

TM 10-5411-237-10

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

**HIGH VALUE ASSET SECURITY CAGE (HVASC),
PORTABLE**

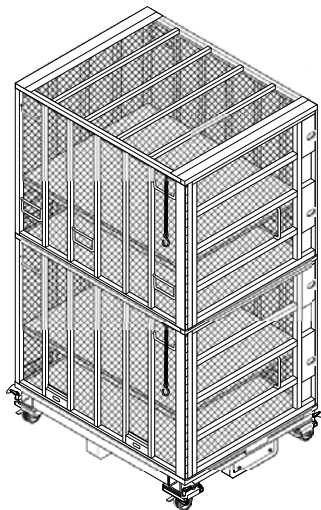
NSN 5411-01-522-4822, GREEN

NSN 5411-01-522-4816, TAN

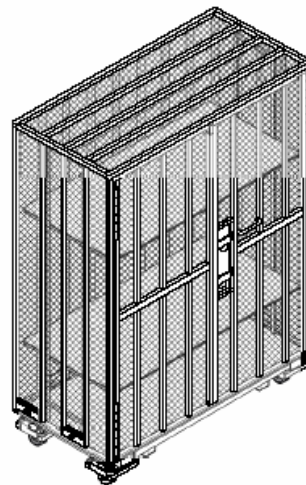
**HIGH VALUE ASSET SECURITY CAGE (HVASC),
SUPPLY**

NSN 5411-01-522-4821, GREEN

NSN 5411-01-522-4823, TAN



Portable



Supply

DISTRIBUTION STATEMENT A. – Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

10 August 2007

WARNING SUMMARY

This section contains general safety warnings and hazardous material warnings that must be understood and applied during operation of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of the safety and hazardous materials icons used within this technical manual. For First Aid information refer to FM 4-25.11 for treatment until trained medical personnel arrive.



HEAVY OBJECT - human figure stooping over heavy object shows physical injury potential from improper lifting technique



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



MOVING PARTS - hand with fingers caught between rollers shows that the moving parts of the equipment present a danger to life or limb



CRUSHED HANDS – 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



HEAVY PARTS – foot with heavy object on top shows that heavy parts can crush and harm



FINGERS CRUSHED – hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb



SHARP OBJECT - pointed object in hand shows that a sharp object presents a danger to limb

General Warning Descriptions

WARNING

Before proceeding with any task that is accompanied by a warning, Refer to FM 4-25.11, First Aid, for First Aid information. Looking for first aid information after an injury can waste precious minutes and may mean the difference between life and death. Address first aid questions to trained medical personnel whenever possible.

WARNING



The weight of the system exceeds the recommended lifting limits for one person. When moving the HVASC, always use two or more persons, one to push and steer, and the other to pull and guide the unit. Always pay attention to the level of the floor or surface. Failure to comply could result in the HVASC toppling over or rolling away.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

WARNING



Ensure the HVASC is blocked and secure when replacing the HVASC casters. Serious crushing injury could result if the HVASC is not blocked properly. Failure to comply could result in the HVASC toppling over or rolling away.

WARNING



The weight of the HVASC exceeds 900 pounds when empty. When moving the HVASC, always use two or more persons, one to push and steer, and the other to pull and guide the unit. Always pay attention to the level of the floor or surface. Failure to comply could result in the HVASC toppling over or rolling away.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

WARNING



Do not use diesel fuel, gasoline, or benzene (Benzoil) for cleaning. These items are highly flammable and, if ignited, can cause injury. Failure to comply may result in serious injury or death to personnel.

WARNING



Do not wear jewelry when performing maintenance. Jewelry can get caught and cause severe injury. Failure to comply can result in injury to hands and fingers.

WARNING



Do not carelessly place hands and fingers in and around doors, hinges, release pins, shelf sides, or caster assemblies. This could result in pinched and injured hands and fingers. Failure to comply can result in injury to hands and fingers.

LIST OF EFFECTIVE PAGES

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

Date of issue for the original manual is:

Original 10 August 2007

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 76, CONSISTING OF THE FOLLOWING:

Page No.	Change No.	Page No.	Change No.
Title	0	2-1 through 2-3/(2-4 Blank) (4 pgs)	0
Warning	0	3-1 through 3-32 (32 pgs)	0
i - iv (4 pgs)	0	4-1 through 4-10 (10 pgs)	0
1-1through 1-6 (6 pgs)	0	Back Cover	0

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 10 August 2007

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

**HIGH VALUE ASSET SECURITY CAGE (HVASC),
PORTABLE**
NSN 5411-01-522-4822, GREEN
NSN 5411-01-522-4816, TAN

**HIGH VALUE ASSET SECURITY CAGE (HVASC),
SUPPLY**
NSN 5411-01-522-4821, GREEN
NSN 5411-01-522-4823, TAN

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to: Commander, US Army TACOM Life Cycle Management Command, ATTN: AMSTA-LC-SECT, Kansas St., Natick, MA 01760-5052. You may also send in your recommended changes via electronic mail or by fax. Our fax number is DSN 256-5205 or commercial 508-233-5205. Our e-mail address is soldier.pubs@us.army.mil. A reply will be furnished to you.

DISTRIBUTION STATEMENT A. - Approved for public release; distribution is unlimited.

TABLE OF CONTENTS

	<u>Page No.</u>
WARNING SUMMARY	a
LIST OF EFFECTIVE PAGES	A
CHAPTER 1 - Equipment Characteristics, Capabilities and Features	
Introduction	1-1

TABLE OF CONTENTS-continued

	<u>Page No.</u>
Reporting Equipment Improvement Recommendations (EIR)	1-1
Maintenance Forms, Records and Reports	1-1
Warranty Information	1-1
Safety, Care, and Handling	1-1
Purpose and Functions	1-1
Performance Capabilities	1-2
Description of the HVASC	1-2
Doors	1-2
Shelves	1-3
Casters and Skids	1-3
Tie-down Points	1-3
Securing and Attaching	1-4
Portable HVASC	1-5
Supply HVASC	1-6
CHAPTER 2 - Preparation for Use and Installation Instructions	
Unpacking	2-1
Inspecting for In-Shipment Damage	2-1
What to do about Damaged Equipment	2-1
Assembly Instructions	2-1
Equipment Data	2-2
Portable HVASC Features of Operation	2-2
Supply HVASC Features of Operation	2-3
CHAPTER 3 - Maintenance Instructions	
Introduction	3-1
Explanation of Table 3-1 Columns	3-1
Common Checks and cleaning	3-2
Lubrication Requirements	3-2
Corrosion Prevention and Control	3-2
Preventive Maintenance Checks and Services for the HVASC	3-3
Operating Instructions	3-6
Start-up Procedures	3-6
Normal Operations	3-6
Removing and Replacing Caster Assemblies for the Portable and Supply Cage	3-7
Installing Caster Assemblies for the Portable and Supply Cage	3-9
Caster Lubrication	3-10
Adjust or Remove Shelves from the Supply Cage	3-11
Removing a Shelf from the Portable Cage	3-14
Installing a Shelf for the Portable Cage	3-15
Remove the Coat Rack Bar (Supply Only)	3-18
Install the Coat Rack Bar (Supply Only)	3-18
Moving or Transporting the Cage (Portable and Supply Cages)	3-19
Disassembly of the Cage (Portable only)	3-20
Assembly of the Cage (Portable only)	3-24
Loading and Unloading the Cage (Portable Only)	3-25
Loading and Unloading the Cage (Supply Only)	3-25

TABLE OF CONTENTS-continued

	<u>Page No.</u>
Placing the Cage in a Stationary Position for Storage (Portable and Supply)	3-29
Operations under Emergency, Adverse, or Abnormal Conditions	3-30
Preparation for Shipment and Storage	3-31
Disassembly, Removal, and Packaging	3-31
Securing	3-31
Covering	3-31
Shipping and Handling Precautions	3-31
Shipment and Unloading	3-31
Indoor and Outdoor Storage	3-32
CHAPTER 4 - Supporting Information	
Explanation of Columns in the COEI List and BII List	4-1
Components of End Item (COEI) List	4-2
Basic Issue Items (BII) List	4-6
Explanation of Columns in the AAL	4-7
Additional Authorized List	4-8
Explanation of Columns in the Expendable/Durable Items List	4-9
Expendable and Durable Items List	4-9
References	4-10

HOW TO USE THIS MANUAL

In this manual, primary chapters appear in upper case/capital letters; paragraphs within a chapter are not numbered and are presented in a title format; pages are presented in numeric sequence, e.g., 1-1, 1-2. For a first level paragraph, title all upper case/capital letters, e.g., INTRODUCTION subordinate paragraph title will have the first letter of the first word of each principle word all upper case/capital letters, e.g., Reporting Errors and Recommending Improvements. The location of additional material that must be referenced is clearly marked. Illustrations supporting maintenance procedures/text are located underneath, or as close as possible to, their referenced paragraph.

This manual contains General Information, Operator Instructions, and Operator Preventive Maintenance Checks and Services (PMCS) for the High Value Asset Security Cage (HVASC).

Front Matter

Front matter consists of front cover, warning summary, title block, table of contents, and how to use this manual pages.

Chapter 1 – General Information, Equipment Description, and Theory of Operation

Chapter 1 contains introductory information on the High Value Asset Security Cage (HVASC).

Chapter 2 – Preparation for Use and Installation Instructions

Chapter 2 contains preparation for use information and principles of operation information.

Chapter 3 – Operator Instructions

Chapter 3 contains operating maintenance instructions and service procedures.

Chapter 4 – Supporting Information

Chapter 4 contains references and other supporting information.

Manual Organization and Page Numbering System

The manual is divided into four major chapters that detail the topics mentioned above. Each chapter covers a wide range of topics. Each chapter is numbered sequentially starting at page 1.

Finding Information

The table of contents aids the reader in finding information in the manual more quickly. The reader should start here first when looking for a specific topic. The table of contents lists the topics contained within each chapter and the page number where it can be found.

Example: If the reader were looking for instructions on “Purpose and Functions”, the table of contents indicates this information can be found in Chapter 1. Scanning down the listings for Chapter 1, “Purpose and Functions” information can be found on page 1-1.

CHAPTER 1

EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

INTRODUCTION

This technical manual is an authentication of the manufacturer's commercial literature and does not conform to the format and the content requirements normally associated with Army technical manuals. This technical manual does, however, contain all essential information required to operate and maintain the equipment.

Reporting Equipment Improvement Recommendations (EIR)

If your HVASC 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. If you have Internet access, the easiest and fastest way to report problems or suggestions is to go to <https://aeeps.ria.army.mil/aeepspublic.cfm> (scroll down and choose the "Submit Quality Deficiency Report" bar). The Internet form lets you choose to submit an Equipment Improvement Recommendation (EIR), a Product Quality Deficiency Report (PQDR) or a Warranty Claim Action (WCA). You may also submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 via e-mail, regular mail, or facsimile using the addresses/facsimile numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

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.

Warranty Information

The HVASC equipment is warranted by the manufacturer for one (1) year, from the date of delivery to the receiving unit/organization/agency. Check with a supervisor for more information. Report all defects in material and workmanship to a supervisor, who will take appropriate action. The only maintenance authorized to be performed on this equipment is specified in this technical manual.

Safety, Care, and Handling

When working on the HVASC, read all of the warnings posted in the front of this manual. Refer to FM 4-25.11 for first aid information.

Many adhesives, cleaning, and bonding agents are used during skin repair procedures on the HVASC. The prolonged use of these materials without proper protection can cause skin irritation. The inhalation of excess vapors can be toxic.

Purpose and Functions

The US Army security community is concerned with the loss of valuable material through theft. The Product Manager, Physical Security Equipment (PM-PSE) has undertaken the material development program to significantly enhance the security of critical assets. The High Value Asset Security Cage (HVASC) is a direct result of surveys and comments received from military field units. The comments expressed a critical need for a highly versatile, bulk-storage cage that is resistant to force for securing high-value and sensitive assets.

The HVASC is equipment that functions as limited security and storage for items that may be targeted for theft or damage. The HVASC provides protection of high value assets from low and very low threats by: (1) preventing/detering theft, (2) slowing-down/inhibiting an attempted theft, (3) providing secure secondary storage, and (4) utilized as a secure shipping container.

The functional aspects that support protection of high value assets are:

- Deter theft
- Temporary or long-term storage
- Moveable and transportable
- Secure in Arms Rooms or any other interior room
- Can be attached to fixed objects and structures
- Supports heavy loads
- Invoke the "2-person" rule with use of 2 padlocks
- Visual inspection and accountability
- Caster locks to restrict movement and add stability
- Tarp for environmental protection and to obscure view of assets
- Easy handling and maneuvering when loaded or unloaded
- Shelves are adjustable to accommodate various assets

Performance Capabilities

The Portable HVASC consists of two smaller units (top and bottom), the top unit has handles for lifting and carrying, the bottom unit has four removable caster assemblies and, fixed wooden skids, each unit has a swing-out door, an interior adjustable and removable shelf (one in each unit), and each door is designed to accommodate two padlocks.

The Supply HVASC is a one-piece cage, equipped with two swing-out doors, interior adjustable and removable shelves, a removable coat rack bar, four removable caster assemblies, fixed wooden skids, and is designed to accommodate two padlocks.

The Portable and Supply HVASC are fabricated from 3/4 inch No. 9 raised mesh carbon steel (ATSM F 1267, Type 1, Class 1) and welded to a tube frame constructed of steel (ASTM A513, Type 1, 11 wall gauge.)

