

TM 9-2350-366-10-1

TECHNICAL MANUAL

OPERATOR MANUAL

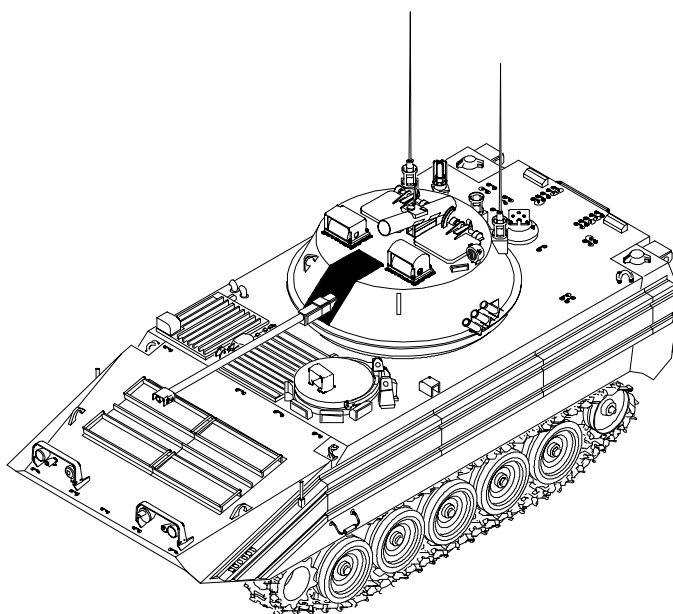
FOR

OPPOSING FORCES SURROGATE VEHICLE (OSV)

M113A3/BMP-2

2350-01-420-4716 (EIC AUK)

HULL



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HEADQUARTERS, DEPARTMENT OF THE ARMY

2 March 2003

TECHNICAL MANUAL
OPERATOR'S MANUAL
OPPOSING FORCES SURROGATE VEHICLE (OSV) M113A3/BMP-2
NSN 2350-01-420-4716
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028-2 (Recommended Changes to Equipment Publications), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax, or email your letter, DA Form 2028, or DA Form 2028-2 directly to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-LC-CIP-WT (Tech Pubs Control Point), Rock Island, IL 61202-0048. The email address is TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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HOW TO USE THIS MANUAL

This manual tells you how to use and maintain the hull on the OPPOSING FORCES SURROGATE VEHICLE (OSV) M113A3/BMP-2. This material is intended for use by the driver and squad members.

Before starting any task/procedure or before applying power to the hull, make sure you have read this HOW TO USE section and Controls and Indicators (WP 0004 00).

WHAT'S IN THE MANUAL — FRONT TO BACK

This TM is divided into chapters and front and rear matter. The chapters are further divided into Work Packages (WPs) for ease of use. The WARNING SUMMARY section, beginning on page “a”, provides safety and first aid information. This section includes general warnings not found in the TM text and a list of the most important detailed warnings extracted from the WPs. All of these warnings cover hazards that could kill or injure personnel.

The TABLE OF CONTENTS lists the WPs in each chapter.

CHAPTER 1 covers general introductory information with theory of operation. The Equipment Description (WP 0002 00) gives a brief description of major parts and features of the hull. The Theory of Operation (WP 0003 00) provides information that will help you understand how the hull components work.

CHAPTER 2 includes the Controls and Indicators (WP 0004 00) and all operation WPs.

CHAPTER 3 contains the troubleshooting WPs (WP 0037 00), which are used to find the cause of hull malfunctions.

CHAPTER 4 includes the Preventive Maintenance Checks and Services (PMCS) (WP 0040 00) and other maintenance WPs. These WPs contain maintenance procedures authorized for the driver and squad members.

CHAPTER 5 provides supporting information for the TM. It includes the following WPs:

- The REFERENCES (WP 0051 00) lists references to be used by personnel in operating and maintaining the hull. These references include technical manuals and other publications.
- The COEI/BII (WP 0052 00) lists components of end item and basic issue items. Components of end item are those items which are assembled and become a permanent part of the vehicle. Basic issue items are items needed to put the vehicle in operation, operate it, and do emergency repairs. This WP is a duplicate of the COEI/BII WP in TM 9-2350-366-10-2.
- The AAL (WP 0053 00) lists additional items required to support the vehicle during operation. This WP is duplicated in the AAL in TM 9-2350-366-10-2.
- The EXPENDABLE/DURABLE ITEMS (WP 0054 00) lists expendable supplies and materials that will be needed to operate and maintain the hull.
- The STOWAGE AND SIGN GUIDE (WP 0055 00) is a stowage guide for all removable equipment carried in and on the hull.

The INDEX is an alphabetical listing of all the major controls, procedures, indicators, systems, and subsystems covered in this manual. Each entry is cross-referenced to the WP number and page number.

DA FORM 2028-2 is used to report errors and to recommend improvements for procedures in this manual. Three blank DA Forms 2028-2 are in the back of this manual. A sample is provided to show you how to fill out the DA Form 2028-2.

The back cover includes a METRIC CONVERSION CHART that can be used to convert U.S. customary measurements to their metric equivalents. Measurements in this manual are given in U.S. customary units with metric units in parentheses.

