table 2-13. Controls and Indicators Software Video Tab

Key	Control/Indicator	Function
1	Video Tab	Opens Video screen. Video display for up to eight cameras can be monitored from this screen. Audio can also be monitored from this screen.
2	Disconnect Video Button	Click to disconnect from video stream. Once disconnected, button becomes Connect To Video button.
3	Video Playing Indicator	Displays under camera display when system is connected to video stream.

END OF WORK PACKAGE

OPERATOR

Operation Under Usual Conditions — Crew Module Unit Recorder (CMUR) Start Up

INITIAL SETUP:

Materials/Parts

AAR/THP Laptop with Ethernet cable

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (1)

References

WP 0009 OPERATION UNDER USUAL CONDITIONS — AAR/THP AND FIELD SUPPORT EQUIPMENT (FSE) SOFTWARE

WP 0016 REMOVE AND INSTALL THE CREW MODULE UNIT RECORDER (CMUR) FOR ABRAMS

WP 0017 REMOVE AND INSTALL CREW MODULE UNIT RECORDER (CMUR) FOR BRADLEY

Equipment Condition

Ensure that the Crew Module Unit Recorder (CMUR) is securely mounted to the vehicle.

Ensure that all cables inside and outside vehicle are secured.

START UP PROCEDURES — CREW MODULE UNIT RECORDER (CMUR)

WARNING

Do not turn on Vehicle Master Power until all CMUR installation steps are completed. See WP 0016 REMOVE AND INSTALL THE CREW MODULE UNIT RECORDER (CMUR) FOR ABRAMS for CMUR installation steps for Abrams. See WP 0017 REMOVE AND INSTALL CREW MODULE UNIT RECORDER (CMUR) FOR BRADLEY for CMUR installation steps for Bradley.

CAUTION

Ensure that all components and cables have been properly installed and secured.

CAUTION

Do not turn on Vehicle Master Power until all CMUR installation steps are completed.

1. Turn on Vehicle Master Power, Turret Power and entire Fire Control System.
2. Remove waterproof cover and connect the Ethernet cable from the AAR/THP Laptop to the CMUR port J5. See Figure 2-14.

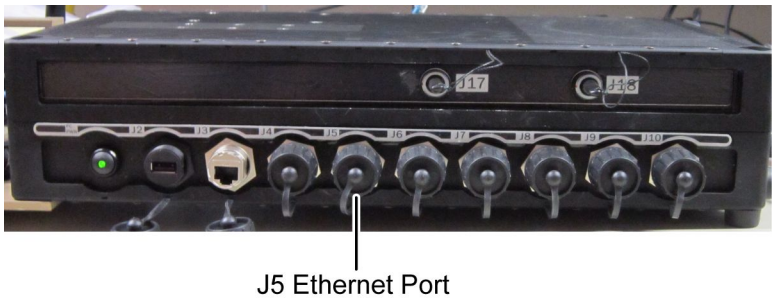

Figure 2-14. CMUR Side View

3. Turn on the **CMUR Power Switch** and observe that the CMUR red power LED light is on, and that two Encoder green power LED lights are on (see Figure 2-15).

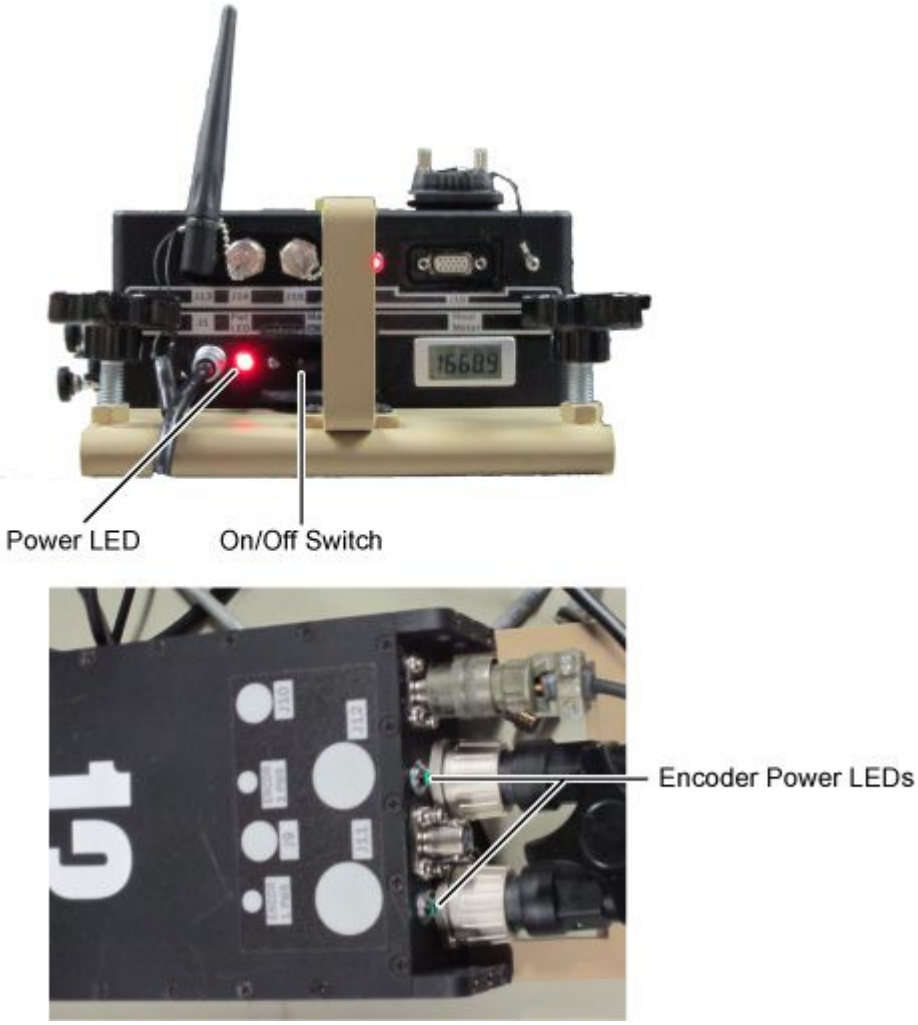

Figure 2-15. CMUR Power On Indicators

4. Turn on the AAR/THP Laptop and verify audio and cameras are working and properly positioned using the FSE software. See WP 0009 OPERATION UNDER USUAL CONDITIONS — AAR/THP AND FIELD SUPPORT EQUIPMENT (FSE) SOFTWARE
5. Disconnect the Ethernet cable from the AAR/THP Laptop to the CMUR J5 port. See Figure 2-14.
6. CMUR is ready for use.

END OF WORK PACKAGE

OPERATOR

Operation Under Usual Conditions — Crew Module Unit Recorder (CMUR) Shut down

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (1)

Equipment Condition

Ensure that the Crew Module Unit Recorder (CMUR) is securely mounted to the vehicle.

Ensure that all cables inside and outside vehicle are secured.

SHUT DOWN PROCEDURES — CREW MODULE UNIT RECORDER (CMUR)

1. Press and hold **PC Power Button** for five seconds to initiate Windows shut down of internal computer. Then release the power button.

Figure 2-16. CMUR Side View

2. Observe the CMUR PC has powered down by listening to the CMUR and verifying the PC light is dim.
3. Turn off the CMUR **On/Off** switch. See Figure 2-17.

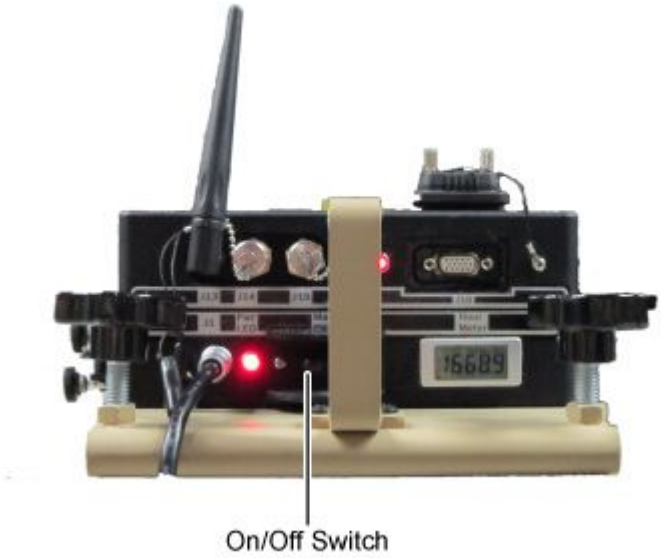

Figure 2-17. CMUR On/Off Switch

END OF WORK PACKAGE

OPERATOR

Operation Under Usual Conditions — AAR/THP and Field Support Equipment (FSE) Software

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (1)

Equipment Condition

CMUR connected to the AAR/THP Laptop

OPENING FSE SOFTWARE

Perform the following steps to start session and open the FSE.

1. Log into the laptop using the name and password provided by the system administrator.
2. Start the FSE application by double-clicking on the **FSE icon**. See Figure 2-18.

Figure 2-18. FSE Icon

3. When starting the FSE application, the FSE Operation Mode Selection window will appear. See Figure 2-19. Click the **CMUR** button to start the FSE program in Standalone Mode.

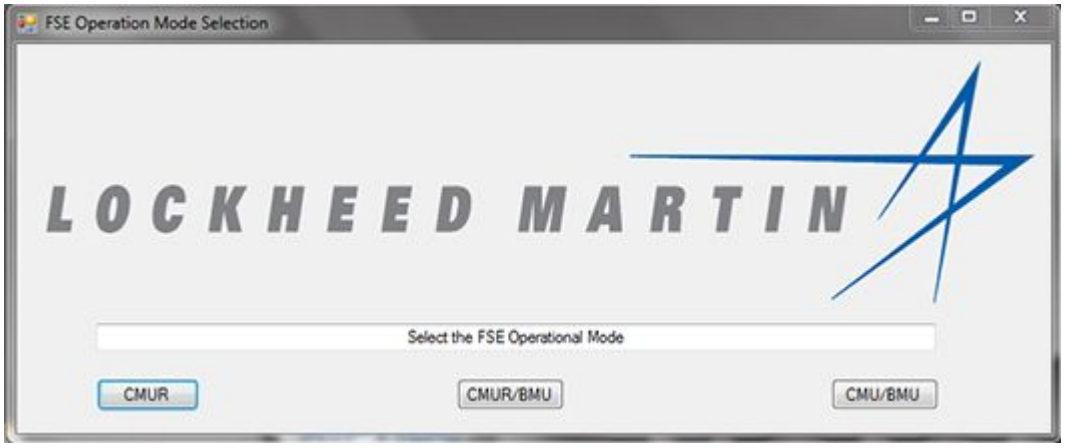

Figure 2-19. FSE Operation Mode Selection Window

Figure 2-20. CMUR Unit Number

NOTE

The IP addresses of CMUR module for a single IPU will always begin with 192.168.5.xxx. The final octet is based on the following formula: (IPU number + 100). If the unit to connect to were unit 09, the final octet (Player Unit ID) would be (09 + 100) or 109, which would result in a complete IP address of 192.168.5.109. As a reference, traditionally the IP address of the IPU matches the number that is stamped on the actual hardware. (i.e., the numbers 02 will signify unit 102 and have an IP of 192.168.5.102). See Figure 2-20.

4. After a few seconds, the Integrated Player Unit (IPU) FSE window will appear. See Figure 2-21. Enter the CMUR ID as part of the Internet Protocol (IP) address into the **CMUR/1553** field.

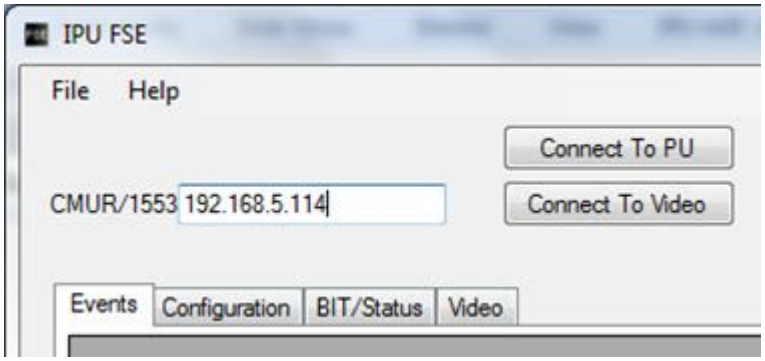

Figure 2-21. IPU FSE Main Screen

5. Connect to the standalone IPU by clicking the **Connect to PU** button. See Figure 2-21 and Figure 2-22.

NOTE

After clicking the **Connect to PU** button, the button will change to **Disconnect PU** and events will begin filling the Event tab.

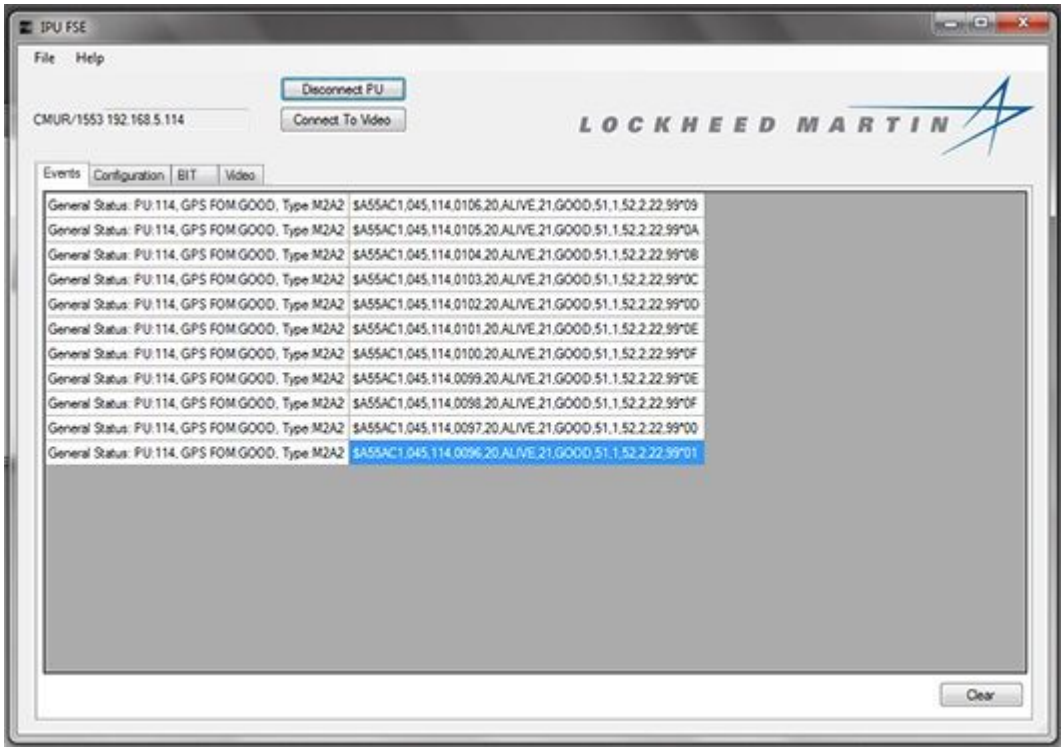

Figure 2-22. IPU FSE — Connected

NOTE

Always click on the **disconnect** button once a task is completed.

If a general status message is not received from CMUR within 15 seconds the connection will be lost.

If the connection was successful then data will begin to fill in the events tab. If there was a problem with the connection, the Unable to connect to IPU error will appear. See Figure 2-23. When this message is received, click on the **Continue** button to see if the problem is resolved. If unable to connect after a few tries, this may signify an issue with the IPU or with the FSE itself, so both need to be checked.

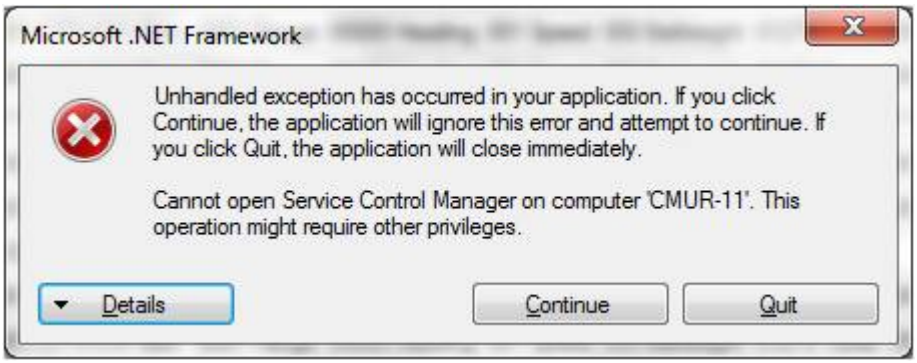

Figure 2-23. Connection Exception

6. FSE Software is now ready to perform tasks described below as needed.

Operating the AAR/THP and FSE Software

The After Action Review/Take Home Package software is run on the AAR/THP laptop. For information on running the AAR/THP software, see the Digital Range Training System (DRTS) – Integrated Player Unit (IPU) Software User Manual (SUM).

The Field Support Equipment (FSE) software application is run on the AAR/THP laptop. It is used to verify that the Crew Module Unit Recorder (CMUR) settings are correct, to verify that audio and video camera feeds are working and properly positioned, and to troubleshoot connectivity.

1. If not already open, open FSE Software. See Opening FSE Software procedure.
2. Adjust reporting rates as needed.
   a. Click the **Configuration** tab. Configuration window opens. See Figure 2-24.

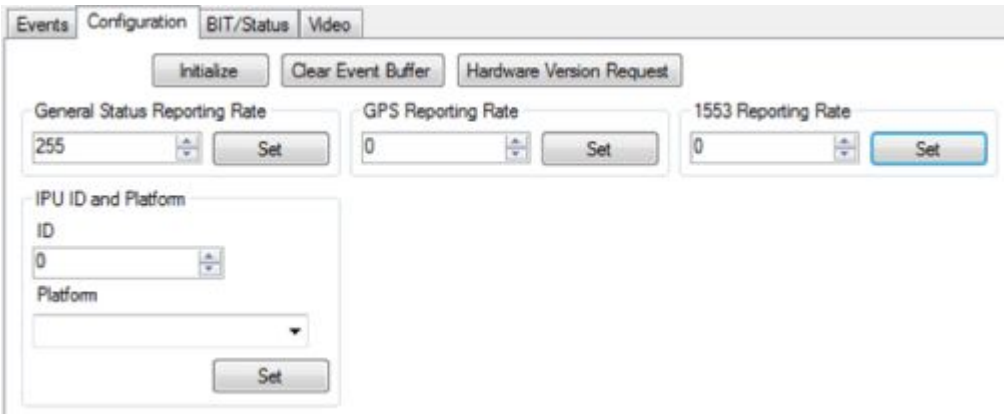

Figure 2-24. Configuration Tab

   b. Enter number of seconds desired between reports for General Status Reporting Rate.
   c. Click the **Set** button in the General Status Reporting Rate box.

NOTE

Minimum reporting rate for General Status is 5 seconds. GPS Reporting Rate is not functional for standalone CMUR. Minimum reporting rate for 1553 is 0 seconds.

   d. Enter number of seconds desired between reports for 1553 Reporting Rate.
   e. Click the **Set** button in the 1553 Reporting Rate box.
   f. Click **Events** tab to monitor reporting.
3. Conduct a Built-in Test.
   a. Select the **BIT/Status** tab. The BIT/Status window is displayed. See Figure 2-25.