Description of the HVASC

Doors

On the Portable HVASC there is a swing-out door on each of the units. The door provides the mounting location for the locking mechanism and is used for normal access to the interior of the unit. The doors are secured in the open position by safety chains and S-hooks. The doors lock shut to secure the contents of the cages by use of two padlocks. The lock mechanism design prevents the padlocks from being defeated by bolt cutters or hacksaw blades.

On the Supply HVASC there are two swing-out doors one is a primary door and the other is a stationary door. The primary door provides the mounting location for the locking mechanism and is used for normal access to the interior of the cage. The stationary door is held in position with two L-handle release pins located at the top and bottom of the door, and secured directly to the frame. The stationary door is normally in the closed position, but can be opened to load or unload large items. It also provides access to the interior for removal, addition, and adjustment of shelves and the coat rack bar. The doors are secured in the open position by safety chains and S-hooks. The primary door locks in place and secures the contents of the cage by use of two padlocks. The lock mechanism design prevents the padlocks from being defeated by bolt cutters or hacksaw blades. The HVASC is designed to accept a standard Series 5200 padlock.

Shelves

For the Portable cage, each top and bottom unit is designed to accept shelves. The shelves have two dowel pins attached to one side, which are aligned and inserted into holes in the interior of the frame. Alignment on the opposite side of the shelf is accomplished with pre-positioned holes and secured with release pins. The release pins are attached to the shelf with a lanyard for ready availability and to prevent loss. The shelves are designed to support a maximum load of 300 lbs.

For the Supply cage, the interior is designed to accept full size (wall-to-wall) shelves, each with a maximum load of 300 lbs. The shelves are installed by sliding the sides into pre-cut support channels located on the shelf bracket bars. A versatile coat rack bar is provided and can be secured inside the top by a release pin.

Casters and Skids

There are four locking caster assemblies on the Portable HVASC and two locking and two non-locking caster assemblies on the Supply HVASC mounted to the base of the frame on the bottom unit. Each caster assembly has a swivel caster, a wheel, a steel mounting plate, and the hardware to secure the caster to the plate. The caster assembly is secured to the cage by sliding the mounting plate into two grooves at each corner of the base. The assembly is secured in position with a movable caster gate. The caster gate swings across the grooves and prevents the plate from sliding out. The caster gate is held in place with a release pin.

To prevent loss, the pin is attached to the cage with a lanyard. The lanyard is attached to the pin at one end and the cage at the other with split rings. Casters allow for easy movement and maneuvering. For stationary storage in a fixed position, remove the casters in accordance with Chapter 3, Removing and Replacing Caster Assemblies. The HVASC will be supported by the mounted wooden skids fastened to the bottom of the frame.

Tie-down Points

WARNING



Does not use tie-down points to lift or sling load. Only lift the HVASC from the bottom by forklift, cargo net, or crane. Using the tie-down points or handles to lift the HVASC may cause personal injury or damage the HVASC and contents inside. Failure to comply may result in serious injury or death to personnel.

The tie-down points for the Portable and Supply cages are located in the four upper corners of the frame for both the top and the bottom units. The tie-down points are steel rod, cut and positioned in the bar stock of the frames. The tie-down points allow for the cages to be secured in transit.



Figure 1-1. Tie-down Points for the Portable and Supply HVACs.

Securing and Attaching

To provide versatile methods of securing both the Portable and Supply HVAC in a stationary position, attachment plates are located at the base edges of the bottom unit frame. The attachment plates allow the HVACs to be joined together or secured with chain or cable to objects or structures.

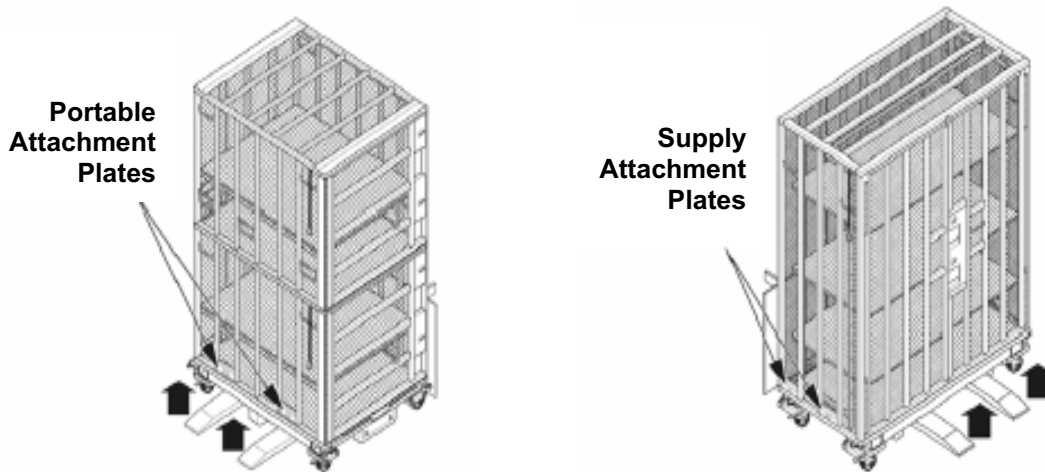


Figure 1-2. Attachment Plates for the Portable and Supply HVACs.

Portable HVAC

The Portable HVAC overall dimensions of top and bottom cages are listed below.

Feature	Portable Cage	Top Unit	Bottom Unit
Height w/Casters	66.50 in.	N/A	37.50 in.
Height	64.00 in.	29.00 in.	35.00 in.
Width	33.00 in.	33.00 in.	33.00 in.
Depth	44.50 in.	44.50 in.	44.50 in.
Weight (complete)	955 lb	-----	-----
Weight (w/shelf)	976 +/- 1 lb	415 lb	-----
Weight (w/shelf, casters)	-----	-----	540 lb
Weight (shelf)	21 +/- 1 lb		

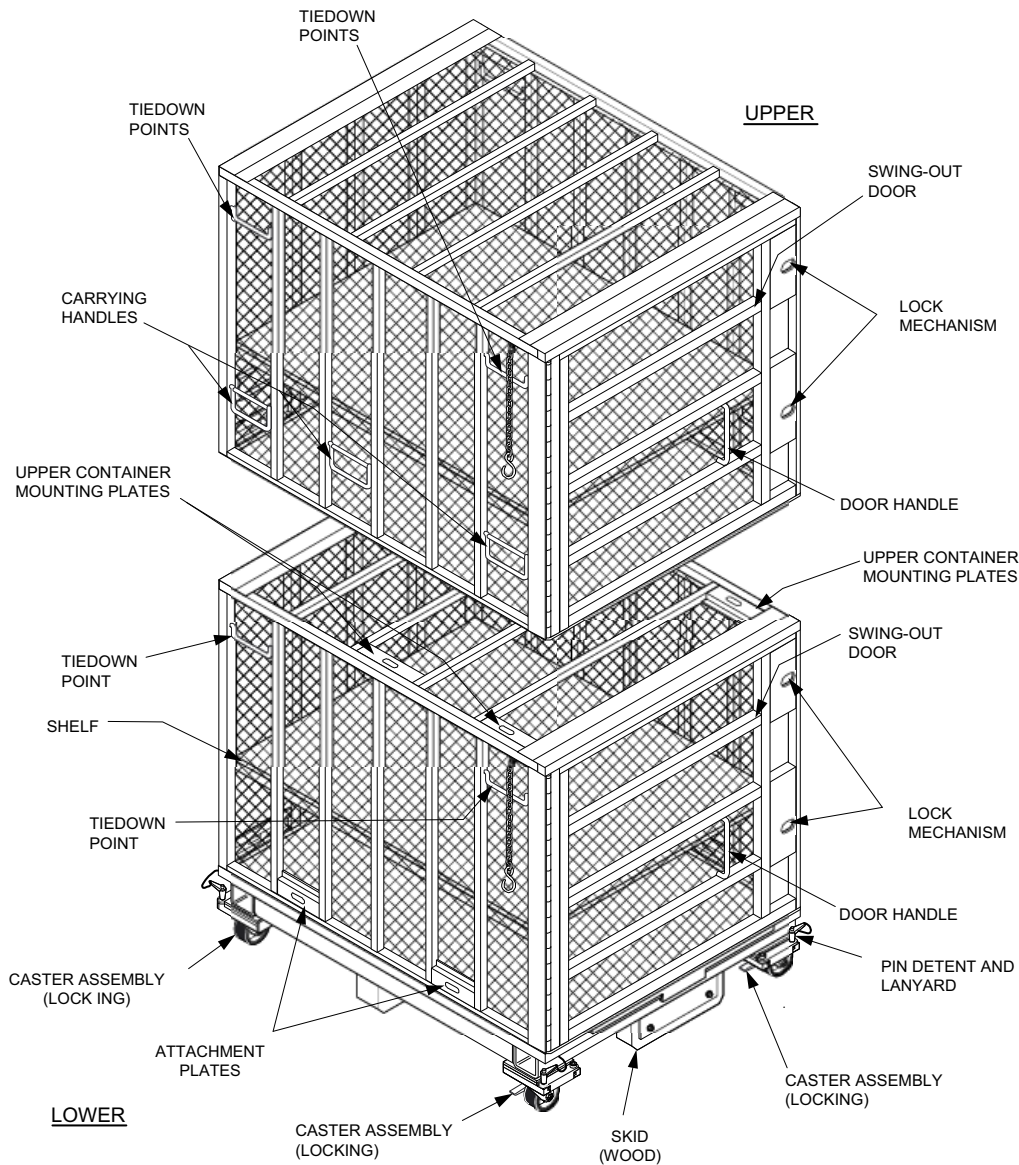


Figure 1-3. Portable HVAC Components.

Supply HVAC

The Supply HVAC overall dimensions are listed below.

Feature	Supply Cage
Height w/casters	71.5 in.
Height	61.0 in.
Width	60.0 in.
Depth	33.0 in.
Weight (includes: Supply HVAC, 3 shelves, 4 caster assemblies, and 1 coat rack bar)	1,090 lb
Weight (Shelf)	33 +/- 1 lb

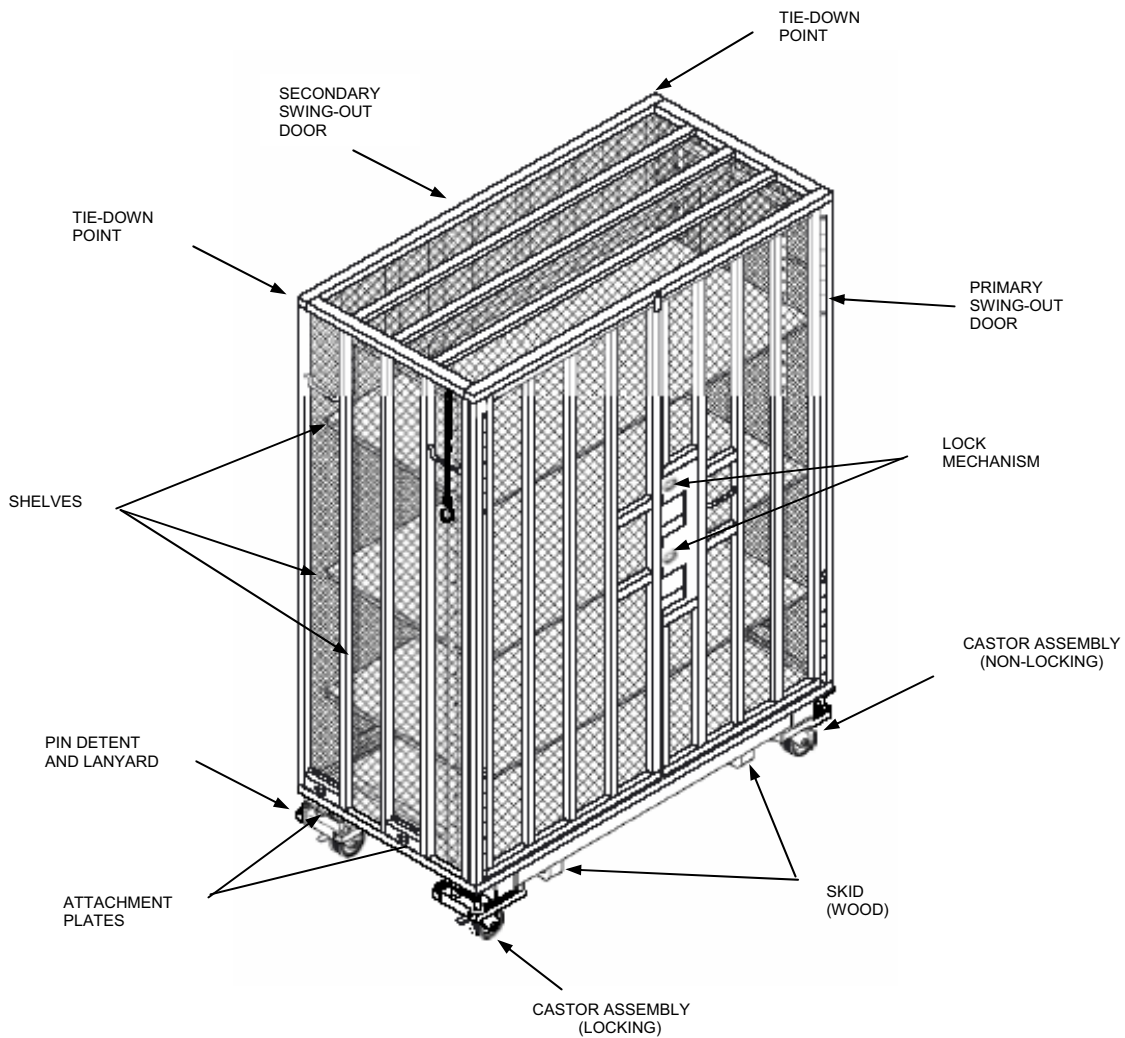


Figure 1-4. Supply HVAC Components.

