*TM 10–3510–221–10

TECHNICAL MANUAL

OPERATOR'S MANUAL

FOR

LAUNDRY ADVANCED SYSTEM (LADS)

(NSN: 3510–01–463–0114)

*This manual supercedes TM 10–3510–221–10 dated 01 October 2000.

HEADQUARTERS, DEPARTMENT OF THE ARMY

31 OCTOBER 2003

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WARNING SUMMARY

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

WARNING

The Laundry Advanced System requires 208 VAC, 3–phase, and 110 VAC, single–phase, 50–60 Hz electrical power to operate the various subsystems. Only maintenance personnel shall conduct servicing, beyond troubleshooting on electrical controls and circuits. Contact with energized connections will result in serious personal injury or death.

WARNING

The fuel, JP–8 or DF–2, used in the Laundry Advanced System is a combustible liquid. Vapors and liquid may ignite or explode. Do not smoke or use open flames when connecting fuel hoses, refueling, or when performing maintenance. Flames and fire can occur resulting in severe burns, personal injury, or death.

WARNING

The Laundry Advanced System contains rotating and vibrating equipment. Never climb into the laundry drum. Personnel must keep their hands, feet, clothing, and loose personal items clear while equipment is operating. Failure to follow this warning may result in serious personal injury or death.

WARNING

Thermal heat exchanger fluid can reach temperature near 400 degrees F when the heating system is operating.T Operators must ensure the “cool down” cycle has been run prior to performing PMCS. Avoid contact with equipment surfaces. Personnel conducting maintenance must wear impermeable gloves and googles for protection. Failure to follow this warning may result in severe burn injury to personnel.

WARNING

Exhaust discharge contains deadly gases. Do not operate the Laundry Advanced System in an enclosed area unless exhaust discharge is properly vented outside. Severe personal injury or death due to carbon monoxide poisoning could result.

WARNING

When the Laundry Advanced System is operating, the noise levels at the roadside of the equipment could cause noise induced hearing loss. Hearing protection must be worn at all times when working near this equipment.

WARNING

When the Laundry Advanced System is operating in a sheltered environment the noise levels could cause noise induced hearing loss. Hearing protection must be worn at all times when working near this equipment.

WARNING SUMMARY – Continued

WARNING

Detergent, sanitizer, and anti–foam used with the Laundry Advanced System are irritants. Operators must refer to Material Safety Data Sheets for pertinent information. Impermeable gloves and eye protection must be worn when handling or dispensing these items. Failure to follow this warning may result in personal illness or injury.

WARNING

Waste water generated during laundry operations may contain chemical and/or biological materials. When maintaining or servicing water plumbing or associated components, personnel must wear impermeable gloves and goggles for protection. Failure to follow this warning may result in serious illness.

WARNING

Precautions must be taken when working with pressurized (air, water, steam, or thermal fluid) systems. Residual pressure must be vented or isolated to prevent release before hoses, fittings, or equipment are connected or disconnected. Failure to follow this warning may result in personal injury or death.

WARNING

Keep hands and fingers away from hinge points on ladder halves when opening and closing. Keep hands and fingers away from inner and outer rungs of ladder when adjusting. Never climb on ladder unless knobs and inner locking devices are properly tightened, footings are placed securely upon ground, and/or ladder is placed securely upon equipment to prevent slipping. Failure to observe this precaution may result in severe personal injury.

WARNING

Before moving the Laundry System, ensure that all loose equipment is properly stowed and that nothing will drag on the ground. Failure to follow this warning may result in injury to personnel or damage to equipment.

WARNING

Improper cleaning methods and use of unauthorized cleaning liquids or solvents can injure personnel and damage equipment. To prevent this, refer to TM 9–247 for further instructions.

WARNING

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Wear protective clothing (goggles/shield, gloves, etc.), and use caution to avoid injury to personnel.

INSERT LATEST UPDATED PAGES/WORK PACKAGES, DESTROY SUPERSEDED DATA.

LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: The portion of the text affected by the updates is indicated by a vertical line in the outer margins of the page. Updates to illustrations are indicated by miniature pointing hands. Updates to wiring diagrams are indicated by shaded areas.

Dates of Issue for original and updated pages / work packages are:

Original.... 0 ...31 OCTOBER 03

TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 16, AND TOTAL NUMBER OF WORK PACKAGES IS 59 CONSISTING OF THE FOLLOWING:

Page / WP No.	* Revision No.	Page / WP No.	* Revision No.	Page / WP No.	* Revision No.
Title	0				
a thru b	0				
A/(B Blank)	0				
i thru iv	0				
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Electronic 2028 Instructions	0				
Sample DA 2028	0				
DA 2028(s)	0				

*** Zero in this column indicates an original page or work package.**

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HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 31 OCTOBER 2003

TECHNICAL MANUAL

OPERATOR'S MANUAL
FOR
LAUNDRY ADVANCED SYSTEM (LADS)

(NSN: 3510–01–463–0114)

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), or DA Form 2028–2, located in the back of this manual directly to: Commander, US Army Soldier and Biological Chemical Command, ATTN: AMSSB–RIM–L(N), Kansas St., Natick, MA 01760. You may also submit your recommended changes by E–mail directly to: <amssbriml@natick.army.mil>. A reply will be furnished directly to you. Instructions for sending electronic 2028 may be found at the back of this manual immediately preceding the hard copy 2028.

*This manual supercedes TM 10–3510–221–10 dated 01 October 2000.

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REAR MATTER

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HOW TO USE THIS MANUAL

In this manual, primary chapters appear in upper case/capital letters; work packages are presented in numeric sequence, e.g., 0001 00; paragraphs within a work package are not numbered and are presented in a titles format. For a first level paragraph title all upper case/capital letters , e.g., INTRODUCTION, the next subordinate paragraph title will have the first letter of the first word and of each principle word all upper case/capital letters , e.g., Still Operation. The location of additional material that must be referenced is clearly marked. Figures supporting maintenance procedures/text are located as close as possible to their references.

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

CHAPTER 1 – INTRODUCTION. Chapter 1 contains general information, equipment description, and theory of operation.

CHAPTER 2 – OPERATOR INSTRUCTIONS. Chapter 2 contains a description and use of operator controls and indicators, operating procedures under usual conditions, and operating procedures under unusual conditions.

CHAPTER 3 – TROUBLESHOOTING PROCEDURES. Chapter 3 contains general troubleshooting information, a troubleshooting index, and troubleshooting procedures authorized at operator level.

CHAPTER 4 – MAINTENANCE INSTRUCTIONS. Chapter 4 provides preventive maintenance checks and services (PMCS), lubrication instructions, and maintenance procedures authorized at operator level.

CHAPTER 5 – SUPPORTING INFORMATION. Chapter 5 contains references, components of end item (COEI) list, basic issue items list (BII) list, additional authorization list (AAL), and expendable and durable items list.

REAR MATTER – Rear matter consists of alphabetical index, DA Form 2028, authentication page, and back cover.

LAUNDRY ADVANCED SYSTEM
(NSN 3510–01–463–0114)
GENERAL INFORMATION

SCOPE

This manual contains instructions for operation, troubleshooting, PMCS and maintenance procedures for the Laundry Advanced System (LADS).

Type of Manual: Operator.

Model Number and Equipment Names: Laundry Advanced System.

Purpose of Equipment: The system is used to perform field laundering of Army clothing and equipment.

Maintenance Forms, Records and Reports.

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 738–750, The Army Maintenance Management System (TAMMS), DA PAM 738–751, The Army Maintenance Management System–Aviation (TAMMS–A); or AR 700–138, The Army Logistics Readiness and Sustainability.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Laundry Advanced System 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 (Product Quality Deficiency Report). Mail it to the address specified in DA PAM 738–750, The Army Maintenance Management System (TAMMS), or as specified by the contracting activity. 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 SF 368, Product Quality Deficiency Report. Use of keywords such as "corrosion, "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in DA PAM 738–750, The Army Maintenance Management System (TAMMS).

DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

References to "destruction of Army materiel to prevent enemy use" are contained in TM 750–244–3.

PREPARATION FOR STORAGE AND SHIPMENT

Refer to PREPARATION FOR MOVEMENT (WP 0014 00).

WARRANTY INFORMATION

The Laundry Advanced System does not contain warranty provisions.

NOMENCLATURE CROSS–REFERENCE LIST

Common Name	Official Nomenclature
LADS	Laundry Advanced System
Laundry Unit	Laundry Advanced System

LIST OF ABBREVIATIONS

ac	alternating current
C	Centigrade
CAGEC	Commercial and Government Entity Code
cm	centimeter
CCW	Counter–Clockwise
CW	Clockwise
CPC	Corrosion Prevention and Control
DA	Department of the Army
dc	direct current
EIR	Equipment Improvement Recommendation
ESD	Electrostatic Discharge Sensitive
F	Fahrenheit
FRS	Finish Reapplication System
ft	foot
Gal	gallon
GFI	Ground Fault Interrupt
hp	horsepower
h	hour
Hz	Hertz (frequency or cycles per second)
in	inches
I/O	Input/Output
ISO	International Organization for Standardization
kg	Kilogram
kW	Kilowatt
kPa	Kilopascal

LIST OF ABBREVIATIONS – Continued

l	liter
ltrs	liters
lbs	pounds
MAC	Maintenance Allocation Chart
NSN	National Stock Number
PCB	Printed Circuit Board
PMCS	Preventive Maintenance Checks and Services
psi	Pounds per square inch
psig	Pounds per square inch gage
RPM	Revolutions Per Minute
RPSTL	Repair Parts and Special Tools List
SCF	Standard Cubic Feet
SMR	Source, Maintenance, and Recoverability [Code]
SSR	Solid State Relays
TM	Technical Manual
TMDE	Test, Measurement, and Diagnostics Equipment
VAC	Volts Alternating Current
VDC	Volts Direct Current

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CHAPTER 1

INTRODUCTORY INFORMATION WITH

THEORY OF OPERATION

FOR

LAUNDRY ADVANCED SYSTEM

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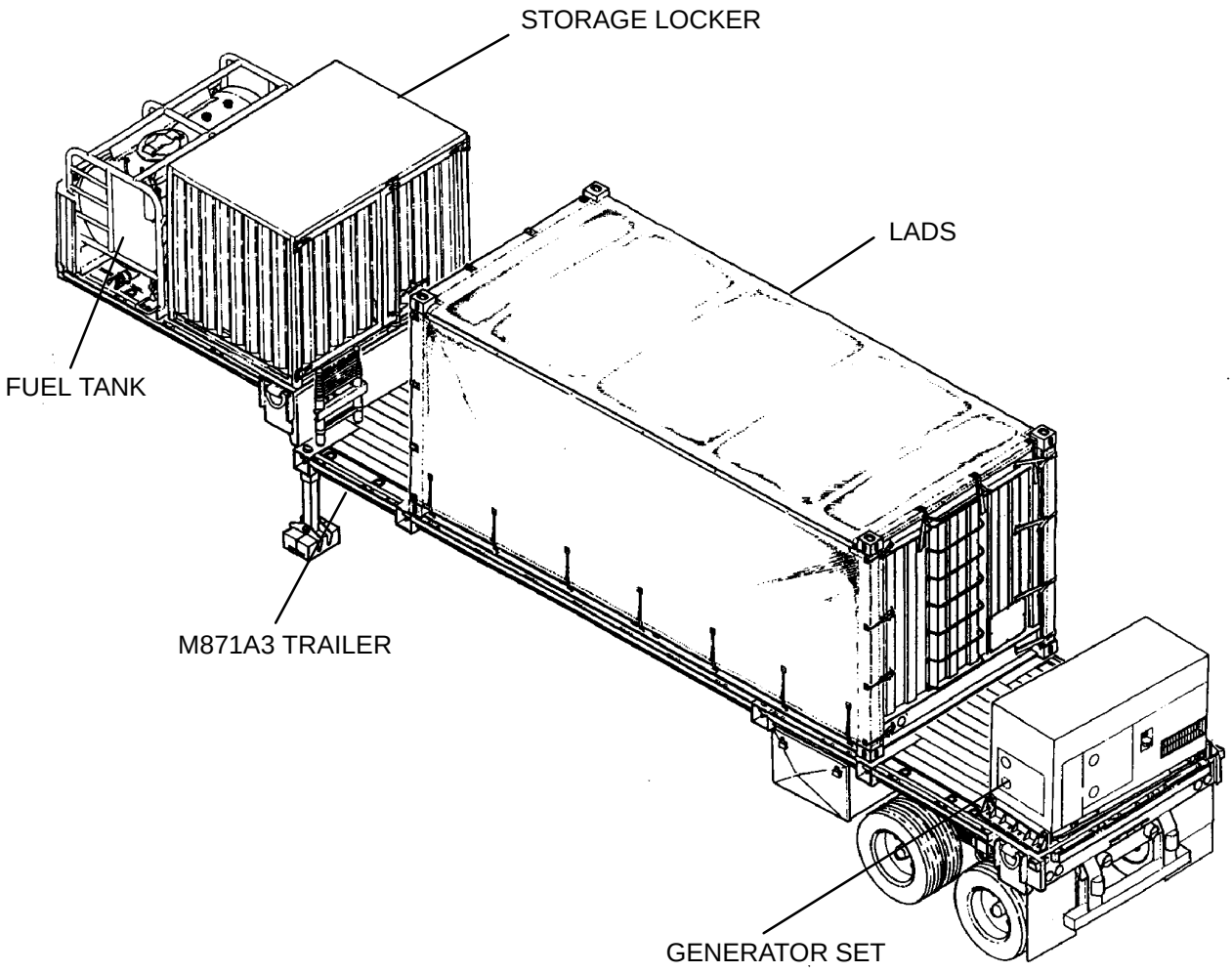
LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

EQUIPMENT DESCRIPTION AND DATA

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

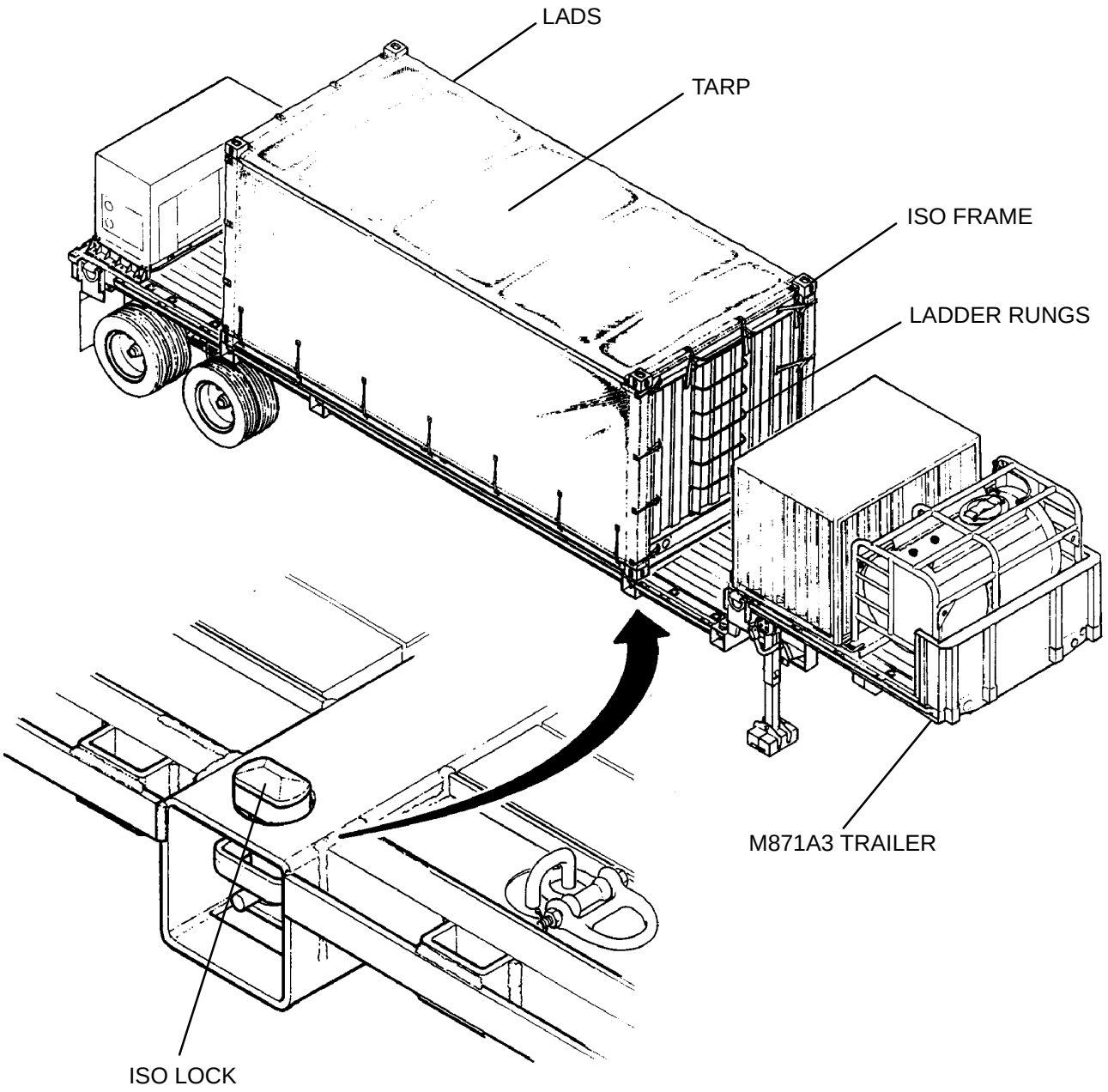
The Laundry Advanced System (LADS) consists of two washing/drying systems. The LADS also includes a water recycle system, heating system, air system, and control system. These systems support the operation of both washing/drying systems. The LADS components are mounted on an International Organization for Standardization (ISO) frame which is mounted on a 22–1/2 ton M871A3 semi–trailer. The LADS uses external electrical power. This power is normally provided by a 30 kilowatt (kW), MEP–805A Tactical Quiet Generator Set. The LADS can also be operated with other field generators or commercial power. The LADS requires an external supply of potable water and an external supply of JP–8 fuel. Fuel is normally provided from a 400–gallon fuel tank. A storage locker is provided to store accessories, auxiliary equipment, and consumables.



LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

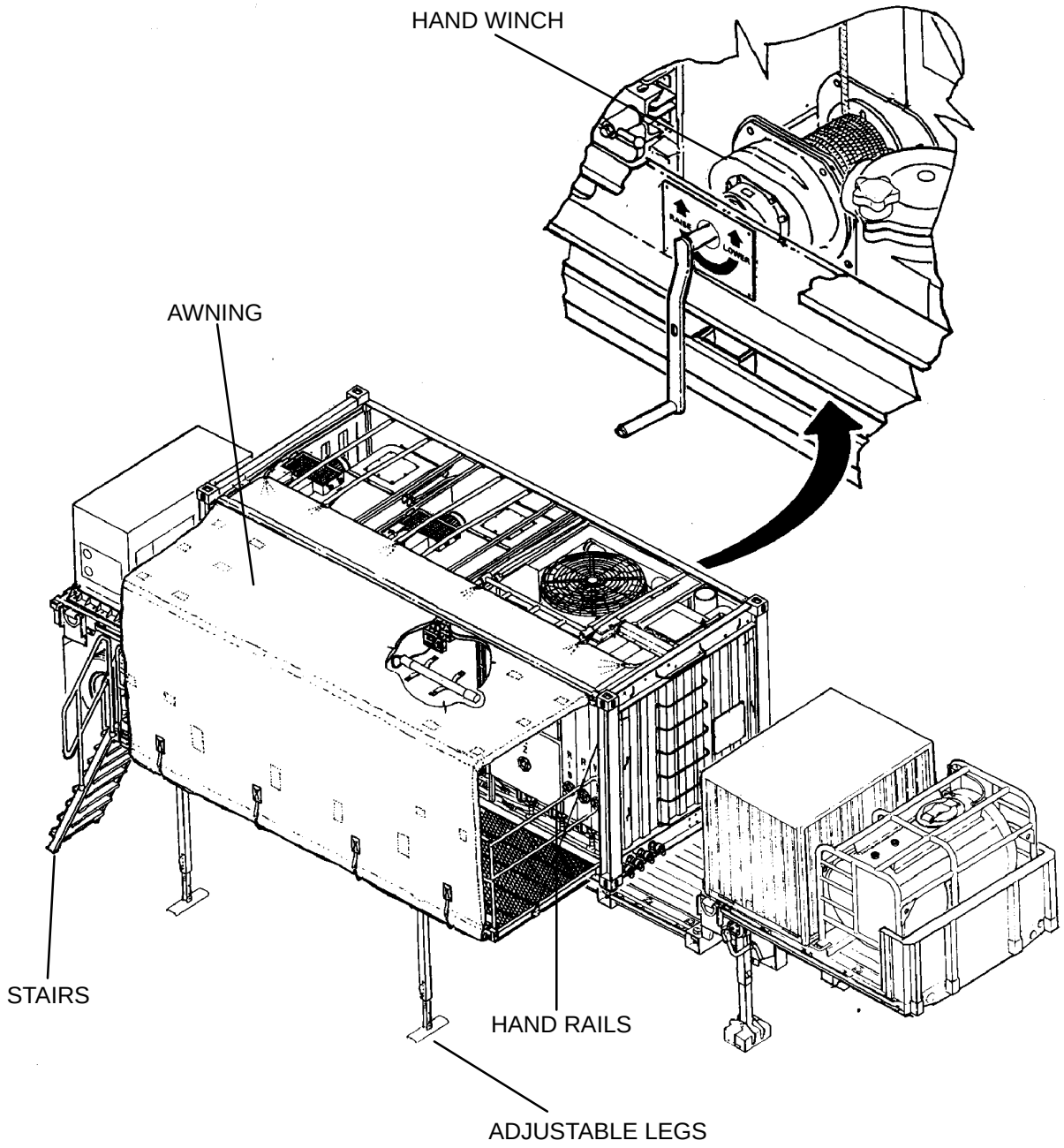
ISO FRAME

The LADS components are mounted to an 8 foot (ft) wide X 8 ft high X 20 ft long ISO frame. The frame mounts to the M871A3 Trailer via ISO locks. Ladder rungs are provided at both ends of the frame to access the top of the LADS. A protective tarp is provided to cover the front, rear, and top of the LADS during transport.



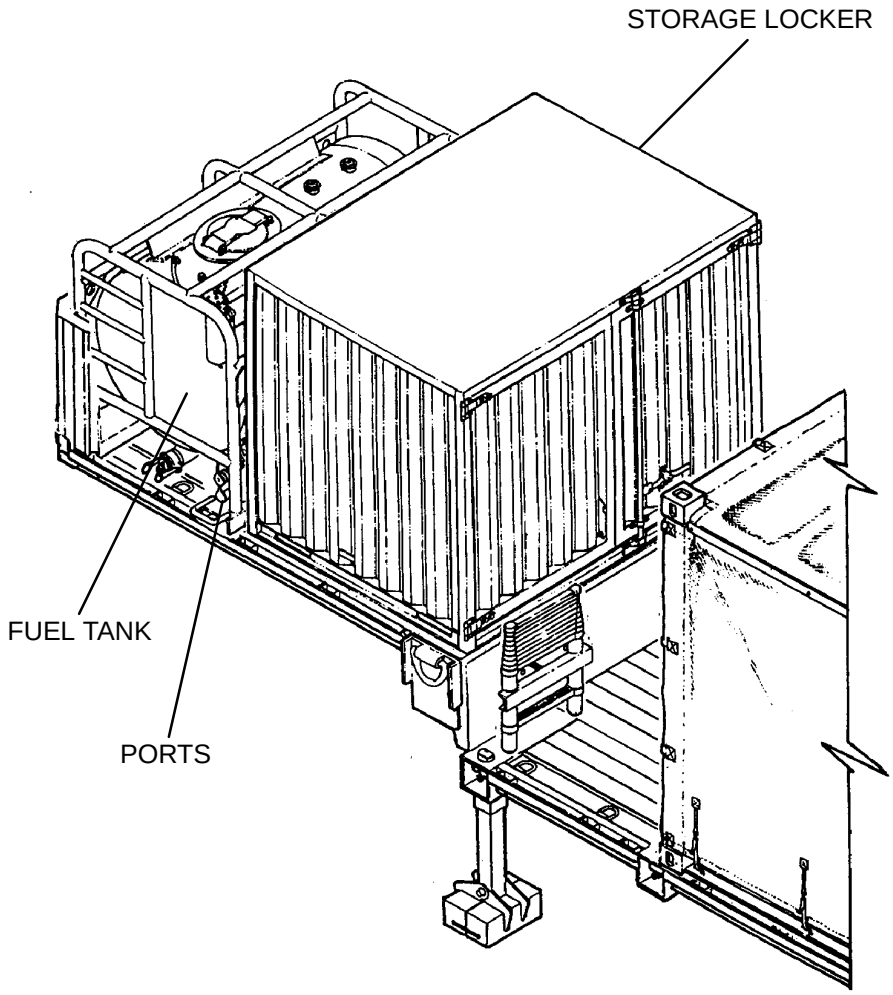
PLATFORM

A work platform is provided at the curbside of the LADS to facilitate laundry and maintenance operations. A hand winch is used to raise and lower the platform. Two adjustable legs are provided to support the front of the platform. Hand rails are provided at the platform sides to prevent personnel from falling. Stairs are located on the side of the platform for ground-level access. The protective tarp used to cover the LADS during transport converts into an awning to protect personnel on the platform from exposure to rain, sun, and wind.



STORAGE LOCKER AND FUEL TANK

A 400–gallon fuel tank and storage locker are mounted on the upper deck of the trailer. The fuel tank has ports that connect directly to the LADS heater and 30 kW generator. The storage locker has a 200 cubic foot capacity and is used to store the LADS accessories, auxiliary equipment, and consumable supplies. Document holders are also provided for storage of the LADS Technical Manuals.

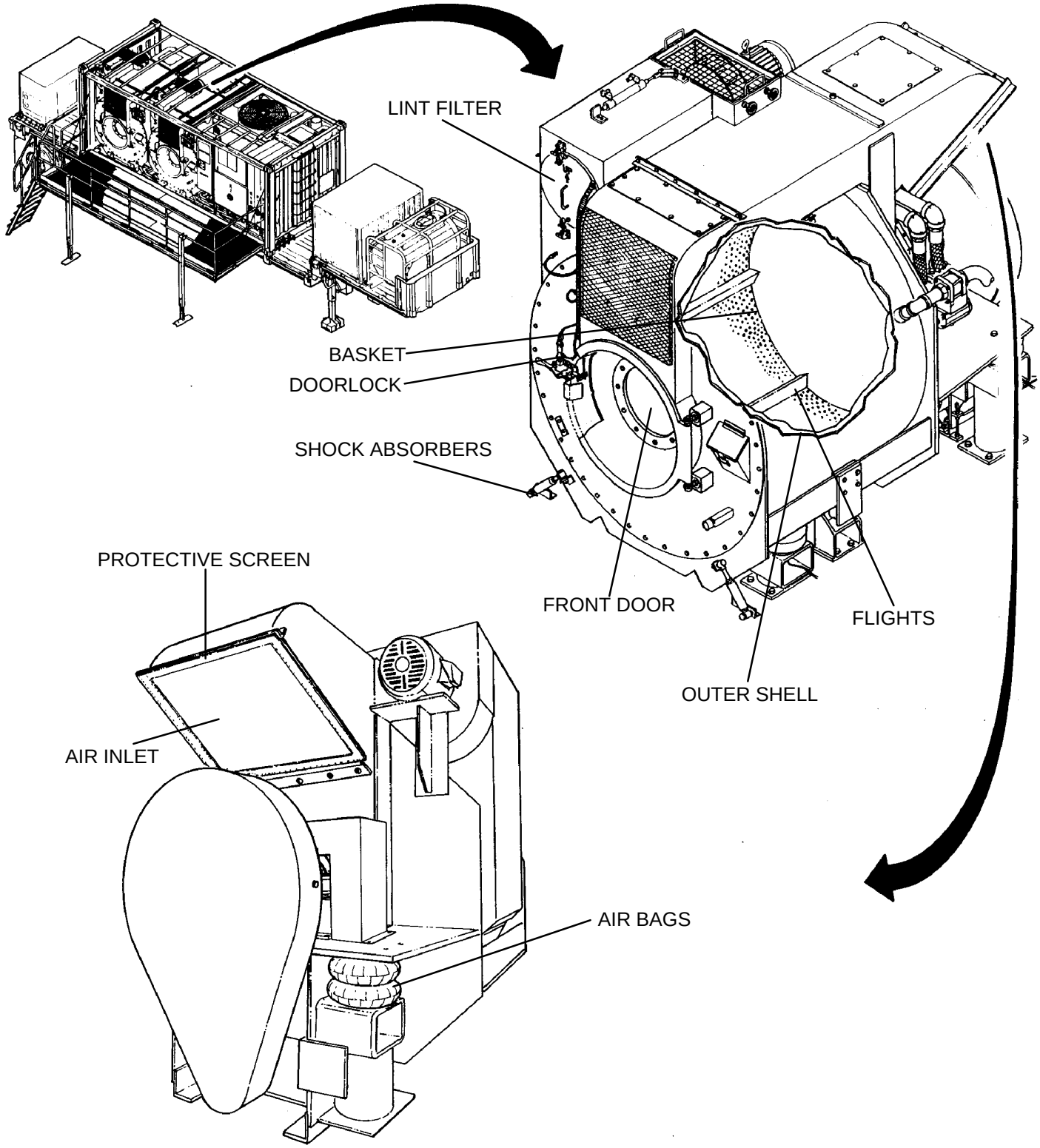


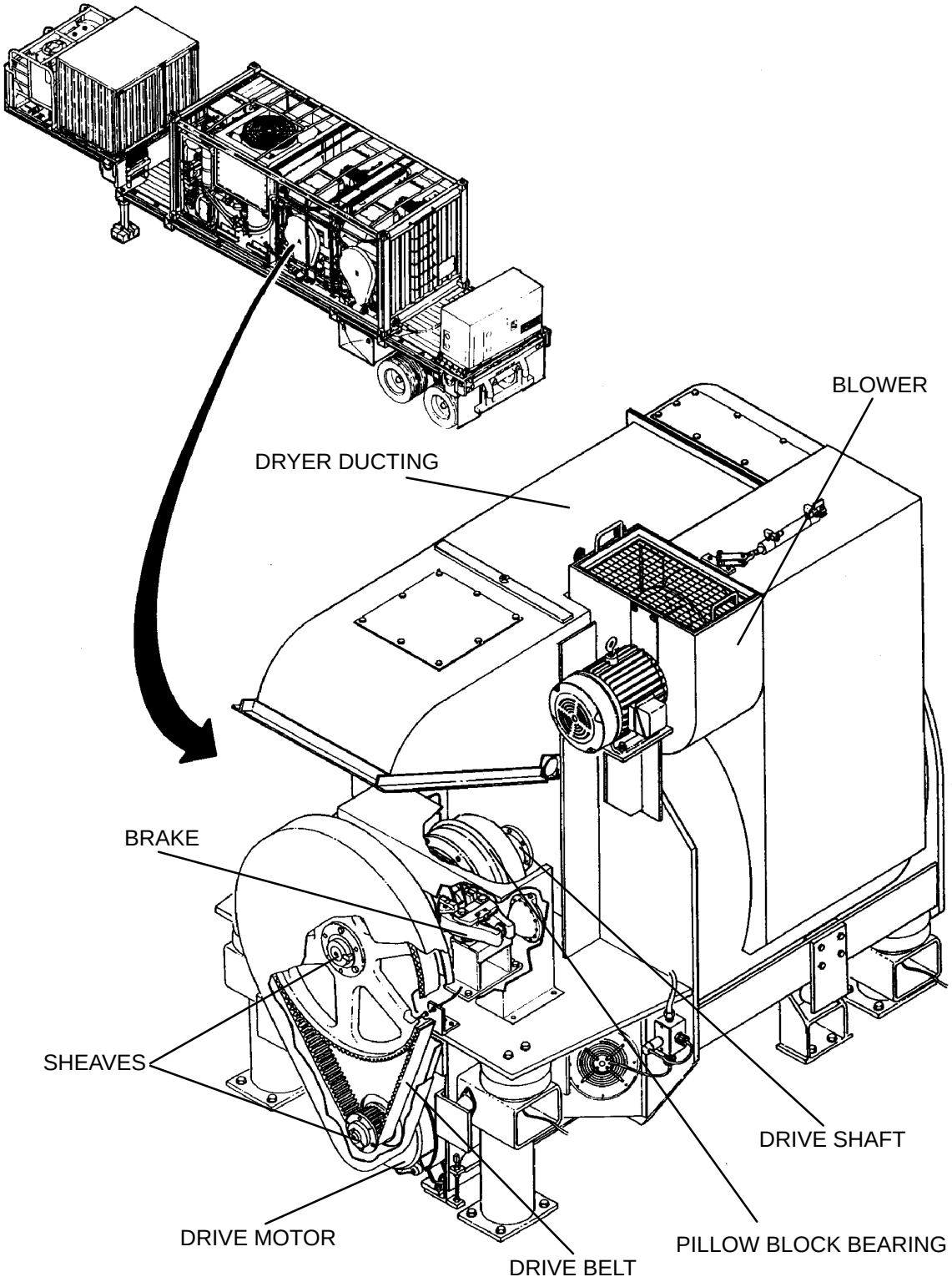
WASHING/DRYING SYSTEM

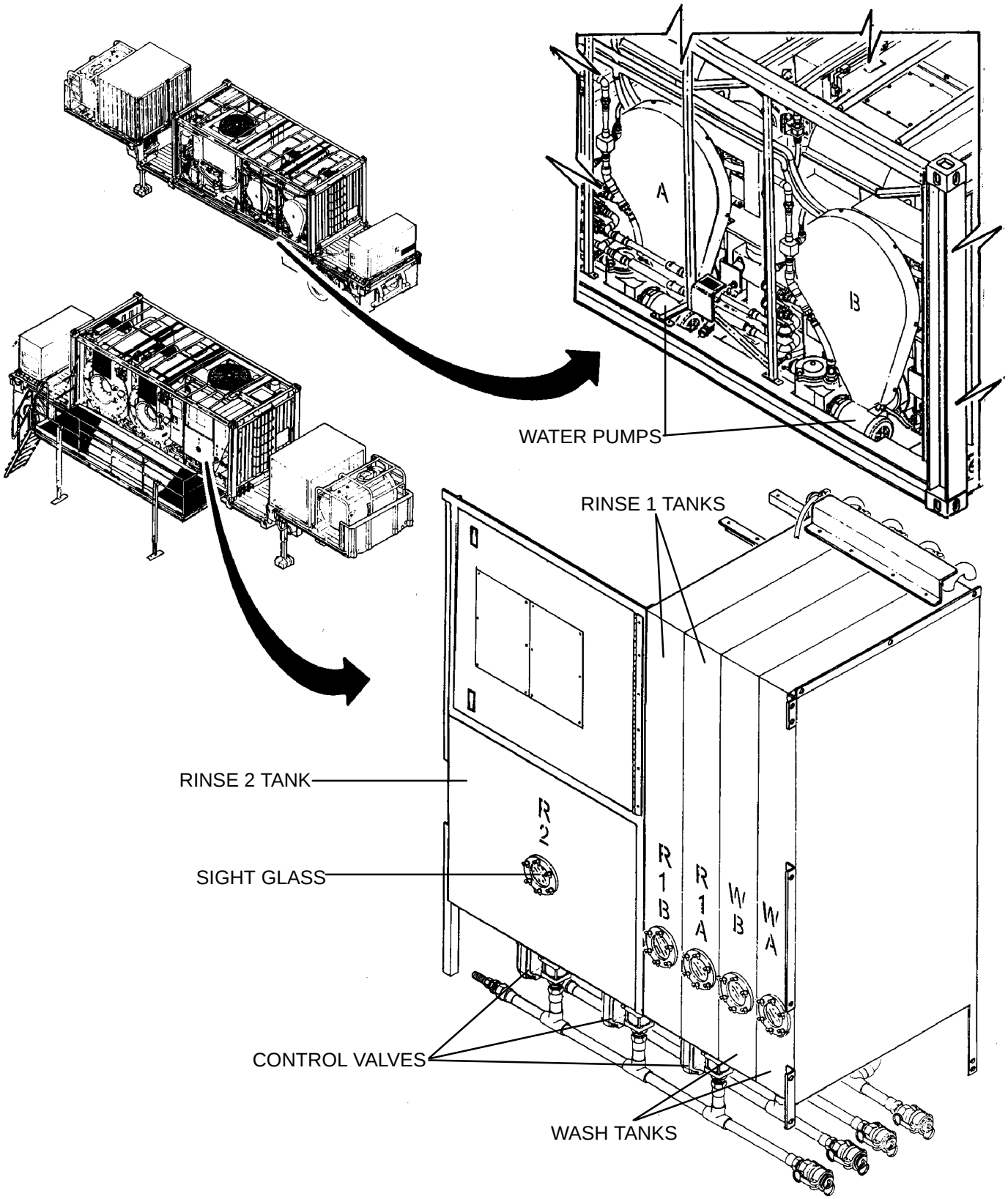
The washing/drying system contains two washing/drying drums. Each drum is capable of washing, rinsing, extracting, and drying 175 – 200 pounds of laundry per hour. Each drum is independently mounted to the LADS frame with four air bags and four shock absorbers. The air bags and shock absorbers reduce the amount of vibration that is transferred to the LADS structure when the drum(s) is rotating. Each drum consists of an outer shell which supports the basket, drive motor, brake, dryer ducting, blower, and front door. The basket consists of a metal housing with four flights that contain and distribute the laundry as it is rotated. The basket and outer edge of the flights are perforated to allow hot drying air to flow onto the laundry.

The basket is connected to a drive shaft that is attached to the drum housing with two pillow block bearings. This shaft is rotated by an electric motor that is connected to the shaft with two sheaves and a drive belt. The shaft also contains a brake rotor that is mounted between the calipers of an air brake. Laundry is loaded into the drum through the see–through front door. The door contains a lock that prevents it from being opened while the basket is rotating. Air used to dry the laundry is provided to each drum by independent electric blowers. A protective screen is located at the fresh air inlet to each blower. These screens prevent debris (sand, dirt, leaves, etc.) from entering the dryer ducting. A lint filter is used in the air recirculation path for each blower. These filters remove lint and other particles from the air that is circulating from the drum back to the blower. The screens and filters are easily removed and are reusable after cleaning.

The LADS contains five water tanks. Each washing/drying drum has a wash tank and a rinse 1 tank. These tanks have an 80 gallon capacity. The rinse 2 tank has a 150 gallon capacity and is shared by both drums. Each tank has a sight glass that provides a visual indication to the operator that the tank is full. Pumps and valves are used to control the flow of water between the tanks and drums.


LINT FILTER
BASKET
DOORLOCK
SHOCK ABSORBERS
PROTECTIVE SCREEN
FRONT DOOR
FLIGHTS
OUTER SHELL
AIR INLET
AIR BAGS

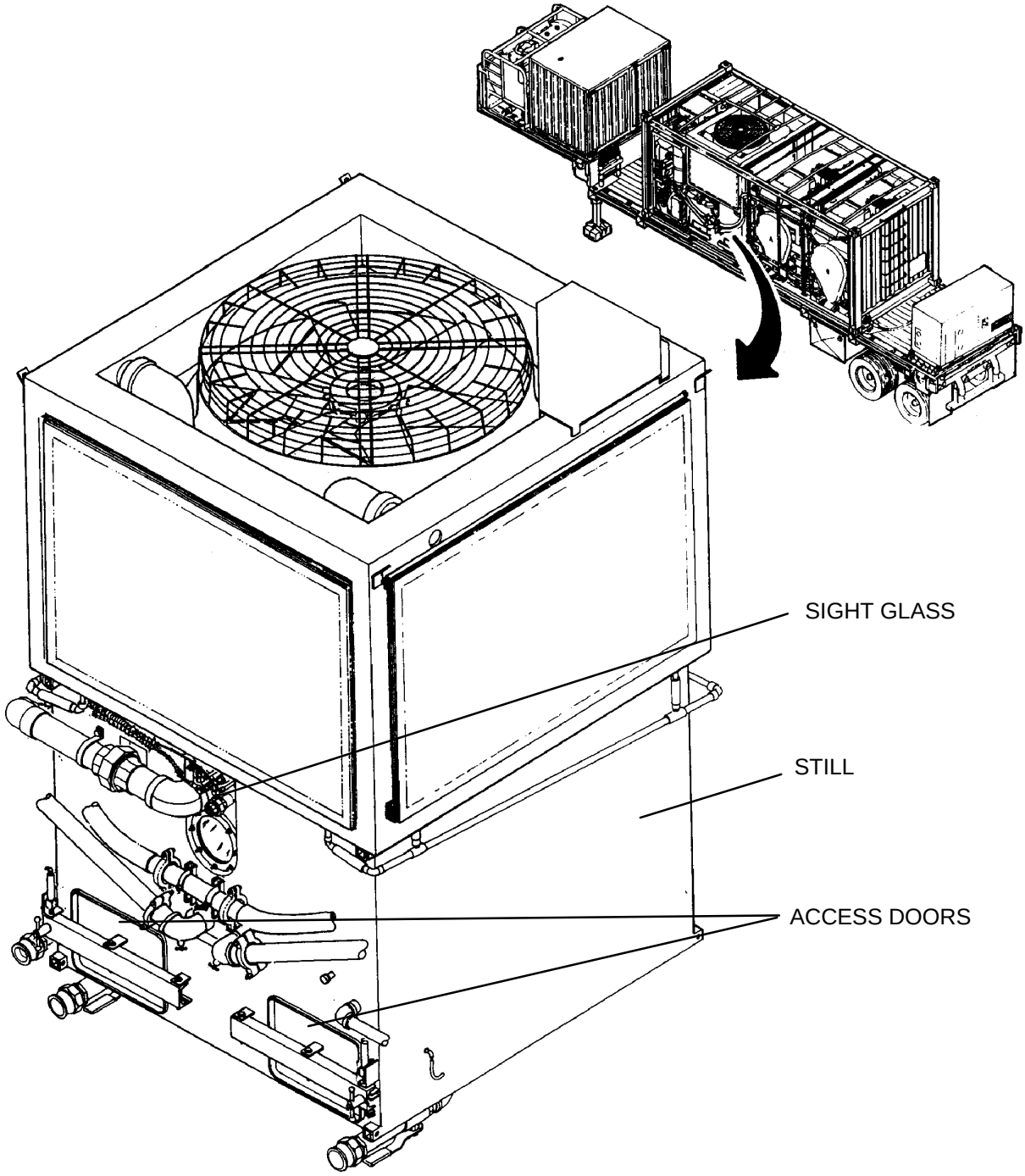

BLOWER
DRYER DUCTING
BRAKE
SHEAVES
DRIVE SHAFT
DRIVE MOTOR
DRIVE BELT
PILLOW BLOCK BEARING


A
B
WATER PUMPS
RINSE 1 TANKS
RINSE 2 TANK
SIGHT GLASS
R 2
R 1 B
R 1 A
W B
W A
CONTROL VALVES
WASH TANKS

WATER RECYCLE SYSTEM

The water recycle system contains a still that is used to clean the dirty wash water coming from the washing/drying drums. This is done by boiling (distilling) the water. This water is then reused during the second–stage rinse process. Two access doors, located on the back of the still, are provided to facilitate cleaning out sludge that is created during the distillation process. A sight glass is located on the back of the still. This provides the operator with a visual indication of the water level inside the still.

A condenser is used to turn the steam, produced by the still, back into water. The condenser consists of four heat exchangers and an electric fan. Screens are provided for each heat exchanger to prevent debris from clogging up the cooling fins on the heat exchangers. The screens are easily removed and are reusable after cleaning.

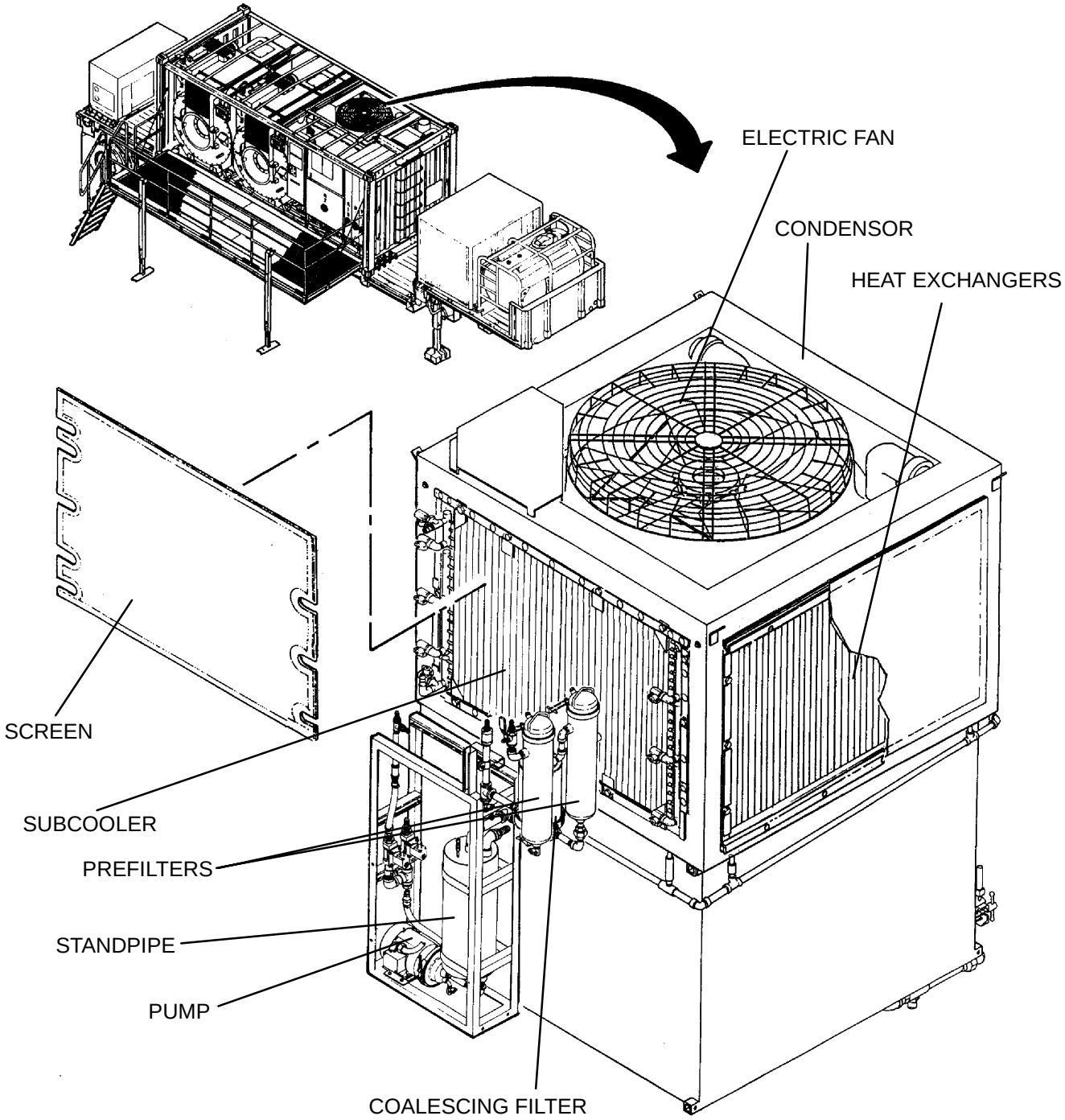


WATER RECYCLE SYSTEM – Continued

The water draining from the condenser flows to a standpipe. When the standpipe is about two–thirds full the distillate pump takes the water from the standpipe and circulates the water through a set of particulate filters and a coalescer back to the rinse 2 tank.

The prefilters remove particles from the water and the coalescer removes light oil from the water.

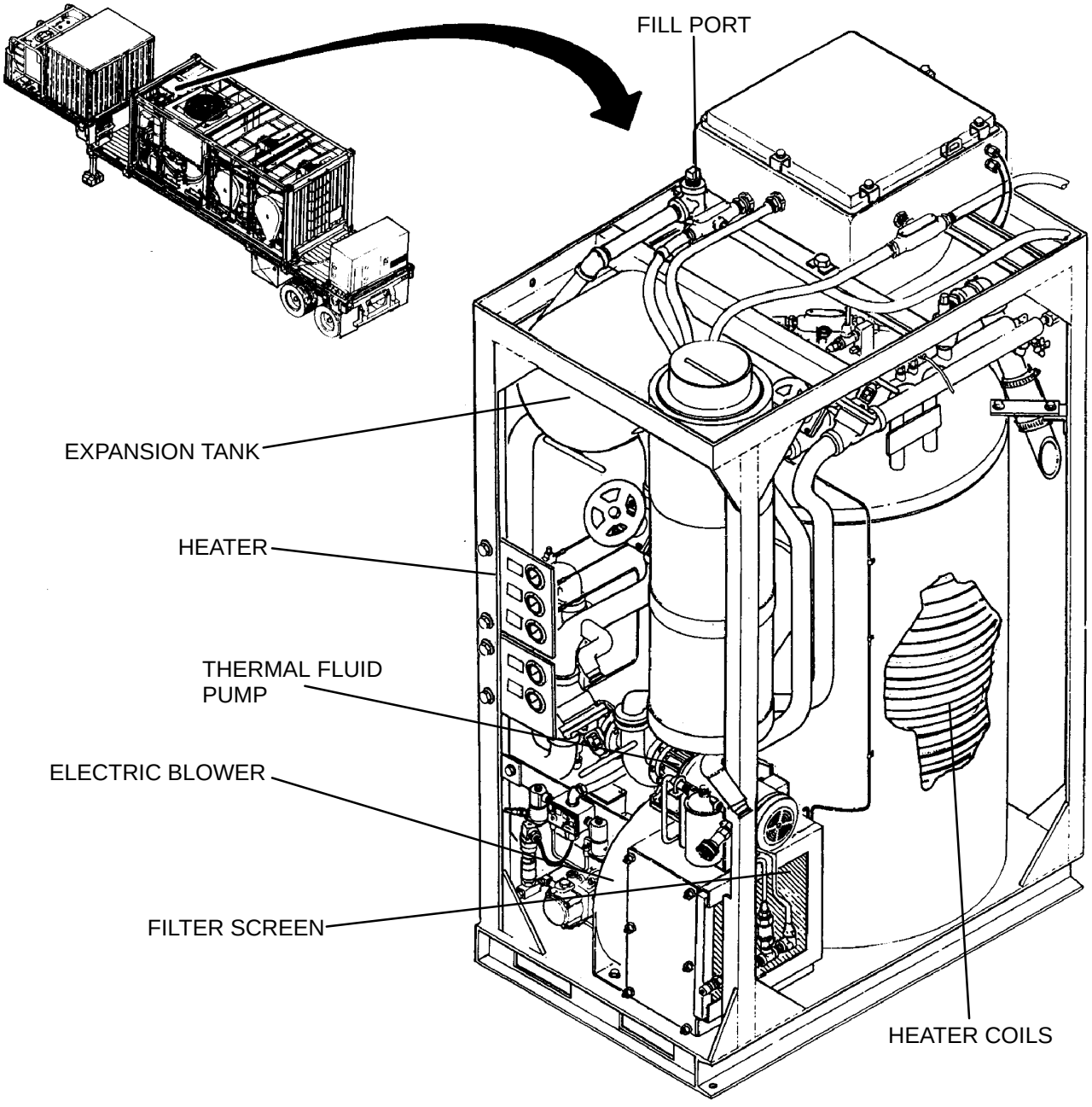
A subcooler is provided to help cool the water going back to the rinse 2 tank. The subcooler is used when 90 degrees – 140 degrees Fahrenheit (F) rinse water is needed and the outside temperature is above 60 degrees F.



HEATING SYSTEM

An oil–fired heater is used to generate heat needed to boil water in the still and to heat the air used to dry the laundry. The heater uses an electric blower to draw in outside air. A screen is used to prevent debris in the air from entering the blower. The air is mixed with JP–8 and ignited to generate a flame inside the heater. The heater exhaust air is then used to heat thermal fluid that is moving through the heater coil.

The hot thermal fluid is circulated to heat exchangers in the washing/drying drums and still by the thermal fluid pump. An expansion tank is used to store thermal fluid and provide a place for the fluid to expand when it gets hot. The tank has a fill port to facilitate servicing of the thermal fluid.



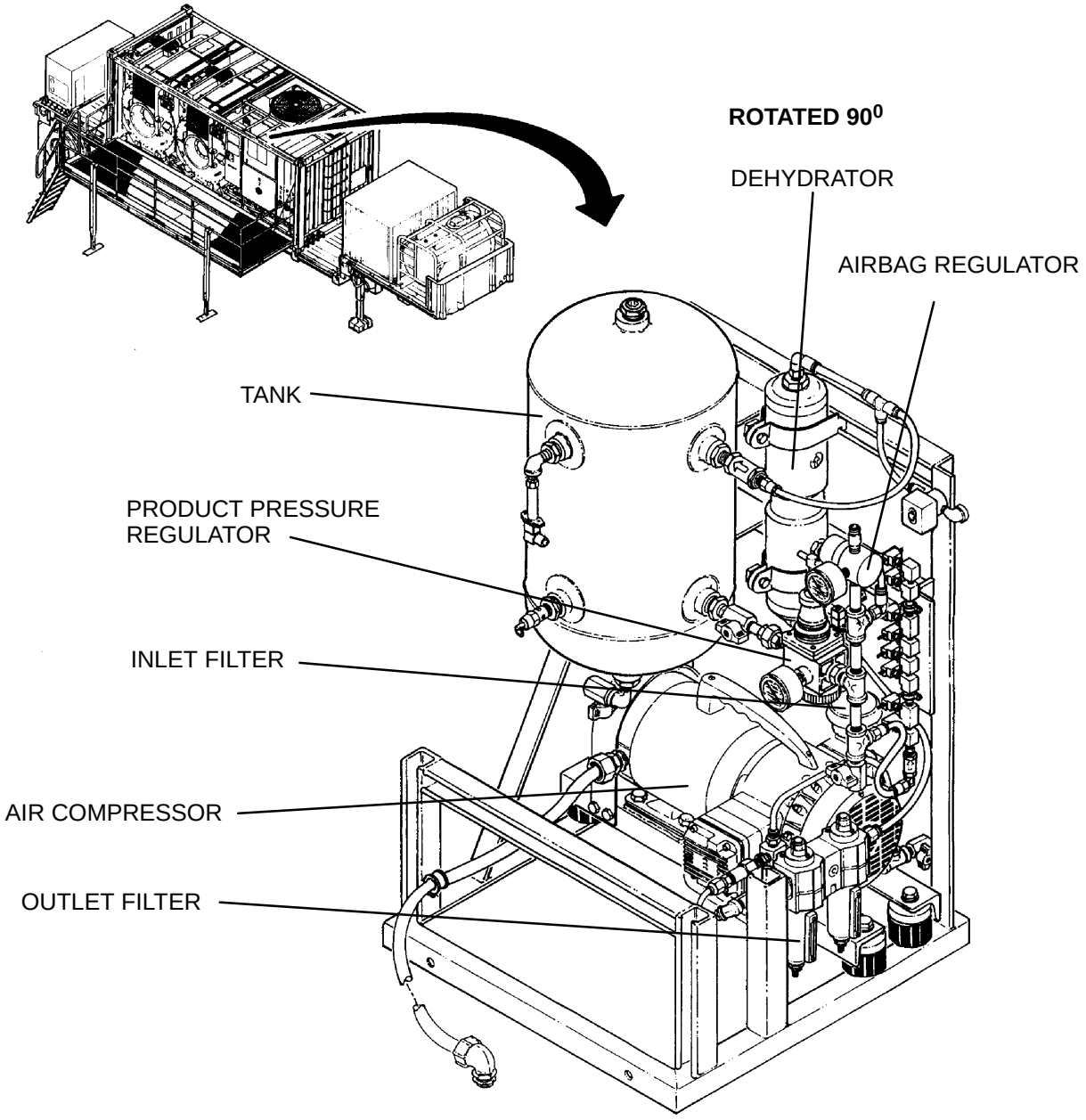
AIR SYSTEM

The air system provides dry compressed air to the other LADS systems. Air is used to pressurize the air bags that support the drums and to actuate ball valves, air dampers, brakes, and door locks used on the washing/drying system and water recycle system. A small amount of air is also used to detect the water level in the wash tanks, rinse tanks, standpipe, and still.

An air compressor is used to pressurize the air entering the system from atmospheric pressure to approximately 125 pounds per square inch gauge (psig). An inlet filter is used to prevent debris from entering the air compressor.

An outlet filter and dehydrator are located at the compressor outlet. These items remove particles and moisture from the compressed air.

A tank stores product air under pressure. The tank contains enough air to allow the compressor to operate intermittently while still allowing smooth operation of the air–driven components. Two pressure regulators are mounted at the tank outlet. One regulator controls the pressure of the product air at approximately 80 psig. The other regulator controls the inflation pressure of the air bags at 65 psig.



CONTROL SYSTEM

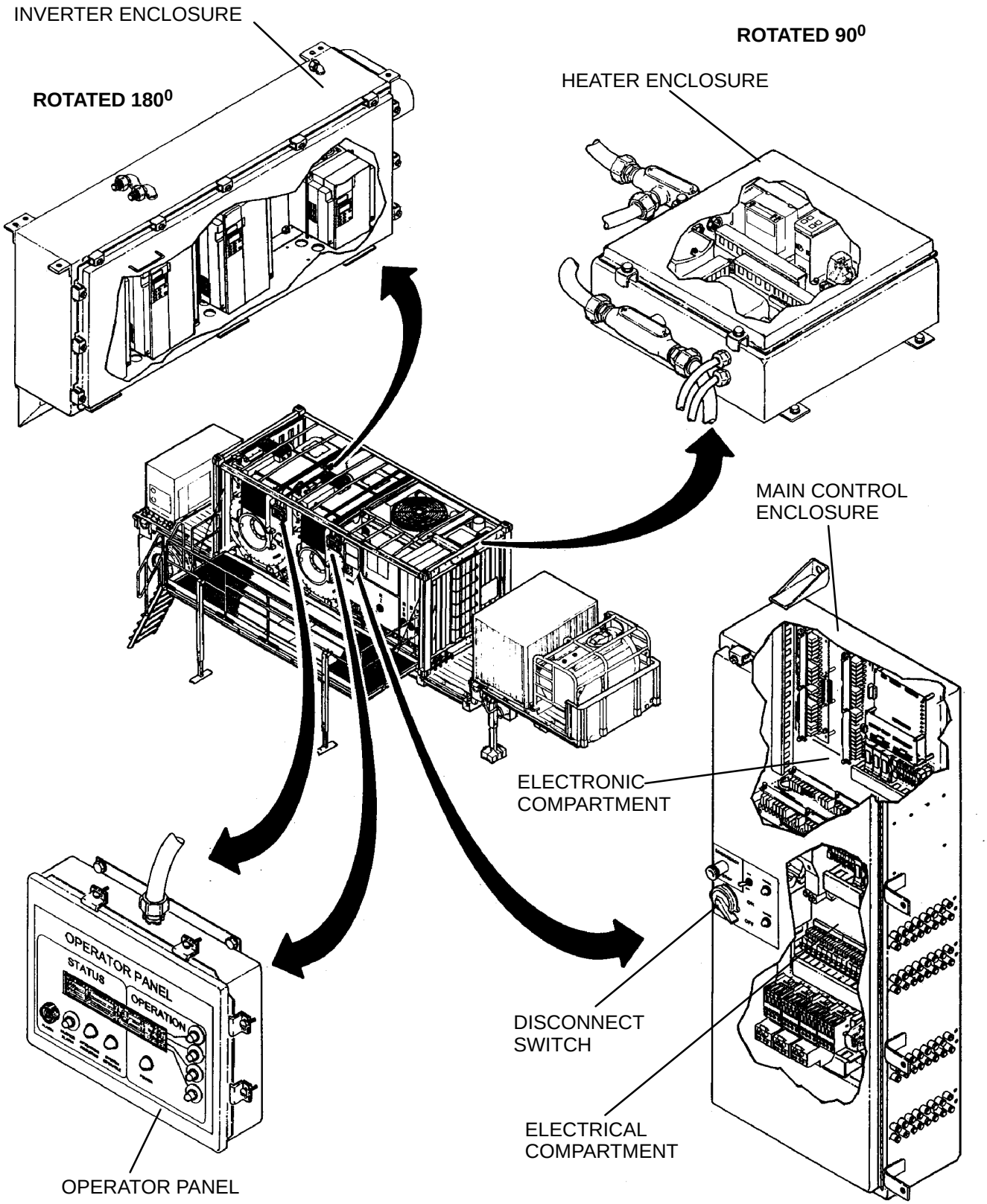
The control system provides the electrical interface between the external power and the LADS electrical and electronic components. This system also includes the controls and indicators that the operator uses when performing laundry operations.

Electrical power enters the LADS through the main control enclosure. This enclosure contains an electrical compartment and electronic compartment. The electrical compartment contains circuit breakers and relays that are connected to the inverter enclosure, heater enclosure, solenoid valves, and motors that utilize alternating current (AC) power. The electronic compartment contains the computer and related circuit boards that control the LADS operation. Items located in this compartment utilize direct current (DC) power. A disconnect switch is mounted on the main control enclosure. This switch removes power from the LADS when turned off.

An operator panel is provided for each washing/drying drum. These panels contain the controls and status indicators necessary for the operator to start and stop laundry operations as well as select different washing/drying formulas. Maintenance personnel also utilize operator panel (A) when communicating with the computer during troubleshooting and checkout.

The inverter enclosure protects the four AC inverters used on the LADS from the outside weather. These inverters communicate with the computer and control the operating speeds of the drum motors, drum blowers, condenser fan, and heater.

The heater enclosure protects the flame programmer, ignition transformer, relays, and switches used to control the LADS heating system from the outside weather.


INVERTER ENCLOSURE
ROTATED 180⁰
ROTATED 90⁰
HEATER ENCLOSURE
MAIN CONTROL ENCLOSURE
ELECTRONIC COMPARTMENT
DISCONNECT SWITCH
ELECTRICAL COMPARTMENT
OPERATOR PANEL
OPERATOR PANEL
STATUS
OPERATION

EQUIPMENT DATA

Table 1 provides information pertaining to operational, electrical, mechanical, and environmental characteristics of LADS and related equipment.

Table 1. Equipment Data.

ITEM	
Operational Characteristics	
Laundry Output (Per Cycle)	350–400 lbs/cycle (159–181 kgs/cycle)
Laundry Output (Per Day)	6,300–7,200 lbs/day (2,862–3,258kgs/day)
Water Capacity (Initial Charge)	460 gal (1,741 ltrs)
Water Consumption (Per Day)	540 gal/day maximum (2,044 ltrs/day)
Fuel Consumption (Per Day)	270 gal/day maximum (1,022 ltrs/day)
Detergent Consumption	0.56 gal/day maximum (2.13 ltrs/day)
Anti–Foam Consumption	1.13 gal/day maximum (4.26 ltrs/day)
Electrical Characteristics	
Power Requirement	208 Vac, 3–Phase, 50–60 Hz
Mechanical Characteristics	
Shipping Configuration (LADS only)	
Length	240 in (610 cm)
Width	96 in (244 cm)
Height	96 in (244 cm)
Cubage	1,280 cu ft (36.24 cu m)
Weight	29,300 lbs (13,290 kg)
Shipping Configuration (LADS and Related Equipment on M871A3)	
Length	480 in (1,219 cm)
Width	96 in (244 cm)
Height	150 in (381 cm)
Cubage	4,000 cu ft (113.28 cu m)
Weight	51,240 lbs (23,263 kg)
Operating Configuration (LADS on M871A3)	
Length	480 in (1,219 cm)
Width	198 in (503 cm)
Height	169 in (429 cm)
Weight (LADS full of water)	33,000 lbs (14,969 kg)
Operating Configuration (LADS on M871A3 in LME)	
Length	480 in (1,219 cm)
Width	288 in (732 cm)
Height	181 in (460 cm)
Weight (LADS full of water)	34,334 lbs (15,588 kg)
Environmental Characteristics	
Storage Temperature	–50 degrees to 140 degrees F (–46 degrees to 60 degrees C)
Operating Temperature (Sheltered)	–25 degrees to 120 degrees F (–32 degrees to 49 degrees C)
Operating Temperature (Unsheltered)	33 degrees to 120 degrees F (1 degree to 49 degrees C)
Operating Altitude	7,500 ft maximum (2,286 meters)

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

WASHING/DRYING SYSTEM THEORY OF OPERATION

WASHING/DRYING SYSTEM

The washing/drying system performs all the operations related to washing, rinsing, extracting, and drying of the laundry. All other systems on the LADS are used to support these operations. Operation of the washing/drying system consists of the following sub–operations:

LOADING LAUNDRY AND STARTING CYCLE

The laundry is loaded into the drum through the front door. After the operator closes and latches the front door a position switch (ZS100) mounted near the door will provide a signal to the control system. If the door is not closed the control system will not allow a laundry cycle to be selected. The operator selects the appropriate laundry formula and starts the laundry cycle. Before the washing operation begins, the control system will provide a signal to extend the pneumatic lock (DN100) into the front door. This lock remains extended during the complete laundry cycle. A position switch (ZS101) mounted under the door lock provides a signal to the control system verifying that the lock is extended.