This TM is published in two volumes as follows:

- Volume 1 contains introductory information WPs, maintenance WPs, operating procedure WPs, troubleshooting WPs, and supporting information WPs for the OSV hull.
- Volume 2 (TM 9-2350-366-10-2) contains introductory information WPs, maintenance WPs, operating procedure WPs, troubleshooting WPs, and supporting information WPs for the OSV turret.

Each volume includes a Table of Contents and an Index.

HOW TO USE THE WORK PACKAGES

How To Find The WP You Need.

Pick a key word from the hull part or system to be used. Look in the INDEX for this key word or the name of the action you will perform. Turn to the WP and page indicated.

The INDEX lists each WP under one or more headings. For example, the WP titled ADJUST DRIVER'S SEAT could be found under the four headings “Adjust”, “Driver's”, “Operation Under Usual Conditions”, and “Seat”.

HOW TO USE THIS MANUAL (cont)**How to read the WP.**

WPs provide either descriptive/supporting information or detailed procedures for operating and maintaining the equipment. The WPs in Chapters 1 and 5 include descriptive/supporting information only. Chapter 2 includes descriptive information on controls and indicators, and operating procedures. Chapter 3 includes troubleshooting procedures. Chapter 4 includes maintenance procedures.

Pay attention to all **WARNINGS**, **CAUTIONS** and **NOTES**. These can appear in all types of procedures. Warnings and cautions help you avoid harm to yourself, other personnel, and equipment. Notes tell you things you should know about the procedure, task or step. Warnings, cautions, and notes appear before the applicable procedure, task, or step.

Before you start a procedure, get all the tools, supplies, and personnel you need to do the procedure. These items will be listed in the INITIAL SETUP of the WP.

Start with step 1 and do each step in the order given. Numbered primary steps tell you what to do. Alpha substeps have procedures that are done when a check has a negative result (such as “if pressure does not read within limits, proceed as follows:”) or when there is a necessity for a procedure that is only applicable to the numbered step (such as

“3. Check the pressure as follows:

- a.
- b.”

After completing the alpha substep procedure, unless there are instructions to do otherwise, go to the next numbered step.

Look at the illustrations. Locators show you where the equipment and parts are located on the hull. Closeup illustrations show the details you need to do the procedure.

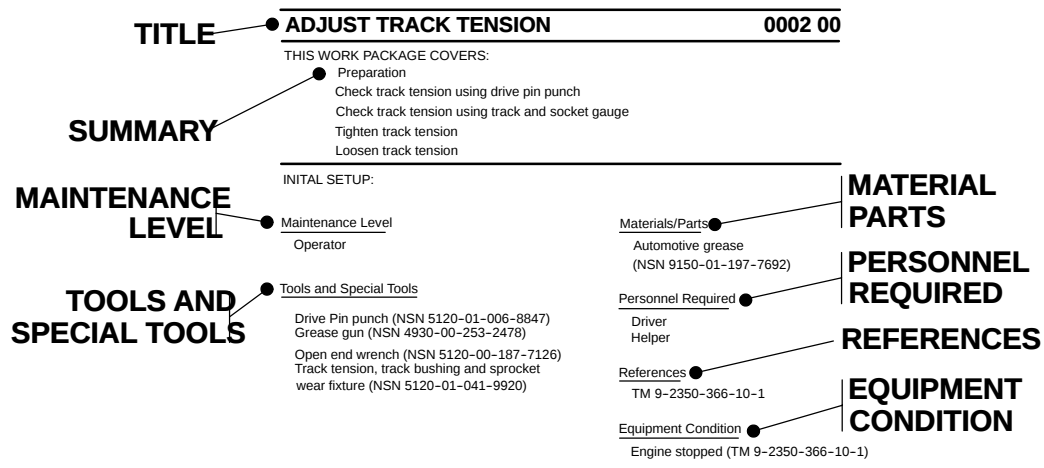
Operator and Maintenance instructions WPs.

Operator instructions WPs tell you how to operate the M113A3/BMP-2 hull and its components. Each WP provides the detailed steps to be performed to complete the procedure.

Maintenance instructions WPs help the crew keep the M113A3/BMP-2 hull in operating condition.

Both Operator and Maintenance instructions WPs use the same format. Look at the two samples given below.

The first sample below shows the THIS WORK PACKAGE COVERS and INITIAL SETUP sections on the first page of a WP. The legend defines each item of information.



HOW TO USE THIS MANUAL (cont)

LEGEND

TITLE	The name of the procedure.
SUMMARY	A listing of the general actions to be performed, cross-referenced to the page where each action begins.
MAINTENANCE LEVEL	The level of personnel authorized to perform the procedures in the WP.
APPLICABLE CONFIGURATIONS	(Not shown above) When the WP does not apply to all vehicle configurations, the applicable models/serial numbers covered by the WP are listed here.
TOOLS AND SPECIAL TOOLS	The tools and equipment needed to do the procedures in the WP.
MATERIALS/PARTS	The supplies and parts needed to do the procedures in the WP.
PERSONNEL REQUIRED	The personnel needed to do the procedures in the WP.
REFERENCES	Other WPs, TMs, and publications you will need to do the procedures in the WP.
EQUIPMENT CONDITIONS	Any special equipment conditions required before the procedure can be started.

Each WP is a different task and has different requirements. Because of this, each WP INITIAL SETUP section only shows the information for that task. Some WPs will include all of the above items. Other WPs will include only some of the above items.