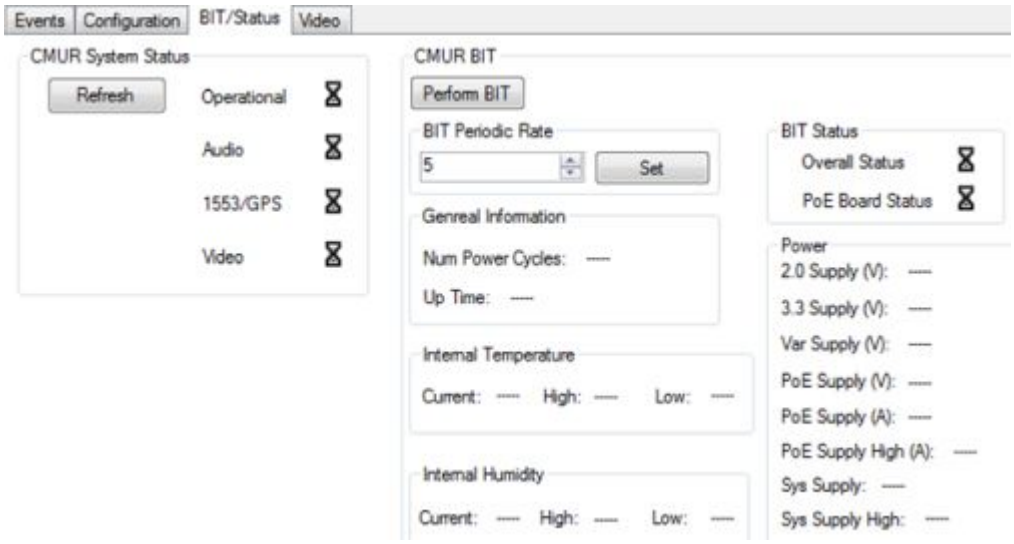

Figure 2-25. BIT/Status Tab

b. Click the **Perform BIT** button. Two green check marks should appear, one for Overall Status and one for PoE Board Status. See Figure 2-26.

Figure 2-26. Successful BIT

c. Click **Refresh** under CMUR System Status. Hourglasses will display while system status is being refreshed.

d. Green check marks show the system is operational. See Figure 2-27.

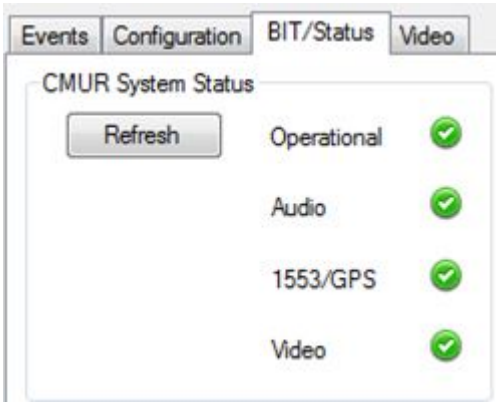

Figure 2-27. CMUR System Status Operational

e. If the Audio, 1553/GPS, or Video does not pass, a red thumbs down will display in the failing system's field and in the Operational field. See Figure 2-28. Verify connections and that power is available to all components.

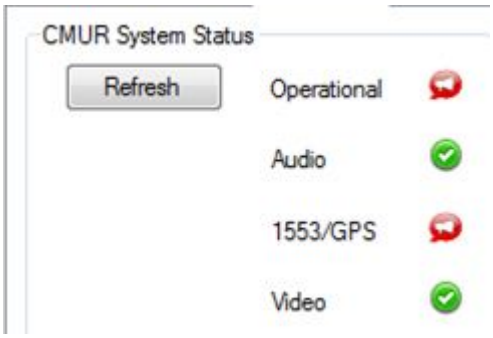

Figure 2-28. CMUR System Status Nonoperational

f. When problem is resolved click **Refresh**.

4. Select the **Video** tab. The videos window is displayed. See Figure 2-29.

Figure 2-29. Video Ready to Connect

5. Click the **Connect to Video** button. See Figure 2-21.

NOTE

After clicking the **Connect to Video** button, the button will change to **Disconnect Video** Audio and video input will begin immediately.

6. Verify all active videos are displayed, and that the camera view is properly positioned and/or aligned. Cameras 1-4 (J3, J4, J7, J8) are displayed in the top row from left to right, and cameras 5-8 (J1, J2, J5, J6) are displayed in the bottom row from left to right. See Figure 2-30.

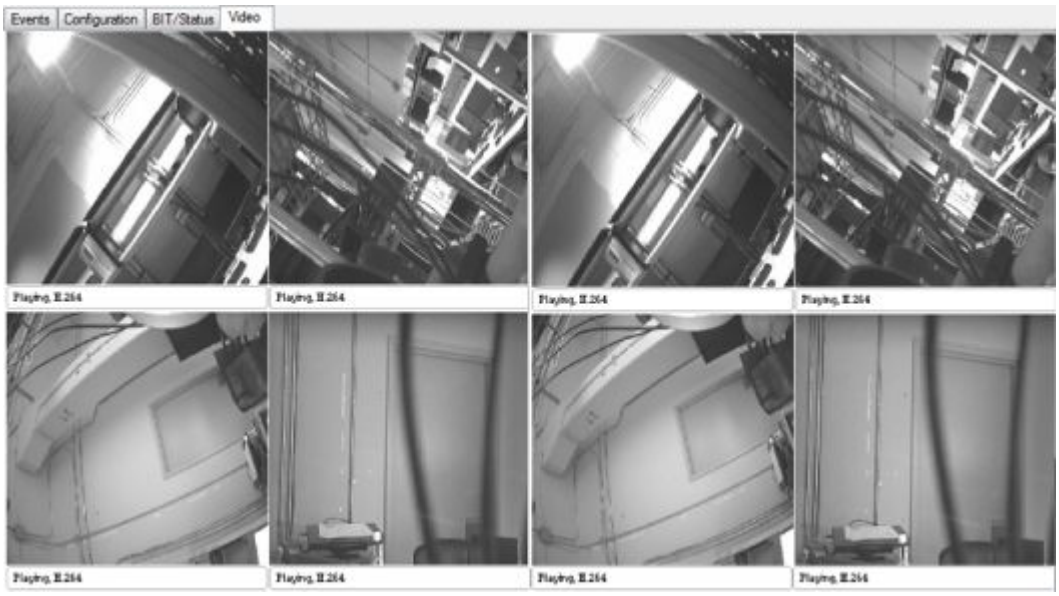

Figure 2-30. Video Connected

7. Verify audio is working. Audio should be heard from the crew compartment or intercom system.
8. Another task may be performed or close FSE software if complete. See Closing FSE Software.

TO SET PLAYER ID

The Set Player ID command allows the user to assign a player unit ID and tactical vehicle type to that specific IPU. When the FSE is connected to an IPU, the Player ID field starts with a default value of zero on the Configuration Tab. The user needs to manually change the player unit number by selecting the text and entering a new player unit number in the IPU ID field located on the IPU Platform drop down menu

1. Open FSE Software. See Opening FSE Software.
2. Click the **Configuration** tab.
3. Under IPU ID and Platform, set ID to match the CMUR ID number. See Figure 2-31.

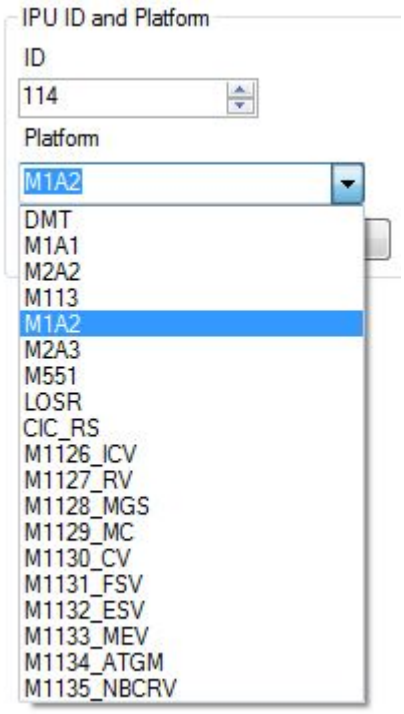

Figure 2-31. IPU ID and Platform Drop Down Menu

4. Click dropdown menu under Platform to select Platform.
5. Click the Set button located in the IPU ID and Platform window. See Figure 2-24. Player ID is set.
6. Another task may be performed or close FSE software if complete. See Closing FSE Software.

TO VIEW MESSAGES

The **Events** Tab displays the messages that the IPU is sending to the CMUR system in raw or readable format. Commands given from the **Configuration** Tab will display in the **Events** Tab view. This view also allows the user to clear messages.

1. If not already open, open FSE Software. See Opening FSE Software.
2. Click on the Events Tab. See Figure 2-32. Prior commands display in the message window. General Status and 1553 Reports update at the rate set when initiating FSE software.

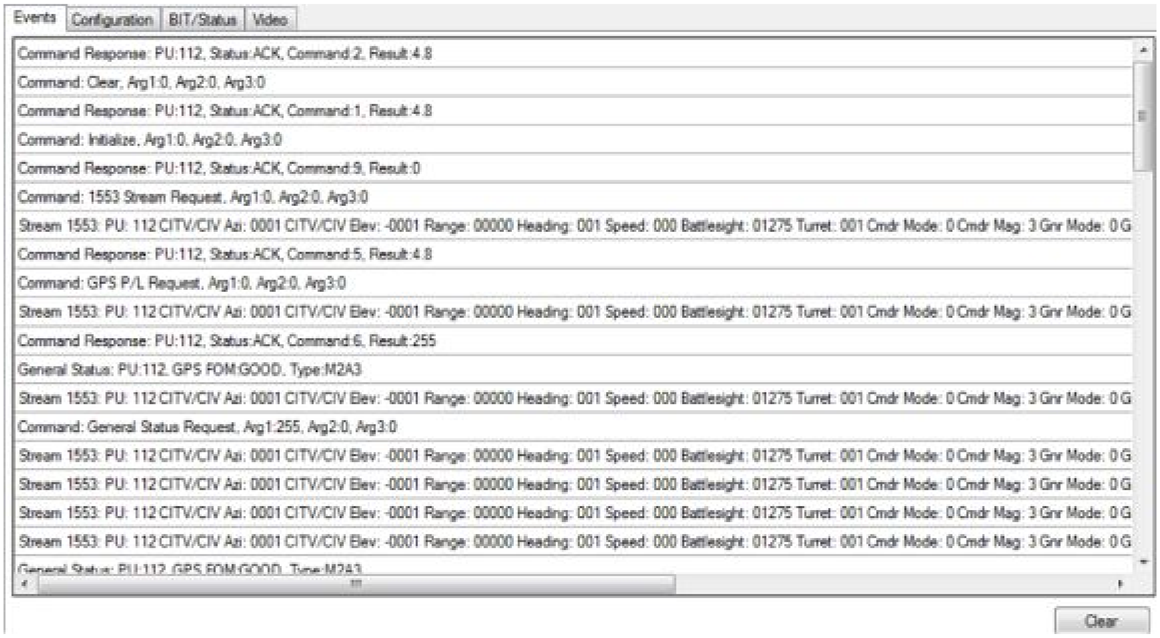

Figure 2-32. View Messages

3. Messages may not fit in the events message window. Click and hold slider bar at the bottom of the message window to view messages to the left or right.
4. Click and hold slider bar at the right of the message window to scroll back and view previous messages.

NOTE

If the messages are cleared, they cannot be recalled.

5. Click the **Clear** button to clear the list of all messages.
6. Another task may be performed or close FSE software if complete. See Closing FSE Software.

COMMAND INTERFACE CONTROL (CIC) COMMANDS

The Configuration Tab screen displays a list of commands that can be sent to the IPU. See Figure 2-33.

Figure 2-33. CIC Commands

1. If not already open, open FSE Software. See Opening FSE Software.
2. Click **Configuration** tab.
3. Click CIC command as desired.
   a. Click **Initialize** to send initialize command. This command will display on the Events tab and reset the message sequence number to 1.
   b. Click **Clear Event Buffer** to send clear event command. This command will display on the Events tab and reset the message sequence number to 1.

c. Click **Hardware Version Request** to send hardware version command. The hardware version will display on the Events tab.

4. Click **Events** tab to view result.
5. Another task may be performed or close FSE software if complete. See Closing FSE Software.

ABOUT THE FSE

Under the Help menu, click **About...** to display the current software version of the FSE software.

1. If not already open, open FSE Software. See Opening FSE Software.
2. Click the **Help** menu. Dropdown menu opens. See Figure 2-34.

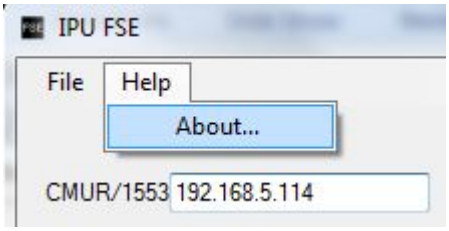

Figure 2-34. Help

3. Click on **About...** option. About FSE window opens, displaying version number and copyright information. See Figure 2-35.

Figure 2-35. Version View

4. Click **OK** when finished and the window will close.
5. Another task may be performed or close FSE software if complete. See Closing FSE Software.

CLOSING FSE SOFTWARE

Perform the following steps to end session and close the FSE.

1. Click the **Disconnect Video** button.
2. Click the **Disconnect PU** button.
3. Close the window by clicking the red **X** in the upper right corner or by selecting **File > Exit**.

4. Close the FSE application on the laptop by clicking the red **X** in the upper right corner. The FSE application closes.

END OF WORK PACKAGE

OPERATOR

COLD START PROCEDURES

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator

References

WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP

Operation Under Unusual Conditions— Cold Startup Procedures

The cold start procedure is used to reinstall the CMUR operating software if the CMUR ceases to function. If the CMUR requires a cold start procedure due to a catastrophic failure, send the CMUR unit to the manufacturer for repair. For normal operation startup procedures, see WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP.

END OF WORK PACKAGE

OPERATOR

Emergency Shut Down Procedure for the Crew Module Unit Recorder (CMUR)

INITIAL SETUP:

Not Required

EMERGENCY SHUT DOWN

To turn off all CMUR equipment in the event of an emergency follow the below procedure.

1. Push the **PC Power** button, the LED will go out when the computer cycles OFF. See Figure 2-36.

Figure 2-36. PC Power Button

2. Turn the **Main Power Switch** to OFF, LED will go out meaning all POWER is OFF. See Figure 2-37.

Figure 2-37. Main Power Switch

END OF WORK PACKAGE

CHAPTER 3

TROUBLESHOOTING PROCEDURES

CREW MODULE UNIT RECORDER (CMUR)

CHAPTER 3

TROUBLESHOOTING PROCEDURES

WORK PACKAGE INDEX

OPERATOR

Troubleshooting Crew Module Unit Recorder (CMUR) Audio/Video/Communication

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator/Telecomm
Mechanic/Electronic Technician (1)

TROUBLESHOOTING PROCEDURE

TROUBLESHOOTING PROCEDURES FOR CMUR NO AUDIO/VIDEO/COMMUNICATIONS

STEP 1

Power down and power up the CMUR. Verify using the FSE tool that the CMUR is transmitting audio and video.

CONDITION/INDICATION

Is the CMUR transmitting audio or video?

DECISION

YES–End Troubleshooting. NO–Step 2

STEP 2

MALFUNCTION

1. The CMUR is not functioning.

ACTION

Replace the CMUR with another CMUR unit.

END OF WORK PACKAGE

OPERATOR

Troubleshooting Procedures for the Crew Module Unit Recorder (CMUR)

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator/Telecomm
Mechanic/Electronic Technician (1)

The following procedures are used to isolate faults in the CMUR. Each procedure lists a potential symptom, the malfunction that would cause that symptom, and the actions the operator or maintainer should take to correct the fault. Troubleshooting begins by finding the symptom below that the equipment is presenting. The operator or maintainer then takes the corrective actions listed with that symptom.

TROUBLESHOOTING PROCEDURE

TROUBLESHOOTING PROCEDURES FOR THE CREW MODULE UNIT RECORDER (CMUR)

SYMPTOM
No power.

MALFUNCTION
Vehicle power source is faulty.

CORRECTIVE ACTION

1. Verify Master and Turret power is ON.
2. Ensure all required vehicle Citizen Band (CB) Radios are ON.

MALFUNCTION
CMUR is faulty.

CORRECTIVE ACTION

1. Verify CMUR Power Switch is ON.
2. Verify that the Power LED is on.
3. If CMUR is faulty, replace CMUR.

MALFUNCTION
Power cable is faulty.

CORRECTIVE ACTION

1. Check power cable connection at CMUR and power source.
2. If cable is faulty, replace power cable.

SYMPTOM
No audio, or weak or distorted audio.

MALFUNCTION
Full Functional Crew Station (FFCS) is faulty.

CORRECTIVE ACTION

1. Check volume on FFCS.

TROUBLESHOOTING PROCEDURES FOR THE CREW MODULE UNIT RECORDER (CMUR)– Continued

2. Check Combat Vision Center (CVC) helmet connections.
3. Move the external audio adapter to the Gunner's FFCS and check for clarity.

MALFUNCTION
Audio Cable is faulty.

CORRECTIVE ACTION

1. Check that External Audio Cable is properly installed.
2. Replace External Audio Cable.

MALFUNCTION
External Audio Adapter is faulty.

CORRECTIVE ACTION

1. Check that External Audio Adapter is properly installed.
2. Replace External Audio Adapter.
3. Return the 8-Channel Encoder to the Tactical Support Center (TSC) for troubleshooting.

MALFUNCTION
CMUR is faulty.

CORRECTIVE ACTION

Replace CMUR.

SYMPTOM
Picture from Crew Camera(s) or Thru-Sight Video (TSV) Cameras is canted.

MALFUNCTION
Camera/TSV Camera alignment is off.

CORRECTIVE ACTION

1. Align Crew Camera/TSV Camera using AAR/THP Laptop FSE tool.
2. Ensure Crew Camera Mounts, TSV Camera Adapters, and thumbscrews are tight.
3. Replace Crew Camera/TSV Camera.

SYMPTOM
Picture from Crew Camera(s) or TSV Camera(s) is blurred or cloudy.

MALFUNCTION
Fault is in vehicle.

CORRECTIVE ACTION

1. Clean optics.
2. Focus vehicle optics.
3. Focus sight using the diopter ring.

MALFUNCTION
Crew Camera/TSV Camera Optics are faulty.

TROUBLESHOOTING PROCEDURES FOR THE CREW MODULE UNIT RECORDER (CMUR)– Continued

CORRECTIVE ACTION

1. Clean optic lens with lens paper.
2. Replace Crew Camera/TSV Camera.

SYMPTOM
CMUR Will not record.

MALFUNCTION
8-Channel Encoder is faulty.

CORRECTIVE ACTION

1. Ensure that the J3 connector on the 8-Channel Encoder has a video source.

MALFUNCTION
CMUR is faulty.

CORRECTIVE ACTION

1. Replace CMUR.

SYMPTOM
No video from Crew Camera(s) or TSV Camera(s) Vehicle Video Inputs.

MALFUNCTION
Camera Cables are faulty.

CORRECTIVE ACTION

1. Check all cable connectors.
2. Replace Crew Camera/TSV Camera cables.
3. Replace Crew Camera/TSV Camera.

MALFUNCTION
CAT5 Cables are faulty.

CORRECTIVE ACTION

1. Check CAT5 Cables connection from CMUR to 8-Channel Encoder.
2. Replace CAT5 Cables.

MALFUNCTION
Cables for digital platforms are faulty.

CORRECTIVE ACTION

1. Check all Cable connectors.
2. Replace Central Display Unit (CDU) adaptor Cable (M1).
3. Replace CDU video adaptor (M1).
4. Replace Training Development Interface Panel (TDIP) Video Cable (M2).