CHAPTER 2

PREPARATION FOR USE AND INSTALLATION INSTRUCTIONS

Unpacking

When delivered, remove and dispose of all packing material. The packing material is only for protection during shipping from the manufacturer. Shipping material is not to be used again. The HVASC will be shipped on a wooden pallet. Do not confuse the attached wood HVASC skids as part of the shipping pallet. It will be necessary to lift the cage to remove the pallet. The cage can then be lowered and will rest on the installed casters.

Inspecting for In-Shipment Damage

Take time and inspect the cage, check the areas listed below.

- Paint finish
- Lettering
- Physical structure (dents, scratches, punctures)
- Functional items (release pins, lanyards, split rings, shelves, caster receivers, safety chains, tie-downs, handles, screw nuts, tarp)
- Hex tool (Portable HVASC Only)
- Tarp

Refer to Chapter 3 for more detailed Preventive Maintenance Checks and Services procedures.

What to do about Damaged Equipment

Please report all damages, defects, and missing items to your supervisor and/or the designated shipping agency.

Assembly Instructions

The HVASC comes completely assembled. Once unpacked, unlock caster assembly to move the HVASC. Refer to page 3-7 to unlock the casters. Remove the door retention hooks in the door lock and replace with padlock(s). This will keep the doors from opening unexpectedly.

The only tool required to operate the Portable HVASC is a hex tool. This is used to fasten and unfasten the hex bolts that attach the top and bottom units together. No tools are required for the setup of the Supply HVASC. A grease gun will be required to lubricate the castors on both assemblies.

EQUIPMENT DATA

Portable HVASC Features of Operation

- Comprised of two separate cage units
- Swing-out doors for full and easy access
- Removable swivel casters on bottom unit - for greater mobility
- Wooden skids on Bottom unit - for stationary storage
- Removable and adjustable shelf in each unit - for versatility
- Handles on 3 sides of the top unit for lifting and carrying
- Top/Bottom held in place with recessed screws and locking nuts
- Common hex tool fastens/unfastens screws
- Passes through standard 36-inch door frame - access to Arms Rooms
- Safety chains - secure doors in "OPEN" position when loading and unloading
- Attachment plates - secure cages to fixed objects
- Tie-down points - accept hooks, shackles, and straps
- Release pins - secure caster assemblies and shelves
- Tarp with draw cord - ensures tight fit to keep out elements
- Casters swivel 360 degrees for greater maneuverability (all four casters lock)
- Designed to accept standard padlocks - flexibility of lock selection
- Capable of holding heavy loads 1,200+ pounds (combined)
- Low maintenance

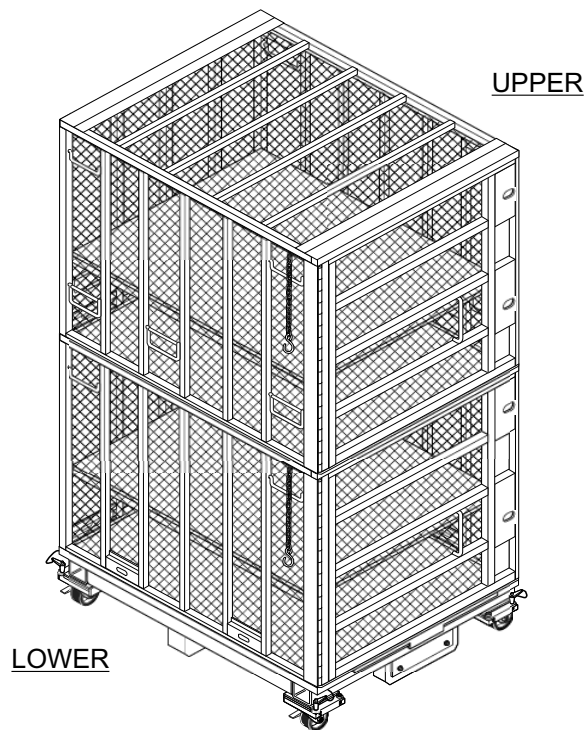


Figure 2-1. Portable HVASC.

Supply HVASC Features of Operation

- Double doors swing-out for full and easy access
- Removable swivel casters for greater mobility
- Wooden skids are used for stationary storage
- Removable coat rack bar for versatility
- Passes through standard 36" door frame - access to Arms Rooms
- Safety chains - secure doors in "OPEN" position when loading and unloading
- Attachment plates - secure cages to fixed objects
- Tie down points accept hooks, shackles, and straps
- Release pins secure doors, caster assemblies, and coat rack bar
- Tarp with draw cord - ensures tight fit to keep out elements
- Casters swivel 360 degrees for greater maneuverability (only two casters lock)
- Designed to accept standard padlocks - flexibility of lock selection
- Capable of holding heavy loads 1,200+ pounds
- Low maintenance

No tools are required for the setup of the Supply HVASC. A grease gun will be required to lubricate the castors on the cage.

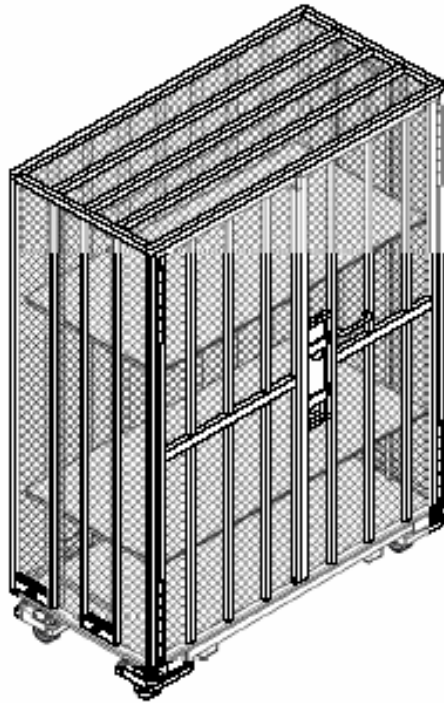


Figure 2-2. Supply HVASC.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

INTRODUCTION

Preventive Maintenance Checks and Services (PMCS) are performed to keep the HVACSC in good operating condition and ready for its primary mission. The checks are used to find, correct, and report problems. PMCS is performed according to the PMCS table provided. Pay attention to all **WARNING**, **CAUTION**, and **NOTE** statements. A **WARNING** indicates that someone could be hurt or killed. A **CAUTION** indicates that equipment could be damaged. A **NOTE** may make your maintenance or repair task easier.

Be sure to perform scheduled PMCS. Always perform PMCS in the same order so it becomes habit. With practice, you will quickly recognize problems with the equipment.

Use DA Form 2404, Equipment Inspection and Maintenance Worksheet, to record any discovered faults. Do not record faults that you fix!

PMCS PROCEDURES

Table 3-1 lists inspections and care required to keep your equipment in good operating condition. It is arranged so that you can perform before operation checks as you walk around the equipment.

Explanation of Table 3-1 Columns

Item No.

Indicates the reference number. When completing DA Form 2404, Equipment Inspection and Maintenance Worksheet, include the item number for the item to check/service indicating a fault. Item numbers appear in the order you must perform the checks/services listed.

Interval

Indicates when you must perform the procedure in the procedure column.

Before - perform before equipment operation

During - perform during equipment operation

After - perform after equipment has been operated

Weekly - perform every week

Monthly - perform each month

Item to be Checked or Serviced

Indicates the item to be checked or serviced.

Procedure

Indicates the procedure you must perform on the item listed in Item to Check/Service column. You must perform the procedure at the time specified in the Interval column.

Equipment Not Ready/Available If

This column indicates faults, which will prevent the equipment from performing its primary mission. If you perform procedures listed in the Procedure column which show faults listed in this column, do not operate the equipment. Follow standard procedures for maintaining the equipment or reporting equipment failure.

Other Special Entries

Observe all special information and notes that appear in Table 3-1. When a check/service procedure is required for both weekly and before intervals, it is not necessary to perform the procedure twice if the equipment is operated during the weekly period.

COMMON CHECKS AND CLEANING

WARNING



Do not use diesel fuel, gasoline, or benzene (Benzoil) for cleaning. These items are highly flammable and, if ignited, can cause injury. Failure to comply may result in serious injury or death to personnel.

Cleaning

Always keep the equipment clean. Remove dirt, sand, and debris from surfaces. Use warm soapy water to clean the HVASC and tarp. Rinse with clean water, and allow to air dry. Do not fold and store the tarp until it is dried thoroughly.

Lubrication Requirements

There are lubrication fittings located on the caster assemblies. At a minimum lubricate the caster assemblies annually. You should also lubricate when the casters do not move or rotate freely. Lubrication may be required at more frequent intervals based on use in operation in special conditions, wet, humid, hot, dry, and sandy conditions. Only use the lubricant identified in Table 4-4.

Bolts, Nuts, and Screws

Check bolts, nuts, and screws for obvious looseness, missing, bent, or broken condition on equipment. If you find a bolt, nut, or screw you think is loose, tighten it or report it to your supervisor.

CORROSION PREVENTION AND CONTROL

The HVASC system is designed to be corrosion resistant; however, the components must never be stored wet or soiled in order to prevent possible corrosive damage to metal parts.

Table 3-1. Preventative Maintenance Checks and Services (PMCS) for the HVASC.


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
1	Before	Cage and shelves	<p>Look for damage, breaches, corrosion or rust on the surface of the portable and supply cages. Clean corrosion or rust.</p> <p>Remove dirt, oil, grease, and other foreign material from the cage.</p> <p style="text-align: center;">WARNING</p> <div style="text-align: center;">  </div> <p>Do not use diesel fuel, gasoline, or benzene (Benzoil) for cleaning. These items are highly flammable and, if ignited, can cause injury. Failure to comply may result in serious injury or death to personnel.</p> <p>Use warm soapy water to clean the HVASC. Rinse with clean water and allow to air dry.</p> <p>Look for damage or breaches on the surface of the portable and supply cages.</p> <p>Check the paint coating to ensure that it is not chipped or peeling.</p> <p>Check the stencils for legibility.</p>	<p>If rust is present, contact local maintenance to remove rust and provide rust prevention.</p> <p>If cracks are present, contact local maintenance.</p> <p>If paint coating is chipped or peeling, contact local maintenance.</p> <p>If stenciling is not legible, contact local maintenance to reapply lettering.</p>

Table 3-1. Preventative Maintenance Checks and Services (PMCS) for the HVASC - Continued.


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
	Before	Cage and Shelves - Continued	Inspect all carry handles for damage. Make sure the carry handles function properly.	Contact local maintenance if handles are damaged.
	Before		Inspect tie down points for movement, storage and damage.	Contact local maintenance if damaged.
			<p>WARNING</p> 	
			The raised mesh metal on the cage has sharp edges. Use caution when handling edges. Failure to comply may result in injury to personnel.	
	Before		Check the raised mesh metal on the entire cage to ensure that it is attached to the frame bars and has not been pushed or bent away. Check for sharp edges.	Contact local maintenance if mesh is damaged.
	Before		Check inside and out on Supply HVASC. Inspect the coat rack bar is present and serviceable. Ensure that the release pin and lanyard are present and in good working condition.	Contact local maintenance if the coat rack bar assembly is damaged.
	Before		Inspect screw and locking nuts, securing the lower and upper cages together on the portable cage. Tighten the screw and locking nuts as required.	
	Before, During		Check the frame bar welds for cracks or separations.	Contact local maintenance if frame is damaged.
	Before, During	Check the shelves for serviceability and ensure the shelves are not bent.	Contact local maintenance if shelves are damaged.	
	Before, During	Verify the release pins and lanyards are present and in good working condition.		

Table 3-1. Preventative Maintenance Checks and Services (PMCS) for the HVASC - Continued.


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
2	Before, During	Cage and Shelves - Continued	Check the wooden skids on the bottom of the cage for splintering and serviceability.	Contact local maintenance if skids are damaged.
		Doors	<p>WARNING</p> 	
	Before		Keep hands and fingers away from door hinges. Fingers and hands may get pinched. Failure to do so may result in injury to personnel.	
	Before		Ensure the hinges on the doors move freely. Swing doors open and closed watching hinge for malfunction.	Contact local maintenance if doors are damaged.
	Before		On the supply cage, verify there are release pins for the top and bottom on the left-side door. Verify the pins and lanyards are in serviceable condition.	Contact local maintenance if damaged.
	Before, During		Ensure the doors close properly. Place doors in the closed position; check doors for alignment to frame.	Contact local maintenance if doors are damaged.
	Before, During	Verify locks are working properly.	Replace locks as needed.	
Before, During		Check for dirt or foreign material. Clean as needed.	Replace locks as needed.	
		Check that doors can be secured in the open position. Inspect chain and S-Hooks are present and in good working condition.	Contact local maintenance if damaged.	
3	Before, During	Caster Assembly	Ensure casters and wheels are free of dirt and other material that will prevent free turning of these components.	Replace casters as needed.

Table 3-1. Preventative Maintenance Checks and Services (PMCS) for the HVASC- Continued.