Read the INITIAL SETUP section carefully before you start any procedure.

Get the tools and supplies listed and the personnel needed. Be sure the equipment is in the condition required.

The second sample below shows you things to watch for when performing the procedures in a WP. Read all steps, substeps, warnings, cautions, and notes before starting the WP procedure. The legend defines each item of information.

CHECK COOLANT LEVEL Continued 0026 00

WARNING

WARNING



Hot coolant can burn you. Radiator cap must not be removed until coolant TEMP gauge reads in bottom one-quarter of green zone. Heat protective mittens and eye protection shall be worn to remove radiator cap. Cap shall be turned slowly to release pressure gradually.

CAUTION

CAUTION

Adding coolant to an overheated engine can cause damage to engine. Coolant must not be added to an overheated engine unless engine is running.

NOTE

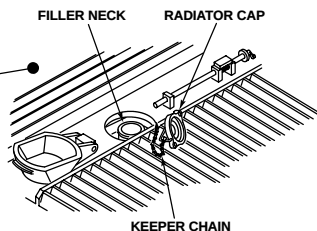
NOTE

Approved antifreeze coolant only may be added to radiator. In emergency conditions, water may be used if specified coolant is not available

STEP

- REMOVE RADIATOR CAP AND CHECK COOLANT LEVEL.

LOCATOR

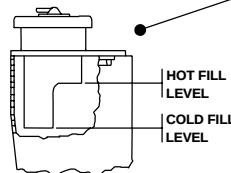


SUBSTEP

● If coolant is hot, check that coolant reaches HOT FILL LEVEL in filler neck.

If coolant is cold, check that coolant reaches COLD FILL LEVEL in filler neck.

CLOSE-UP



HOW TO USE THIS MANUAL (cont)

LEGEND

STEP	This tells you WHAT to do.
SUBSTEP	This tells you HOW to do a complicated step or how to proceed if a check or inspection results in a negative condition.
WARNING	This describes a condition that, if it occurs, could cause death or serious injury to yourself and/or other personnel or cause catastrophic failure (totaled) of equipment.
CAUTION	This describes a condition that could cause injury to personnel and/or damage to equipment.
NOTE	This gives additional information that is not part of the step but is required to perform the step.
LOCATOR	An illustration that locates the equipment on or in the hull.
CLOSEUP	A detailed illustration of the equipment.

Some WPs will include all of the above items. Some will not.

Read all of the WP before starting. Follow the steps in the order given.

The words END OF OPERATING PROCEDURE or END OF TASK will tell you when you have finished the procedure.

Preventive Maintenance Checks and Services (PMCS) WP

The PMCS procedures (WP 0040 00) are performed on a daily, weekly, and monthly basis to keep the vehicle operating properly.

There are four types of PMCS as follows:

- The BEFORE (B) PMCS must be done before you operate the hull.
- The DURING (D) PMCS must be done when you operate the hull. Monitor the hull systems as you perform your mission. Perform DURING (D) PMCS on a system only when the system is required to complete your mission.
- The AFTER (A) PMCS must be done after completing your mission.
- The WEEKLY (W) PMCS must be done weekly.

If anything seems wrong with the systems and you cannot fix it yourself, notify your supervisor. Common things to watch for are loose bolts or damaged welds. Watch for worn insulation, loose clamps, and loose connectors when checking wiring harnesses.

The following sample shows you what to look for when you read a PMCS procedure. For more information, see PMCS (WP 0040 00).

Table 2-1. Preventative Maintenance Checks and Services Model OSV

MAN-HOUR	ITEM NO.	INTERVAL	MAN-HOUR	ITEM TO BE CHECKED OR SERVICED	CREWMEMBER PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
	8	Before		REAR ACCESS DOORS	DRIVER Check right rear access door for proper operation and seal.	Outside door handle will not secure and seal right door.
	9	Before		HINGES	Make sure hinges work properly and that right door can be tightly secured.	Lock will not secure door. Hinge(s) damaged or missing.

The diagram shows the rear of the vehicle with two large access doors. Arrows point from the 'HINGE' label to the hinge mechanism on the right door and from the 'OUTSIDE DOOR HANDLE' label to the handle on the left door.

HOW TO USE THIS MANUAL (cont)

LEGEND

ITEM NUMBER

This is the sequence for doing the PMCS.

INTERVAL

This tells you when to perform the PMCS check.

MAN-HOUR

When equipment must be lubricated, this tells you the man-hours that will be required for the lubrication procedure.

**ITEM TO BE CHECKED
OR SERVICED**

The name of the hull system or component being checked.

CREWMEMBER

This tells you which crewmember must perform the check.

PROCEDURE

This tells you what needs to be done.

**EQUIPMENT NOT READY/
AVAILABLE IF:**

This tells you what conditions prevent the hull from being operational. These conditions will have to be corrected before you perform your mission.

Troubleshooting WPs.

Troubleshooting WPs help solve common problems and malfunctions. The Troubleshooting Symptom Index (WP 0038 00) lists the most common malfunctions that occur. This index directs you to the correct procedure in the Troubleshooting Table (WP 0039 00).

The following sample shows you what to look for when reading a troubleshooting procedure. The legend defines each item of information. For more information, see Troubleshooting introduction (WP 0037 00).