MALFUNCTION
Crew Cameras or TSV Camera(s) are faulty.

TROUBLESHOOTING PROCEDURES FOR THE CREW MODULE UNIT RECORDER (CMUR)– Continued

CORRECTIVE ACTION

Replace Crew Camera/TSV Camera.

MALFUNCTION
8-Channel Encoder is faulty.

CORRECTIVE ACTION

Replace 8-Channel Encoder.

SYMPTOM
Radio Control Unit (RCU) does not work.

MALFUNCTION
RCU is faulty.

CORRECTIVE ACTION

1. Ensure RCU and CMUR sensors are aligned.
2. Replace battery.
3. Replace RCU.

SYMPTOM
Remote will not operate one of the Secure Digital (SD) Drives.

MALFUNCTION
SD Card is faulty.

CORRECTIVE ACTION

1. Ensure remote switches are in the ON position.
2. Ensure SD cards are properly seated in all slots.
3. Ensure SD cards are unlocked.
4. Replace SD card.

MALFUNCTION
CMUR is faulty.

CORRECTIVE ACTION

1. Replace CMUR.

NOTE

If Troubleshooting steps do not resolve problem, report findings to TSC.

END OF WORK PACKAGE

CHAPTER 4

MAINTENANCE INSTRUCTIONS

CREW MODULE UNIT RECORDER (CMUR)

CHAPTER 4

MAINTENANCE INSTRUCTIONS

WORK PACKAGE INDEX

MAINTAINER

Preventative Maintenance Checks and Service Introduction

Introduction

The Work Package (WP) titled Preventive Maintenance Checks and Services (PMCS) contains instructions for performing PMCS on Crew Module Unit Recorder (CMUR) components.

PMCS is performed to keep the CMUR components in optimum operating condition. The procedures list checks, services, and criteria to ensure that the CMUR components are prepared for operation. All checks and services must be performed at the specified intervals. The user must observe all warnings, cautions, and notes.

WARNINGS provide precautions or alerts for conditions that can result in personnel injury or death.
CAUTIONS provide precautions or alerts to conditions that can result in equipment damage.
NOTES are informational and provide emphasis or detailed information to the text.

EXPLANATION OF PMCS TABLE HEADINGS

The PMCS table indicates scheduled and general procedures required to keep the CMUR components in good operating condition. The PMCS table headings are described below.

ITEM NO. - Identification number for each task.
INTERVAL - Periodic intervals when to perform tasks.
MAN HOUR - Time required to perform tasks.
ITEM TO BE CHECKED OR SERVICED - Equipment requiring tasks.
EQUIPMENT NOT READY/AVAILABLE IF - Equipment faults or conditions that would limit performance or combat mission requirements and could endanger the crew or operators.

EXPLANATION OF INTERVALS IN PMCS TABLE

The description of intervals that may appear in a PMCS table is listed below.

Before (B) - Procedures must be done before use of the equipment.
After (A) - Procedures must be done immediately after recovery.
Monthly (M) - Procedures must be done once each calendar month.

DISCREPANCIES

When a discrepancy is found during PMCS, record the discrepancy on Department of the Army (DA) Form 2404, Equipment Inspection and Maintenance Worksheet. Write up items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 738-750, Functional User's Manual for The Army Maintenance Management System (TAMMS). Record any faults discovered during PMCS before taking corrective action.

END OF WORK PACKAGE

OPERATOR

Preventive Maintenance Checks and Services Procedures

INITIAL SETUP:

Personnel Required

Authorized Systems Administrator/Telecomm
Mechanic/Electronic Technician

Table 4-1. Preventive Maintenance Checks and Services for CMUR, Before Equipment Use

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/Available If:
1	Before	CMUR Casing	Inspect the CMUR for damage to casing such as cracks or missing fasteners.	Damaged. Report damage to maintenance personnel.
2	Before	Cable Connectors	Inspect cable connectors for damaged sockets or pins. Inspect cables for cuts or damage. Inspect the Cable Clamps for missing or broken magnets and plastic clamps.	Damaged. Report damage to maintenance personnel.
3	Before	Thru-Sight Cameras	Inspect both Thru Sight Cameras (TSCs) for damage, including broken lenses, dust on exterior components, and broken or worn cables.	Damaged. Report damage to maintenance personnel.
4	Before	Crew Cameras	Inspect both Crew Cameras for damage, including broken lenses, dust on exterior components, and broken or worn cables.	Damaged. Report damage to maintenance personnel.
5	Before	External Audio Adapter	Inspect the External Audio Adapter for damage.	Damaged. Report damage to maintenance personnel.
6	Before	Adapters and Brackets	Inspect the Adapters and Brackets for damage or missing pieces.	Damaged. Report damage to maintenance personnel.
7	Before	Camera Mounts	Inspect the Camera Mounts for missing or broken magnets.	Damaged. Report damage to maintenance personnel.

Table 4-2. Preventive Maintenance Checks and Services for CMUR, During Equipment Use

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/Available If:
1	During	Thru Sight Camera	Inspect both Thru Sight Cameras (TSCs) for damage, including broken lenses, dust on exterior	Damaged. Report damage to maintenance personnel.

Table 4-2. Preventive Maintenance Checks and Services for CMUR, During Equipment Use – Continued

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/Available If:
			components, and broken or worn cables.	
2	During	Crew Cameras	Inspect both Crew Cameras for damage, including broken lenses, dust on exterior components, and broken or worn cables.	Damaged. Report damage to maintenance personnel.
3	During	External Audio Adapter	Inspect the External Audio Adapter for damage.	Damaged. Report damage to maintenance personnel.
4	During	Camera Mounts	Inspect the Camera Mounts for missing or broken magnets.	Damaged. Report missing/broken magnets to maintenance personnel.

Table 4-3. Preventive Maintenance Checks and Services For CMUR, After Equipment Use

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/Available If:
1	After	CMUR Casing	Inspect the CMUR for damage to casing such as cracks or missing fasteners.	Damaged. Report damage to maintenance personnel.
2	After	Cable Connectors	Inspect cable connectors for damaged sockets or pins. Inspect cables for cuts or damage. Inspect the Cable Clamps for missing or broken magnets and plastic clamps.	Damaged. Report damage to maintenance personnel.
3	After	Thru-Sight Cameras	Inspect both Thru Sight Cameras (TSCs) for damage, including broken lenses, dust on exterior components, and broken or worn cables.	Damaged. Report damage to maintenance personnel.
4	After	Crew Cameras	Inspect both Crew Cameras for damage, including broken lenses, dust on exterior components, and broken or worn cables.	Damaged. Report damage to maintenance personnel.
5	After	External Audio Adapter	Inspect the External Audio Adapter for damage.	Damaged. Report damage to maintenance personnel.

Table 4-3. Preventive Maintenance Checks and Services For CMUR, After Equipment Use – Continued

Item No.	Interval	Item To Be Checked or Serviced	Procedure	Equipment Not Ready/Available If:
6	After	Adapters and Brackets	Inspect the Adapters and Brackets for damage or missing pieces.	Damaged. Report damage or missing items to maintenance personnel.
7	After	Camera Mounts	Inspect the Camera Mounts for missing or broken magnets.	Damaged. Report missing/broken magnets to maintenance personnel.

END OF WORK PACKAGE

OPERATOR

Remove and Install the Crew Module Unit Recorder (CMUR) for Abrams

For M1A1/M1A1 ED/M1A1 SA/M1A2 SEP/M1A2 SEPV2 Tanks

INITIAL SETUP:

Materials/Parts

Vehicle Accessory Kit (VAK)

CMUR

8-Channel Encoder

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (2)

References

WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP

WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN

WP 0009 OPERATION UNDER USUAL CONDITIONS — AAR/THP AND FIELD SUPPORT EQUIPMENT (FSE) SOFTWARE

Equipment Condition

Ensure the vehicle is fully operational, including the Combat Vision Center (CVC) helmets, Full Functional Crew Station (FFCS), and Vehicle Information System (VIS).

Ensure Preventive Maintenance Checks and Services (PMCS)/Prepare to fire checks have been performed on the vehicle.

Park vehicle on level ground.

Position turret with gun over the front slope of vehicle.

Ensure CMUR is powered off.

The vehicle Master Power and Turret Power must be in the OFF position prior to removal or installation.

The turret traverse/elevation locks must be engaged prior to removal or installation.

Lock all turret hatches in the open position.

REMOVAL

Remove the Crew Module Unit Recorder (CMUR)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Failure to verify CMUR power is OFF prior to vehicle shut down could result in damage to the CMUR.

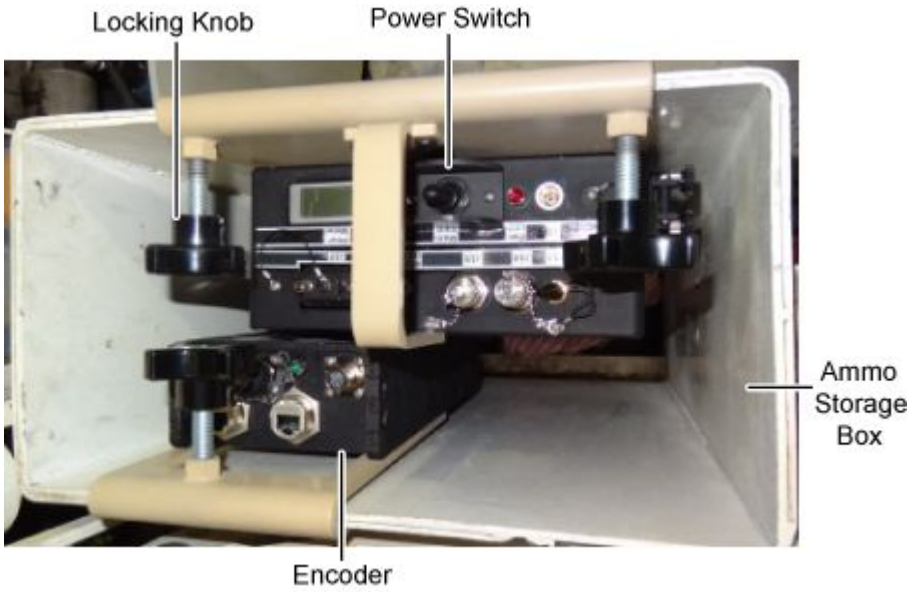

Figure 4-1. CMUR Top View

1. Verify that CMUR power is set to OFF position. See Figure 4-1 for power switch location. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Loosen locking knobs on CMUR until unit moves freely within .50 cal ammo storage box.
3. Carefully lift CMUR from ammo storage box.
4. Disconnect the GPS cable from the J17 port on the CMUR and store the GPS in the accessory case.
5. Disconnect all remaining cables from the CMUR and store CMUR in accessory case.

REMOVAL

Remove the 8-Channel Encoder

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Loosen locking knobs on 8-Channel Encoder until unit moves freely within .50 cal ammo storage box.
2. Disconnect all cables from the Encoder.
3. Carefully lift Encoder from storage box and store Encoder in accessory case.
4. Place cables inside accessory case.

REMOVAL

Remove the Gunner's Primary Sight Extension (GPSE) Thru-Sight Video (TSV) Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Do not over-tighten the locking screws. Excessive force could cause screws to strip and break.

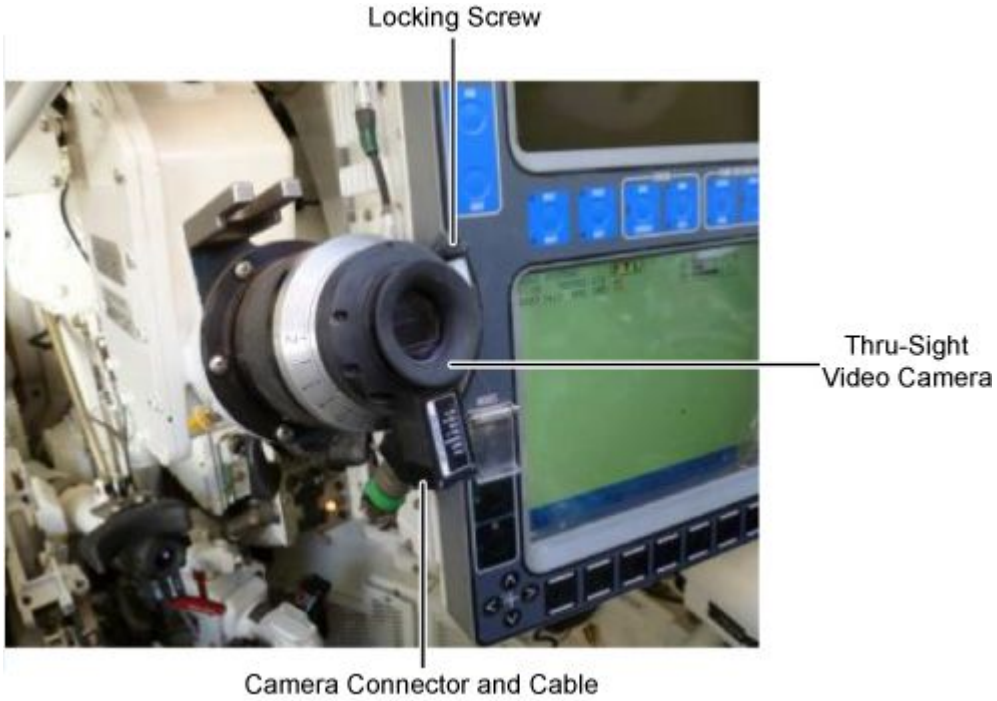

Figure 4-2. GPSE TSV Camera

REMOVAL– CONTINUED

1. Remove the camera cable from GPSE TSV camera. See Figure 4-2.

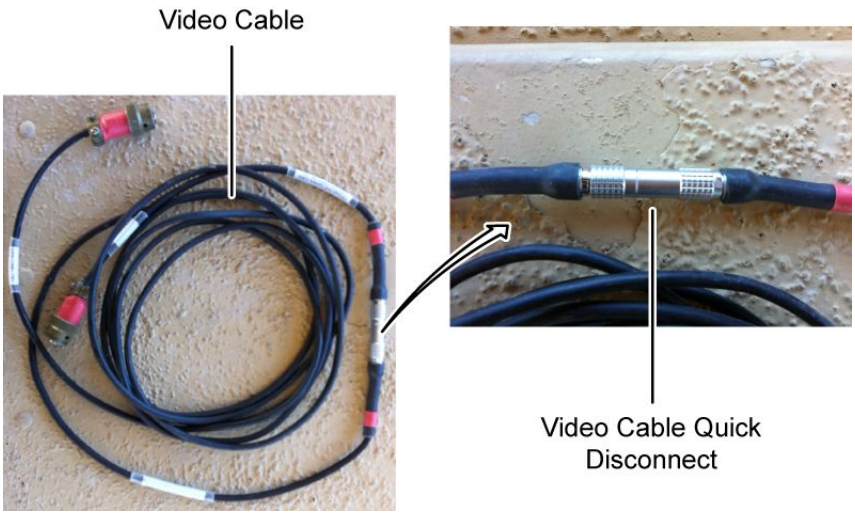

Figure 4-3. Video Cable Quick Disconnect

2. Using video cable quick disconnect separate video cable ends and remove cable from along turret wall. See Figure 4-3.
3. Using video cable quick disconnect reconnect video cable ends and store cable in Vehicle Accessory Kit (VAK).
4. Remove the TSV Camera from the GPSE. See Figure 4-2.
   a. Loosen the locking screw that secures the TSV Camera to the GPSE.
   b. Remove the TSV camera from the GPSE and store in VAK.
   c. Tighten the locking screw once camera has been removed.
5. Reinstall the brow pad onto the GPSE.

REMOVAL

Remove the Gunner's Auxiliary Sight (GAS) TSV Camera and Adapter

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Do not over-tighten the locking screws. Excessive force could cause screws to strip and break.

1. Remove the GAS brow-pad.
2. Disconnect the aux camera cable from the GPSE tube.
3. Remove cable and cable magnets from along the turret wall.

REMOVAL– CONTINUED

4. Disconnect the camera cable from the TSV Camera by pulling gently downward on camera and toward oneself.
5. Remove the TSV Camera from the GAS Adapter:
   a. Loosen the locking screw.
   b. Remove the TSV Camera from the GAS Adapter.
   c. Loosen the adapter locking screws. See Figure 4-4.

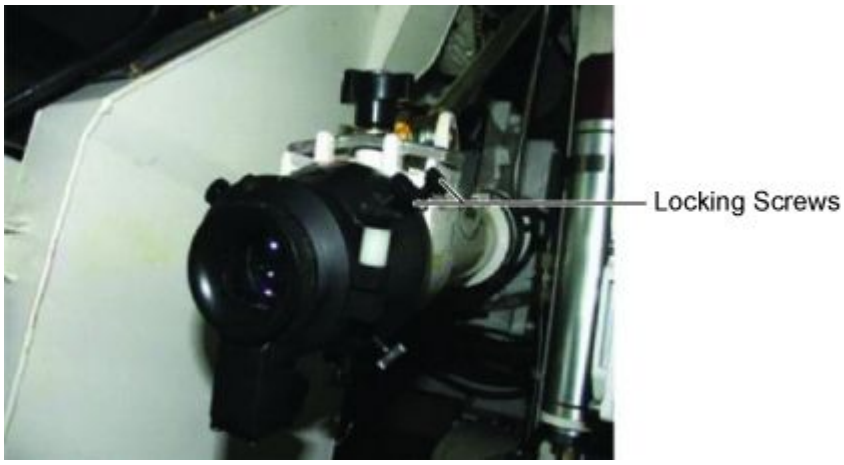

Figure 4-4. GAS and TSV Camera Locking Screws

6. Remove adapter.
7. Replace the GAS brow-pad.

REMOVAL

Remove the Loader's Crew Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

WARNING

Do not block fire extinguisher sensors. Keep all cables clear of sensors. Death or serious injury can occur.

CAUTION

Keep the camera and all cables clear of the ammo door. Failure to do so could result in damage to equipment.

1. Remove cable and cable magnets from along the turret wall.
2. Disconnect the camera cable from the loader's crew camera. See Figure 4-5.

REMOVAL– CONTINUED

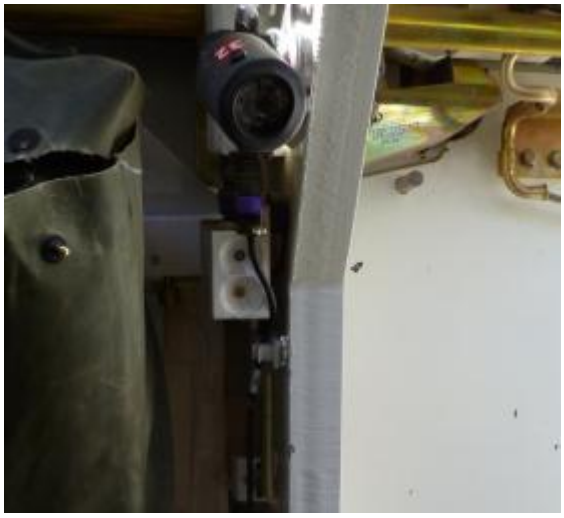

Figure 4-5. Loader's Crew Camera

3. Loosen the camera knuckle and remove the loader's crew camera from the camera mount.
4. Remove the magnetic camera mount in the loader's compartment above the fire sensor.

REMOVAL

Remove the Gunner's Crew Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Do not over-tighten the locking screws. Excessive force could cause screws to strip and break.