WASHING

During the washing portion of the laundry cycle, water is transferred from the wash tank to the drum. The laundry tumbles in the drum mixing with the detergent and water. The dirty water is drained from the drum to the still then a low–speed extract (spin) is used to squeeze the water out of the laundry. A detailed description of the washing cycle is as follows:

Fill From Wash Tank

The control system provides a signal to start drive motor (M100) and water pump (M101). The control system also opens ball valves (FV101 and FV106). The basket starts rotating at tumble speed (approximately 36 revolutions per minute (RPM)). As the basket is rotating, the water pump draws water out of the wash tank and pumps it into the drum. Approximately one minute into the wash cycle, the wash tank is empty and the drum is full of water. The control system turns off the water pump and closes ball valves (FV101 and FV106).

Washing

The basket continues to tumble for three or more minutes as determined by the formula and the water level in the still. The laundry is mixed with water and detergent. Mechanical action of the material tumbling is used to break or loosen the contaminants from the laundry.

Drain To Still

At the end of the wash time the control system opens ball valves (FV107 and FV109) and turns on the water pump (M101). Wash water is pumped out of the drum and into the still for approximately 2 minutes.

Extract To Still

While the drum is being drained the control system increases the drive motor speed until the basket is rotating at low extract speed (approximately 300 RPM). The basket remains at extract speed for approximately one minute while the drum is drained. At the end of extract, the control system turns off the drive motor and water pump, applies the brake, and closes ball valves (FV107 and FV109).

FIRST STAGE RINSING

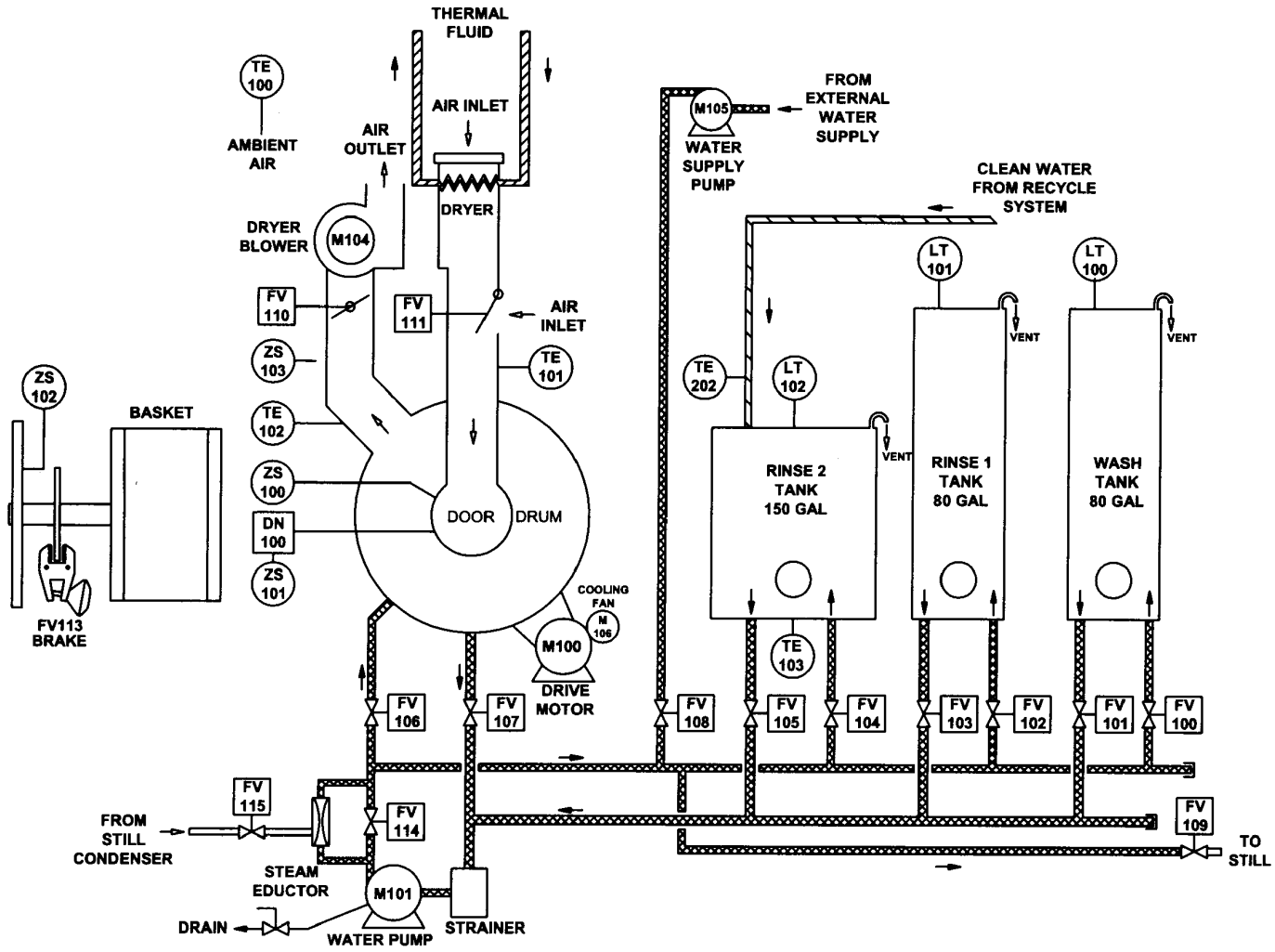
During the first stage rinsing portion of the laundry cycle, water is transferred from the rinse 1 tank to the drum. The laundry tumbles in the drum mixing with the water. The water is drained from the drum to the wash tank then a low–speed extract (spin) is used to squeeze the water out of the laundry. A detailed description of the first stage rinsing cycle is as follows:

Fill From Rinse 1 Tank

The control system provides a signal to start drive motor (M100) and water pump (M101). The control system also opens ball valves (FV103 and FV106). The basket starts rotating at tumble speed. As the basket is rotating, the water pump draws water out of the rinse 1 tank and pumps it into the drum. Approximately one minute into the rinse cycle, the rinse 1 tank is empty and the drum is full of water. The control system turns off the water pump and closes ball valves (FV103 and FV106).

Rinsing 1

The basket continues to tumble for approximately two more minutes as determined by the formula. The laundry is mixed with water to rinse residual soap and dirt off of the laundry.



NOTE

All functional components on this diagram are used for washing/drying system A and B. Example – FV100A is the inlet valve on wash tank A and FV100B is the inlet valve on wash tank B.

FIRST STAGE RINSING – Continued

Drain To Wash Tank

At the end of the rinse time, the control system opens ball valves (FV100 and FV107) and turns on the water pump (M101). Rinse water is pumped out of the drum and into the wash tank for approximately two minutes.

Extract To Wash Tank

While the drum is being drained, the control system increases the drive motor speed until the basket is rotating at low extract speed. The basket remains at extract speed for approximately one minute while the drum is drained. At the end of extract, the control system turns off the drive motor and water pump, applies the brake, and closes ball valves (FV100 and FV107).

SECOND STAGE RINSING

During the second stage rinsing portion of the laundry cycle water is transferred from the rinse 2 tank to the drum. The laundry tumbles in the drum mixing with the water. The water is drained from the drum to the rinse 1 tank then a high–speed extract (spin) is used to squeeze the water out of the laundry. A detailed description of the second stage rinsing cycle is as follows:

Fill From Rinse 2 Tank

The control system provides a signal to start drive motor (M100) and water pump (M101). The control system also opens ball valves (FV105 and FV106). The basket starts rotating at tumble speed. As the basket is rotating, the water pump draws water out of the rinse 2 tank and pumps it into the drum. When the control system determines that 65 gallons of water has been moved out of the rinse 2 tank, it turns off the water pump and closes ball valves (FV105 and FV106). This occurs approximately one minute into the rinse cycle.

Rinsing 2

The basket continues to tumble for approximately two more minutes as determined by the formula. The laundry is mixed with water to rinse residual soap and dirt off of the laundry.

Drain To Rinse 1 Tank

The basket continues to tumble for approximately two more minutes as determined by the formula. At the end of the rinse time the control system opens ball valves (FV102 and FV107) and turns on the water pump (M101). Rinse water is pumped out of the drum and into the rinse 1 tank.

Extract To Rinse 1 Tank

While the drum is being drained the control system increases the drive motor speed until the basket is rotating at high extract speed (approximately 570 RPM). The basket remains at extract speed for approximately seven minutes while the drum is drained. At the end of extract, the control system turns off the drive motor (M100) and water pump (M101), applies the brake, and closes ball valves (FV102 and FV107).

Special Rinsing Steps

For the second–stage rinsing process the operator has the option of selecting a formula that calls for sanitizer or Finish Reapplication System (FRS) application. When these formulas are selected, the operator will be notified by the control system when it is time to add sanitizer or FRS. The operator adds the sanitizer or FRS through a sluice located on the front of the drum.

DRYING

During the drying portion of the laundry cycle hot air is blown over the material while the laundry tumbles and water is evaporated. The laundry tumbles in the drum for 20–43 minutes as specified by the formula. A detailed description of the drying cycle is as follows:

Dry, Heating–Up

The control system provides a signal to start drive motor (M100) and blower (M104). The control system also opens outlet damper (FV110) and closes inlet damper (FV111). The basket starts rotating at tumble speed. As the basket tumbles, ambient air is drawn through a heat exchanger connected to the LADS heating system. The hot air passing through the heat exchanger is then directed into the drum inlet. As the air enters the drum, it passes through the laundry removing moisture. The air is then exhausted out of the blower exhaust duct.

DRYING – Continued

Dry, Controlled

While the air is circulating through the drum, temperature sensors (TE101 and TE102) monitor the temperature at the drum inlet and outlet. Once the air outlet temperature reaches a selected drying temperature, the control system will maintain the proper inlet temperature by opening and closing the inlet damper (FV111). This allows for accurate air temperature control regardless of the ambient temperature conditions and drying temperature selected.

Cool

Near the end of the drying cycle, the control system opens inlet damper (FV111) for approximately one minute to allow ambient air to circulate through the drum. This cools down the laundry so that it can be safely handled by the operator. At the end of the drying cycle, the control system turns off the drive motor (M100) and blower (M104) and applies the brake. The control system also closes outlet and inlet dampers (FV110 and FV111) and retracts the door lock (DN100).

UNLOAD LAUNDRY

The control system provides a signal to the operator panel that the laundry cycle is completed. The operator then opens the front door, removes the laundry, and repeats the process.

DRUM SUPPORT/VIBRATION DAMPENING

Before power is applied to the LADS the drum rests on the ISO frame structure. In the operational mode, the air system pressurizes four air bags that inflate to support the weight of the drum. Leveling valves connected to the front two air bag mounts are used to adjust the height of the air bags by adding or bleeding air pressure. This allows for side–to–side leveling of the drum when the LADS is located on uneven terrain. Four shock absorbers, located at each corner of the drum, are used to restrain the drum while it is rotating. Vibration eliminators are also located on the sides and back of the drum mounts to dampen the amount of vibration that is transferred to the LADS structure during the extraction steps.

DRUM ROTATION

The drum basket is driven by an electric motor (M100) connected via a drive belt and two sheaves. A cooling fan (M106) is used to continuously direct fresh air onto the drive motor to prevent the motor from overheating. During a laundry cycle, the control system changes the speed and direction of the motor to achieve the proper basket rotation needed for tumble, distribute, low extract and high extract as follows:

Rotation Direction

At tumble speed, basket rotation is in the clockwise (CW) direction during washing, rinsing, drying, and any time the drum is filling. The basket rotates in the counter–clockwise (CCW) direction which is used during all draining steps at tumble speed, and at the distribute, low extract, and high extract speeds.

Rotation Speed

At tumble speed, the basket is rotating at about 28 RPM. Tumble speed is used during washing, rinsing, drying, and any time the drum is filling or draining. Distribute speed is at about 56 RPM. Distribute is used to transition between tumble and extract to allow the laundry to evenly distribute towards the outer wall of the basket using centrifugal force. Low and high extract speeds are 300 RPM and 530 RPM. Extract speed is used to force (squeeze) water out of the laundry.

Rotation Sensing

When the basket is rotating, proximity sensor (ZS102) monitors rotation of the drum sheave and provides a signal to the control system. This information is used to verify the drum basket is either rotating or stopped. During extracts the drive motor has the potential to stall when the drum is severely unbalanced or the basket is overloaded. If a stall occurs, the basket will not maintain extract speed resulting in improper removal of water from the laundry. This can lead to water transfer and drying problems. The control system monitors the drive motor for a stall condition using the signal from ZS102 to verify the basket is rotating at the proper speed. If the basket begins to slow down when it should be speeding up, the control system will automatically stop drum rotation and restart the extract. If two stalls are sensed in a row, the control system will notify the operator of a stall condition.

DRUM BRAKING

After the extraction step or drying cycle is finished, the control system provides a signal to open solenoid valve (SV113). When this valve opens air pressure is directed to a thruster which extends the brake caliper. Pads on the brake caliper apply friction to the brake rotor thereby causing the basket to slow down rapidly. Any time the basket is stopped, the brake is automatically applied to prevent rotation. When the control system is ready to start basket rotation, the signal to solenoid valve (SV113) is removed and the brake caliper retracts allowing free rotation of the basket.

DRUM BALANCING

During extract steps, it is possible for the laundry load to be unbalanced. If not controlled, an out of balance load can cause excessive shock and vibration to be transferred to the LADS structure or a drum motor stall. This could result in improper processing of laundry, premature failure of LADS components, or structural failures. To compensate for unbalanced loads, the LADS uses a self balancing process. At the start of extract, the basket is slowly rotated, to give the laundry a chance to distribute. As the rotational speed is increased, centrifugal force pulls the laundry out against the basket walls. If the laundry load is balanced, the control system will allow the basket to rotate at full extract speed. If the laundry load is unbalanced, the drum will contact a limit switch (ZS103). The limit switch will provide a signal to the control system to stop basket rotation. The control system will then attempt to redistribute and restart the extract step. If a balanced load can not be obtained in five attempts, the control system will notify the operator of an unbalanced load condition.

WATER LEVEL MONITORING

Each water tank contains a bubbler tube that extends to the tank bottom. When the LADS is operating, a small amount of air is directed from the air system to each bubbler tube. When a tank is empty, there is no resistance to the air coming out of the bubbler tube. As the water level in the tank begins to rise, the force (pressure) required to push the air out of the bubbler tube increases. This increase in pressure is measured by pressure sensors (LT100, LT101, and LT102) which provide signals to the control system. The control system uses this pressure information to determine the water level. During operation, this information is used to verify that the tank is draining or filling and to determine when the tank is drained or filled. The control system continuously monitors the water level in each tank and will notify the operator if the tank water levels are not within required limits. Each tank contains an overflow tube that prevents the tank from overfilling in the event of a ball valve or level sensing failure. Water from the overflow tube is collected and routed to a drain port at the back of the LADS.

WATER FILLING

The LADS water tanks and still must be filled with water before laundry operations can begin. During continuous operations, the water level will drop and the tanks must be refilled. Both operations are described below:

Initial Water Filling

When the LADS is initially started, it is necessary to fill the water tanks and still prior to performing laundry operations. After the LADS is turned on, the control system will turn on the water supply pump (M105) and prompt the operator to select the tank filling sequence. If the filling function is selected, the control system will open ball valves (FV100 and FV108). The water supply pump will draw water from the external water supply and fill the wash tanks to 65 gallons. The control system will close ball valves (FV100) and open ball valves (FV102) to fill the rinse 1 tanks to 65 gallons. The control system will close ball valves (FV102) and open ball valves (FV104) to fill the rinse 2 tank to 100–110 gallons. The control system will open ball valves (FV108 and FV109) to fill the still to 25 gallons (2 inches). The control system will then close ball valves (FV108 and FV109) and turn off the water supply pump.

Water Refilling

During continuous operations, the water level in rinse 2 tank will gradually drop due to residual moisture left in the laundry. When the water level drops below the amount required to perform a laundry cycle, the control system will automatically add water to the still. When this occurs, the control system will open ball valves (FV108 and FV109) and turn on the water supply pump (M105). The water supply pump will draw water from the external water supply and add it to the still. When the proper amount of water has been added, the control system will close ball valves (FV108 and FV109) and turn off the water supply pump. This water will eventually return to the rinse 2 tank through the normal water recycling process (WP 0004 00). The refilling process is performed after each drying cycle is started.

WATER HEATING

After the water tanks have been filled, the control system prompts the operator to select the desired water temperature and then start the water heating sequence if desired. The water in the rinse 2 tank will be heated as described below:

Checking Water Temperature

The control system will open ball valves (FV104A and FV105A) and turn on the water pump (M101A) to obtain a representative sample temperature of the water in the rinse 2 tank. After the sample has been obtained the control system will close the ball valves and turn off the water pump. If the actual water temperature is within 5 degrees F of the desired temperature, the water heating function will be bypassed. If the water is too hot, the operator can change the desired temperature or wait for the water to cool down. If the water is not hot enough, the heating process will continue.

Transfer Rinse 2 To Still

Once the control system has determined that water heating is required, it will open ball valves (FV105A and FV109A) and turn on the water pump (M101A) to transfer water from the rinse 2 tank to the still. The amount of water transferred will be 50 to 70 gallons, depending on the amount of heating required. When enough water has been transferred to support distillation, the control system will the close ball valves and turn off the water pump.

Heating Rinse 2

After the still has begun to produce steam the control system will open ball valves (FV104, FV105, and FV115), close ball valves (FV114), and turn on both water pumps (M101). As the water coming out of the rinse 2 tank is pumped through the steam eductors, it mixes with steam/water flowing from the still condenser. Using the input from temperature sensor (TE103), the control system will determine when the water is at the proper temperature. The control system will close ball valves (FV104, FV105, and FV115), open ball valve (FV114) and turn off both water pumps (M101). Any water left in the still will return to the rinse 2 tank through the normal water recycle process (WP 0004 00). After two laundry cycles have been completed, the water initially heated for the rinse 2 tank will be in the wash tank. All subsequent laundry cycles will be completed with heated water. If hot water is desired in all tanks before laundry operations are started, two Clean/Heat Wash Tank cycles can be performed as described in Water Transferring.

WATER TRANSFERRING

If a laundry cycle is interrupted and then restarted, it may be necessary to add water to the wash or rinse 1 tank in order to complete the cycle. In this circumstance the control system will automatically transfer water from the rinse 2 tank to the wash tank or rinse 1 tank. Water can also be transferred from the wash tank to the still, from the rinse 1 tank to the wash tank, and from the rinse 2 tank to the rinse 1 tank utilizing a Clean/Heat Wash Tank cycle. When these functions are selected, the control system will open the appropriate ball valves and turn on the water pump (M101). The control system will close the ball valves and turn off the water pump when the level indication at that wash and rinse 1 tanks determine that they are at the proper level. In the transfer mode, the control system will prevent further laundry operations until the rinse 2 tank has been refilled through the normal water recycling process (WP 0004 00).

WATER DRAINING

When a fresh supply of water is desired, preparing the LADS for transport, or when maintenance requires that the tanks be drained, the operator selects the DRAIN CYCLE. The drain cycle will remove water from the water tanks, still, and plumbing as described below:

Cooldown

Before the draining sequence starts, the system performs a cooldown sequence so the still interior can be safely accessed by the operator who is required to perform AFTER PMCS. After the still is clean and the doors are shut, the control system will prompt the operator to continue the drain cycle.

WATER DRAINING – Continued

Drain System B

When the drain cycle continues, the control system will open ball valves (FV101B and FV109B) and turn on the water pump (M101B). Water in wash tank B will be pumped into the still and will gravity drain to the drain area. Anytime during the drain sequence, if the still level is more than 3 inches, the control system will hold up switching to the next tank draining sequence. This prevents overfilling the still. After wash tank B is drained, the control system will close ball valve (FV101B) and open ball valve (FV103B) to drain the rinse 1B tank. After the rinse 1B tank is drained, the control system will close ball valve (FV103B) and turn off water pump (M101B).

Drain System A

Once system B is empty, the control system will open ball valve (FV101A) and turn on the water pump (M101A) to drain wash tank A. After wash tank A is drained, the control system will close ball valve (FV101A) and open ball valve (FV103A) to drain the rinse 1A tank. After the rinse 1A tank is drained, the control system will close ball valve (FV103A) and open ball valve (FV105A) to drain the rinse 2 tank. When the rinse 2 tank is drained, the control system will turn off water pump (M101A) and close ball valve (FV105A).

Cycling Valves

The control system will prompt the operator to open manual drain valves and remove caps that are strategically located on the water plumbing. The control system will then cycle (open and close) all valves in the water plumbing several times to allow residual water to drain from the system.

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

WATER RECYCLE SYSTEM THEORY OF OPERATION

WATER RECYCLE SYSTEM

The water recycle system takes the dirty wash water from the drums and recycles the water for use during the second−stage rinse process. During start up of the LADS, the water recycle system also provides steam that is used to heat up the rinse 2 water. Water recycle system operation consists of the following sub−operations.

WATER DISTILLATION

The LADS uses a water distillation process to remove contaminants from the dirty water produced during the washing sequence. A still is the primary component used in the water distillation process as described below:

Still Operation

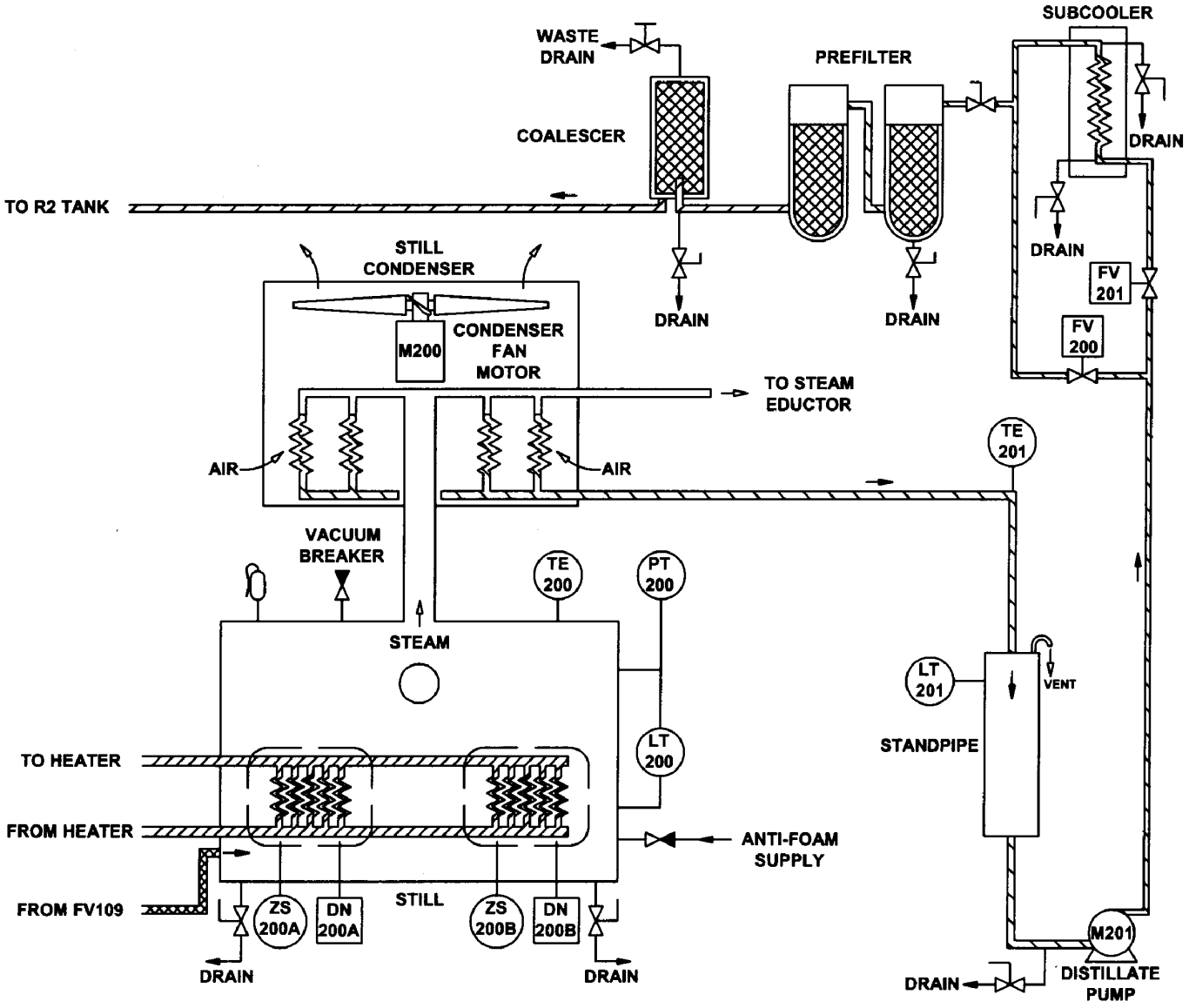
The still contains fourteen heatplates that have hot thermal fluid (from the heating system) circulating through them. When dirty water is dumped into the still, it heats up and begins to boil. The solid materials in the water such as dirt and sand collect in the bottom of the still while the water turns into steam and exits through the top of the still. Connected to the still are several monitoring and safety devices. Temperature sensor (TE200) monitors the temperature of the steam exiting the still. Pressure sensor (PT200) continuously monitors the still internal pressure. If the pressure rises to an unsafe level, a signal sent to the control system by the sensor will prompt the heater to turn off. A relief valve is mounted on the still to prevent it from over−pressurizing in the event of a pressure sensor or control system failure. Level-sensor (LT200) monitors the water level inside the still. A vacuum breaker is mounted on the still to prevent a negative pressure from being generated inside the still when cold water is dumped to the still from the drums or during the cooldown sequence.

Foam Control

During the distillation process, foam can be generated from detergent and other contaminates in the water. Excess foam can cause the still pressure to rise to undesirable levels. To prevent excessive foaming, an anti−foam solution must be injected into the still from an external container. As wash water is pumped from each laundry drum to the still, the control system will prompt the Operator to add anti−foam via a hand pump. Another method used to control the still boiling rate is by limiting the amount of water inside the still. If the still level is 7 inches or above, the control system will continue the washing step even after the normal wash time is completed. When the water level in the still drops below 7 inches, the control system will allow the drum to drain. This ensures the still does not get overfilled and decreases the chances of a boil−over.

Still Cleaning

At the end of the daily washing operations, the sludge collected at the bottom of the still and on the heatplates must be cleaned out. If this cleaning is not performed, the distillation rate will drop causing low water levels in the rinse 2 tank and delays in starting of further laundry cycles. The number of laundry cycles that can be done depends on how dirty the laundry is. Normally, 10−20 laundry cycles can be completed between cleanings. The dirtier the laundry is, the more frequently the still will need to be cleaned. After the last daily laundry cycle is completed, the operator selects a COOLDOWN CYCLE. After level sensor (LT200) signals the control system that the water level in the still is below the heatplates, the control system will turn off the heater. At this time the thermal fluid will continue to circulate through the dryer heat exchangers and the still. The control system will turn on the dryer blowers (M104). Ambient air passing through the dryer heat exchangers will draw the residual heat out of the thermal fluid allowing the still to cooldown. Once the thermal fluid temperature is below 150 degrees F, the control system will stop thermal fluid circulation and turn off the dryer blowers. The control system will also release locks (DN200) mounted on the access doors at the back of the still. The door locks prevent opening of the doors while boiling water is present inside the still. The still is cleaned by brushing debris from the heatplates and flushing the waste material out drain ports, with manual valves at the still bottom. Once the still is cleaned and the doors are closed, a position switch (ZS200) mounted on each door will provide a signal to the control system. The control system will not allow water heating or laundry operations to be started unless the still doors are closed.


SUBCOOLER
WASTE DRAIN
PREFILTER
COALESCER
DRAIN
TO R2 TANK
DRAIN
DRAIN
DRAIN
FV 201
FV 200
STILL CONDENSER
M200
CONDENSER FAN MOTOR
TO STEAM EDUCTOR
AIR
AIR
TE 201
VACUUM BREAKER
TE 200
PT 200
STEAM
LT 201
VENT
STANDPIPE
TO HEATER
LT 200
FROM HEATER
ANTI-FOAM SUPPLY
FROM FV109
ZS 200A
DN 200A
STILL
ZS 200B
DN 200B
M201
DRAIN
DRAIN
DRAIN
DISTILLATE PUMP

WATER CONDENSING

A still condenser is used to turn the steam produced by the still back into water. The still condenser consists of four heat exchangers and an electric motor–driven fan (M200). As steam moves into the coils of the heat exchangers, ambient air passes by the cooling fins. This causes the steam to cool and turn back into liquid. The hot air is then directed out through the top of the fan. The water exiting the condenser gravity drains to the standpipe and is recirculated. Temperature sensor (TE201), located at the outlet of the condenser, is used to monitor the temperature of the condensed water.

WATER RECIRCULATION

The standpipe ensures a constant supply of water is available to the distillate pump (M201). As water flows out of the still condenser, it collects in the standpipe. When the water level is at sixteen inches in the standpipe, a signal from level sensor (LT201) will cause the control system to turn on the distillate pump. When the water level is at three inches in the standpipe, a signal from the level sensor to the control system will turn off the distillate pump. With the distillate pump on, water is pumped to the pre–filters, coalescer, and back to the rinse 2 tank.

PRE–FILTER/COALESCER OPERATION

During the distilling processes, some organic vapors such as light fractions of fuel or oil may codistill with the steam exiting the top of the still. In addition, if a boil–over occurs, particulates may be carried along with the condensed water. To ensure only clean water is returned to the rinse 2 tank, a two–stage particulate filter and a coalescer are used. The pre–filters trap particulate contamination from the water to prevent premature clogging of the coalescer. The pre–filters contain disposable bags that are less expensive than the coalescer element. The coalescer contains a disposable element that separates the lighter fuel/oils from the heavier water. While the water recycle system is operating, the coalescer drains the separated fluid into an external waste container.

WATER TEMPERATURE CONTROL

Prior to entering the pre–filters, water may pass through the subcooler for additional cooling. The subcooler is an air–to–water heat exchanger that is used when the temperature of the water returning to the rinse 2 tank is twenty or more degrees above the selected set–point. In this circumstance, the signal from temperature sensor (TE202), located at the inlet to the rinse 2 tank, will prompt the control system to close solenoid valve (FV200) and open solenoid valve (FV201). When the valves reposition, water is forced to circulate through the subcooler before it gets to the pre–filters. As the water is passing through the coils of the subcooler, ambient air is drawn through the cooling fins by the still condenser fan. When the temperature of the water returning to the rinse 2 tank is acceptable, solenoid valve (FV200) is opened, and solenoid valve (FV201) is closed. This allows the water going into the pre–filters to bypass the subcooler.

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

HEATING SYSTEM THEORY OF OPERATION

HEATING SYSTEM

The heating system provides hot thermal fluid to the water recycle system for boiling water, and to heat exchangers in the washing/drying systems for drying laundry. Heating system operation consists of the following sub–operations:

THERMAL FLUID HEATING

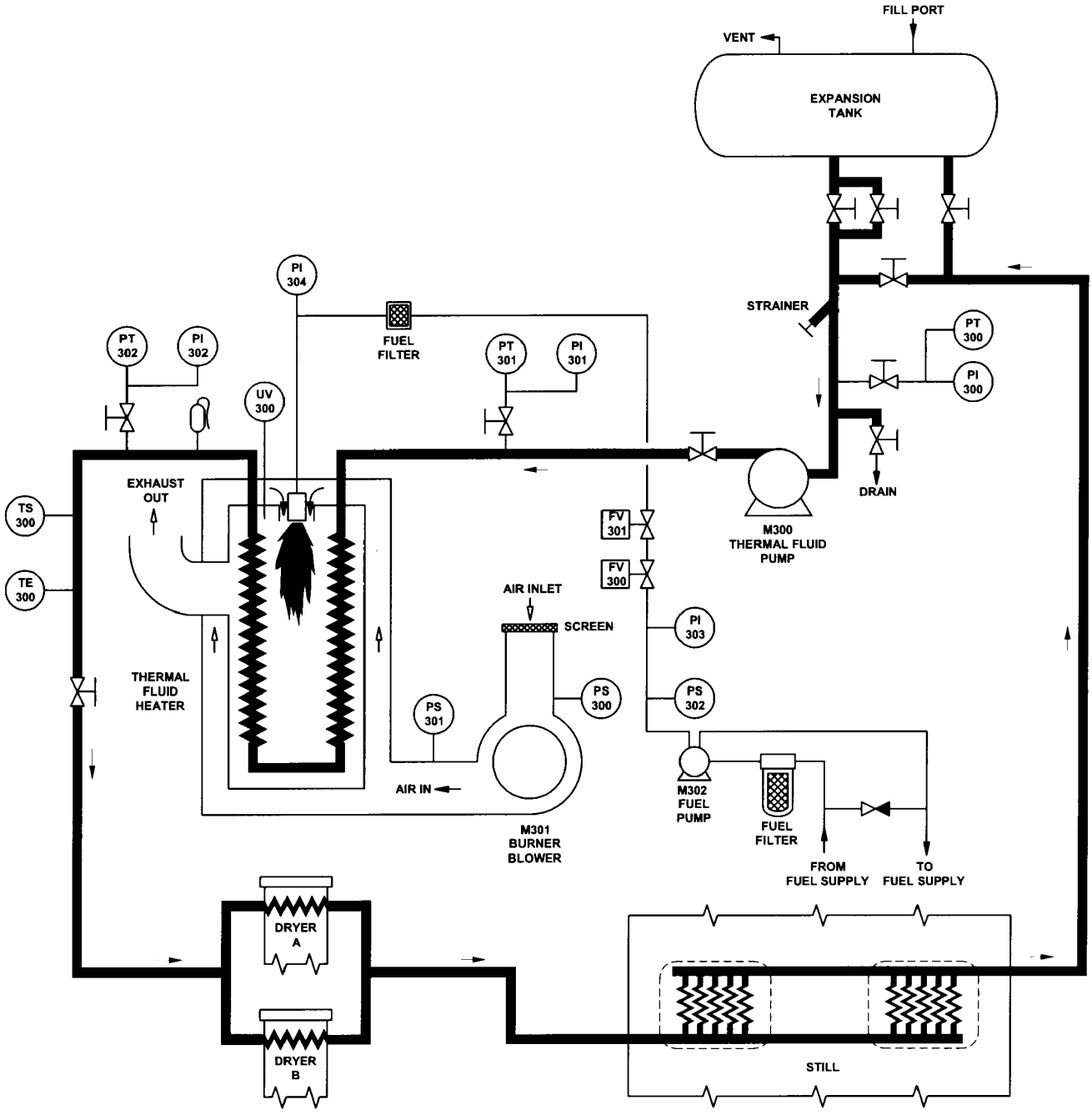
An oil–fired heater is used to heat the thermal fluid that is circulating through the heating system. Ambient air is drawn into the heater by the burner blower (M301). The blower consists of a squirrel–cage wheel driven by an electric motor. When the blower is on, it pushes air through the heater outer chamber into the burner chamber. As the air flows from the outer chamber to the burner chamber, it is preheated for maximum efficiency. The air gap created by routing the inlet air through the outer chamber creates a barrier that eliminates the need to insulate the burner chamber while also reducing the heater exterior surface temperature. This eliminates potential burn hazards to personnel and allows rapid cooldown of the heater after shutdown. When the blower is on, the fuel pump (M302) is also on. The fuel pump is a gear–type pump driven by an electric motor. The fuel pump draws fuel from an external supply. The fuel passes through a filter before entering the pump. The pressurized fuel coming out of the pump is supplied to two series–connected solenoid valves (FV300 and FV301). When the valves energize, fuel is supplied to the burner chamber. When air reaches the burner chamber, it is mixed with the fuel and ignited. Ignition of the fuel/air mixture occurs when two electrodes located in the burner chamber are energized with 10, 000 volts. The ignition transformer that is controlled by the flame programmer provides the high voltage. As the hot air flows through the burner chamber, the coil filled with circulating thermal fluid is heated. The exhaust air is then vented from the top of the heater through an exhaust stack. Operation of the burner blower and fuel pump are continuous when the heating system is on. Ignition is turned off by the flame programmer once combustion is established. There are times during laundry operations that the still is not being used. When this occurs, the control system will turn the heater on and off as necessary to maintain the required dryer air temperatures. This is accomplished by turning off the burner blower and de–energizing fuel solenoid valves. When combustion is required, the control system will provide a call for heat signal to start the burner blower and fuel pump. Once the flame programmer verifies the blower is operating and fuel pressure is available, it will energize the fuel solenoid valves and apply power to the ignition transformer.

THERMAL FLUID CIRCULATING

Thermal fluid is circulated through the heating system by the thermal fluid pump (M300). The thermal fluid pump is a centrifugal type pump driven by an electrical motor. When the thermal fluid exits the heater coil it is pumped through the heat exchangers in the drum drying ducts. The thermal fluid then passes through the heatplates in the still and is returned to the heater. During laundry operations, the thermal fluid pump is continuously circulating thermal fluid, even when the heater is off. When the heater is on, the thermal fluid temperature rises and the thermal fluid expands. To compensate for this expansion the heater contains an expansion tank. When the thermal fluid is at ambient temperature, the expansion tank will be approximately one–third full of thermal fluid. As the heating system reaches its maximum operating temperature, the level in the expansion tank will rise to approximately two–thirds full. A vent is provided at the top of the expansion tank to bleed air pressure from the system as the thermal fluid expands. A relief valve is installed in the thermal fluid line at the outlet of the heater. This valve prevents the pressure of the thermal fluid from exceeding safe operating limits in the event of a control system failure. A strainer is provided at the thermal fluid pump inlet to prevent debris in the plumbing from entering the pump. Isolation valves are located throughout the thermal fluid plumbing to seal off portions of the heating system to reduce the amount of thermal fluid that will need to be drained for maintenance.

HEATER MONITORING AND CONTROL

Heater operation is monitored and controlled by a flame programmer (FP300). Once the flame programmer receives a call–for–heat signal from the control system to start the heater, the flame programmer will control heater operation until the control system removes the signal. Interface between the flame programmer and control system is discussed in SYSTEM MONITORING AND CONTROL (WP 0007 00). The flame programmer and control system contain interlock circuits that are connected to various sensors and switches located on the heater. The devices used to monitor and control the heater are described in the following paragraphs:


FILL PORT
VENT
EXPANSION TANK
STRAINER
PT 300
PI 300
DRAIN
PI 304
FUEL FILTER
PT 302
PI 302
PT 301
PI 301
UV 300
EXHAUST OUT
TS 300
TE 300
FV 301
FV 300
M300 THERMAL FLUID PUMP
AIR INLET
SCREEN
PI 303
PS 300
PS 302
PS 301
THERMAL FLUID HEATER
AIR IN
M301 BURNER BLOWER
M302 FUEL PUMP
FUEL FILTER
FROM FUEL SUPPLY
TO FUEL SUPPLY
DRYER A
DRYER B
STILL

Air Pressure Monitoring

Two pressure switches are provided for monitoring air flow through the burner blower (M301). Pressure switch (PS300) monitors air pressure at the blower inlet. Pressure switch (PS301) monitors air pressure at the blower outlet. Signals from both switches are continuously monitored to ensure that adequate air flow is provided to support combustion. If sufficient air flow is not detected one or both switches will open the flame programmer interlock circuit to stop heater operation. Alarm signals will also be provided to the control system by the flame programmer and the pressure switch.

Fuel Pressure Monitoring

A pressure switch (PS302) is provided for monitoring pressure at the outlet of the fuel pump (M302). The signal from the switch is continuously monitored to ensure that adequate fuel pressure is available to support combustion. If sufficient fuel pressure is not detected, the switch will open the flame programmer interlock circuit to stop heater operation. Alarm signals will also be provided to the control system by the flame programmer and the pressure switch. When LADS is started, the heater fuel system must be primed. To prime the system, the operator lifts up a switch that connects 110 VAC power to the coil of the burner blower contactor (MC301). When the burner blower (M301) is operating the fuel pump is also operating. The operator releases the switch when the lines from the fuel supply are filled and the pump outlet pressure is high enough to sustain heater operation. Pressure gauge (PI303), connected to the fuel pump outlet, is provided to inform the operator when the fuel system is primed. Pressure gauge (PI304), connected to the burner chamber inlet, is provided to aid in troubleshooting fuel pressure problems.

Flame Monitoring

An ultra–violet light detector (UV300) is used to continuously monitor the presence of a flame inside the burner chamber. The signal from the detector is provided to the flame programmer (FP300). During start–up, the flame programmer uses this signal to turn off the ignition transformer. During operation, if this signal is not received by the flame programmer, the flame programmer will stop heater operation, and provide an interlock alarm signal to the control system.

Thermal Fluid Pressure Monitoring

Three pressure sensors are used for monitoring the pressure of the thermal fluid. Pressure sensor (PT300) monitors the thermal fluid pump (M300) inlet pressure. Pressure sensor (PT301) monitors the thermal fluid pump outlet pressure. Pressure sensor (PT302) monitors the thermal fluid heater outlet pressure. Signals from the pressure sensors are continuously monitored by the control system to ensure the thermal fluid is circulating at the proper flow rate. The control system will shut off operation of the heating system if the flow of thermal fluid is not within the required range. Pressure gauges (PI300, PI301, and PI302) are connected at the same locations as the pressure sensors, and are provided to monitor the thermal fluid pressure when troubleshooting and servicing the thermal fluid system.

Thermal Fluid Temperature Monitoring

Two temperature sensors are provided for monitoring the thermal fluid temperature at the heater outlet. Temperature sensor (TE300) is used to control operation of the heater and regulate the temperature of the thermal fluid going into the dryer heaters. When the still is not being used, the thermal fluid temperature will rise. The signal from TE300 will be used to detect this condition and the control system will turn off the call–for–heat signal to the flame programmer (FP300) as previously described. As long as the thermal fluid temperature is sufficient to maintain the selected drying temperature the heater will remain in this state. If the thermal fluid temperature must be increased to maintain the proper air drying temperature, the signal from TE300 will be used by the control system to apply the call–for–heat signal to the flame programmer. Temperature switch (TS300) continuously monitors the thermal fluid temperature to ensure that the thermal fluid does not overheat. If the thermal fluid temperature exceeds the specified limit, the switch will open the flame programmer interlock circuit to stop heater operation. Alarm signals will also be provided to the control system by the flame programmer and temperature switch.

Thermal Fluid Level Monitoring

The expansion tank contains a dipstick to periodically check the thermal fluid level in the tank. The dipstick has marks indicating when thermal fluid needs to added and when the expansion tank is full.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM
(NSN 3510–01–463–0114)
AIR SYSTEM THEORY OF OPERATION

AIR SYSTEM

The air system provides dry compressed air to the other LADS systems. This air is used to pressurize the air bags that support the drums and to actuate ball valves, air dampers, brakes, and door locks used on the washing/drying system and water recycle system. A small amount of air is also used to detect the water level in the wash tanks, rinse tanks, still, and standpipe. Air system operation consists of the following sub–operations:

AIR COMPRESSION AND CONDITIONING

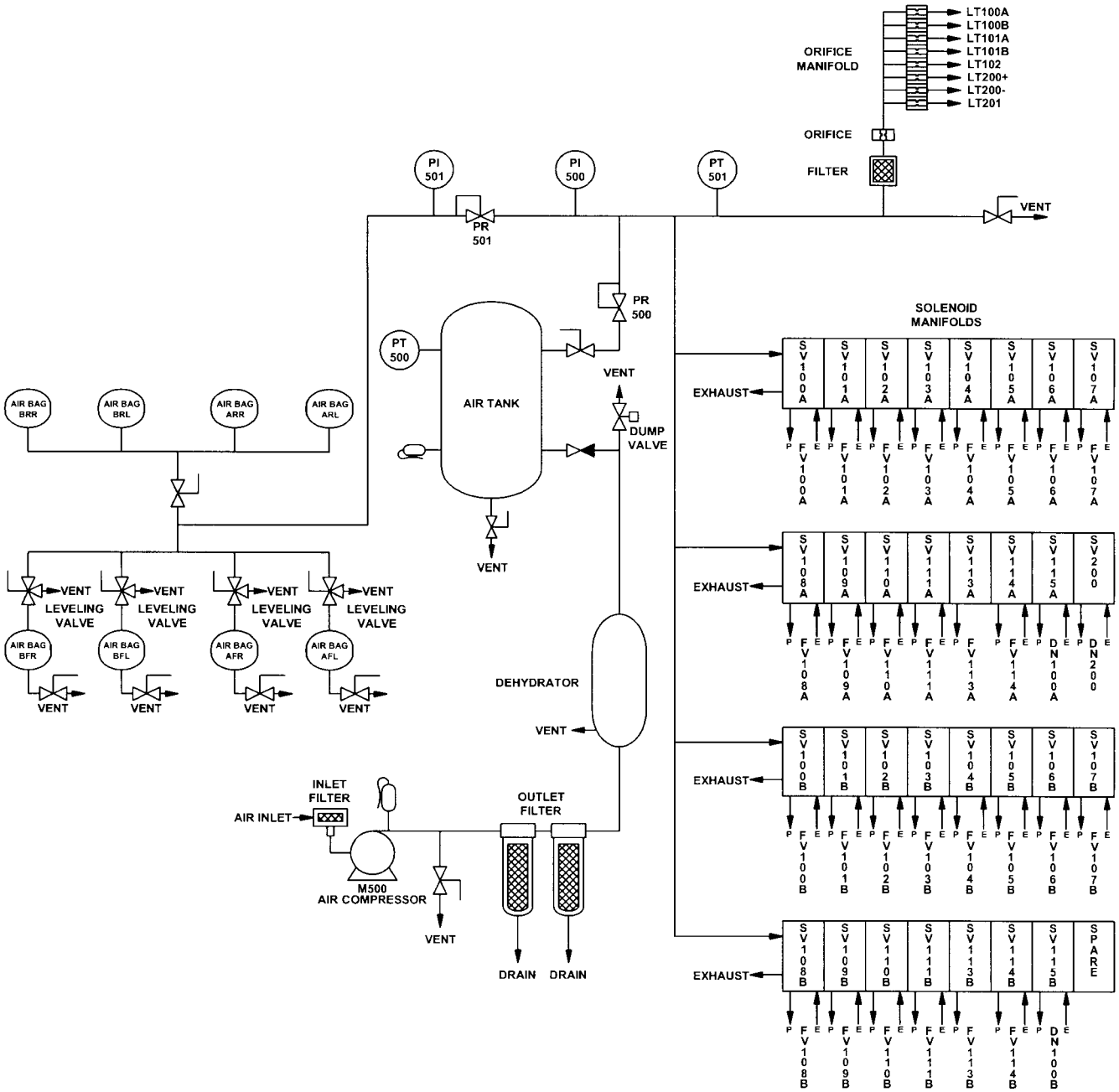
Ambient air enters the air system through an inlet filter. The inlet filter is used to prevent debris (sand, dirt, leaves, etc.) from entering the air compressor (M500). The air compressor is used to pressurize the air entering the system from atmospheric pressure to approximately 125 psig. The compressor is a two–stage, two–cylinder, reciprocating piston type that is driven by an electric motor. A relief valve is mounted at the compressor outlet to prevent the discharge pressure from exceeding safe limits. Air leaving the compressor is routed to an outlet filter that removes most of the water generated during the compression process from the product air. The filter contains two disposable elements that separate particles and water from the air. Float valves located in the filter bowls automatically drain the filters to remove the separated water. Once the air leaves the outlet filter, it passes through a dehydrator. The dehydrator is used to completely dry the product air. The dehydrator consists of a membrane vessel. When product air enters the vessel about 80 percent of the air passes through the membrane material where the water is squeezed out of the air. The other 20 percent of the air is used to sweep the moisture off of the membrane to a vent port. The dried product air is then routed to an air tank.

COMPRESSED AIR STORAGE

When the air leaves the dehydrator, it is stored in the air tank. When the tank is fully pressurized, it contains enough air to allow the compressor (M500) to operate intermittently (approximately 30 minutes per hour) while still allowing smooth operation of the air–driven components. Pressure sensor (PT500), mounted on the air tank, is used to determine when the compressor should turn on and off. When the pressure in the tank drops to 85 psig, due to operation of air driven components, the signal sent to the control system by the sensor will prompt the control system to turn on the compressor. Likewise, when the air tank has been recharged to the 125 psig, the signal from the sensor will turn off the compressor. A dump valve (FV500) opens to allow pressure trapped between the air tank and compressor to vent. A relief valve is mounted on the air tank to prevent the pressure of the stored air from exceeding safe limits. A storage tank vent valve is located at the tank bottom to allow the tank to be de–pressurized prior to performing maintenance on the air system. The air tank also contains an isolation valve that maintains the air pressure in the tank when the product pressure vent valve is opened. A check valve is provided at the tank inlet to prevent pressure in the air tank from bleeding back through the dehydrator, or out the dump valve, when the compressor is not operating.

PRODUCT AIR DISTRIBUTION

A pressure regulator (PR500) is used to control the pressure of the air delivered to the air–driven components. The regulator is set to deliver air at 80 psig regardless of normal changes in flow demand. The regulator is adjustable and contains a pressure gauge (PI500) that indicates the regulated pressure. Pressure sensor (PT501) is also mounted at the outlet of the pressure regulator. This sensor is used by the control system to verify that sufficient air pressure is available to operate the air–driven components. Product air leaving the pressure regulator is distributed to the solenoid manifolds, orifice manifold, and drum air bags. Four solenoid manifolds, each consisting of eight 4–way valves, are provided to control operation of the various air–actuated ball valves, air dampers, drum brakes and door locks. These 4–way valves use electrical signals received from the control system to control the direction of air flow to and from the air–driven components. The orifice manifold is used to control the flow of air to the tank level sensors. A filter is mounted at the manifold inlet to prevent particles from plugging the orifices. An inlet orifice is provided to isolate the individual level sensor orifices from pressure and flow surges. Eight level sensor orifices are used to supply a steady flow of low pressure air to the pressure sensor and bubbler tube used to determine the water levels in the wash tanks, rinse tanks, still, and standpipe. The air provided to the drum air bags passes through a regulator (PR501) that is set to deliver air at 65 psig. The regulator contains a pressure gauge (PI501) that indicates the regulated pressure. Each front air bag has a leveling valve that is mechanically connected to the drum. When the LADS is operating on unlevel terrain, the leveling valve adds or vents pressure from the air bag until the drum is level in the side–to–side direction.



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LAUNDRY ADVANCED SYSTEM

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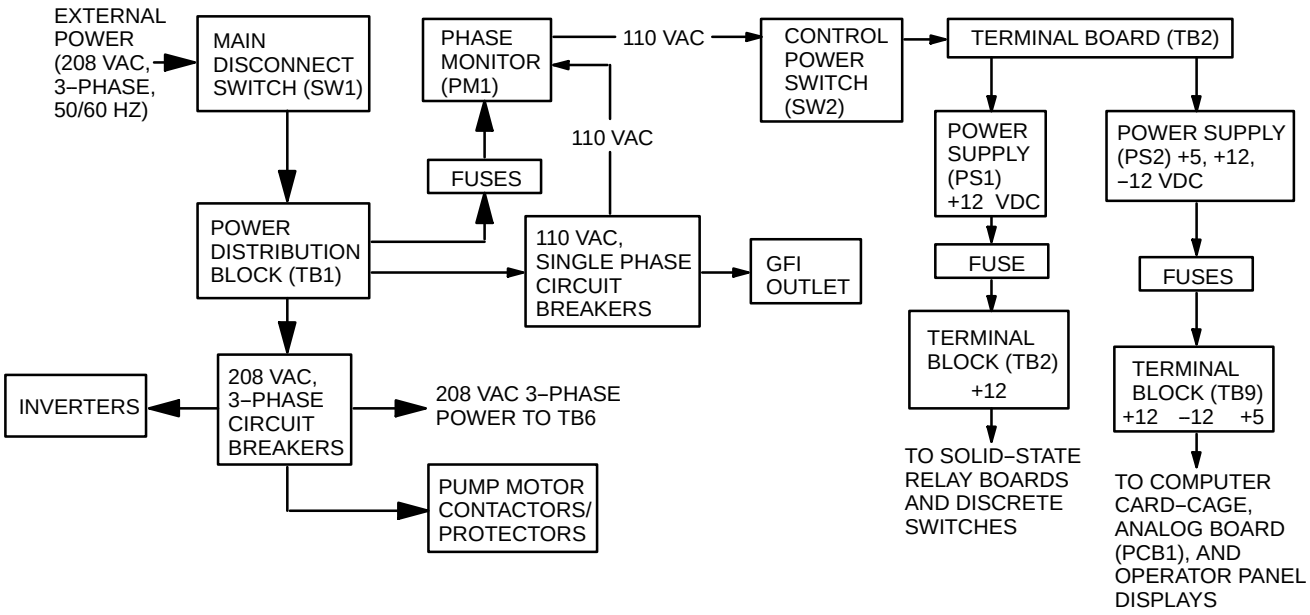
CONTROL SYSTEM THEORY OF OPERATION

CONTROL SYSTEM

The control system provides the electrical interface between the external power and the LADS electrical and electronic components. This system also controls all aspects of LADS automated operation and provides the interface to the controls and indicators that the operator uses when performing laundry operations. Control system operation consists of the following sub–operations.

INPUT POWER DISTRIBUTION AND CONDITIONING

The LADS requires external 208 VAC, 3–Phase, 50/60 Hz electrical power in order to operate. External power is connected to the disconnect switch (SW1) located in the main control enclosure. This switch removes power from the LADS when turned off and provides power to the power distribution block (TB1) when turned on. Inside the main control enclosure power is divided and distributed to circuit breakers that protect all electrical circuits routed in the LADS. Input power is connected to a phase monitor (PM1) that continually analyzes the input power provided to the LADS. If an out–of–tolerance condition exists, power can not be applied, or will be automatically removed from the control system. Single–phase 110 VAC power is connected to a ground fault interrupt (GFI) circuit and the control power switch (SW2). When SW2 is turned on power is applied to two power supplies (PS1 and PS2). PS1 and PS2 supply direct current (DC) power to the electric and electronic components that provide control over all aspects of LADS operation.



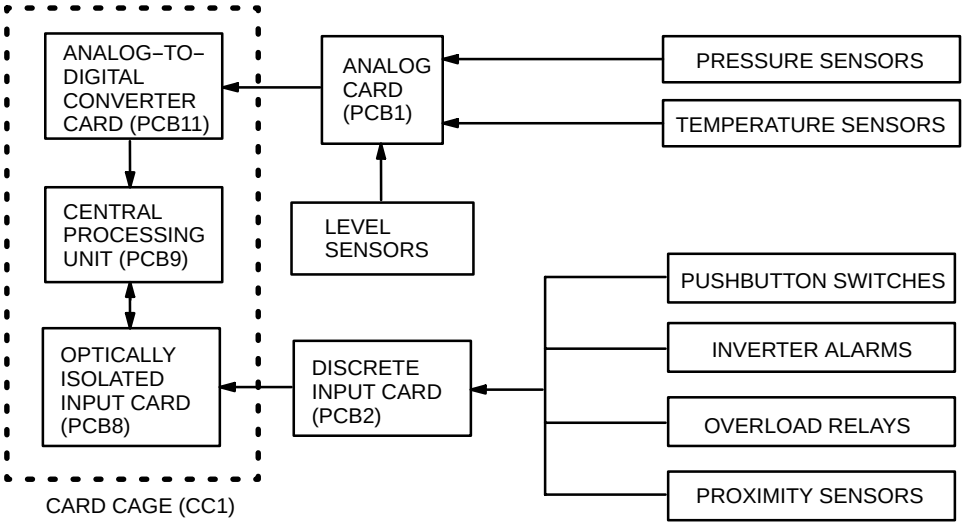
SYSTEM MONITORING AND CONTROL

LADS operation is electronically controlled. This control is accomplished using a central processing unit (PCB9) that contains custom software. PCB9 interfaces with other circuits to control and monitor all automatic operations as follows:

Monitoring System Inputs

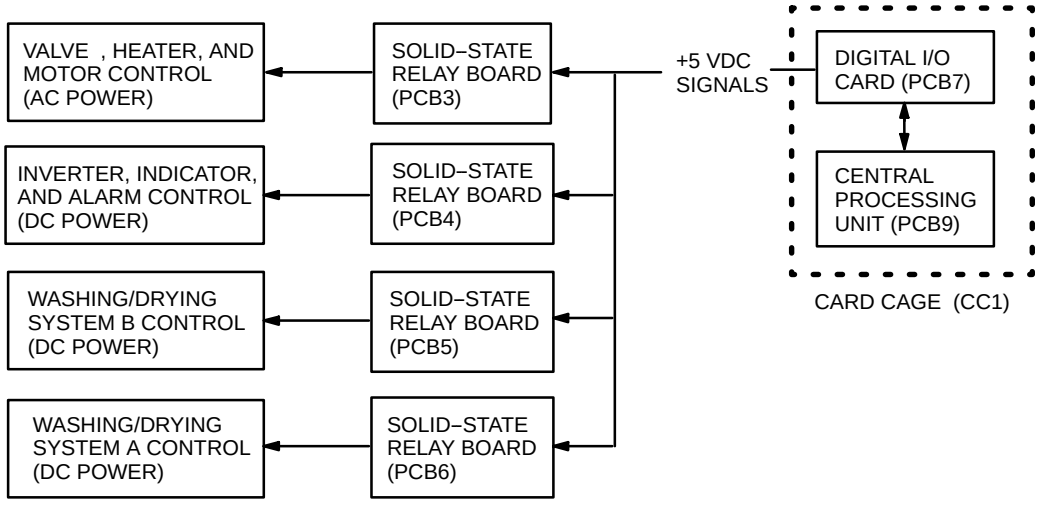
Analog sensors and discrete switches are used to monitor all aspects of LADS operation. Analog board (PCB1) takes signals from the analog sensors and provides a conditioned signal to the analog–to–digital converter card (PCB11). PCB11 changes the signal to digital information and provides the information to the central processing unit (PCB9). The discrete input board (PCB2) provides a path from each discrete switching device to the optically isolated input card (PCB8). PCB8 takes the on or off signal from the switching device and provides a signal to PCB9.

SYSTEM MONITORING AND CONTROL – CONTINUED



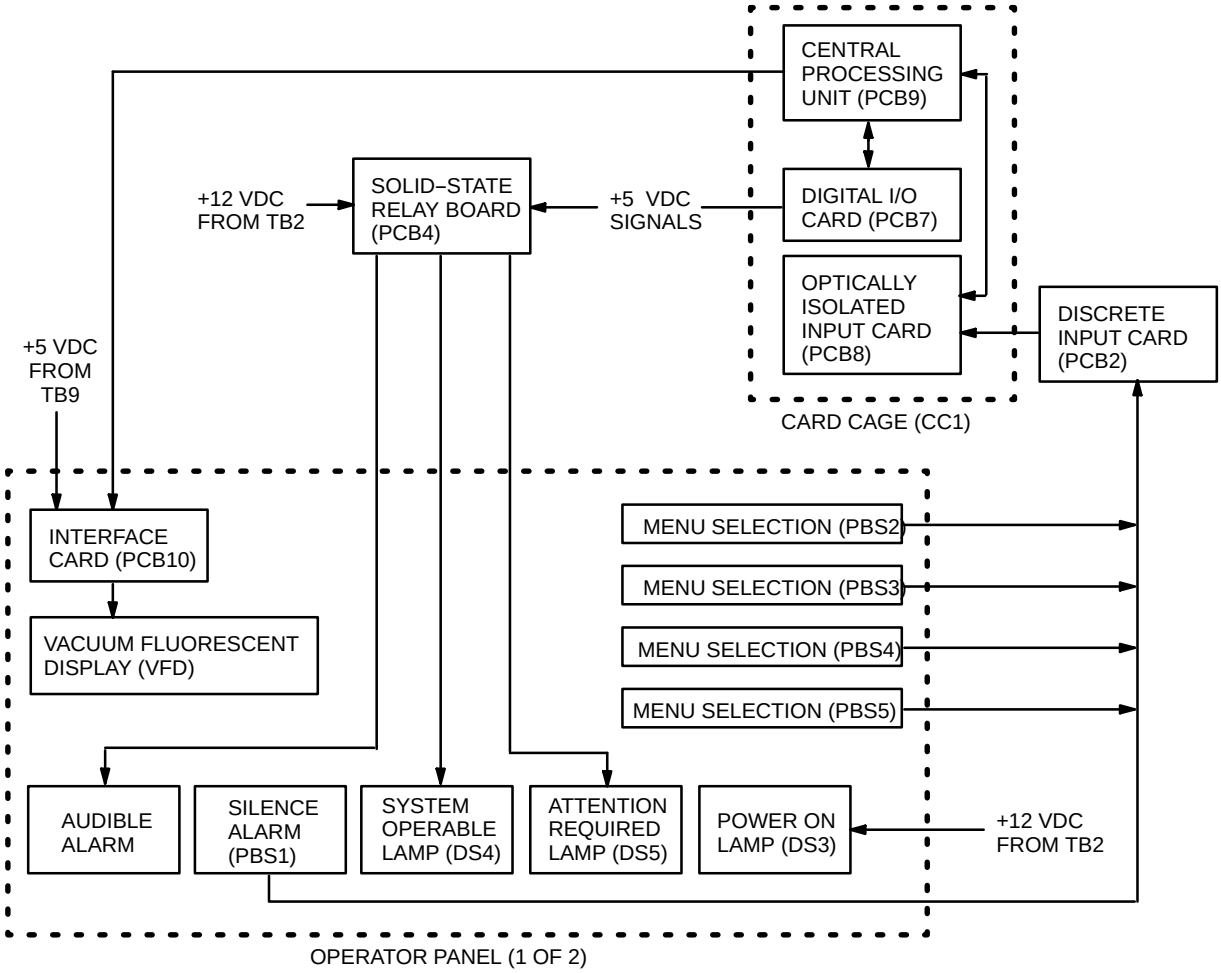
Controlling System Outputs

The LADS contains fans, motors, pumps, valves, and many other components that need to be turned on or off at specific times in order for correct laundry operations to occur. Based on software contained in the central processing unit (PCB9) the control system will provide the required outputs to four solid–state relay boards (PCB3, 4, 5, and 6). Individual solid–state relays (SSRs) on these boards receive input signals from PCB9 through a digital input/output card (PCB7). When the SSRs receive an input signal they energize and provide AC or DC power to turn on the proper output.



OPERATOR INTERFACE

Main power and control power are applied to LADS at the main control enclosure as previously discussed under input power distribution and conditioning. At the operator panels the operator uses pushbutton switches, indicating lights, an alarm, and a message display to control and monitor LADS operation. Operator panels A and B are used for selecting laundry formulas and starting and stopping laundry cycles on their assigned washing/drying systems. Operator panel A is used to drain, fill, and heat water tanks on both washing/drying systems and control operation of the air system. Operator panel A is also used by maintenance personnel to observe system alarms, monitor operating parameters, and initiate specific system or component tests. Communication between the operator panels and the control system is accomplished using several methods. Selection of menu options and turning off the alarm is done using pushbutton switches. These switches communicate with the CPU board (PCB9) by providing an input to the discrete input board (PCB2). PCB2 provides a signal to the optically isolated input card (PCB8) which provides the signal to PCB9. Indicator lights and the audible alarm are turned on when a solid−state relay (SSR) receives an input signal from PCB9 through the digital input/output (I/O) board (PCB7). When the 5 VDC signal is removed, the SSR switches and power is removed from the indicator. The display contains its own processing circuit that communicates digitally with PCB9. An interface card (PCB10) provides an interconnection between the display and PCB9. PCB10 also provides 5 VDC power from PS2 to the display backlight. There are four alarm levels associated with LADS operation. When the system is operating normally the alarm is off. If the alarm comes on, and remains steady, this indicates that some type of operator action is required (i.e., close doors, laundry, cycle is complete, add FRS, etc.). If the alarm comes on with a slow pulse a non−critical fault has occurred. If the alarm comes on with a fast pulse a critical fault has occurred and LADS operation will be shut down by the control system.



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CHAPTER 2

OPERATOR INSTRUCTIONS

FOR

LAUNDRY ADVANCED SYSTEM

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

GENERAL

The following paragraphs contain illustrations that show the location of each control and indicator used to operate the LADS. Each control and indicator is clearly labeled as it appears on the equipment. Review these paragraphs thoroughly before operating the system.

MAIN CONTROL ENCLOSURE CONTROLS AND INDICATORS

Figure 1 shows the location of the controls and indicators found on the main control enclosure. Table 1 describes the use of these controls and indicators. To access the controls located inside the main control enclosure, loosen the eleven latches with a flat tip screwdriver from the tool box (WP 0057 00, Table 2, Item 10) and open door.