SYSTEM OR COMPONENT

ENGINE

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
MALFUNCTION 1. DOES NOT CRANK WHEN START SWITCH IS PUSHED.	TEST OR INSPECTION 1. Check that master switch is set to ON. 2. Check that transmission controller is in SL position.	CORRECTIVE ACTION 1. Turn master switch to ON. 2. Put transmission controller lever to SL.

HOW TO USE THIS MANUAL (cont)

DEFINITION OF WP TERMS

Warnings, Cautions, And Notes.

Pay attention to all warnings and cautions within the WP. Ignoring a warning could cause death or injury to yourself or other personnel. Ignoring a caution could cause damage to equipment. Notes contain facts that are not required to complete the step but the operator must know. Warnings, cautions, and notes always appear just above the step to which they apply.

WARNINGS

Calls attention to conditions that could cause death or injury to personnel and/or loss of OSV or equipment. Warnings are also listed in the Warning Summary section.

CAUTIONS

Calls attention to actions or materials that could injure personnel and/or damage equipment.

NOTES

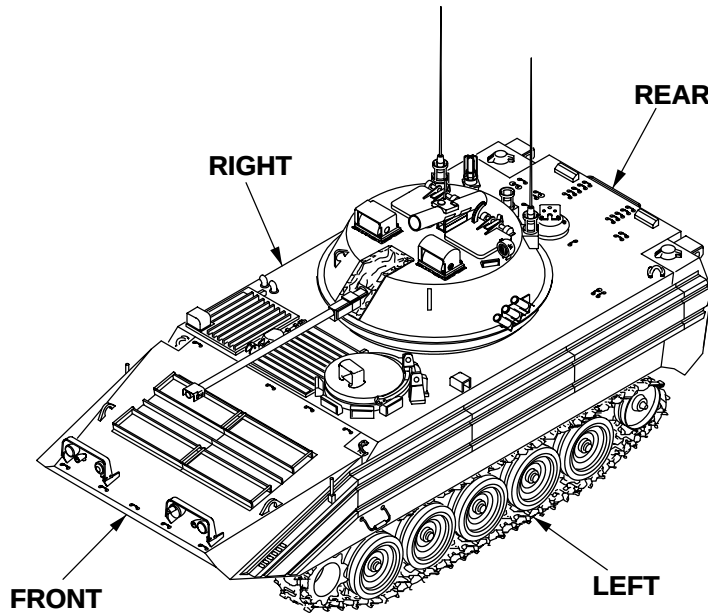
Contains information to make the step that follows easier or that the operator must know (such as “NOTE: IR lights have been removed and IR/BO switch only works in BO mode.”).

Helper.

Helpers are needed in procedures that require more than one person. Use a helper to help lift objects or act as an outside observer.

If a helper is needed to perform a procedure, the INITIAL SETUP will list Helper (H) under the PERSONNEL REQUIRED heading. If a helper assists with a step, the step will include: “Have helper assist”.

If a helper performs the action alone, the step will start with “(H):”.



Location Terms.

The terms “front”, “rear”, “left”, and “right” are used to indicate where items are located on the vehicle hull. Think of these locations as if you were standing at the rear of the OSV facing the inside of the vehicle.

CHAPTER 1
OPERATOR INTRODUCTORY INFORMATION WITH THEORY OF OPERATION

WORK PACKAGE INDEX

<u>Title</u>	<u>Sequence No.</u>
GENERAL INFORMATION	0001 00
EQUIPMENT DESCRIPTION AND DATA	0002 00
THEORY OF OPERATION	0003 00

GENERAL INFORMATION

0001 00**SCOPE**

Information in this manual tells you how to operate and maintain the M113A3/BMP-2 Opposing Forces Surrogate Vehicle (OSV) hull. It tells you what to do and what not to do and how to protect the safety of yourself and others.

Type of Manual: Operator

Equipment Name: M113A3/BMP-2 Opposing Forces Surrogate Vehicle (OSV) Hull

Purpose of Equipment: The M113A3/BMP-2 Opposing Forces Surrogate Vehicle (OSV) visually and tactically simulates the Russian-built Infantry Fighting Vehicle (IFV). The Opposing Forces use the OSV as a training device to simulate the capabilities of an armored fighting vehicle in maneuver exercises. The OSV is a modified version of the M113 Family of Vehicles (FOV) full tracked Armored Personnel Carrier (APC). Modifications include the addition of drive components and related visual modifications (VISMOS). The VISMOS provide key recognition signatures to the threat system being simulated.

MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your M113A3/BMP-2 OSV 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. Let us know why you don't like the design or performance. Put it on an (SF 368 Quality Deficiency Report). Mail it to us: Director, U.S. Army Armament Research, Development, and Engineering Center, ATTN: AMSTA-AR-QAW-A (R), Rock Island, IL 61299-7300. We will send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368 (Quality Deficiency Report). Use of key words such as "corrosion", "rust", "deterioration" or "cracking" will assure that the information is identified as a CPC problem. The form should be submitted to: Director, US Army Armament Research, Development, and Engineering Center, ATTN: AMSTA-AR-QAW-A (R), Rock Island, IL 61299-7300.

PREPARATION FOR STORAGE OR SHIPMENT

See AR 750-1 for information about administrative storage.

NOMENCLATURE CROSS-REFERENCE

This listing includes abbreviations and nomenclature cross references used in this manual.