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY /AVAILABLE IF:
4	Monthly	Caster Assembly-Continued	<p>Check caster locks to ensure that they function properly and lock the wheel to prevent turning. Refer to page 3-7 for instructions.</p> <p>Check casters for release pins and lanyards on caster receiver gates. Ensure the release pins are properly attached to the cages. Inspect pins for damage.</p> <p>Verify casters for move freely.</p>	<p>Adjust caster assembly locks for proper function.</p> <p>Attach release pins if necessary. Report damage to supervisor.</p> <p>Lubricate when casters do not move freely or under special conditions. Refer to page 3-10 for lubrication procedure.</p>
	Before		Verify that caster lubrication fittings are clean, free of debris, and are serviceable.	Replace casters if damaged. Refer to page 3-7.
	Before, During		Check caster wheel for damage, missing material, chips and tears or for areas that will interfere with movement.	Replace casters if damaged. Refer to page 3-7.
	Before	Tarp Cover	Inspect cover for rips, tears, cuts or dry rot.	Replace cover as needed.
5	Before	Skid, Wood	<p style="text-align: center;">NOTE</p> <p>Do not discard the skid. The skid is the HVASC base when the casters are not mounted.</p> <p>Inspect skid for damage.</p>	Contact local maintenance if skid is damaged.

OPERATING INSTRUCTIONS

Start-Up Procedures

Conduct Preventive Maintenance Checks and Services (PMCS) procedures in accordance with Table 3-1. Report anything that would prevent the equipment from being used. Remember to report all paint peeling/chipping, rust, and cracks in the metal. Check to see that the equipment and parts function properly to include: wheels roll freely, locks prevent wheels from turning, safety chains and S-hooks are serviceable, shelves are not bent, and the tarp is not torn. Finally, if the HVASC contains cargo, ensure the cage is loaded properly and the cage is not top-heavy.

If instructions in this manual pertain to only one of the cages there will be a statement identifying the appropriate system.

Normal Operation

The normal operation of the Portable HVASC consists of removing or replacing caster assemblies, loading and unloading the units, transporting or moving the cages, disassembly and assembly of the unit, and placing the cage in a stationary position for storage. The steps for performing these operations are listed below.

Removing Caster Assemblies for the Portable and Supply Cage

WARNING



The weight of the HVASC exceeds 900 pounds when empty. Always use two or more persons when moving the HVASC. One person should push and steer and the other should pull and guide the HVASC. Always pay attention to the level of the floor or surface. Failure to comply could result in the HVASC toppling over or rolling away.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

1. Secure the doors with a padlock.
2. Move the cage to a level surface.
3. Lock the front caster assemblies by stepping on the lever to prevent the HVASC from rolling.

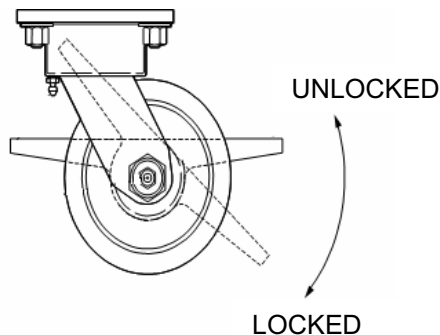


Figure 3-1. Locked and Unlocked position for the Caster Assembly.

WARNING



Keep feet, hands, and fingers away from underneath the HVASC when it is being placed by a forklift. Your feet, hands, or fingers may be crushed. Failure to comply could result in serious injury if hands and fingers are underneath the HVASC.

Do not lift an assembled Portable or individual top and bottom units from the top of the cage, only lift from the base of a cage. Do not use the handles or the top of the HVASC for lifting. Failure to comply could result in back injury.

In the event of back injury, safely immobilize the victim and see immediate medical attention.

Only lift the HVASC to the minimum height needed to remove caster assembly. Over-lifting or raising one side of the HVASC too high may cause a serious tipping hazard. Failure to comply could result in injury to personnel.

NOTE

When using a forklift, all casters may be removed at the same time.

4. Using a lifting device (rated for safety), raise the cage. Raise the cage just high enough to clear the surface.
5. Pull the release pin (Figure 3-2, Item 1) out of the caster receiver (Figure 3-2, Item 4) and swing the receiver gate (Figure 3-2, Item 2) open.
6. Grasp the mounting plate (Figure 3-2, Item 5) and pull the caster assembly (Figure 3-2, Item 3) free from the base of the cage.
7. Close the receiver gate (Figure 3-2, Item 2) on the caster receiver (Figure 3-2, Item 4) and replace the release pin (Figure 3-2, Item 1).
8. To remove all casters, follow steps 5-7 above. After all the casters have been removed, lower the cage so it rests on the skids (Figure 3-2, Item 6).

NOTE

The safest place to secure the caster assemblies so they will not become lost or stolen may be in the HVASC.

9. Once the casters have been removed and the cage is resting on the skids (Figure 3-2, Item 6), secure the caster assemblies (Figure 3-2, Item 3).

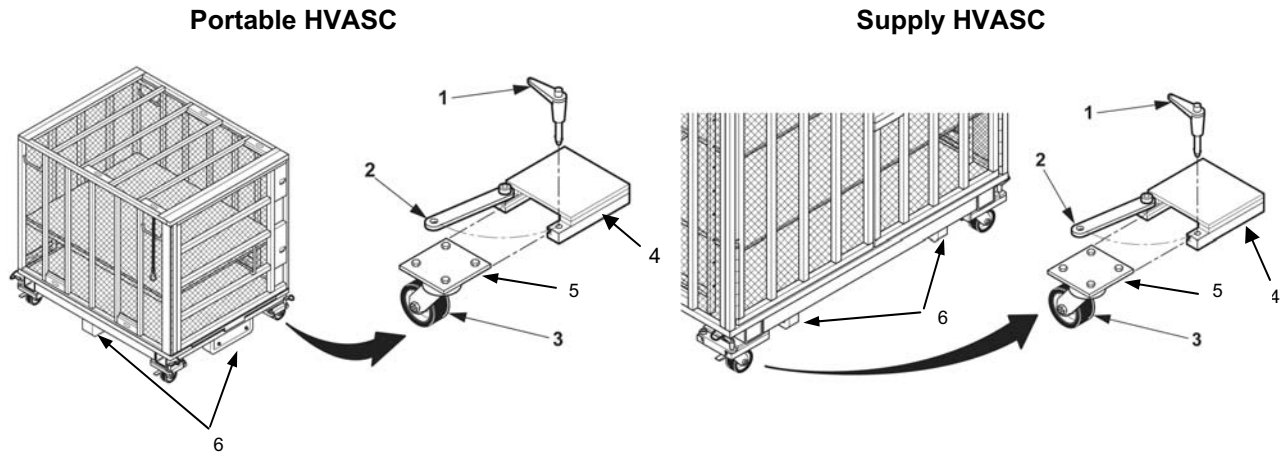


Figure 3-2. Replacing the Caster Assemblies.

Installing Caster Assemblies for the Portable and Supply Cage

1. Install the caster assembly by raising the cage high enough to clear the surface.
2. Pull the release pin (Figure 3-3, Item 1) out of the caster receiver (Figure 3-3, Item 4) and swing the receiver gate (Figure 3-3, Item 2) open.
3. Grasp the access (finger) hold (Figure 3-4, Item 5) in the caster mounting plate and push the caster assembly into the base of the cage.
4. Close the caster receiver (Figure 3-3, Item 2) and replace the release pin (Figure 3-3, Item 1).
5. To install all casters, follow steps 2-4 above.

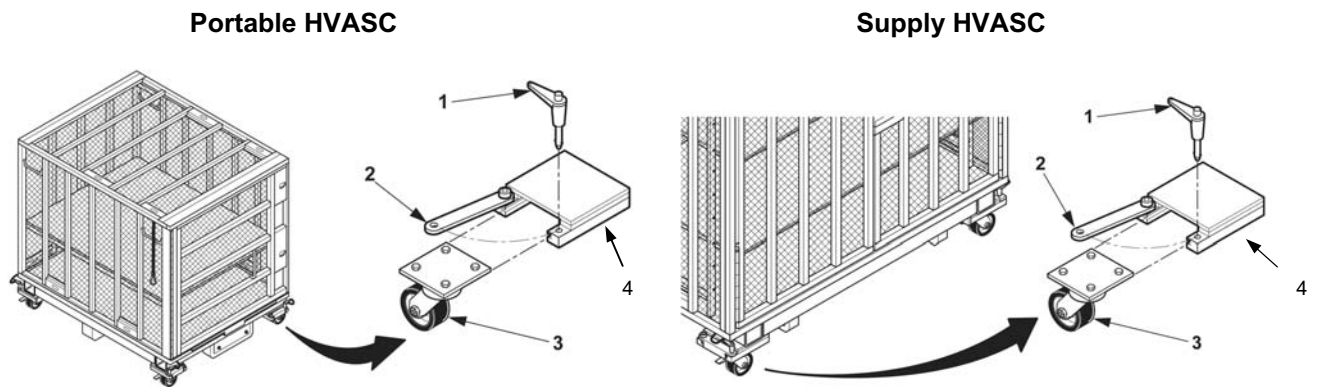


Figure 3-3. Installing the Caster Assemblies.



Figure 3-4. Access (Finger) Hold.

Caster Lubrication

1. Move the HVASC to a level surface.
2. Lock the front caster assemblies by stepping on the lever to prevent the HVASC from rolling
3. Use the grease gun (Figure 3-6, Item 3) to lubricate the caster wheel axle fittings (Figure 3-5, Item 1). Add lubricant until the grease starts exiting the fitting. Refer to Table 4-4 for lubricant.
4. Wipe off excess grease with a cloth to prevent staining.
5. Lubricate the caster swivel bearing (Figure 3-5, Item 2). Add lubricant until grease starts exiting the fitting.
6. Wipe off excess grease with a cloth to prevent staining.

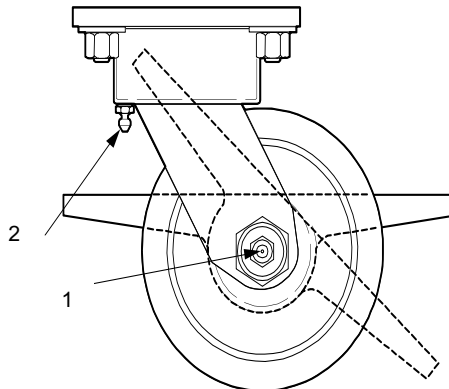


Figure 3-5. Lubricating the Swivel Bearing and the Axle Fittings.



Figure 3-6. Use the Grease Gun to Lubricate Casters.

Adjust or Remove Shelves from the Supply Cage

WARNING



Always use two people when moving the shelf. The weight of the shelf exceeds the recommended lifting limits for one person. Failure to do so could result in the HVASC toppling over or rolling away.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

NOTE

The shelf can be adjusted or removed to meet the requirements of the cargo.

1. Remove the tarp (Figure 3-7, Item 1) from the HVASC and secure, if present.

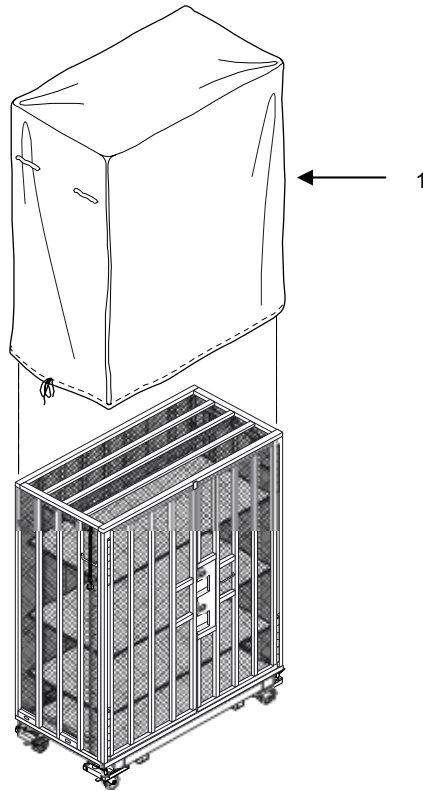


Figure 3-7. Removing the Tarp from the Portable Cage.

2. Open both doors to the cage.
3. Pull the shelf (Figure 3-8, Item 1) straight out from the cage and set aside.
4. Align shelf with the appropriate adjustment slot (Figure 3-8, Item 2) and slide the shelf into the cage.

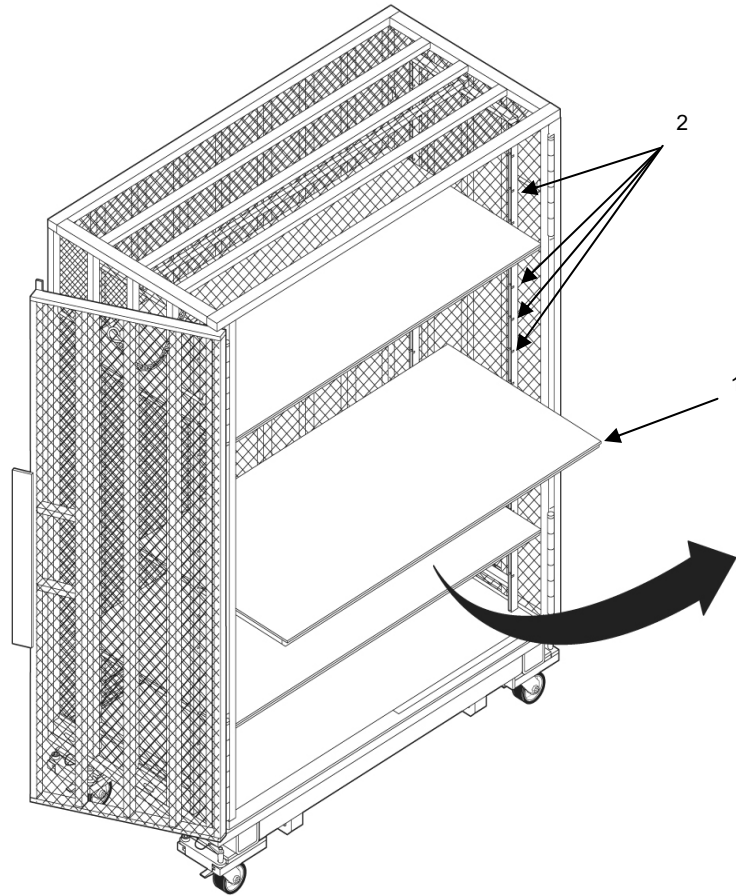


Figure 3-8. Adjusting or Removing Shelves.