1. Remove cable and cable magnets from along the turret wall.
2. Disconnect the camera cable from the crew camera.
3. Loosen the knuckle only enough to remove the gunner's crew camera, and remove the gunner's crew camera from the camera mount.
4. Remove the magnetic camera mount from its position.
5. Store the camera and the magnetic camera mount in the Vehicle Accessory Kit.

REMOVAL

Remove the Thermal Imaging System (TIS) TSVR Video Adapter (M1A1 SA and M1A2 SEPV2)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

WARNING

Failure to align pins properly will damage the Fire Control System.

NOTE

Notice key controls on cable for replacement.

1. Remove cable and cable magnets from along the turret wall.
2. Disconnect the TIS Video Cable from the TIS Video jack located on the TSVR Video Adapter.
3. Disconnect the Target Reporting Unit (TRU) J2 cable from the TSVR Video Adapter.
4. Connect cable connector to TRU. See Figure 4-6.

Figure 4-6. TRU J2 Connection

5. Store the TSVR Video Adapter in the Vehicle Accessory Kit.

REMOVAL

Commander's Display Unit (CDU) Video Adapter and Cable

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

NOTE

CROWS-equipped vehicles have two video cables. See Figure 4-7.

Figure 4-7. CROWS Cable

1. Disconnect the CDU Video cable from the CDU Video jack located on the CDU Video Adapter.
2. Remove cable and magnets from along turret wall.
3. Disconnect the CDU J4 cable from the CDU Video Adapter.
4. Disconnect the CDU Video Adapter to connector J4 on the rear of the CDU.
5. Connect the J4 cable Connector from the rear of the CDU.
6. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove External Audio Adapter/External Audio Cable (All Abrams Vehicles)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the orange audio cable from the audio/video input cable jack labeled audio out.
2. Disconnect the CVC spaghetti cable from the external audio adapter labelled CVC.
3. Disconnect the external audio adapter connector labeled Headset from the Commander's FFCS CVC Connector. See Figure 4-8.

Figure 4-8. External Audio Adapter

4. Remove audio cable from along wall.
5. Reconnect CVC cable to the FFCS.
6. Disconnect audio cable from Encoder.
7. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove 1553 Data Bus A Cable (M1A2 SEP)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect blue Data Bus Cable A from the 1553 connector J1 located in the Loader's Station.

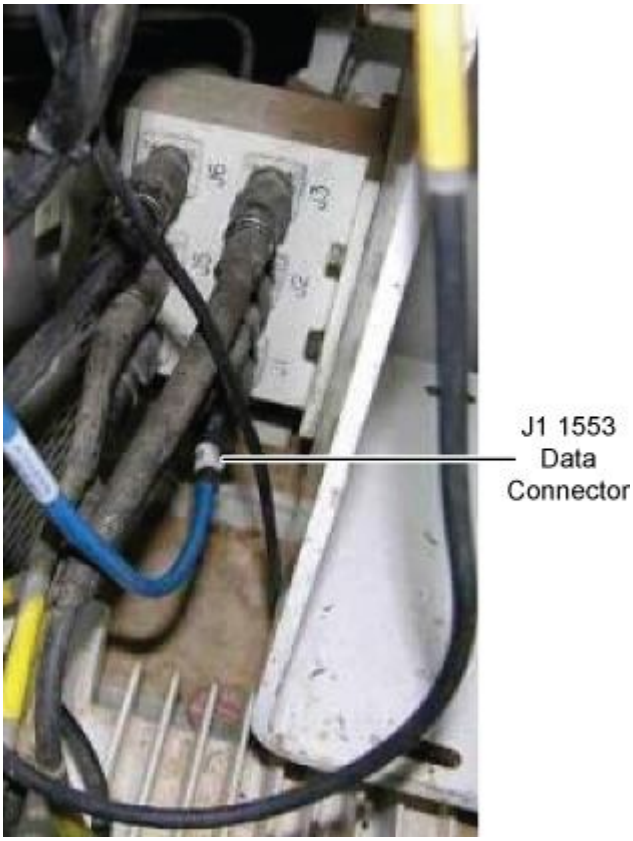

Figure 4-9. J1 1553 Data Connector

2. Remove cable and cable magnets from along the turret wall.
3. Disconnect cable from CMUR.
4. Store the data bus cable in the Vehicle Accessory Kit.

REMOVAL

Remove the 1553 Data Bus B Cable

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the blue data bus cable from the 1553 connector J4, located in the Gunner's station. See Figure 4-10.

Figure 4-10. J4 1553 Connector Gunner Position

2. Remove cable and cable magnets from along the turret wall.
3. Disconnect cable from CMUR.
4. Store the data bus cable in the Vehicle Accessory Kit.

REMOVAL

Remove CMUR 24V Power Cable and Power Utility Adapter (M1A1/M1A1D/M1A1SA)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the vehicle power cable from the Turret Utility Outlet Connector located on the Turret Network Box (TNB) (see Figure 4-11) or Re-worked Turret Network Box (RTNB) (see Figure 4-12).

REMOVAL– CONTINUED

Figure 4-11. TNB Utility Outlet Connector

Figure 4-12. RTNB Utility Outlet Connector

2. Remove cable and cable magnets from along the turret wall.
3. Disconnect the power adapter utility cable from the 24 VDC power cable.
4. Store the power converter cable in the Vehicle Accessory Kit.

REMOVAL

Remove CMUR 24V Power Cable and Power Utility Adapter (M1A2 SEP Models)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the Turret Utility Outlet Connector. See Figure 4-13.

REMOVAL– CONTINUED

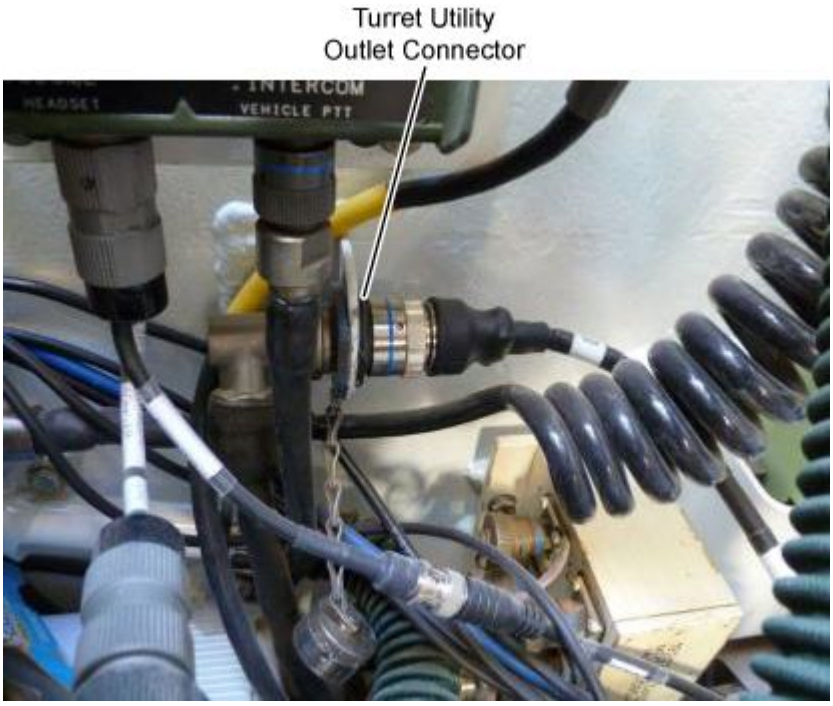

Figure 4-13. M1A2 Power Cable Connected to Utility Outlet Connector

2. Remove cable and cable magnets from along the turret wall.
3. Disconnect the Power Adapter Utility cable from the CMUR 24VDC power cable
4. Return the CMUR 24V Power Cable and the Power Adapter Utility Cable to the Vehicle Accessory Kit.

INSTALLATION

Install the CMUR

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Place CMUR and Encoder on .50 Cal Ammo Box.
2. Unscrew the Solid State Drive (SSD) thumb screws.
3. Press latch release button and ensure that the SSD has been installed. See Figure 4-14.

INSTALLATION– CONTINUED

NOTE

The units are stored with a SSD installed however, if one is not present, obtain an SSD and insert it in the SSD bay.

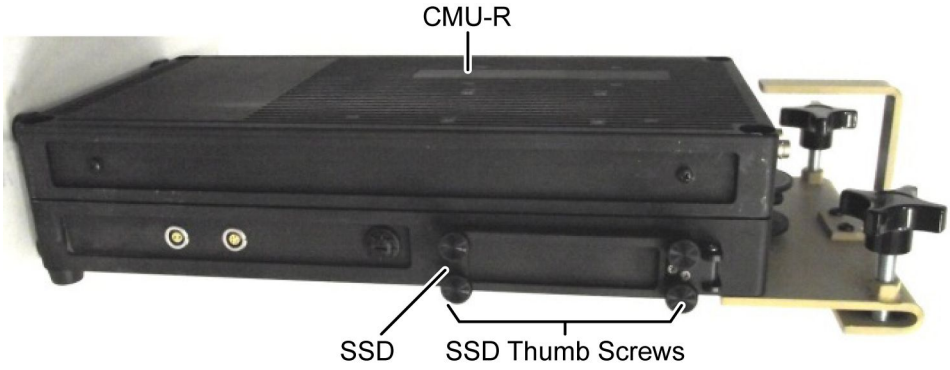

Figure 4-14. SSD Thumb Screws

4. Reseat hard drive.
5. Close the bay door and tighten thumb screws.

CAUTION

Failure to close the CMUR cover and tighten the thumb screws will expose the SSD slot to dust, moisture and debris, which could cause damage to the CMUR.

6. Verify CMUR power is set to OFF position. See Figure 4-15, for power switch location.

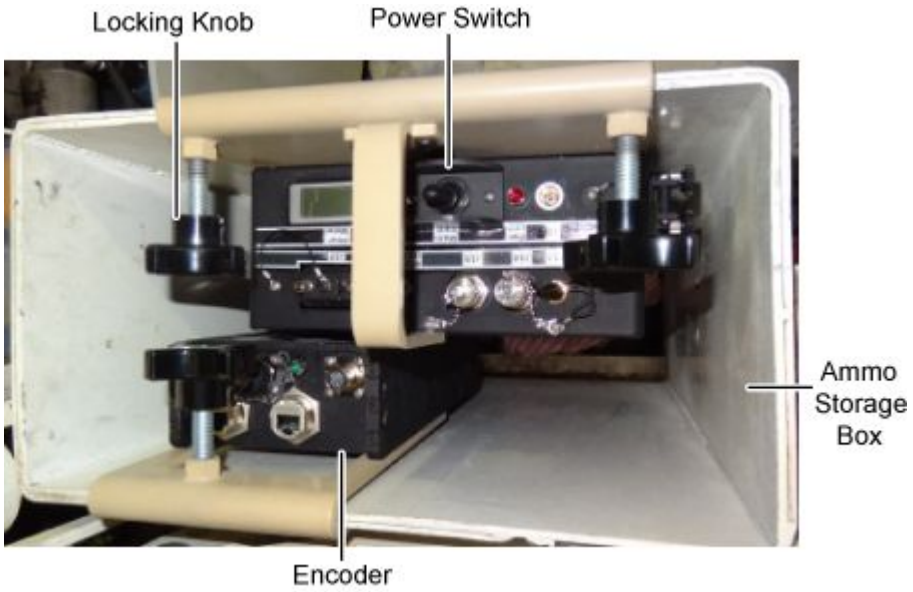

Figure 4-15. CMUR Top View

INSTALLATION– CONTINUED

7. Loosen the locking knobs of the CMUR.

8. Connect 2 CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder. See Figure 4-16.

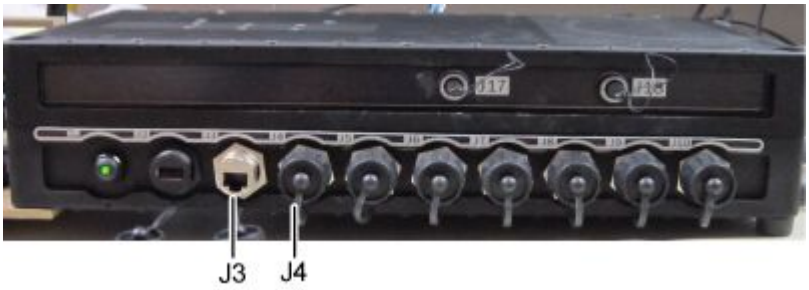

Figure 4-16. J3 and J4 Connections

CAUTION

Ensure that GPS Receiver cable routing does not interfere with crew operation and allows for the opening and closing of hatches with no crimping of cable. If not followed damage to the GPS Receiver Cable will result.

NOTE

The GPS will only work with the Loader's hatch OPEN.

9. Connect GPS to J17 connector on CMUR. Route the cable from the CMUR between the Loader's and Tank Commander's positions, by the Loader's Crew Camera and attach the GPS Receiver to the inside of the Loader's hatch using its magnetic base.

10. Place CMUR in .50 Cal Ammo Storage Box.

11. Tighten locking knobs on CMUR and verify that unit is secure.

INSTALLATION

Install the 8-Channel Encoder

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Connect 2 CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder.

INSTALLATION– CONTINUED

NOTE

Do not tighten the locking knob until all cameras and cables have been connected. The camera cable connectors are located on the bottom of the 8-Channel Encoder and the unit will have to be removed from its mounting location to connect each camera cable.

2. Loosen the locking knob and position the 8-Channel Encoder in the .50 Cal Ammo Storage Box as shown in Figure 4-15.

3. Tighten the locking knob and verify that the Encoder is secure.

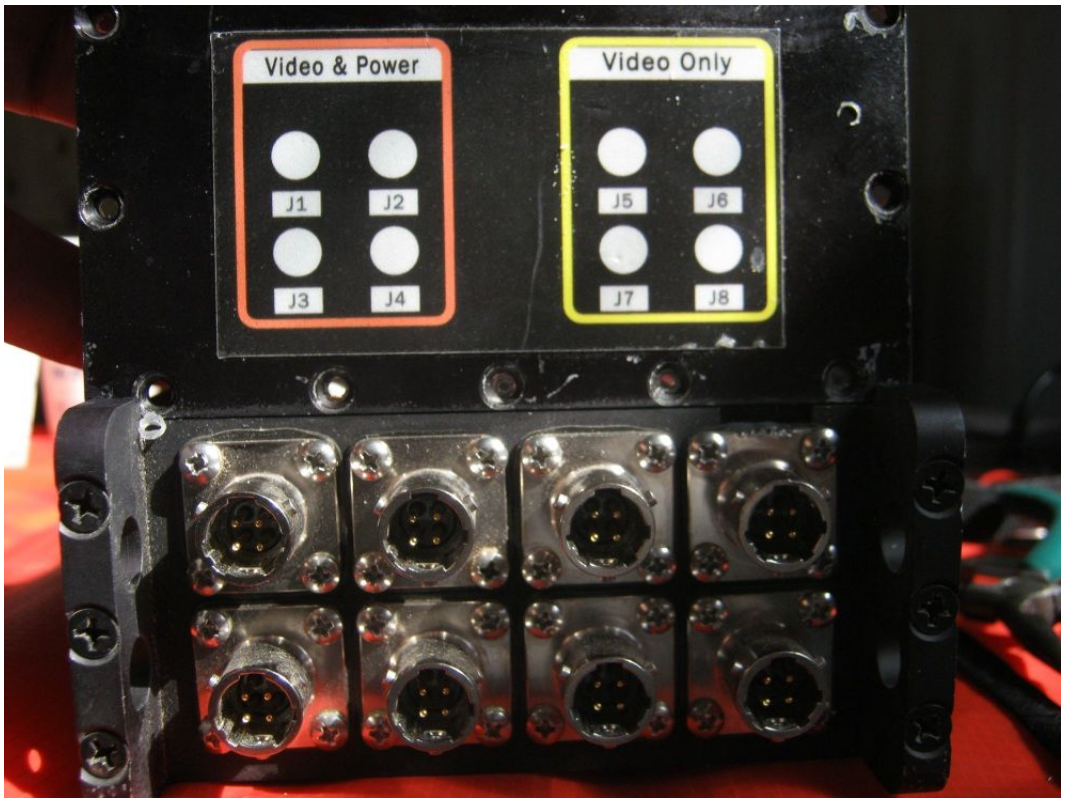

Figure 4-17. CMUR Encoder Camera Connectors J1–J8

Table 4-4. CMUR Encoder Camera Connections J1–J4

VEHICLE PLATFORM	POWER			
	J1	J2	J3	J4
M1A1 (HC) TANK	LDR CREW CAM	GNR CREW CAM	GPSE THRU SIGHT	GAS THRU SIGHT
M1A1 SA TANK	LDR CREW CAM	GNR CREW CAM	GPSE THRU SIGHT	GAS THRU SIGHT
M1A2 SEP V2	LDR CREW CAM	GNR CREW CAM	GPSE THRU SIGHT	GAS THRU SIGHT
M1A2 SEP V2 WITH CROWS	LDR CREW CAM	GNR CREW CAM	GPSE THRU SIGHT	GAS THRU SIGHT

INSTALLATION– CONTINUED

Table 4-5. CMUR Encoder Camera Connections J5–J8

VEHICLE PLATFORM	NON-POWER			
	J5	J6	J7	J8
M1A1 (HC) TANK	NOT USED	NOT USED	NOT USED	NOT USED
M1A1 SA TANK	TSVR	CDU	NOT USED	NOT USED
M1A2 SEP V2	TSVR	CDU	NOT USED	NOT USED
M1A2 SEP V2 WITH CROWS	TSVR	CDU	NOT USED	CROWS

INSTALLATION

Install the Gunner's Primary Sight Extension (GPSE) TSV Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Do not over-tighten the locking screws. Excessive force could cause screws to strip and break.

1. Remove the brow pad from the GPSE. See Figure 4-18.
2. Install the TSV Camera on the GPSE:
   a. Loosen the locking screw. See Figure 4-18.
   b. Place camera over the sight.
   c. Tighten the locking screw to secure the TSV Camera.

INSTALLATION– CONTINUED

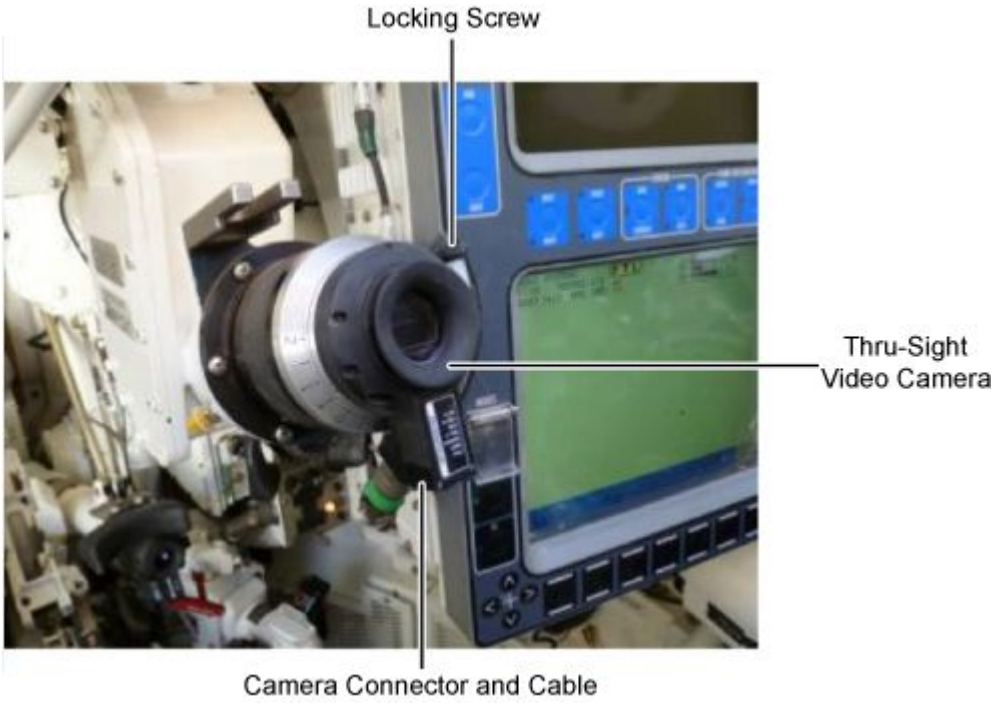

Figure 4-18. GPSE TSV Camera

3. Connect colored camera cable short end to the GPSE.
4. Route the long side camera cable from the encoder and along the turret wall to the GPSE housing.
5. Use a large (#5) cable magnet from the encoder to secure the camera cable along the turret wall.