Cleaning solvent	Cleaning compound, solvent
Intercom	Full function crew station
Jack	Receptacle
Latch	Pin
Lower clutch override knob	Lower feed shaft stop
Plug	Connector
Rubber cap	Discharger cap
Sear release	Sear release link
Track and bolt assembly	Bolt and track assembly
Upper clutch override knob	Upper feed shaft stop

LIST OF ABBREVIATIONS/ACRONYMS

Many abbreviations are used in this manual. The uncommon ones are listed below.

A	After
AAL	Additional Authorization List
B	Before
BATT	Battery
BII	Basic Issue Item
BO	Blackout
BRT	Brightness
COEIL	Components of End Item List
COMM	Communications
CPC	Corrosion Prevention and Control
D	During
DN	Down
DNV	Driver's Night Vision
ENG	Engine
GEN	Generator
HI TEMP	High Temperature
LO	Lubrication Order
LOF	Line-of-Fire
LRU	Line Replaceable Unit
MALF	Malfunction

GENERAL INFORMATION - Continued

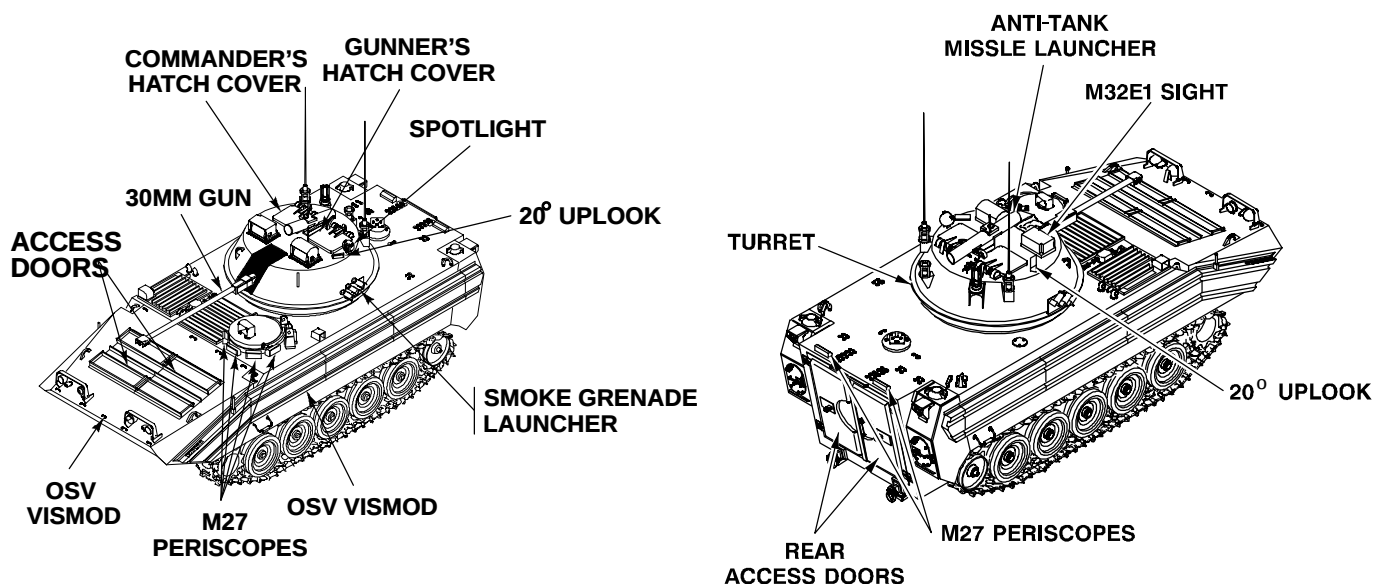
0001 00

NBC	Nuclear, Biological, and Chemical
OVE	On Vehicle Equipment
OSV	Opposing Forces Surrogate Vehicle
PMCS	Preventive Maintenance Checks and Services
PRESS	Pressure
TEMP	Temperature
TTS	Tank Thermal Sight
VENT	Ventilation
VISMOD	Visual Modification
W	Weekly
WFOV	Wide Field of View

SAFETY, CARE, AND HANDLING

HEARING PROTECTION. You must use ear plugs and other approved hearing protectors while you are aboard the OSV. The CVC helmet does not have enough hearing protection. Make sure you know how to use the ear plugs and hearing protectors that are issued to you. Keep them clean and ready to use. Read warning in Warning Summary.