Removing a Shelf from the Portable Cage

WARNING



Always use two people when moving the shelving unit. The weight of the shelf exceeds the recommended lifting limits for one person. Failure to do so could result in the HVASC toppling over or rolling away.

Do not lift an assembled Portable or individual top and bottom units from the top of the cage, only lift from the base of a cage. Do not use the handles or the top of the HVASC for lifting. Failure to comply could result in back injury.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

Only lift the HVASC to the minimum height needed to remove caster assembly. Over-lifting or raising one side of the HVASC too high may cause a serious tipping hazard. Failure to comply could result in injury to personnel.

NOTE

The shelves can be adjusted or removed to meet the requirements of the cargo.

NOTE

Ensure the S-hook safety chain has been removed from the shelf frame before removing the release pin.

1. Open the door to the cage.

NOTE

Support the left side of the shelf where the release pins are located.

2. Remove the shelf (Figure 3-9, Item 1), by removing the release pin (Figure 3-9, Item 2) from the rear of the cage.
3. Remove the release pin (Figure 3-9, Item 2) from the front of the cage out of the shelf frame.
4. Lower the shelf (Figure 3-9, Item 1) at an angle while maintaining support.



Figure 3-9. Removing a Shelf from the Portable Cage.

Installing a Shelf for the Portable Cage

1. Remove the tarp from the HVASC and secure, if present.

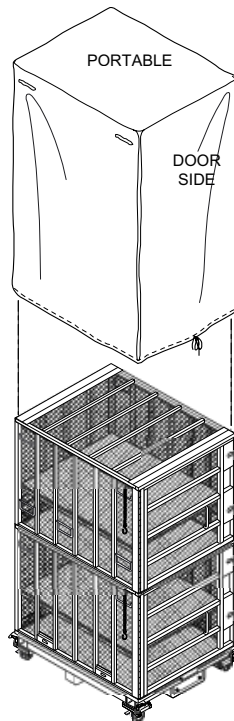


Figure 3-10. Portable HVASC with Cover.

2. Open the door to the cage.

WARNING



Always use two people when moving the shelving unit. The weight of the shelf exceeds the recommended lifting limits for one person. Failure to do so could result in the HVASC toppling over or rolling away.

Do not lift an assembled Portable or individual top and bottom units from the top of the cage, only lift from the base of a cage. Do not use the handles or the top of the HVASC for lifting. Failure to comply could result in back injury.

In the event of back injury, safely immobilize the victim and seek immediate medical attention.

Only lift the HVASC to the minimum height needed to remove caster assembly. Over-lifting or raising one side of the HVASC too high may cause a serious tipping hazard. Failure to comply could result in injury to personnel.

3. Install the shelf at an angle. Align the fixed pins (Figure 3-11, Item 1) in the shelf with the shelf adjustment holes (Figure 3-11, Item 2) within the cage. Raise the left side of the shelf and insert the first release pin (Figure 3-11, Item 3) through the shelf into the corresponding shelf adjustment hole from inside the HVASC.
4. Install the rear release pin to support the shelf.



Figure 3-11. Installing the Shelf for the Portable Cage.

5. Ensure release pins are fully engaged.
6. Load or unload the portable cage. Refer to page 3-25 for instructions.

NOTE

To prevent a tipping hazard, load heavy items in the bottom cage and then the top cage when assembled. Distribute the load evenly. Unload the top cage and then the bottom when assembled.

7. Disconnect the safety chains. Close the door and secure with padlock(s) (top and bottom).
8. Secure safety chain to the cage.

NOTE

Ensure the lettered side of the tarp marked "DOOR THIS SIDE" on the same side that the doors are located.

9. Place the tarp on the HVASC and tighten the draw cord.

Remove the Coat Rack Bar (Supply Only)

NOTE

The coat rack bar can be removed if more storage space is required.

1. Remove release pin (Figure 3-12, Item 1) from the coat rack bar (Figure 3-12, Item 2) on the top of the cage frame (Figure 3-12, Item 3).
2. Remove the coat rack bar (Figure 3-12, Item 2).

Install Coat Rack Bar (Supply Only)

1. Place the coat rack bar (Figure 3-12, Item 2) inside the cage and align with the top of the cage frame (Figure 3-12, Item 3).
2. Secure coat rack bar (Figure 3-12, Item 2) with release pin (Figure 3-12, Item 1).

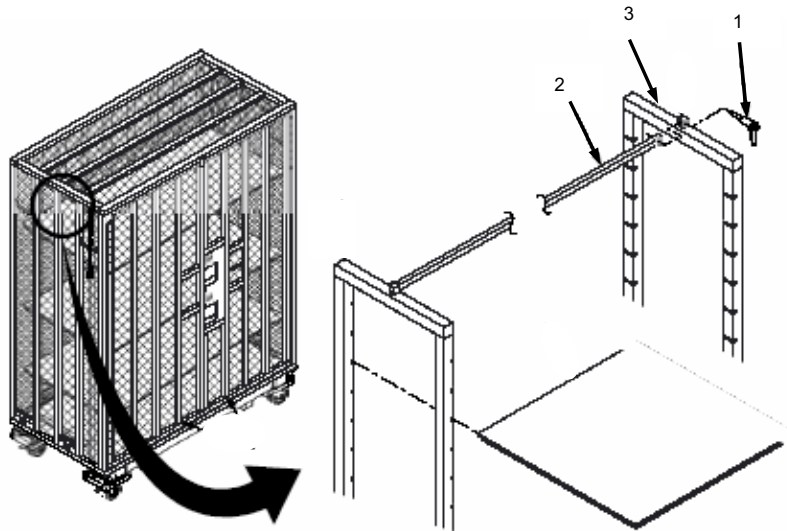


Figure 3-12. Removing or Inserting the Coat Rack Bar.

Moving or Transporting the Cage (Portable and Supply Cages)

1. Visually inspect the cage to ensure that it is serviceable and that any equipment or cargo is evenly distributed and secured within the cage.
2. Close doors to both top and bottom of the supply cage and lock with padlock(s). Close doors to the portable cage (Figure 3-13, Item 1) and secure with release pins (Figure 3-13, Item 2). Lock the portable cage with padlock(s).

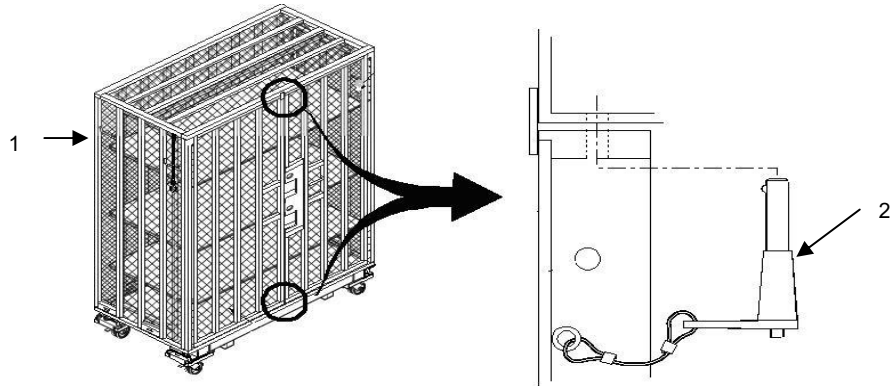
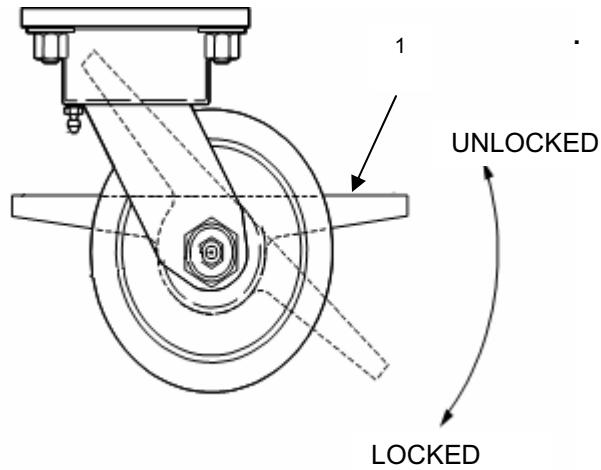


Figure 3-13. Securing the Supply Cage Doors.

3. Release the caster assembly locks (Figure 3-14, Item 1) so the wheels turn freely.



WARNING



The weight of the HVASC exceeds 900 pounds when empty. Exercise caution when moving the HVASC because of the weight. Two persons are required when moving the HVASC. One person pushes and guides the unit while the other pulls and steers. Failure to comply may result in injury to personnel.

WARNING



When moving the HVASC with forklifts and cranes, always lift from the bottom. Never connect hooks, chains, straps, shackles, or other items to the HVASC handles, tie-down points, or on top of the HVASC for lifting. Do not use the handles on top of the cages as lifting points. Over-lifting or raising one side of the HVASC too high causes a serious tipping hazard. Failure to comply may result in serious injury or death to personnel.

4. After the HVASC is in the desired location and there is clear access to the doors, lock the caster assemblies.

Disassembly of the Cage (Portable only)

1. Move the cage to a level surface.
2. Lock or remove the caster assemblies (Figure 3-15, Item 1) to prevent rolling of the HVASC. To remove the caster assembly, refer to page 3-7.

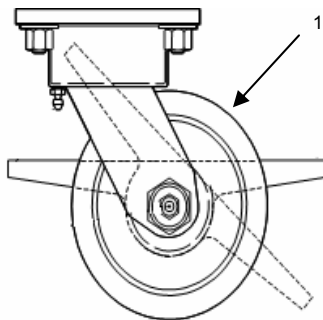


Figure 3-15. Lock Caster to prevent rolling.

WARNING



When loading the HVASC, ensure that the weight is balanced in both cages. There is a potential for the cage to tip if it is unbalanced. To prevent injury, unload from the top and then the bottom cage assembly. Failure to comply may result in injury to personnel.

3. Empty/Unload the top cage.



Figure 3-16. Upper Portable HVASC.

WARNING



The raised mesh metal on the cage has sharp edges. Use caution when removing the screws. Hands may get scraped along the sides of the top unit. Failure to do so may result in injury to personnel.

NOTE

It is recommended that the screws and nuts be secured with the bottom unit to prevent being misplaced.

NOTE

A mallet in conjunction with the hex tool may be necessary to loosen the screw.

4. Using the hex tool, loosen the four screws located in the floor of the top unit. Open the bottom unit door to catch the locking nuts. Twist the locking nuts free from the inside of the roof on the bottom unit. Refer to Figure 3-17.
5. Secure the screws.
6. Close the doors on the top and bottom cages.
7. Secure the doors with padlocks.

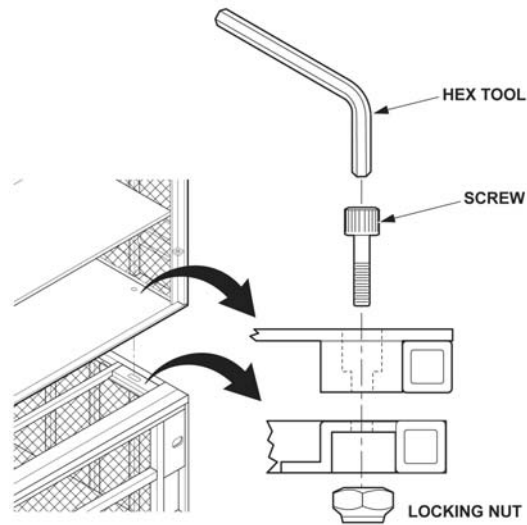


Figure 3-17. Disconnecting the Portable Cages.

WARNING



Use caution when lifting and carrying the top unit. Use the required number of persons to lift and carry the cage. Only lift the cage using the carrying handles and when the cage is empty. Only lift the HVACSC to the minimum height needed to remove caster assembly. Over-lifting or raising one side of the HVACSC too high may cause a serious tipping hazard. Failure to comply may result in injury to personnel.

Use proper lifting techniques and correct number of personnel when lifting the cage. The units are heavy and may be awkward to lift or move. Failure to do so may result in injury.

NOTE

Leave room between the cages to allow for the cage door to be opened.

8. Using the carrying handles (Figure 3-18, Item 1), lift the top unit straight up and place behind the bottom unit. Rotate the cage so that the door is facing the back of the bottom unit.