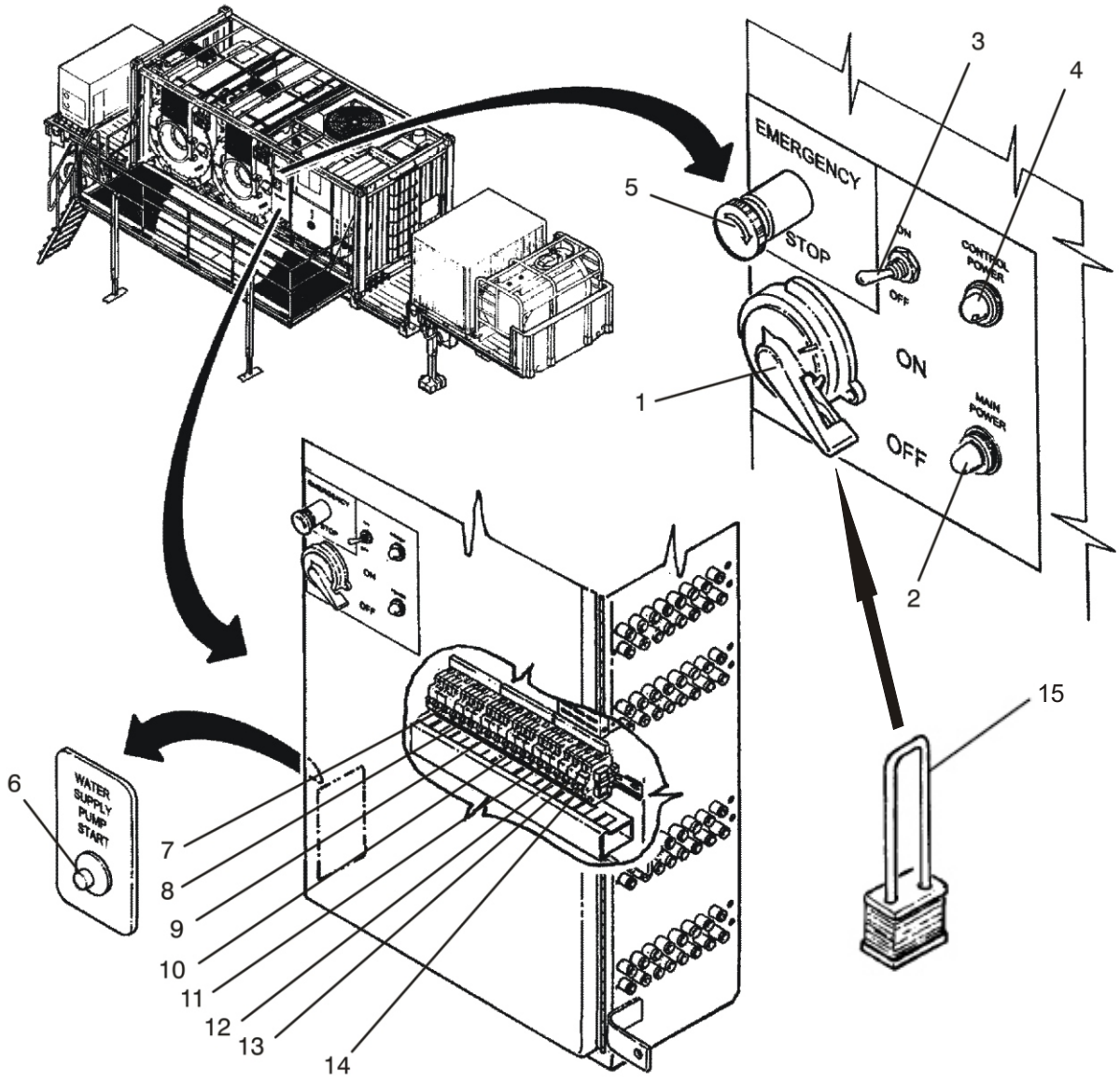

Figure 1. Location of Main Control Enclosure Controls and Indicators.

MAIN CONTROL ENCLOSURE CONTROLS AND INDICATORS – Continued.

Table 1. Main Control Enclosure Controls and Indicators.

INDEX	DESCRIPTION	TYPE	FUNCTION
1	MAIN DISCONNECT ON/OFF	2 Position Switch	Turns main power on or off.
2	MAIN POWER	Indicator	Illuminates when main power is applied to LADS.
3	CONTROL POWER ON/OFF	2 Position Switch	Turns control power on or off.
4	CONTROL POWER	Indicator	Illuminates when control power is applied to LADS.
5	EMERGENCY STOP	Pushbutton Switch	Used to stop LADS operation under emergency situations.
6	WATER SUPPLY PUMP START	Pushbutton Switch	Used to start water supply pump. Once started, the pump will remain on for 10 minutes.
7	CIRCUIT BREAKER CB1	63 AMP, Lever Actuated	Used to protect wiring and components in the 20 HP inverter circuits. Lever is ON in up position.
8	CIRCUIT BREAKER CB2	40 AMP, Lever Actuated	Used to protect wiring and components in the 10 HP inverter circuits. Lever is ON in up position.
9	CIRCUIT BREAKER CB3	40 AMP, Lever Actuated	Used to protect wiring and components in the Drum A inverter circuits. Lever is ON in up position.
10	CIRCUIT BREAKER CB4	40 AMP, Lever Actuated	Used to protect wiring and components in the Drum B inverter circuits. Lever is ON in up position.
11	CIRCUIT BREAKER CB5	20 AMP, Lever Actuated	Used to protect wiring and components in the water pump circuits. Lever is ON in up position.
12	CIRCUIT BREAKER CB6	16 AMP, Lever Actuated	Used to protect wiring and components in the external water pump, distillate pump, and air compressor circuits. Lever is ON in up position.
13	CIRCUIT BREAKER CB7	16 AMP, Lever Actuated	Used to protect wiring and components in the control power circuits. Lever is ON in up position.
14	CIRCUIT BREAKER CB8	16 AMP, Lever Actuated	Used to protect wiring and components in the external GFI circuit.
15	PADLOCK		Lock is from storage cabinet. Used for electrical lockout of system.

OPERATOR PANEL CONTROLS AND INDICATORS

Two operator panels are used on LADS. Operator panel A is used to operate washing/drying system A. Maintenance personnel also use operator panel A to control, monitor, and test LADS operation. Operator panel B is used only to operate washing/drying system B. Figure 2 shows the location of the controls and indicators found on the operator panels. Table 2 describes the use of these controls and indicators found on each operator panel.

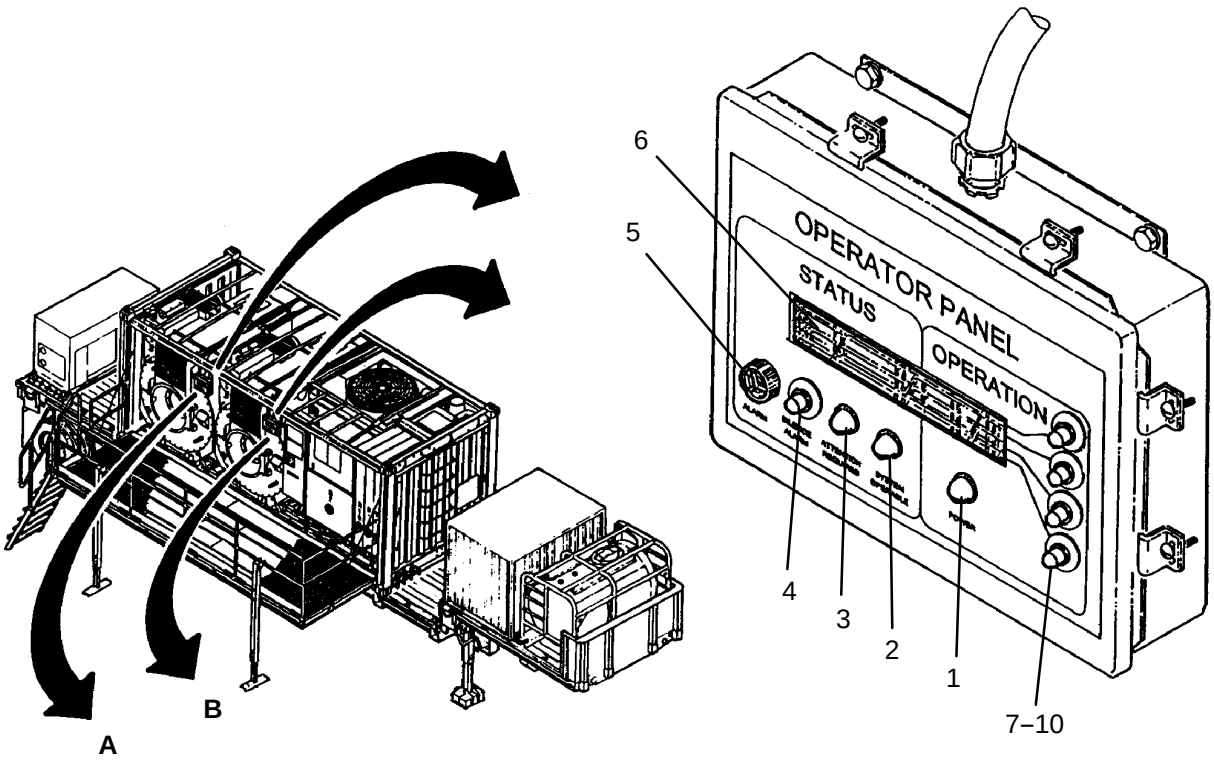

Figure 2. Location of Operator Panel Control Enclosure Controls and Indicators.

Table 2. Operator Panel Controls and Indicators.

INDEX	DESCRIPTION	TYPE	FUNCTION
1	POWER	Indicator	Illuminates when power is applied to operator panel.
2	SYSTEM OPERABLE	Indicator	Illuminates green when system is ready to operate.
3	ATTENTION REQUIRED	Indicator	Illuminates red when system requires attention.
4	SILENCE ALARM	Pushbutton Switch	Silences audible alarm.
5	ALARM	Audio	Sounds when a system attention or a fault occurs.
6	DISPLAY	Vacuum Fluorescent	Shows system status and listing of menu options.
7–10	MENU SELECTION	Pushbutton Switches	Used to select various menu options that appear on display.

INVERTER ENCLOSURE CONTROLS

Figure 3 shows the location of the controls found on the inverter enclosure. Table 3 describes the use of these controls.

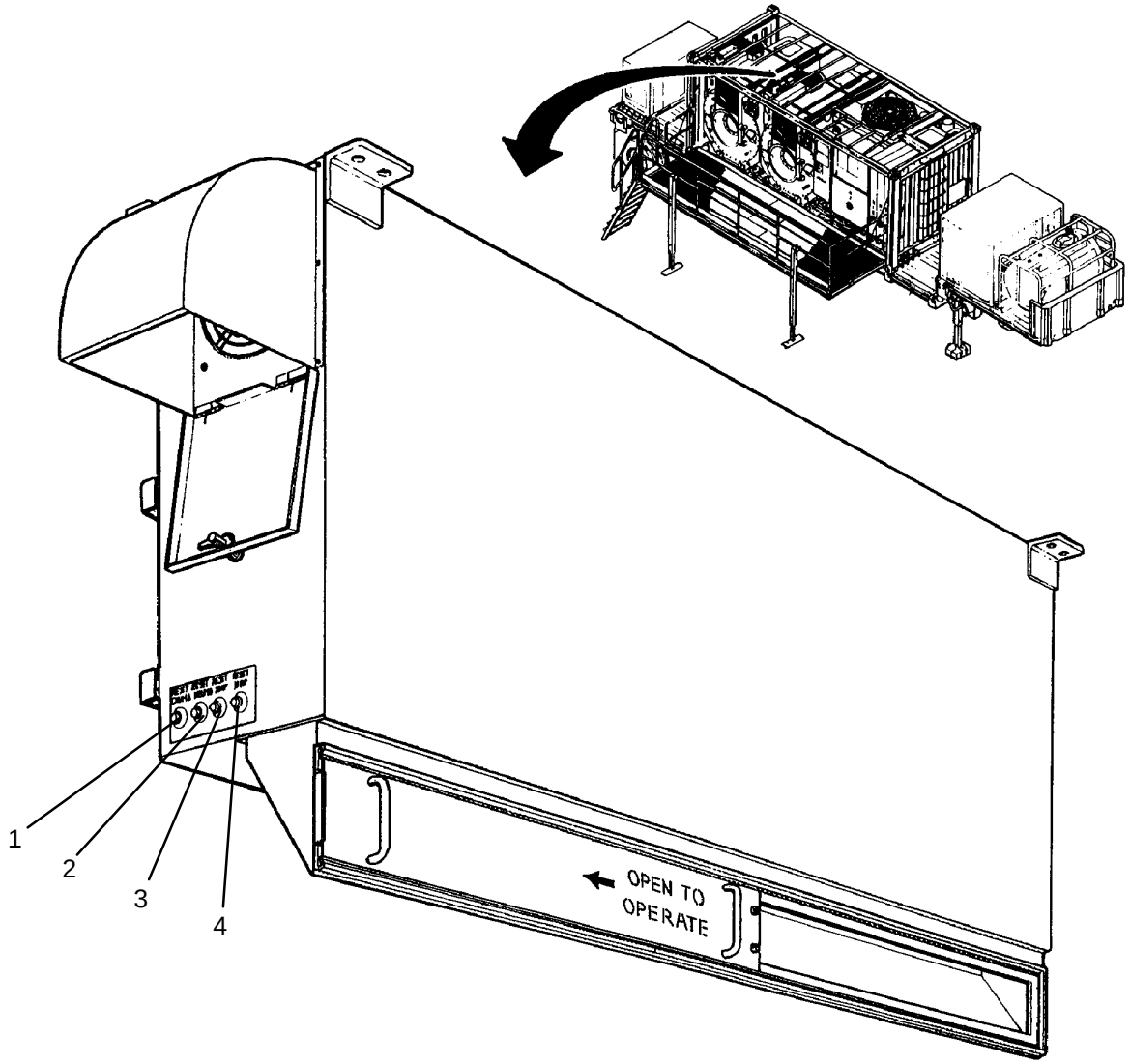

Figure 3. Location of Inverter Enclosure Controls.

Table 3. Inverter Enclosure Controls.

INDEX	DESCRIPTION	TYPE	FUNCTION
1	RESET DRUM A	Pushbutton Switch	Used to reset drum A inverter when a ”DRUM A INVERTER FAULT” is displayed.
2	RESET DRUM B	Pushbutton Switch	Used to reset drum B inverter when a ”DRUM B INVERTER FAULT” is displayed.
3	RESET 20 HP	Pushbutton Switch	Used to reset a 20 HP inverter when a ”20 HP INVERTER FAULT” is displayed.
4	RESET 10 HP	Pushbutton Switch	Used to reset a 10 HP inverter when a ”10 HP INVERTER FAULT” is displayed.

HEATER CONTROLS AND INDICATORS

Figure 4 shows the location of the controls and indicators found on the heating system. Table 4 describes the use of these controls and indicators.

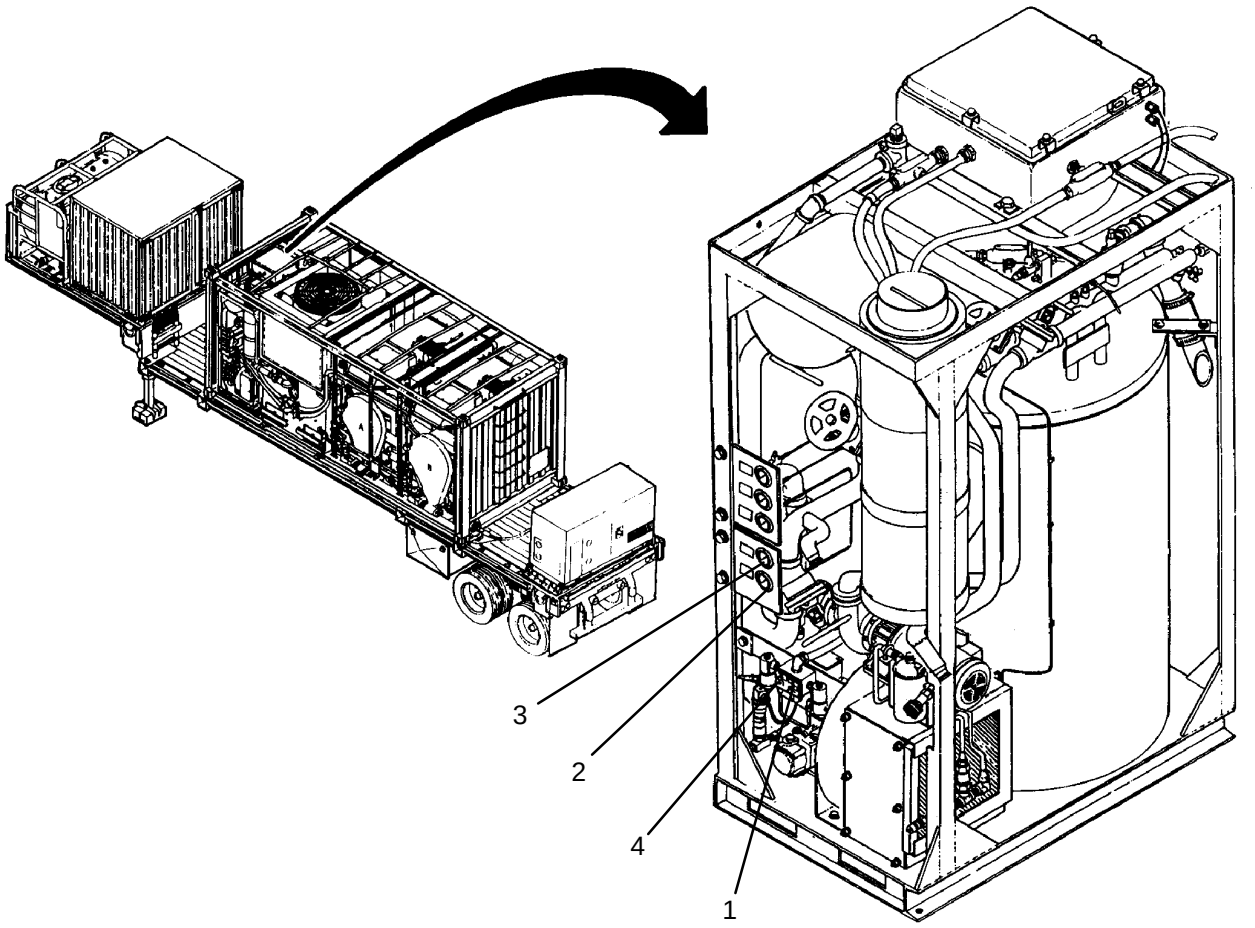

Figure 4. Location of Heating System Controls and Indicators.

Table 4. Heating System Controls and Indicators.

INDEX	DESCRIPTION	TYPE	FUNCTION
1	PRIME PUMP ON/OFF	Momentary Toggle Switch	Used to prime heater fuel system.
2	FUEL PUMP PRESSURE	Gage, 0–200 PSIG	Used to verify fuel pump is primed and proper fuel pressure is available to run heating system.
3	BURNER FUEL PRESSURE	Gage, 0–200 PSIG	Used to verify fuel pressure is available to support heater ignition.
4	FP300 RESET	Pushbutton Switch	Used to reset heater flame programmer when a heating system related failure is displayed.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER USUAL CONDITIONS
GENERAL OPERATING INFORMATION

GENERAL

The usual condition operating procedures are divided into five Work Packages. The specific procedures required to operate the LADS depend on the operational scenario. Table 1 provides a listing of the various procedures by Work Package with a description of what is contained in each procedure. Table 2 provides guidance on which procedures are required for each scenario.

Table 1. Usual Condition Operating Procedures.

TITLE	PURPOSE	WORK PACKAGE
GENERAL OPERATING INFORMATION	Provides guidance on mission planning, site selection, sheltering, and laundry operations.	WP 0009 00
ASSEMBLY AND PREPARATION FOR USE	Provides procedures for setting–up the LADS when it is in the transport–ready or stored configuration.	WP 0010 00
INITIAL ADJUSTMENTS, BEFORE USE, AND SELF–TEST	Provides guidance for starting the LADS after it has been set–up.	WP 0011 00
DAILY OPERATING PROCEDURES	Provides procedures for operating the LADS for continuous laundry operations.	WP 0012 00
DRAINING PROCEDURES	Provides guidance on how to drain the LADS to change the water or when preparing to move.	WP 0013 00
PREPARATION FOR MOVEMENT	Provides procedures on packing–up the LADS for the transport–ready or stored configuration.	WP 0014 00

Table 2. Operating Procedure Usage.

SCENARIO	WP 0009 00	WP 0010 00	WP 0011 00	WP 0012 00	WP 0013 00	WP 0014 00
PRE–DEPLOYMENT	X					
DEPLOYMENT	X	X	X			
DAILY OPERATIONS				X	X	
MOVEMENT					X	X
POST–DEPLOYMENT	X					

MISSION PLANNING

Proper planning helps ensure a successful deployment. In order to properly plan a mission the number of soldiers to be supported and the deployment duration must be determined. Once this information is obtained, the number of LADS, auxiliary equipment, and consumables required to support the mission can be calculated. After the quantities have been identified, it is necessary to ensure these items are available, serviceable, and ready for transport. The following paragraphs provide guidance on how to plan for the mission based on total number of soldiers to be supported, daily laundry requirements, and deployment duration.

MISSION PLANNING – Continued

Determining How Many LADS

The number of LADS required to support a mission is directly dependant on the laundry requirements. The LADS can process 7,500 lbs (500 soldiers' worth at 15 lbs per soldier) of laundry in a 20–hour day if the laundry is processed on a continuous basis using the "BDU 65 MIN" cycle. This equates to 18 cycles per drum with the average load of 28 bags, weighing 7.5 lbs each. In a field environment, it is more realistic to expect daily laundry outputs in the 5,000 lbs per day range. This takes into account several factors. 1) There are normally delays encountered when the laundry is received and bagged, causing idle time on the LADS. 2) Soldier's do not always turn in amounts of laundry that can evenly be divided into the perfectly loaded bag. This causes bags weighing as low as 2 or 3 lbs to be laundered in place of ones weighing 7.5 lbs. 3) Soldier's clothing can be soiled to the point where the longer "BDU 70 MIN" or "BDU 75 MIN" cycles should be used. This results in less than 18 cycles per day. 4) If the LADS is inoperable for any period of time in a given day, extra laundry must be processed the following day, to prevent falling behind. 5) During a long deployment in harsh environmental conditions downtimes should be expected for both corrective and preventative maintenance. The following formula provides guidance on how to calculate the number of LADS required to perform a mission.

To determine the number of LADS for a deployment use the following calculation:

$$\frac{\text{NOS} \times 15 \text{ lbs} \times \text{ULF} \times \text{SF} \times \text{EF}}{7{,}500 \text{ lbs}} = \text{Number of LADS Required (always round up to nearest whole number)}$$

Where:
NOS = Number of soldiers serviced per day
ULF = Under Load Factor 1+ Percentage of laundry bags that weigh < 7.5 lbs
SF = Soil Factor 1 + 0% for lightly soiled, 7.5% for moderately soiled, or 15% for heavily soiled laundry
EF = Environmental Factor 1 + 25% if temperatures < 32 degrees F or >100 degrees F are expected + 25% for dusty conditions

Example 1:

$$\frac{325 \times 15 \text{ lbs} \times 1.25 \times 1.15 \times 1.25}{7{,}500 \text{ lbs}} = 1.17 \text{ LADS or 2 LADS when rounded up}$$

Where:
NOS = 325 soldiers
ULF = 1.25 for 25% of laundry bags weighing less than 7.5 lbs
SF = 1.15 for heavily soiled laundry
EF = 1.25 for high temperatures

Example 2:

$$\frac{400 \times 15 \text{ lbs} \times 1.25 \times 1.00 \times 1.00}{7{,}500 \text{ lbs}} = 1.00 \text{ LADS}$$

Where:
NOS = 400 soldiers
ULF = 1.25 for 25% of laundry bags weighing less than 7.5 lbs
SF = 1.00 for lightly soiled laundry
EF = 1.00 for moderate temperatures

Example 3:

$$\frac{450 \times 15 \text{ lbs} \times 1.25 \times 1.15 \times 1.50}{7{,}500 \text{ lbs}} = 1.94 \text{ LADS or 2 LADS when rounded up}$$

Where:
NOS = 450 soldiers
ULF = 1.25 for 25% of laundry bags weighing less than 7.5 lbs
SF = 1.15 for heavily soiled laundry
EF = 1.50 for high temperatures and dusty conditions

MISSION PLANNING – Continued

Preparing the LADS for Deployment

Properly preparing the LADS for deployment is essential to mission success. Each LADS that is to be deployed should be set–up as described in ”ASSEMBLY AND PREPARATION FOR USE” procedures WP 0010 00. After the LADS is set–up perform all ”BEFORE, QUARTERLY, SEMI–ANNUAL, and ANNUAL PMCS” IAW WP 0032 00 and WP 0035 00. In addition, all required PMCS from TM 10–3510–221–24 should be completed by maintenance personnel. After all PMCS is completed the LADS should be started using ”INITIAL ADJUSTMENTS, BEFORE USE, AND SELF–TEST” procedures WP 0011 00. After the water tanks are filled and heated, at least 3 consecutive laundry cycles should be completed for each drum using the ”DAILY OPERATING PROCEDURES” WP 0012 00. If any problems are encountered during set–up or operation they should be corrected and verified. After the simulated operation is completed the LADS should be drained using ”DRAINING PROCEDURES” WP 0013 00. As part of the draining procedures all ”AFTER PMCS” WP 0034 00 should be performed. Once drained, use ”PREPARATION FOR MOVEMENT” WP 0014 00 to pack–up the LADS. Perform an inventory of all the LADS accessories as identified in the ”COMPONENTS OF END ITEM (COEI) LIST” WP 0057 00. Store the LADS accessories in the storage locker on the M871 trailer.

Auxiliary Equipment Planning

Equipment required to perform laundry operations includes those items found in the ”BASIC ISSUE ITEM” list, ”ADDITIONAL AUTHORIZED ITEM” list, and ”EXPENDABLE AND DURABLE ITEMS” list. Other commonly used equipment is identified in Table 3. This equipment should be identified, inventoried, inspected, and prepared for deployment as appropriate. Ensure all required PMCS is performed on the Generator Set, Trailer, and Tractor per the applicable TM. For operation of the Generator Set refer to TM 9-6115-644-10. For operation of the Trailer refer to TM 9–2330–326–14&P, for operation of the Tractor refer to TM 9–2320–336–10.

Table 3. Auxiliary Equipment for Laundry Operations.

NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	U/M	QTY
	APRON, DISPOSABLE, (39428) 7738T11	BX100	1
	BAG, FILTER, 5–MICRON, (39428) 5162K18	EA	SEE TABLE 4
	BAG, FILTER, 10–MICRON, (39428) 5162K82	EA	SEE TABLE 4
8105–01–183–9768	BAG, TRASH (58536) A–A–1668	BX125	4
7920–00–061–0038	BRUSH, SCRUB, (58536) A–A–2074	EA	1 PER LADS
7240–00–169–0440	CAN, TRASH, (58536) A–A–1069	EA	3
4330–00–001–7841	CARTRIDGE, COALESCING FILTER, (87405) CC–21–7	EA	SEE TABLE 4
7105–00–269–8483	CHAIR, FOLDING, (58536) A–A–3083	EA	6 PER LADS
7930–01–306–8369	CLEANING COMPOUND, SOLVENT, (1Z575) SIMPLE GREEN	EA	6 PER LADS
7110–00–656–1110	DESK, FIELD, (81349) MIL–D–10821	EA	2
4820–01–477–9033	DRAIN, AUTOMATIC, (43990) 4000–51R	EA	2 PER LADS
4330–01–481–7604	ELEMENT, AIR FILTER, COALESCING, (43990) 4444–01	EA	1 PER LADS
	ELEMENT, AIR FILTER, PARTICULATE, (43990) 4438–01	EA	1 PER LADS
3510–01–481–7830	ELEMENT, LINT FILTER, (4X630) 863–110133	EA	4 PER LADS
4460–01–481–7552	FILTER, AIR, ELECTROSTATIC, (25794) 6B701	EA	1
5855–01–073–1384	FILTER, AIR INLET, (0UPS6) C87714	EA	1 PER LADS

MISSION PLANNING – Continued

Table 3. Auxiliary Equipment for Laundry Operations.

NATIONAL STOCK NUMBER	DESCRIPTION, CAGEC, AND PART NUMBER	U/M	QTY
6230–00–643–3486	FLASHLIGHT, (U4207) E/N95	EA	2 PER LADS
5330–01–481–1846	GASKET, STILL DOOR, (4X630) 863–210111	EA	2
5330–01–493–4411	GASKET, WATER PUMP COVER, (NONE) 20458	EA	2
8514–01–434–1781	GLOVES, DISPOSABLE, (0Z057) GRER–LG	BX100	4
8415–01–441–0149	GLOVES, IMPERMEABLE, (1H8U7) 50801	PG10	4
4240–01–292–2818	GOGGLES, SAFETY, (65240) 9305	PR	1PER LADS
	GUN, GREASE, (39428) 1055K14	EA	1
	HAMPER, MOBILE, 27 CuFt, (39428) 2631T19	EA	2 PER LADS
	KIT, FILTER GASKET, (4X630) 863–410500	EA	1 PER LADS
5980–01–493–5664	LAMP, LED, WHITE (24446), 080BAS120LB	EA	1
6240–00–001–9404	LAMP, T–2/12, 12V, (88204) 12MB	EA	1
7240–00–161–1143	LID, TRASH CAN, (58536) A–A–1069	EA	3
	MASK, DUST, (39428) 5450T42	BX20	5
	PACKING, PRE–FORMED, (4X630) 863–410510	EA	2 PER LADS
5340–01–247–9650	PADLOCK, (39428) 1176A41	EA	3 PER LADS
7240–01–150–0716	PAIL, UTILITY 3 GALLON, (13147) B12R	EA	1 PER LADS
6515–00–137–6345	PLUGS, EAR, (U3216) E–A–R	BX400	1
7920–00–205–3570	RAG, WIPING, (58536) A–A–2522	BE(50LB)	1
5975–00–878–3791	ROD, GROUNDING, (82370) A104	EA	2 PER LADS
3510–01–481–6856	SCREEN ASSY, DRYER, (4X630) 863–110011	EA	2
3510–01–481–3396	SCREEN ASSY, CONDENSER, (4X630) 863–220100	EA	3
3510–01–481–3393	SCREEN ASSY, CONDENSER, (4X630) 863–220101	EA	1
5120–00–265–7462	SLEDGE HAMMER, (58536) A–A–1293	EA	1
5120–01–103–1676	SLIDE HAMMER, (45225) P74–144	EA	1
7110–01–145–6895	TABLE, FOLDING, (81337) 9–1–0191	EA	5 PER LADS
8340–01–456–3648	TENT, MEDIUM GENERAL PURPOSE, (73005) 2480108	EA	2 PER LADS
3920–00–929–8588	TRUCK, HAND, LAUNDRY, (81349) MIL–T–43610	EA	1
6145–01–226–9164	WIRE, GROUNDING, (58536) A–A–59551	FT	25 PER LADS

MISSION PLANNING – Continued

Consumables Planning

The amount of consumables required to support the LADS is directly related to the number of laundry cycles the LADS is operated per day times the number of operating days. Table 4 provides quantity factors for each consumable required per cycle. Multiplying these factors by the number of cycles per day, then by the number of days in the deployment will provide information on how much of each consumable is required.

Table 4. CONSUMABLE CALCULATIONS.

DESCRIPTION	QUANTITY PER CYCLE FACTOR	UNIT OF MEASURE	UNIT OF ISSUE
POTABLE WATER	12.8	Gallons	1 Gallon
FUEL (JP–8 OR DF–2)	7.5	Gallons	1 Gallon
ANTI–FOAM	0.031	Gallons	5–Gallons
DETERGENT	0.008	Gallons	5–Gallons
FILTER, BAG (10–micron)	0.10	Each	1 Each
FILTER, BAG (5–micron)	0.03	Each	1 Each
FILTER ELEMENT, COALESCER	0.009	Each	1 Each

Example 1: To determine the amount of anti–foam required use the following calculation:

$$\frac{QF \times \#C \times \#D}{UOI} = \text{Quantity of Anti–Foam Required (always round up to nearest whole number)}$$

Where:
QF = Quantity per Cycle Factor
#C = Number of Cycles per Day
#D = Number of Deployment Days
UOI = Unit of Issue

$$\frac{0.031 \times 36 \times 45}{5} = 10.04 \text{ Containers or } 11 \text{ Containers when rounded up}$$

Where:
QF = 0.031
#C = 36 Cycles (18 Cycles per Drum)
#D = 45 Days
UOI = 5–Gallons

Example 2: To determine the amount of 10 micron bag filters required use the following calculation:

$$\frac{0.10 \times 24 \times 60}{1} = 144 \text{ Filters}$$

Where:
QF = 0.10
#C = 24 Cycles (12 Cycles per Drum)
#D = 60 Days
UOI = 1 Each

MISSION PLANNING – Continued

Personnel Planning

The number of personnel required to support the LADS is directly related to the amount of laundry to be processed and the number of LADS to be deployed. A minimum of 1 crew (1 Supervisor and 2 Operators) is required when operating the LADS for 10 hours or less per day. If continuous 20–hour daily operations are expected, a minimum of 2 crews per LADS are required. In addition, personnel are required to support the laundry receiving, bagging, un–bagging, and shipping operations. These operations require at least one supervisor per shift and 1 laundry handling person for every 50 soldiers worth of laundry processed.

SITING REQUIREMENTS

Proper siting and set–up of the LADS is the most important factor in achieving mission success. Prior to set–up there are many considerations that must be taken into account. These include terrain, space constraints, and traffic flow. The following paragraphs along with Figures 1 through 7 provide guidance for choosing a location to set–up the LADS and conduct laundry operations.

Terrain

The LADS must be operated on firm ground with a 5 percent slope or less. Leveling the LADS from front–to– back is more critical than left–to–right to enhance washing/drying drum balancing. Once the LADS is placed in position left–to–right level can be achieved using the landing legs on the front of the M871A3 trailer. The LADS should be positioned in a manner that allows drain water to run away, so as to not be a nuisance while conducting laundry operations. The drain area must be approved for waste disposal. The actual waste disposal requirements may vary depending on deployment condition and host nation/local requirements. If an external supply of fuel is to be used, the tank should be level or slightly higher than the LADS level. The height of the water supply is not critical to the LADS operation.

Space Constraints

Providing adequate space for conducting laundry operations is essential for efficient laundry processing. Allow adequate space to access all four sides and top of each LADS for operator PMCS and maintenance. There should be at least 4 feet of space at the curbside and sides of the LADS and 8 feet at the roadside of the LADS. Vegetation and other hindrances must clear the top of the LADS by 8 feet minimum and be cleared from the path of the heater, condenser fan, and dryer blower exhausts. If an external fuel tank is used, the tank must be located within at least 70 feet of the LADS fuel connection point. The water tank must be within 100 feet of the LADS water connection point. If the LADS is to be operated for long durations at one location, it is recommended that a utility power source be connected to the LADS. This will decrease the operating hours on the Generator Set. If an external power source is used, the LADS must be a maximum of 100 feet from the power connection point. Adequate space must also be provided for other functions associated with laundry operations such as: receiving, inventory, bagging, un–bagging, and shipping.

Traffic Flow

Designated parking areas should be laid–out for personnel to drop–off and pick–up laundry. When possible these areas should be separated to help prevent mixing of clean and dirty laundry. Parking areas, and vehicle access to them, should be laid out in a manner that prevents vehicle traffic from interfering with laundry processing. Drain hoses coming from the LADS should be routed to avoid traffic areas and the drain area should be away from both vehicle and foot traffic. Fuel and water supply hoses must also be routed away from traffic. An unrestricted path must be maintained to allow tankers to service the LADS fuel and water supplies. If an external power source is used the power cable must be routed away from traffic.

SITING REQUIREMENTS – Continued

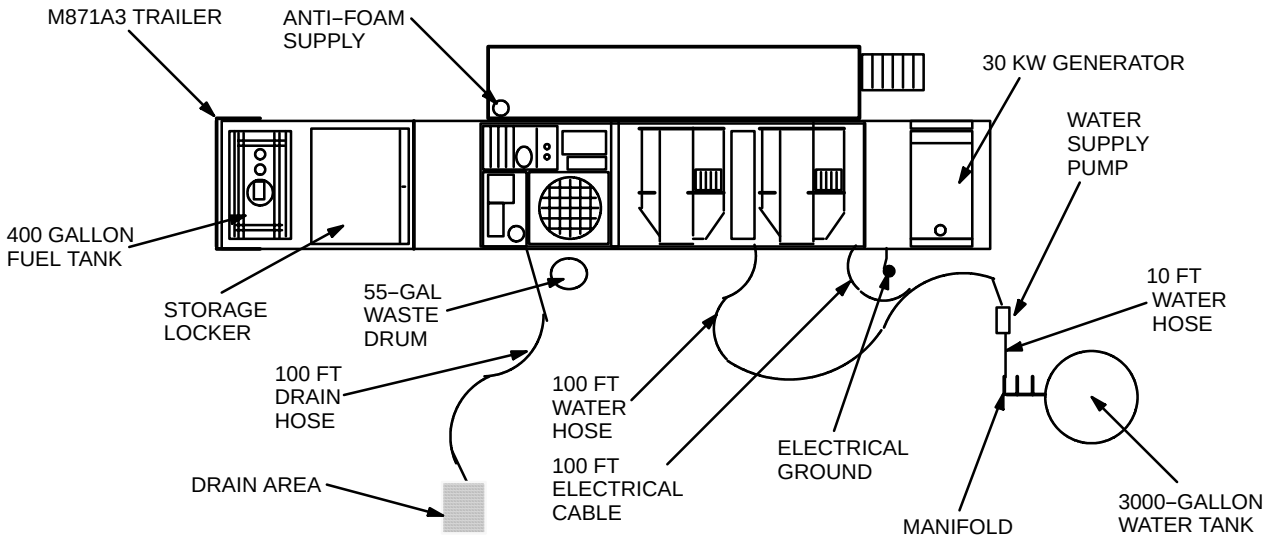

Figure 1. Typical LADS Set–up.

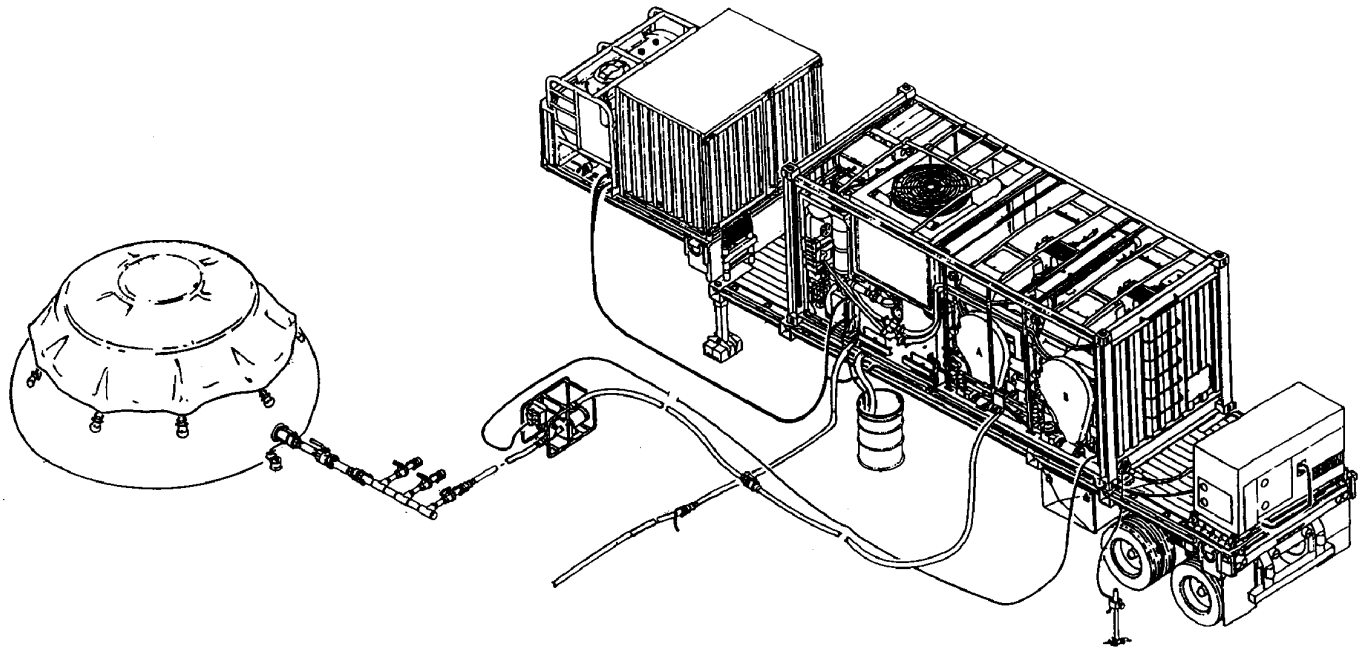

Figure 2. Typical LADS Set–Up.

SITING REQUIREMENTS – Continued

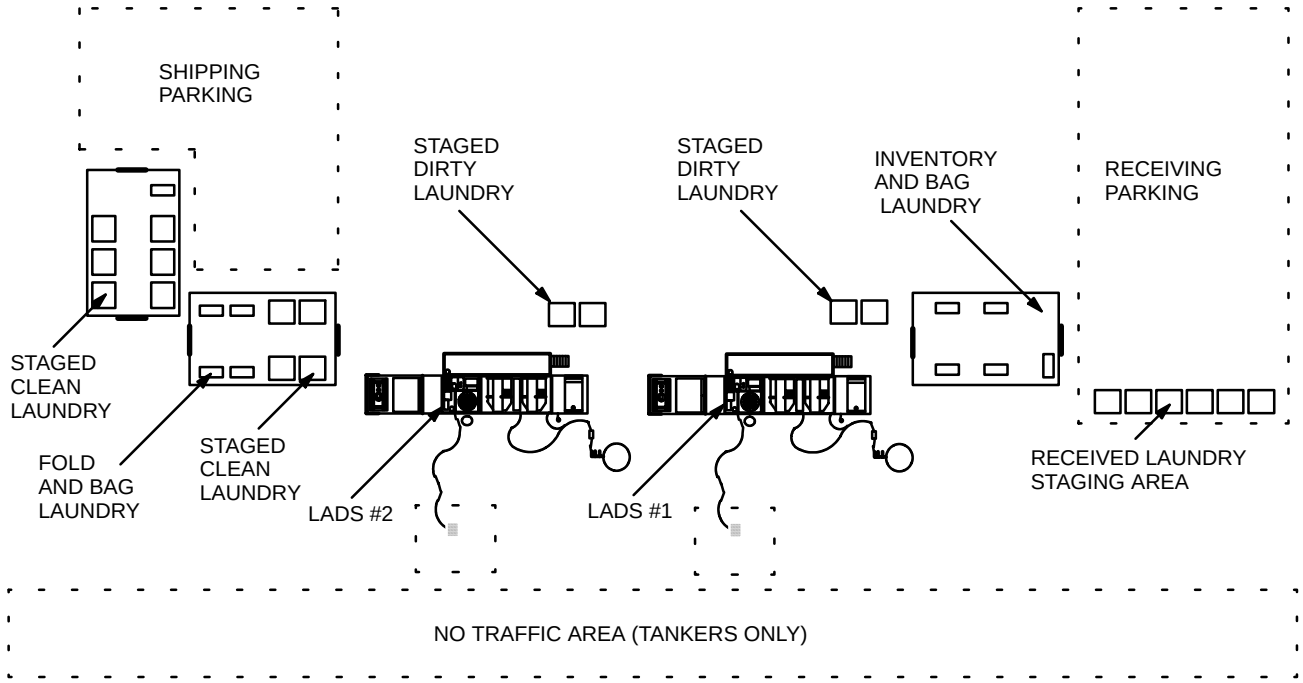

Figure 3. Typical Field Laundry Facility Set–up, Two LADS In Series.

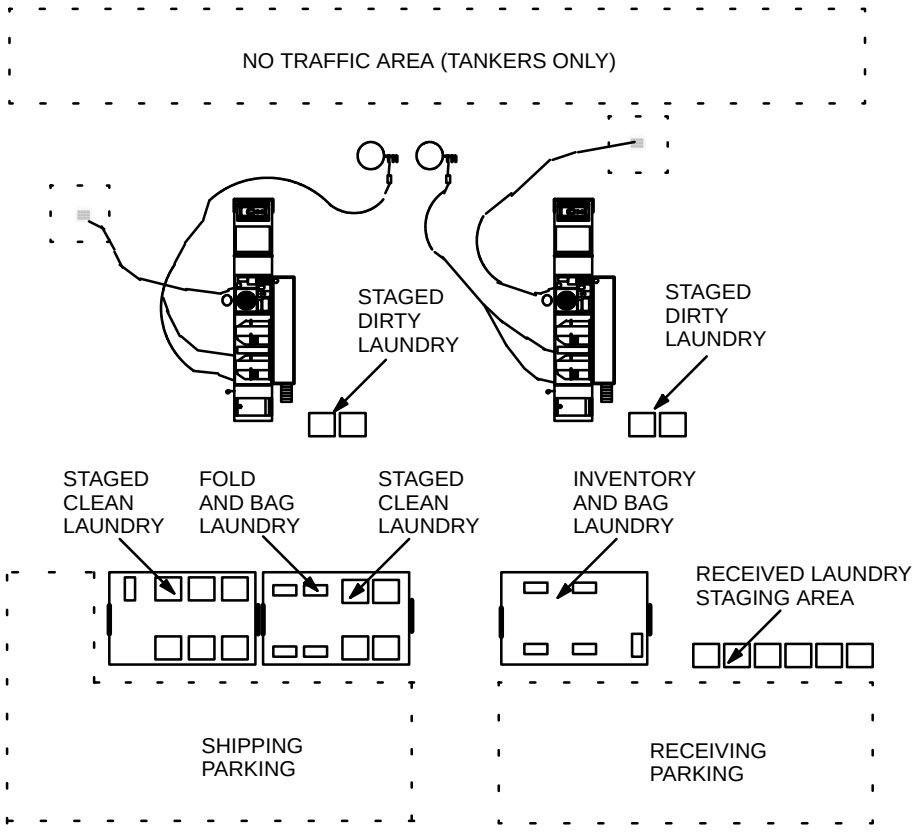

Figure 4. Typical Field Laundry Facility Set–up, Two LADS In Parallel.

SITING REQUIREMENTS – Continued

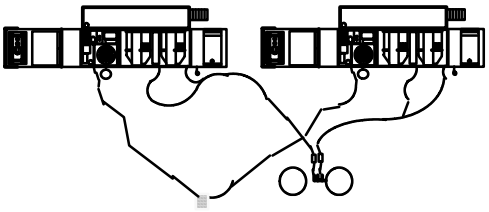

Figure 5. Typical Field Laundry Facility Set–up, Two LADS In Series Sharing Water Tank.

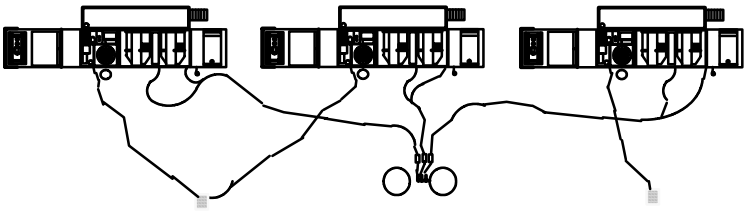

Figure 6. Typical Field Laundry Facility Set–up, Three LADS In Series Sharing Water Tank.

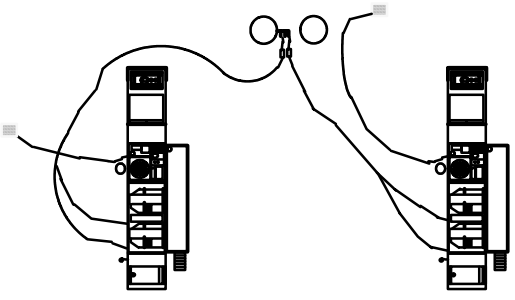

Figure 7. Typical Field Laundry Facility Set–up, Two LADS In Parallel Sharing Water Tank.

SHELTER REQUIREMENTS

WARNING

Exhaust discharge contains deadly gases. Do not operate Laundry System in an enclosed area unless exhaust discharge is properly vented outside. Severe personnel injury or death due to carbon monoxide poisoning could result.

The LADS can be operated at ambient temperatures between 33 and 120 degrees F outside of a shelter. If ambient temperatures are expected to be below 33 degrees F, the LADS may be operated in a modified Lightweight Maintenance Shelter (LME) as shown below. The LADS can also be operated in the LME to avoid other weather conditions such as blowing dust/sand, rain, and solar radiation. It is recommended that the LADS water supply be kept inside the LME during cold weather operation. During periods when the LADS is operating, the LME windows should be opened and closed as necessary to control the temperature inside the LADS. To keep the LADS water plumbing, water supply, and interconnecting hoses from freezing a heater should be installed in the LME or the LADS should be operated every 3–4 hours to maintain temperatures above freezing. For operation and maintenance of the LME refer to TM 10-5410-284-13&P.

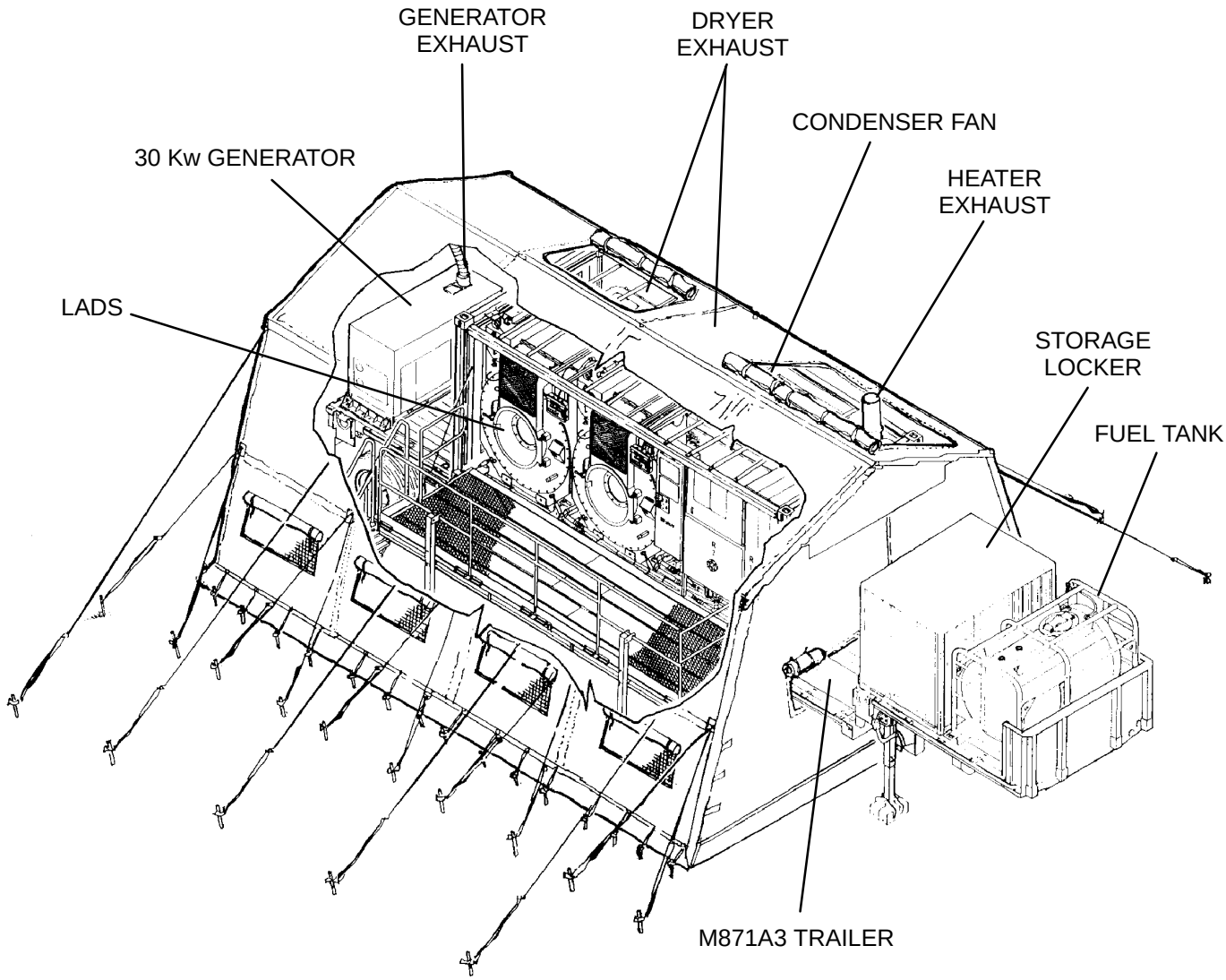

Figure 8. LADS In LME, Front View.

SHELTER REQUIREMENTS – Continued

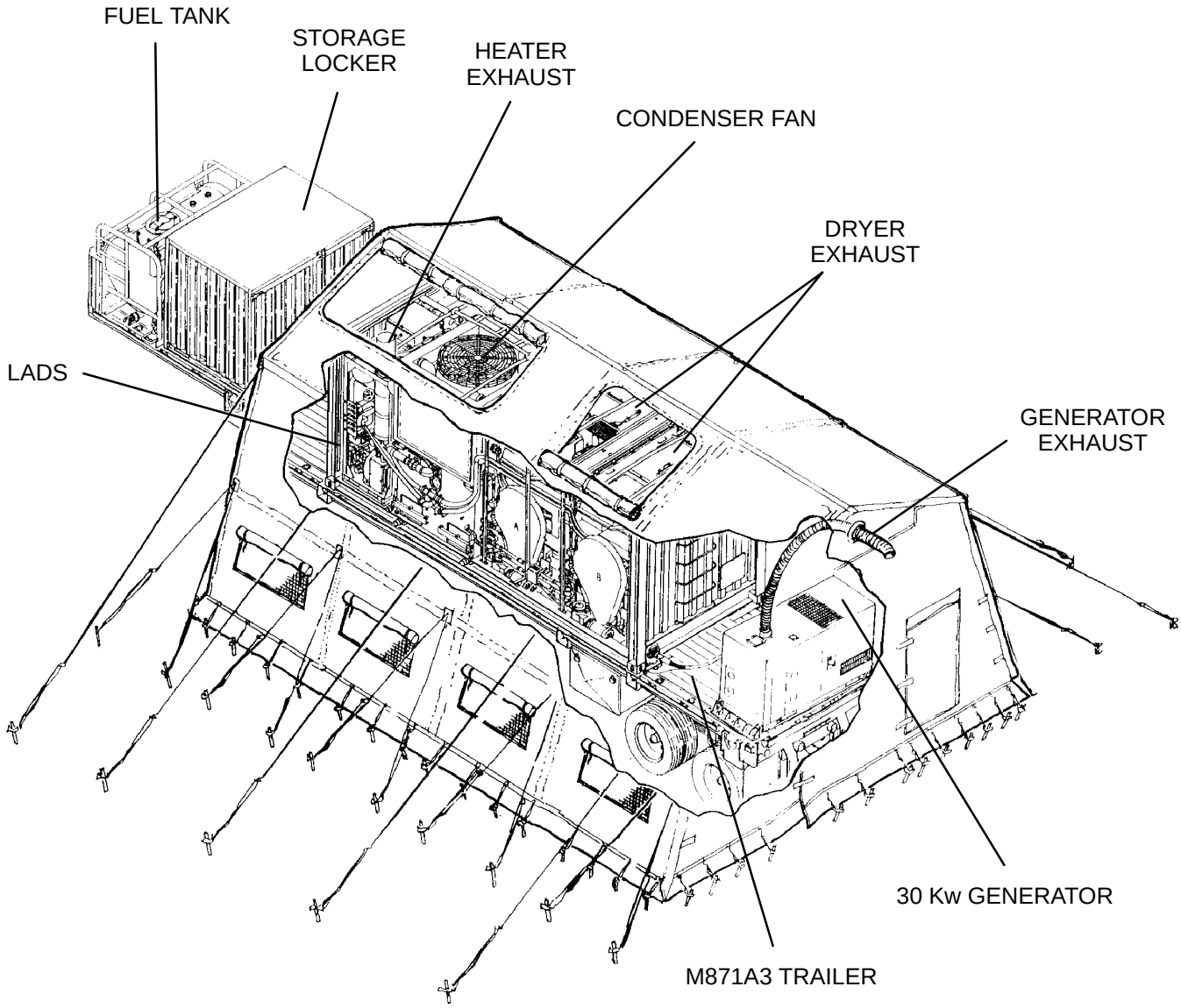

Figure 9. LADS In LME, Rear View.

LAUNDRY PROCESSING GUIDELINES

Receiving Laundry

Laundry that is excessively sandy or muddy should be pre–washed by spraying with water from the utility hose at the back of the LADS. This will use extra water but will keep the LADS cleaner longer. The cleaner the water in the LADS stays, the less often you will need to: drain and refill the water tanks, clean the still, and replace the coalescing filter. The cleaner the water stays, the easier it will be to clean out the water tanks during Post–Deployment PMCS.

The LADS is not an industrial laundry machine. Do not clean shop rags or other clothing soaked in oil, fuel, or other chemicals. Coveralls or uniforms from aviation or motor–pool personnel can be processed in the LADS with oil and fuel stains. If they are soaked in oil or fuel, or caked with grease they are unserviceable and should be discarded.

Synthetics or materials that are not compatible with warm or high temperatures should not be laundered in the LADS. The lowest water temperature available is 20 degrees above the ambient (outside) temperature. The lowest drying temperature available is 110 degrees F. If you are unsure if an item can be laundered in the LADS, check the label for recommended washing and drying temperatures.

Non–military issue bras will be destroyed if laundered in the LADS. Straps on bras will get out of bags and cause multiple bags to become tangled. Underwires from bras will rip out and clog up the drum drain plumbing.

Protective gloves should be worn by personnel handling laundry to prevent coming in contact with biological and chemical contamination that may be present.

Pockets on all laundry **must** be checked. Pens, paper, money, hardware, etc... can fall out and clog the drum drain plumbing. Ammunition or other explosives left in laundry can be set–off by the forces encountered during extracts.

Bagging Laundry

Mesh bags should only be loaded half full. Over–stuffing bags will not allow all surfaces of laundry to be exposed to the washing, rinsing, or drying process. This will result in poorly laundered clothing. Over–stuffing bags can also cause inefficiencies in drum balancing that will lead to longer cycle times.

When mesh bags get holes in them or the zippers don’t work the bags are unserviceable and should be replaced. Using bags with broken zippers will cause the laundry to come out of the bag during the cycle. This results in lost or mixed–up laundry.

Loading Laundry

Over–loading or under–loading drums will cause balancing problems and drum inverter faults. Both of these conditions will lead to longer cycle times. A typical load of laundry should be 20 to 30 properly loaded mesh bags.

Never put more than six sleeping bags into drum at one time. Drums will have a hard time balancing if an odd number of sleeping bags are loaded. Always load two, four, or six bags per drum.

When laundering loose sheets or blankets, balancing problems may be encountered because the garments don’t evenly distribute in the drum. Use trial and error to find a loading combination that works, then stay with that loading plan.

Washing Laundry

Mixing whites with colors will turn whites gray.

Bleach **can not** be used in the LADS. A sanitizer is available if required by heath monitoring personnel.

Use only the specified detergent. Add detergent in one (1) ounce doses. Clothing laundered in home washing machines will retain soap due to the load speed of the spin cycle. This residual soap will come out during extracts adding soap to the LADS water. If soap suds are visible in drum during rinsing steps cut back on the amount of detergent added. Too much detergent will cause excessive foam in still and water tanks. Too much foam in still can cause boil–overs and rapid consumption of pre–filters and coalescing filters.

If the water pump strainers are not clean, water will not transfer properly during laundry cycles. This will cause poorly washed, rinsed, and dried laundry.

Change the water in the LADS when it is dirty. Don’t let water sit idle in the LADS water tanks or water supply tank for days. During periods of inactivity, drain the LADS and water supply tank.

LAUNDRY PROCESSING GUIDELINES – Continued

Drying Laundry

If lint filters are not clean, air can not flow through drum, and the laundry will not dry.

Fabric softener sheets can be used, but must be removed after every cycle, or water pump strainers will get clogged.

Use drying temperatures compatible with laundry. Check the labels before setting dry temperatures. Use lower temperatures when not drying full loads. Using too high of a drying temperature will shrink laundry.

Unloading Laundry

Don’t let laundry bags sit in drums after drying. Keep the process moving. Removing the bags from the drums and the laundry from the bags immediately after the cycle is completed will prevent excessive wrinkles.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

LAUNDRY ADVANCED SYSTEM OPERATION UNDER USUAL CONDITIONS
ASSEMBLY AND PREPARATION FOR USE

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

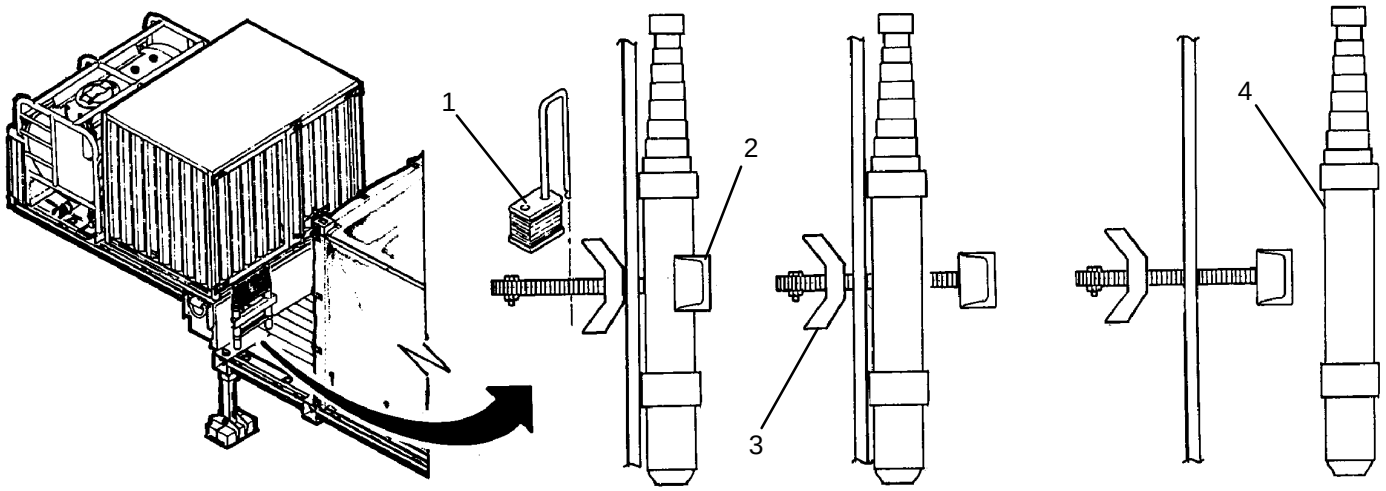
Personnel Required
Four Operators, One Supervisor

Materials/Parts

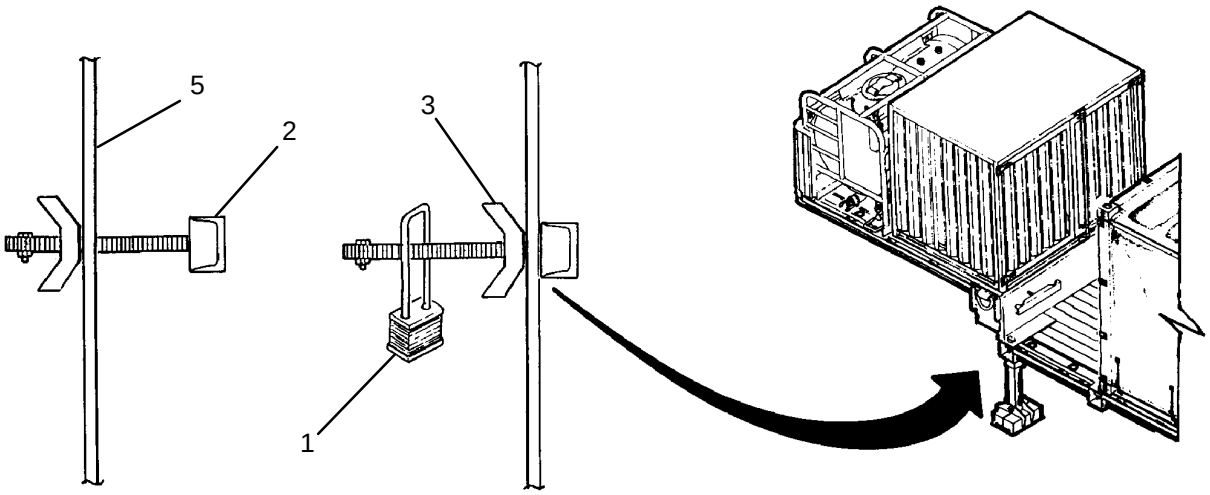
Equipment Conditions

Remove Telescoping Ladders

1. Remove lock (1) from holddown bracket (2).
2. Loosen retainer (3) then slide holddown bracket (2) away from telescoping ladder (4).
3. Slide telescoping ladder (4) out from behind holdown bracket (2) and remove from trailer.