NOTE

Do not use zip ties or secure cable magnets until the system has been tested and everything is installed.

6. Connect the camera cable to the appropriate Video Input cable connector J1-J4 on the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use.

INSTALLATION

Install the Gunner's Auxiliary Sight (GAS) TSV Camera and Adapter

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Do not over-tighten the locking screws. Excessive force could cause screws to strip and break.

1. Remove the GAS brow pad.

INSTALLATION– CONTINUED

NOTE

Ensure that GAS Adapter is installed with the Arrow indicator in the up position. See Figure 4-19.
The GAS Adapter locking screws may need additional adjustment to properly align the camera.

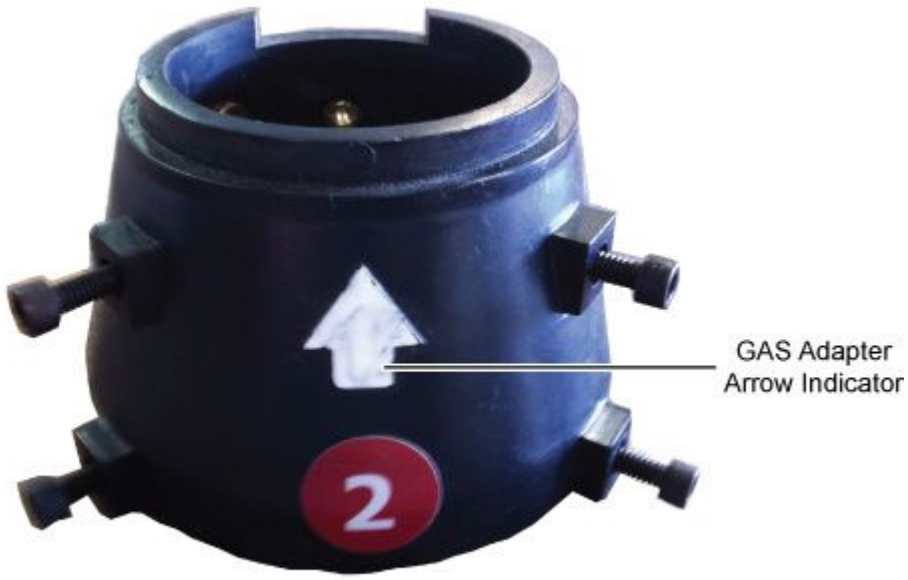

Figure 4-19. GAS Adapter Arrow Indicator

2. Install the GAS Adapter over the GAS by securing with the locking screws.
3. Install the TSV Camera on the GAS Adapter:
   a. Loosen the locking screw.
   b. Place the TSV Camera on the GAS Adapter.
   c. Tighten the locking screws. See Figure 4-4.
4. Disconnect short end from the quick disconnect and connect to the TSU camera.
5. Route the camera cable along the turret wall to the CMUR 8-Channel Encoder.
6. Use the large (#5) cable magnets to secure the camera cable along the turret wall.
7. Connect the camera cable to the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use. See Figure 4-20.
8. Replace the brow pad.

INSTALLATION– CONTINUED

Figure 4-20. AUX Camera Cable Routing

INSTALLATION

Install the Loader's Crew Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

WARNING

Do not block fire extinguisher sensors. Keep all cables clear of sensors. Death or serious injury can occur.

CAUTION

Keep the camera and all cables clear of the ammo door. Failure to do so could result in damage to equipment.

1. Loosen the knuckle on the crew camera.
2. Attach the loader's crew camera to the magnetic camera mount and tighten the knuckle to secure.
3. Place the magnetic camera mount on the Tank Commander's side of the upper crew compartment by the Fire Sensor oriented on the Breech of the 120mm Main Gun.
4. Separate the camera cable by its quick disconnects and route the camera cable from the crew camera to the CMUR, ensuring that the cable stays clear of the Ammunition Doors and the Tank Commander's seat. Then reconnect the cable's quick disconnects.

INSTALLATION– CONTINUED

5. Connect the camera cable to the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use.

INSTALLATION

Install the Gunner's Crew Camera

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Identify and remove one crew camera and one magnetic camera mount from the Vehicle Accessory Kit. The Gunner's Camera Bracket Alternative or the small Gunner's Bracket can be used.

NOTE

Use whichever configuration provides the best view of the Gunner's lower panel, which contains weapons type, selection, and ammunition select for AAR purposes.

2. Loosen the knuckle on the crew camera.
3. Attach the gunner's crew camera to the camera mount and tighten the knuckle to secure.
4. Orient gunner's crew camera on GPS lower panel.
5. Place the magnetic camera mount to the right of the Gunner's Control Display Panel. See Figure 4-21.

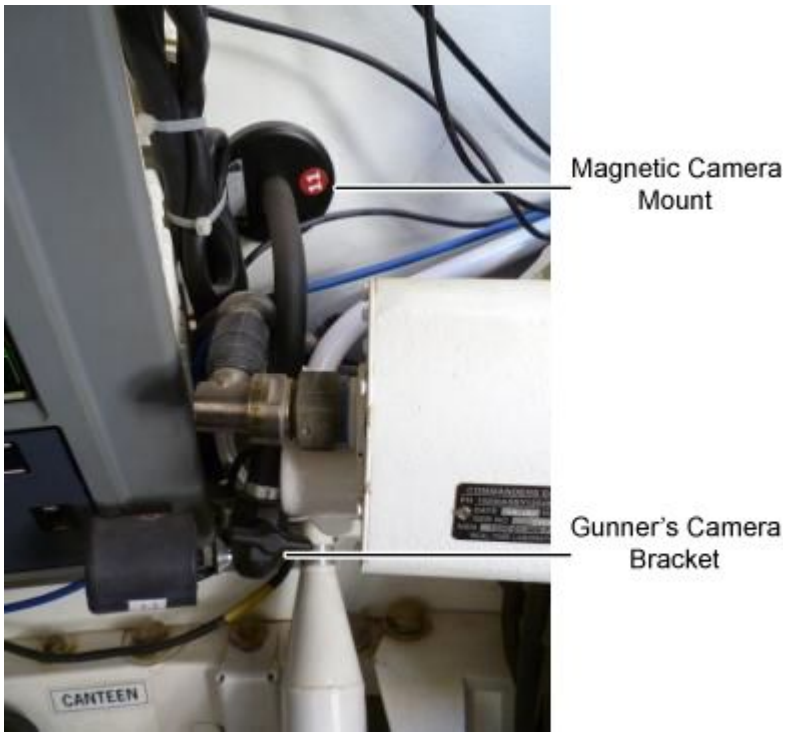

Figure 4-21. Gunner's Camera Bracket

INSTALLATION– CONTINUED

6. Separate the camera cable by its quick disconnects and route the camera cable from the gunner's camera to the CMUR along the turret wall. Then reconnect the cable's quick disconnects.
7. Connect the camera cable to the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use.

INSTALLATION

Install the TSVR Video Adapter (M1A1 SA and M1A2 SEPV2)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Locate and remove the TSVR Video Adapter from the Vehicle Accessory Kit. See Figure 4-22.

Figure 4-22. TSVR Video Adapter

2. Identify and disconnect the J2 cable connector from the Thermal Receiving Unit (TRU).
3. Connect the male end of the TSVR Video Adapter to the TRU J2.

CAUTION

Ensure that the keyways and pins are properly aligned prior to connecting the cable; failure to align the keyways and pins will result in damage to the cable pins.

4. Connect the TRU J2 cable to the TSVR Video Adapter.
5. Connect video cable extension to the TIS Video Cable.
6. Connect the TIS Video Cable to TIS Video jack located on the TSVR Video Adapter.
7. Route the TIS Video Cable along the Turret wall behind the Tank Commanders seat to the TSVR Video Adapter; secure with cable magnets.
8. Connect the other end of the camera cable to the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use.

INSTALLATION

CDU Video Adapter and Cable (M1A2 models only)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

DO NOT over tighten the CDU Video Adapter on connector J4. This will cause damage to the connector and/or the CDU. If resistance is felt when installing the CDU Video Adapter, stop and remove the adapter, re-align the connector, and try again.

CAUTION

Ensure the keyways are properly aligned prior to connecting the cable. Failure to align the keyways may result in damage to cable pins.

1. Disconnect the cable from connector J4 on the rear of the CDU.
2. Connect the male end of the CDU video adapter to connector J4.
3. Connect the J4 cable to the CDU video adapter.
4. Route the cable along the turret wall behind the Commander's seat to the CDU and secure with cable magnets.
5. Connect the CDU video cable to video jack located on the CDU video adapter. See Figure 4-23.

INSTALLATION– CONTINUED

Figure 4-23. CDU Video Adapter and CDU Video Cable Installed

6. Connect CROWS Video Cable to CROWS video jack located on the CDU Video Adapter (CROWS only).
7. Connect camera cable to the 8-Channel Encoder. If CROWS is present, connect the CROWS connector to the 8-Channel Encoder. See Table 4-4 and Table 4-5 to determine which connector to use.

INSTALLATION– CONTINUED

Figure 4-24. Crows Cable

INSTALLATION

Install External Audio Adapter/External Audio Cable (All Abrams Vehicles)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

NOTE

If a CVC is connected to Commanders FFCS remove until the External Audio Adapter is installed.

NOTE

The External Audio Cable can be connected to any FFCS in the turret, however the Commander's FFCS is recommended.

1. Attach the External Audio Adapter connector labeled Headset to Commander's FFCS CVC connector. See Figure 4-25.

INSTALLATION– CONTINUED

Figure 4-25. External Audio Adapter

2. Connect the CVC to the External Audio Adapter connector labeled CVC.
3. Connect the orange External Audio Cable to the connector on the external audio adapter labeled Audio Out.
4. Connect the External Audio Cable to the 8-Channel Encoder J10 connector.

INSTALLATION

Install Loader's 1553 Data Bus A Cable (SEP Only)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Connect Data Bus Cable A to the 1553 connector J1 located in the loader's station. See Figure 4-26.

INSTALLATION– CONTINUED

Figure 4-26. J1 1553 Data Connector Full View

2. Route the cable along the turret wall to the CMUR using wall magnets.
3. Connect the end labeled to CMUR Data Bus to the CMUR J14 connector.

INSTALLATION

Install Gunner's 1553 Data Bus B Cable (SEP Only)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Locate the 1553 J4 connector under the turret wall and between the HS. See Figure 4-27.

INSTALLATION– CONTINUED

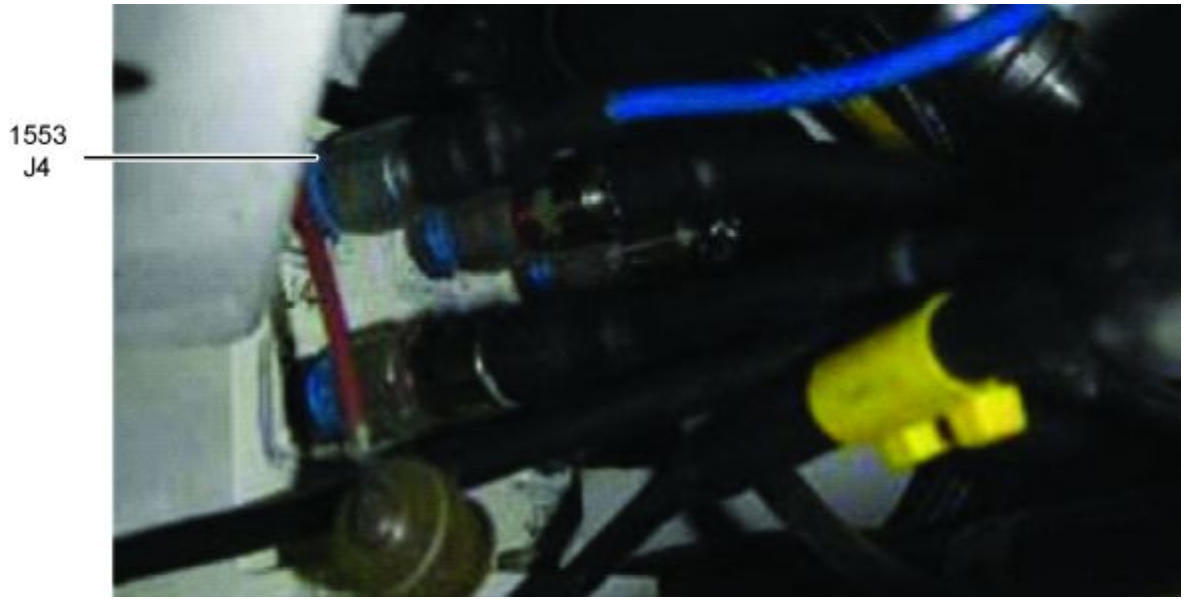

Figure 4-27. J4 1553 Connector Gunner Position

2. Connect the data bus cable to the 1553 connector J4 located in the Gunner's station.
3. Route the cable along the turret wall behind the Commander's seat and to the CMUR.
4. Connect the end labeled to CMUR Data Bus to the CMUR J15 connector.

INSTALLATION

Install CMUR 24V Power Cable and Power Utility Adapter (M1A1/M1A1D/M1A1SA)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Identify and remove the CMUR 24V Power Cable and the Power Adapter Utility Cable from the Vehicle Accessory Kit.
2. Connect the Power Adapter Utility cable to the CMUR 24V power cable.
3. Connect the 24V out connector on the CMUR power cable to the CMUR J1 Connector.
4. To connect to vehicle power, route the cable along the ledge of the turret behind the Loader's Seat (staying clear of the Ready Ammunition Door) and to the Turret Utility Outlet Connector located on the Turret Network Box (TNB) or Re-worked Turret Network Box (RTNB) .
5. On the M1A1 D or M1A1 SA route the cable the same and input into the Turret Utility Outlet Connector on the RTNB.
6. Ensure the test utility outlet switch is in the on position.

INSTALLATION

Install CMUR 24V Power Cable and Power Utility Adapter (M1A2 SEP Models)

WARNING

Failure to verify vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Identify and remove the CMUR 24V Power Cable and the Power Adapter Utility Cable from the Vehicle Accessory Kit.
2. Connect the Power Adapter Utility cable to the CMUR 24VDC power cable.
3. Connect the 24V out connector on the CMUR power cable to the CMUR J1 Connector.
4. Route the cable behind the Tank Commander's seat and connect to the Turret Utility Outlet Connector.

Final Inspection

1. Check for loose or hanging cables that may interfere with the operation of the tank or impede crew duties during normal operations of the vehicle.
2. Visually inspect cable connections to ensure that they are tight.
3. Visually check cameras to ensure they are mounted securely.
4. Visually ensure that the CMUR and the 8-Channel Encoder are securely mounted to the vehicle and that all cables inside and outside are tied down.
5. Turn the turret utility power on at the CDU in order to power the CMUR (SEP only).
6. Power on the CMUR. See WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP.
7. Have the Gunner sit in the Gunner's position and check the view with the FSE while the Gunner adjusts the camera as needed.

END OF WORK PACKAGE

OPERATOR

Remove and Install Crew Module Unit Recorder (CMUR) for Bradley
For M2A2/M2A3

INITIAL SETUP:

Tools and Special Tools

9/16 in. Turret Ratchet

7/16 in. Wrench

Materials/Parts

Vehicle Accessory Kit (VAK)

CMUR

8-Channel Encoder

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (2)

References

WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP
WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN
WP 0009 OPERATION UNDER USUAL CONDITIONS — AAR/THP AND FIELD SUPPORT EQUIPMENT (FSE) SOFTWARE
WP 0020 REMOVE AND INSTALL OF CREW MODULE UNIT RECORDER (CMUR) SUN SHIELD

Equipment Condition

Ensure the vehicle is fully operational, including the Combat Vision Center (CVC) helmets, Full Functional Crew Station (FFCS), and Vehicle Information System (VIS).

Ensure Preventive Maintenance Checks And Services (PMCS)/Prepare to fire checks have been performed on the vehicle.

Park vehicle on level ground.

Position turret with gun over the front slope of vehicle.

The vehicle Master Power and Turret Power must be in the OFF position prior to installation.

The turret traverse/elevation locks must be engaged prior to installation.

Ensure CMUR is off.

Ensure CMUR Sun Shield is installed.

REMOVAL

Remove the Crew Module Unit Recorder (CMUR)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

Watch for power cables connected to the Training Device Interface Panel (TDIP). See Figure 4-28.

Figure 4-28. TDIP

1. Make sure that Vehicle Master Power is turned OFF.
2. Disconnect all cables from the CMUR and place Encoder in case.

NOTE

Ports J5–J10 can be used if J3 and J4 are inoperable.

3. Loosen the waterproof connectors and disconnect the two CAT5 cables from the J3 and J4 connectors on the CMUR.
4. Loosen the locking knobs on the CMUR and remove unit from bustle rack.

REMOVAL

Remove 8-Channel Encoder

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Verify that power is set to OFF.
2. Loosen the locking knob for the 8-Channel Encoder on the bustle rack.
3. Disconnect all cables from the Encoder.

CAUTION

Lay Encoder flat when removed from rack.

5. Remove Encoder from bustle rack and place Encoder in case.

REMOVAL

Remove Auxiliary (AUX) Thru-Sight Camera (TSC) and M2 Auxiliary (AUX) Sight Adapter Ring (All Versions)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. From within the turret, disconnect camera cable from TSV Camera Connector on lens and separate camera cable quick disconnects.
3. Cut cable ties used during install.
4. Remove camera cable through cable access hole #2. See Figure 4-29 and Figure 4-30.

REMOVAL– CONTINUED

Figure 4-29. Cable Access Holes Behind Gunner's Position (Inside View)

REMOVAL– CONTINUED

Figure 4-30. Cable Access Holes Behind Gunner's Position (Outside View)

5. Reconnect the camera cable's quick disconnects and return TGV cable to the Vehicle Accessory Kit.
6. Detach the Thru-Sight Video Camera from the Adapter by loosening the locking screw, removing the camera from the adapter and then tightening the locking screw again.
7. Remove locking screws and rotate Sight Adapter Ring to unlocked position to uninstall the adapter, and place in accessory kit. See Figure 4-31.

REMOVAL– CONTINUED

Figure 4-31. M2 AUX Sight Adapter Ring

8. Replace rubber eyepiece on the AUX sight.
9. Replace stored bolts on Gunner's side and secure flip Down Armor Plate.

REMOVAL

Remove Crew Cameras

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Disconnect red and green camera cable from camera.
3. Disconnect camera cable at its quick disconnect, remove cable from behind the radio racks through the right side of the TDIP cover screw hole, and place in vehicle accessory kit.
4. Remove the M2M3 Camera Bracket from the cover above the hand-grip in the rear of the turret using 9/16 in. ratchet. See Figure 4-32.