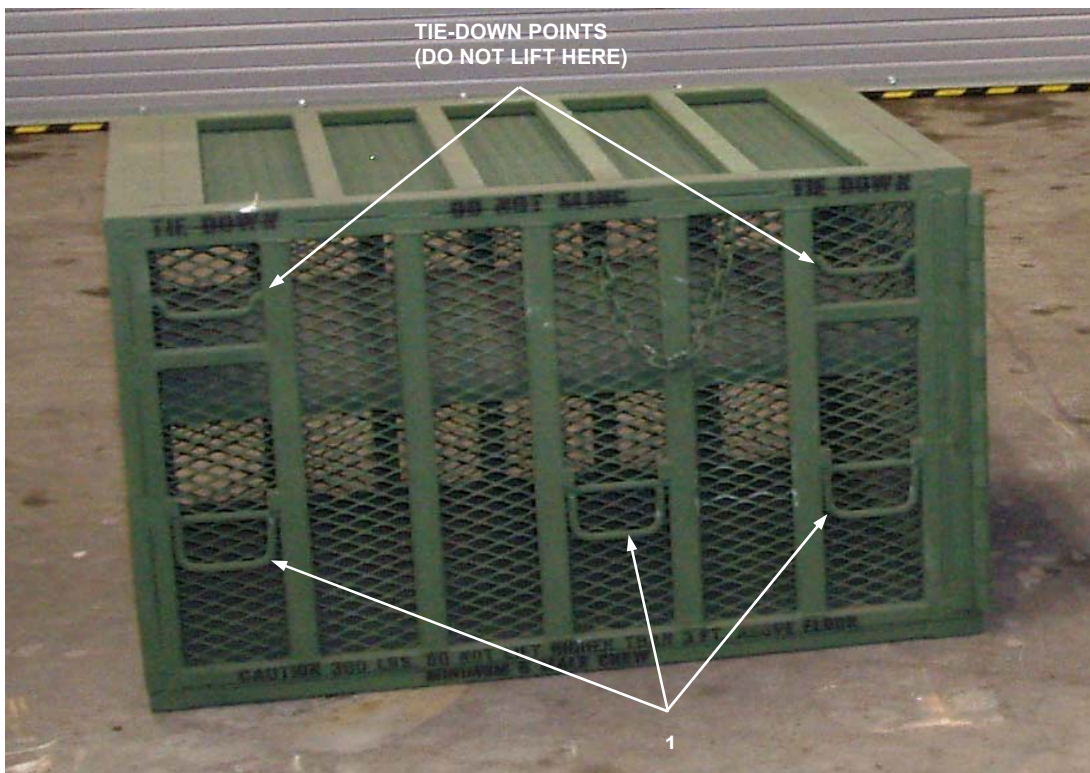


Figure 3-18. Portable HVACSC Carrying Handles.

Assembly of the Cage (Portable Only)

1. Unload the top cage.
2. Ensure the top and bottom units are on a level surface.
3. Lock or remove the caster assemblies to prevent rolling. Refer to page 3-7 to remove caster assembly.

WARNING



Use caution when lifting and carrying the top unit. Use six persons to lift and carry the cage. Only lift the cage when it is empty. Only lift the HVACSC to the minimum height needed to remove caster assembly. Over-lifting or raising one side of the HVACSC too high causes a serious tipping hazard. Failure to comply may result in injury to personnel.

Use proper lifting techniques and correct number of personnel when lifting the cage. The units are heavy and may be awkward to lift or move. Failure to do so may result in injury.

WARNING



Do not carelessly place hands and fingers in and around doors, hinges, release pins, shelf sides, or caster assemblies. This could result in pinched and injured hands and fingers. Failure to comply can result in injury to hands and fingers.

4. Using the carrying handles (Figure 3-19, Item 1), lift the top unit straight up and place on top of the bottom unit.
5. Align the units (Figure 3-19, Item 2). Unlock and open the doors to the top and bottom units. Insert the screws and secure with locking nuts.

NOTE

You may need pliers to secure locking nut.

6. Firmly tighten the screws using the hex tool.
7. Close doors and secure with padlocks.

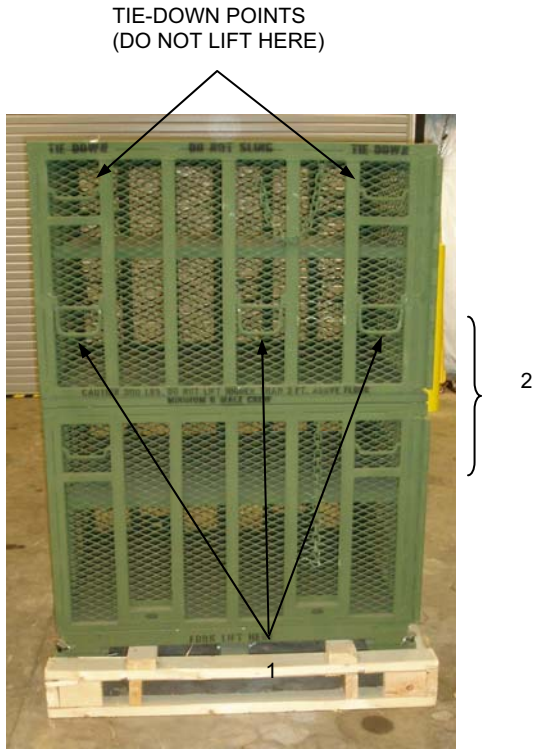


Figure 3-19. Portable Cage Assembly.

Loading and Unloading the Cage (Portable Only)

1. Conduct PMCS to ensure that the cage is ready for use. Refer to Table 3-1.
2. Move the cage to a level surface.
3. Lock the front caster assemblies by stepping on the lever to prevent the HVASC from rolling.
4. Remove the padlock(s). Place the padlocks on the door after opening for safekeeping.

WARNING



Do not carelessly place hands and fingers in and around doors, hinges, release pins, shelf sides, or caster assemblies. This could result in pinched and injured hands and fingers. Failure to comply can result in injury to hands and fingers.

5. Open the cage door (top or bottom) and attach the safety chain with the S-hook to the open door.

SAFETY CHAIN
(ATTACH "S" HOOK TO EXPANDED METAL)

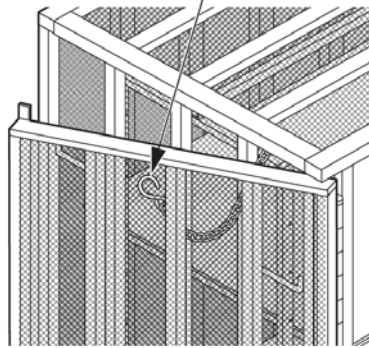


Figure 3-20. Safety Chain with S-Hook.

NOTE

To prevent a tipping hazard, load heavy items in the bottom cage and then the top cage when assembled. Distribute load evenly. Unload the top cage and then the bottom when assembled.

6. Load or unload the HVASC.
7. Disconnect the safety chains. Close the door and secure with padlock(s) (top and bottom).
8. Secure the safety chain to the cage.

NOTE

Place the lettered side of the tarp marked "DOOR THIS SIDE" on the same side that the doors are located.

9. Place the tarp on the HVASC and tighten the draw cord.

Loading and Unloading the Cage (Supply only)

1. Conduct PMCS in accordance with Table 3-1.
2. Move HVASC to a level surface.
3. Lock the front caster assemblies by stepping on the lever to prevent the HVASC from rolling.
4. Remove padlock(s) (Figure 3-21, Item 1). Place the padlocks back on the door after opening for safekeeping.

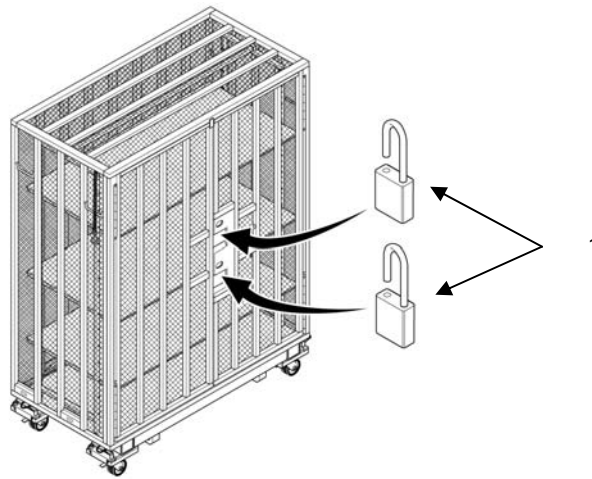


Figure 3-21. Removing Padlocks from the Supply Cage.

WARNING



Keep hands and fingers away from hinges and doors. Placing hands or fingers in these areas could result in pinched and injured hands and fingers. Failure to comply may result in injury to personnel.

5. Open the primary door (right side) and attach the S-hook of the safety chain.

**SAFETY CHAIN
(ATTACH "S" HOOK TO EXPANDED METAL)**

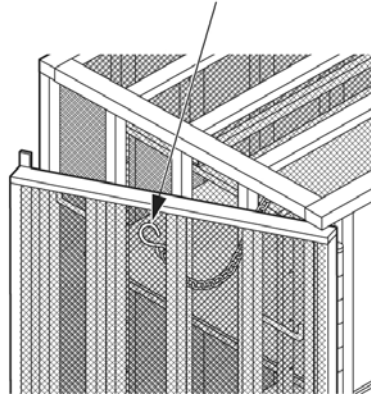


Figure 3-22. Attach Safety Chain to Cage Door.

6. Take out the release pins (Figure 3-23, Item 1) from the top and bottom (Figure 3-23, Item 2) of the secondary door (left side) and open. Attach S-hook of the safety chain Figure 3-23, Item 3).

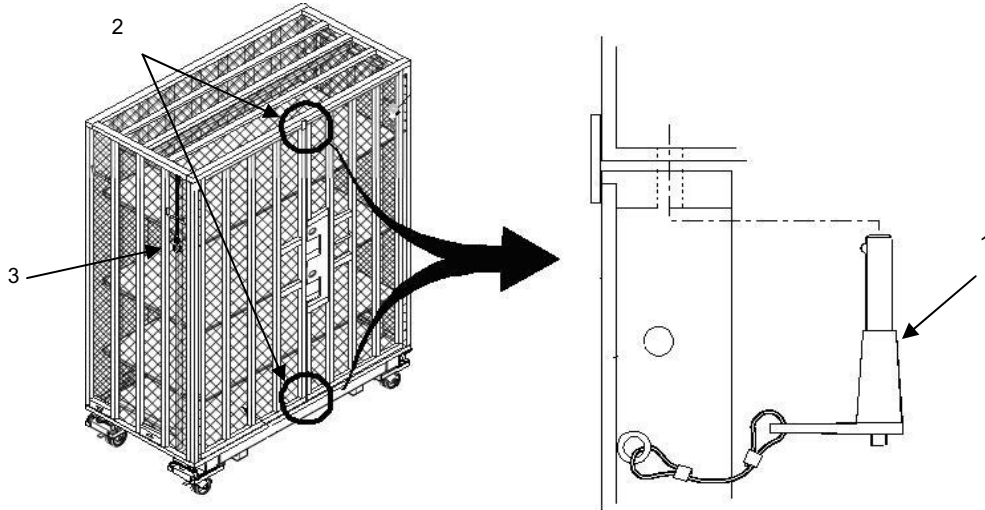


Figure 3-23. Removing Release Pins from the Secondary Doors.

WARNING



Use proper lifting techniques and correct number of personnel when loading or unloading the HVASC. The shelves are heavy and may be awkward to lift or move. Failure to comply may result in injury.

7. Load/unload the HVASC (Supply HVASC)

NOTE

To prevent a tipping hazard, load heavy items in the bottom cage and then the top cage when assembled. Distribute load evenly. Unload the top cage and then the bottom when assembled.

8. Disconnect the S-hook safety chains on both doors.
9. Close the primary door and secure with padlock(s).
10. Close the secondary door and secure with release pins on both the top and bottom of the cage.

NOTE

Ensure the lettered side of the tarp marked "DOOR THIS SIDE" on the same side that the doors are located.

11. Place the tarp (Figure 3-24, Item 1) on the HVASC and tighten the draw cord (Figure 3-24, Item 2).

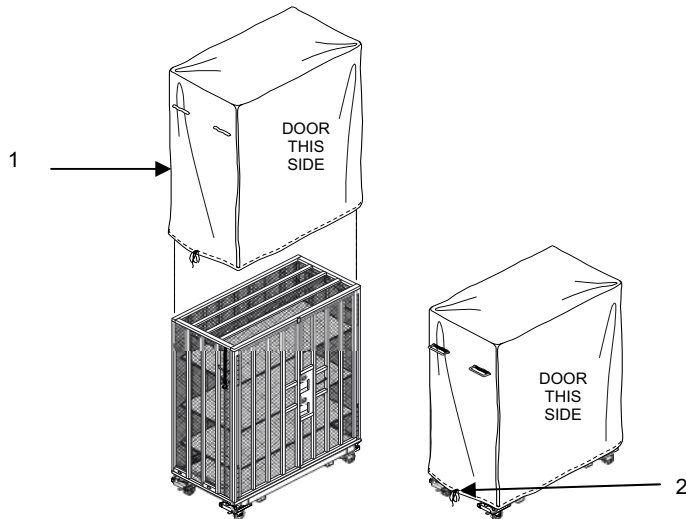


Figure 3-24. Placing the Tarp over the HVASC.

Placing the Cage in a Stationary Position for Storage (Portable and Supply)

1. Move HVASC to a level surface.

NOTE

If the tarp is on the HVASC, position the unit so there is free access to the side that is marked "DOOR THIS SIDE".

2. Lock the caster assemblies to prevent rolling of the HVASC.
3. Secure the HVASC to a fixed object or structure (Figure 3-25, Item 1) by pulling the chain (Figure 3-25, Item 2) through the attachment plate (Figure 3-25, Item 3) and securing it around or through a designated fixed object or other HVASC in the storage area.