4. Push holdown bracket (2) tight against wall of trailer (5), then tighten retainer (3).
5. Install lock (1) into holddown bracket (2).
6. Repeat steps 1 through 5 for second ladder.



Set–up Telescoping Ladders

WARNING

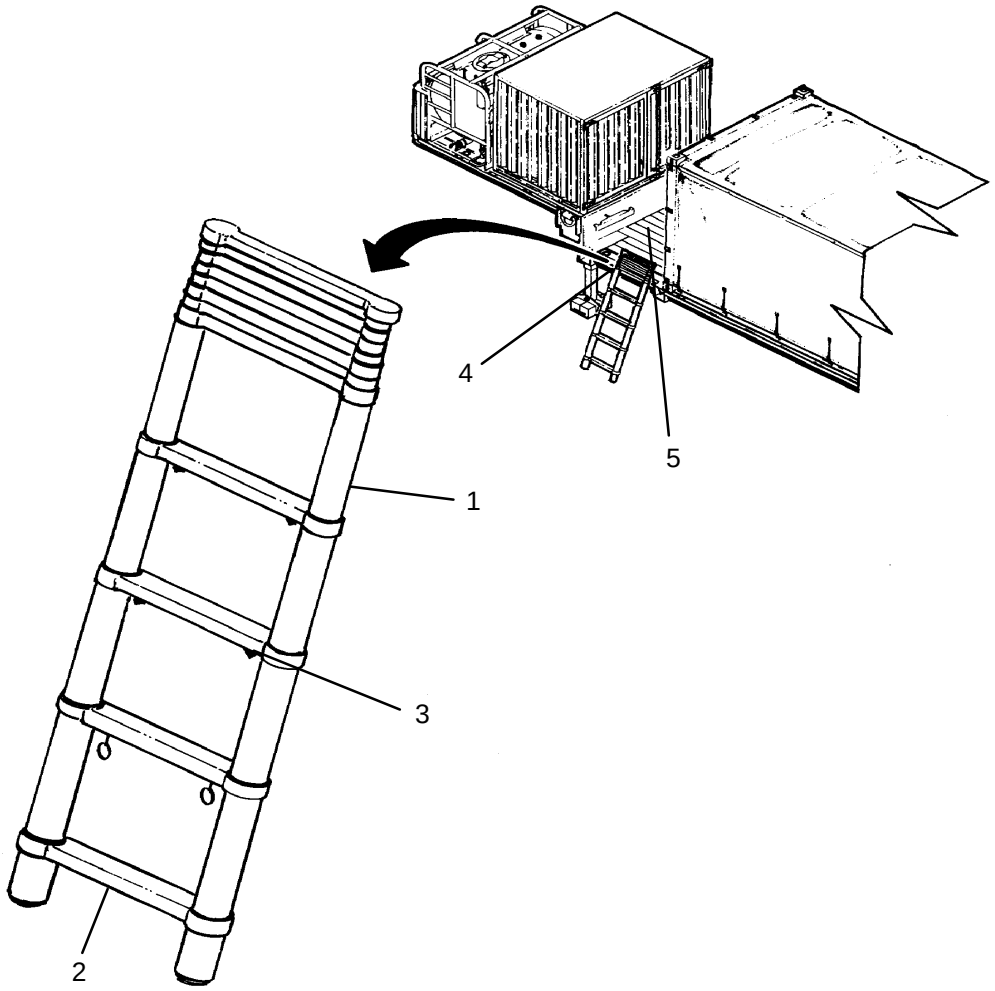
Always extend ladder from the bottom up. Keep hands and fingers away from sliding points on ladder sections when opening and closing. Never climb on ladder unless locking devices are properly engaged. Failure to observe these precautions may result in severe personal injury.

1. Extend each ladder (1) as follows:
   a. Place foot on bottom rung (2) and lift to separate from next higher rung until locks (3) are engaged.
   b. Continue extending ladder (1) following process in step a until desired height is achieved.

WARNING

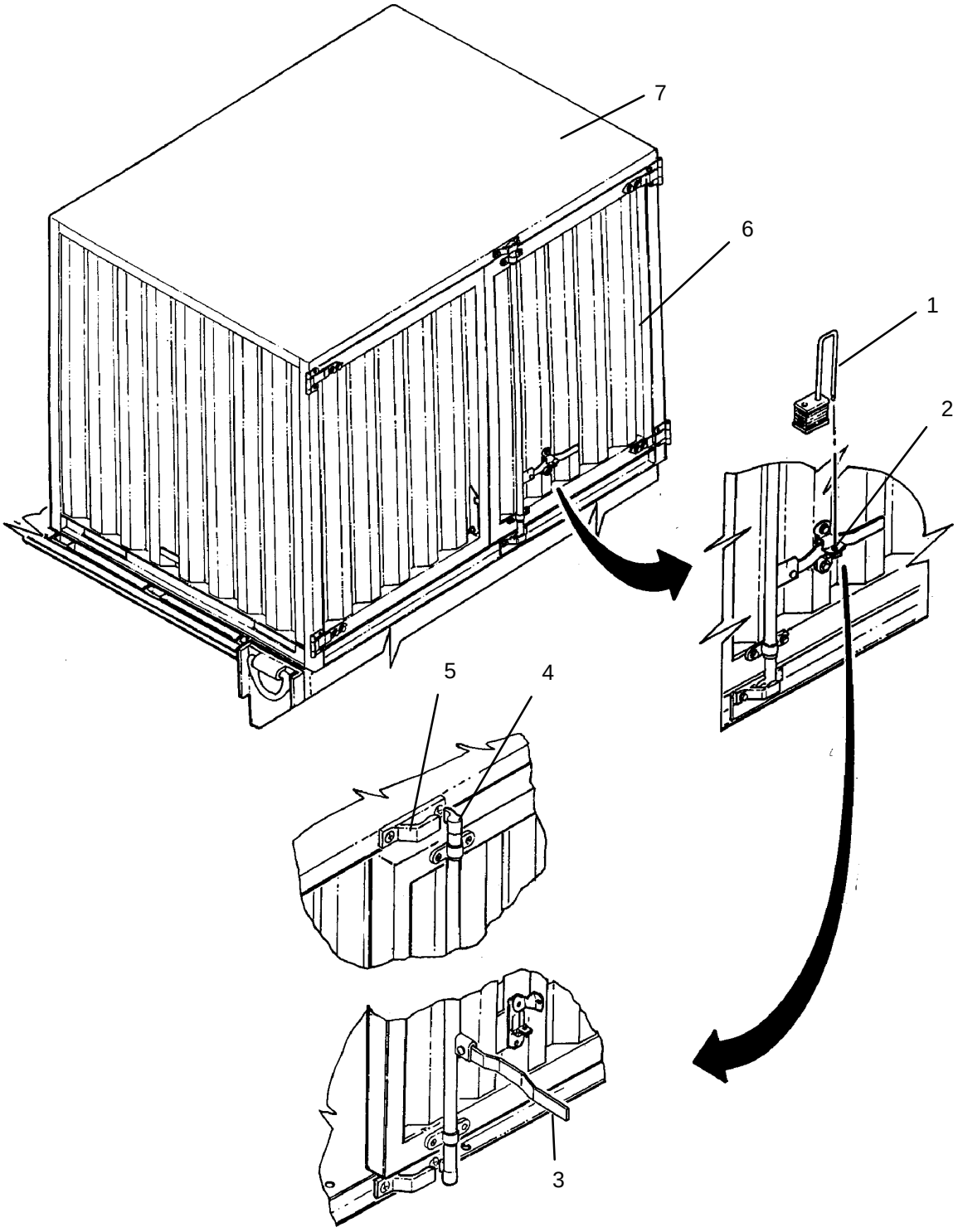
Always make sure ladder is resting on and supported by firm ground. Always keep ladder rungs dry and free of dirt. Do not over–reach. Move the ladder instead. Keep body centered between side rails. Never allow more than one person on the ladder at a time. Failure to observe these precautions may result in severe personal injury.

2. Place ladders (1) against both sides of trailer (4) to gain access to trailer bottom deck (5).



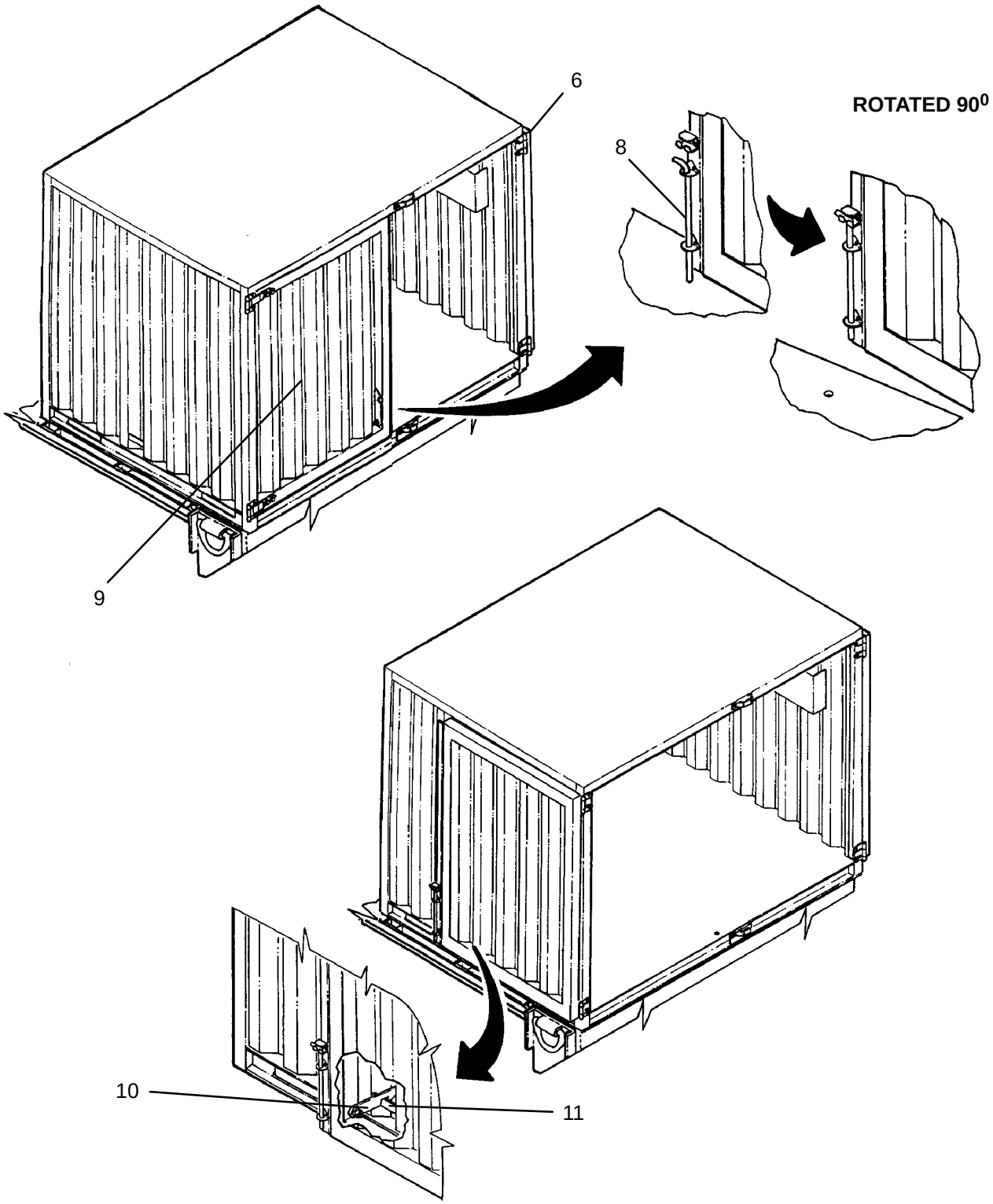
Open and Secure Storage Locker Doors

1. Remove lock (1) from hasp (2).
2. Pivot hasp (2) then lift, and turn handle (3) until locking rod (4) retracts from holder (5).
3. Swing door (6) out and away from storage locker (7), then place handle (3) back into hasp (2).
4. Install lock (1) back onto hasp (2).



Open and Secure Storage Locker Doors – Continued

5. Open door (6) to access cane lock (8).
6. Lift and reposition cane lock (8) behind door (9).
7. Swing doors (6 and 9) open against sides of storage locker (7) and secure with retaining plates (11).

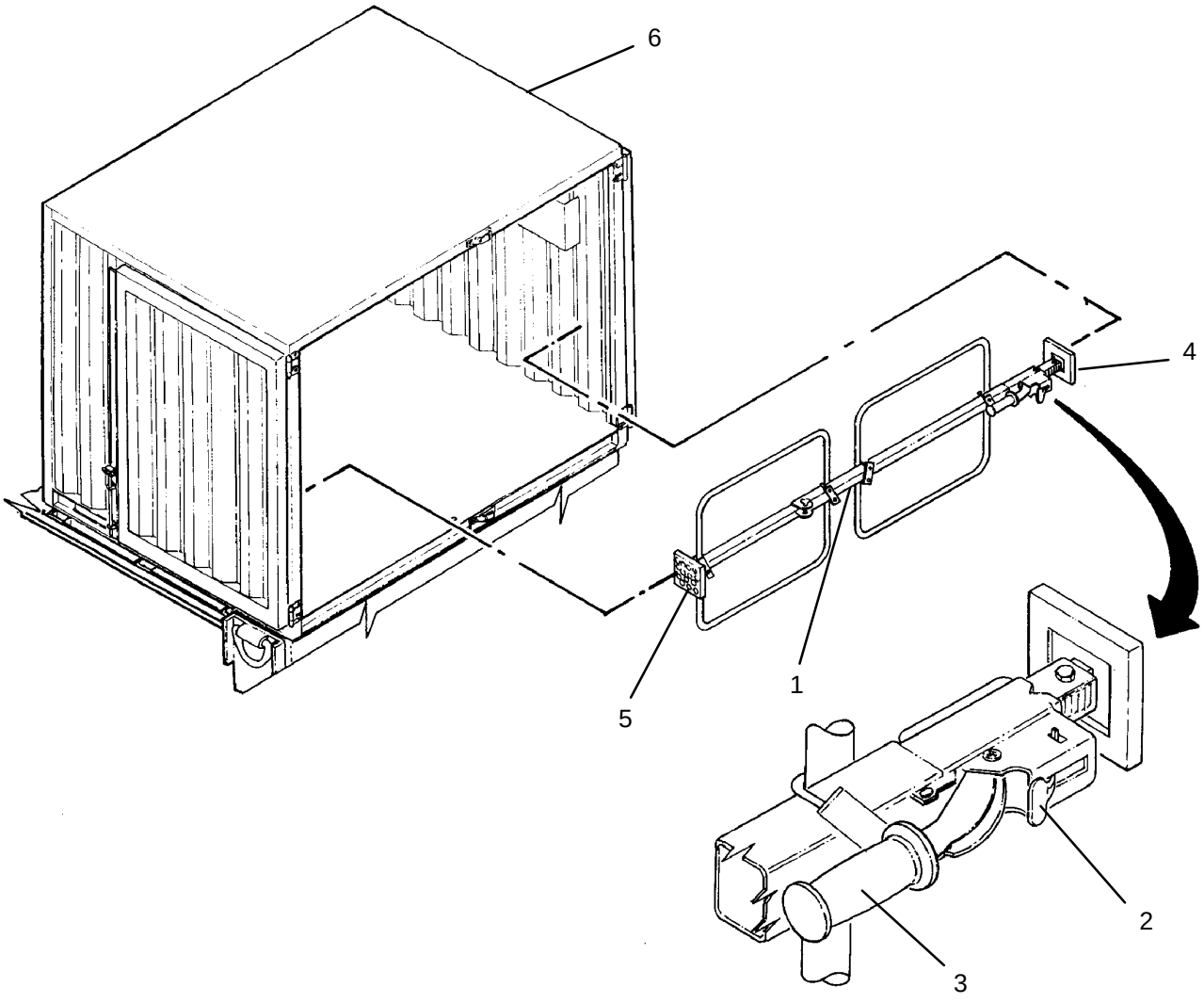


Remove Stowed Accessories

NOTE

Personnel in the 5th percentile may require a step air for this procedure.

1. Remove stabilizing bars (1) as follows:
   a. Push out on tab (2) to change ratcheting direction of handle (3).
   b. Ratchet handle (3) to release tension of wall pads (4 and 5).
   c. Apply pressure on wall pad (4) nearest to handle (3) then continue ratcheting handle until stabilizing bar (1) can be removed from storage locker (6).
2. Remove following items from storage locker (6):
   a. Folding Ladder, qty 1
   b. Stairs, qty 1
   c. Handrails qty 2
   d. Awning supports, qty 6
   e. Side railing, qty 1
   f. Water tank, qty 1
   g. Operator tool box, qty 1
   h. Water supply pump, qty 1
   i. 25 ft fuel hose, qty 1
   j. Adapter, fuel hose, qty 1
   k. 30 ft fuel hose, qty 1
   l. Exhaust extension, qty 1
   m. Clean–out rake, qty 1
   n. Sluice tray, qty 1
   o. Anti–foam container, qty 2
   p. Detergent container, qty 2
   q. Container, 55 gallon, qty 1
   r. Fire extinguisher, qty 1
3. Stow stabilizing bars (1) inside storage locker (6).



Setup Folding Ladder

WARNING

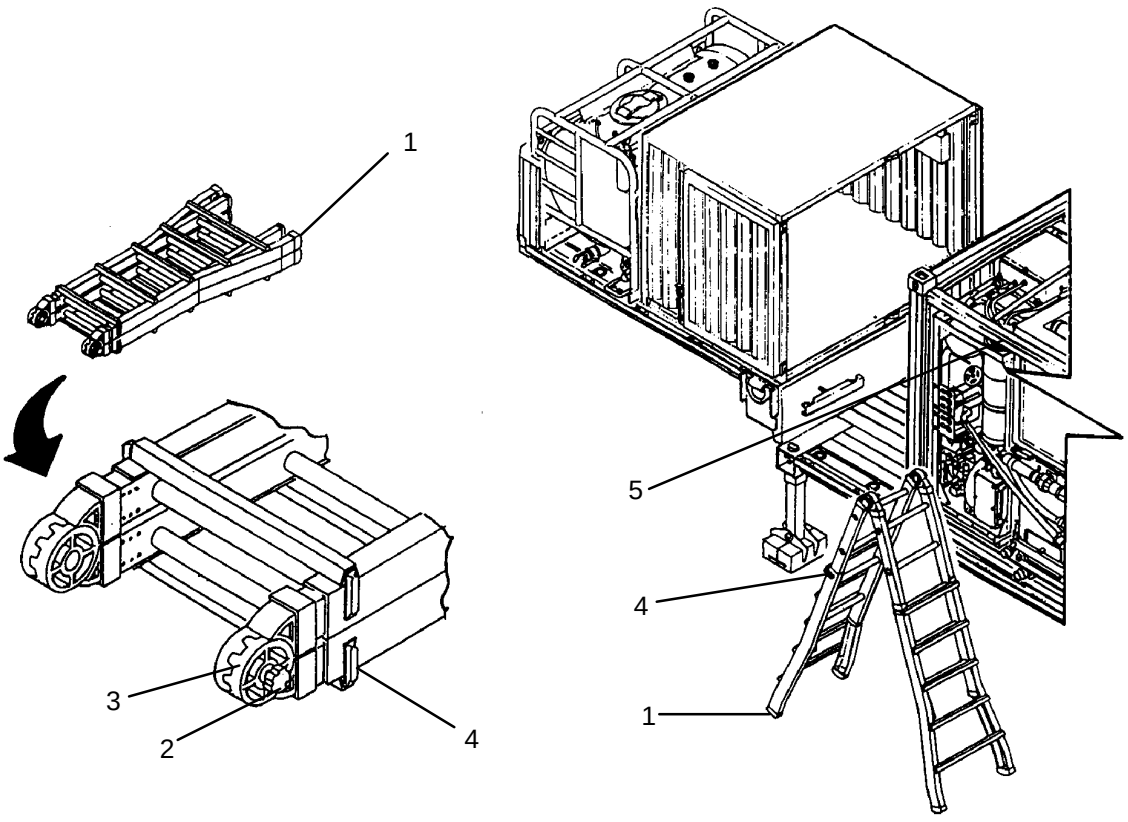
Keep hands and fingers away from hinge points on ladder halves when opening and closing. Keep hands and fingers away from inner and outer rungs of ladder when adjusting. Never climb on ladder unless knobs and locking devices are properly tightened. Failure to observe these precautions may result in severe personal injury.

1. Place ladder (1) flat on ground.
2. Loosen knobs (2) then separate jaws (3) on each side of ladder (1).
3. Unfold ladder (1) to desired angle then tighten knobs (2) to lock jaws (3) in place.
4. Pull out and pivot locking devices (4) on each side of ladder (1).
5. Slide outer section of ladder (1) to desired height.
6. Pivot locking devices (4) back into ladder (1) to lock in height adjustment.

WARNING

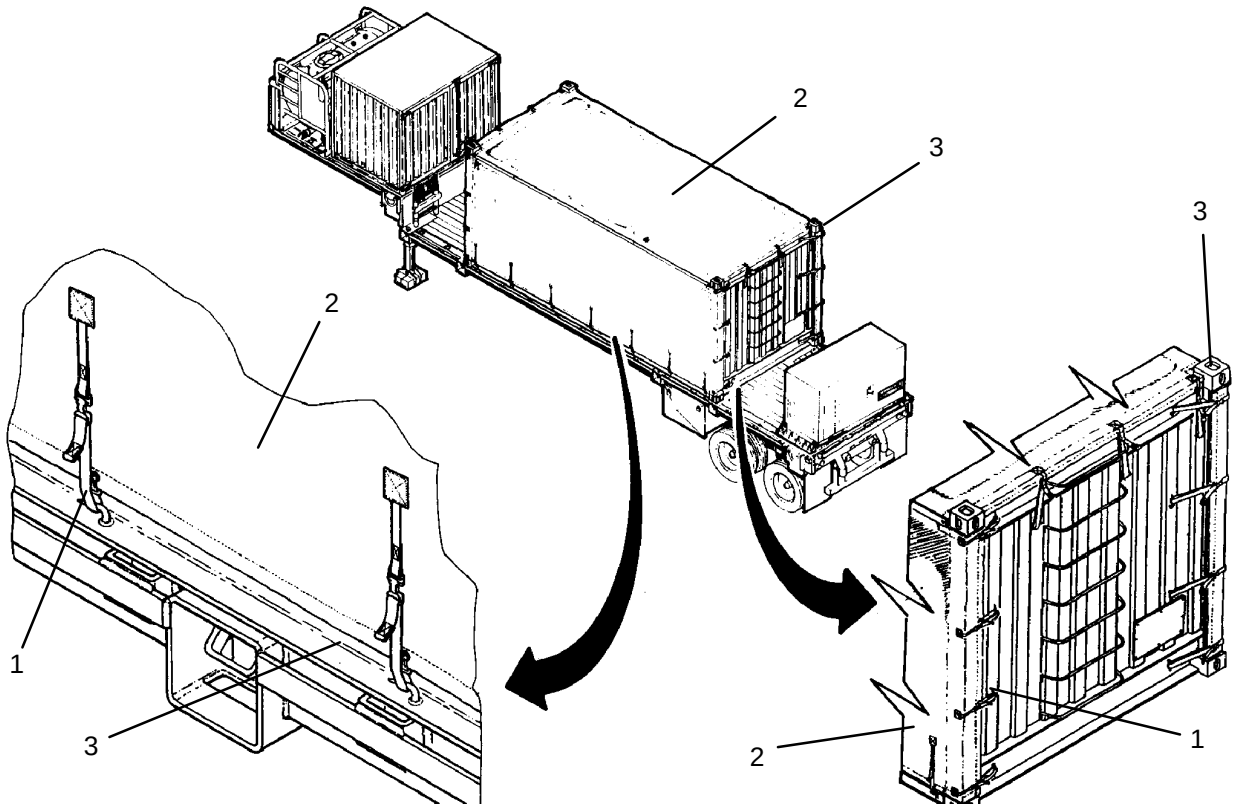
Always make sure ladder is resting on and supported by firm ground. Always keep ladder rungs dry and free of dirt. Do not over–reach. Move the ladder instead. Keep body centered between side rails. Never allow more than one person on the ladder at a time. Failure to observe these precautions may result in severe personal injury.

7. If ladder (1) is set–up straight ensure top of ladder is resting on support angle (5) and bottom of ladder is resting on firm even ground.

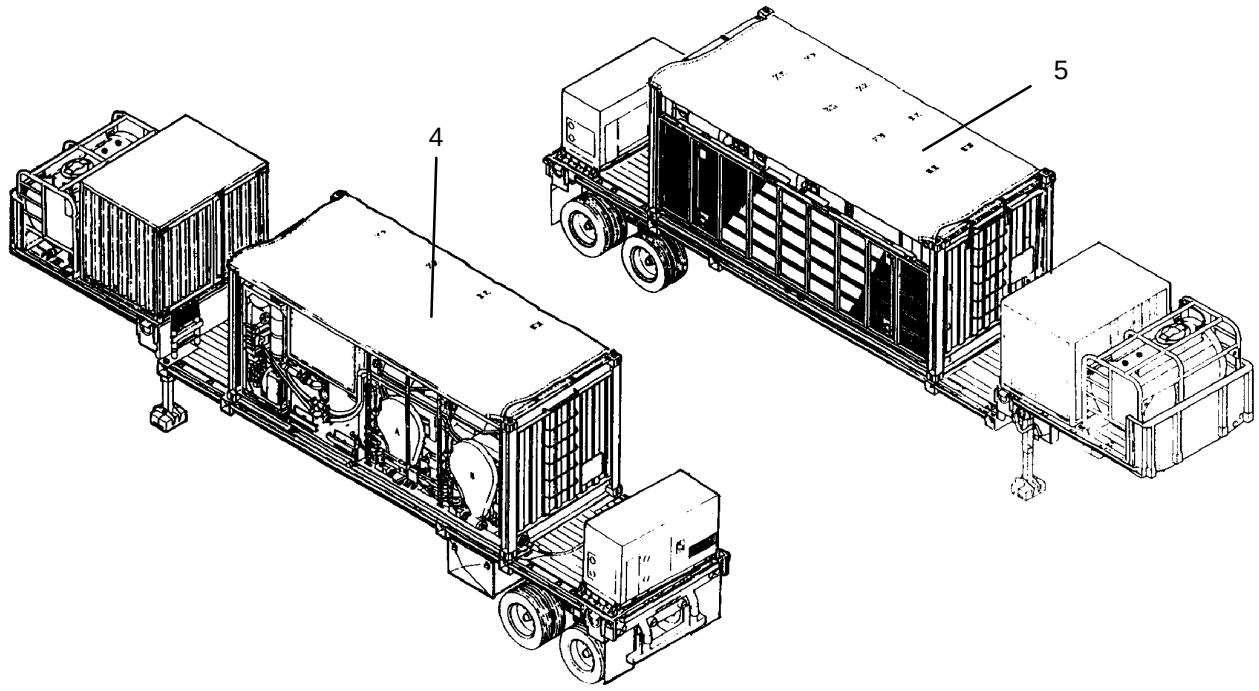


Loosen Tarp

1. Loosen and disconnect straps (1) securing tarp (2) to ISO frame (3).



2. Flip roadside section (4) over to expose back of the LADS.
3. Flip curbside section (5) over to expose front of the LADS.

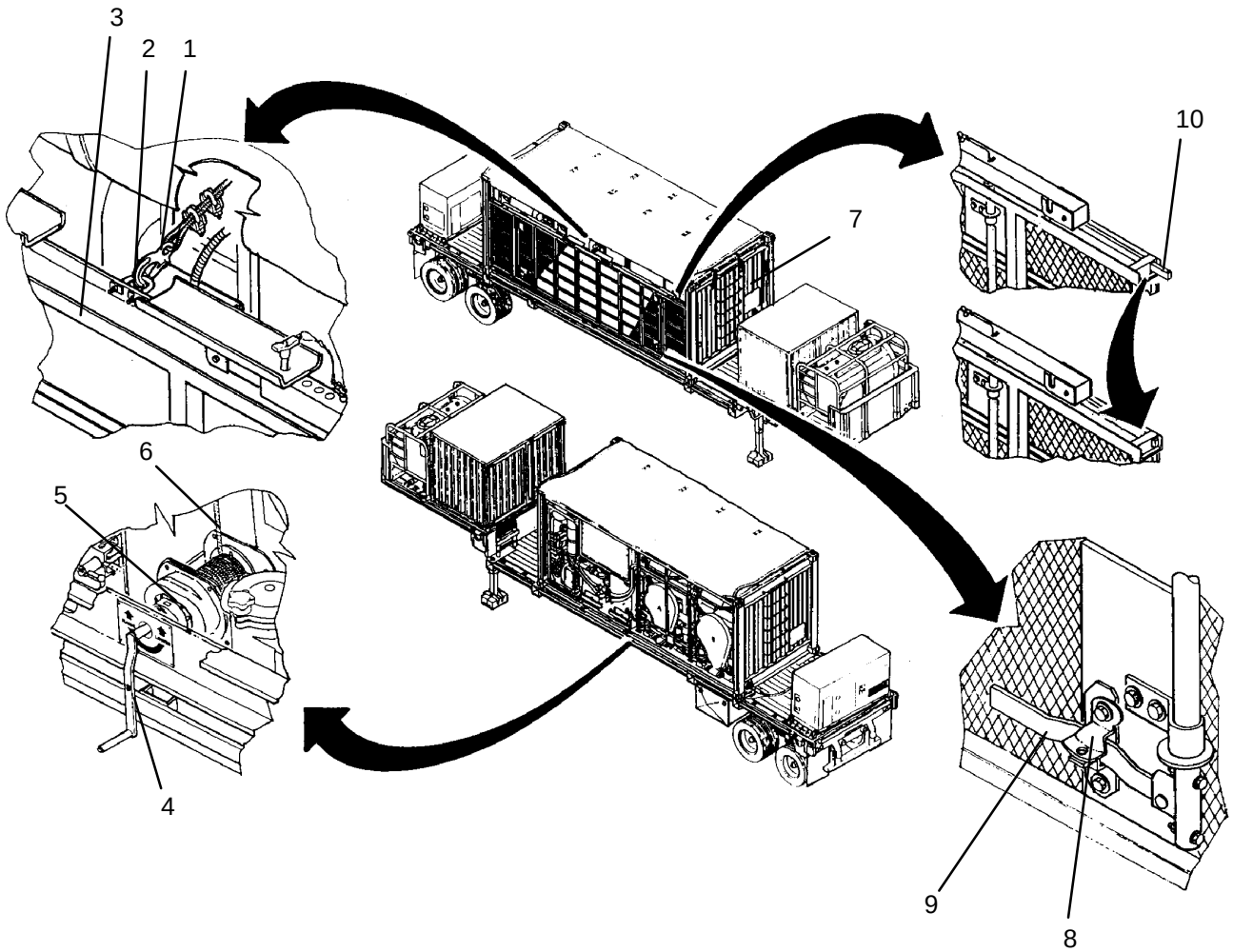


Unlock Platform

WARNING

Winch cable must be connected to platform prior to unlocking platform from ISO frame. Verify that all personnel remain clear of platform while it is being lowered. Failure to follow this precaution can cause severe injury or death to yourself or other personnel working nearby.

1. Ensure shackle (1) is attached to u–bolt (2) on platform (3). Attach shackle if necessary.
2. Remove winch handle (4) from tool box and install onto winch (5).
3. Use winch (5) to remove any slack in cable (6).
4. Unlock platform (3) from ISO frame (7) as follows:
   a. Pivot hasp (8) then lift and turn handle (9) until stow bar (10) retracts.
   b. Repeat step a to unlock other end of platform (3).



Lower Platform

CAUTION

When lowering platform never allow slack to build up in winch cable. Failure to follow this precaution may result in sudden drops of platform during raising and lowering operations and cause excess strain on cable.

1. Use winch (1) to lower platform (2) slightly until stow bars (3) are clear of ISO frame (4).

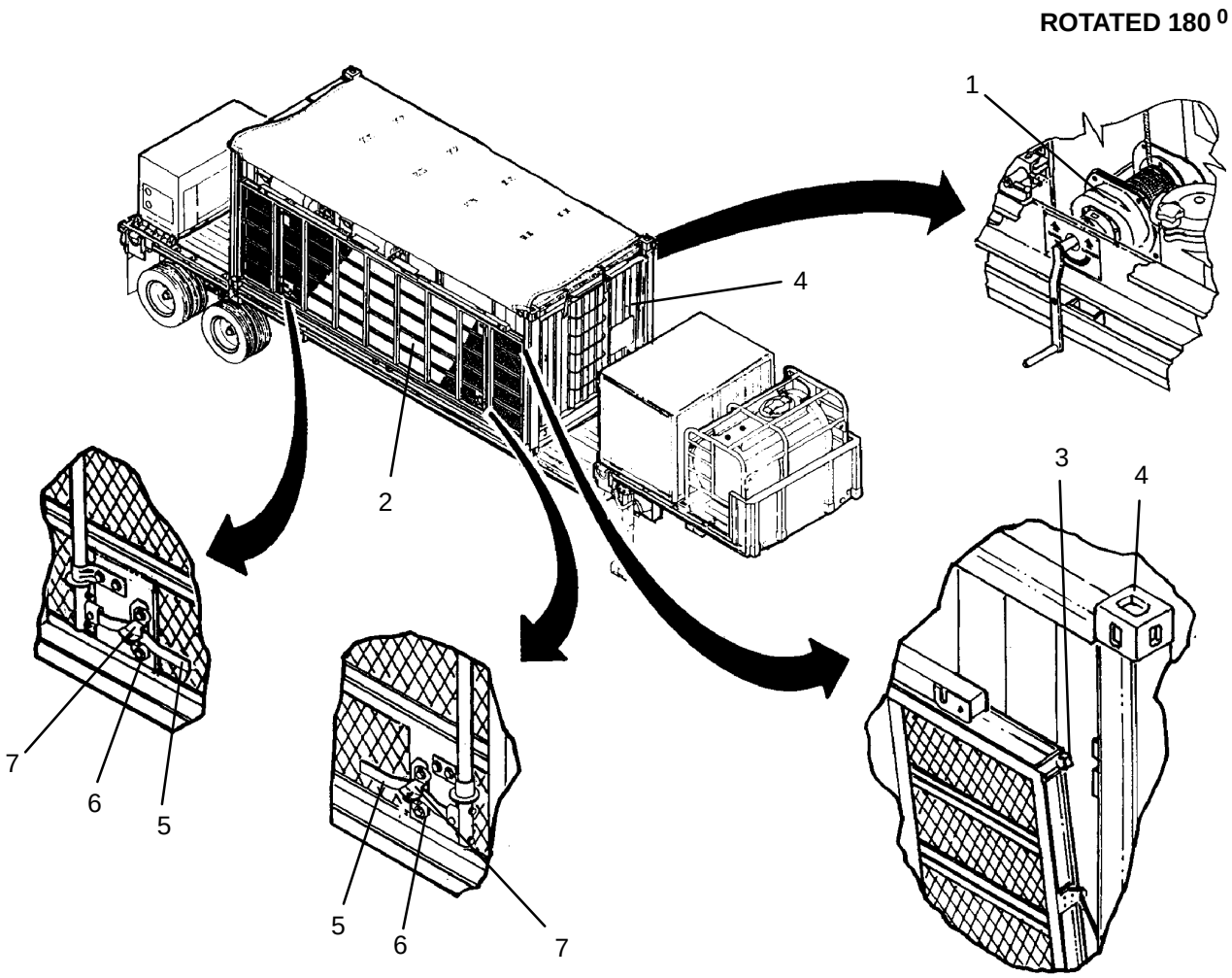
CAUTION

Handles must be secured prior to lowering platform. Failure to follow this precaution may result in damage to platform locking components if handles contact ISO frame.

During use, platform should be level with ISO frame. If platform is not even with ISO frame installation of railing and awning components will be more difficult and air system access door may not open.

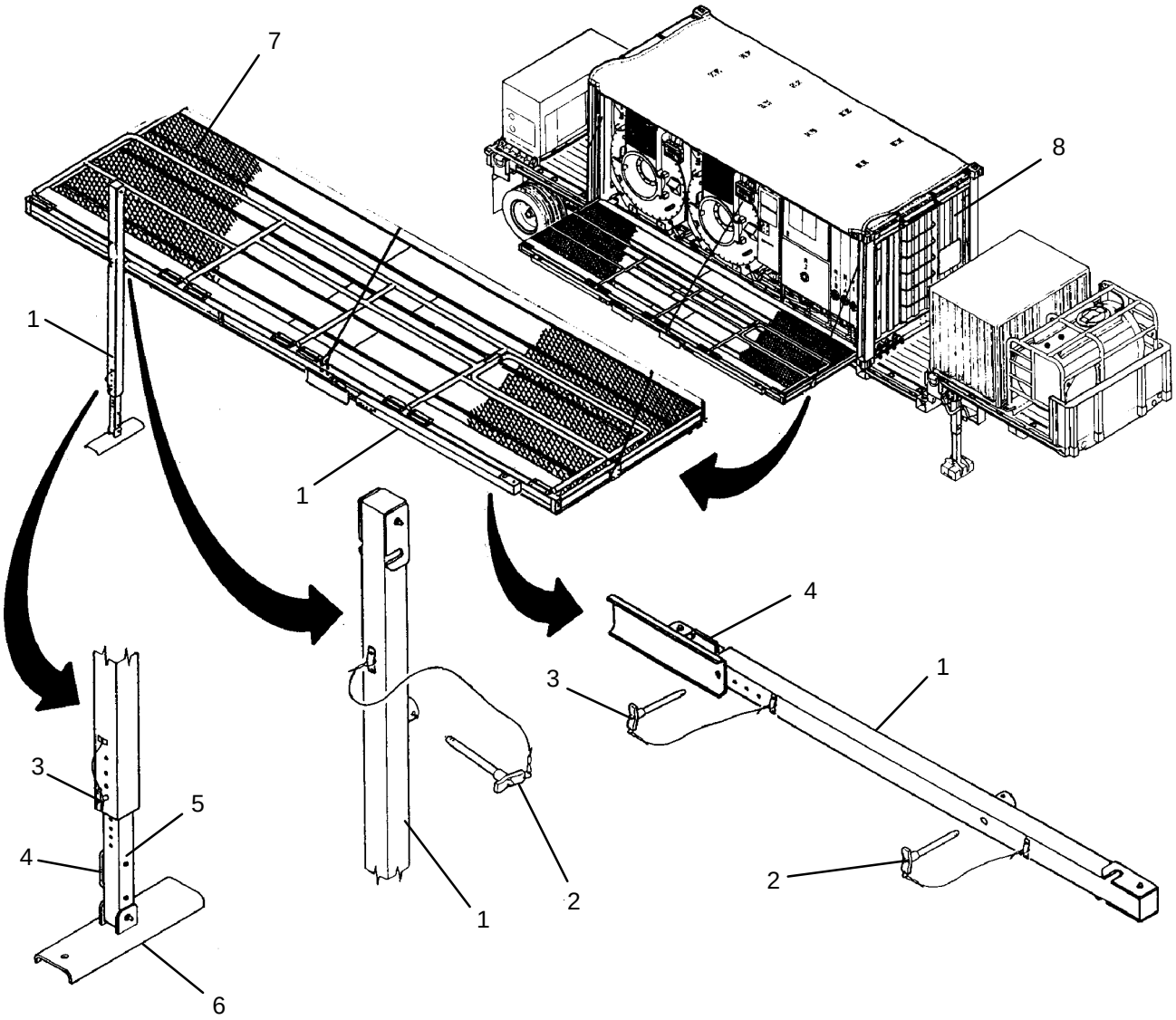
Lowering platform below ISO frame can cause damage to torsion bars.

2. Place handles (5) back into retainers (6) then pivot hasps (7) to secure handles.
3. Use winch (1) to lower platform (2) until platform is level with ISO frame (4).



Secure Platform

1. Lower and secure two support legs (1) as follows:
   a. Pull quick–connect pin (2) out of support leg (1).
   b. Pull quick–connect pin (3) out of support leg (1).
   c. Grasp handle (4) then rotate support leg (1) to vertical position.
   d. Slowly lower inner leg (5) until foot (6) has solid contact with ground and is supporting weight of platform (7).
   e. Install quick–connect pin (2) to secure support leg (1) to platform (7).
   f. Install quick–connect pin (3) to fix position of support leg (1).
2. Ensure platform (7) is even with ISO frame (8). Readjust support legs (1) if necessary.



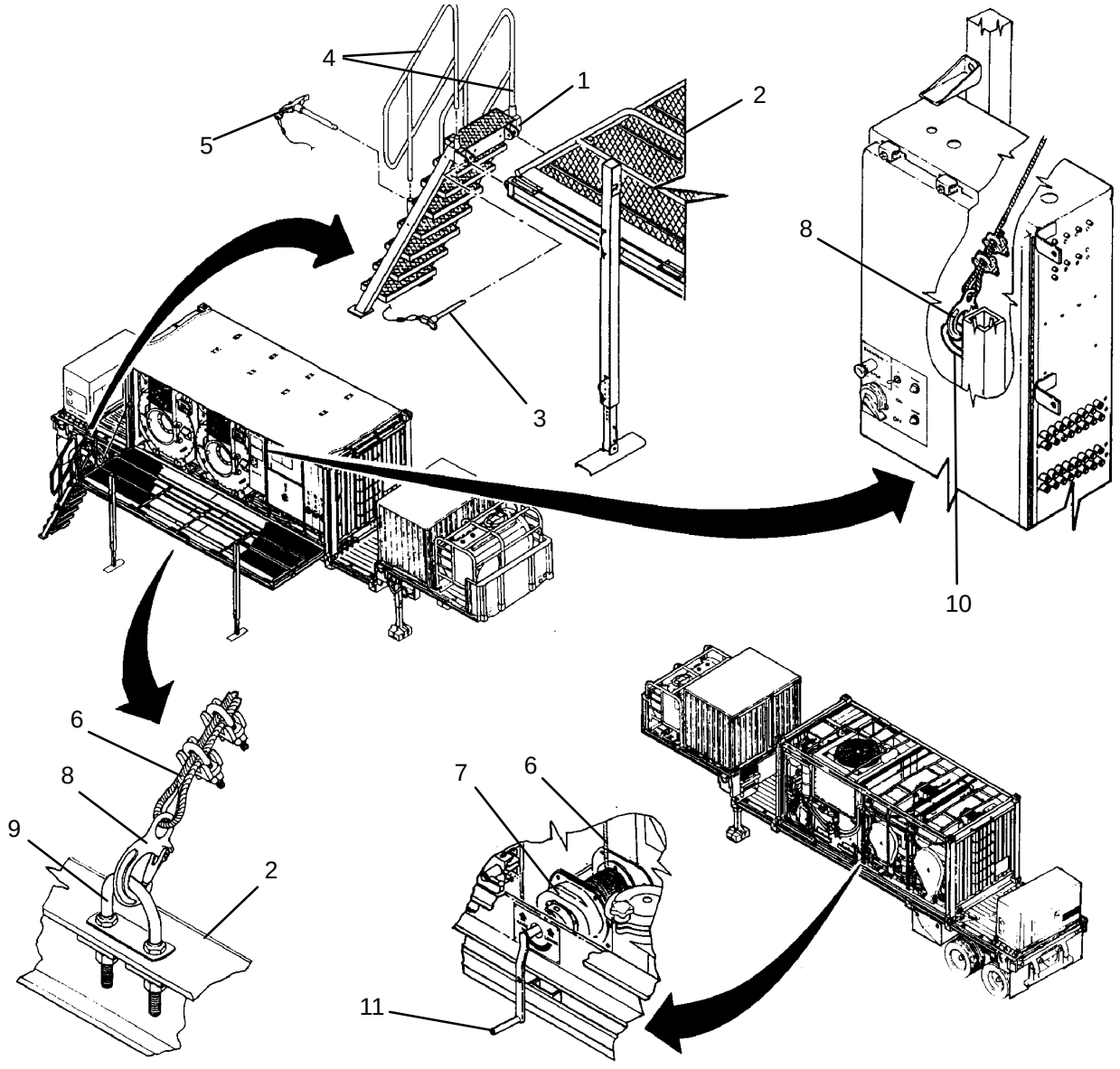
Install Stairs and Stow Winch Cable

1. Position stairs (1) onto platform (2) then secure with two quick–connect pins (3).
2. Install handrails (4) onto stairs (1) then secure each handrail with two quick–connect pins (5).
3. Disconnect cable (6) from platform (2) as follows:
   a. Use winch (7) to slightly loosen cable (6).
   b. Unhook shackle (8) from u–bolt (9).

CAUTION

Maintain a slight tension when winding up winch cable to ensure cable wraps tightly on winch. Failure to follow this precaution may result in sudden drops of platform during raising and lower operations causing excess strain on cable.

4. Use winch (7) to retract cable (6) while maintaining a slight tension on cable.
5. Hook shackle (8) on u–bolt (10) then remove slack from cable (6).
6. Remove and stow winch handle (11) in tool box.

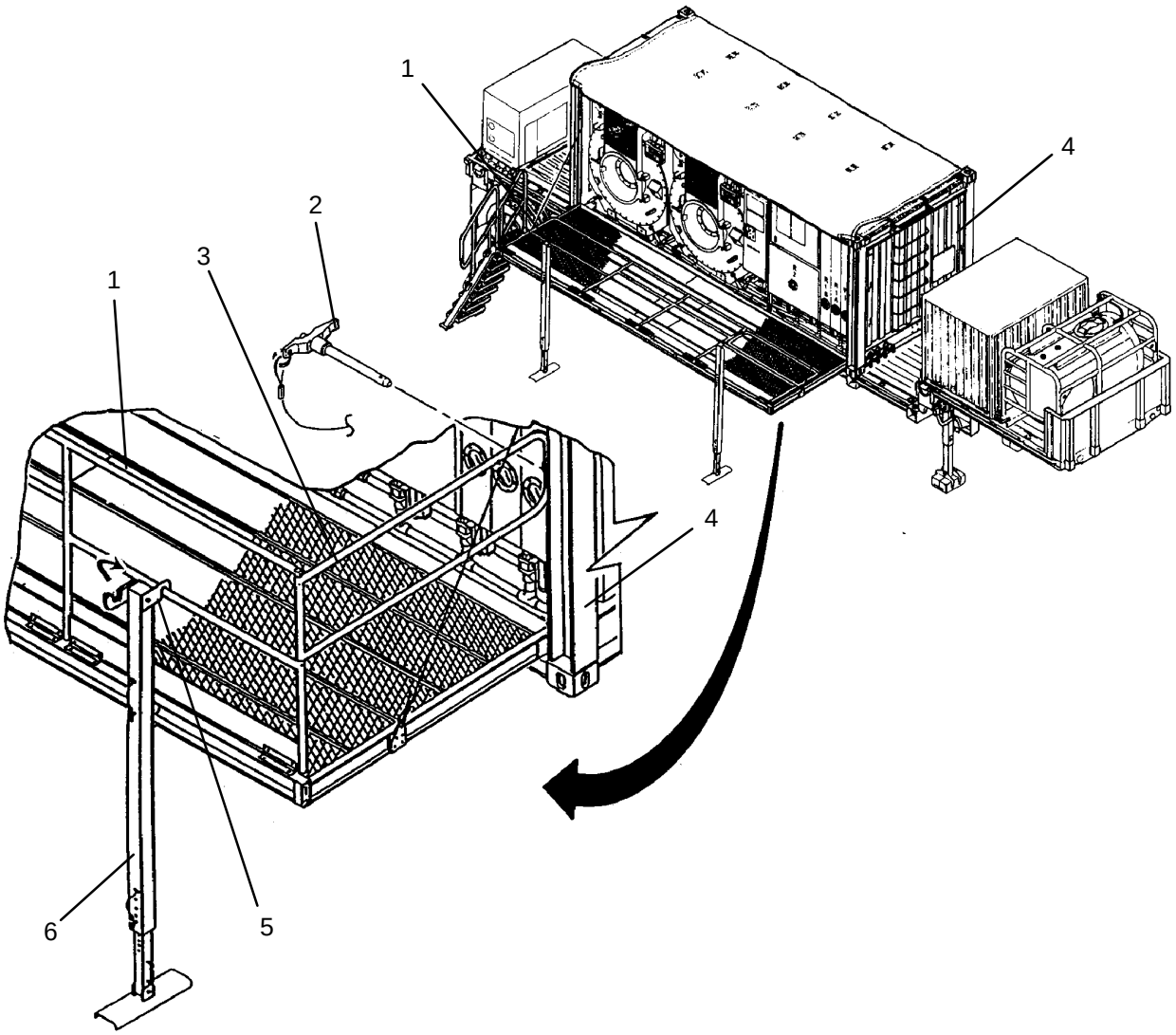


Install Main and Side Railings

NOTE

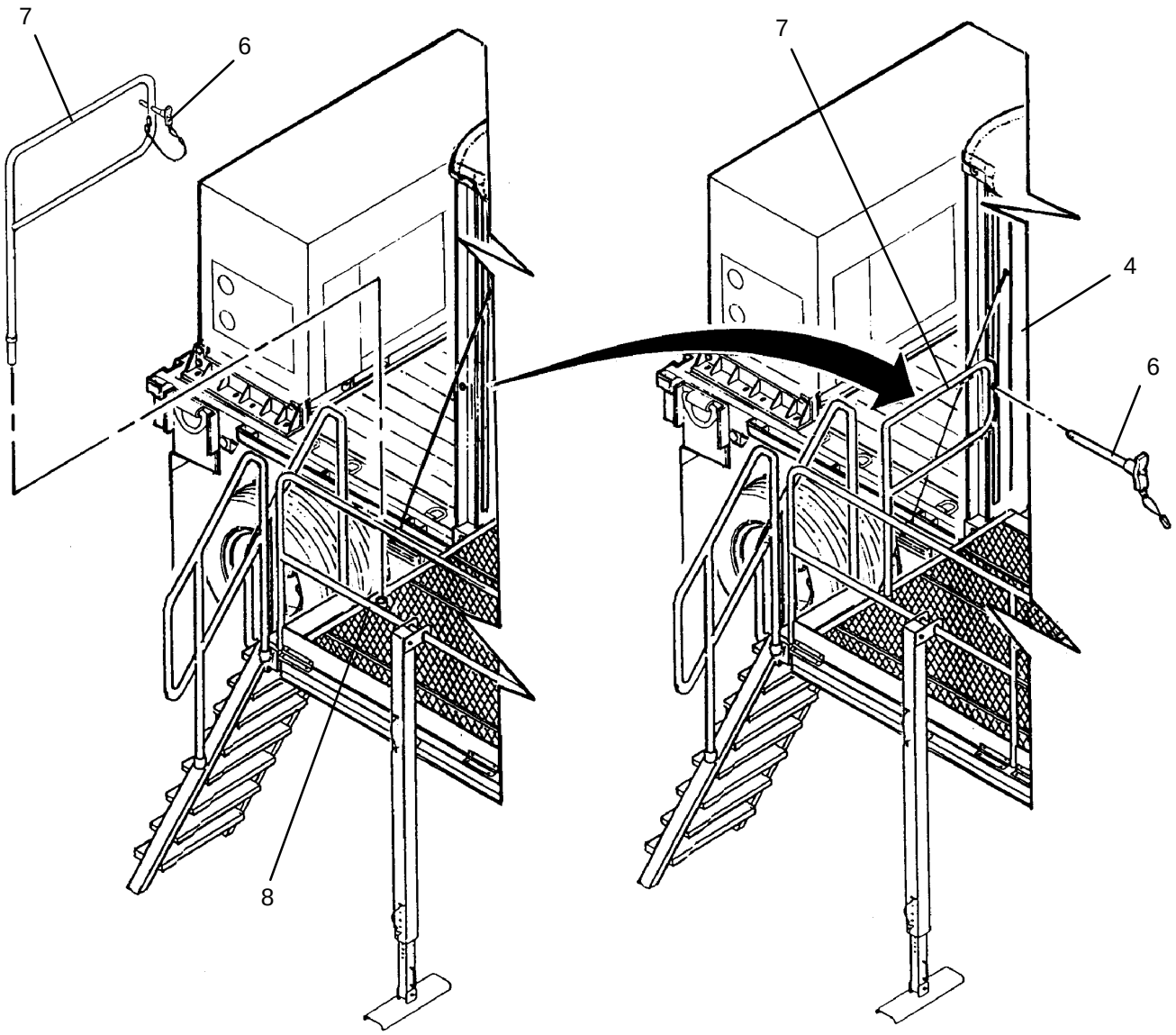
When securing railings to ISO frame, misalignment of mating holes for quick–connect pins is an indication that platform is not level. This problem can be corrected by slightly raising or lowering platform as necessary.

1. Lift main railing (1) up to vertical position.
2. Pull quick–connect pin (2) out of main railing (1) and gate (3).
3. Swing gate (3) over and mate with ISO frame (4).
4 Install quick–connect pin (2) to secure gate (3) to ISO frame (4).
5. Simultaneously flip two support brackets (5) on each support leg (6) over main railing (1).



Install Main and Side Railings – Continued

1. Pull quick–connect pin (6) out of side railing (7).
2. Slide side railing (7) into hole in platform (8).
3. Mate side railing (7) with ISO frame (4).
4. Install quick–connect pin (6) to secure side railing (7) to ISO frame (4).



Set–up Awning

NOTE

Awning (Tarp) can be stowed on top of the LADS, partially deployed, or completely deployed as desired.

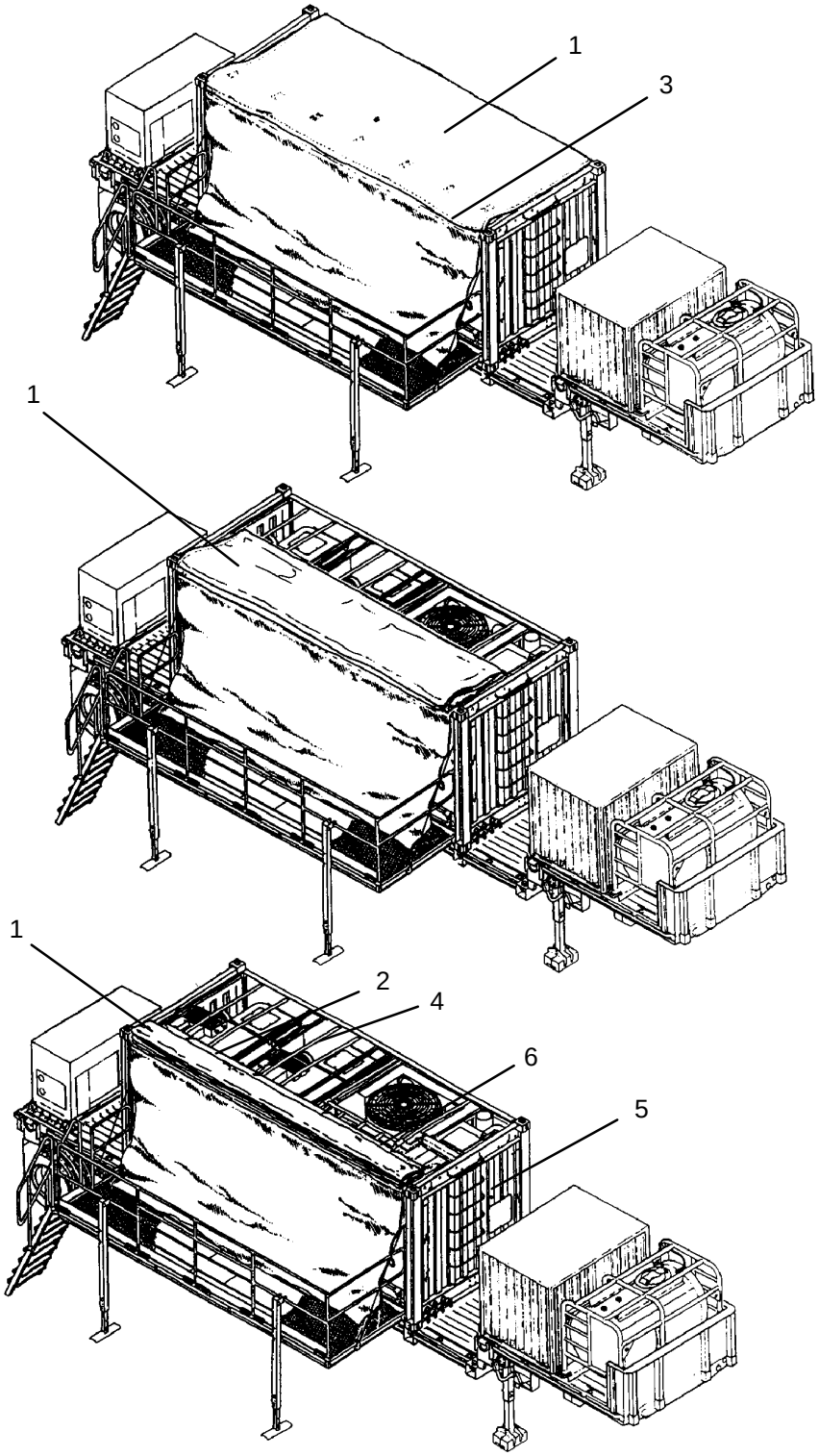
1. Determine what awning set–up is desired. To stow awning on top of the LADS follow steps 2 through 6. To partially deploy awning follow steps 7 through 11. To completely deploy awning follow steps 7 through 15.
2. Flip curbside section of tarp (1) down over curbside of the LADS.
3. Fold roadside section of tarp on top of awning extension (2) as follows:
   a. Align back–bottom edge (3) on roadside section of tarp (1) even with curbside edge of the LADS.
   b. From roadside–to–curbside, fold roadside section of tarp (1) forward, until even with curbside edge of the LADS.
   c. Repeat step b to fold roadside section of tarp (1) over again.
   d. Ensure roadside section of tarp (1) is directly above and not hanging over awning extension (2).

WARNING

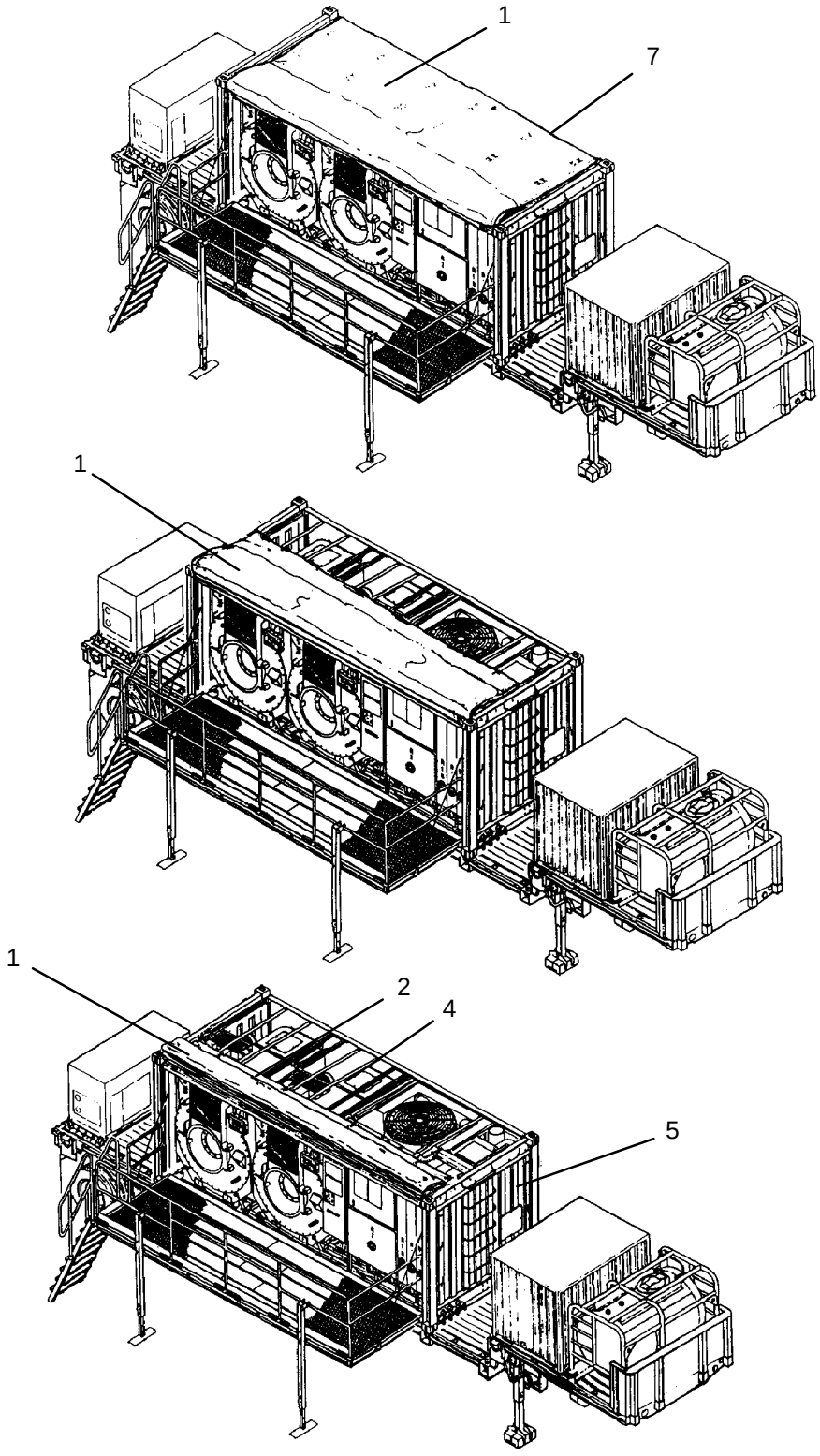
Awning extension and awning supports are designed to support the awning/tarp only. Do not step on or hang from these items. Failure to follow this precaution may result in equipment damage and personal injury.

4. Ensure awning extension (2) is secured to tarp supports (4) and ISO frame (5). Tighten straps (6) if necessary.
5. Flip curbside section of tarp (1) over top of the LADS.
6. Fold curbside section of tarp (1) on top of roadside section of tarp as follows:
   a. Align front–bottom edge (7) on curbside section of tarp (1) even with roadside edge of the LADS.
   b. From roadside–to–curbside, fold curbside section of tarp (1) forward, until even with curbside edge of the LADS.
   c. Repeat step b to curbside section of tarp (1) over again.
   d. Ensure curbside section of tarp (1) is directly above and not hanging over awning extension (2).