REMOVAL– CONTINUED

Figure 4-32. Crew Cameras and M2/M3 Camera Bracket

5. Detach the Crew Cameras from the M2/M3 Camera Bracket by loosening the knuckle on the Crew Cameras and removing them from the M2/M3 Camera Bracket.
6. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove Dome Light Power Cable

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

When using the Dome Light as a power source for the CMUR, opening the rear hatch will turn off the Dome Light and cut power to the CMUR. Avoid opening the rear hatch when using the Dome Light as a power source for the CMUR.

1. Disconnect the Dome Light Power Cable labeled TO POWER CONVERTER from the Power Converter connector. See Figure 4-33.

REMOVAL– CONTINUED

Figure 4-33. Dome Light Power Cable

2. Disconnect the Dome Light power cable labeled TO POWER CONVERTER from the Power Converter connector.
3. Disconnect the ground cable using 7/16 in. wrench.
4. Connect Gunner's Dome Light Power Cable to the dome light.
5. Remove the quick disconnect cable from the TDIP screw hole.
6. Reconnect the quick disconnect cable on the Dome Light Power Cable.
7. Reconnect Dome Light Power Cable.
8. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove ETDP Video Cable (M2A3/M2A3-SA)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

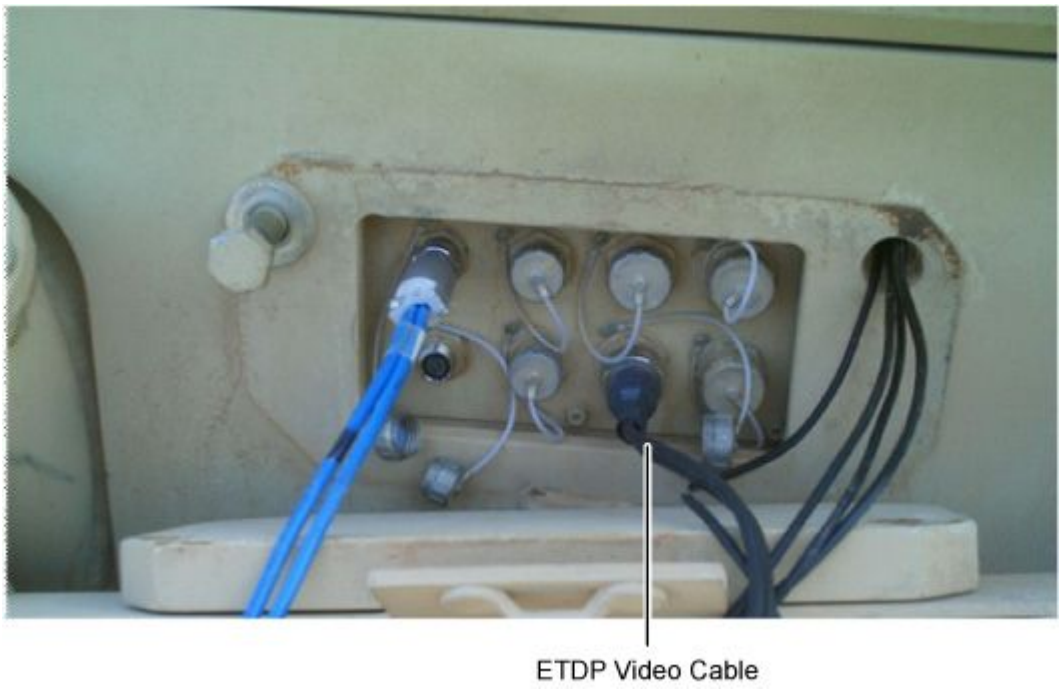

Figure 4-34. EDTP Video Cable

1. Disconnect the M2/M3 ETDP Video Cable from the TDIP J6 Connector.
2. Remove cables from bustle rack floor.
3. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove External Audio Adapter/External Audio Cable

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

Figure 4-35. External Audio Adapter

1. Disconnect external audio cable from the connector on the External Audio Adapter labeled AUDIO OUT.
2. Disconnect the two-piece external audio adapter cable and remove through the right side TDIP cover screw hole.
3. Disconnect the CVC from the External Audio Adapter connector.
4. Detach the External Audio Adapter connector labeled Headset from the Bradley Commander's FFCS CVC connector.
5. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove the TSV Camera (M2/3 ODS and below only)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect TSV Camera cable from the TSV Camera.
2. Disconnect the other end of the camera cable from the 8-Channel Encoder and remove cable.

REMOVAL– CONTINUED

CAUTION

Do not over tighten locking screw. Excessive force could cause the screw to strip and break.

3. Remove the TSV Camera from the Commanders Sight Extension (CSE) by loosening the locking screw and removing the camera from the sight then tightening the locking screw. See Figure 4-36.

Figure 4-36. TSV Camera on the CSE

4. Separate the TSV Camera from the M2/3 Sight Adapter ring. See Figure 4-37 and Figure 4-38.

Figure 4-37. TSV Camera

Figure 4-38. Sight Adapter Ring

5. Replace rubber cover from the beam splitter on the TSV Camera.

6. Disconnect camera cable from the TSV Camera.

7. Store the removed items in the Vehicle Accessory Kit.

INSTALLATION

Install the Crew Module Unit Recorder (CMUR)

WARNING

Failure to verify Vehicle Master Power is OFF could result in injury to personnel and/or damage to the system.

WARNING

When using the CMUR and 8-Channel Encoder outdoors, the Sun Shields must be attached. Failure to install the Sun Shield will result in damage to CMUR and 8-Channel Encoder.

1. Ensure the CMUR sun shield is installed. See WP 0020 REMOVE AND INSTALL OF CREW MODULE UNIT RECORDER (CMUR) SUN SHIELD.
2. Unscrew the Solid State Drive (SSD) thumb screws and ensure that the SSD has been installed. See Figure 4-39.

NOTE

The units are stored with a SSD installed however, if one is not present, obtain a SSD and insert it in the SSD bay.

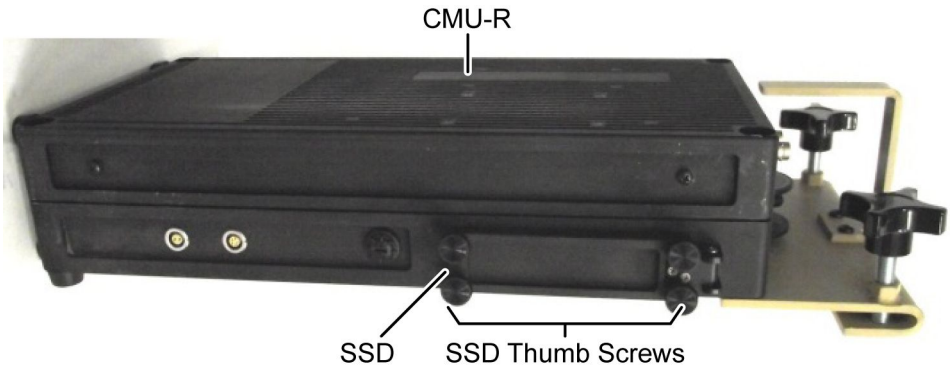

Figure 4-39. SSD Thumb Screws

3. Close the bay door and tighten thumb screws.

CAUTION

Failure to close the CMUR cover and tighten the thumb screws will expose the SSD slot to dust, moisture and debris which could cause damage to the CMUR.

4. Ensure that CMUR Power is set to OFF position.
5. Loosen the locking knobs on the CMUR.
6. Place the CMUR inside the bustle rack. See Figure 4-40.

INSTALLATION– CONTINUED

Figure 4-40. CMUR Mounted

7. Connect 2 CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder. Tighten the waterproof connectors.

CAUTION

Ensure that GPS Receiver cable routing does not interfere with crew operation and allows for the opening and closing of hatches with no crimping of cable. If not followed damage to the GPS Receiver Cable will result.

8. Using its magnetic base mount the GPS Receiver next to the CMUR on the Bustle Rack.
9. Connect GPS Receiver cable to CMUR J17 connector.
10. Tighten the locking knobs on the CMUR and ensure the unit is secure.

INSTALLATION

8-Channel Encoder Installation

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

WARNING

When using the CMUR and 8-Channel Encoder outdoors, the Sun Shield must be attached. Failure to install the Sun Shield will result in damage to CMUR and 8-Channel Encoder.

1. Ensure the 8-Channel Encoder sun shield is installed. See WP 0020 REMOVE AND INSTALL OF CREW MODULE UNIT RECORDER (CMUR) SUN SHIELD.

INSTALLATION– CONTINUED

2. Ensure CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
3. Connect 2 CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder.

CAUTION

Ensure Encoder is on a flat surface when connecting camera cables.

NOTE

Do not tighten the locking knob until all cameras and cable have been connected. The camera cable connectors are located on the bottom of the 8-Channel Encoder and the unit will have to be removed from its mounting location to connect each camera cable.

4. Loosen the locking knob and position the 8-Channel Encoder on the bustle rack.
5. Once all camera cables have been connected, tighten the locking knob and check that the 8-Channel Encoder is secure.

Table 4-6. CMUR Encoder Camera Connections J1–J4

VEHICLE PLATFORM	POWER			
	J1	J2	J3	J4
M2A1 BRADLEY	GNR CREW CAM	CDR CREW CAM	CDR EXT THRU SIGHT	AUX THRU SIGHT
M2A2 ODS BRADLEY	GNR CREW CAM	CDR CREW CAM	AUX THRU SIGHT	NOT USED
M2A2 SA BRADLEY	GNR CREW CAM	CDR CREW CAM	AUX THRU SIGHT	NOT USED
M2A3 BRADLEY	GNR CREW CAM	CDR CREW CAM	AUX THRU SIGHT	NOT USED

Table 4-7. CMUR Encoder Camera Connections J5–J8

VEHICLE PLATFORM	NON-POWER			
	J5	J6	J7	J8
M2A1 BRADLEY	NOT USED	NOT USED	NOT USED	NOT USED
M2A2 ODS BRADLEY	IBAS			
M2A2 SA BRADLEY	IBAS	CIV	NOT USED	NOT USED
M2A3 BRADLEY	IBAS	CIV	NOT USED	NOT USED

INSTALLATION

Install Auxiliary (AUX) TSV Camera and M2 Auxiliary (AUX) Sight Adapter Ring (All Versions)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Remove the two TDIP 1 1/8 in. bolts, flip down Armor Plate, and store the bolts until the CMUR system is removed at the conclusion of training.
3. Remove corresponding Bolts on Gunners side to allow cables to be passed into the turret.
4. Remove the rubber eyepiece from the AUX sight.
5. Install the adapter from the Vehicle Accessory Kit over the sight and rotate to lock into position then secure the locking screws.
6. Attach the Thru-Sight Camera at the 6 o'clock position to the Adapter by loosening the locking screw and placing the camera over the adapter. Then tighten the locking screw.
7. Disconnect the two-piece camera cable and attach the short end to the TSV Camera Connector.

NOTE

The cables are color-coded. Use the colors of the cables to keep track of their identities when routing the cables into and out of the vehicle.

8. Insert the connector of the long end of the camera cable through the left side (Gunner's Side) screw hole and route behind the Radio Racks.
9. Reconnect the camera cable and make sure the cables are properly routed ensuring no interference with the crew's operations while conducting gunnery training.

NOTE

Connectors J1-J4 are power connectors.

10. Connect the other end of the camera cable to the 8-Channel Encoder. See Table 4-6 and Table 4-7 to determine which connector to use.

INSTALLATION

Install Crew Cameras

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.

INSTALLATION– CONTINUED

2. Attach the Crew Cameras to the M2/M3 Camera Bracket by loosening the knuckle on the Crew Cameras and attaching them to the M2/M3 Camera Bracket.

CAUTION

Do not mount Crew Cameras in a way that interferes with using the handle to egress the turret as in Figure 4-41.

NOTE

Ensure buttons on cameras are positioned at the 12 o'clock position.

3. Secure the M2M3 Camera Bracket to the cover above the hand-grip in the rear of the turret tightening the mounting bolts with a 9/16 in. socket.

Figure 4-41. Crew Cameras and M2/M3 Camera Bracket Installed

4. Disconnect the two-piece camera cable and attach the short end to the crew camera connectors.

NOTE

The cables are color-coded. Use the colors of the cables to keep track of their identities when routing the cables into and out of the vehicle.

5. Insert the connector of the long end of the cable through the right side of the TDIP cover screw hole and route behind the radio racks.

6. Reconnect both camera cables and ensure that the cables are properly routed to prevent interference with the operations of the vehicle.

7. Connect the other end of the camera cable to the 8-Channel Encoder. See Table 4-6 and Table 4-7 to determine which connector to use.

INSTALLATION

Install External Audio Adapter/External Audio Cable

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. If a CVC is connected to the Bradley Commander's FFCS remove until the External Audio Adapter is installed.
3. Attach the External Audio Adapter connector labeled Headset to the Bradley Commander's FFCS CVC connector.

NOTE

The External Audio Adapters can be connected to any FFCS in the turret, however the Bradley Gunner's FFCS is recommended.

4. Connect the CVC to the External Audio Adapter connector labeled CVC.

Figure 4-42. External Audio Adapter

5. Disconnect the two-piece external orange audio adapter cable and insert the short end to the connector on the External Audio Adapter labeled AUDIO OUT.
6. Insert the connector of the long end of the cable through the right side TDIP cover screw hole and route behind the radio racks.

INSTALLATION– CONTINUED

7. Reconnect the external orange audio cable and ensure that the cable is properly routed to prevent interference with the operations of the vehicle.
8. Connect the External Audio Cable to the 8-Channel Encoder J10 connector.

INSTALLATION

Install Dome Light Power Cable

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

CAUTION

When using the Dome Light as a power source for the CMUR, opening the rear hatch will turn off the Dome Light and cut power to the CMUR. Avoid opening the rear hatch when using the Dome Light as a power source for the CMUR.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Disconnect the quick disconnect cable on the Dome Light Power Adapter.

NOTE

Do not force the cable through the hole.

3. Insert the quick disconnect cable through the left side TDIP screw hole and route it behind the radio racks to the Gunner's dome light.
4. Reconnect the Dome Light Power Adapter.
5. Disconnect the Gunner's Dome Light Power Adapter from the dome light. See Figure 4-43.

INSTALLATION– CONTINUED

Figure 4-43. Power Cable

6. Connect the Gunner's dome light cable to the connector on the Dome Light Power Cable that is labeled DOME LIGHT POWER.

7. Connect the side labeled TO DOME LIGHT on the Dome Light Power Cable to the Gunner's dome light.

8. Loosen one of the dome light bolts enough to attach the ground cable.

9. Tighten the bolt with 7/16 in. wrench to ensure that the ground cable is secure.

10. Connect the Dome Light Power Cable labeled TO POWER CONVERTER to the Power Converter connector. See Figure 4-44.

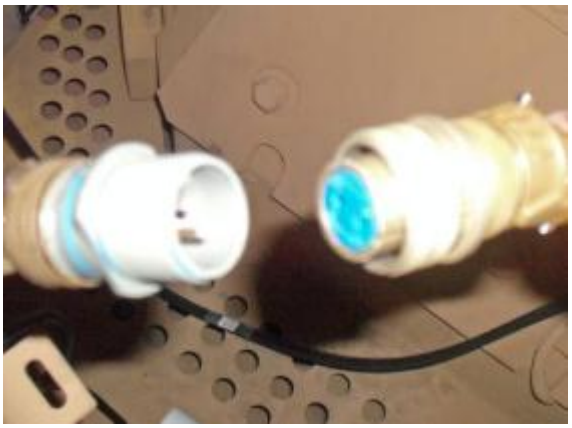

Figure 4-44. Dome Light Power Cable

11. Route the power cable along the floor of the bustle rack and over to the CMUR.

12. Connect the power cable to the CMUR J1 connector.

INSTALLATION

Install ETDP Video Cable (M2A3/M2A3-SA)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

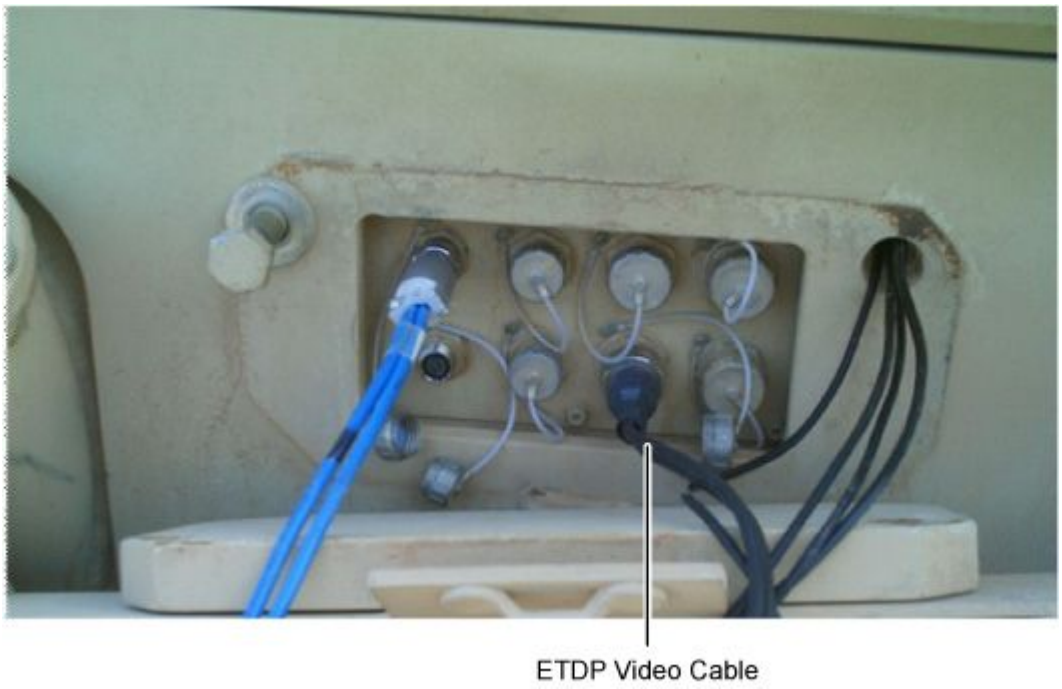

Figure 4-45. EDTP Video Cable

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Connect the M2/M3 ETDP Video Cable to the TDIP J6 Connector outside the vehicle, behind the turret.
3. Route the M2/M3 ETDP Video Cable along the bustle rack floor and to the Encoder.
4. Connect the other ends of the camera cable (IBAS and CIV) to the 8-Channel Encoder. See Table 4-6 and Table 4-7 to determine which connector to use.

INSTALLATION– CONTINUED

NOTE

The M2A2 SA will not have a CIV Video.

INSTALLATION

Install the TSV Camera (M2/3 ODS and below only)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

NOTE

Ensure that the CSE eye-piece is focused prior to installing TSV Camera.

1. Ensure that CMUR power is set to OFF. If the CMUR power is on, turn off the CMUR in accordance with WP 0008 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) SHUT DOWN.
2. Identify and remove the M2 GPSE adapter ring and the TSV Camera from the Vehicle Accessory Kit.
3. Identify and remove a camera cable, connect cable to the TSV Camera.
4. Align the tightening screw on the TSV Camera so that is aligns with the slot of the M2 GPSE adapter ring.
5. Gently snap the TSV Camera and the M2/3 Sight Adapter Ring together.
6. Remove the rubber cover from the beam splitter on the TSV Camera.