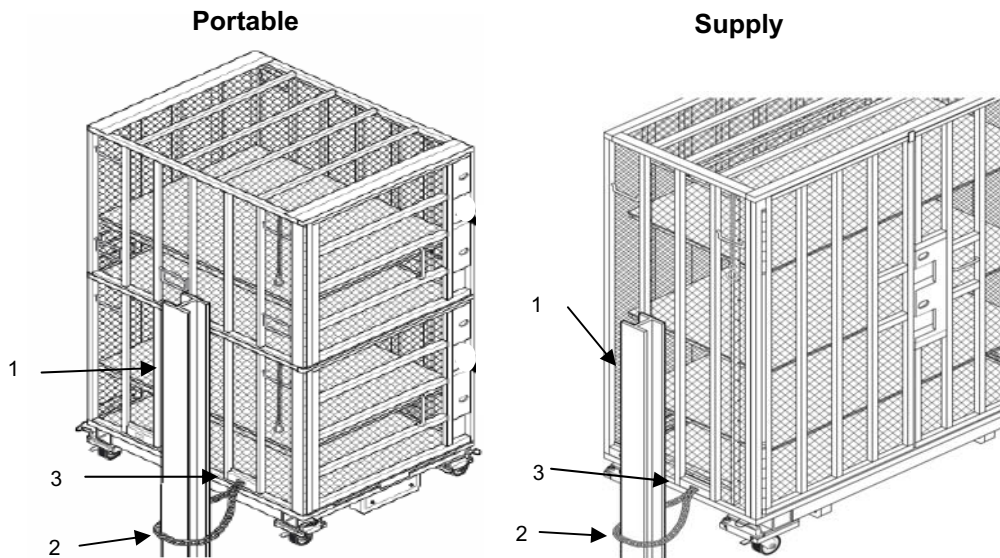


Figure 3-25. Securing the HVASCs.

NOTE

Use the bottom door on the Portable cage.

4. Open the cage door (Figure 3-26, Item 1).
5. Insert padlock shank (Figure 3-26, Item 2) from inside the cage and through the attachment plate hole (Figure 3-26, Item 3).
6. Place the link from one end of the chain onto the padlock shank (Figure 3-26, Item 2) and wrap the remainder of the chain around a fixed object or structure.
7. Insert the opposite end of the chain onto the padlock shank (Figure 3-26, Item 2).
8. Secure padlock and close the cage door.

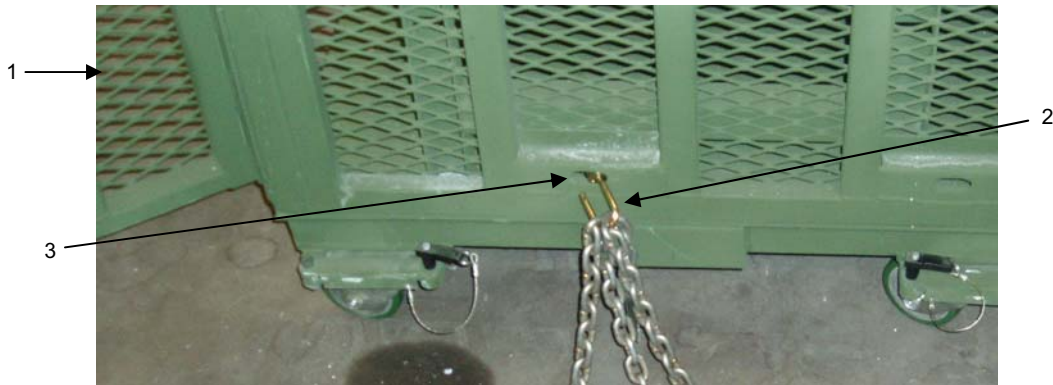


Figure 3-26. Placing the Cage in a Stationary Position.

9. Place the tarp on the HVASC and tighten the draw cord. Place the lettered side of the tarp marked "DOOR THIS SIDE" on the same side that the doors located.

Operations Under Emergency, Adverse, or Abnormal Conditions

Use caution when moving the HVASC over; uneven surfaces, slopes, soft earth, sand, mud, gravel, snow, or ice. Avoid this type of terrain if possible.

Cover the HVASC with the tarp when it is placed outdoors, or when stored indoors for long periods of time.

Lubricate caster assemblies as needed. Refer to page 3-10 for instructions.

PREPARATION FOR SHIPMENT AND STORAGE

Disassembly, Removal, and Packaging

The Portable HVASC may be shipped as one unit or as top and bottom individually. The only other disassembly appropriate for shipment is the removal of the caster assemblies. This is determined by the loading procedures set by the transporting authority or commercial carrier.

Securing

Secure the cage at the tie down points to the transport vehicle with: straps, shackles, or hooks. Do not use the carrying handles as tie down points. This also applies when the cages are transported separately. If you are planning on shipping the HVASC with the casters installed, ensure the caster assemblies are locked and additional wheel chocks are used.

Covering

The tarp should be used when transporting the Portable HVASC assembled. The tarp provides protection for cargo and the HVASC assemblies.

Shipping and Handling Precautions

NOTE

Caution must be taken when transporting the cage with the tarp on; look before moving to make sure cargo has not shifted.

When shipping the Portable HVASC loaded with equipment/cargo, secure the contents to prevent shifting while moving. Use the tie-down points to secure the cage during transport.

Verify that the following measures have been taken when transporting the HVASC:

- Cargo is evenly distributed and internally secured to prevent shifting
- Door locks and caster gates are properly secured
- When shipping the HVASC with the casters removed, place the casters inside or secure the casters to the HVASC to prevent loss.

Shipment and Unloading

When shipping the HVASC, use a forklift, pallet jack, or crane. Do not lift an assembled portable or individual top and bottom units from the tops, only from the base of a cage. Do not use the handles or the top of the HVASC for lifting.

Indoor and Outdoor Storage

NOTE

Always place the lettered side of the tarp marked "DOOR THIS SIDE" on the same side that the doors are located.

When placing the HVASC in storage, either indoor or outdoor, position the HVASC on a firm level surface and lock the caster assemblies to prevent rolling. Place the tarp on the HVASC and pull the draw cord at the bottom to secure. This will protect the cage and contents from various elements: dust, dirt, rain, frost, snow, and sun. It is recommended that when using the HVASC as a storage container, the cage should be secured to a fixed structure by a chain placed through the attachment plates. Refer to Placing the Portable and Supply Cages in a Stationary Position section for more detail procedures.

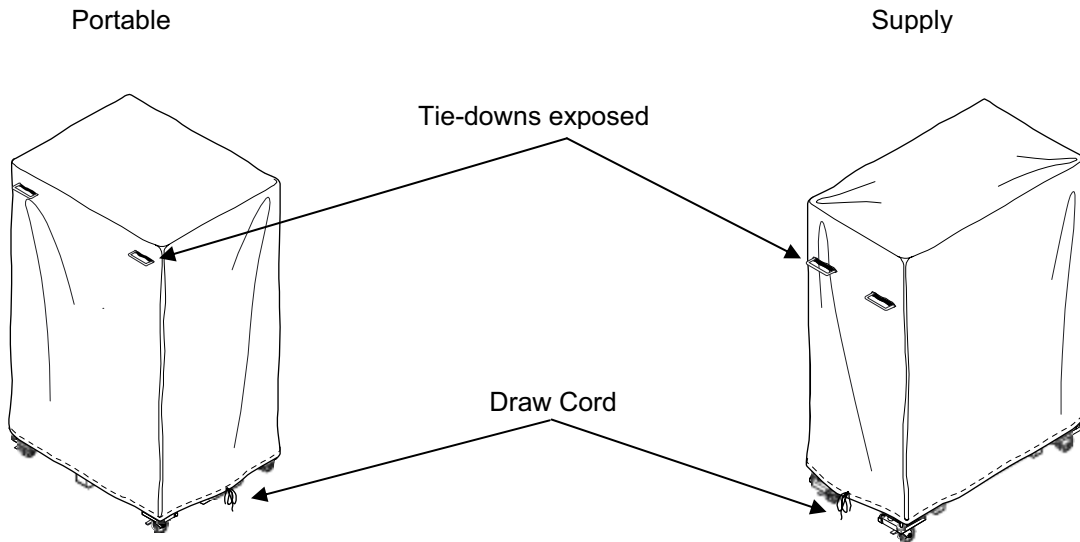


Figure 3-24. Storing the HVASC.

CHAPTER 4
SUPPORTING INFORMATION

COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

INTRODUCTION

Scope

This work package lists COEI and BII for the High Value Asset Security Cage (HVASC) 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 High Value Asset Security Cage (HVASC). 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 High Value Asset Security Cage (HVASC) in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the High Value Asset Security Cage (HVASC) 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 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) Item Number. Gives you the reference number of the item listed.

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

Column (3) Description, Part Number/(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 part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

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) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.

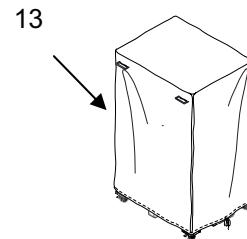
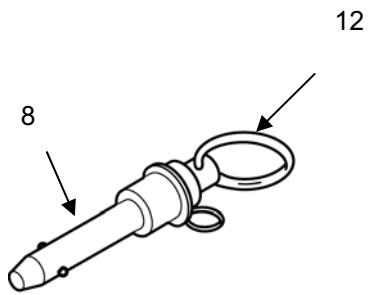
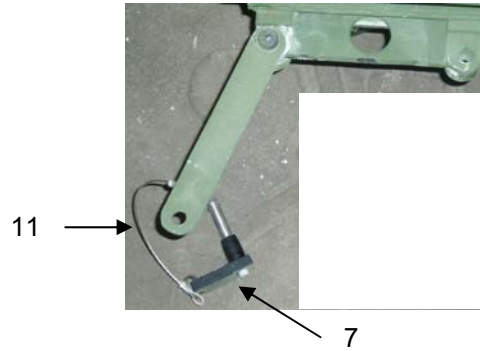
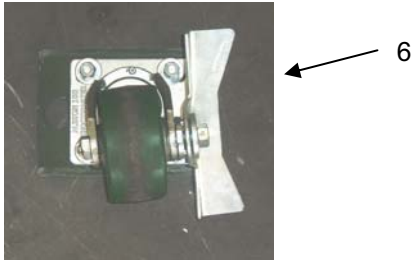
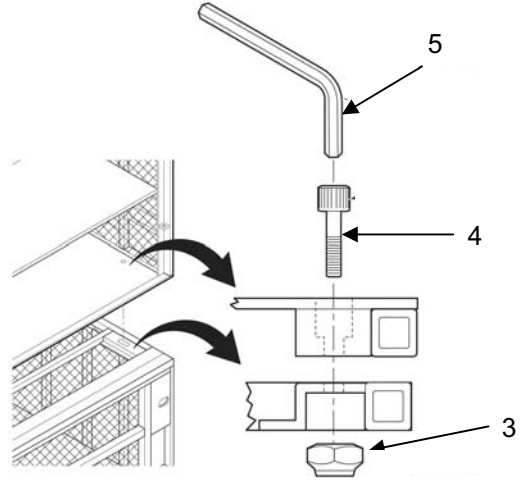
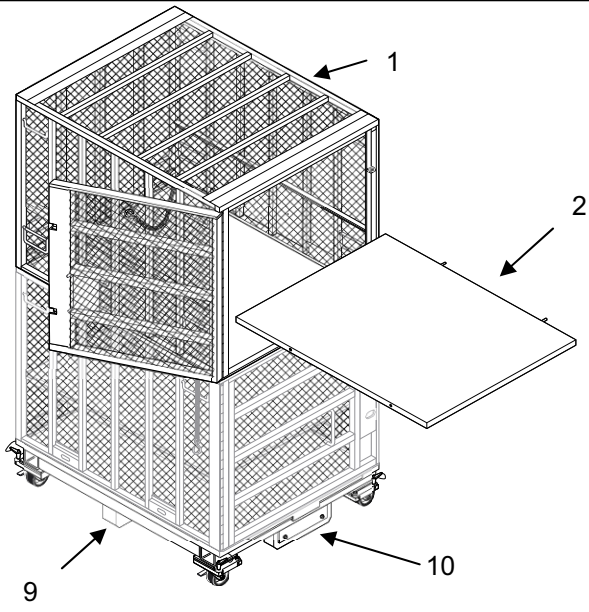


Table 4-1. Components of End Item (COEI) List for the Portable HVASC.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	5411-01-522-4822	HVASC, PORTABLE (TOP/BOTTOM UNIT) GREEN (80063) A3266557-1		EA	1
1	5411-01-522-4816	HVASC, PORTABLE (TOP/BOTTOM UNIT) TAN (80063) A3266557-2		EA	1
2		SHELF, PORTABLE (80063) A3266568		EA	2
3		NUT, NYLON LOCKING (1/2-20) (2V507) 90101A255		EA	4
4	5305-01-548-7873	SCREW, SHOULDER CAP (1/2-20 x 1.5") (2V507) 92196A387		EA	6
5	5120-00-198-5390	HEX TOOL (3/8") (80063) 7122A26		EA	1
6	5340-01-547-4341	CASTER, LOCKING (BRAKE) (81337) 17-2-1574-1		EA	4
7	5315-01-548-8054	PIN, QUICK RELEASE, L-HANDLE (3/8 x 1") (CASTERS) (2V507) 90302A311		EA	4
8	5315-01-296-7862	PIN, QUICK RELEASE, RING-GRIP (1/2 x 2") (SHELF) (2V507) 90382A094		EA	4
9		SKID WOOD, MIDDLE (80063) A3266561-93		EA	1
10		SKID WOOD, END (80063) A3266561-54		EA	2
11	4010-01-530-3295	LANYARD ASSEMBLY, LOOP EACH END (6") (39428) 30345T14		EA	4
12	5340-01-303-2997	HOLDER KEY (SPLIT RINGS OD 0.740) (39428) 90177A216		EA	4
13	5411-01-549-5844	TARP, COVER HVASC PORTABLE (GREEN) (80063) A3266571-2GR		EA	1
13	5411-01-549-5841	TARP, COVER HVASC PORTABLE (TAN) (80063) A3266571-2TN		EA	1