Set–up Awning – Continued

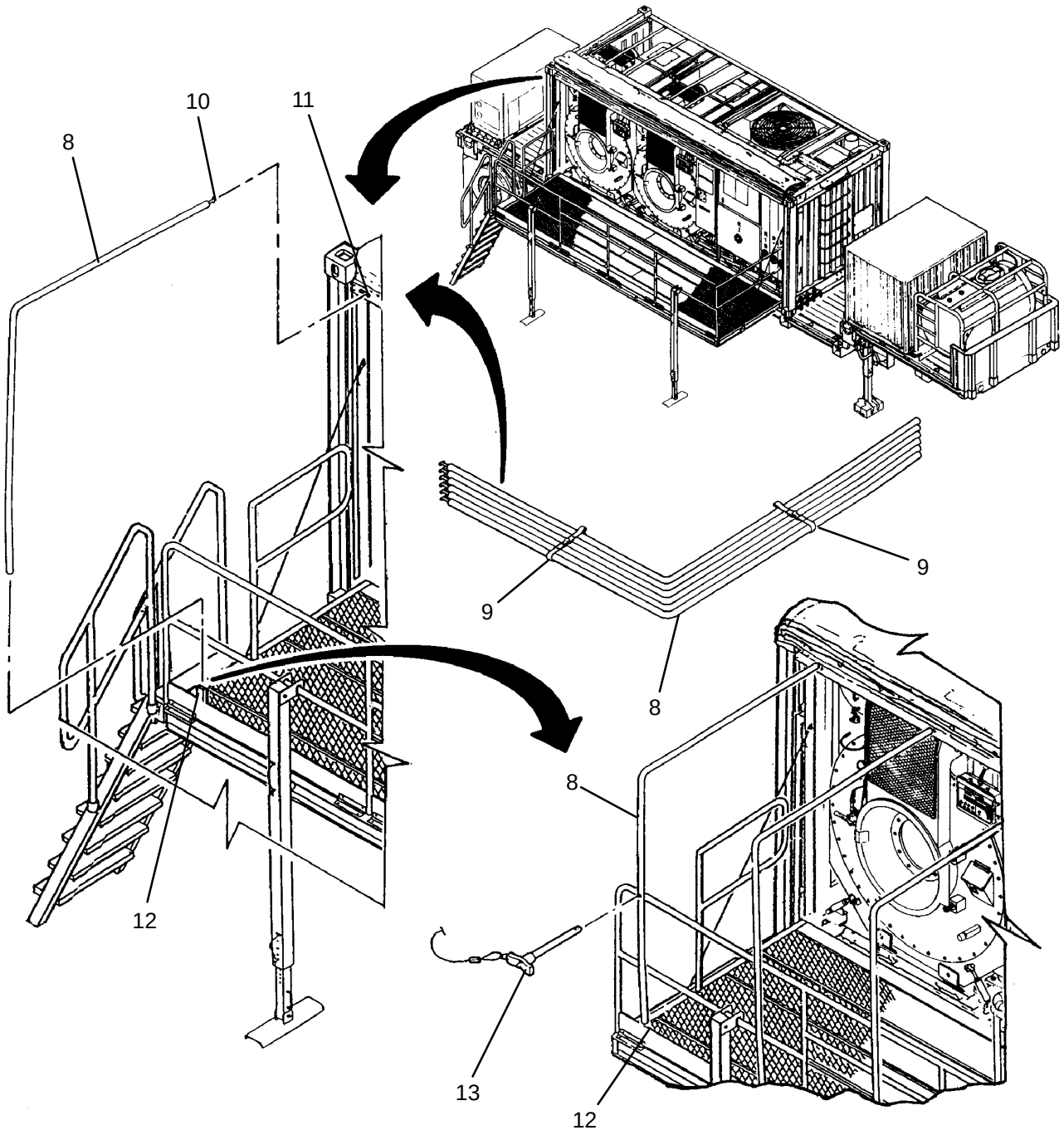


Set–up Awning – Continued



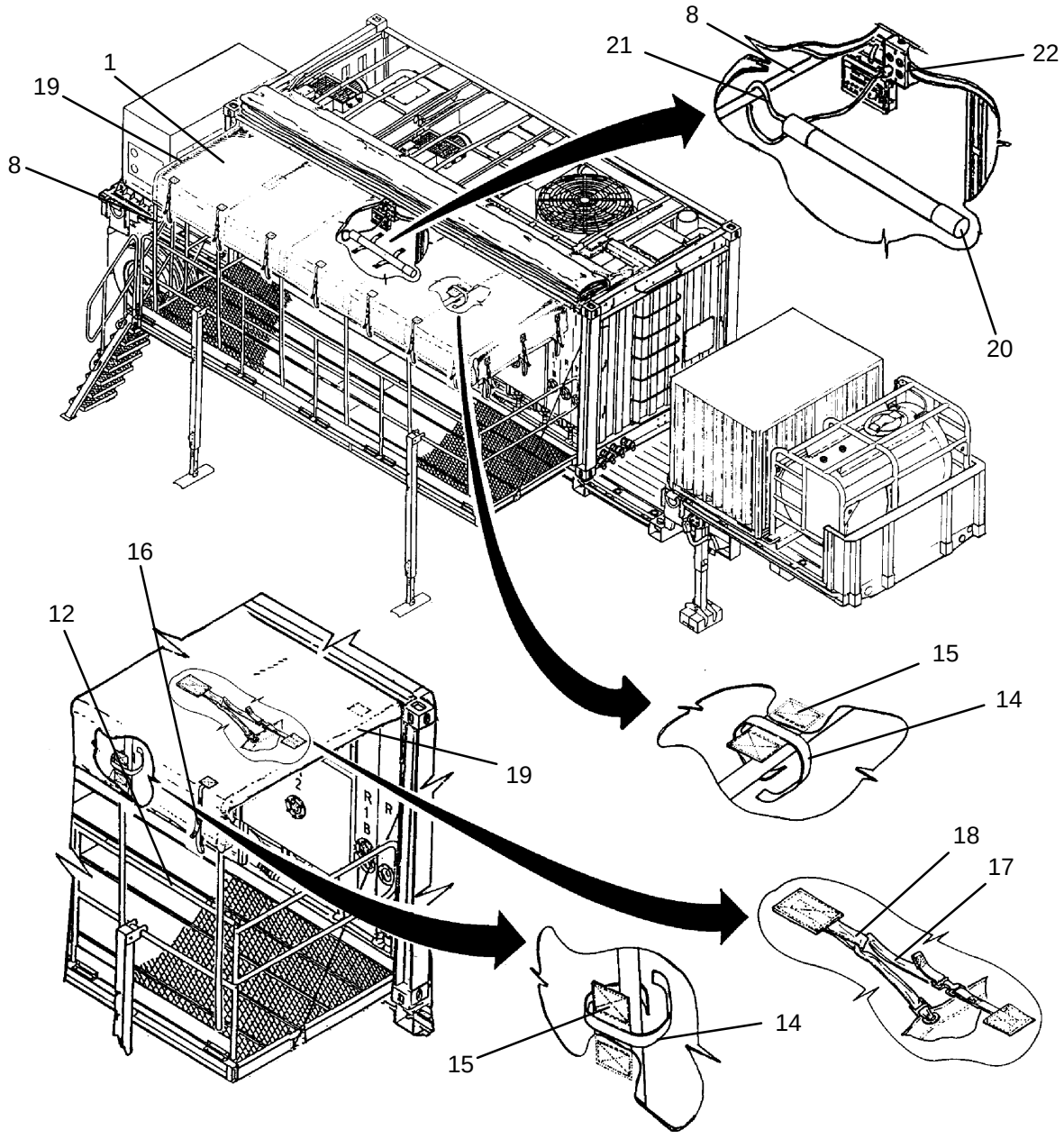
Set–up Awning – Continued

7. Install six awning supports (8) as follows:
   a. Loosen and remove straps (9) securing awning supports (8) together. Put straps in tool box.
   b. Insert t–bolt (10) into front support (11).
   c. Rotate awning support (8) downward and mate with main railing (12).
   d. Insert quick–connect pin (13) to secure awning support (8) to main railing (12).



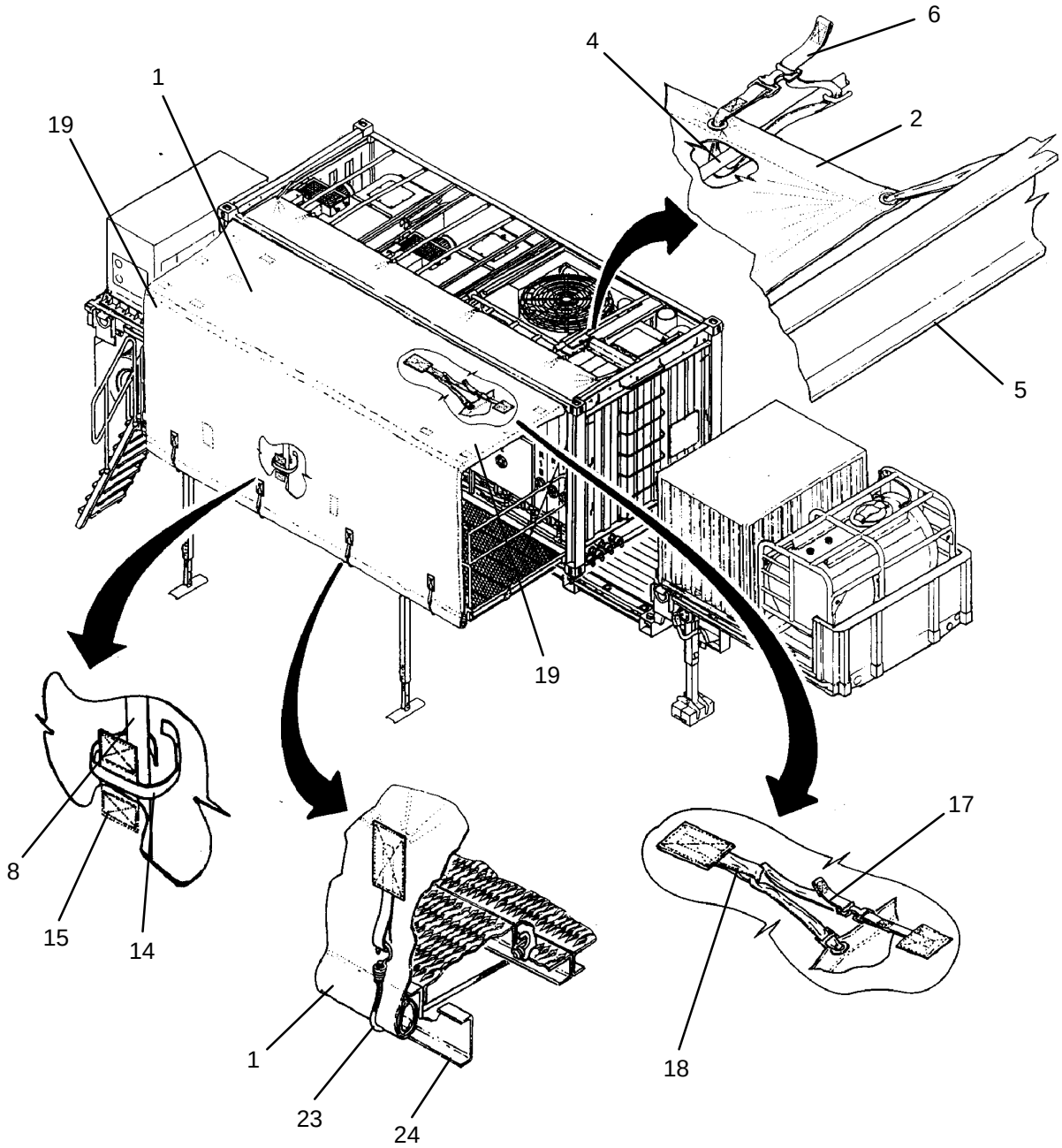
Set–up Awning – Continued

8. Flip curbside section of tarp (1) over awning supports (8).
9. Secure tarp (1) to awning supports (8) as follows:
   a. Slide eight straps (14) through loops (15) and secure to awning supports (8).
   b. Wrap straps (16) around main railing (12). Pull straps tight and tie off.
   c. Slide straps (17) through loops (18) to secure tarp (1) to outer awning supports (19).
10. If desired, install light (20) to underside of tarp (1) as follows:
   a. Position light (20) at desired location.
   b. Route electrical cable (21) between tarp (1) and awning supports (8).
   c. Connect electrical cable (21) at receptacle (22).
11 . If awning is to be completely deployed proceed to step 12, otherwise perform steps 3 and 4 to secure roadside section of tarp.



Set–up Awning – Continued

12. Flip roadside section of tarp (1) over curbside section of tarp and awning supports (8).
13. Secure tarp (1) to awning supports (8) as follows:
    a. Slide four straps (14) through loops (15) and secure to awning supports (8).
    c. Slide straps (17) through loops (18) to secure tarp (1) to outer awning supports (19).
14. Roll up excess tarp (1) and secure to underside of platform (23) with bungee cords (24).
15. Ensure awning extension (2) is secured to tarp supports (4) and ISO frame (5). Tighten straps (6) if necessary.



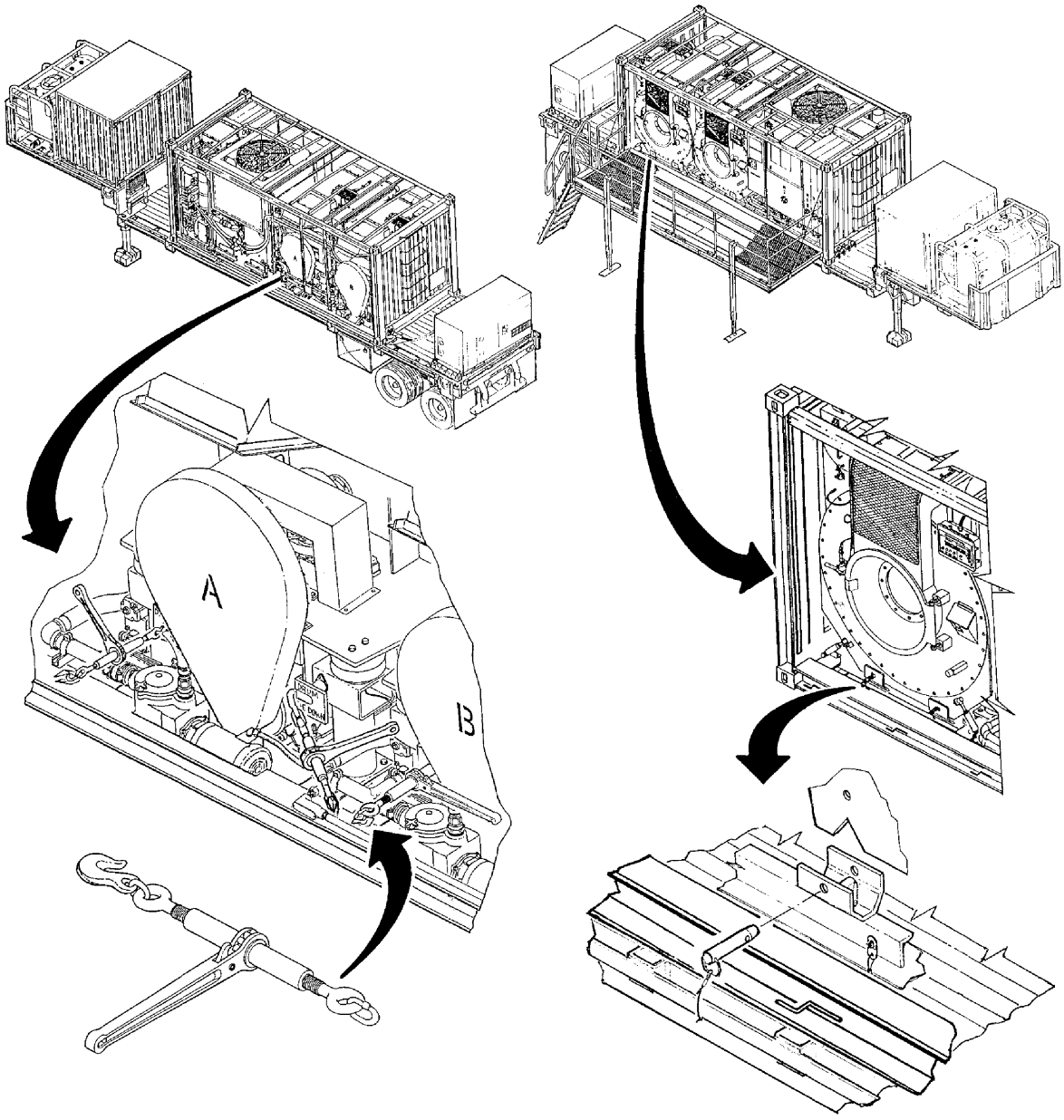
Unlock Drums

1. Remove four load binders (1) securing back of washing/drying drums (2) to ISO frame (3) as follows.
   a. Flip catch (4) over to allow loosening of load binder (1)
   b. Grasp barrel (5) then use handle (6) to loosen until eye (7) can be removed from hook point (8).
   c. Slide eye (7) out of hook point (8), then slide hook (9) out of hook point (10).
   d. Stow load binders (1) in storage container.

NOTE

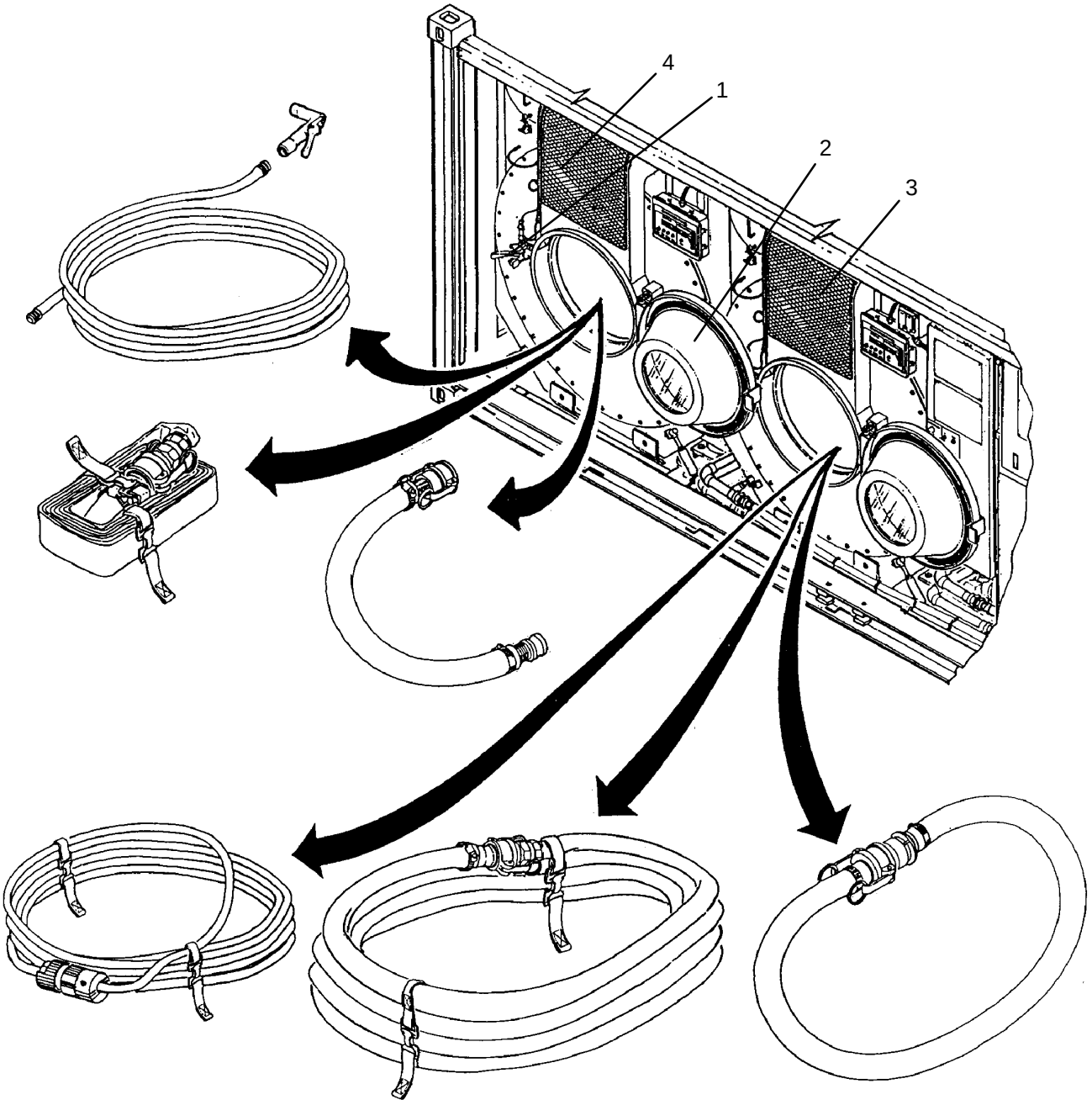
During transport drums may shift slightly making it difficult to remove pins from front of drums. If a pin is stuck it can be removed as air bags inflate during start–up.

2. Remove four pins (11) securing front of washing/drying drums (2) to ISO frame (3) as follows:
   a. Pull pin (11) out of ISO frame (3).
   b. Place pin (11) down into ISO frame (3) on trailer surface (12).



Remove Stowed Accessories

1. Pull out on handles (1) and open doors (2).
2. Remove items from drum A (3) and place on ground as follows:
   a. 10 ft water supply hose, qty 1
   b. 50 ft water supply hoses, qty 3
   c. 100 ft electrical cable, qty 1
3. Remove items in drum B (4) and place on ground as follows:
   a. 5 ft drain hose, qty 1
   b. 50 ft drain hoses, qty 2
   c. Utility hose, qty 1
   d. Spray nozzle, qty 1
4. Close drum doors (2) then push in on handles (1) to lock doors.



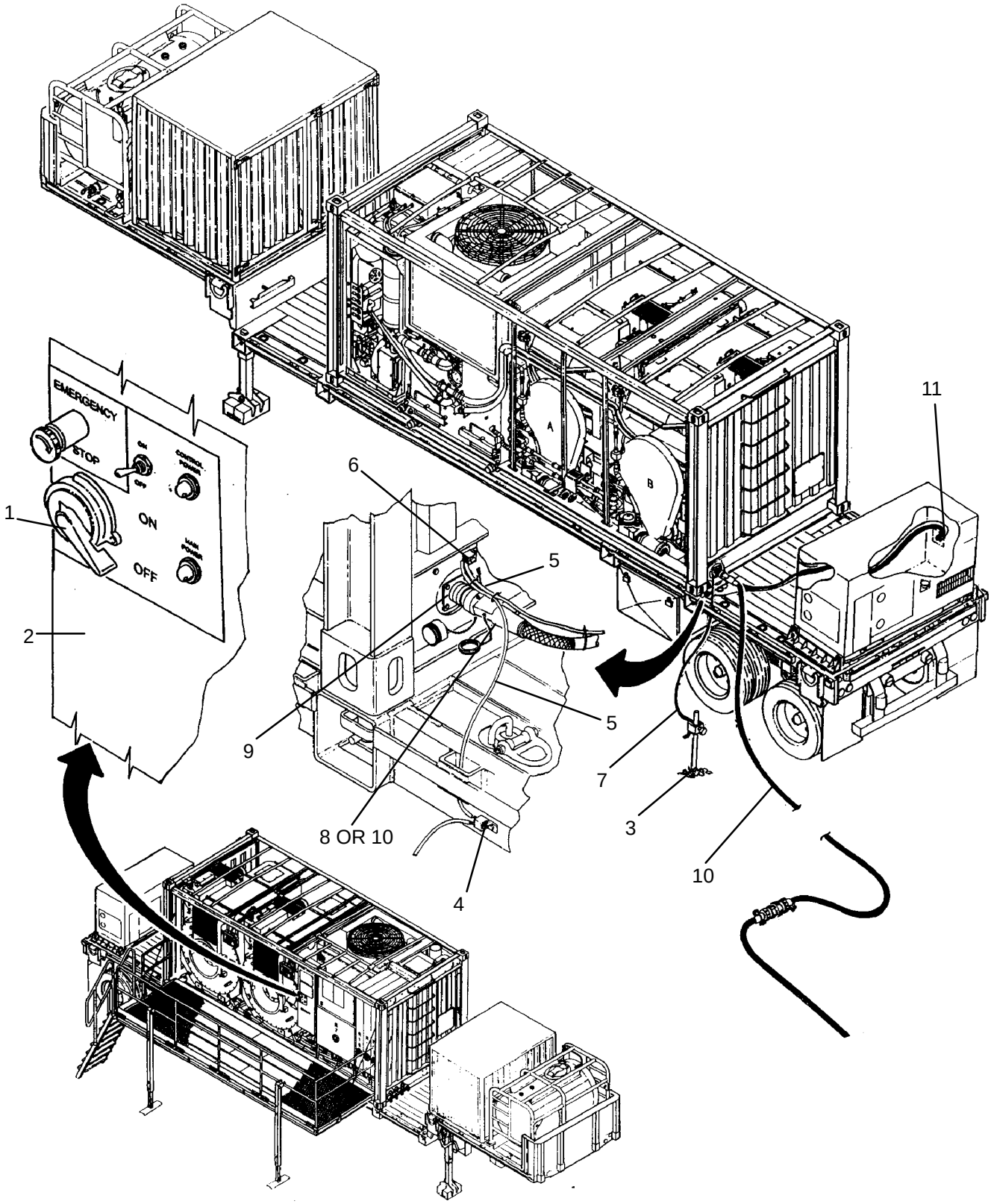
Establish Electrical Power Source

WARNING

Master power must be shut off before connecting the LADS power cable. Do not apply power to the LADS until a separate connection has been made with a suitable earth ground. Be careful not to come into contact with high–voltage connections. Whenever possible, keep one hand away from the equipment to reduce the hazard of current flowing through the body's vital organs. Failure to follow this warning may result in personnel injury or death.

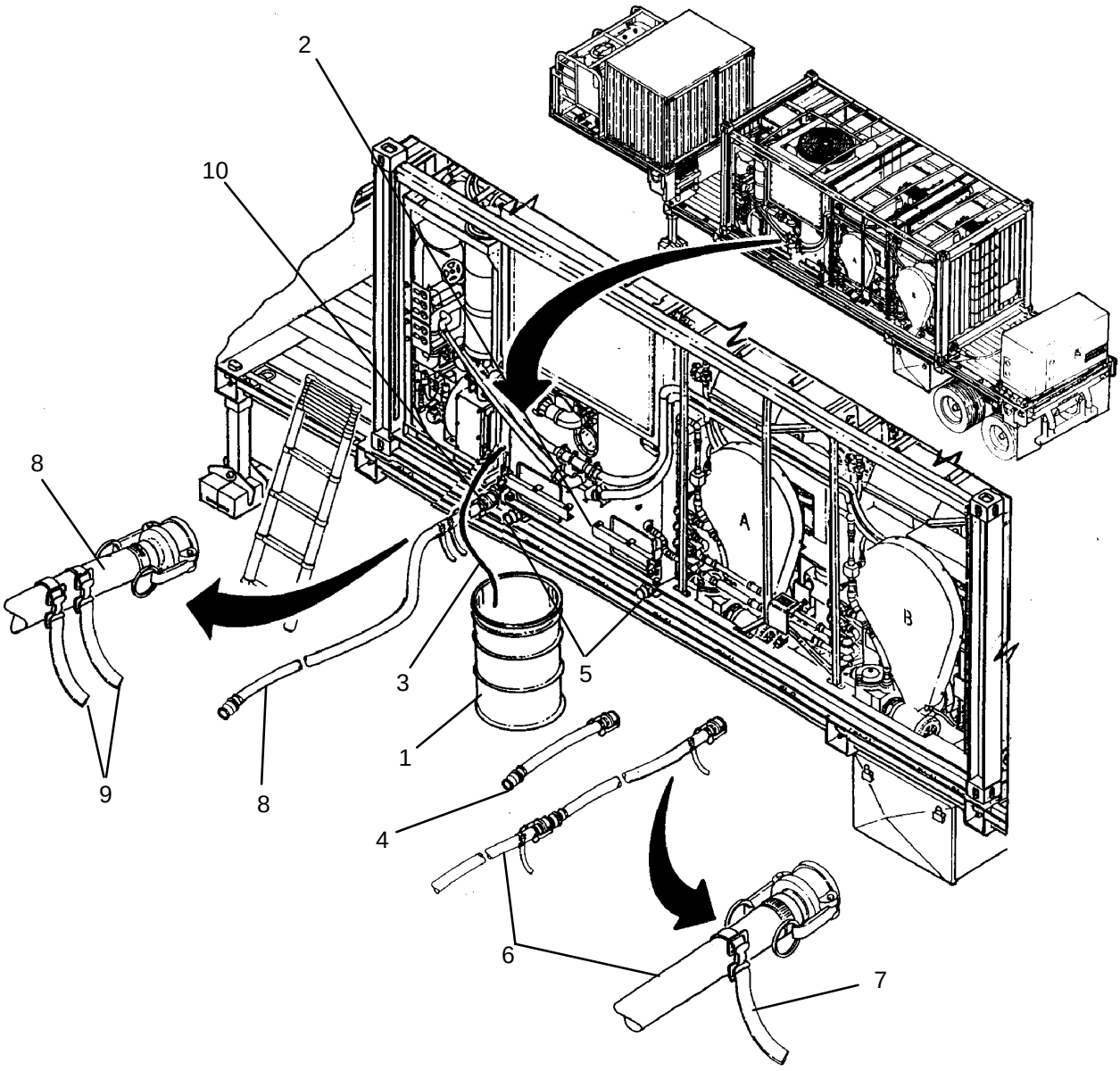
1. Determine what power source will be used to operate the LADS. If the MEP–805A generator is to be used proceed to step 3, otherwise continue to step 2.
2. Establish connection to electrical power source as follows:
   a. Ensure MAIN DISCONNECT switch (1) on main control enclosure (2) is OFF. Position switch to OFF if necessary.
   b. Drive grounding rod (3) into the earth, near grounding lug (4), to a minimum depth of eight feet.
   c. Ensure grounding wire (5) is attached to grounding lugs (4) and (6). Attach grounding wire if necessary using an adjustable wrench from tool box.
   d. Connect grounding wire (7) to grounding rod (3) and grounding lug (4).
   e. If connected, disconnect power cable (8) at junction box (9).
   f. Ensure external power source is not on.
   g. Connect power cable (10) from power source to junction box (9). Proceed to **Establish Water and Waste Drain**.
3. Establish connection to MEP–805A generator as follows:
   a. Ensure MAIN DISCONNECT switch (1) on main control enclosure (2) is OFF. Position switch to OFF if necessary.
   b. Drive grounding rod (3) into the earth, near grounding lug (4), to a minimum depth of eight feet.
   c. Ensure grounding wire (5) is attached to grounding lugs (4), (6) and (11). Attach grounding wire if necessary using an adjustable wrench from tool box.
   d. Connect grounding wire (7) to grounding rod (3) and grounding lug (4).
   e. Ensure MEP–805A generator is not on.
   f. Ensure power cable (8) is connected at junction box (9) and MEP–805A generator. Connect power cable if necessary.

Establish Electrical Power Source – Continued



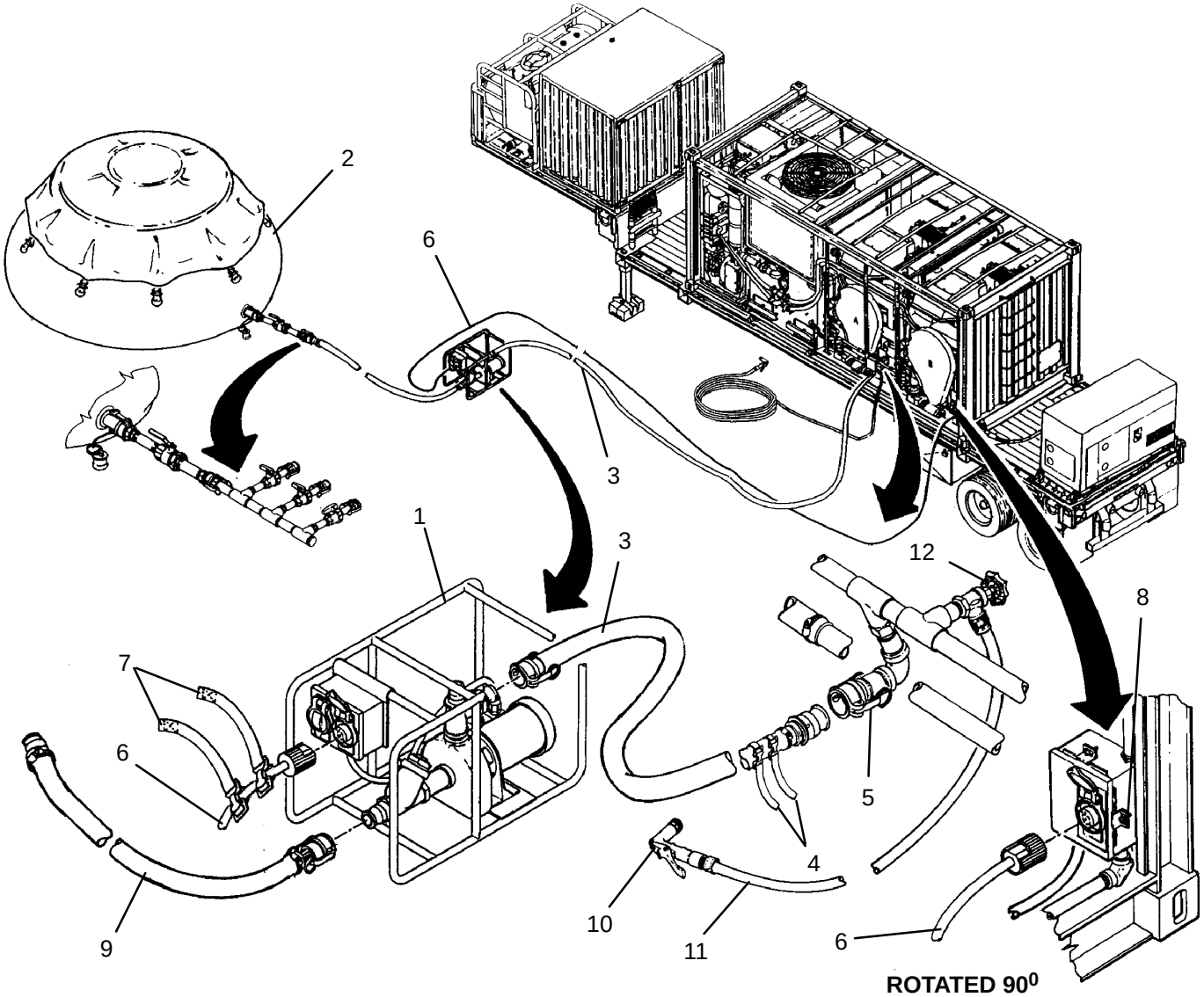
Establish Water and Waste Drain

1. Place waste container (1) in front of and centered below still (2).
2. Place coalescer drain tube (3) in waste container (1)
3. Place 5 ft drain hose (4) below two drain ports (5).
4. Route 50 ft drain hose (6) as follows.
   a. Remove strap (7) from around hose (6). Secure strap to either end of hose.
   b. Disconnect, roll out, and route hose (6) towards drainage area.
   c. If necessary connect a second hose (6) and roll out to drainage area.
   d. Leave enough slack in hose (6) to connect to drain port (5).
5. Route 50 ft overflow hose (8) as follows.
   a. Remove strap (9) from around hose (8). Secure strap to either end of hose.
   b. Disconnect, roll out, and route hose (8) to drainage area.
   c. Connect hose (8) to overflow port (10).



Establish Water Supply

1. Place water supply pump (1) and water tank (2) at desired location.
2. Set–up water tank (2) IAW TM 10–5430–237–12&P.
3. Route 50 ft water supply hose (3) as follows.
   a. Remove straps (4) from around hose (3). Secure straps to either end of hose.
   b. Disconnect, roll out, and route hose (3) from water supply pump (1) towards water supply port (5).
   c. If necessary connect second hose (3) following steps a and b.
4. Connect 50 ft water supply hose (3) at water supply pump (1) and water supply port (5).
5. Route electrical cable (6) as follows:
   a. Remove straps (7) from around cable (6). Secure straps to either end of cable.
   b. Disconnect, roll out, and route cable (6) from water supply pump (1) towards junction box (8).
6. Connect electrical cable (6) at water supply pump (1) and junction box (8).
7. Disconnect and route 10 ft water supply hose (9) between water supply pump (1) and water tank (2).
8. Connect 10 ft water supply hose (9) at water supply pump (1) and water tank (2).
9. Connect spray nozzle (10) to utility hose (11).
10. Connect utility hose (11) to faucet (12).



Establish Fuel Supply

WARNING

Before making connections or servicing fuel supply, ensure fuel container is properly connected to a suitable earth ground and electrically bonded to the LADS trailer. Ensure fire extinguishing equipment is available and operational. Failure to follow this warning may result in personnel injury or death.

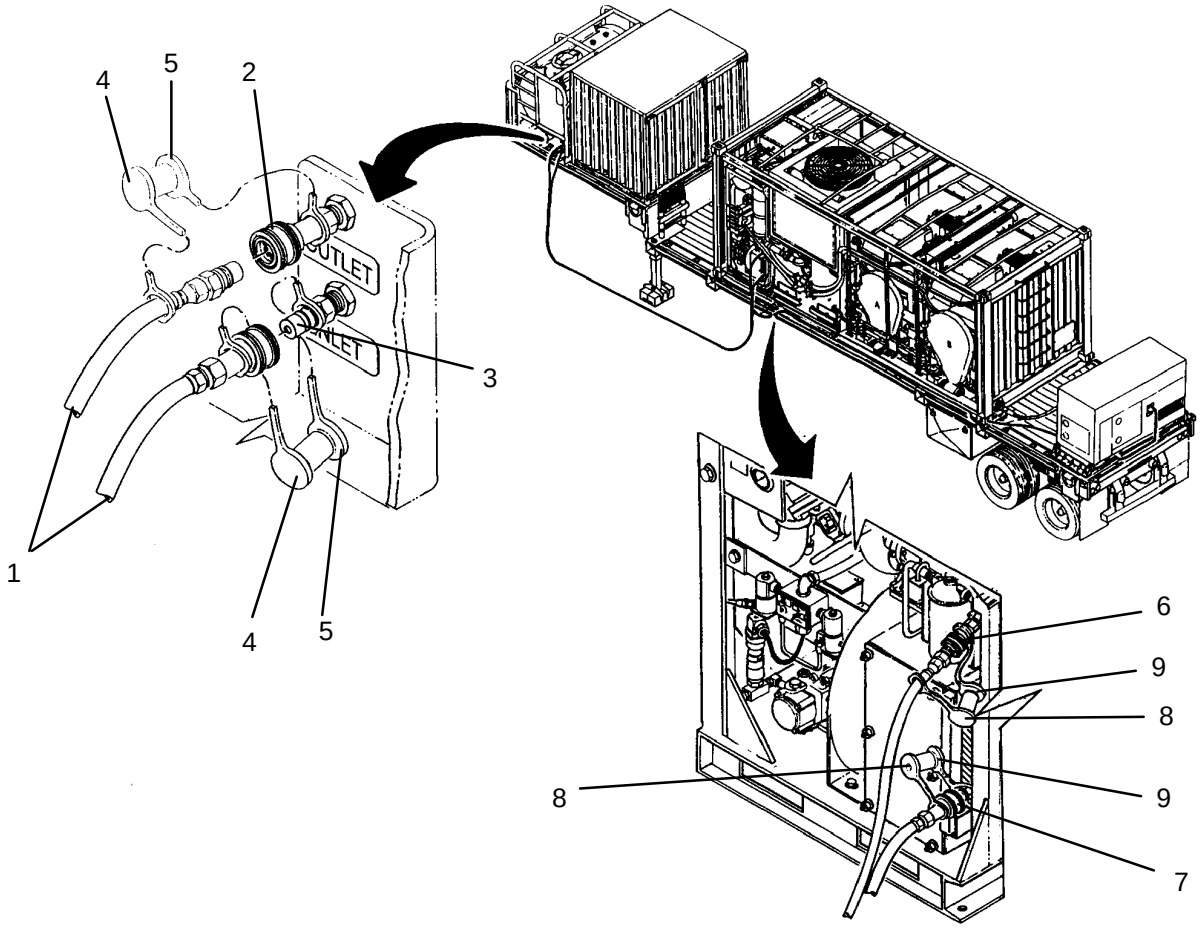
CAUTION

The LADS should only be operated using JP–8 or DF–2 fuel. Fuel supply must be free of water and contaminants. Connections on fuel hoses must be clean prior to connecting to heater and fuel supply. Improper, dirty, or contaminated fuel can cause damage to heater fuel system.

NOTE

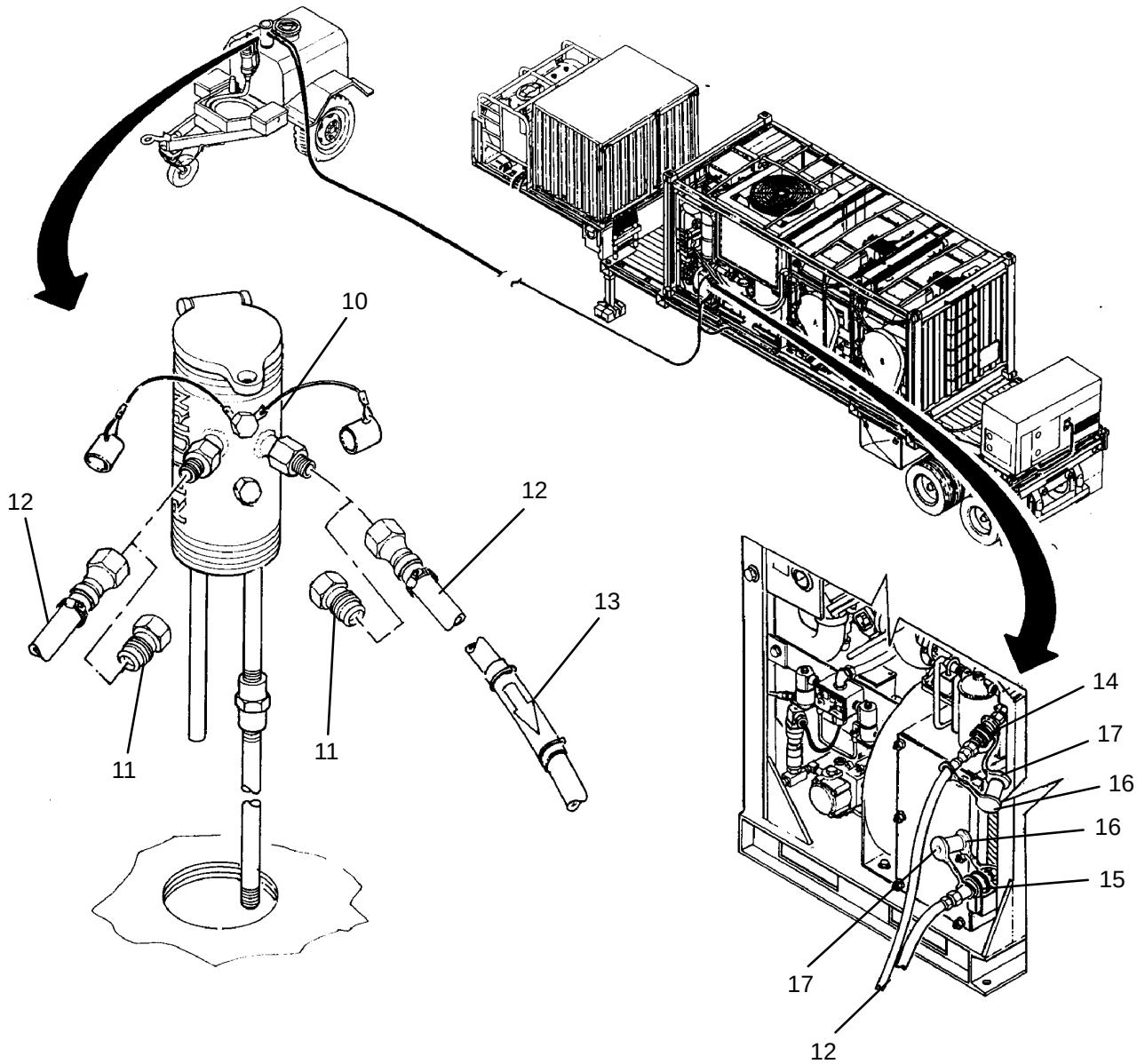
The LADS may be connected to fuel tank located on the M871A3 trailer or to another fuel supply as desired.

1. Determine what fuel connection set–up is desired. To connect the LADS to the fuel tank on the M871A3 trailer, follow steps 2 through 6 and 14 through 19. To connect the LADS to another external fuel supply follow steps 7 through 19.
2. Connect 30 ft fuel hose (1) at fuel tank connections (2) and (3). Ensure connections are fully seated.
3. Connect caps (4) and plugs (5) to each other.
4. Roll out and route 30 ft fuel hose (1) towards the LADS heater connections (6) and (7).
5. Connect fuel hose (1) at heater connections (6) and (7). Ensure connections are fully seated.
6. Connect caps (8) and plugs (9) to each other. Proceed to step 14.



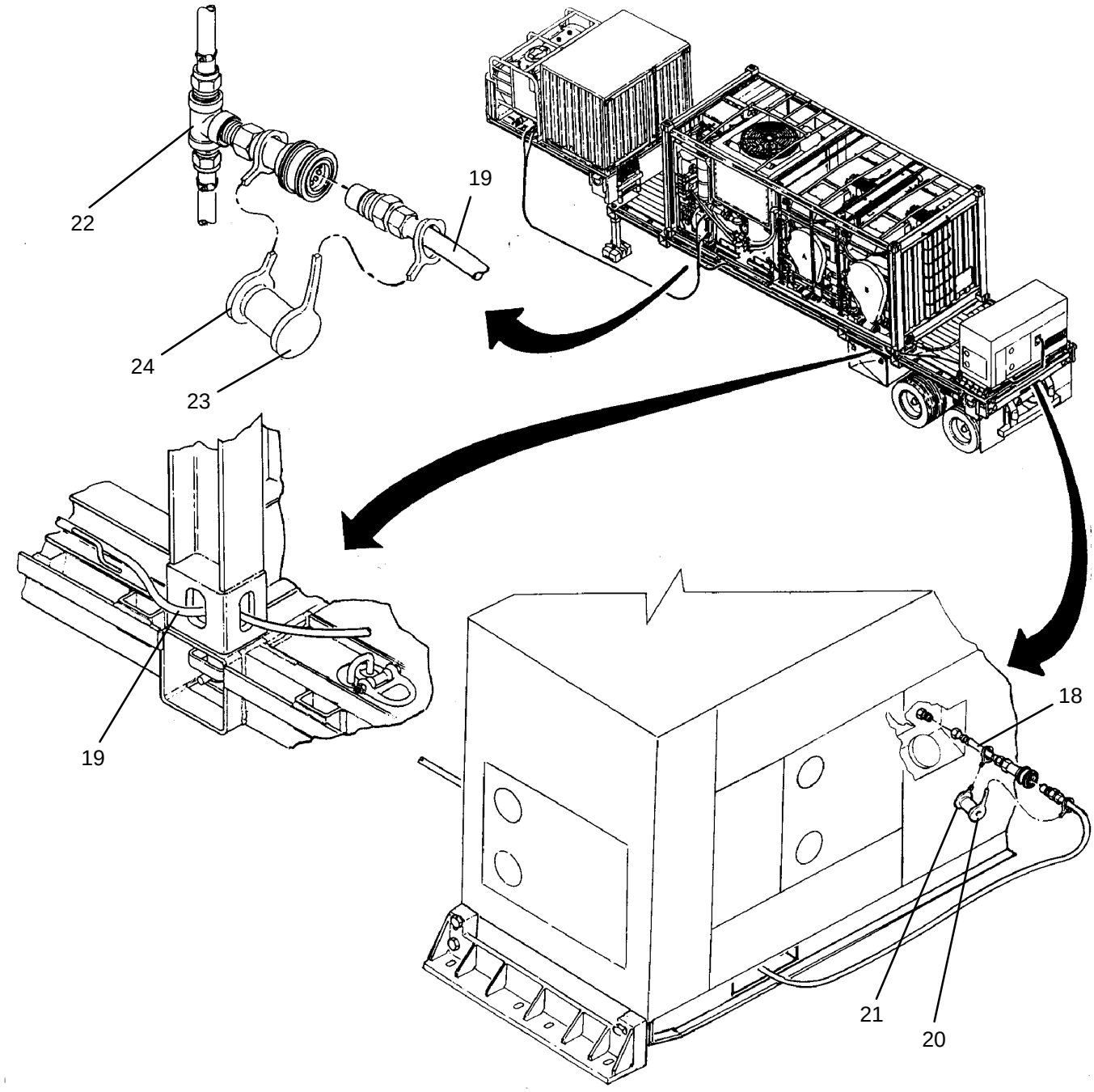
Establish Fuel Supply – Continued

7. Insert and secure fuel probe (10) at properly grounded fuel supply.
8. Remove plugs (11) from fuel hose (12).
9. Connect fuel hose (12) with direction arrow (13) to supply port on fuel probe (10) using an adjustable wrench from tool box.
10. Connect return half of fuel hose (12) to return port on fuel probe (10) using an adjustable wrench.
11. Roll out and route fuel hose (12) towards the LADS heater connections (14) and (15).
12. Connect fuel hose (12) at heater connections (14) and (15). Ensure connections are fully seated
13. Connect caps (16) and plugs (17) to each other. Proceed to step 14.



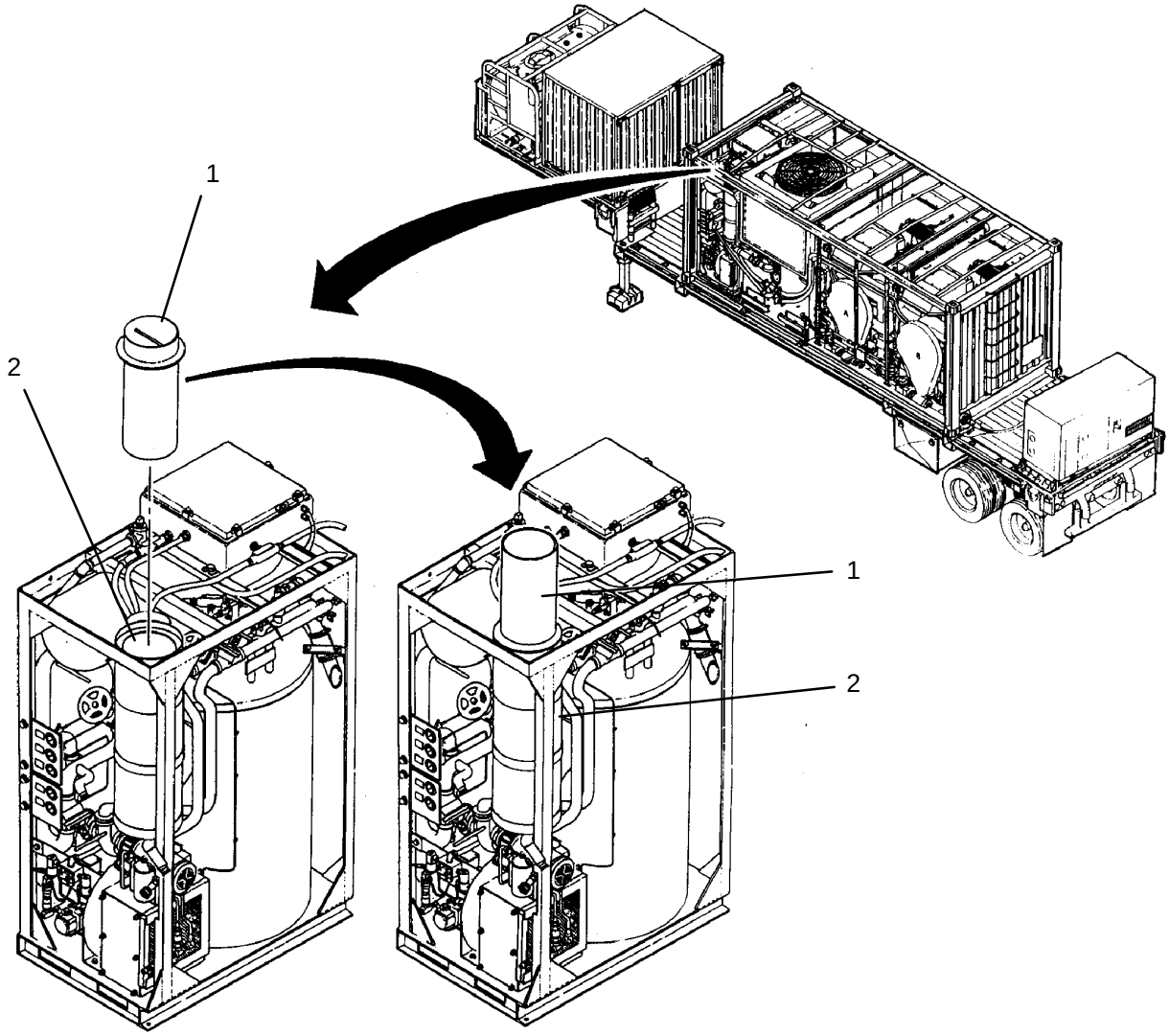
Establish Fuel Supply – Continued

14. Connect adapter (18) to MEP–805A generator (TM 9–6115–644–10) and tighten using an adjustable wrench.
15. Connect 25 ft fuel hose (19) to adapter (18). Ensure connection is fully seated.
16. Connect cap (20) and plug (21) to each other.
17. Roll out and route 25 ft fuel hose (19) towards fuel hose (22) along side of M871A3 trailer.
18. Connect 25 ft fuel hose (19) to 30 ft fuel hose (22). Ensure connection is fully seated.
19. Connect cap (23) and plug (24) to each other.



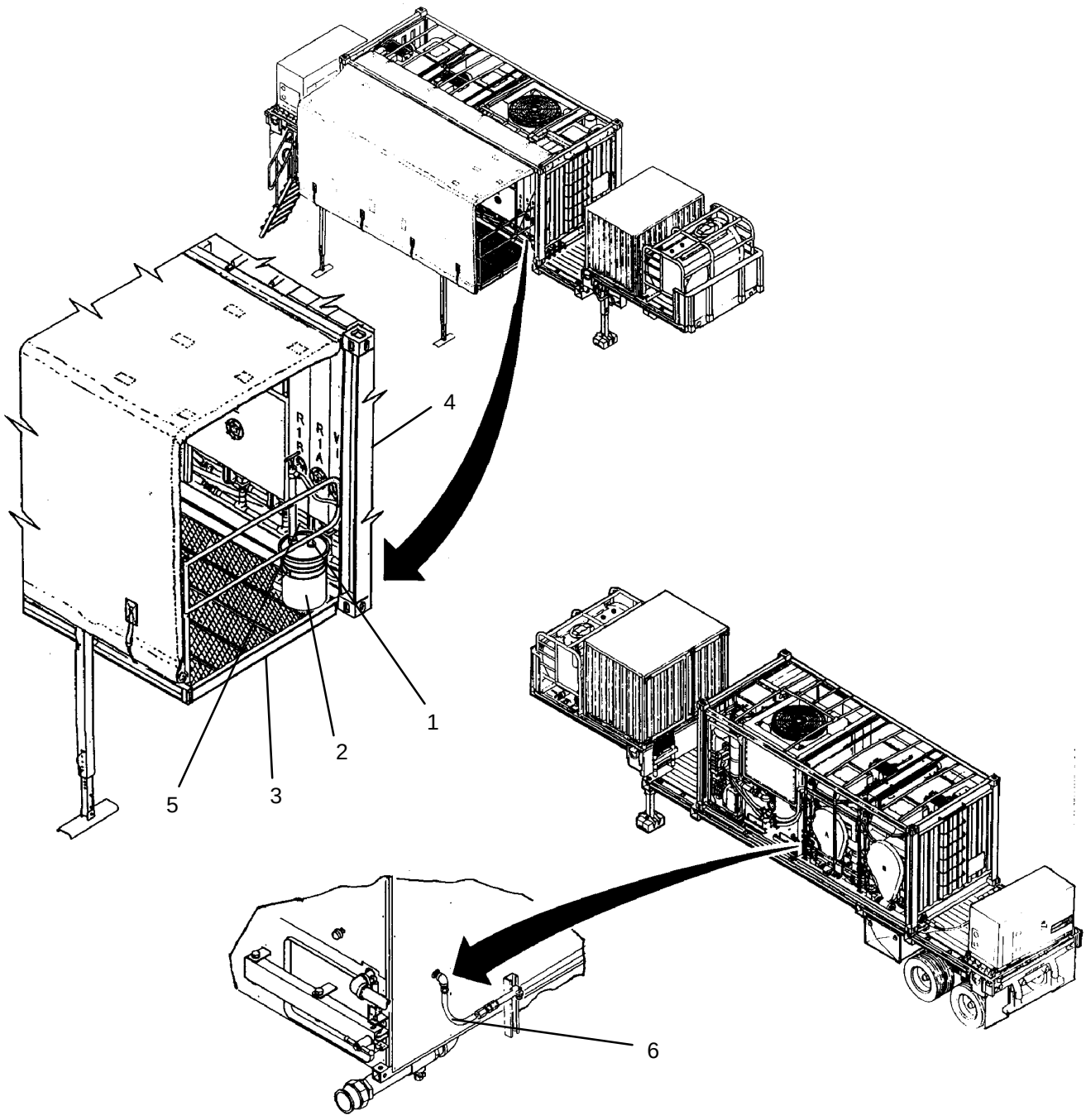
Install Exhaust Duct

1. Pull exhaust duct extension (1) up out of exhaust stack (2).
2. Flip exhaust duct extension (1) over and mate with exhaust stack (2).



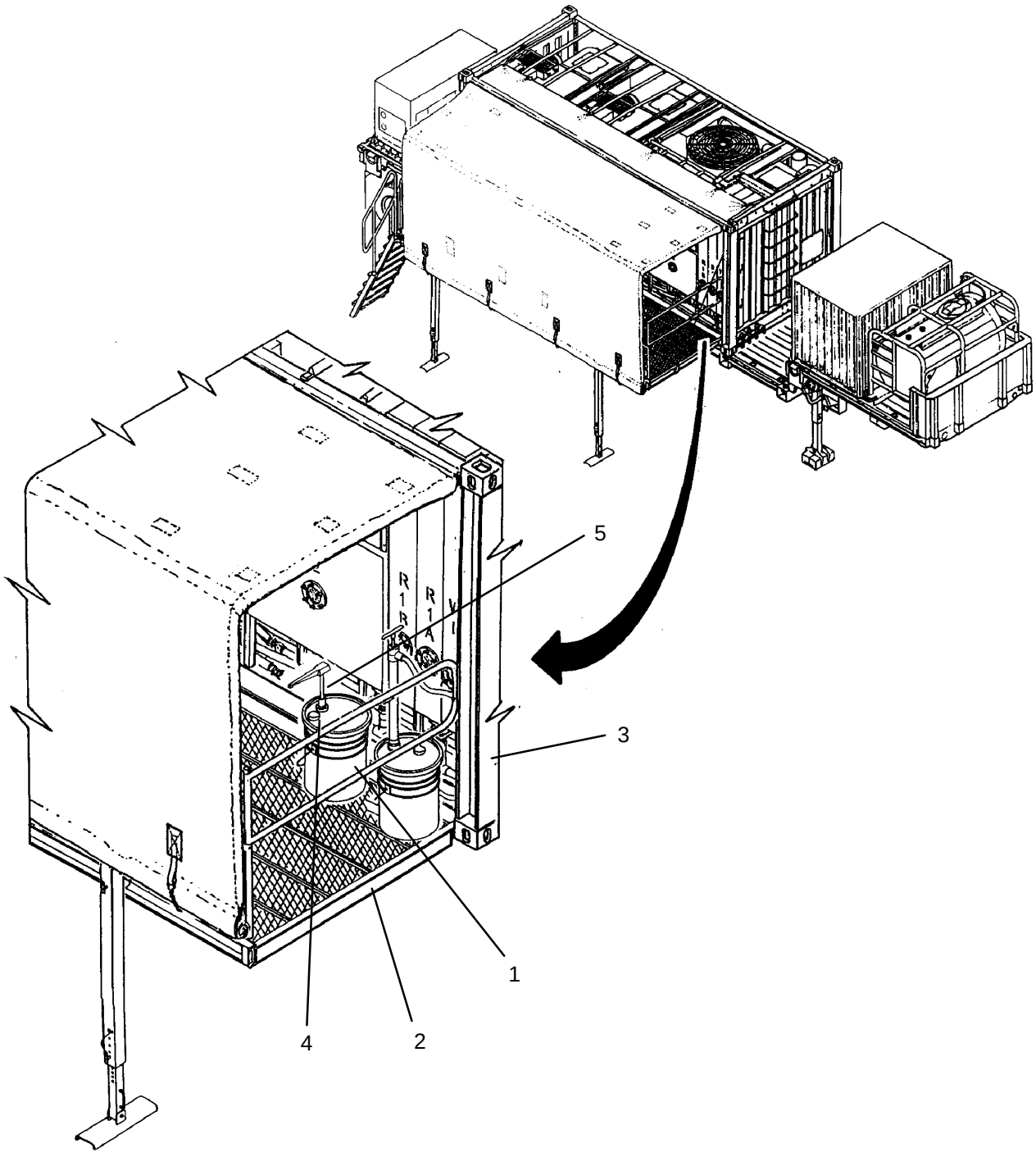
Establish Anti–Foam Supply

1. Ensure cap (1) is tight on anti–foam container (2) then shake container thoroughly to remove any clumps.
2. Place anti–foam container (2) on platform (3) next to corner of ISO frame (4).
3. Remove cap (1) from anti–foam container (2) and retain for later use.
4. Insert hand pump (5) into anti–foam container (2).
5. Stroke hand pump (5) until anti–foam is visible at inlet to still (6). Then add one more stroke.



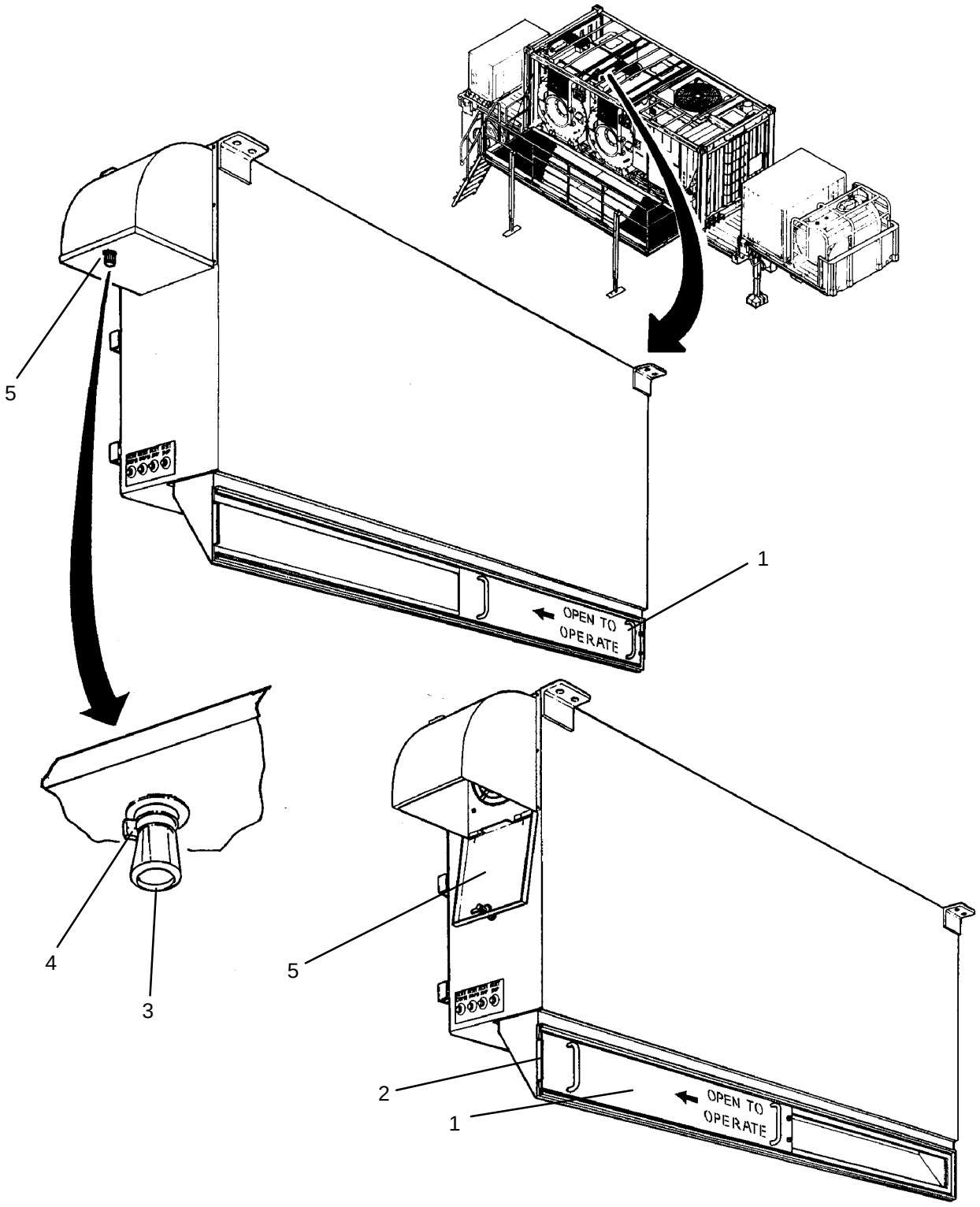
Establish Detergent Supply

1. Place detergent container (1) on platform (2) next to front corner of ISO frame (3).
2. Remove cap (4) from detergent container (1) and retain for later use.
3. Insert hand pump (5) into detergent container (1) and hand–tighten.



Open Inverter Air Flow Doors

1. Slide air inlet door (1) forward until it contacts stop (2).
2. Loosen knob (3) then rotate latch (4) to open air outlet door (5).



END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER USUAL CONDITIONS
INITIAL ADJUSTMENTS, BEFORE USE, AND SELF–TEST

INITIAL SETUP:

Tools

Personnel Required
Two Operators, One Supervisor

Materials/Parts

Equipment Conditions
Assembly and Preparation For Use completed (WP 0010 00)

Initial System Start–up

WARNING

Operating personnel must be familiar with system operation, warnings, and emergency procedures prior to operating the LADS. Failure to operate this system properly can cause severe injury or death to yourself or other personnel working nearby.

If any hazardous or unusual conditions are observed during operation, perform an emergency stop shutdown immediately (WP 0016 00).

1. Ensure all BEFORE PMCS procedures have been completed (WP 0032 00).
2. Bring MEP–805A generator on–line (TM 9–6115–644–10) or apply external power as required.
3. Set generator output to 210 VAC, 60 HZ.
4. Verify EMERGENCY STOP switch (WP 0008 00, Figure 1, 5) is pulled out.

NOTE

If indicators displayed at main control enclosure or at operator panels are not as stated in the following procedures, refer to troubleshooting procedures (WP 0018 00) to determine the proper action to take.