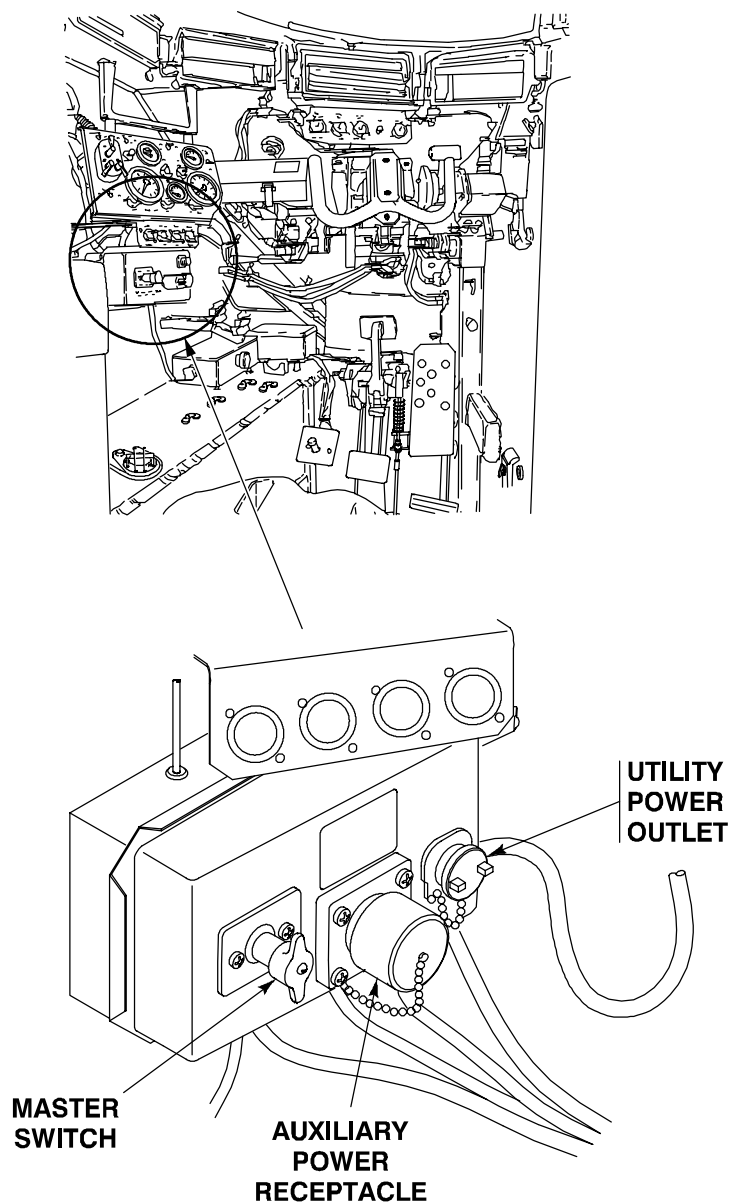
END OF TASK

EQUIPMENT DESCRIPTION AND DATA**0002 00****EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**

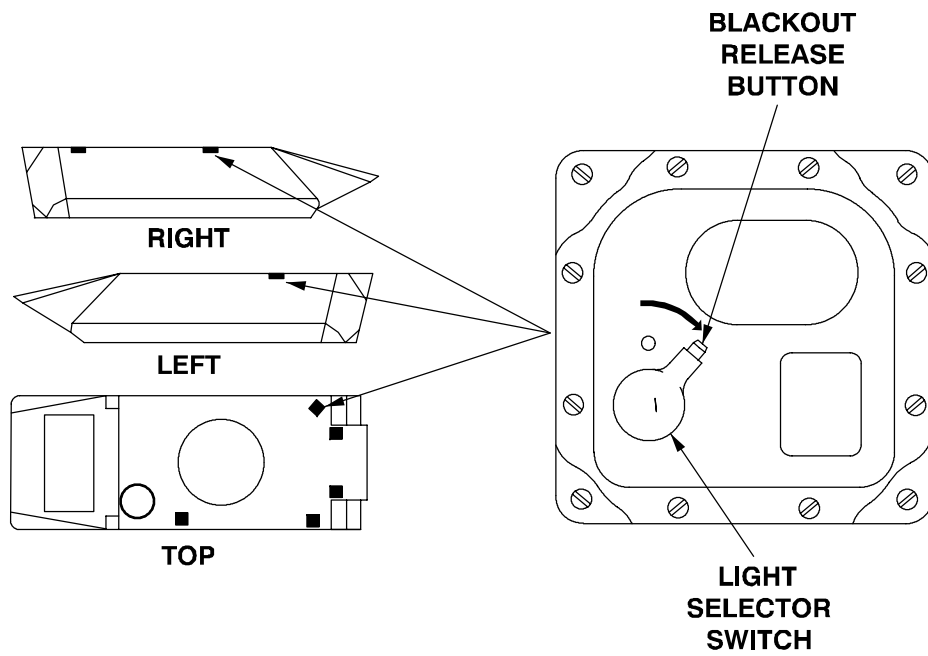
M113A3/BMP-2 Opposing Forces Surrogate Vehicle (OSV) visually and tactically simulates the Russian-built Infantry Fighting Vehicle (IFV). The opposing forces use OSV as a training device to simulate capabilities of an armored fighting vehicle in maneuver exercises. The OSV is a modified version of M113 Family of Vehicles (FOV) full tracked Armored Personnel Carrier (APC). Modifications include addition of drive components and related visual modifications (VISMOS). VISMOS provide key recognition signatures to threat system being simulated.