NOTE

Ensure that the CSE eye-piece is focused prior to installing TSV Camera.

7. Install the TSV Camera at 6 o'clock position on the CSE by loosening the locking screw and placing the camera over the sight then tightening the locking screw.

CAUTION

Do not over tighten locking screw. Excessive force could cause the screw to strip and break.

8. Connect one TSV Camera cable to the TSV Camera and route along the turret roof.
9. Connect the other end of the camera cable to the 8-Channel Encoder. See Table 4-6 and Table 4-7 to determine which connector to use.
10. Replace the brow pad.
11. Roll up and strap any excess cable and store out of the way.

Final Inspection

1. Check for loose or hanging cables that may interfere with the operation of the vehicle.
2. Visually inspect cable connections to ensure that they are tight.

3. Visually inspect the Crew Camera mount to ensure it is mounted securely.
4. Visually ensure that the Crew Module Unit Recorder (CMUR) and 8-Channel Encoder are securely mounted to the vehicle and that all cables inside and outside are tied down.
5. Check installation of the GPSE and AUX Sight Brow pads.
6. Make final checks and zip tie cabling.
7. Have the Vehicle Commander verify and validate that the cabling does not interfere with normal functioning.
8. Turn on the equipment and check it with the FSE. Refer to WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP and 0009 Operating the AAR/THP and FSE Software.

END OF WORK PACKAGE

OPERATOR

Remove and Install Integrated Player Unit (IPU) for Stryker MGS

INITIAL SETUP:

Tools and Special Tools

Vehicle Accessory Kit (VAK)

7/16 in. wrench

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician

References

Equipment Condition

Ensure that the vehicle, turret and all associated equipment is powered down.

Drawings Required

Technical Data Package — Ethernet Connection Spreadsheet

Technical Data Package — Elevation Spreadsheet

Technical Data Package — IP Address Spreadsheet

REMOVAL

Remove the Crew Module Unit Recorder (CMUR) (M1128)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Ensure CMUR power is off. See Figure 4-46.

REMOVAL– CONTINUED

Figure 4-46. CMUR Top View

2. Ensure vehicle master power is turned off.
3. Loosen locking knobs on CMUR.
4. Lift CMUR from Gunner's turret guard rail.

NOTE

J1 cable may need to be wiggled back and forward to lift it up.

5. Remove all cables from all connectors on the CMUR and store in case.

REMOVAL

Remove the Encoder

1. Power off the CMUR.
2. Ensure vehicle master power is turned off.
3. Loosen locking knobs on Encoder.
4. Lift Encoder from Gunner's turret guard rail.
5. Remove all cables from the Encoder and store in case.

REMOVAL

Remove Gunner's Aux Sight Thru Sight Video Camera

1. Disconnect the video cable from camera. See Figure 4-47.

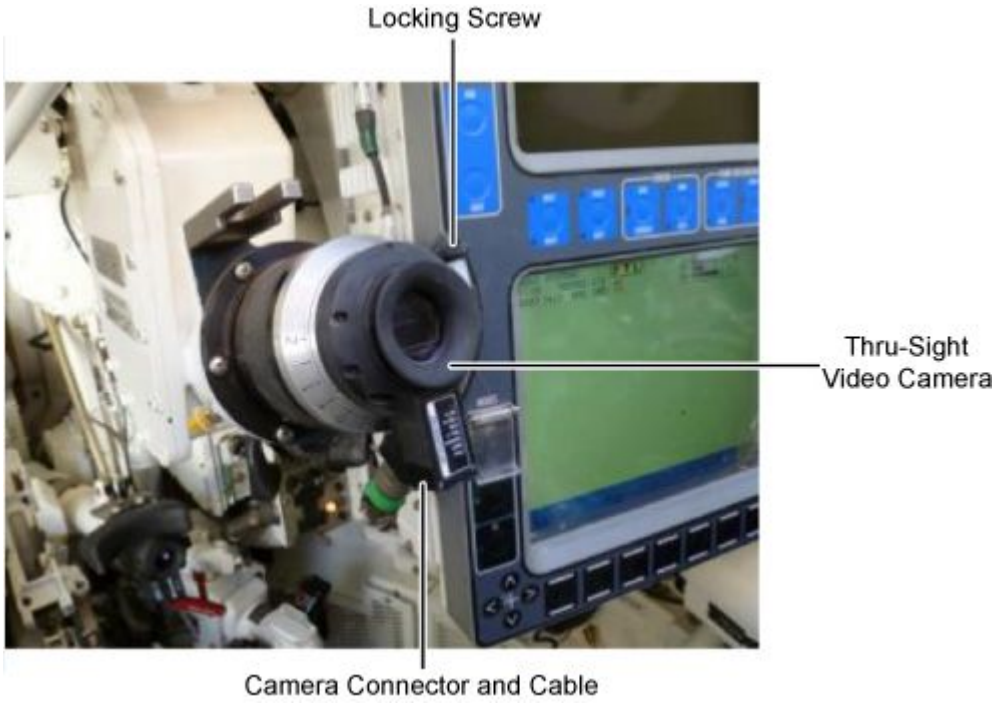

Figure 4-47. GPSE TSV Camera

2. Remove the Thru Sight Camera.
3. Remove eyepiece ring.
4. Replace the rubber eyepiece on the Thru Sight Camera.
5. Disconnect short end of cable from quick disconnect and cut zip ties to remove cable from along turret wall.
6. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove the MGS Video Cable

NOTE

Cut zip ties to remove cables from along turret wall.

1. Disconnect 3 camera cables: red from FLIR, yellow from CMSDAY, and black from CDU.
2. Disconnect shorting plug from end of video cable.

REMOVAL– CONTINUED

CAUTION

If shorting plug is not replaced, Fire Control system will not function.

3. Reconnect shorting plug to J3 connector on back of CDU.
4. Remove the video cables and video cable extension from along turret wall and store in vehicle accessory kit.

REMOVAL

Remove Crew Camera

1. Disconnect Video Cable from Crew Camera located between Commander's and Gunner's position.
2. Remove Video Cable from along turret wall.
3. Remove Crew Camera and mount from turret wall.
4. Store the removed items in the Vehicle Accessory Kit.

REMOVAL

Remove Audio Adapter and Audio Cable

1. Disconnect the BNC end of the Audio Cable from the EAA.
2. Remove the Audio Adapter Cable. See Figure 4-48.

Figure 4-48. External Audio Adapter

3. Reconnect spaghetti cable to the EAA.
4. Remove orange audio cable from behind CDU and store in vehicle accessory kit.

REMOVAL

Remove Dome Light Power Cable

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the Dome Light Power Cable labeled TO POWER CONVERTER from the Power Converter connector. See Figure 4-49.

Figure 4-49. Dome Light Power Cable

2. Disconnect the Dome Light power cable labeled TO POWER CONVERTER from the Power Converter connector.
3. Disconnect the ground cable using 7/16 in. wrench.
4. Connect Gunner's Dome Light Power Cable to the dome light.
5. Remove the quick disconnect cable from the TDIP screw hole.
6. Reconnect the quick disconnect cable on the Dome Light Power Cable.
7. Reconnect Dome Light Power Cable.
8. Store the removed items in the Vehicle Accessory Kit.

INSTALLATION

Install Dome Light Power Cable

NOTE

Ensure dome light being used is operational. If it is not, use other dome light.

1. Disconnect two Dome Light Power Cables from the dome light.
2. Connect the ground cable to the 13 mm Gun Light Mounting Plate.

INSTALLATION– CONTINUED

3. Connect the Dome Light Power Cable labeled To Power Converter to the Power Converter Connector. See Figure 4-50.

Figure 4-50. Dome Light Power Cable

4. Connect the Dome Light Power Cable labeled To Power Converter to the Power Converter Connector.
5. Route Dome Light Power Cable behind CMUR and connect to J1 connector on CMUR.

INSTALLATION

Install Audio Adapter and Audio Cable

1. Disconnect the spaghetti cable from the EAA.
2. Connect the Audio Adapter to the EAA. See Figure 4-51.

INSTALLATION– CONTINUED

Figure 4-51. External Audio Adapter

3. Reconnect the spaghetti cable to the Audio Adapter.
4. Connect the Audio Cable to the Audio Adapter.
5. Route Audio Cable along turret wall behind CDU to the Encoder's J10 connector.

INSTALLATION

Install Crew Camera

1. Place base of the Long Flexible Magnetic Mount below and behind left side periscope in Commander's position. See Figure 4-52.

INSTALLATION– CONTINUED

Figure 4-52. Stryker MGS Crew Camera

2. Orient the Camera to capture the Computer Control Panel (CCP) between the Commander and Gunner's position.

3. Connect the Video Cable to the Crew Camera and route towards the CMUR.

INSTALLATION

Install Gunner's Aux Sight Thru Sight Video Camera

1. Remove the rubber eyepiece and set aside to be replaced after training.

2. Ensure the Gunner has focused the GAS prior to installing the TSV.

3. Install the Eye Piece Ring.

4. Install the Through Sight Camera.

5. Connect the Video Cable to the Camera. See Figure 4-47.

6. Route Cable to the Commander's side ensuring that routing will not hinder traversing.

INSTALLATION

Install the CMUR

1. Place CMUR and Encoder on a flat surface.
2. Unscrew the SSD thumbscrews.
3. Press latch release button and ensure the SSD has been installed.
4. Reseat hard drive.
5. Close the bay door and tighten the thumbscrews.
6. Verify CMUR power is set to the OFF position. See Figure 4-53.

Figure 4-53. CMUR Top View

7. Loosen the locking knobs of the CMUR and place on Gunner turret ring guard.
8. Connect two CAT5 cables to J3 and J4 connectors on CMUR.

INSTALLATION– CONTINUED

CAUTION

Ensure that GPS Receiver cable routing does not interfere with crew operation and allows for the opening and closing of hatches with no crimping of cable. If not followed damage to the GPS Receiver Cable will result.

NOTE

The GPS will only work with the Gunner's hatch OPEN.

10. Attach the GPS Receiver to the inside of the Gunner's hatch using double-sided tape.
11. Connect GPS Receiver cable to the CMUR J17 connector.
12. Tighten locking knobs on CMUR and verify that unit is secure.

INSTALLATION

Install the Encoder

1. Connect the two CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder.
2. Loosen Encoder locking knobs.
3. Place Encoder on Gunner turret ring guard.
4. Tighten locking knobs on Encoder and verify that unit is secure.

INSTALLATION

Install MGS Video Cable

1. Remove shorting plug from J3 connector on back of CDU.
2. Attach shorting plug to end of video cable adapter.
3. Route the video cable and video cable extension along the turret wall.
4. Connect the three camera cable connectors: red to FLIR, yellow to CMSDAY, and black to CDU.

Table 4-8. CMUR Encoder Camera Connections J1–J4

POWER			
J1	**J2**	**J3**	**J4**
NOT USED	AUX THRU SIGHT	CREW CAM	NOT USED

Table 4-9. CMUR Encoder Camera Connections J5–J8

NON-POWER			
J5	**J6**	**J7**	**J8**
FLIR	CMS DAY	CDU	NOT USED

Final Inspection

1. Connect all cables to the CMUR and ensure that they are secure.
2. Visually inspect cable connections to ensure that they are tight.
3. Visually inspect the Crew Camera mount to ensure it is mounted securely.
4. Visually ensure that the CMUR is securely mounted to the vehicle and that all cables inside and outside are tied down.
5. Check installation of the AUX Sight Brow pad.
6. Make final checks and zip tie cabling. Have the Vehicle Commander verify and validate that cabling does not interfere with normal functioning to include Manual Traverse and Elevation.
7. Power on the equipment. See WP 0007 OPERATION UNDER USUAL CONDITIONS — CREW MODULE UNIT RECORDER (CMUR) START UP.

END OF WORK PACKAGE

OPERATOR

Remove and Install Integrated Player Unit (IPU) for Stryker ICV

INITIAL SETUP:

Tools and Special Tools

Vehicle Accessory Kit (VAK)

7/16 in. wrench

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician

References

Equipment Condition

Ensure that the vehicle, turret and all associated equipment is powered down.

Drawings Required

Technical Data Package — Ethernet Connection Spreadsheet

Technical Data Package — Elevation Spreadsheet

Technical Data Package — IP Address Spreadsheet

REMOVAL

Remove the Crew Module Unit Recorder (CMUR) (M1128)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

Figure 4-54. CMUR Front View

1. Power off the CMUR.

REMOVAL– CONTINUED

2. Verify that vehicle master power and turret power is OFF.
3. Loosen locking knobs on rear of CMUR.
4. Disconnect all cables and remove GPS.
5. Place CMUR and locking knobs in case.

REMOVAL

Remove Encoder

1. Loosen locking knobs on rear of Encoder.
2. Disconnect all cables.
3. Place Encoder and locking knobs in case.

REMOVAL

Remove Crew Cameras

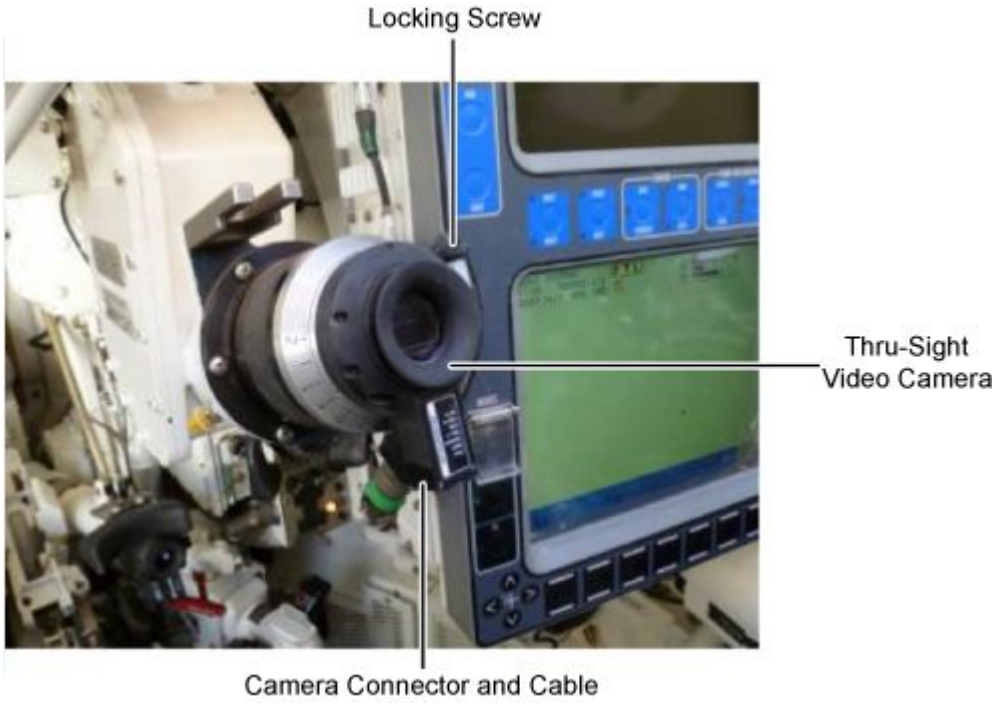

Figure 4-55. GPSE TSV Camera

1. Disconnect cables from Crew Cameras and remove Crew Cameras.
2. Cut zip ties securing cables and remove cables.
3. Store cables in vehicle accessory case.

REMOVAL

Remove Stryker Video Cable

1. Disconnect the Stryker Video Cable from J8 connector on the video monitor.
2. Disconnect the Stryker Video Cable from the video cable.

REMOVAL– CONTINUED

3. Remove video cable.
4. Store cable in vehicle accessory case.

REMOVAL

Remove Audio Adapter and Audio Cable

Figure 4-56. External Audio Adapter

1. Disconnect the BNC end of the Audio Cable from the EAA.
2. Remove the Audio Adapter Cable.
3. Reconnect spaghetti cable to EAA.
4. Remove orange audio cable and store in vehicle accessory case.

REMOVAL

Remove Power Cable

1. Disconnect the Power Adapter Cable from the J3 rear circuit breaker box.
2. Remove the cable.
3. Store cable in vehicle accessory case.

REMOVAL

Remove Power Cable (Command Vehicle Only)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect the Dome Light Power Cable labeled TO POWER CONVERTER from the Power Converter connector. See Figure 4-57.

Figure 4-57. Dome Light Power Cable

2. Disconnect the Dome Light power cable labeled TO POWER CONVERTER from the Power Converter connector.
3. Disconnect the ground cable using 7/16 in. wrench.
4. Connect Gunner's Dome Light Power Cable to the dome light.
5. Remove the quick disconnect cable from the TDIP screw hole.
6. Reconnect the quick disconnect cable on the Dome Light Power Cable.
7. Reconnect Dome Light Power Cable.
8. Store the removed items in the Vehicle Accessory Kit.

INSTALLATION

Install the Crew Module Unit Recorder (CMUR) (M1128)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

Figure 4-58. CMUR Front View

1. Remove CMUR and locking knobs from case.

INSTALLATION– CONTINUED

2. Verify CMUR is set to OFF position.
3. Verify that vehicle master power and turret power is OFF.

CAUTION

Ensure that GPS Receiver cable routing does not interfere with crew operation and allows for the opening and closing of hatches with no crimping of cable. If not followed damage to the GPS Receiver Cable will result.

NOTE

The GPS will only work with the Troop hatch OPEN.

5. Attach the GPS Receiver to the inside of the troop hatch using double-sided tape.
6. Connect the GPS Receiver cable to the CMUR J17 connector.
7. Place the CMUR against the metal mesh screen behind the commander's seat. See Figure 4-58.
8. Tighten locking knobs on rear of CMUR.

INSTALLATION

Install Encoder

1. Ensure that CMUR and vehicle power is set to OFF.
2. Loosen the locking knob and position the 8-Channel Encoder against the metal mesh screen behind the commander's seat. See Figure 4-58.
3. Connect the two CAT5 cables from the J3 connector on the CMUR to the J11 connector on the Encoder; and from the J4 connector on the CMUR to the J12 connector on the Encoder.

NOTE

Do not tighten the locking knob until all cameras and cable have been connected. The camera cable connectors are located on the bottom of the 8-Channel Encoder and the unit will have to be removed from its mounting location to connect each camera cable.