If the control system detects a system failure the audible alarm will go on and off intermittently. Further operations may or may not be interrupted, depending on how critical the failure is. If this occurs the operator panel display will read:

SYSTEM SHUTDOWN XXXXXX FAILURE	

or

WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F FILL FROM WASH TANK XXXXXX FAILURE	PAUSE MODIFY TEMPS EXAMINE INPUTS

In either case, refer to troubleshooting procedures work package (WP 0018 00) to determine the proper action to take.

5. Position MAIN DISCONNECT switch (1) to ON.
6. Verify MAIN POWER lamp (2) is ON.
7. Perform DURING PMCS items 1 and 2 (WP 0033 00).
8. Position CONTROL POWER switch (3) to ON.

Initial System Start–up – Continued

NOTE

The LADS contains a monitor that verifies correct electrical phasing with external power source. If phasing is not correct, CONTROL POWER lamp will not come on, with CONTROL POWER switch in ON position.

9. Verify CONTROL POWER lamp (4) is ON.
10. Verify POWER lamps (WP 0008 00 Figure 2, 1) are on at operator panels A and B.
11. Monitor display (6) at operator panel A, it should read:

TESTING CONTROL SYSTEM WAIT	

then

	PRESS TO START

Pressurize Air System

CAUTION

When pressurizing the air system the drum air bags will begin to inflate. If drum stowage pins could not be removed previously, ensure they are removed at this time. Attempting to inflate the air bags fully with the pins installed will result in damage to the air bags, pins, and drum structure.

1. Press MENU SELECTION switch (7) to start operation.
2. Monitor display (6), it should read:

TESTING AIR SYSTEM AIR TANK PRESS= XXX PSIG WAIT	

3. Perform DURING PMCS item 3 (WP 0033 00).
4. Wait about 15–20 minutes for air system to pressurize then to monitor display (6), it should read:

WATER LEVEL LOW	FILL TANKS OVERRIDE FILLING EXAMINE INPUTS

Prime Water Supply

1. Check rotation and prime water supply pump.

Fill Water Tanks

NOTE

For continuous laundry operations, always start with full water tanks for both systems. If a laundry cycle is started without enough water in the tanks the laundry cycle will be interrupted.

1. Press MENU SELECTION switch (7) to start water filling.
2. Monitor display (6), it should read:

FILLING WATER TANKS	OVERRIDE FILLING EXAMINE INPUTS

Prime Fuel Supply and Heat Rinse 2 Tank

1. Wait about 15 minutes for tanks to fill then monitor display (6), it should read:

SET WATER TEMPERATURE SETPNT= XXX F	MODIFY SETPOINT HEAT WATER OVERRIDE HEATING EXAMINE INPUTS

WARNING

When priming fuel supply, reading at burner pressure gauge must be at “ZERO”. If pressure at this gauge increases when the “PRIME PUMP” switch is on, STOP the priming operation and notify Unit Maintenance. Attempting to start the heater with excess fuel in the combustion chamber may cause vapors and liquids to ignite or explode resulting in death or serious personal injury.

2. Prime fuel supply to heater as follows:
   a. Lift and hold PRIME PUMP switch (WP 0008 00 Figure 4, 1).
   b. Observe reading on pressure gauge (2).
   c. Release switch (1) when pressure gauge (2) remains steady at 135 psi or higher for a continuous 120 second period.
3. Proceed to (WP 0012 00, DAILY OPERATING PROCEDURES, System Start–up, step 19) to complete water heating.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER USUAL CONDITIONS
DAILY OPERATING PROCEDURES

INITIAL SETUP:

Tools

Personnel Required
Two Operators, One Supervisor

Materials/Parts

Equipment Conditions

System Start–up

WARNING

Operating personnel must be familiar with system operation, warnings, and emergency procedures prior to operating the LADS. Failure to operate this system properly can cause severe injury or death to yourself or other personnel working nearby.

If any hazardous or unusual conditions are observed during operation, perform an emergency stop shutdown immediately (WP 0016 00).

1. Ensure all BEFORE PMCS procedures have been completed (WP 0032 00).
2. Bring MEP–805A generator on–line (TM 9–6115–644–10) or apply external power as required.
3. Set generator output to 210 VAC, 60 HZ.
4. Verify EMERGENCY STOP switch (WP 0008 00, Figure 1, 5) is pulled out.

NOTE

If indications displayed at main control enclosure or at operator panels are not as stated in the following procedures refer to troubleshooting procedures (WP 0018 00) to determine the proper action to take.

If the control system detects a system failure the audible alarm will go on and off intermittently. Further operations may or may not be interrupted, depending on how critical the failure is. If this occurs the operator panel display will read:

SYSTEM SHUTDOWN XXXXXX FAILURE	

or

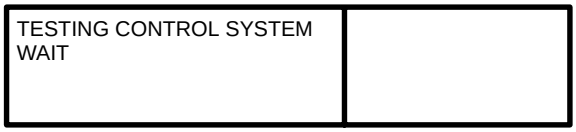
WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F FILL FROM WASH TANK XXXXXX FAILURE	PAUSE MODIFY TEMPS EXAMINE INPUTS

In either case, refer to troubleshooting procedures work package (WP 0018 00) to determine the proper action to take.

5. Position MAIN DISCONNECT switch (1) to ON.
6. Perform DURING PMCS items 1 and 2 (WP 0033 00).
7. Position CONTROL POWER switch (3) to ON.
8. Verify POWER lamps (WP 0008 00, Figure 2, 1) are on at operator panels A and B.

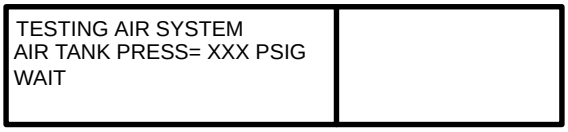
System Start–up – Continued

9. Monitor display (6) at operator panel A, it should read:



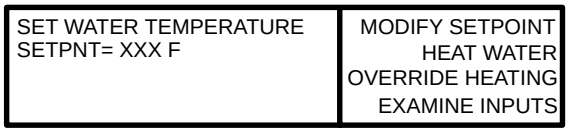
then

10. Press MENU SELECTION switch (7) to start operation.
11. Monitor display (6), it should read:



12. Perform DURING PMCS item 3 (WP 0033 00).
13. Wait for air system to pressurize then monitor display (6), it should read:

or



If WATER LEVEL LOW is displayed, continue to step 14, otherwise proceed to step 17.

NOTE

For continuous laundry operations, always start with full water tanks for both systems. If a laundry cycle is started without enough water in the tanks, the laundry cycle will be interrupted.

If the LADS operation is stopped while in progress, OVERRIDE FILLING should be selected when system is restarted. Selecting the FILL TANKS option will result in excess water being added to the water tanks.

14. Press MENU SELECTION switch as follows:
    a. Select FILL TANKS to fill all water tanks to proper level. Proceed to step 15.
    b. Select OVERRIDE FILLING to bypass water filling. Proceed to step 17.

System Start–up – Continued

15. Monitor display (6), it should read:

FILL WASH TANK	OVERRIDE FILLING EXAMINE INPUTS

16. Wait about 10–15 minutes for tanks to fill then proceed to step 17.
17. Monitor display (6), it should read:

SET WATER TEMPERATURE SETPNT= XXX F	MODIFY SETPOINT HEAT WATER OVERRIDE HEATING EXAMINE INPUTS

WARNING

When priming fuel supply, reading at burner pressure gauge must be at “ZERO”. If pressure at this gauge increases when the “PRIME PUMP” switch is on, STOP the priming operation and notify Unit Maintenance. Attempting to start the heater with excess fuel in the combustion chamber may cause vapors and liquids to ignite or explode resulting in death or serious personal injury.

18. Prime fuel supply to heater as follows:
    a. Lift and hold PRIME PUMP switch (WP 0008 00, Figure 4, 1).
    b. Observe reading on pressure gauge (2).
    c. Release switch (1) when pressure gauge (2) remains steady at 135 psi or higher for a continuous 30 second period.
19. Press MENU SELECTION switch as follows:
    a. Select MODIFY SETPOINT to change displayed setpoint in 5 degree increments until desired setpoint is displayed. Continue to step 19b.
    b. Select HEAT WATER to heat rinse 2 tank. Continue to step 20.
    c. Select OVERRIDE HEATING to bypass rinse 2 tank heating. Proceed to **Load Laundry**.
20. Monitor display (7), it should read:

HEATING WATER SETPNT= XXX F TEMP = XXX F HEATING RINSE 2	MODIFY SETPOINT EXAMINE INPUTS

NOTE

After water heating is complete, only the rinse 2 tank will have hot water. Water in the other tanks can be heated by continuing with this procedure or laundry operations can be started if desired. If laundry operations are started all tanks will be heated after two laundry cycles are completed.

21. Wait 30–40 minutes for rinse 2 tank to heat–up. If hot water is desired in all tanks continue to step 22, otherwise proceed to **Load Laundry**.

System Start–up – Continued

NOTE

The following procedures need to be performed at operator panel A to heat water for drum A and at operator panel B to heat water for drum B.

Selecting CLEAN/HEAT WASH TANK cycle once will move the hot rinse 2 water to the rinse 1 tank. Selecting CLEAN/HEAT WASH TANK a second time will move the hot rinse 1 water to the wash tank.

Once the CLEAN/HEAT WASH TANK cycle is started for one drum the other operator panel will be forced into STAGGERING cycles mode. Operation at that panel will not be allowed until the cycle for the other drum is completed.

22. At operator panel A monitor display (WP 0008 00, Figure 2, 6), it should read:

WASH CYCLE X	SELECT CYCLE
WASH= XXX F DRY= XXX F	MODIFY TEMPS
SELECT CYCLE, TEMP, START	START CYCLE
	EXAMINE INPUTS

23. Press SELECT CYCLE switch (7) to toggle through available cycles until CLEAN/HEAT WASH TANK is displayed.
24. Monitor display (6), it should read:

CLEAN/HEAT WASH TANK	SELECT CYCLE
WASH= XXX F DRY= XXX F	MODIFY TEMPS
SELECT CYCLE, TEMP, START	START CYCLE
	EXAMINE INPUTS

25. Press START CYCLE to start heating water for drum A rinse 1 tank.
26. When audible alarm (5) sounds press SILENCE ALARM switch (4).
27. Monitor display (6), it should read:

WASH CYCLE X IN PROGRESS	PAUSE
WASH= XXX F DRY= XXX F	
DRAIN TO STILL	
ADD ANTI–FOAM	EXAMINE INPUTS

28. Add one stroke of anti–foam with hand pump (1).
29. Wait for cycle to be completed. When audible alarm (5) sounds press SILENCE ALARM switch (4).
30. Perform steps 22 through 29 for drum B rinse 1 tank.
29. Perform steps 22 through 29 for drum A wash tank.
30. Perform steps 22 through 29 for drum B wash 1 tank.
31. Continue to **Load Laundry** after water heating is completed.

Load Laundry

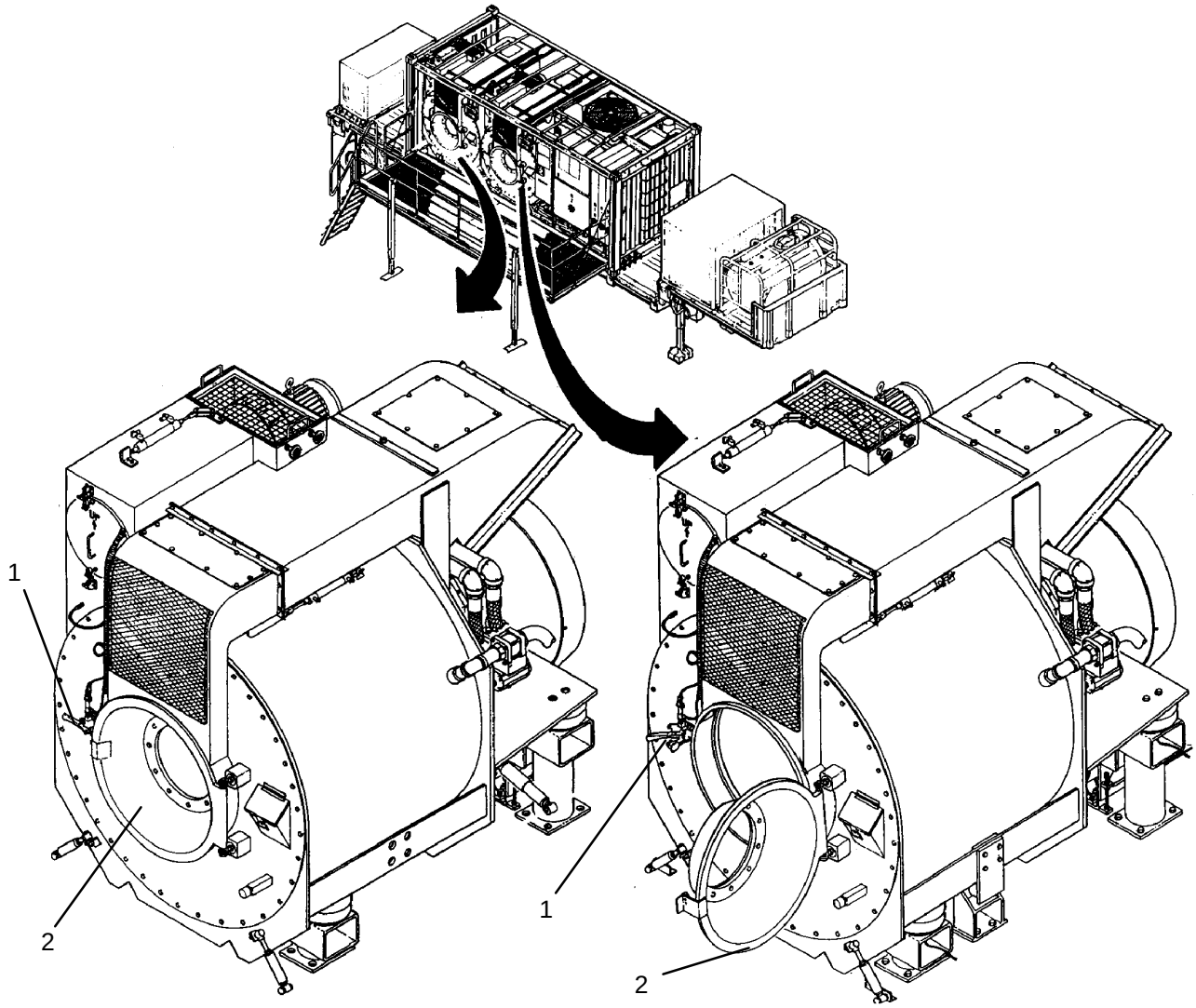
CAUTION

Never load more than 200 lbs or less than 50 lbs of laundry into one drum. Excessive or undersized loads can cause stress to drum structure and drive components leading to premature failure.

Only use the detergent specified in this manual. Never add more than 1 ounce of detergent per load. Use of the wrong detergent or too much detergent can cause excessive sudsing, overflowing of tanks, and still boil–overs.

Never use chlorine bleach in the LADS. If chlorine bleach enters the still, hydrochloric acid will be produced, causing rapid deterioration of the still, still condenser, and condensate plumbing.

1. Pull out on handle (1) and open drum door (2).
2. Add 1 ounce (stroke) of detergent onto any bag of laundry being loaded.
3. Load laundry bags (refer to WP 0009 00 for guidance on properly loading laundry bags and drum).
4. Make sure laundry is clear of door (2).
5. Close drum door (2) then push in on handle (1) to lock door.
6. Proceed to **Select and Start Laundry Cycle**.



Select and Start Laundry Cycle

NOTE

The following procedures are performed at operator panel A for drum A and operator panel B for drum B.

If one drum is already operating the operating panel for the second drum will read STAGGERING CYCLES. The laundry menu will appear for the second drum as soon as the first drum reaches the DRAIN TO RINSE 1 TANK step. This typically occurs 18–20 minutes after the first cycle is started.

During continuous laundry operations review DURING PMCS (WP 0033 00) after each cycle and at shift change. Perform actions as indicated.

1. Monitor display (WP 0008 00, Figure 2, 6), it should read:

WASH CYCLE X	SELECT CYCLE
WASH= XXX F DRY= XXX F	MODIFY TEMPS
SELECT CYCLE, TEMP, START	START CYCLE
	EXAMINE INPUTS

2. Press MENU SELECTION switch as follows:

CAUTION

Laundering small loads at higher dryer temperatures may lead to material shrinkage. Utilize lower dryer temperatures when full loads are not being laundered.

   a. Select SELECT CYCLE to toggle to next available cycle until desired laundry cycle is displayed.
   b. Select MODIFY TEMPS to change displayed washing or drying temperature. Proceed to step 3.
   c. Select START CYCLE to start laundry cycle. Proceed to **Laundry Cycle Operation**.

3. Monitor display (6), it should read:

WASH CYCLE X	MODIFY WASH TEMP
WASH= XXX F DRY= XXX F	MODIFY DRY TEMP
SELECT CYCLE, TEMP, START	
	RETURN

NOTE

If wash temperature setpoint is changed, water temperature for systems A and B will change. If dry temperature setpoint is changed only the system where change was made will be affected.

Changes made to wash temperatures will return to the default setpoint when control power is removed from the LADS and reapplied.

Temperature of water used during a laundry cycle will not change to modified wash temperature until 3 laundry cycles after the change was selected.

Changes made to dry temperature will return to the default setpoint after the laundry cycle is completed.

4. Press MENU SELECTION switch as follows:

   a. Select MODIFY WASH TEMP to change displayed setpoint in 5 degree increments until desired setpoint is displayed.
   b. Select MODIFY DRY TEMP to change displayed setpoint in 5 degree increments until desired setpoint is displayed.
   c. Select RETURN to accept changed setpoints. Return to step 2.

Laundry Cycle Operation

NOTE

A typical laundry cycle lasts 65–75 minutes. Once a laundry cycle starts, operation is automatic until the cycle is complete. When a continuous audible alarm sounds, this indicates that some type of operator action is required or the cycle is complete.

If a laundry cycle must be interrupted during operation follow the guidelines in INTRODUCTION TO TROUBLESHOOTING (WP 0017 00) for proper procedures for pausing.

To prevent still boil–overs, the control system will attempt to limit the still water level. This is done by **not** switching from the WASHING step to the DRAIN TO STILL until the still water level is low enough to accept the next drum load of water. This may result in the WASHING step being longer than the times listed for each cycle.

1. Monitor display (WP 0008 00, Figure 2, 6), it should read:

WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F FILL FROM WASH TANK	PAUSE EXAMINE INPUTS

2. Wait for laundry cycle to reach DRAIN TO STILL step.
3. When audible alarm (5) sounds, press SILENCE ALARM switch (4).
4. Monitor display (6), it should read:

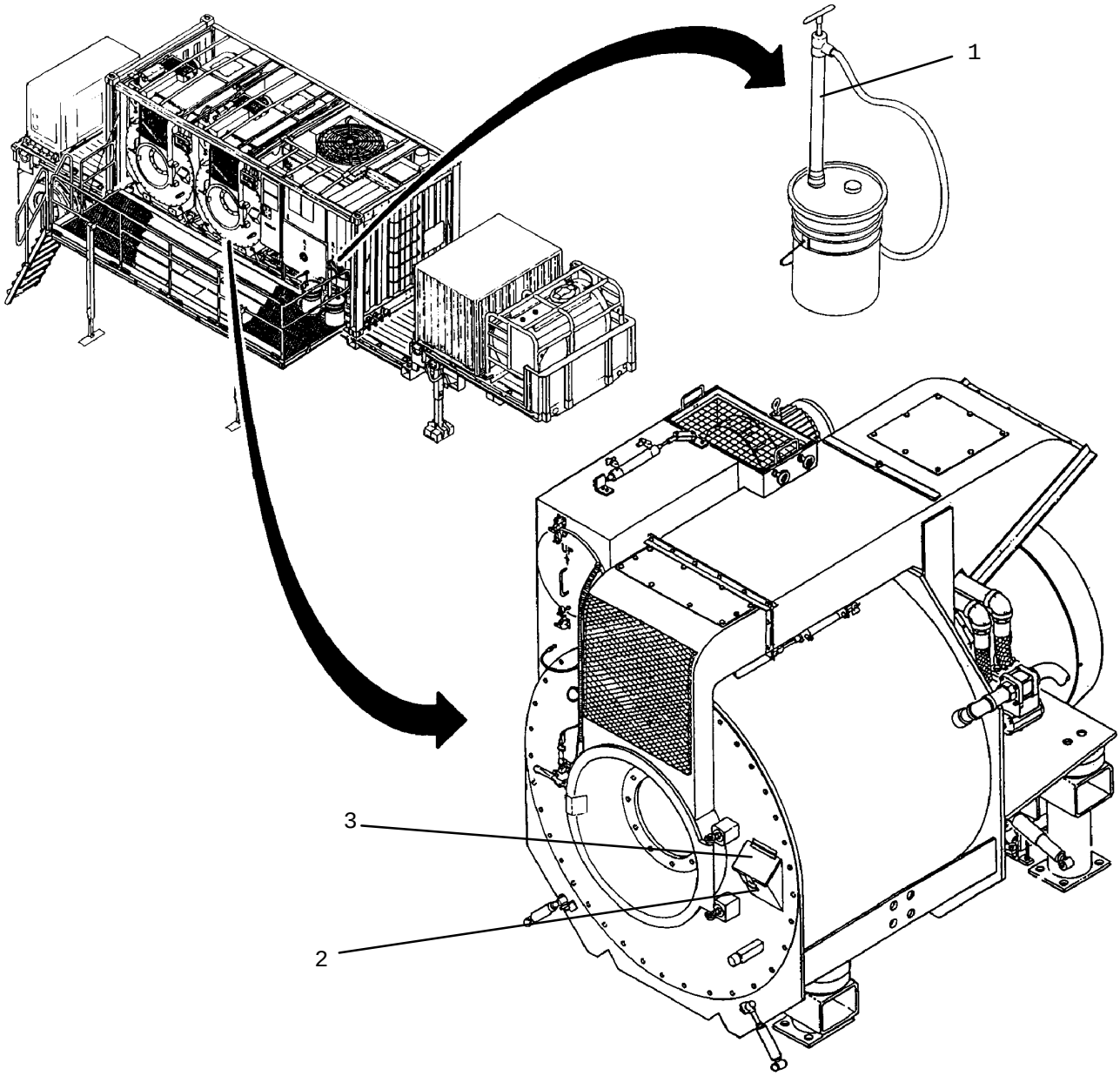
WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F DRAIN TO STILL ADD ANTI–FOAM	PAUSE EXAMINE INPUTS

5. Add one stroke of anti–foam with hand pump (1).
6. If FRS or sanitizer needs to be added proceed to step 7, otherwise proceed to **Unload Laundry** to complete laundry cycle.
7. When audible alarm (WP 0008 00, Figure 2, 5) sounds, press SILENCE ALARM switch (4).
8. Monitor display (6), it should read:

CYCLE PAUSED ADD FRS (or SANITIZER)	CONTINUE CYCLE

9. Unlock latch (2) and open lid (3).
10. Add FRS or sanitizer.
11. Close lid (3) and engage latch (2).
12. Press MENU SELECTION switch to continue cycle. Proceed to **Unload Laundry** to complete laundry cycle.

Laundry Cycle Operation – Continued.



Unload Laundry

NOTE

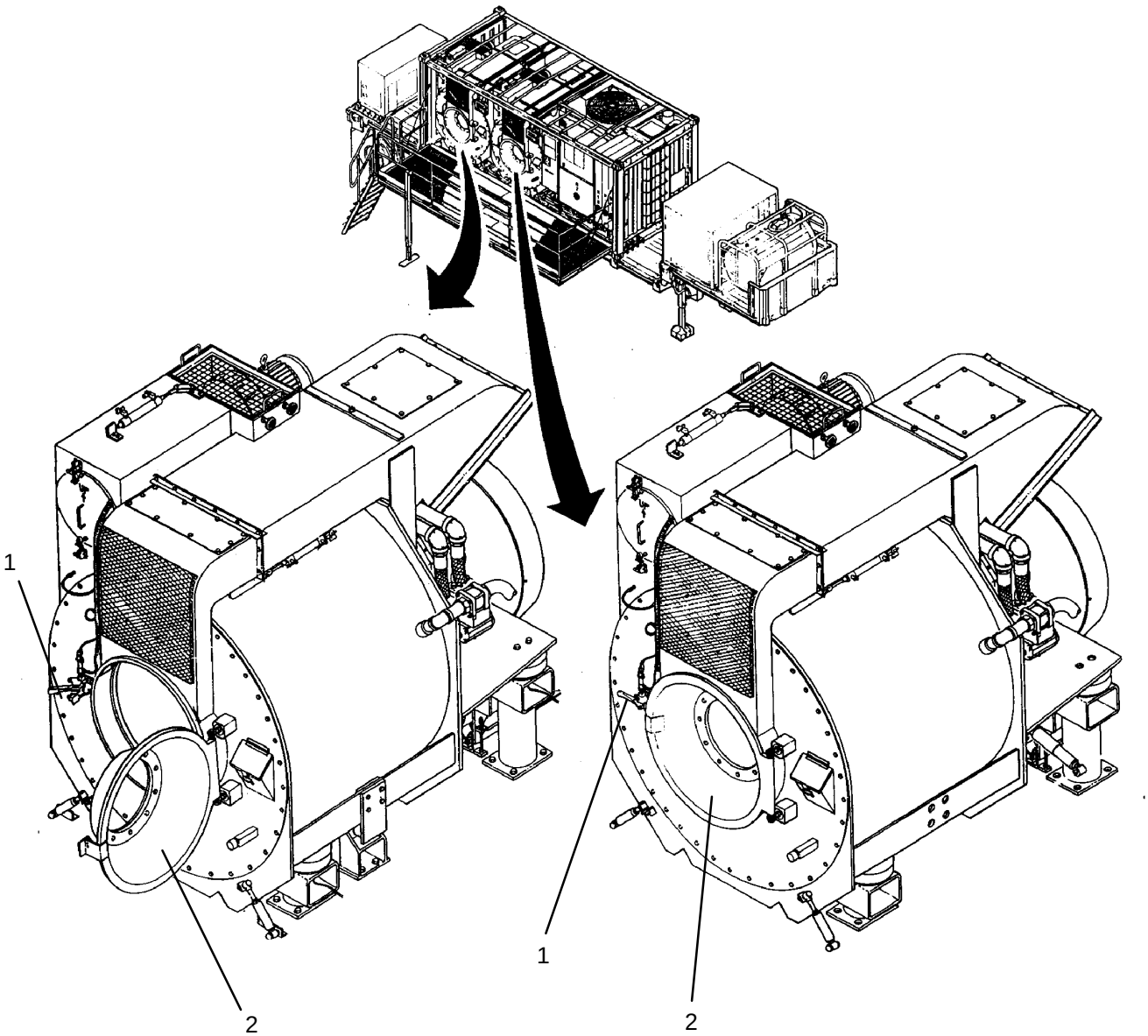
After laundry is unloaded it should be removed from the mesh bag as soon as possible. Laundry will be extremely wrinkled if left in mesh bags.

1. Wait for cycle to be completed. When audible alarm (WP 0008 00, Figure 2, 5) sounds, press SILENCE ALARM switch (4) on operator panel.
2. Monitor display (6), it should read:

CYCLE COMPLETE UNLOAD LAUNDRY	

Unload Laundry – Continued.

3. Pull out on handle (1) and open drum door (2).
4. Unload laundry.
5. Clean lint filter (WP 0039 00).
6. Perform additional laundry operations. After last laundry load is completed proceed to **System Shutdown**.



System Shutdown.

This procedure describes steps required to perform a normal system shutdown after daily laundry operations have concluded. If the LADS needs to be drained to change the water for sanitary reasons, dirty water, prevent over–night freezing, or in preparation for movement, refer to **DRAINING PROCEDURES** (WP 0013 00).

WARNING

Prior to removing power from the LADS a cooldown cycle must be run. This allows piping and system components to cool down to safe temperatures prior to performing AFTER PMCS procedures. Thermal fluid can reach temperatures near 400 degrees Fahrenheit while the heating system is operating. Failure to perform the cooldown procedure could result in personnel being exposed to hot fluids and external surfaces causing severe injury or death.

NOTE

Laundry cycle must be completed for system B before a cooldown cycle can be initiated.

1. Monitor display (WP 0008 00, Figure 2, 6) at operator panel A, it should read:

WASH CYCLE X WASH= XXX F DRY= XXX F SELECT CYCLE, TEMP, START	SELECT CYCLE MODIFY TEMPS START CYCLE

2. Press MENU SELECTION switch (7) to toggle through available cycles until COOLDOWN CYCLE is displayed.
3. Press MENU SELECTION switch (9) to start cooldown cycle.

NOTE

A normal cooldown lasts about 30 minutes. Once a cooldown cycle starts, operation is automatic until cycle is completed. When a continuous audible alarm sounds this indicates the cycle is complete.

4. Wait for cycle to be completed. When audible alarm (5) sounds, press SILENCE ALARM switch (5) on operator panel A.
5. Monitor display (6), it should read:

CYCLE COMPLETE PERFORM AFTER PMCS	

6. Perform **AFTER PMCS** (WP 0034 00).
7. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
8. Position MAIN DISCONNECT switch (1) to OFF and apply lock–out.
9. Discontinue operation of MEP–805A generator (TM 9–6115–644–10) or remove external power as required.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER USUAL CONDITIONS
DRAINING PROCEDURES

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

Personnel Required
Two Operators, One Supervisor

Materials/Parts

Equipment Conditions

Flushing Anti–Foam and Detergent Hand Pumps.

NOTE

Laundry cycles must be completed for systems A and B before a drain cycle can be initiated.

The procedures for draining the LADS to change dirty water, prevent over–night freezing, or in preparation for movement are the same except where noted.

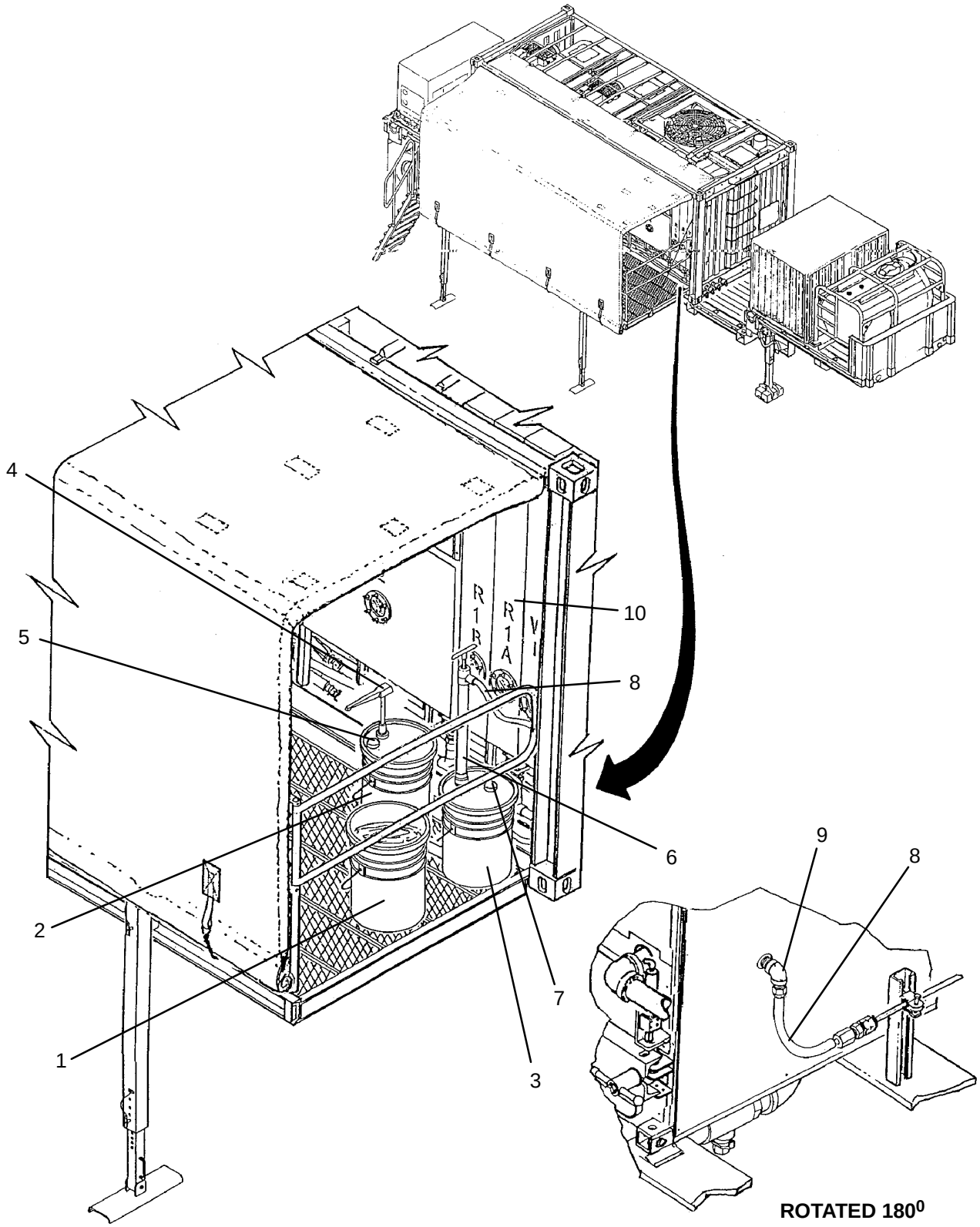
1. If the LADS is being drained to change dirty water, proceed to **Starting Drain Cycle**, otherwise continue to step

CAUTION

Failure to properly clean and flush anti–foam and detergent hand pumps can cause either solution to harden inside pumps and tubing. This will lead to pump and tubing damage and prevent the proper amount of solution from being added during follow on operations. Failure to flush water from pumps and tubing after cleaning can lead to freeze damage.

2. Fill a clean container (1) with 2–3 gallons of clean water.
3. Place water container (1) next to detergent container (2) and anti–foam container (3).
4. Remove hand pump (4) from detergent container (2) then place in water container (1).
5. Install cap (5) onto detergent container (2).
6. Stroke hand pump (4) to flush detergent out of pump. Continue stroking until detergent is completely flushed from hand pump.
7. Remove hand pump (4) from water conatiner (1) and stroke to flush water out of pump.
8. Stow hand pump (4) in tool box.
9. Remove anti–foam hand pump (6) from anti–foam container (3) then place in water container (1).
10. Install cap (7) onto anti–foam container (3).
11. Stroke hand pump (6) to flush anti–foam out of pump. Continue stroking until anti–foam is completely flushed from tubing (8) and water is visible at inlet to still (9).
12. Rinse anti–foam off of hand pump (6) then remove pump from water container (1).
13. Stroke hand pump (6) to flush water out of pump and tubing (8).
14. Stow hand pump (6) under water tank (10).
15. Remove detergent container (2) and anti–foam container (3) from platform.

Flushing Anti–Foam and Detergent Hand Pumps – Continued.



Starting Drain Cycle.

1. Monitor display (WP 0008 00, Figure 2, 6) at operator panel A, it should read:

WASH CYCLE X WASH= XXX F DRY= XXX F SELECT CYCLE, TEMP, START	SELECT CYCLE MODIFY TEMPS START CYCLE EXAMINE INPUTS

2. Press MENU SELECTION switch (7) to toggle through available cycles until DRAIN CYCLE is displayed.
3. Monitor display (6) at operator panel A, it should read:

DRAIN CYCLE WASH= XXX F DRY= XXX F SELECT CYCLE, TEMP, START	SELECT CYCLE MODIFY TEMPS START CYCLE EXAMINE INPUTS

4. Press MENU SELECTION switch (9) to start drain cycle.

NOTE

The control system will automatically perform a cooldown cycle when a drain cycle is initiated. A normal cooldown lasts about 30 minutes. Operation is automatic until the cooldown portion of drain cycle is complete. When a continuous audible alarm sounds this indicates the cooldown cycle is complete.

5. Wait for cooldown cycle to be completed. When audible alarm (5) sounds press SILENCE ALARM switch (4) on operator panel A.
6. Monitor display (6), it should read:

DRAIN CYCLE PAUSED PERFORM AFTER PMCS	CONTINUE CYCLE EXAMINE INPUTS

7. Perform **AFTER PMCS** (WP 0034 00). When cleaning still, do not add anti–foam if the LADS is not going to be refilled with water.

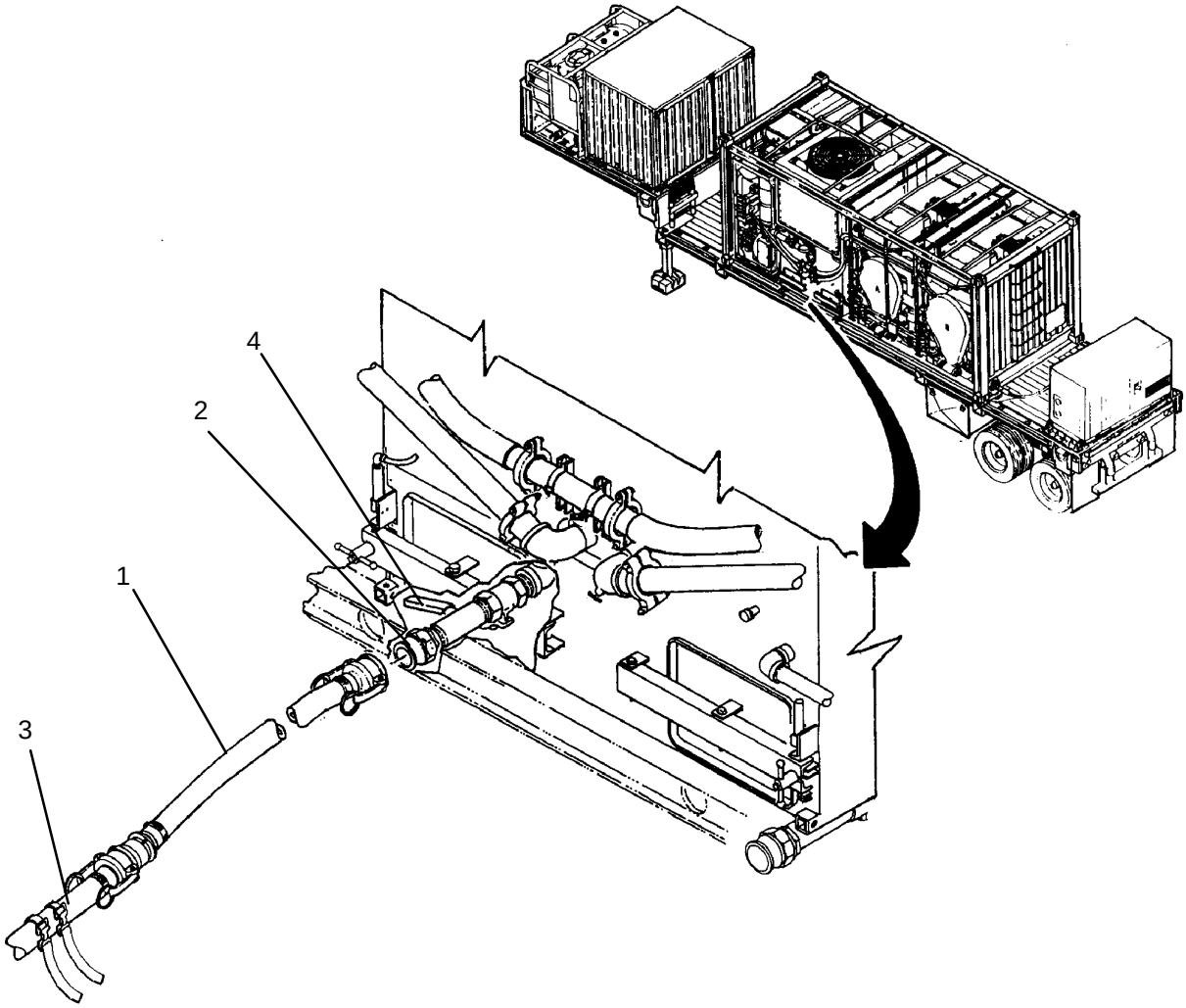
Continuing Drain Cycle.

1. Connect 5 ft drain hose (1) to drain port (2).
2. Connect 50 ft drain hose (3) to 5 ft drain hose (1).
3. Route 50 ft drain hose (3) out to drain area approved for waste disposal. If necessary attach a second 50 ft drain hose.
4. Open drain valve (4) where hose (1) is connected.
5. Monitor display (WP 0008 00, Figure 2, 6), it should read:

DRAIN CYCLE	CONTINUE CYCLE EXAMINE INPUTS

6. Press MENU SELECTION switch (7) to continue drain cycle.

Continuing Drain Cycle – Continued.



NOTE

The control system will automatically drain water tanks. This will take about 15 minutes. When a continuous audible alarm sounds this indicates the water tanks are drained.

7. Wait for water tanks to drain. When audible alarm (5) sounds, press SILENCE ALARM switch (4) on operator panel A.
8. Monitor display (6), it should read:

CYCLE PAUSED	CONTINUE CYCLE
OPEN DRAINS, REMOVE CAPS	EXAMINE INPUTS

9. If draining the LADS to change water in tanks, proceed to **System Shutdown**, otherwise continue to **Completing Drain Cycle**.

Completing Drain Cycle

1. Shut–off water flow from water supply container (1).
2. Disconnect 50 ft water hose (2) at water supply port (3).
3. Close manual valve (4) on air system only if draining in preparation for movement.
4. Drain residual water from the LADS plumbing as follows:
   a. Remove four caps (5) from water manifolds (6).
   b. Open manual valves (7) on both water pumps (8).
   c. Open manual valve (9) on distillate pump (10).
   d. Open manual valve (11) on first–stage pre–filter (12).
   e. Open manual valve (13) at outlet to coalescer (14).
   f. Open eight manual valves (15) on subcooler (16).
   g. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to continue drain cycle.

NOTE

The control system will wait several minutes to allow residual water to drain. The control system will then automatically open and close all control valves several times to complete the drain cycle. This will take about 5 minutes. When a continuous audible alarm sounds this indicates the drain cycle is complete.

   h. Wait for residual water to drain. When audible alarm (WP 0008 00, Figure 2, 5) sounds press SILENCE ALARM switch (4) on operator panel A.
   i. Monitor display (6), it should read:

CYCLE COMPLETE SHUTDOWN	

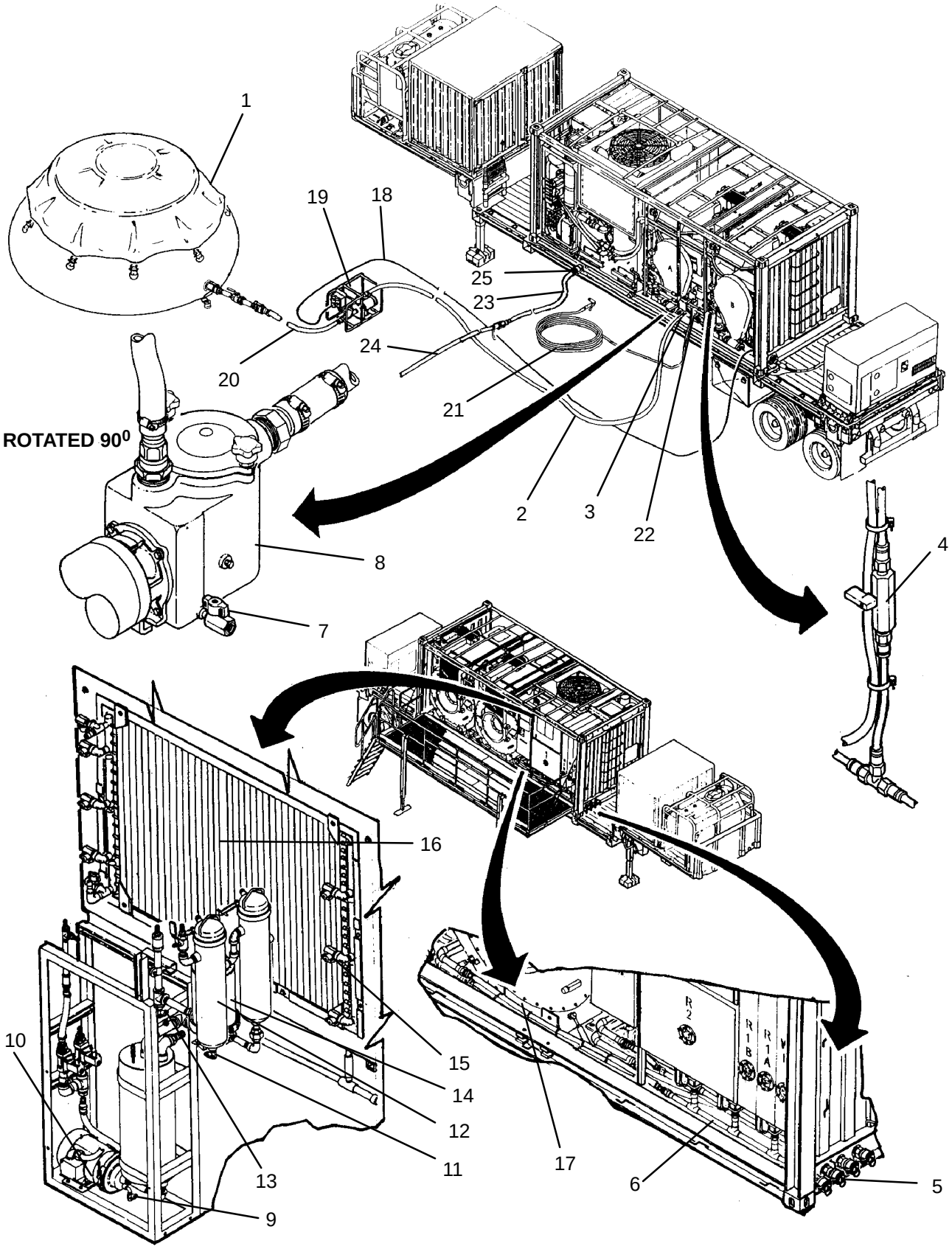
   j. Lift up on hoses (17) to allow water to drain towards water manifolds (6).

CAUTION

All manual valves that were opened for draining should be left open during transport. Closing manual valves may allow residual water to flow around during movement, fill–up an area of plumbing, and cause freeze damage.

   k. Install four caps (5). Leave all manual drain valves open.
5. Drain residual water from water supply plumbing as follows:
   a. Disconnect electrical cable (18) from water supply pump (19).
   b. Disconnect 10 ft water supply hose (20) from water supply pump (19).
   c. Disconnect 50 ft water supply hose (2) from water supply pump (19).
   d. Disconnect utility hose (21) from shut–off valve (22).
   e. Drain water from water supply pump (19) and water hoses (2, 20, and 21).
6. Drain residual water from drain plumbing as follows:
   a. Disconnect 5 ft drain hose (23) from 50 ft drain hose (24).
   b. Disconnect 5 ft drain hose (23) from drain port (25).
   c. Drain water from hoses (23 and 24).

Completing Drain Cycle – Continued.



System Shutdown.

1. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
2. Position MAIN DISCONNECT switch (1) to OFF.
3. Push in on EMERGENCY STOP switch (5) only if preparing for movement.
4. Discontinue operation of MEP–805A generator (TM 9–6115–644–10) or remove external power as required.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER USUAL CONDITIONS
PREPARATION FOR MOVEMENT

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

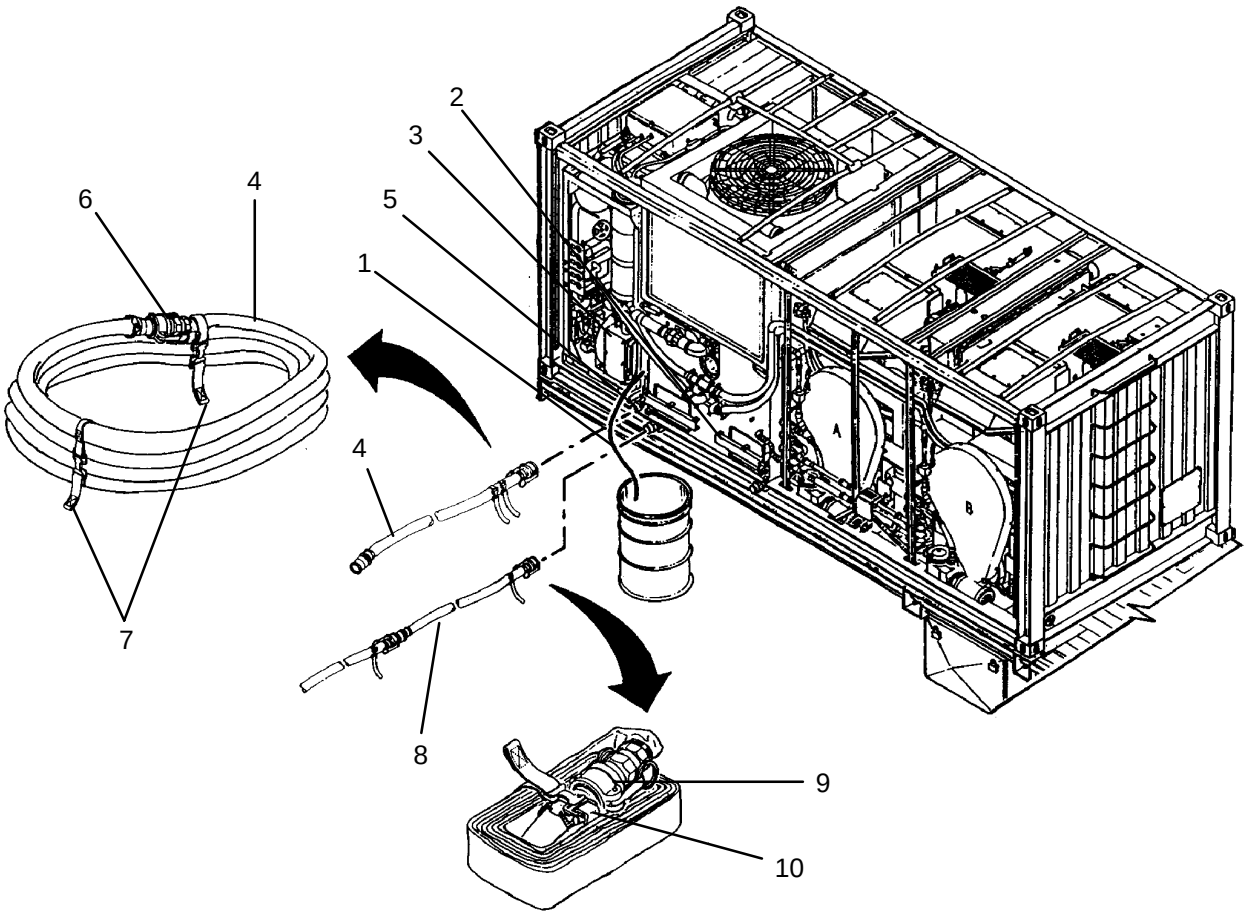
Personnel Required
Two Operators, One Supervisor

Materials/Parts

Equipment Conditions

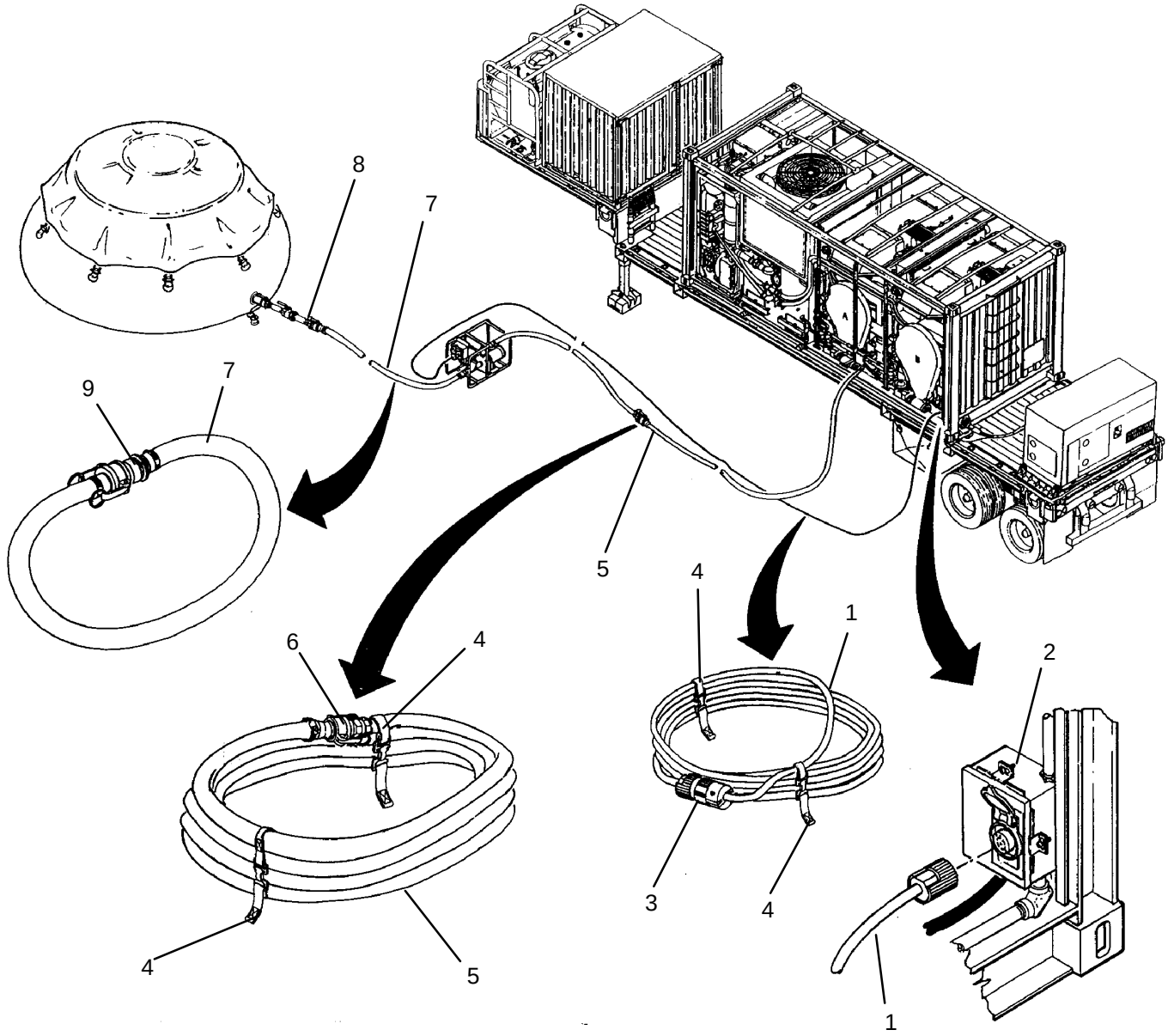
Disconnect Water Drain.

1. Stow coalescer drain tube (1) between still (2) and heater (3).
2. Disconnect 50 ft drain hose (4) from drain port (5).
3. Roll up 50 ft drain hose (4) as follows:
   a. Roll up hose (4) small enough to fit into drum.
   b. Connect end fittings (6) together.
   c. Install two straps (7).
4. Disconnect two 50 ft drain hoses (8) from each other.
5. Roll up 50 ft drain hoses (8) as follows:
   a. Roll up hose (8) as tight as possible.



Disconnect Water Supply.

1. Disconnect electrical cable (1) at junction box (2).
2. Roll up electrical cable (1), connect end connections (3) together, then install two straps (4).
3. Disconnect two 50 ft water supply hoses (5) from each other.
4. Roll up each 50 ft water supply hose (5) as follows:
   a. Roll up hose (5) small enough to fit into drum.
   b. Connect end fittings (6) together.
   c. Install two straps (4).
5. Disconnect 10 ft water supply hose (7) at water supply (8).
6. Connect end fittings (9) on hose (7) together.



Lower Drums.

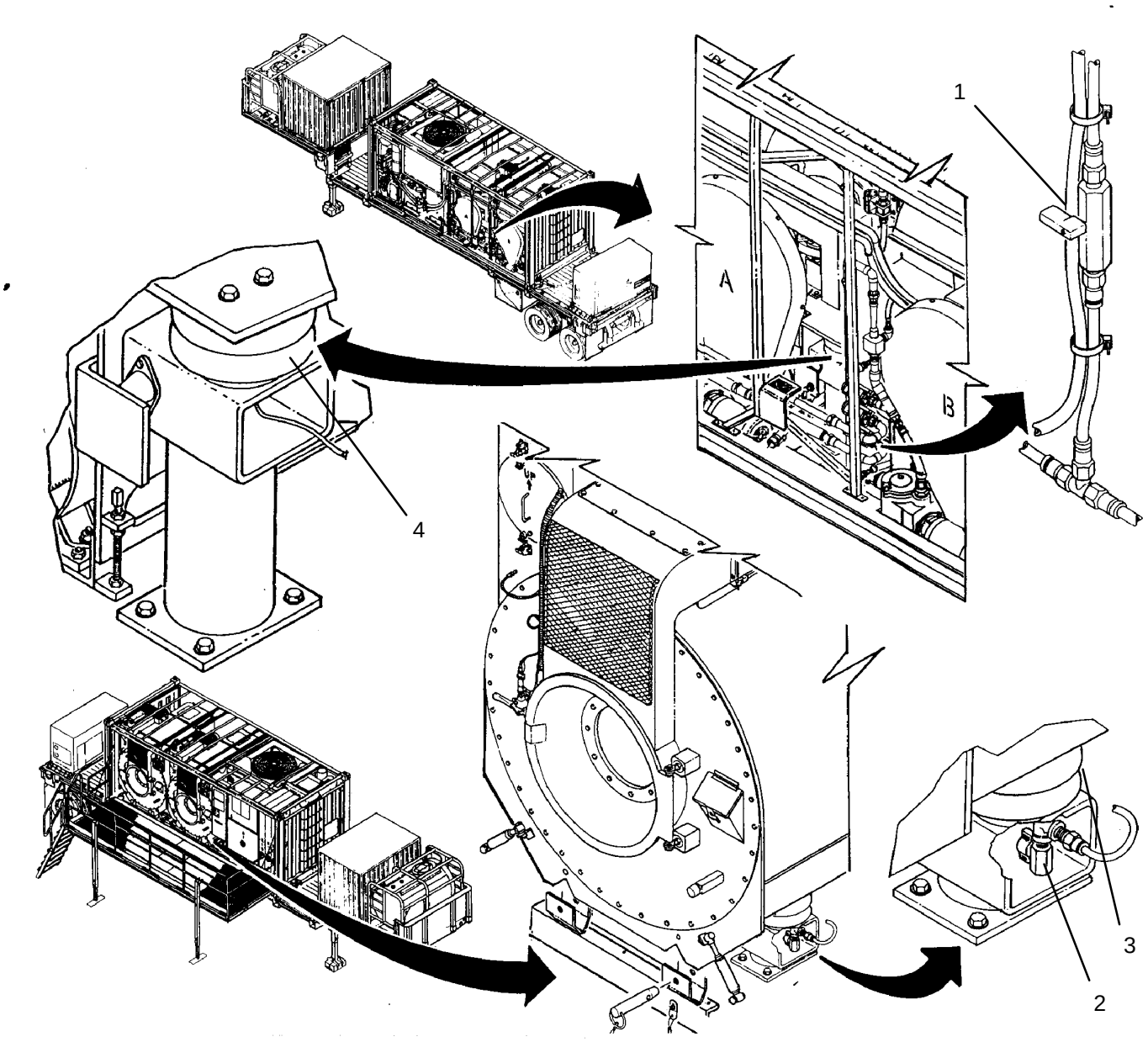
WARNING

Keep hands and feet clear of drums bottoms when venting air bags. Failure to follow this precaution could result in severe personal injury.

NOTE

In order for drums to rest properly on ISO frame, air pressure must be vented from front air bags before air pressure is vented from rear air bags.

1. Verify manual valve (1) is closed.
2. Open four manual valves (2) under four front air bags (3).
3. Wait for air pressure to vent from front air bags (3) then open manual valve (1).
4. Wait for air pressure to vent from rear air bags (4) then close manual valves (2).



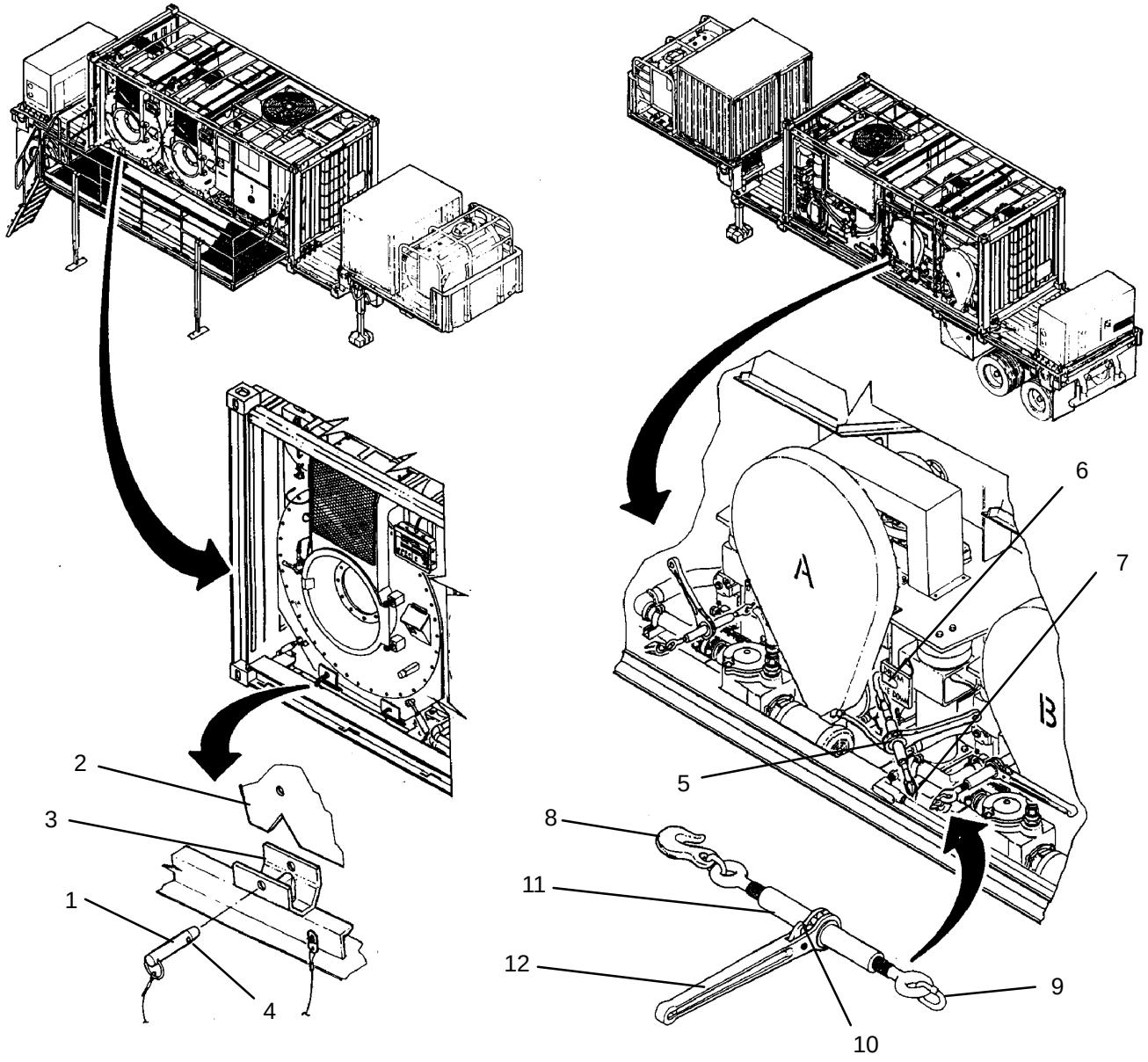
Secure Drums.

1. Insert four pins (1) to secure front of drums (2) to ISO frame (3).
2. Rotate pins (1) as necessary to ensure ball (4) is contacting ISO frame (3).