Capabilities/Characteristics

- at 25 mph, a minimum cruising range of 250 miles
- crew seat restraining system (seatbelts)
- visual devices for commander (M32E1) sight and gunner tank thermal sight (TTS) that permit 360 degrees vision by rotating turret
- fire control system with BMP-2 capabilities
- mobility similar to BMP-2
- physical characteristics and dimensions of BMP-2
- payload of five infantry soldiers and their equipment
- operating crew of three: Commander, Driver, Gunner
- built in lift points
- uses standard diesel fuel or automotive JP-8
- has stowage space for Basic Issue Items
- equipped with standard slaving receptacles
- double rear doors
- towed from rear instead of standard towing
- two man turret assembly with following features:
 - (1) ruggedized for crew safety
 - (2) meets visual and integration requirements of BMP-2
 - (3) traverse control to prevent 30mm main gun from hitting vehicle during turret movement
 - (4) two plane (azimuth and elevation) stabilization

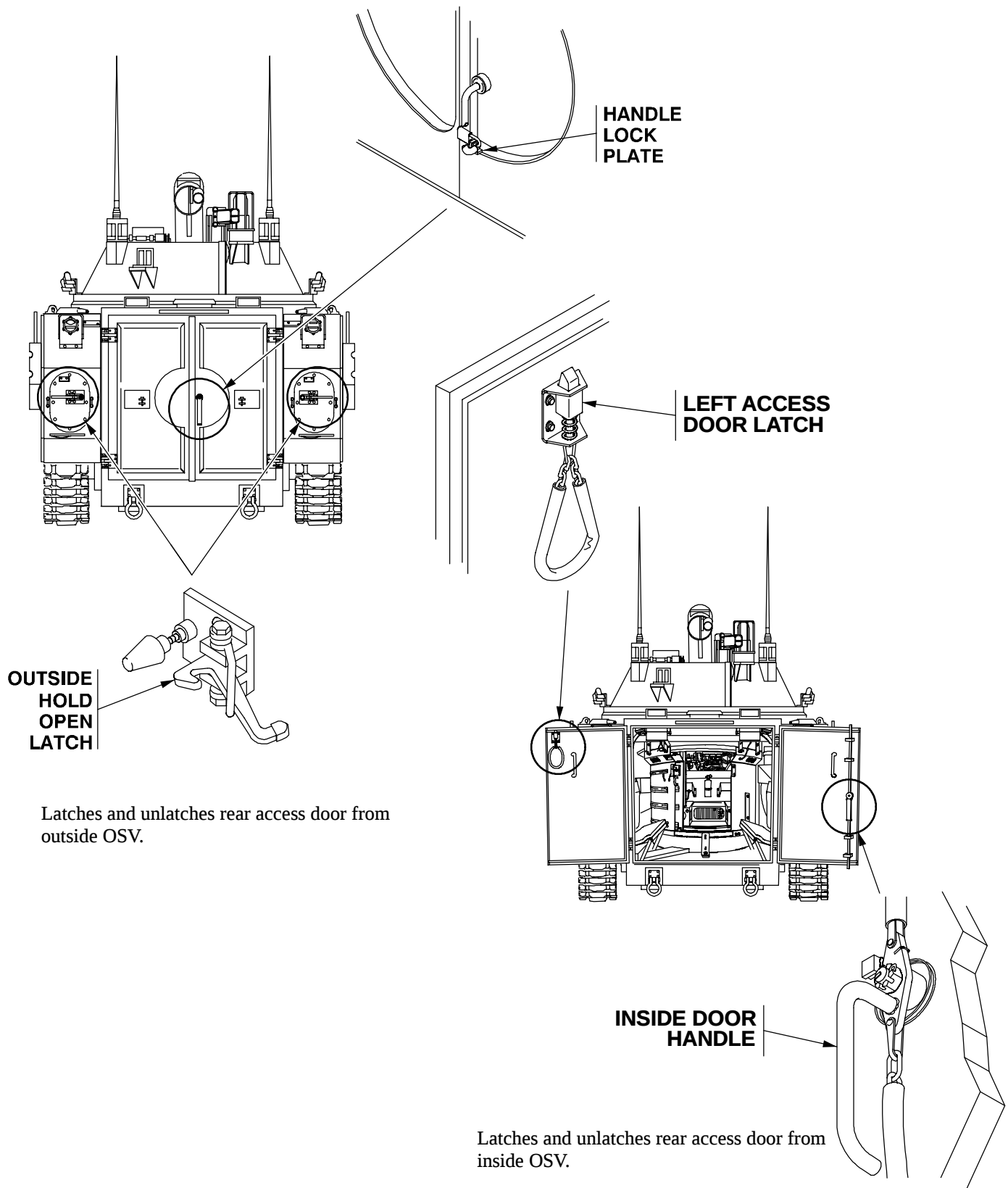
MASTER SWITCH PANEL (MSP)