4. Tighten the locking knob and verify that the Encoder is secure.

INSTALLATION– CONTINUED

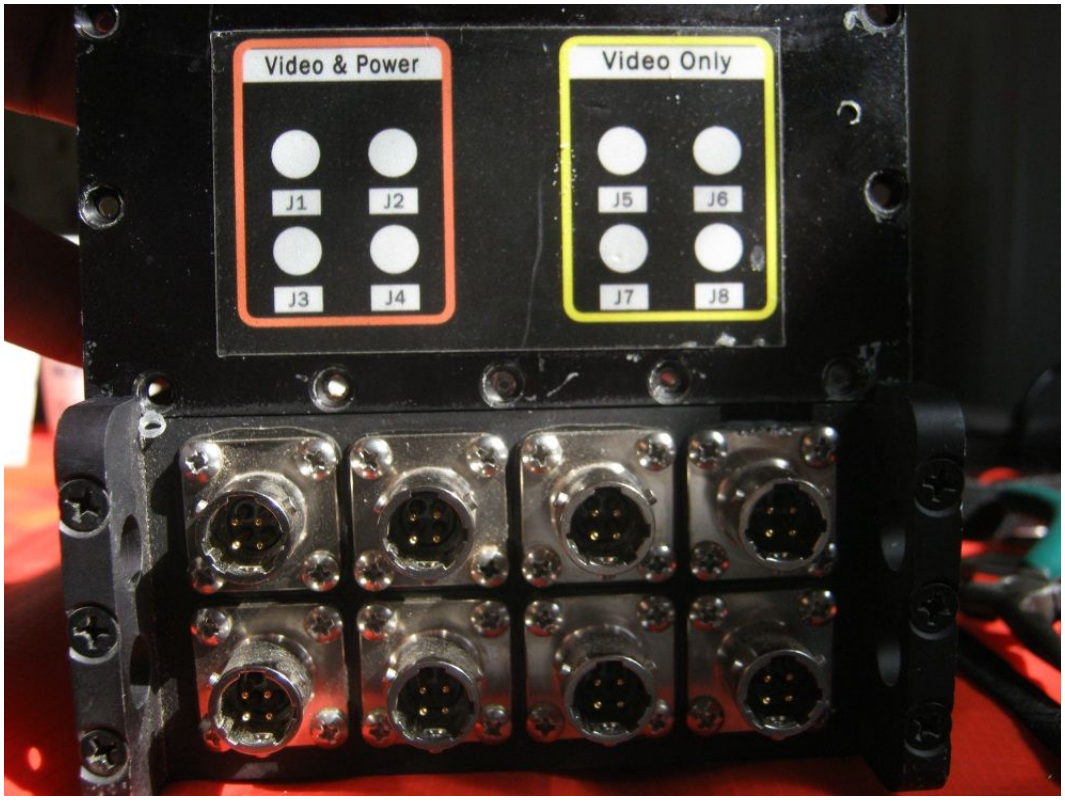

Figure 4-59. CMUR Encoder Camera Connectors J1–J8

INSTALLATION

Install Stryker Crew Cameras

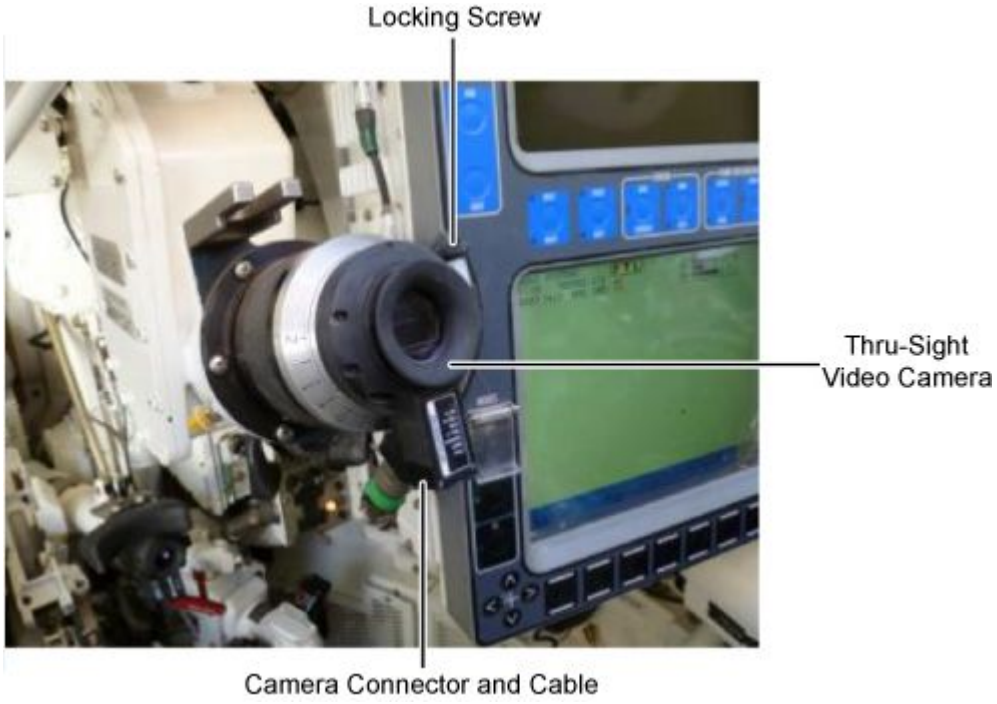

Figure 4-60. GPSE TSV Camera

1. Route cables to camera housing.

2. Attach crew cameras and connect camera cables to the 8-Channel Encoder. See Table 4-10 and Table 4-11 to determine which connector to use.

Table 4-10. CMUR Encoder Camera Connections J1–J4

VEHICLE PLATFORM	POWER			
	J1	J2	J3	J4
STRYKER ICV	NOT USED	DISMOUNT CREW CAM	CDR CREW CAM	NOT USED
STRYKER CV	NOT USED	DISMOUNT CREW CAM	CDR CREW CAM	NOT USED

Table 4-11. CMUR Encoder Camera Connections J5–J8

VEHICLE PLATFORM	NON-POWER			
	J5	J6	J7	J8
STRYKER ICV	RWS	NOT USED	NOT USED	NOT USED
STRYKER CV	RWS	NOT USED	NOT USED	NOT USED

INSTALLATION

Install Stryker Video Cable

1. Attach video cable.
2. Connect the Stryker Video Cable to the video cable.
3. Connect the Stryker Video Cable to J8 connector on the video monitor.

INSTALLATION

Install Audio Adapter and Audio Cable

Figure 4-61. External Audio Adapter

1. Disconnect the spaghetti cable from the EAA.
2. Connect the Audio Adapter to the EAA.
3. Reconnect the spaghetti cable to the Audio Adapter.
4. Connect the Audio Cable to the Audio Adapter.
5. Route Audio Cable along turret wall behind CDU to the Encoder's J10 connector.

INSTALLATION

Install Power Cable

1. Connect the Power Adapter Cable to the J3 Rear Circuit Breaker Box.
2. Route cable to the CMUR and connect to J1 connector.

INSTALLATION

Install Power Cable (Command Vehicle Only)

WARNING

Failure to ensure vehicle power and turret power are OFF could result in injury to personnel and/or damage to the system.

1. Disconnect Dome Light Power Cable.
2. Disconnect the quick disconnect cable on the Dome Light Power Cable.
3. Route the quick disconnect cable through the TDIP screw hole and reconnect quick disconnect cable.
4. Disconnect Gunner's Dome Light Power Cable from the dome light.
5. Connect the ground cable using 7/16 in. wrench.
6. Connect the Dome Light Power Cable labeled TO POWER CONVERTER to the Power Converter connector. See Figure 4-62.

Figure 4-62. Dome Light Power Cable

Final Inspection

1. Ensure all components and cables have been properly installed.
2. Turn on Vehicle Master Power.
3. Wait 30 seconds before powering up the CMUR.
4. Turn on the CMUR power and observe that the red power LED indicator is lit.
5. Turn the Handheld Monitor Switch to the desired video input and ensure that the Cameras are aligned properly.
6. After all cameras are aligned and checked, remove the Handheld Monitor.

7. Make final checks and zip tie cabling. Have the Vehicle Commander verify and validate that cabling does not interfere with normal functioning.

END OF WORK PACKAGE

MAINTAINER

Remove and Install of Crew Module Unit Recorder (CMUR) Sun Shield

INITIAL SETUP:

Materials/Parts

CMUR

CMUR Sun Shield part #CMUR-Shld

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (1)

Equipment Condition

CMUR not installed on vehicle

REMOVAL

Removal of the CMUR Sun Shield

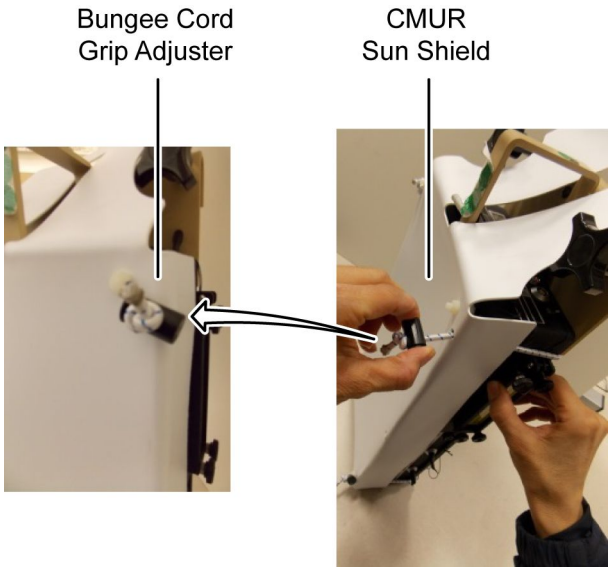

Figure 4-63. Bungee Cord Grip Adjusters

1. Loosen the top and bottom bungee cord grip adjusters. See Figure 4-63.

REMOVAL– CONTINUED

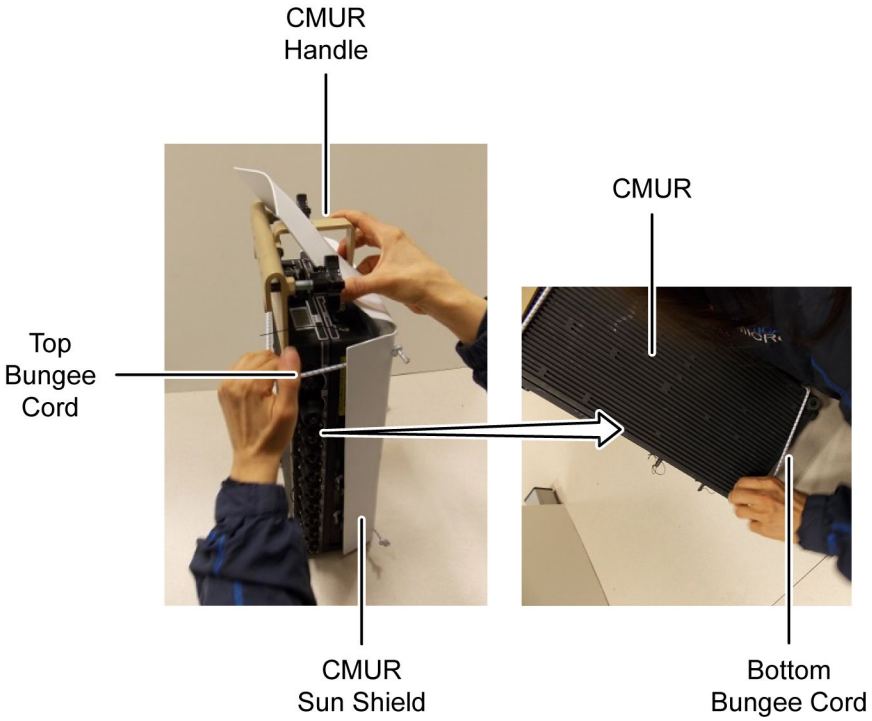

Figure 4-64. CMUR Sun Shield

2. Slide top bungee cord off top of CMUR. See Figure 4-64.
3. Slide bottom bungee cord off bottom of CMUR.
4. Remove Sun Shield.
5. Store CMUR Sun Shield.

INSTALLATION

Installation of the CMUR Sun Shield

WARNING

When using the CMUR and 8-Channel Encoder outdoors, the Sun Shield must be attached. Failure to install the Sun Shield will result in damage to CMUR and 8-Channel Encoder.

1. Ensure the bungee cord grip adjusters on the Sun Shield are loose.
2. Slide top bungee cord over top of CMUR. See Figure 4-64.
3. Slide handle of CMUR through opening in top of sun shield.
4. Slide bottom bungee cord over bottom of CMUR.

INSTALLATION– CONTINUED

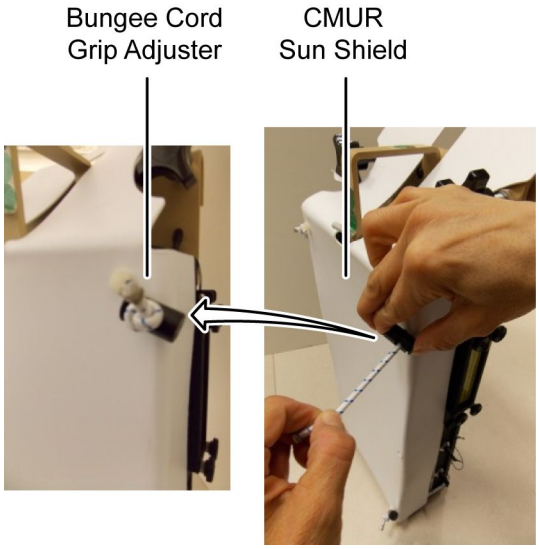

Figure 4-65. Bungee Cord Grip Adjusters

5. Tighten top and bottom bungee cord grip adjusters to desired tightness. See Figure 4-65.

END OF WORK PACKAGE

MAINTAINER

Replacement of the 8-Channel Encoder Sun Shield

INITIAL SETUP:

Materials/Parts

8 Channel Encoder

8 Channel Encoder Sun Shield part #ENC-Shld

Personnel Required

Authorized Systems Administrator/Telecomm Mechanic/Electronic Technician (1)

REMOVAL

Removal of the 8-Channel Encoder Sun Shield

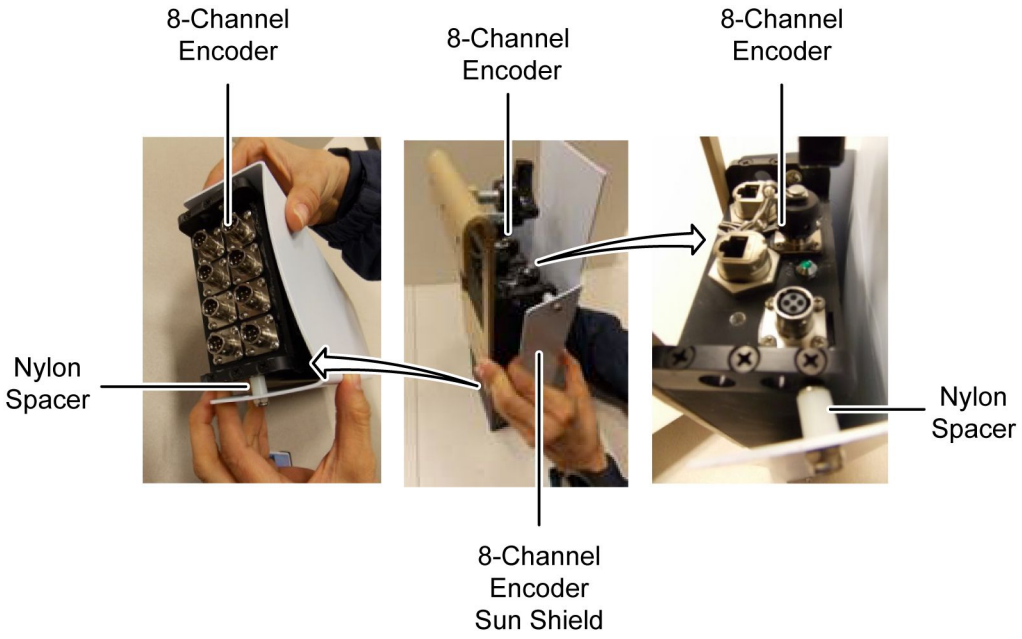

Figure 4-66. 8-Channel Encoder Sun Shield

1. Remove the four nylon spacers located on either side of the Sun Shield from the rear holes on the top and bottom brackets of the 8-Channel Encoder. See Figure 4-66.
2. Store 8-Channel Encoder Sun Shield.

INSTALLATION

Installation of the 8-Channel Encoder Sun Shield

NOTE

Sun Shield is secure once all four spacers have been inserted into the 8 Channel Encoder bracket holes.

1. Insert the four nylon spacers located on either side of the Sun Shield into the rear holes on the top and bottom brackets of the 8-Channel Encoder. See Figure 4-66.

END OF WORK PACKAGE

CHAPTER 5

SUPPORTING INFORMATION

CREW MODULE UNIT RECORDER (CMUR)

CHAPTER 5

SUPPORTING INFORMATION

WORK PACKAGE INDEX

SUPPORTING INFORMATION

References

SCOPE

The publications required to support the CREW MODULE UNIT RECORDER (CMUR) are listed below

COMMERCIAL OFF THE SHELF (COTS) AND COTS SUPPLEMENTAL MANUALS

Dell	Dell Latitude E6420XFR User Manual
Lilliput	Hand Held Monitor Operation Manual
Netgear	Netgear Installation Guide
Panasonic	Panasonic CF-31 Toughbook Operating Instructions
RCA	RCA MP3 Player User Manual
Riptide	Sight Software User Guide
Startech	SATA HDD Docking Station Manual

END OF WORK PACKAGE

OPERATOR

Components of End Item (COEI) and Basic Issue Items (BII) Lists

Introduction

Scope

This work package lists the Components of End Item (COEI) and the Basic Issue Items (BII) for the CMUR to help you inventory items for safe and efficient operation of the equipment.

General

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). This list is for information purposes only and is not authority to requisition replacements. These items are part of the CMUR. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

Basic Issue Items (BII). These essential items are required to place the CMUR in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the CMUR during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the Table of Organization and Equipment/Modified Table of Organization and Equipment (TOE/MTOE). Illustrations are furnished to help you find and identify the items.

Explanation of Columns in the COEI List and BII List

Column (1) Illus Number. Gives you the number of the item illustrated.

Column (2) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (3) Description, Part Number/Commercial and Government Entity Code (CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the CAGEC (in parentheses) and the part number.

Column (4) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (5) Qty Rqr. Indicates the quantity required.

Figure 5-1. Components of End Item List

Table 5-1. Components of End Item List

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) U/I	(5) Qty Rqr
1	N/A	RECORDER, CMU CMUR (36WH5)	Ea.	2
2	N/A	ENCODER, VIDEO, POE CMUR-POEVIDENC (36WH5)	Ea.	2

Table 5-1. Components of End Item List – Continued

(1) Illus Number	(2) National Stock Number (NSN)	(3) Description, Part Number/(CAGEC)	(4) U/I	(5) Qty Rqr
3	N/A	LAPTOP, RUGGED, E6420 9GWY9A00AVJ (36WH5)	Ea.	5
4	N/A	SSD STARTECH DRIVEBAY SATDOCK4U3E (36WH5)	Ea.	5
5	N/A	STRYKER ICV VAK ICV-AK (36WH5)	Ea.	
6	N/A	STRYKER MGS VAK MGS-AK (36WH5)	Ea.	
7	N/A	LAPTOP TEST STATION (36WH5)	Ea.	
8	N/A	VAK VAK (36WH5)	Ea.	2

END OF WORK PACKAGE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 29 April 2011
TO: *(Forward to proponent of publication or form) (Include ZIP Code)* Program Executive Office, Simulation Training and Instrumentation (PEO STRI), ATTN: PEO STRI SFAE-PS-Q, 12350 Research Pkwy, Orlando, FL 32826-3276	**FROM:** *(Activity and location) (Include ZIP Code)* Jane Q. Doe, SFC 1234 Any Street Anytown, AL 34565	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 11-1234-567-14	16 Sep 2001	Operator, Field and Sustainment Support Maintenance Manual for Radio, AN/ABC-123

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
1	WP0005 PG 3		2			Test or Correctiive Action column sho[illegible] a different WP number.

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Jane Q. Doe, SFC	123-4567	

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION/FORM NUMBER	DATE	TITLE

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is OAASA	Use Part II *(reverse)* for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	

PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS

PUBLICATION/FORM NUMBER	DATE	TITLE

ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED.

TO: *(Forward to proponent of publication or form) (Include ZIP Code)*	**FROM:** *(Activity and location) (Include ZIP Code)*	**DATE**

PART II- REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION

PART III - REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE

APD V4.00

AUTHENTICATION PAGE

PLACE HOLDER