CAUTION

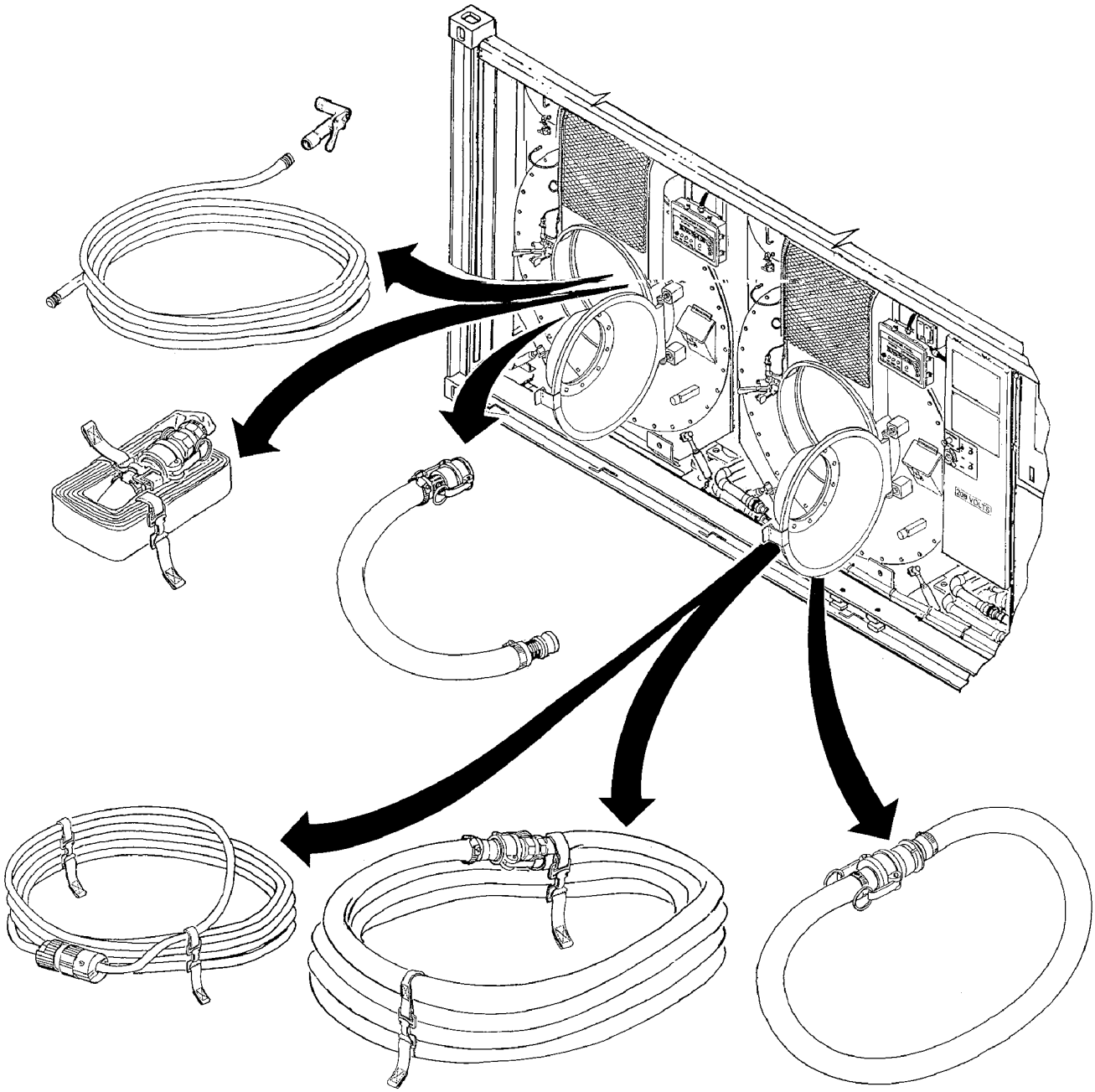
Load binders only need to be tightened until all slack is removed between hook points. Over or Under–tightening load binders can cause drums to shift, causing difficulty when removing load binders and front pins during set–up.

3. Install four load binders (5) at hook points (6) and (7) as follows:
   a. Attach hook (8) to hook point (6).
   b. Thread eye (9) in or out as necessary then attach to hook point (7).
   c. Position catch (10) to tightening position then rotate barrel (11) to hand–tighten load binder.
   d. Use handle (12) to tighten load binder until all slack is removed from hook point (6) to hook point (7).



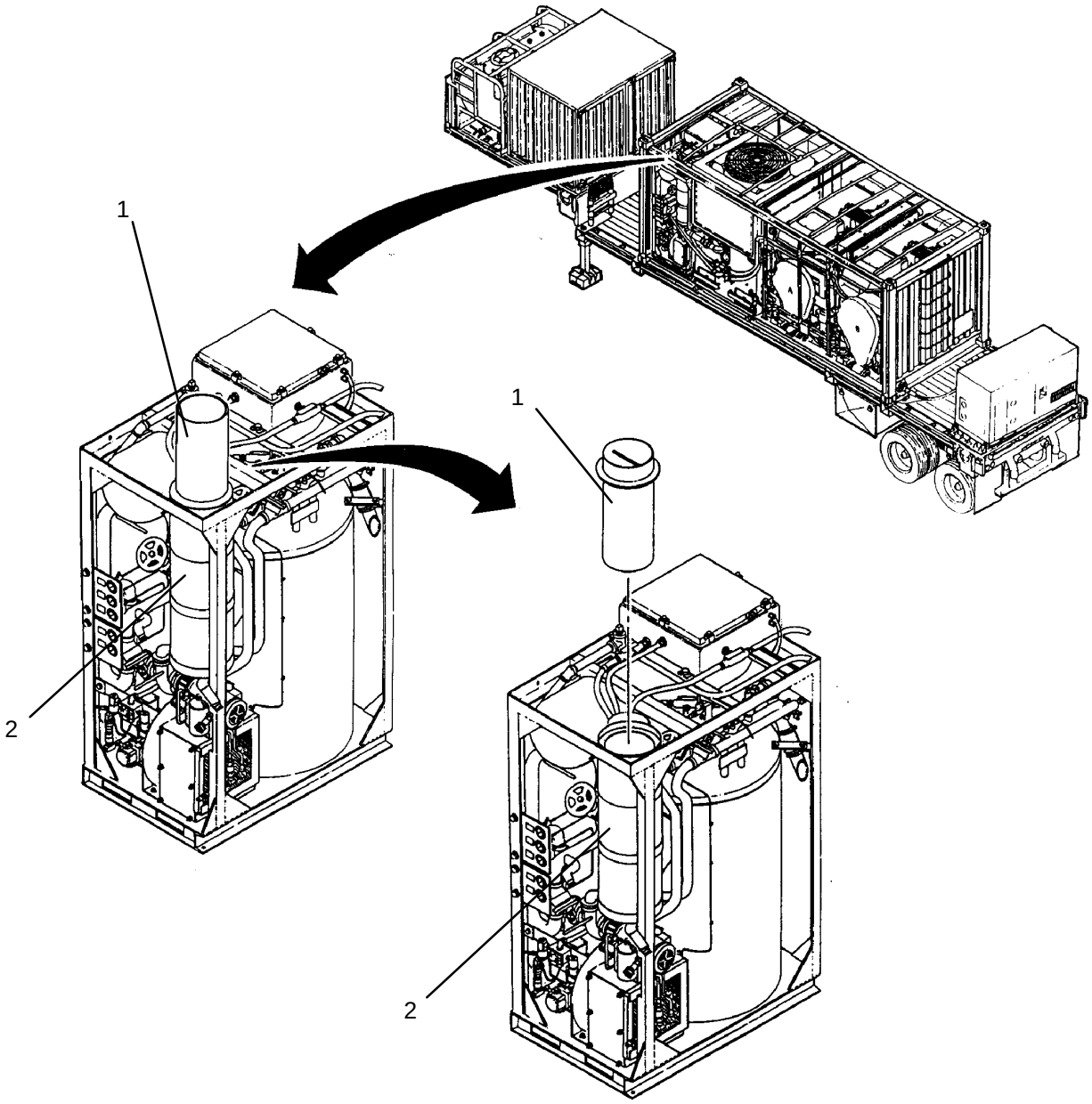
Stow Equipment in Drums

1. Pull out on handles (1) and open doors (2).
2. Stow items in drum A (3) as follows:
   a. 10 ft water supply hose, qty 1
   b. 50 ft water supply hoses, qty 3
   c. 100 ft electrical cable, qty 1
3. Stow items in drums B (4) as follows:
   a. 5 ft drain hose, qty 1
   b. 50 ft drain hoses, qty 2
   c. Utility hose, qty 1
   d. Spray nozzle, qty 1
4. Close drum doors (2) then push in on handles (1) to lock doors.
5. Ensure sluice lids (5) are closed and latches (6) are engaged.



Stow Exhaust Duct

1. Pull exhaust duct extension (1) up out of exhaust stack (2).
2. Flip exhaust duct extension (1) over and place inside exhaust stack (2).



Disconnect Fuel Supply

WARNING

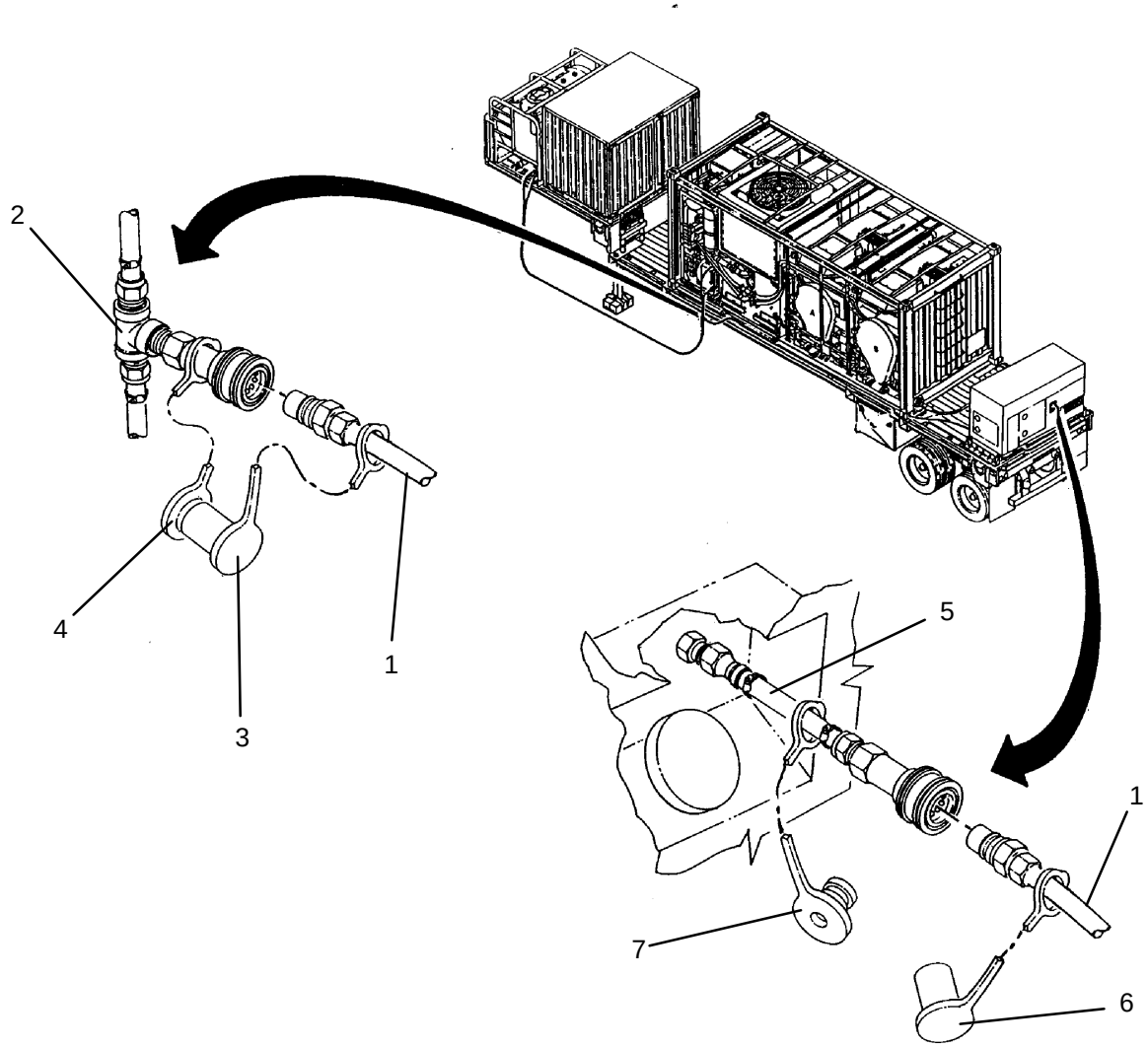
The fuel, JP–8 or DF–2, used in the LADS is a combustible liquid. Vapors and liquids may ignite or explode. Do not smoke or use open flames when disconnecting fuel hoses. Flames and fire can occur resulting in severe burns, personal injury, or death.

CAUTION

Hose(s) connections must not be left uncovered when stowed. Dirt or other contamination on connections can cause damage to heater fuel system.

Do not store fuel hoses inside drums. Fuel leaking into drums will contaminate the water plumbing and cause an odor in laundry during subsequent operations.

1. Determine what fuel connection set–up was used during operation. If the LADS was connected to fuel tank on the M871A3 trailer, follow steps 2 through 12. If the LADS was connected to another external fuel supply follow steps 2 through 9 and 13 through 16.
2. Disconnect fuel hose (1) from fuel hose (2).
3. Install cap (3) on fuel hose (1) and dust plug (4) on fuel hose (2).
4. Disconnect fuel hose (1) from adapter (5).
5. Install cap (6) on fuel hose (1) and plug (7) on adapter (5).
6. Roll up fuel hose (1).

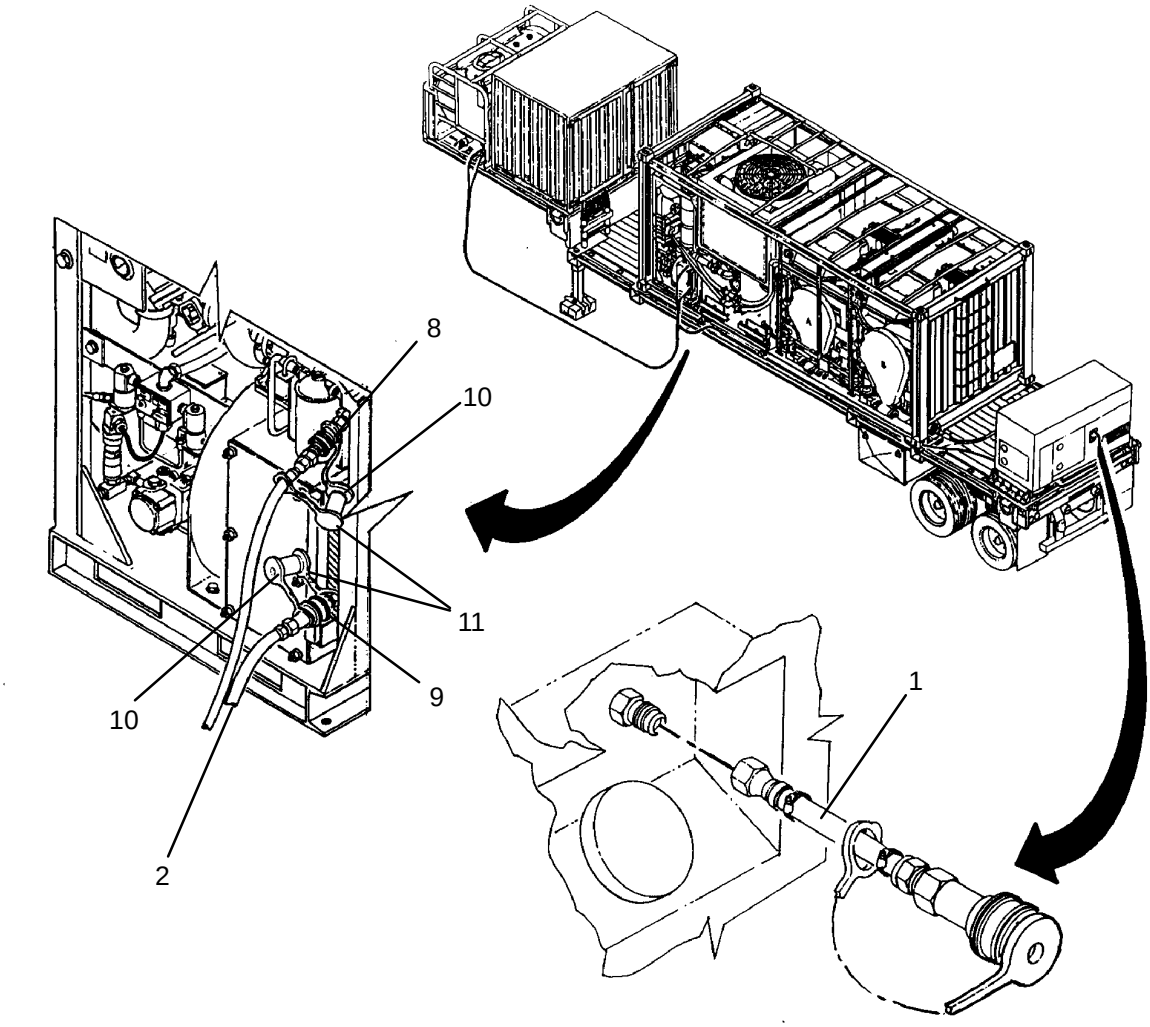


Disconnect Fuel Supply – Continued

CAUTION

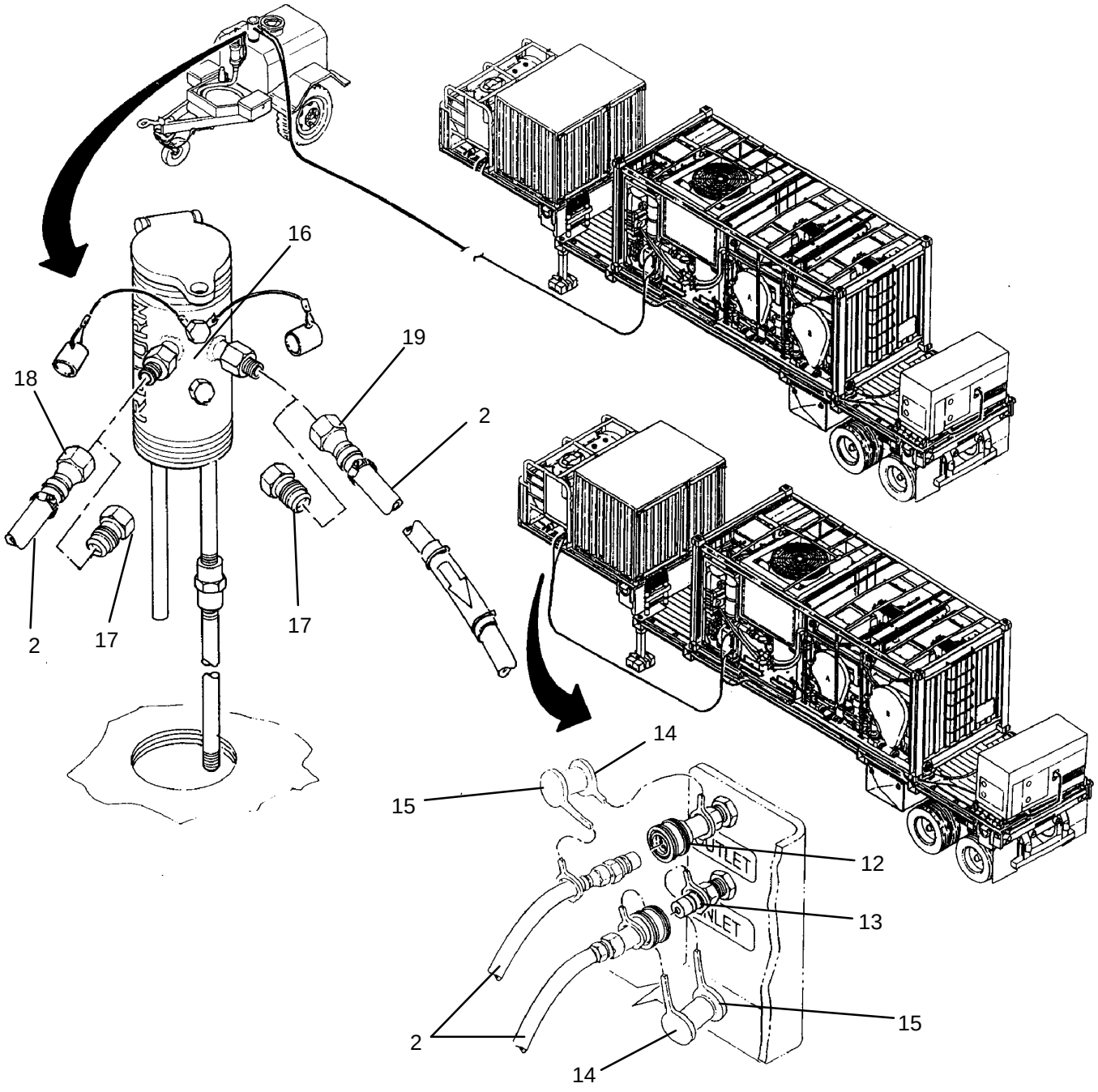
Do not reconnect adapter to fuel hose once it has been removed from generator. Making connection to hose will release internal shutoff in quick–connect fitting causing all fuel trapped inside hose to leak out.

7. Disconnect adapter (1) from MEP–805A generator (TM 9–6115–644–10).
8. Disconnect fuel hose (2) at heater connections (8 and 9).
9. Install dust plugs (10) and caps (11) onto fuel hose (2) and heater connections (8 and 9).



Disconnect Fuel Supply – Continued

10. Disconnect fuel hose (2) at fuel tank connections (12 and 13).
11. Install dust plugs (14) and caps (15) onto fuel hose (2) and fuel tank connections (12 and 13).
12. Roll up fuel hose (2). Proceed to **Disconnect Electrical Power Source**.
13. Roll up fuel hose (2) while draining fuel back into fuel supply.
14. Disconnect fuel hose (2) at fuel probe (16).
15. Install plugs (17) onto fuel hose end fittings (18 and 19).
16. Remove fuel probe (16) from fuel supply.

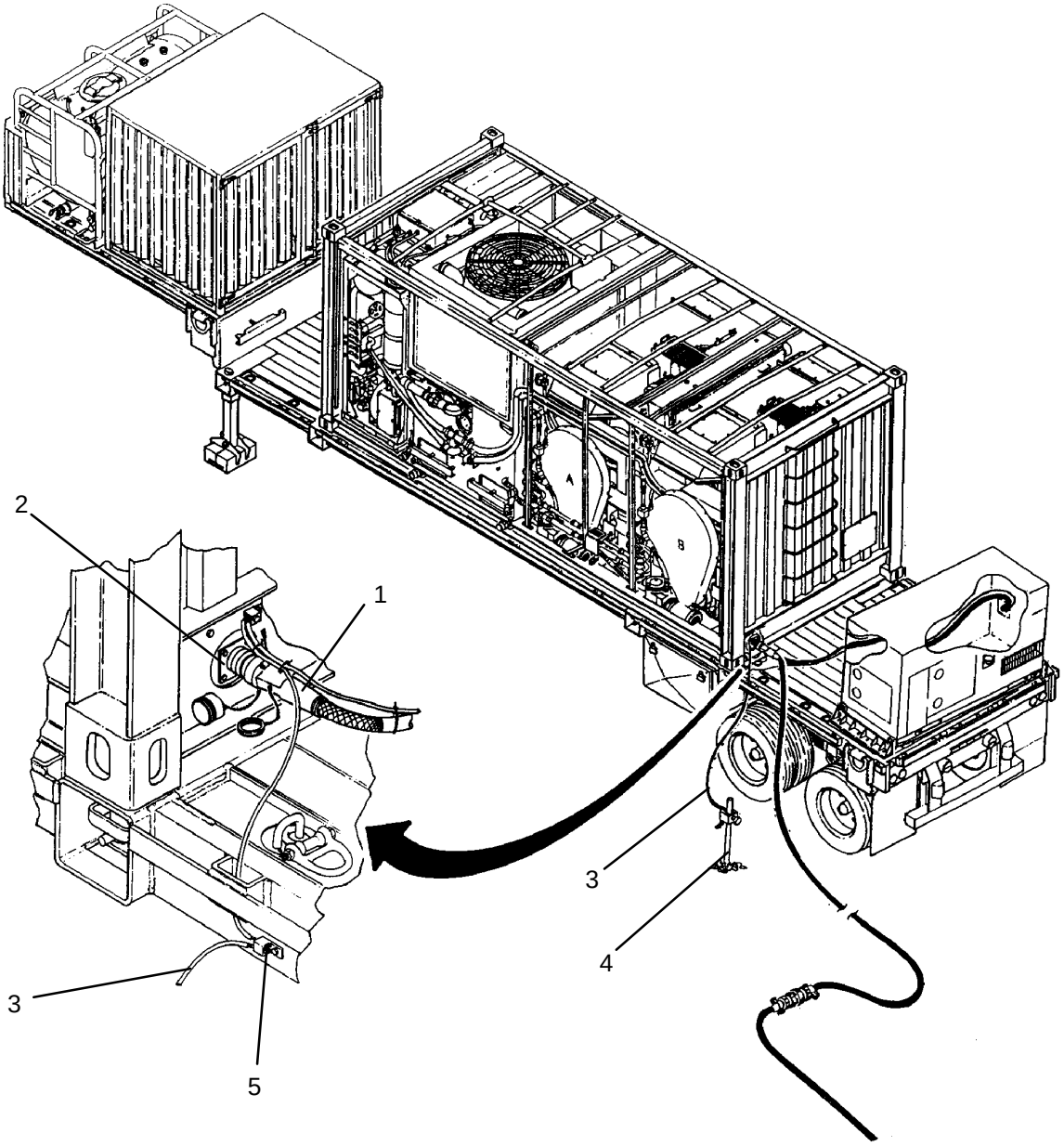


Disconnect Electrical Power Source

WARNING

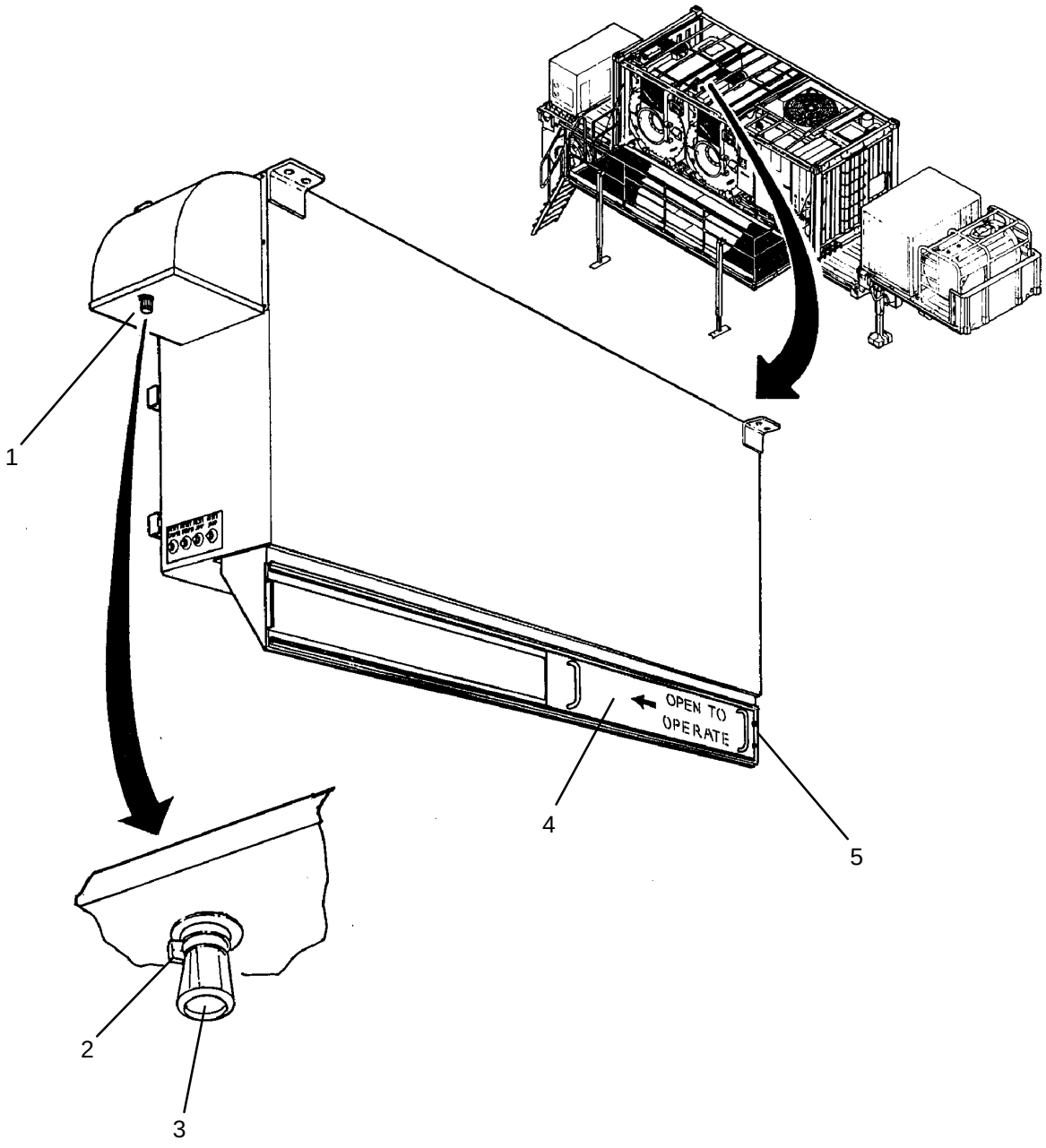
Master power must be shut off before disconnecting the LADS power cable. Be careful not to contact high–voltage connections. Whenever possible, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body. Failure to follow this warning may result in personnel injury or death.

1. Determine what power source was used to operate the LADS. If the MEP–805A generator was used proceed to step 3, otherwise continue to step 2.
2. Disconnect power cable (1) at junction box (2).
3. Disconnect grounding wire (3) from grounding rod (4) and grounding lug (5).
4. Pull grounding rod (4) out of ground. Clean grounding rod after removal.
5. Stow grounding wire (3) and grounding rod (4) on MEP–805A generator (TM 9–6115–644–10).



Secure Inverter Air Flow Doors

1. Close air outlet door (1) then rotate latch (2) to lock door in place.
2. Tighten knob (3).
3. Close air inlet door (4) and fully seat with lip seal (5).



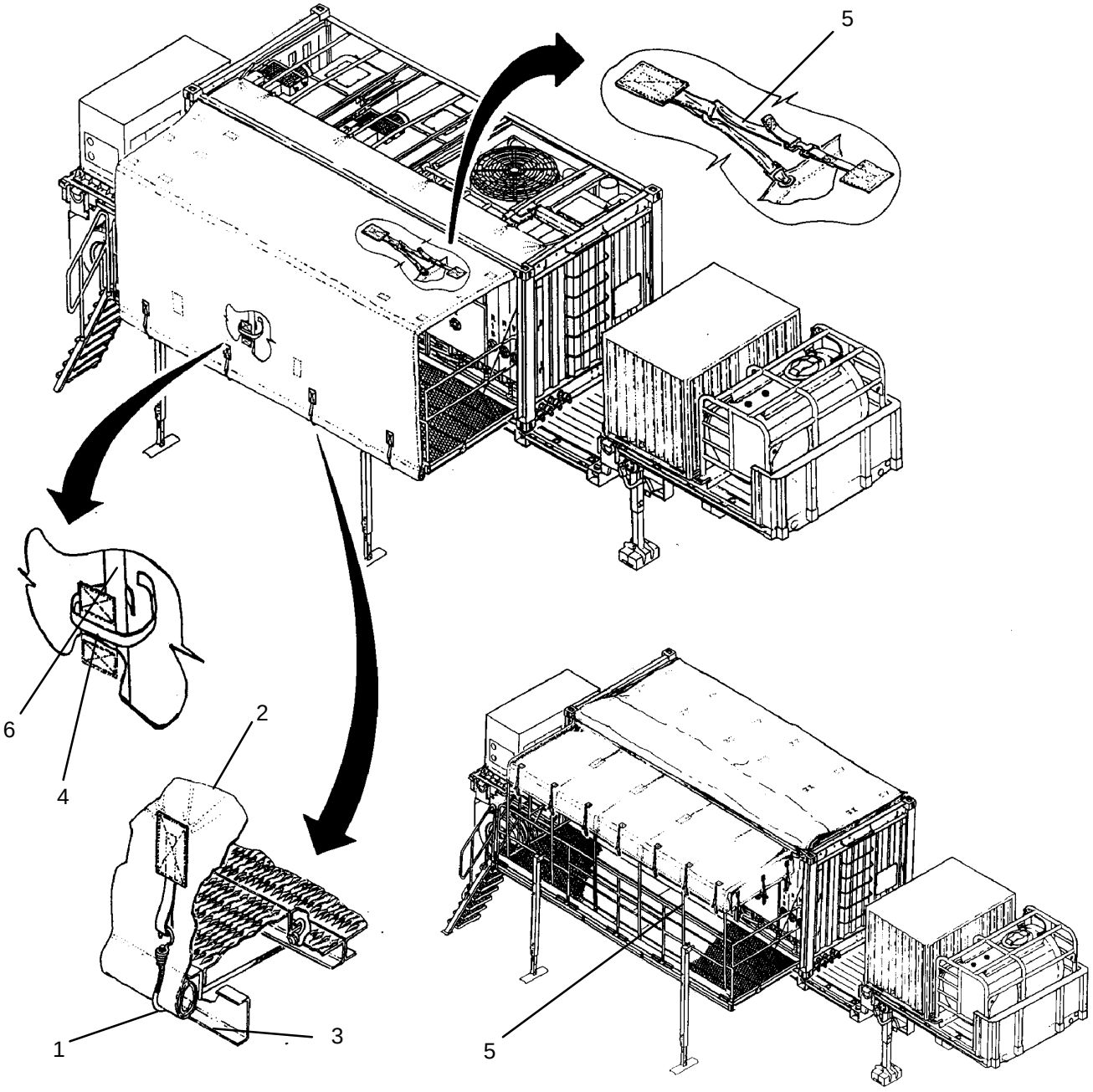
Take Down Awning

1. Determine what awning set–up was used. If awning was completely deployed follow steps 2 through 8. If awning was partially deployed follow steps 5 through 8. If awning was stowed on top of the LADS proceed to **Stow Main and Side Railings**.
2. Remove bungee cords (1) securing tarp (2) to underside of platform (3). Stow bungee cords in tool box.

WARNING

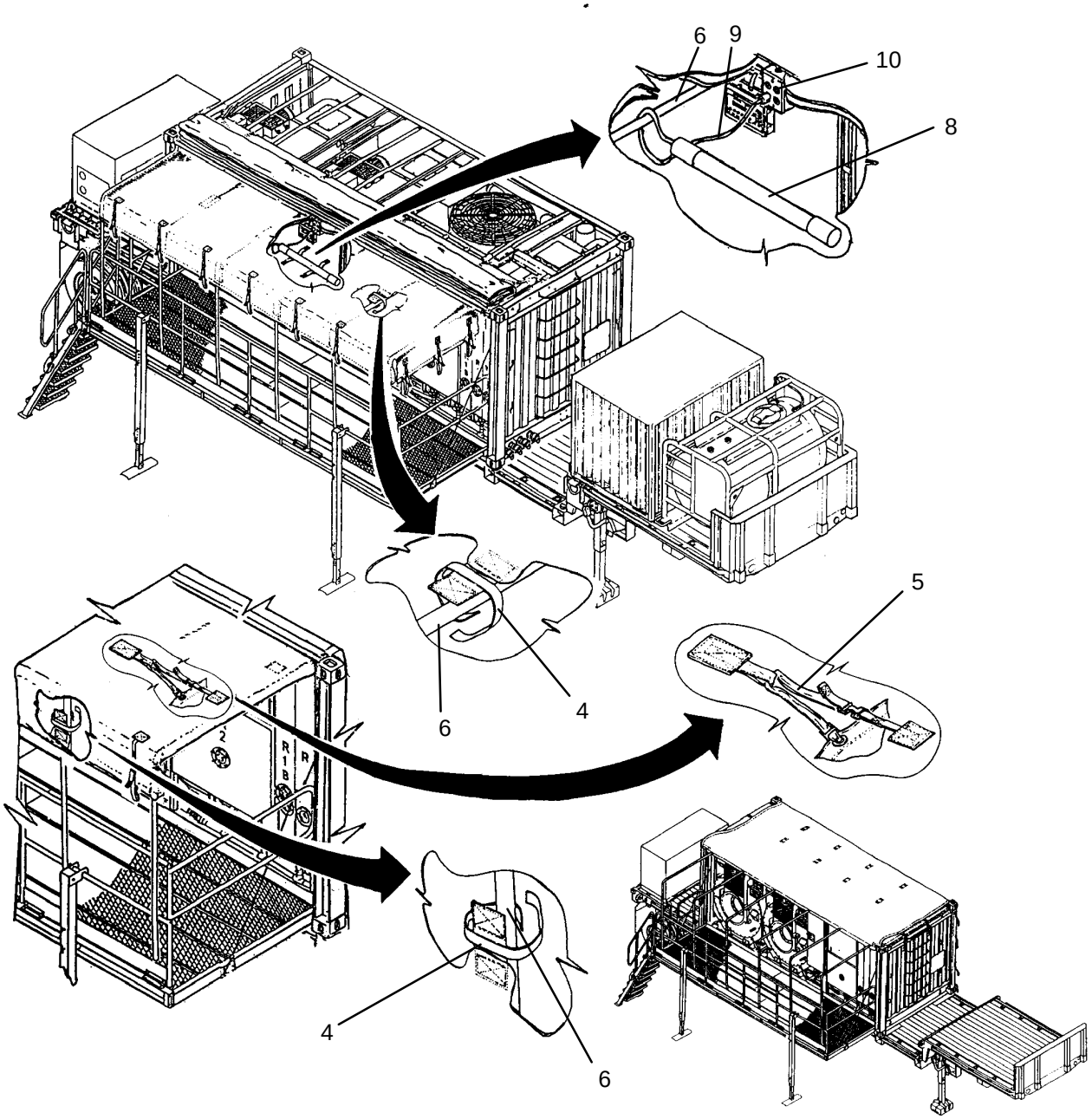
Awning extension and awning supports are designed to support the awning/tarp only. Do not step on or hang from these items. Failure to follow this precaution may result in equipment damage and personal injury.

3. Unfasten straps (4 and 5) securing underside of tarp (2) to awning supports (6). Stow straps (4) in tool box.
4. Flip back section of tarp (2) over and lay on top of the LADS.



Take Down Awning – Continued

5. Unfasten straps (4 and 5) securing underside of tarp (2) to awning supports (6) and main railing (7). Stow straps in tool box.
6. Remove light (8), if installed, from underside of tarp (2) as follows:
   a. Disconnect electrical cable (9) at receptacle (10).
   b. Pull electrical cable (9) out from between tarp (2) and awning supports (6).
   c. Unfasten straps (11) securing light (8).
   d. Stow light (8).
7. Flip front section of tarp (2) over and lay on top of the LADS.

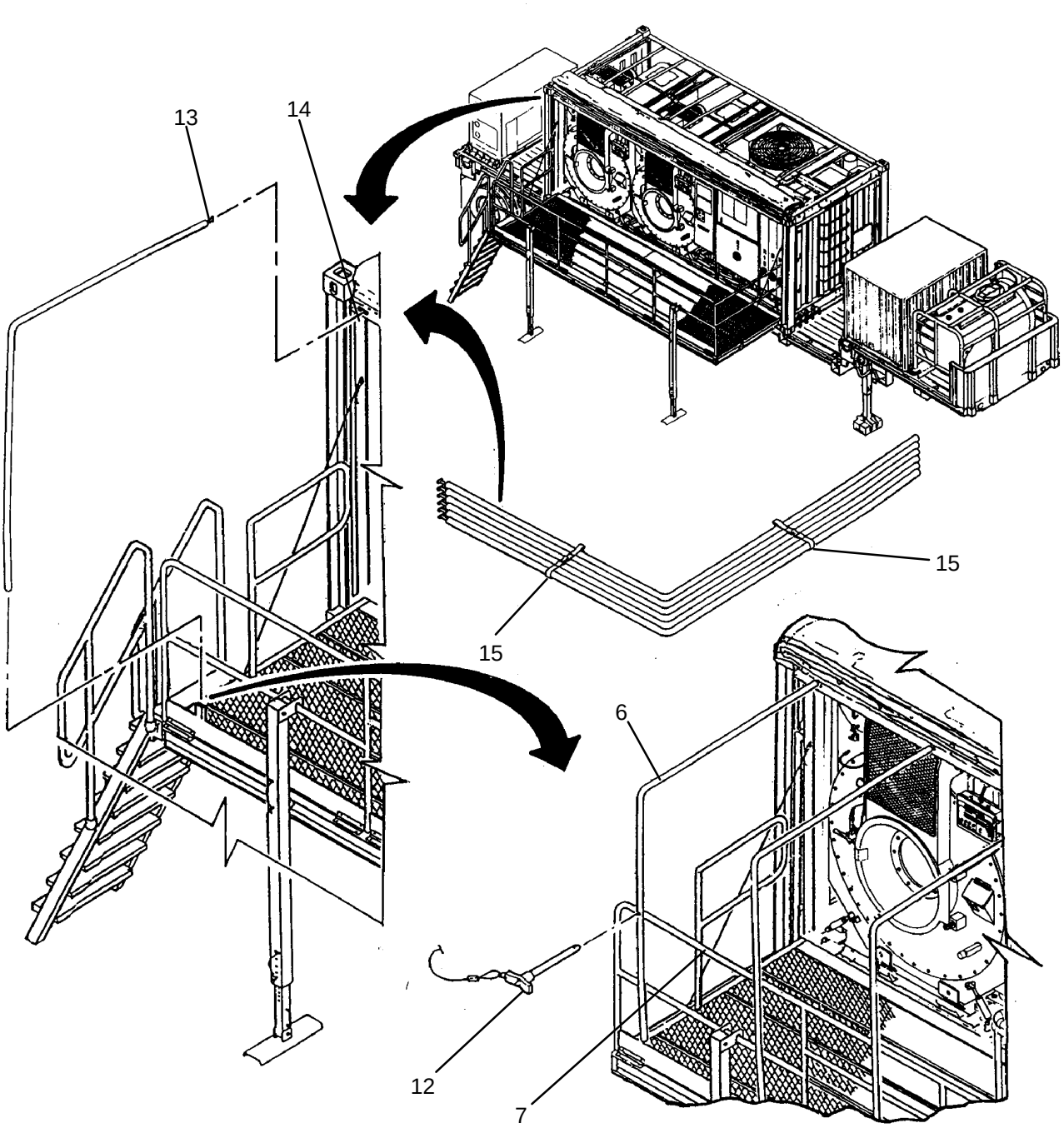


Take Down Awning – Continued

CAUTION

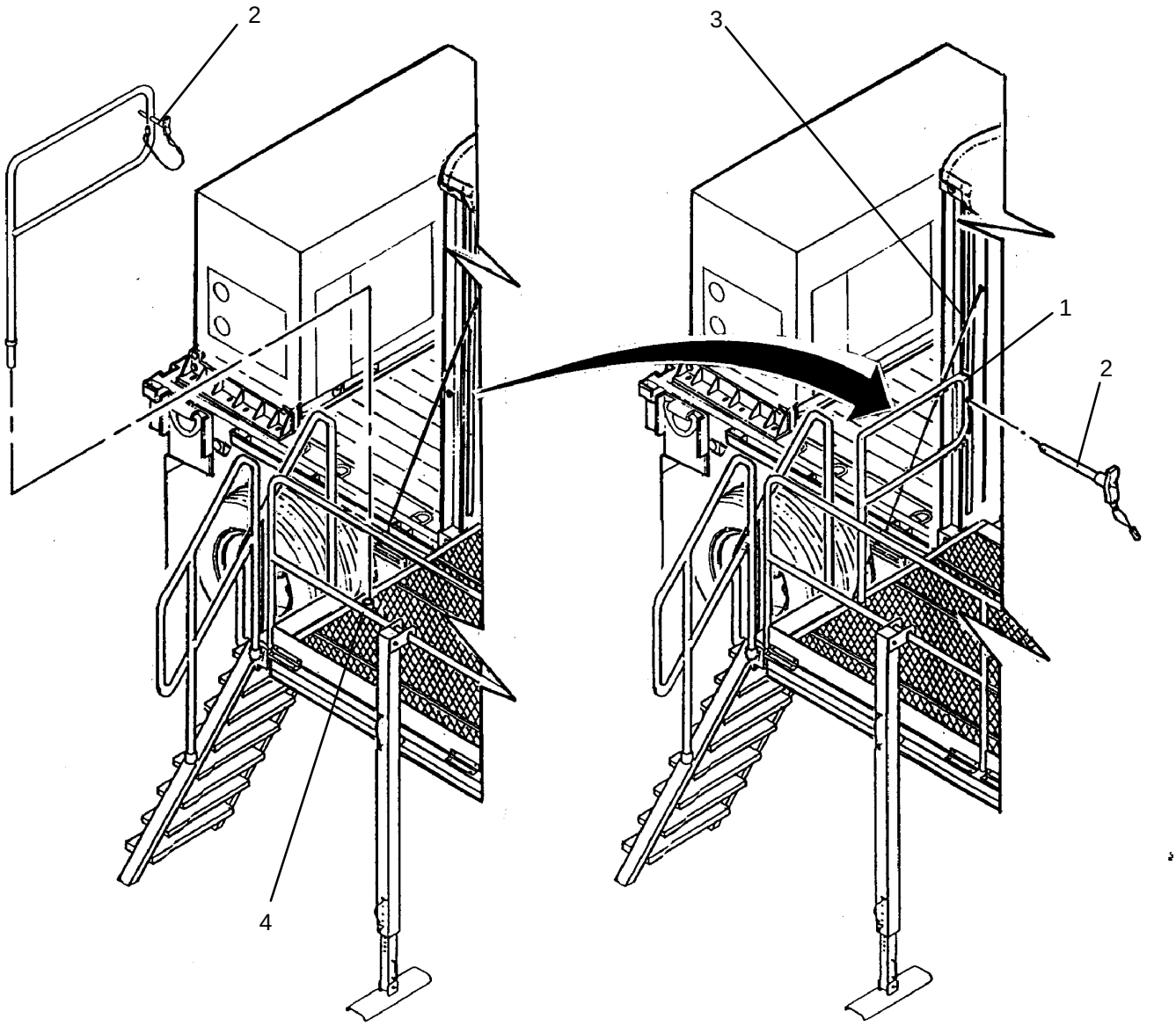
Quick–connect pins must be properly stowed. Loose pins can get caught in platform as it is raised causing damage to pins and platform during lowering operations.

8. Remove six awning supports (6) as follows:
   a. Pull quick–connect pins (12) securing awning support (6) to main railing (7).
   b. Lift each awning support (6) then rotate upward to unhook t–bolt (13) from front support (14).
   c. Stack awning supports (6) and secure together with straps (15).
   d. Install six quick–connect pins (12) into top holes on main railing (7).



Stow Main and Side Railings

1. Remove side railing (1) as follows:
   a. Pull quick–connect pin (2) out of side railing (1) and ISO frame (3).
   b. Lift side railing (1) out of hole in platform (4).
   c. Install quick–connect pin (2) into side railing (1).

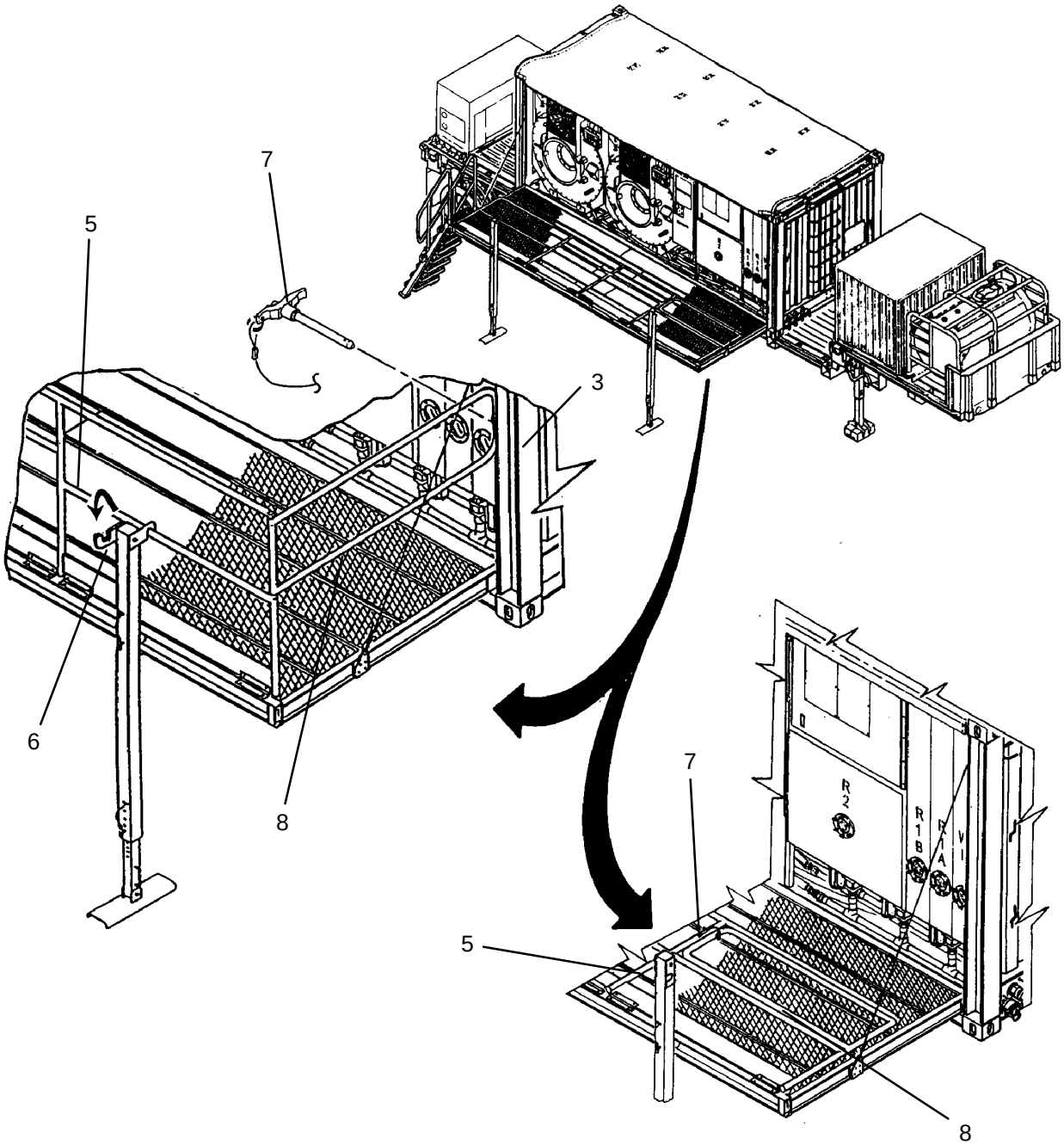


Stow Main and Side Railings – Continued

CAUTION

Quick–connect pins must be properly stowed. Loose pins can get caught in platform as it is raised causing damage to pins and platform during lowering operations.

2. Lower and stow main railing (5) as follows:
   a. Flip four support brackets (6) off of main railing (5).
   b. Pull quick–connect pin (7) out of gate (8) and ISO frame (3).
   c. Swing gate (8) inside of main railing (5) then secure with quick–connect pin (7).
   d. Lower main railing (5) to horizontal position.

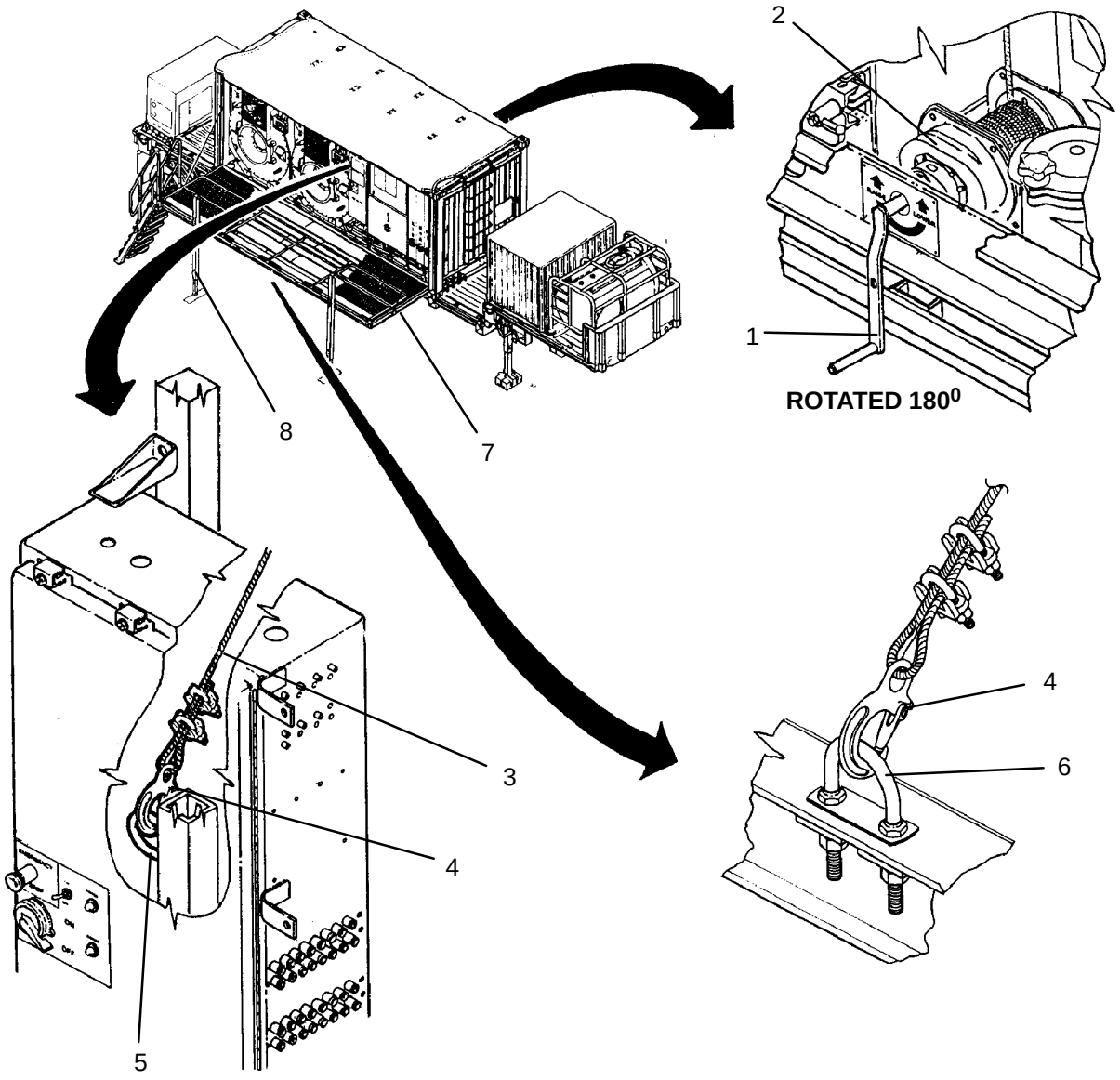


Deploy Winch Cable

CAUTION

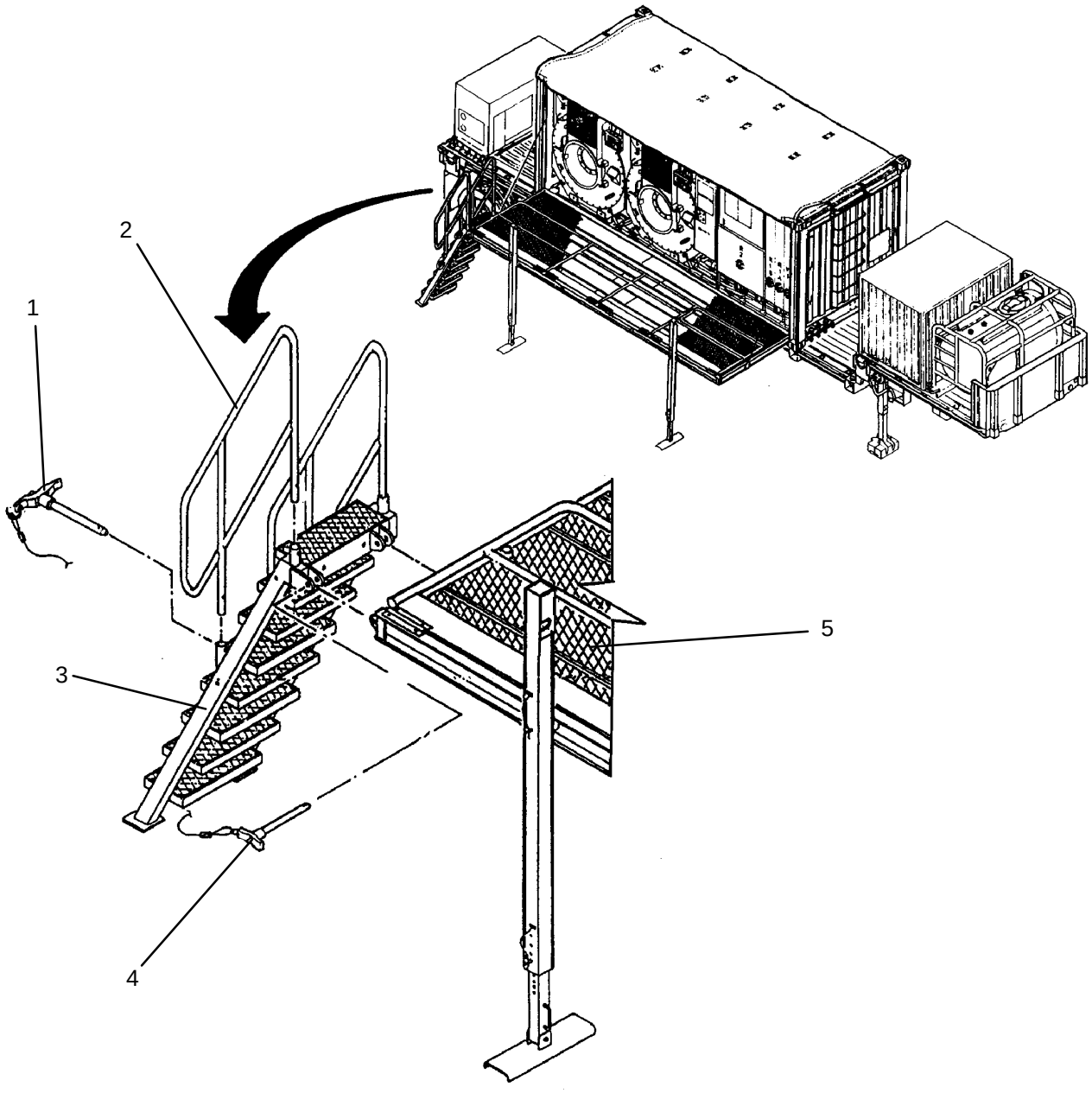
Maintain a slight tension when paying out winch cable to ensure cable wraps remain tight on winch. Failure to follow this precaution may result in sudden drops of platform during raising and lower operations causing excess strain on cable.

1. Remove winch handle (1) from tool box and install onto winch (2).
2. Loosen cable (3) slightly then unhook shackle (4) from u–bolt (5).
3. Use winch (2) to pay out cable (3) while maintaining a slight tension on cable.
4. Connect shackle (4) to u–bolt (6).
5. Use winch (2) to slightly raise platform (7) until support legs (8) are no longer contacting ground.



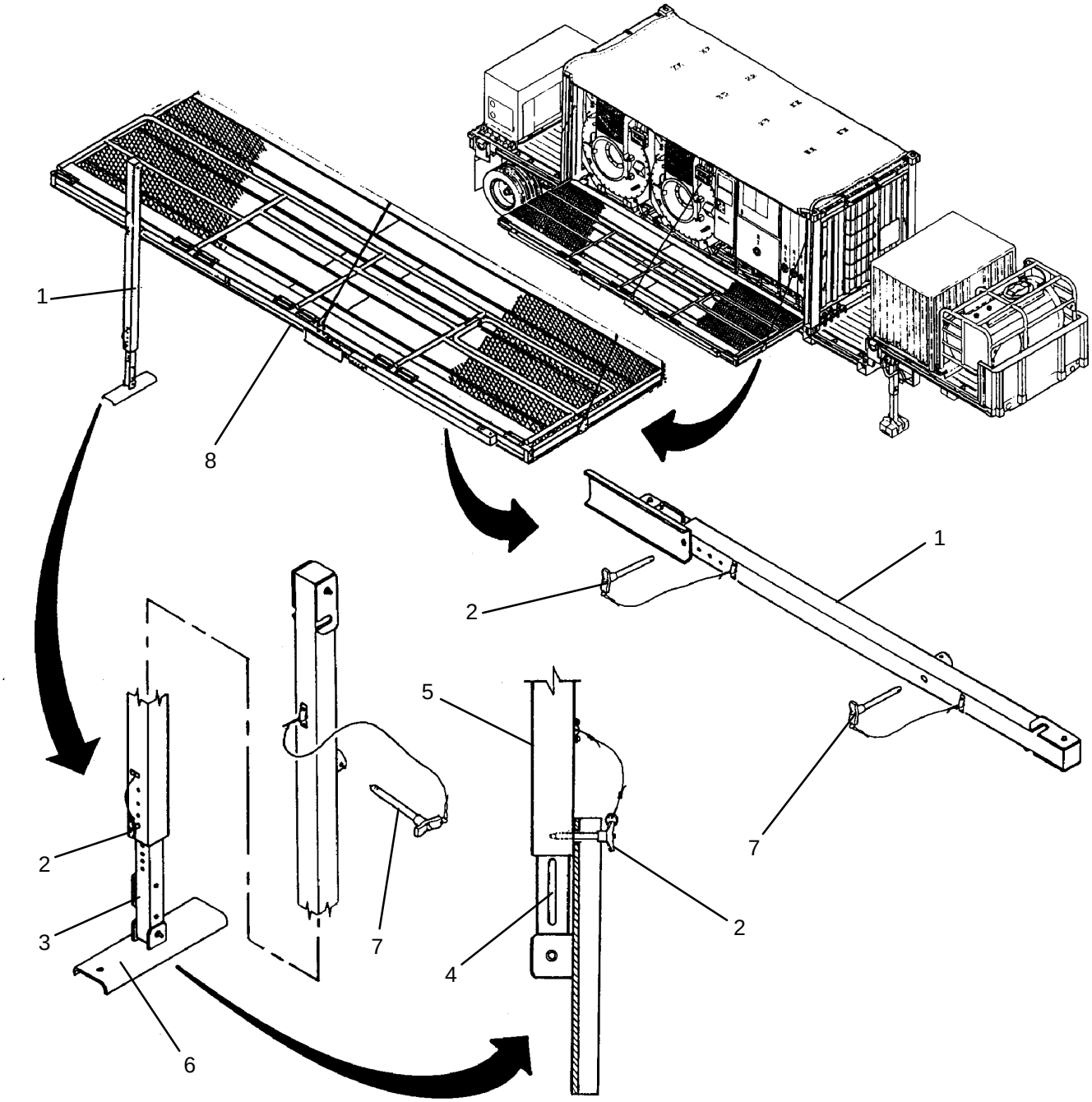
Remove Stairs

1. Remove two quick–connect pins (1) from each handrail (2).
2. Remove handrails (2) from stairs (3) and place on ground.
3. Remove two quick–connect pins (4) securing stairs (3) to platform (5).
4. Lift stairs (3) off of platform (5) and place on ground.
5. Insert quick–connect pins (1 and 4) into stairs (3).



Raise and Secure Platform

1. Raise and secure two support legs (1) as follows:
   a. Pull quick–connect pin (2) and slide inner leg (3) up until handle (4) contacts outer leg (5).
   b. Fold foot (6) over then insert quick–connect pin (2) through foot and front side of outer leg (5).
   c. Pull quick–connect pin (7) securing support leg (1) to platform (8).
   d. Rotate support leg (1) to horizontal position.
   e. Insert quick–connect pin (2) through support leg (1) then into platform (8).
   f. Insert quick–connect pin (7) into support leg (1).



Raise and Secure Platform – Continued

CAUTION

Stow bars must be retracted prior to raising platform. Failure to follow this precaution may result in damage to platform locking components.