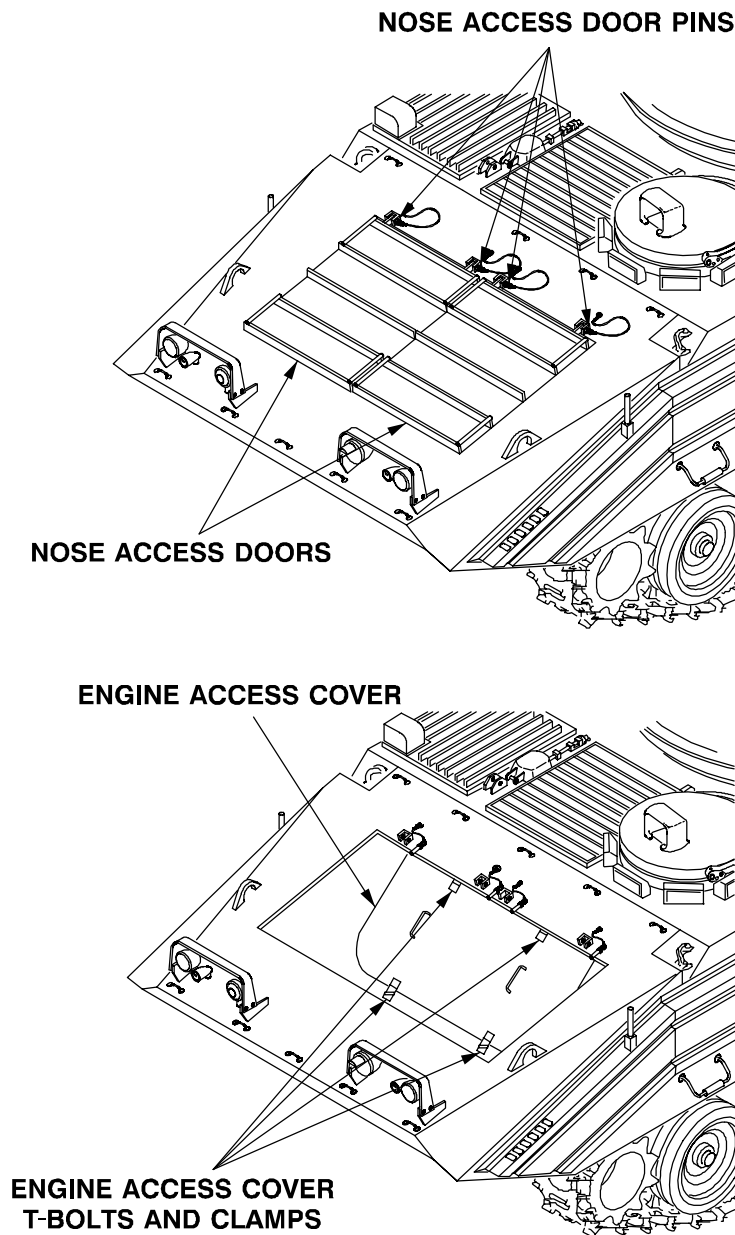
The MSP provides electrical power and slave start capability for hull operation.

DOME LIGHTS

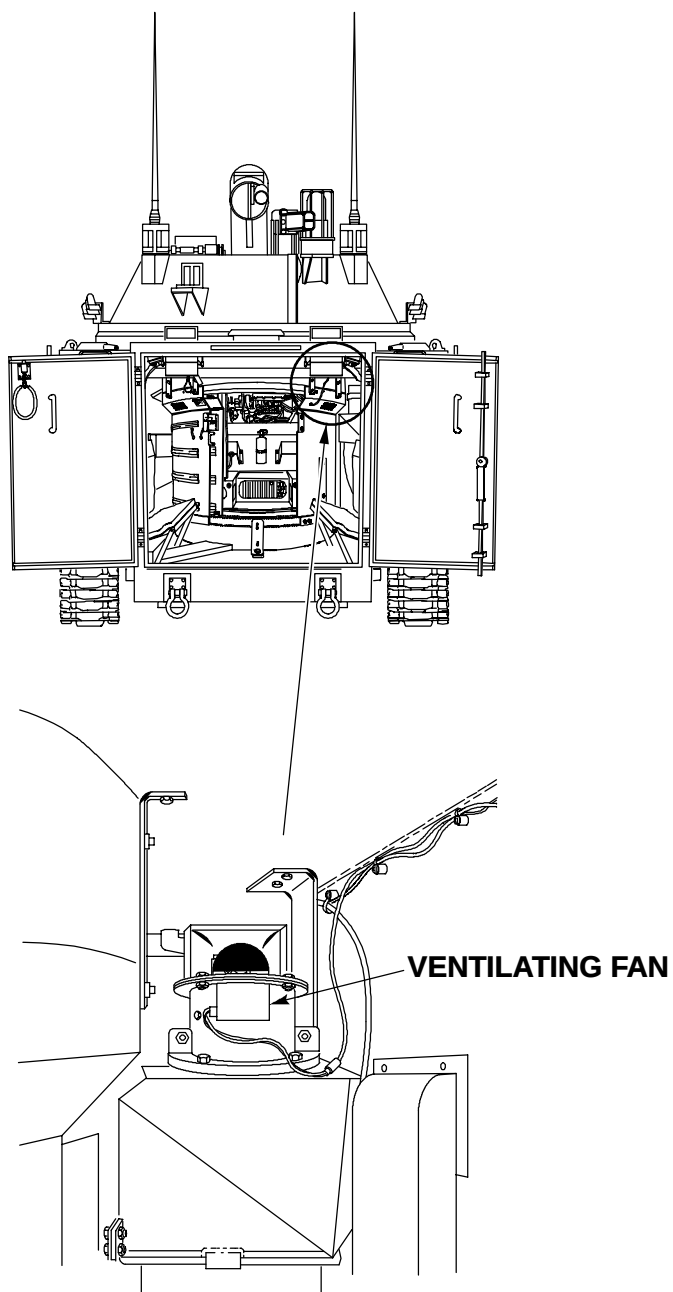
Dome lights provide illumination for interior of hull. They select blackout (BO) or white light

REAR ACCESS DOOR CONTROLS



POWER PLANT ACCESS DOOR HARDWARE

Door hardware consists of pins, t-bolts, and clamps that secure nose access doors and engine access cover and must be removed to access power plant.

VENTILATING FAN

Fan provides fresh air to passenger compartment.