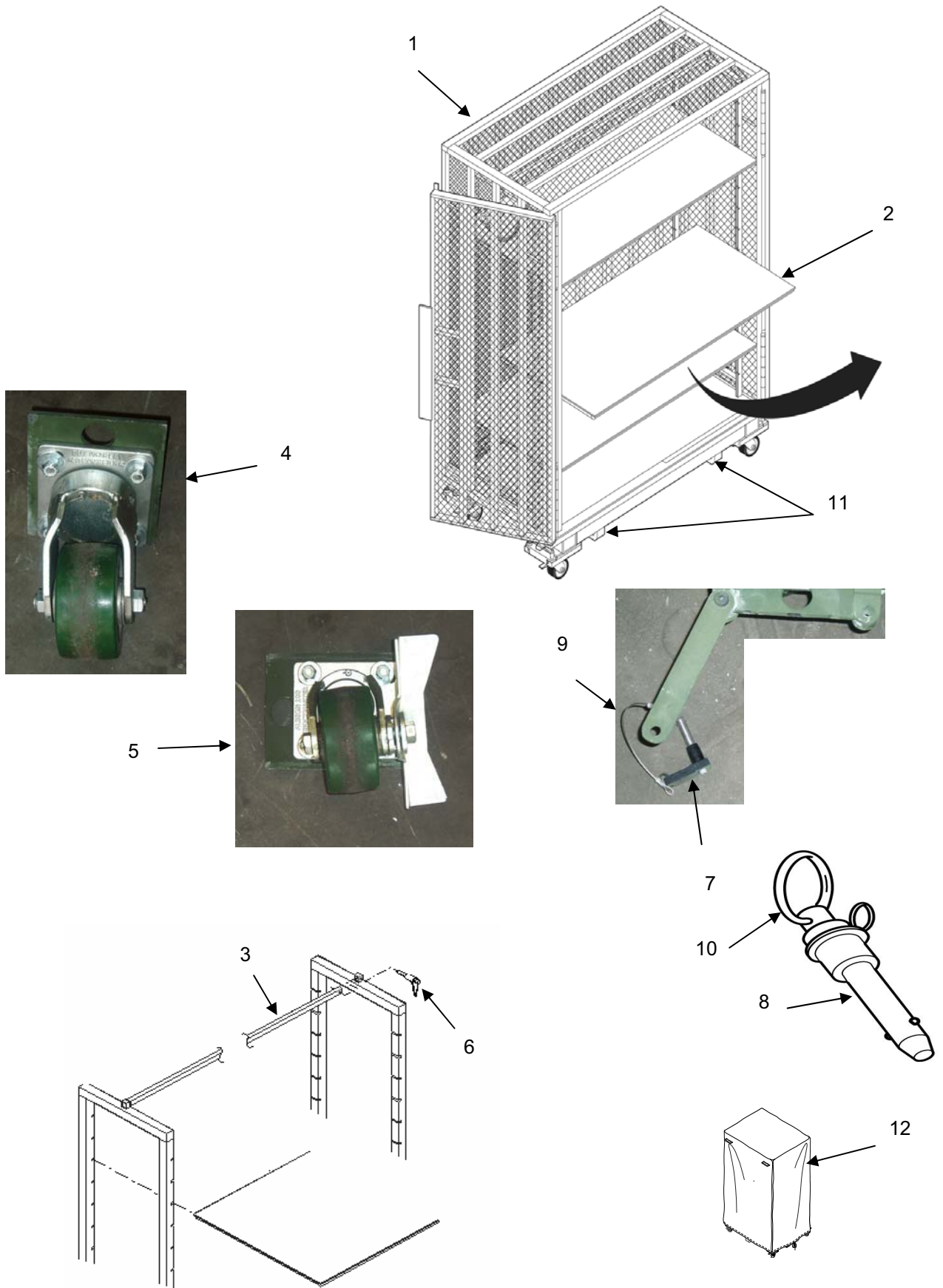


Table 4-2. Components of End Item (COEI) List for the Supply HVASC.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	5411-01-522-4821	HVASC, SUPPLY GREEN (80063) A3266548-1		EA	1
1	5411-01-522-4823	HVASC, SUPPLY TAN (80063) A3266548-2		EA	1
2		SHELF, SUPPLY (80063) A3266556		EA	4
3		COAT RACK BAR (80063) A3266548-99		EA	1
4	5340-01-547-6527	CASTER (NON LOCKING) (81337) 17-2-1574-1		EA	2
5	5340-01-547-4341	CASTER, LOCKING (BRAKE) (81337) 17-2-1574-2		EA	2
6	5315-01-443-9585	PIN, QUICK RELEASE, L-HANDLE (COAT RACK) (39428) 90302A312		EA	1
7	5315-01-548-8054	PIN, QUICK RELEASE, L-HANDLE (3/8 x 1") (CASTERS) (2V507) 90302A311		EA	4
8	5315-01-548-7885	PIN, QUICK RELEASE (1/2 x 2") (DOOR) (2V507) 90302A412		EA	2
9	4010-01-530-3295	LANYARD ASSEMBLY, LOOP EACH END (6") (39428) 30345T14		EA	7
10	5340-01-303-2997	HOLDER KEY (SPLIT RINGS OD 0.740) (39428) 90177A216		EA	7
11		SKID WOOD (80063) A326652-94		EA	2
12	5411-01-549-5843	TARP, COVER HVASC SUPPLY (GREEN) (80063) A3266571-1GR		EA	1
12	5411-01-549-5842	TARP, COVER HVASC SUPPLY (TAN) (80063) A3266571-1TN		EA	1

Table 4-2. Basic Issue Items list (BII).

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN)	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1		TM 10-5411-237-10		EA	1

ADDITIONAL AUTHORIZED LIST

INTRODUCTION

Scope

This work package lists additional items you are authorized for the support of the High Value Asset Security Cage (HVASC).

General

This list identifies items that do not have to accompany the High Value Asset Security Cage (HVASC) and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanation of Columns in the AAL

Column (1) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

Column (4) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (1).

Column (5) Qty Recm. Indicates the quantity recommended.

Table 4-3. Additional Authorized List.

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/(CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
4010-00-171-4427	CHAIN 20 FT (81348) RR-C-271		EA	1
4930-00-222-2680	GUN, FLUID, DIRECT DELIVERY (36251) 620		EA	1
5120-00-926-7716	MALLET		EA	1
5340-00-158-3805	PADLOCK 5200 SERIES (PORTABLE) (58536) AA59487-2S		EA	4
5340-00-158-3805	PADLOCK 5200 SERIES (SUPPLY) (58536) AA59487-2S		EA	2

EXPENDABLE AND DURABLE ITEMS LIST

Scope

This section lists expendable and durable items that you will need to operate and maintain the High Value Asset Security Cage (HVASC). This list is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts, and Heraldic Items), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item.

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item
C = Operator/Crew, O = Unit, F = Direct Support.

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Table 4-4. Expendable and Durable Items List.

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC)	(5) U/I
1	C	7930-00-068-1669	DETERGENT, GENERAL PURPOSE (83421)7930-00-068-1669	GL
2	C		LUBRICANT CASTER MYSTIK LT-200 (7X110) 665027002	EA
3	C	7920-00-148-9666	RAG, WIPING (80244) 7920-00-148-9666	BE

REFERENCES

SCOPE

This section lists all field manuals, regulations, forms and pamphlets referenced in this manual.

Field Manuals

FM 4-25.11 First Aid

Army Regulations

AR 700-138 Army Logistics Readiness and Sustainability

AR 190-11 Physical Security

Forms

DA 2404 Equipment Inspection and Maintenance Worksheet

SF 368 Product Quality Deficiency Report

DA Pamphlets

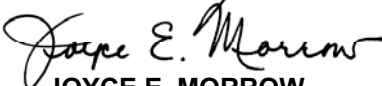
DA PAM 750-8 The Army Maintenance Management System (TAMMS) Users Manual

DA PAM 738-751 Functional Users Manual for the Army Maintenance Management Systems—
Aviation (TAMMS-A)

By Order of the Secretary of the Army:

GEORGE W. CASEY, JR.
General, United States Army
Chief of Staff

Official:


JOYCE E. MORROW
Administrative Assistant to the
Secretary of the Army
0721501

DISTRIBUTION: To be distributed in accordance with the initial distribution number 256941 requirements for TM 10-5411-237-10.

These are the instructions for sending an electronic 2028

The following format must be used if submitting an electronic 2028. The subject line must be exactly the same and all fields must be included; however, only the following fields are mandatory: 1, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, and 27.

From: "Whomever" <whomever@avma27.army.mil>
To: soldier.pubs@us.army.mil

Subject: DA Form 2028

1. From: Joe Smith
2. Unit: home
3. Address: 4300 Park
4. City: Hometown
5. St: MO
6. Zip: 77777
7. Date Sent: 19-OCT-93
8. Pub no: 55-2840-229-23
9. Pub Title: TM
10. Publication Date: 04-JUL-85
11. Change Number: 7
12. Submitter Rank: MSG
13. Submitter FName: Joe
14. Submitter MName: T
15. Submitter LName: Smith
16. Submitter Phone: 123-123-1234
17. Problem: 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. Text:

This is the text for the problem below line 27.

RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS For use of this form, see AR 25-30; the proponent agency is ODISC4.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE 21 October 2003
TO: (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT 15 KANSAS ST NATICK, MA 01760-5052						FROM: (Activity and location) (Include ZIP Code) PFC JANE DOE Co A 3 RD Engineer Br. Ft Leonard Wood, MO 63108	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 10-1670-296-23&P						DATE 30 October 2002	TITLE Unit Manual for Ancillary Equipment for Low Velocity Air Drop Systems
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible).	
	0036 00-2				1	<i>In Table 1, Sewing Machine Code Symbols, the second sewing machine code symbol should be MDZZ not MD22</i> <i>Change the manual to show Sewing Machine, Industrial: Zig-Zag; 308 stitch; medium-duty; NSN 3530-01-181-1421 as a MDZZ code symbol.</i>	
*Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE Jane Doe, PFC				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION (508) 233-4141 DSN 256-4141		SIGNATURE Jane Doe Jane Doe	

TO: <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT 15 KANSAS ST NATICK, MA 01760-5052	FROM: <i>(Activity and location) (Include ZIP Code)</i> PFC JANE DOE Co A 3 RD Engineer Br. Ft Leonard Wood, MO 63108	DATE 21 October 2003
--	--	--------------------------------

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

PUBLICATION NUMBER TM 10-1670-296-23&P	DATE 30 October 2002	TITLE Unit Manual for Ancillary Equipment for Low Velocity Air Drop Systems
---	-------------------------	--

PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
0066 00-1					4			<i>Callout 16 in figure 4 is pointed to a D-Ring. In the Repair Part List key for Figure 4, item 16 is called a <u>Snap Hook</u>. Please correct one or the other.</i>

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						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is ODISC4.							
TO: (Forward to proponent of publication or form) (Include ZIP Code) Commander U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT Kansas Street, Natick, MA 01760-5052.						FROM: (Activity and location) (Include ZIP Code)	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 10-5411-237-10				DATE 10 Aug 2007		TITLE High Value Asset Security Cage (HVASC): Portable and Supply	
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible).	
*Reference to line numbers within the paragraph or subparagraph.							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TO: <i>(Forward direct to addressee listed in publication)</i> Commander U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT Kansas Street, Natick, MA 01760-5052.	FROM: <i>(Activity and location) (Include ZIP Code)</i>	DATE
---	--	-------------

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

PUBLICATION NUMBER TM 10-5411-237-10	DATE 10 Aug 2007	TITLE High Value Asset Security Cage (HVASC): Portable and Supply
---	---------------------	---

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						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE
For use of this form, see AR 25-30; the proponent agency is ODISC4.							
TO: (Forward to proponent of publication or form) (Include ZIP Code) Commander U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT Kansas Street, Natick, MA 01760-5052.						FROM: (Activity and location) (Include ZIP Code)	
PART I - ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 10-5411-237-10				DATE 10 Aug 2007		High Value Asset Security Cage (HVASC): Portable and Supply	
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO. *	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible).	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TO: <i>(Forward direct to addressee listed in publication)</i> Commander U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LC-SECT Kansas Street, Natick, MA 01760-5052.	FROM: <i>(Activity and location) (Include ZIP Code)</i>	DATE
---	--	-------------

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

PUBLICATION NUMBER TM 10-5411-237-10	DATE 10 Aug 2007	TITLE High Value Asset Security Cage (HVASC): Portable and Supply
---	---------------------	---

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
----------------------------	--	-----------

The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
 1 decimeter = 10 centimeters = 3.94 inches
 1 meter = 10 decimeters = 39.37 inches
 1 dekameter = 10 meters = 32.8 feet
 1 hectometer = 10 dekameters = 328.08 feet
 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
 1 decigram = 10 centigrams = 1.54 grains
 1 gram = 10 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 3.52 ounces
 1 kilogram = 10 hectograms = 2.2 pounds
 1 quintal = 100 kilograms = 220.46 pounds
 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
 1 deciliter = 10 centiliters = 3.38 fl. ounces
 1 liter = 10 deciliters = 33.81 fl. ounces
 1 dekaliter = 10 liters = 2.64 gallons
 1 hectoliter = 10 dekaliters = 26.42 gallons
 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
 1 cu. meter = 1000 cu. decimeters = 35.31 feet

Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

 °F Fahrenheit temperature $\times \frac{5}{9}$ (after subtracting 32) = Celsius temperature °C