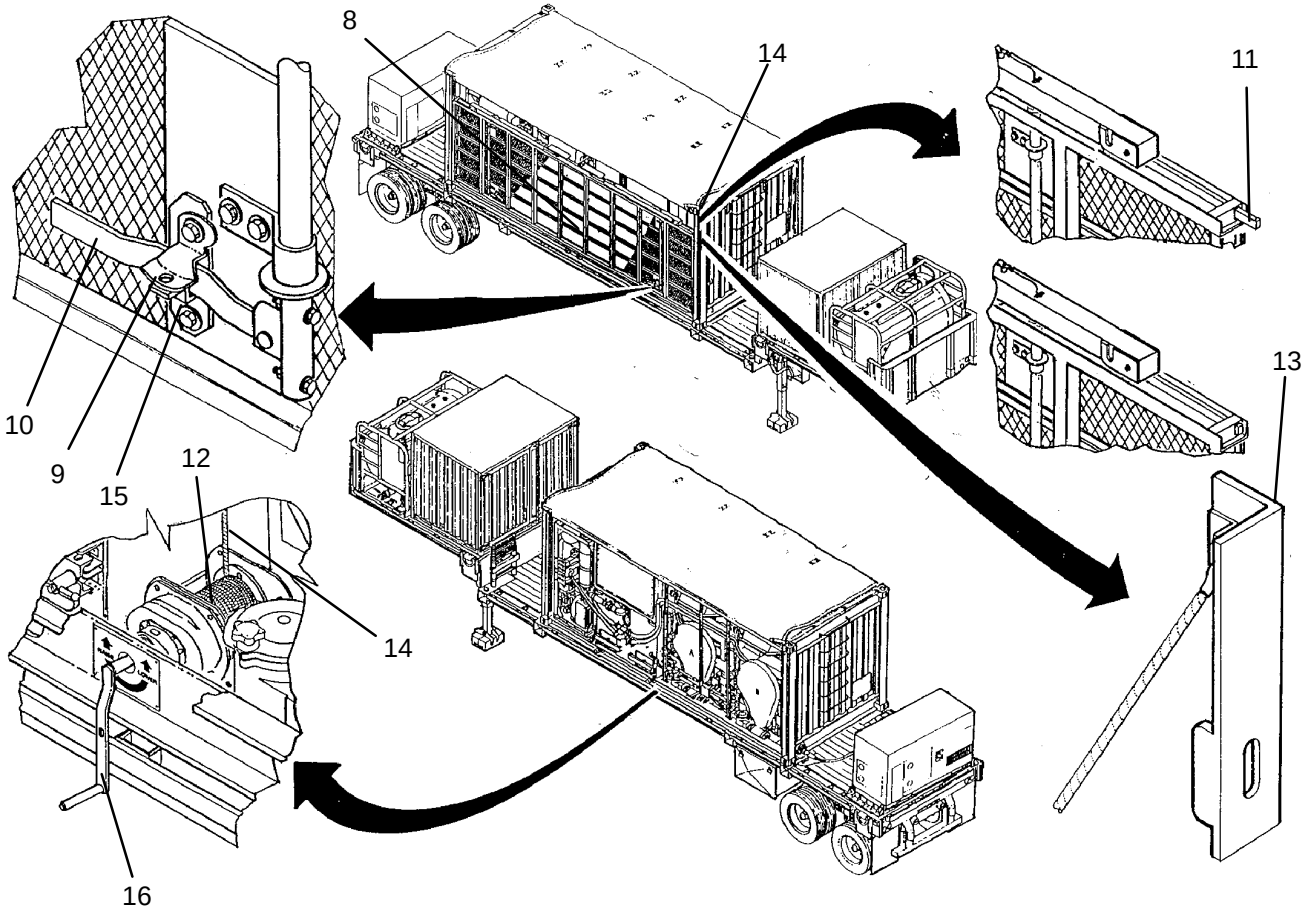
2. Pivot hasps (9) then lift and turn handles (10) until stow bars (11) retract.

WARNING

Verify that all personnel remain clear of platform while it is being raised. Failure to follow this precaution can cause severe personnel injury or death.

Platform must be secured before movement. Improper stowage of platform could result in platform extending during transport. Failure to follow this precaution may cause damage to platform and/or result in serious injury or death to personnel involved with movement and handling of the LADS.

3. Use winch (12) to raise platform (8) until stow bars (11) are behind stow brackets (13).
4. Lock platform (8) to ISO frame (14) as follows:
   a. Turn handle (10) until stow bar (11) extends into stow bracket (13).
   b. Insert handle (10) into retainer (15).
   c. Pivot hasp (9) over top of handle (10).
   d. Repeat step a through c to lock other end of platform (8).
5. Use winch (12) to pull cable (14) taught. Remove winch handle (16) and stow in tool box.



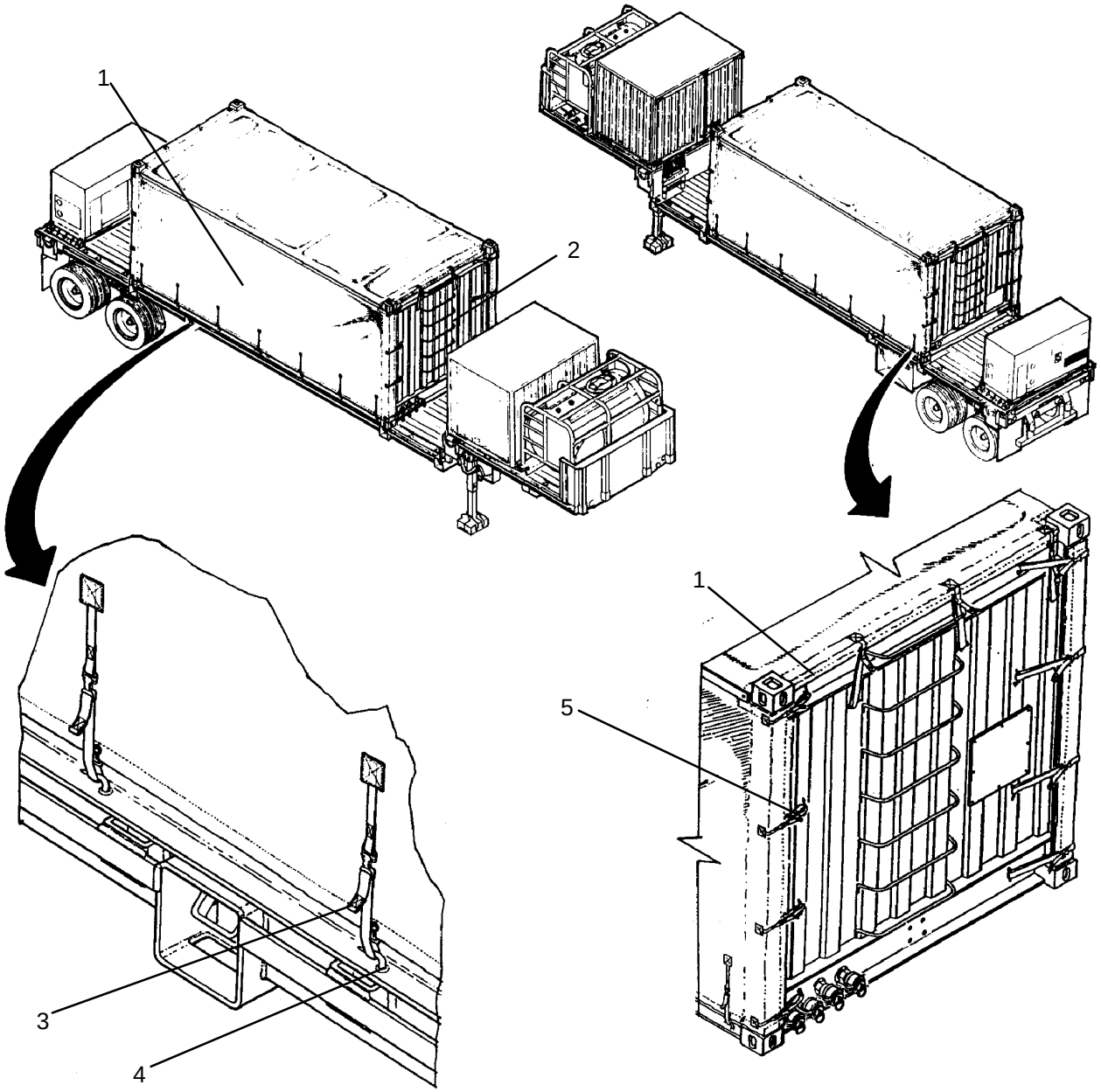
Secure Tarp

1. Flip front section of tarp (1) over to cover curbside of the LADS.
2. Flip back section of tarp (1) over top and roadside of the LADS.
3. Pull sides of tarp (1) over end walls (2).

NOTE

To evenly secure tarp, tighten the center straps on both sides to the ISO frame first, then work towards the ISO frame end walls.

4. Connect straps (3) to ISO frame (4).
5. Pull straps (3) tight starting at center of the LADS and working towards end walls (2).
6. Connect and tighten straps (5) to end walls of ISO frame (4).

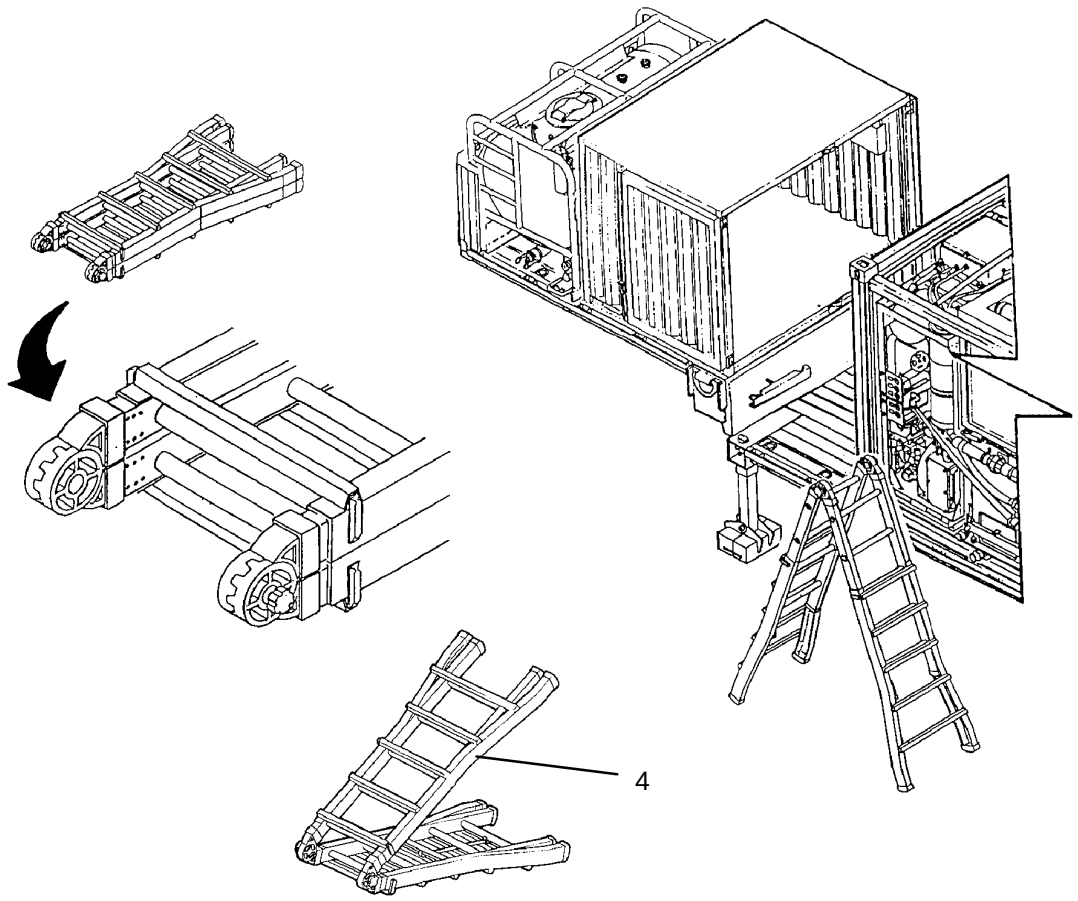


Breakdown Folding Ladder

WARNING

Keep hands and fingers away from hinge points on ladder halves when opening and closing. Keep hands and fingers away from inner and outer rungs of ladder when adjusting. Never climb on ladder unless knobs and locking devices are properly tightened. Failure to observe this precaution may result in severe personal injury.

1. Place ladder (1) flat on ground.
2. Return ladder (1) to storage height as follows:
   a. Pull out and pivot locking devices (2) on each side of ladder (1).
   b. Slide outer section of ladder (3) in as far as possible.
   c. Pivot locking devices (2) back into inner section of ladder (1).
3. Fold ladder (1) flat as follows:
   a. Hold higher section of ladder (4) so it does not fall.
   b. Loosen knobs (5) then separate jaws (6) on each side of ladder (1).
   c. Fold ladder (1) flat, then tighten knobs (5) to lock jaws (6) in place.



Stow Accessories

CAUTION

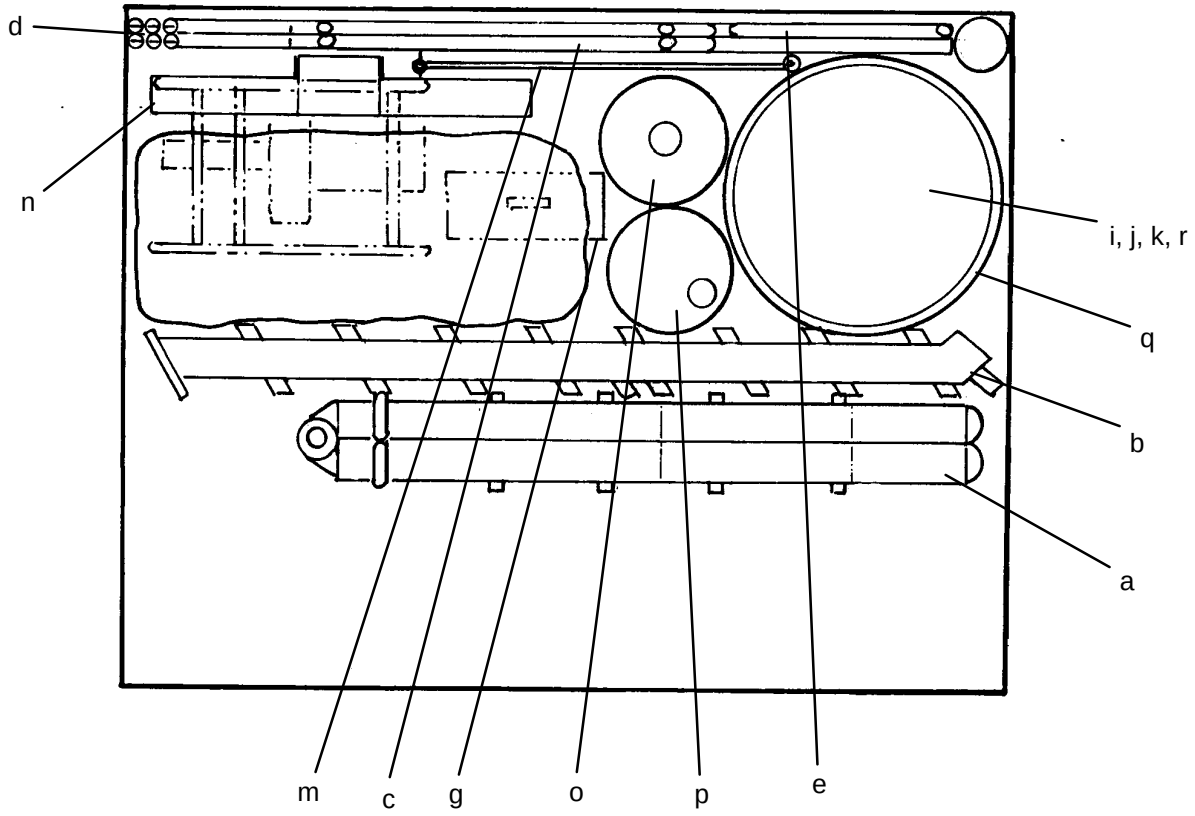
Stowed equipment can shift during transport if not properly secured. Use care when arranging equipment in storage locker. Ensure load stabilizers cover all items and are properly tightened. Failure to follow this precaution may result in equipment becoming unserviceable for next mission.

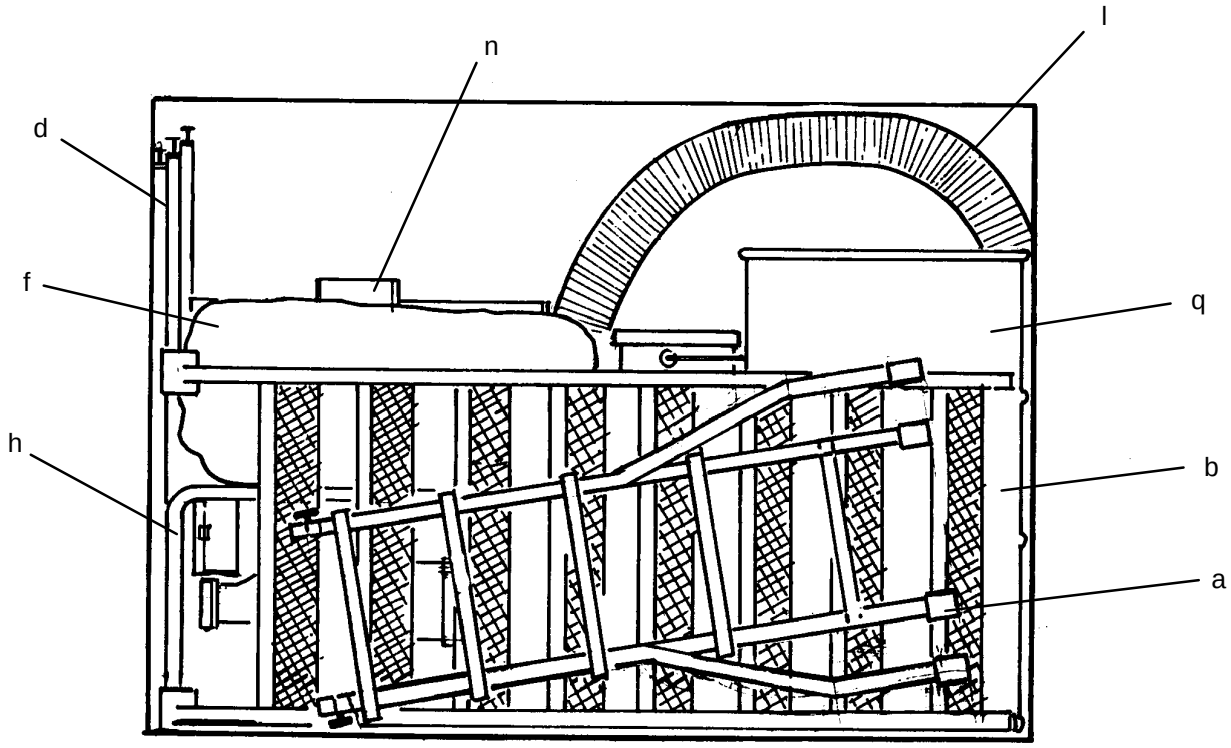
NOTE

Personnel in the 5th percentile may require a step aid for this procedure.

1. Stow following items in storage locker (1) as shown:
   a. Folding Ladder, qty 1
   b. Stairs, qty 1
   c. Handrails qty 2
   d. Awning supports, qty 6
   e. Side railing, qty 1
   f. Water tank, qty 1
   g. Operator tool box, qty 1
   h. Water supply pump, qty 1
   i. 25 ft fuel hose, qty 1
   j. Adapter, fuel hose, qty 1
   k. 30 ft fuel hose, qty 1
   l. Exhaust extension, qty 1
   m. Clean–out rake, qty 1
   n. Sluice tray, qty 1
   o. Anti–foam container, qty 2
   p. Detergent container, qty 2
   q. Container, 55 gallon, qty 1
   r. Fire extinguisher, qty 1

Stow Accessories – Continued



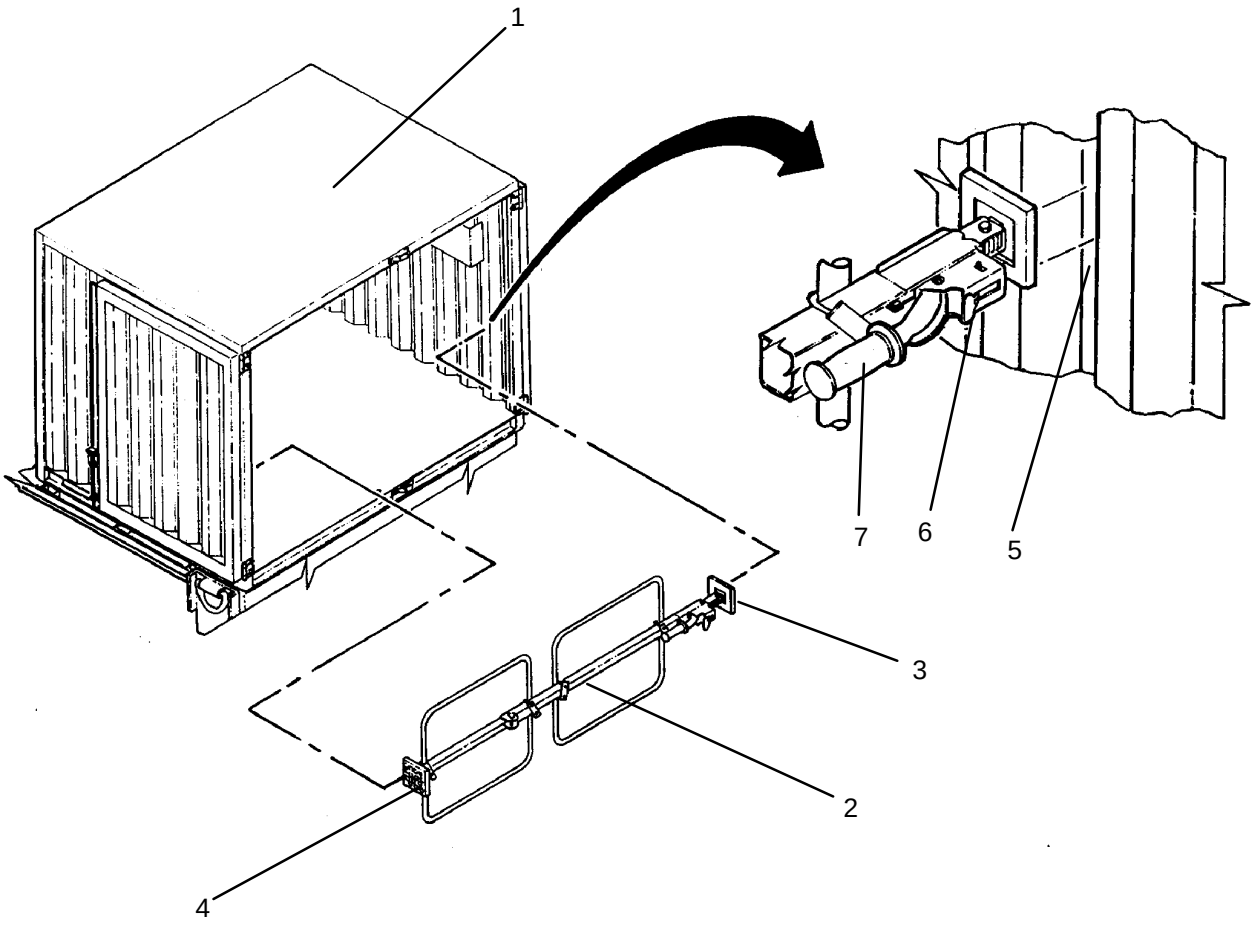


Stow Accessories – Continued

CAUTION

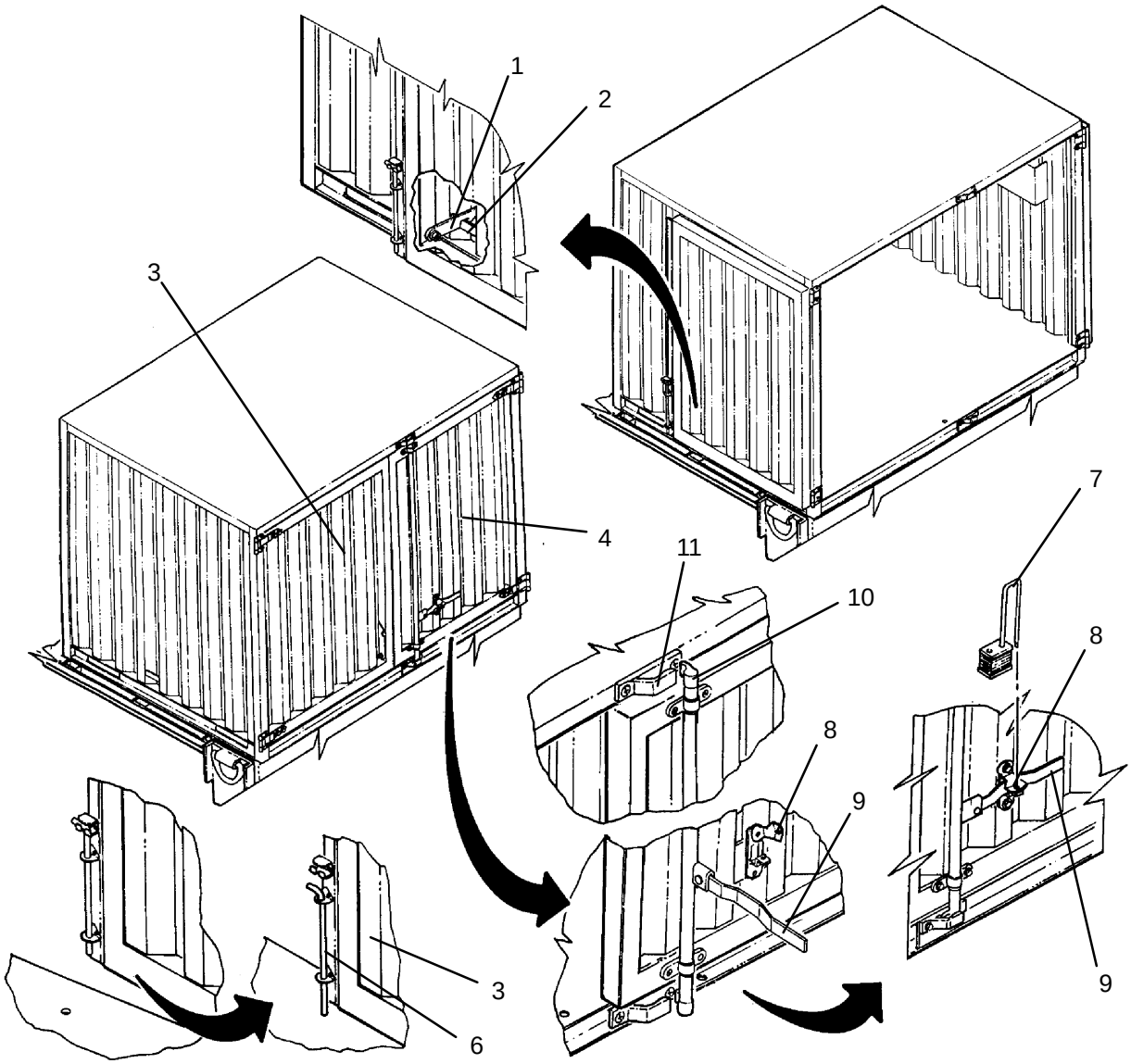
Do not over–tighten stabilizer bars. Too much tension on bars can cause walls of storage locker to bow and make it difficult to open and close the doors.

2. Install stabilizing bars (2) to secure items in storage locker (1) as follows:
   a. Place stabilizing bar (2) in a position where it can prevent movement of stored items.
   b. Ensure both wall pads (3 and 4) are set to apply tension to a valley (5) in walls of storage locker (1).
   c. Push in on tab (6) to change ratcheting direction of handle (7).
   d. Ratchet handle (7) to apply tension of wall pads (3 and 4) until stabilizer bar is tight.



Close and Secure Storage Locker Doors

1. Lift–up to unlock fingers (1) from retaining plates (2).
2. Swing doors (3 and 4) back towards opening in storage locker (5), but do not close doors.
3. Close door (3) then lift and reposition cane lock (6) to secure door.
4. Remove lock (7) from hasp (8).
5. Pivot hasp (8) then lift and turn handle (9).
6. Close door (4) until locking rod (10) is aligned with holder (11).
7. Turn handle (9) until locking rod (10) engages in holder (11).
8. Pivot hasp (8) over handle (9).
9. Install lock (7) back onto hasp (8).



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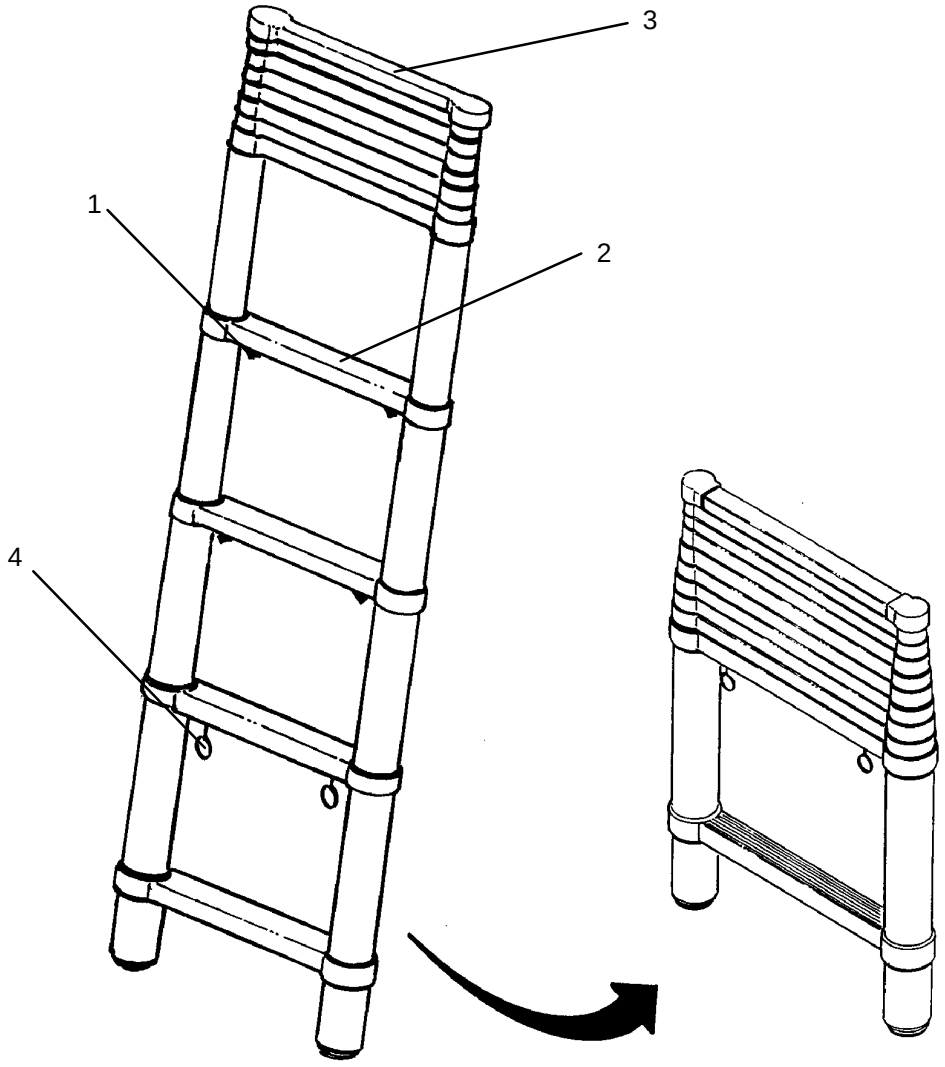
Retract Telescoping Ladder

WARNING

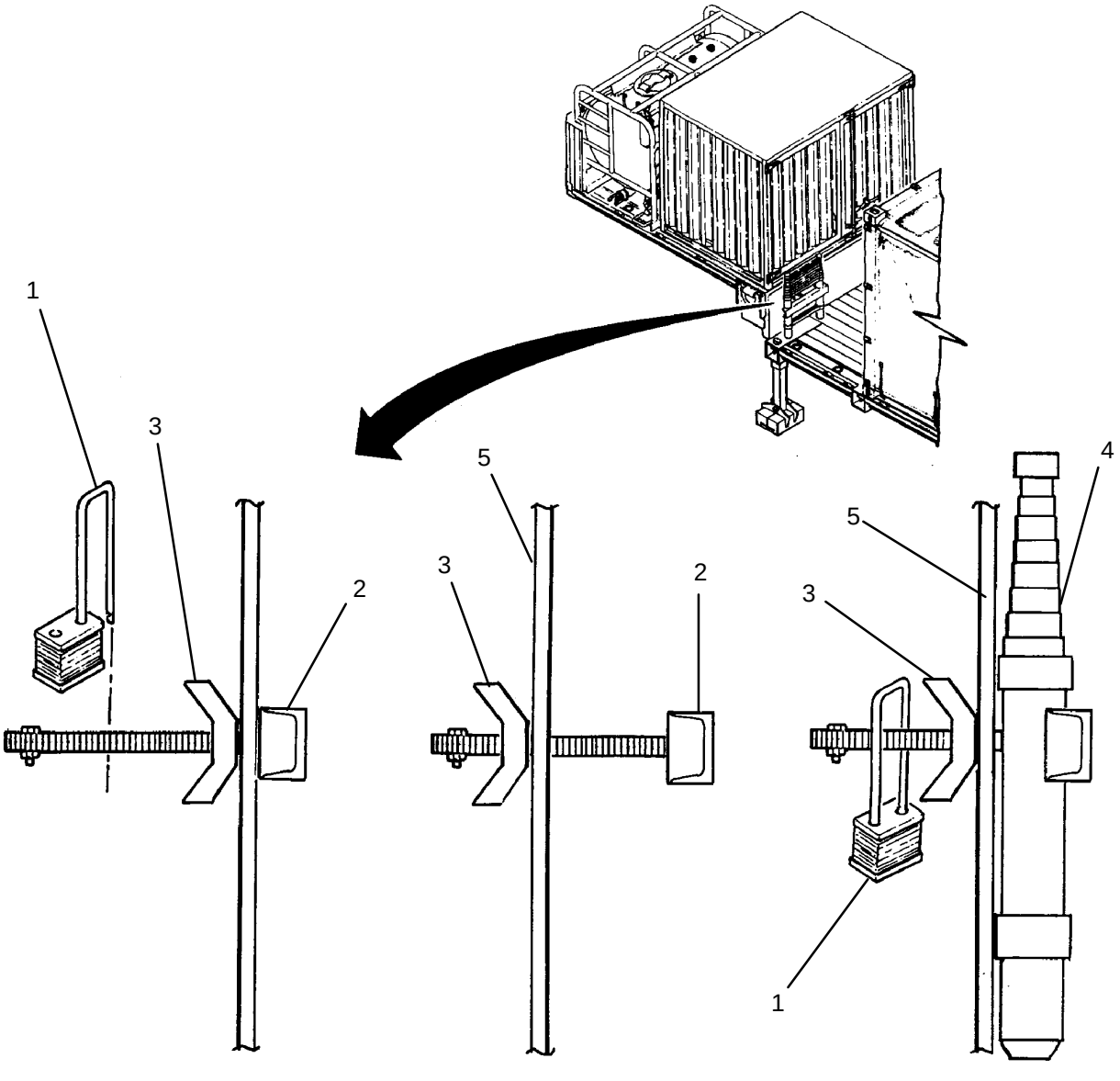
Always retract ladder from the top down. Keep hands and fingers away from sliding points on ladder sections when opening and closing. Never climb on ladder unless locking devices are properly engaged. Failure to observe these precautions may result in severe personal injury.

1. Push in on latches (1) under lower rung (2) of top ladder section to unlock.
2. Push down on upper rung (3) to collapse section.
3. Repeat steps 1 and 2 until only the bottom section remains extended.
4. Pull down on rings (4) to collapse last ladder section.



Secure Telescoping Ladders

1. Remove lock (1) from holddown bracket (2).
2. Loosen retainer (3) then slide holddown bracket (2) rearward.
3. Slide telescoping ladder (4) behind holdown bracket (2).
4. Push in on holdown bracket (2) until telescoping ladder (4) is tight against wall of trailer (5).
5. Tighten retainer (3).
6. Install lock (1) into holddown bracket (2).
7. Repeat steps 1 through 6 for second ladder.



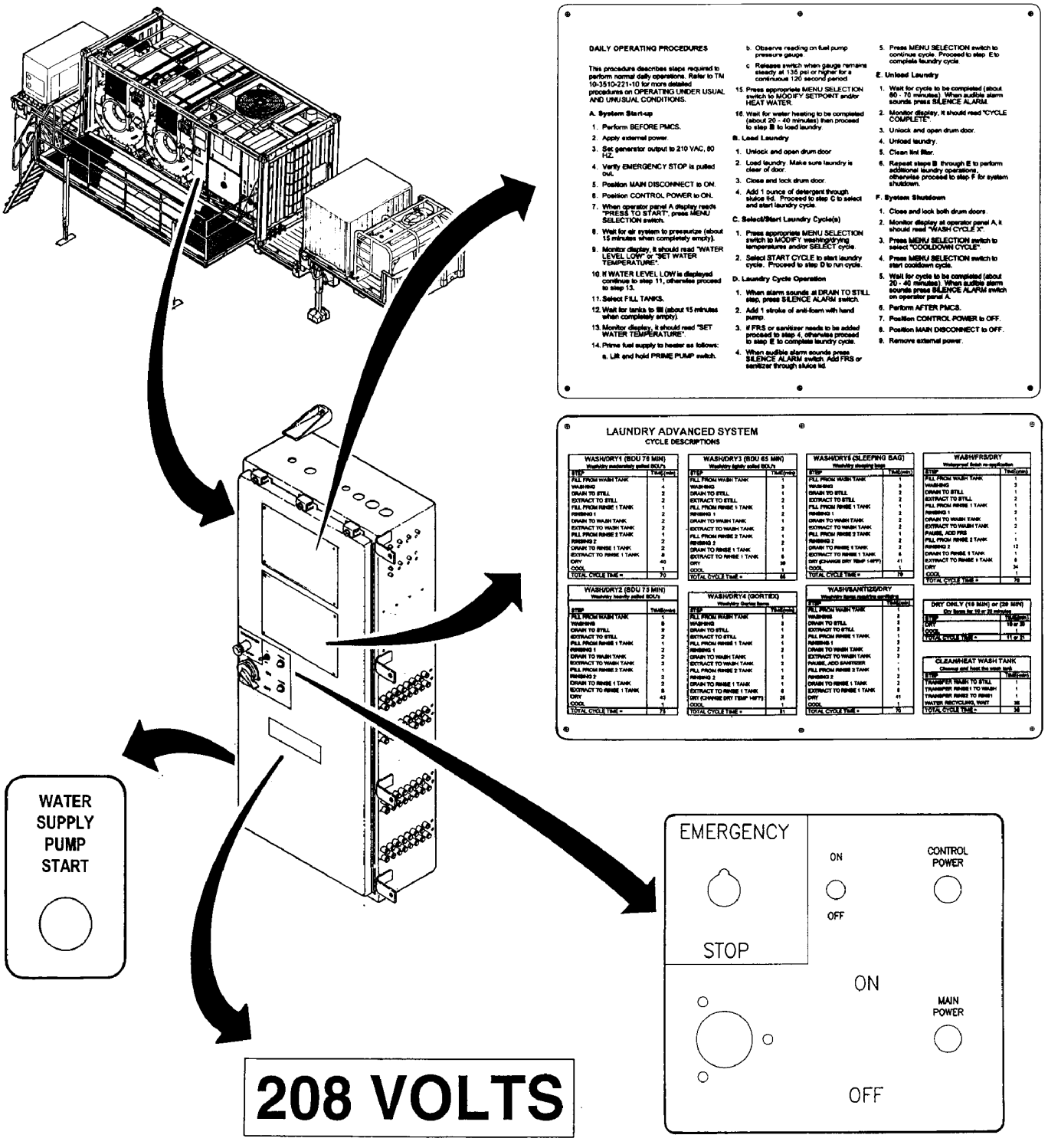
END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

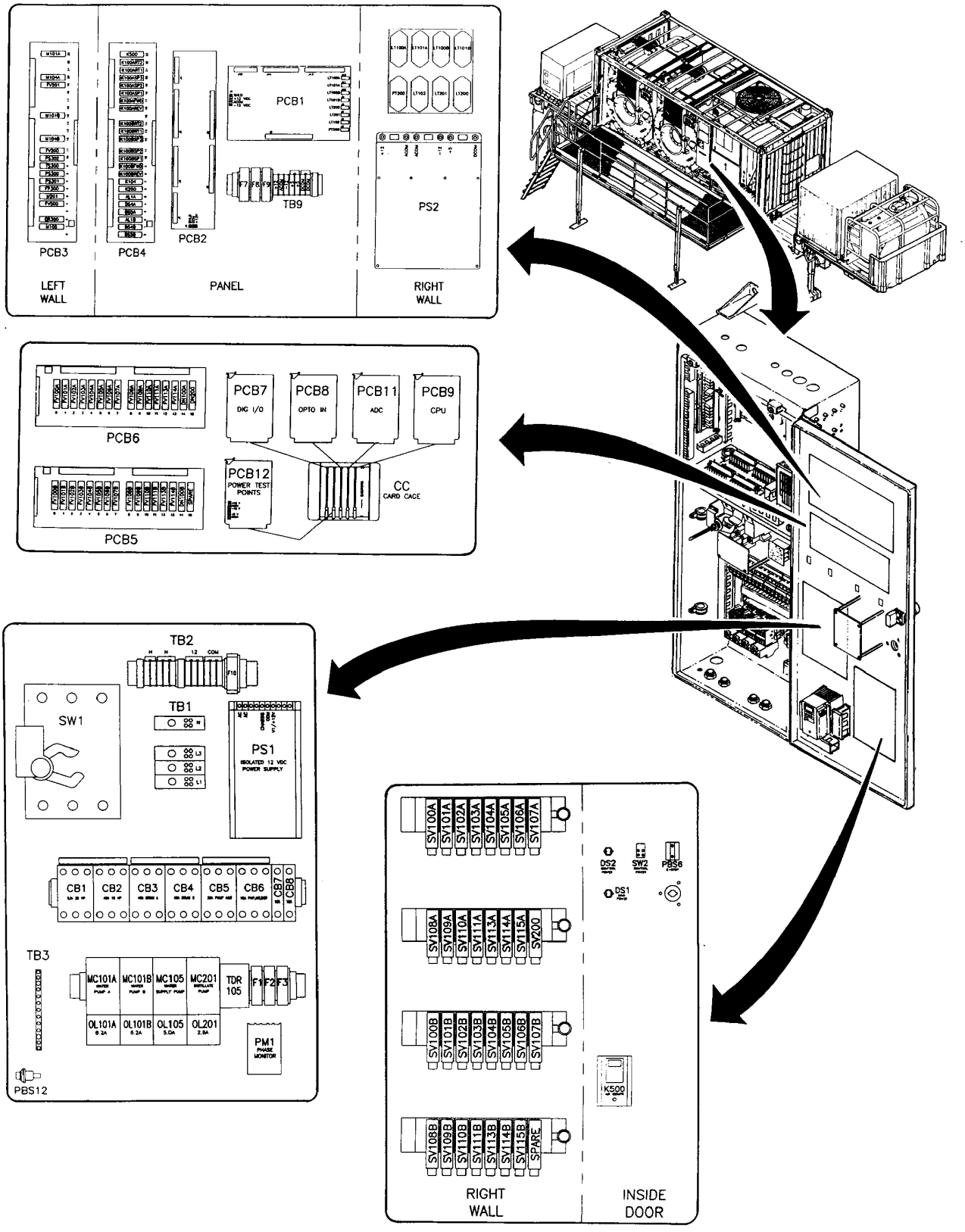
(NSN 3510–01–463–0114)

LAUNDRY ADVANCED SYSTEM OPERATION UNDER USUAL CONDITIONS DECALS AND INSTRUCTION PLATES

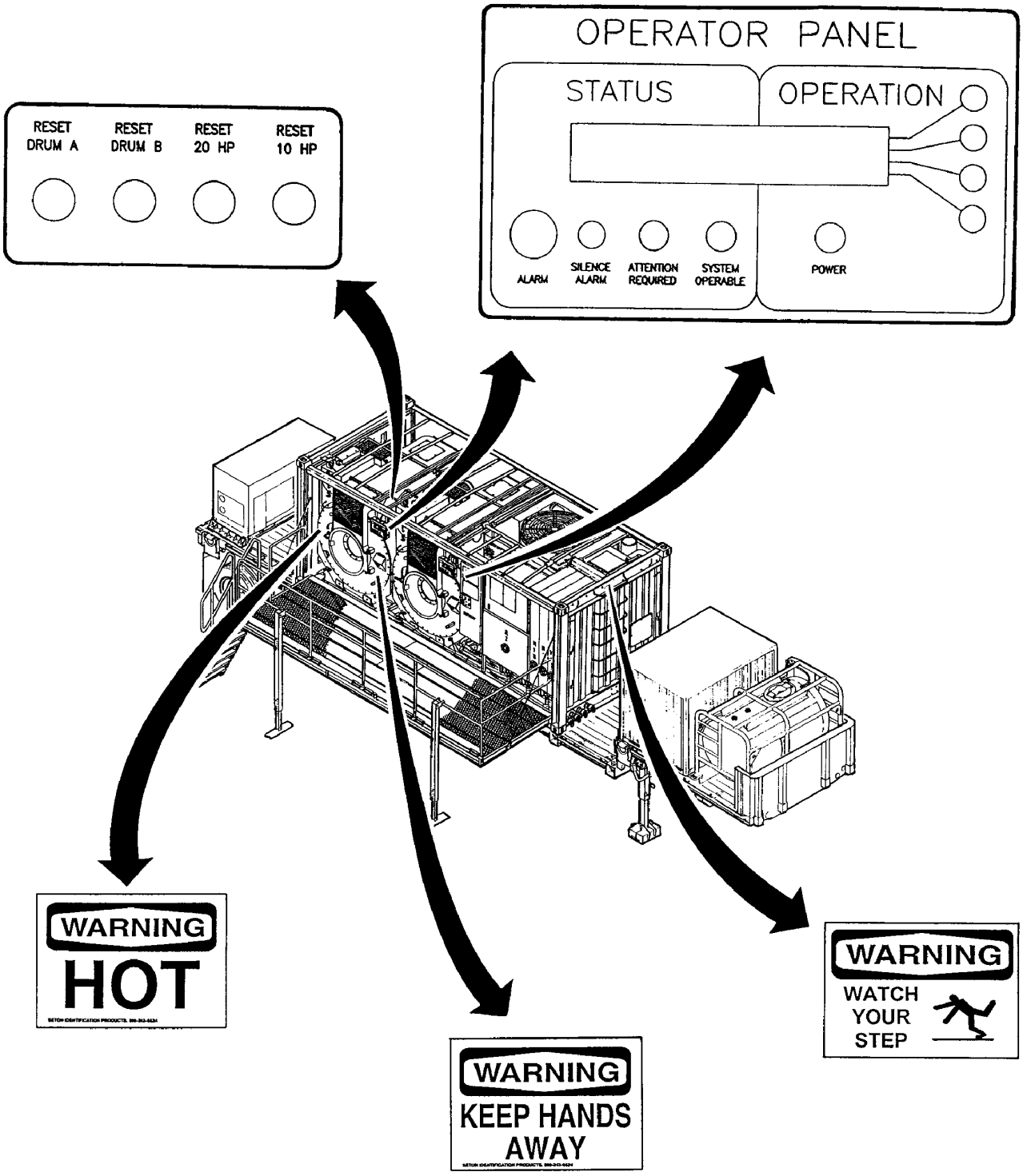
DECALS AND INSTRUCTION PLATES



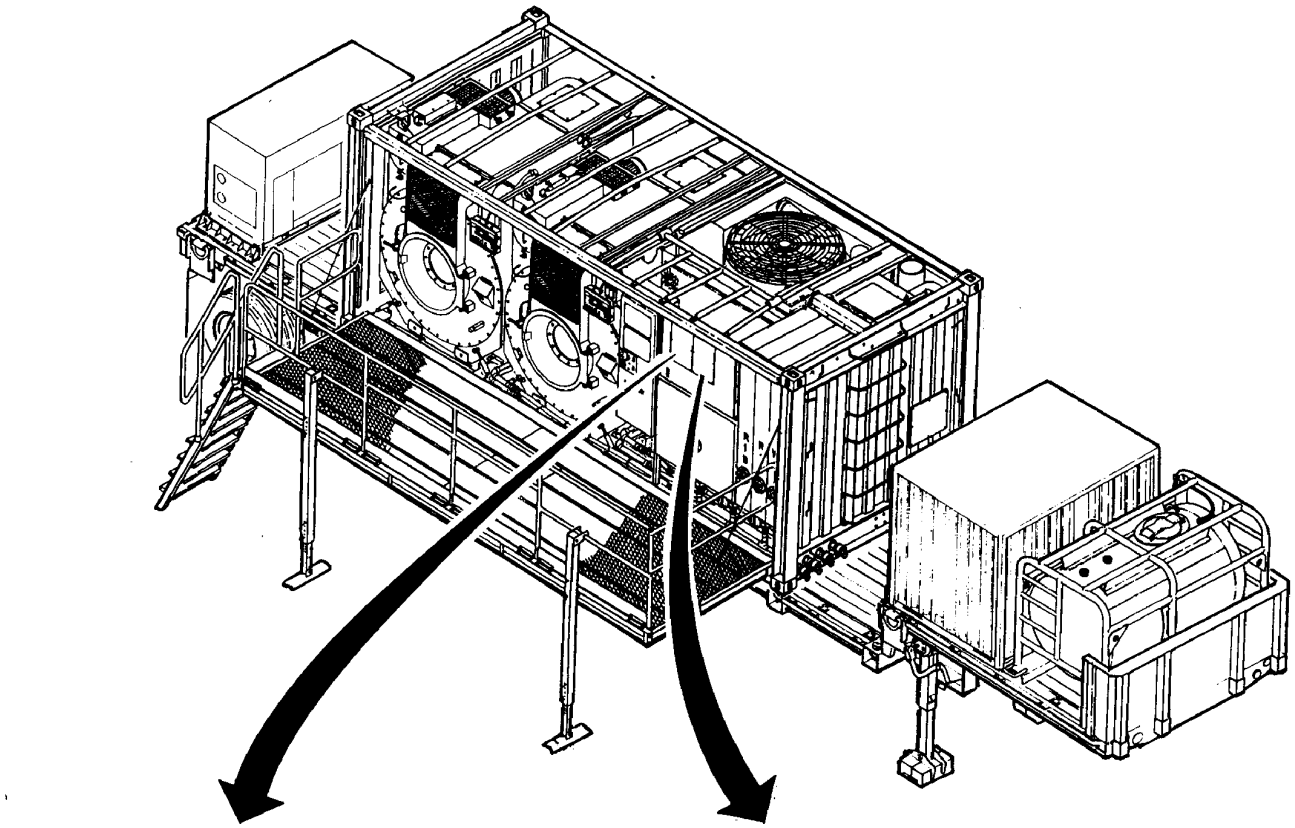
DECALS AND INSTRUCTION PLATES – Continued



DECALS AND INSTRUCTION PLATES – Continued



DECALS AND INSTRUCTION PLATES – Continued



LAUNDRY ADVANCED SYSTEM
MALFUNCTION/SYMPTOM INDEX (Observed Faults)

Malfunction/Symptom	Troubleshooting Procedure
CONTROL SYSTEM (Main Control Enclosure Indications)	
1. CONTROL POWER lamp is not on	WP 0027 00
2. MAIN POWER lamp is not on	WP 0027 00
CONTROL SYSTEM (Operator Panel Indications)	
1. ALARM does not sound	Complete Cycle/Notify Maintenance
2. ALARM will not turn off when SILENCE ALARM switch is pressed	Complete Cycle/Notify Maintenance
3. ATTENTION REQUIRED lamp is not on	WP 0028 00
4. Display does not come on	WP 0028 00
5. Display comes on but has scrambled or no characters	Notify Maintenance
6. Display state does not change when menu selection switch is pressed	Notify Maintenance
7. SYSTEM OPERABLE lamp is not on	WP 0028 00
CONTROL SYSTEM (Observed Faults)	
1. Inverter enclosure fan does not come on	Notify Maintenance
2. Drum motor cooling fan does not come on	Notify Maintenance
WASHING/DRYING SYSTEM (Observed Faults)	
1. Drum Door Will Not Open	Notify Maintenance
2. Drum Shaking Excessively	Pause Cycle/WP 0019 00
3. Laundry Cycle Can Not Be Started	Notify Maintenance
4. Laundry Not Drying	WP 0016 00
5. R2 Tank Not Heating	WP 0016 00
6. Water Spraying From Blower During Extract	Complete Cycle/Notify Maintenance
7. Water Not Draining From Drum	Pause Cycle/WP 0019 00
8. Water Visible at Rear Seal of Drum	Complete Cycle/WP 0019 00
WATER RECYCLE SYSTEM (Observed Faults)	
1. Cooldown or Drain Cycle Will Not Finish	Notify Maintenance
2. Recycled Water Temperature High	Complete Cycle(s) WP 0021 00
3. Still Door(s) Will Not Open	WP 0021 00
HEATING SYSTEM (Observed Faults)	
1. Heater Smoking	WP 0023 00
2. Fuel Pump Will Not Prime	WP 0023 00
AIR SYSTEM (Observed Faults)	
1. Air Compressor Does Not Come On	WP 0025 00
2. Water In Air Lines	Complete Cycle/Notify Maintenance
AUXILIARY EQUIPMENT (Observed Faults)	
1. Auxiliary Overhead Light Does Not Turn On	WP 0030 00

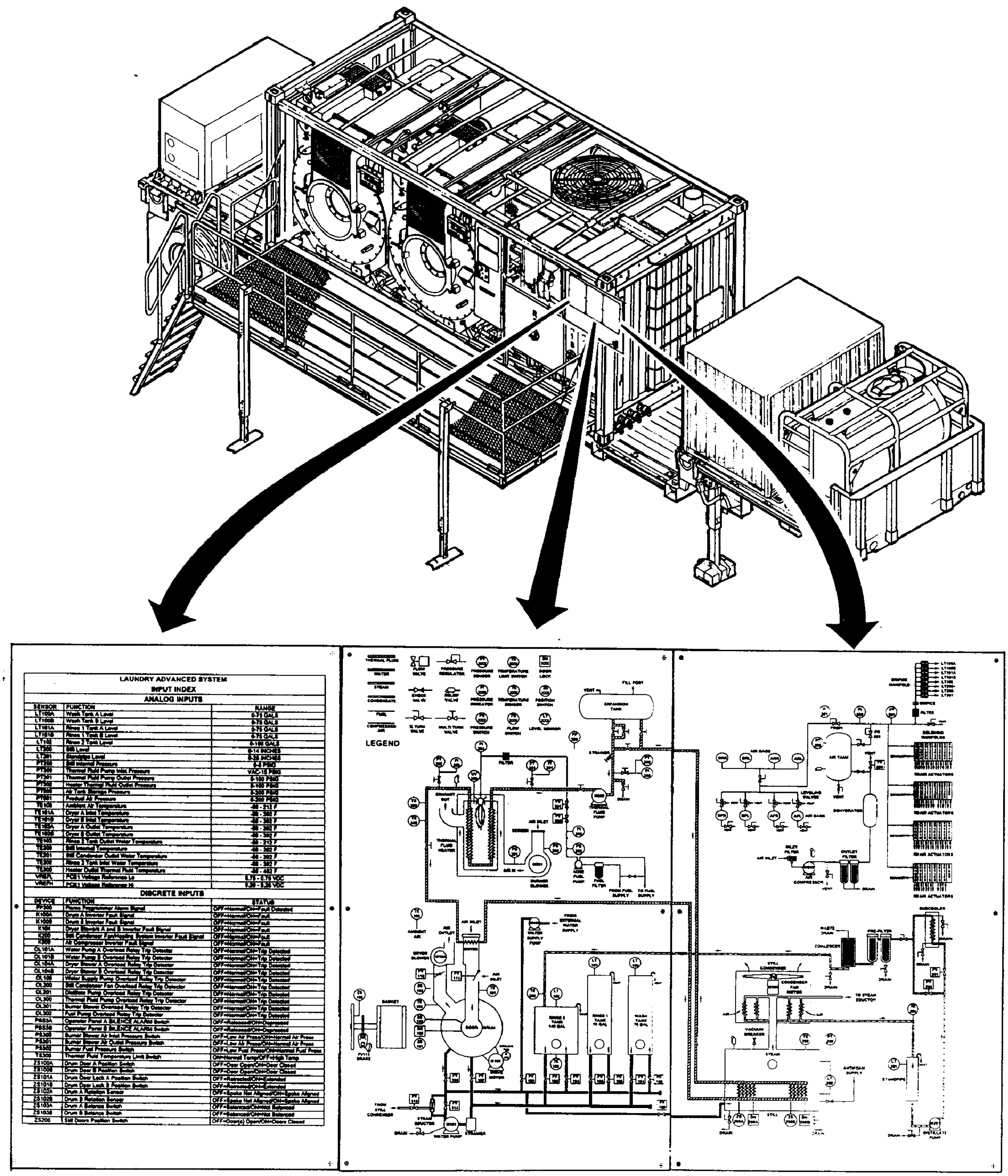
LAUNDRY ADVANCED SYSTEM
MALFUNCTION/SYMPTOM INDEX (Operator Panel Alarm Messages)

FAILURE MESSAGE	ALARM LEVEL	OPERATOR ACTION
Air Compr Inverter Fault	3	Pause Cycle(s)/WP 0026 00
Air Product Press Lo	4	WP 0026 00
Air Product Press Hi	3	Complete Cycle(s)/Notify Maintenance
Air Tank Not Pressurizing	4	WP 0026 00
Air Tank Press Hi	3	Complete Cycle(s)/Notify Maintenance
Ambient Air Temp Hi	3	Complete Cycle(s)/WP 0020 00
Ambient Air Temp Lo	3	Complete Cycle(s)/WP 0020 00
Burner Blwr In Press Lo	3	Pause Cycle(s)/WP 0024 00
Burner Blwr Out Press Lo	3	Pause Cycle(s)/WP 0024 00
Burner Blower Overload	3	Pause Cycle(s)/Notify Maintenance
Condensate Temp Hi	3	Complete Cycle(s)/WP 0022 00
Condensate Temp Lo	3	Complete Cycle(s)/Notify Maintenance
Condenser Fan Overload	3	End Cycle(s)/Notify Maintenance
CPU Test Failure (Only at Startup)	4	WP 0028 00
Distillate Pump Overload	3	Notify Maintenance

LAUNDRY ADVANCED SYSTEM
MALFUNCTION/SYMPTOM INDEX (Operator Panel Alarm Messages CONT.)

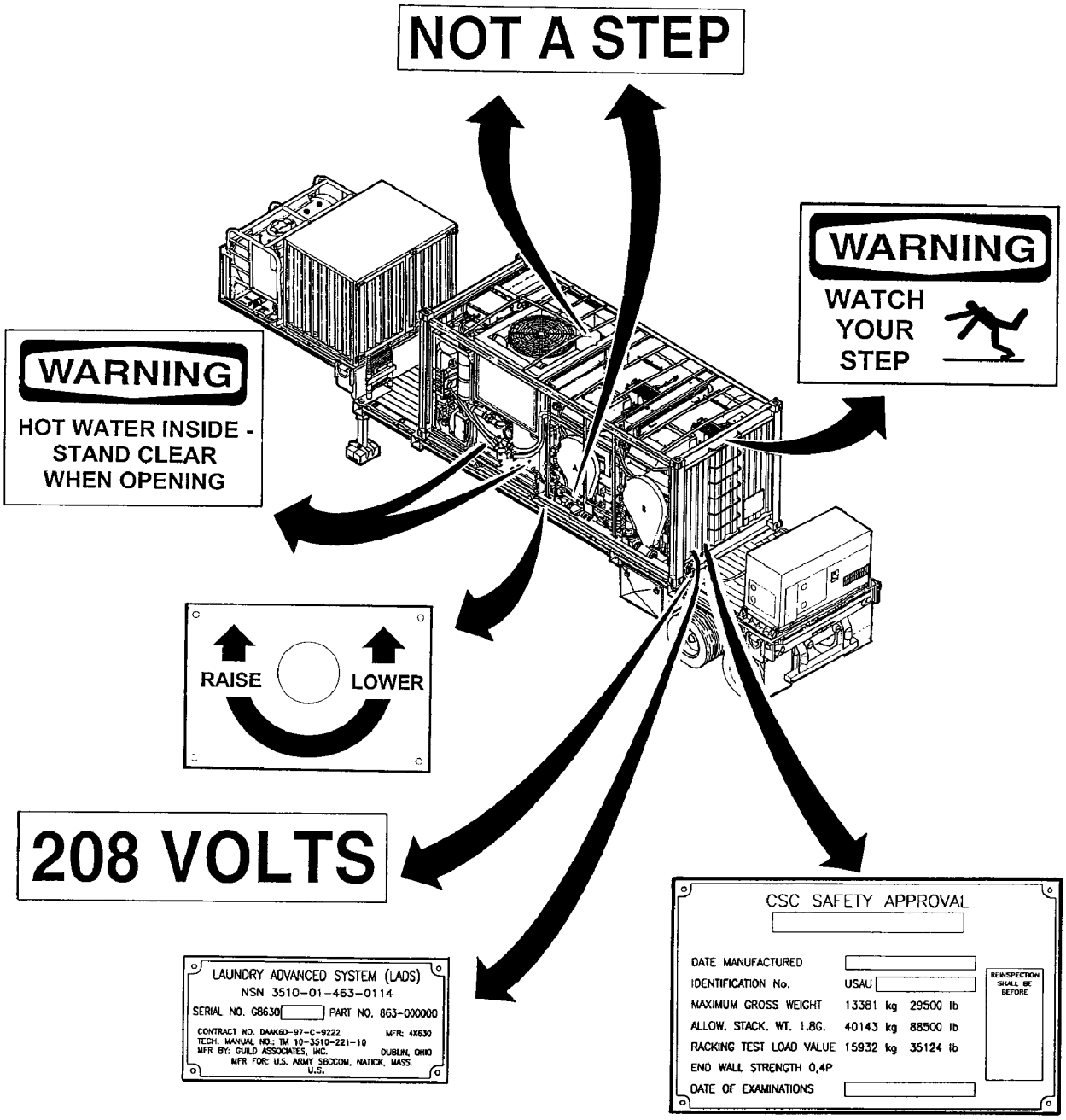
FAILURE MESSAGE	ALARM LEVEL	OPERATOR ACTION
Drum X Braking Slow	3	Complete Cycle/Notify Maintenance
Drum X Inverter Fault	3	Pause Cycle/WP 0020 00
Drum X No Rotation	3	Pause Cycle/WP 0020 00
Drum X Stalling	3	Pause Cycle/WP 0020 00
Drum X Will Not Balance	3	WP 0020 00
Drum Door X Not Locked	2	WP 0020 00
Dryer X Inlet Temp Hi	3	Pause Cycle/WP 0020 00
Dryer X Inlet Temp Lo	3	Pause Cycle/WP 0020 00
Dryer Blower X Overload	3	Pause Cycle/Notify Maintenance
Emergency Stop Activated	4	WP 0029 00
Fuel Level Lo	3	Pause Cycle(s)/WP 0024 00
Fuel Pressure Lo	3	Pause Cycle(s)/WP 0024 00
Fuel Pump Overload	3	Pause Cycle/Notify Maintenance
Heating System Failure	3	Pause Cycle(s)/WP 0024 00
LT100X Failure	3	Complete Cycle/Notify Maintenance
LT101X Failure	3	Complete Cycle/Notify Maintenance
LT102 Failure	3	End Cycle/Notify Maintenance
LT200 Failure	3	Complete Cycle/Notify Maintenance
LT201 Failure	3	End Cycle(s)/Notify Maintenance
PCBJ SSR X FAULT	3	Complete Cycle(s)/Notify Maintenance
PT200 Failure	4	Notify Maintenance
PT300 Failure	3	Complete Cycle(s)/Notify Maintenance
PT301 Failure	3	Complete Cycle(s)/Notify Maintenance
PT303 Failure	3	Complete Cycle(s)/Notify Maintenance
PT500 Failure	4	Notify Maintenance
PT501 Failure	4	Notify Maintenance
RAM Test Failure (Only at Startup)	4	WP 0028 00
ROM Test Failure (Only at Startup)	4	WP 0028 00
R1 Tank X Not Emptying	3	Pause Cycle/WP 0020 00
R1 Tank X Not Filling	3	Pause Cycle/WP 0020 00
R2 Tank Not Emptying	3	Pause Cycle(s)/WP 0020 00
R2 Tank Not Filling	3	Pause Cycle(s)/WP 0020 00
R2 Water Temp Hi	3	Complete Cycle/WP 0020 00
R2 Water Temp Lo	3	Complete Cycle/WP 0020 00
Stall Sensing Fault	3	Complete Cycle(s)/Notify Maintenance
Standpipe Level Lo	3	Complete Cycle(s)/WP 0022 00
Standpipe Not Emptying	3	WP 0022 00
Still Door(s) Open	3	WP 0022 00
Still Not Boiling Down	3	Complete Cycle(s)/Notify Maintenance
Still Not Filling	3	Complete Cycle(s)/WP 0022 00
Still Press Hi	3	WP 0022 00
Still Press Lo	3	Complete Cycle(s)/Notify Maintenance
Still Temp Lo	3	Complete Cycle(s)/Notify Maintenance
TEXXX Failure	3	Complete Cycle(s)/Notify Maintenance
TE300 Failure	3	End Cycle(s)/Notify Maintenance
TF Flow Lo	3	End Cycle(s)/WP 0024 00
TF Pump Inlet Press Lo	3	End Cycle(s)/WP 0024 00
TF Pump Outlet Press Hi	3	End Cycle(s)/Notify Maintenance
TF Pump Outlet Press Lo	3	End Cycle(s)/WP 0024 00
TF Pump Overload	3	End Cycle(s)/Notify Maintenance
TF Temp Hi	3	End Cycle(s)/Notify Maintenance
TF Temp Hi Limit	3	End Cycle(s)/Notify Maintenance
TF Temp Lo	3	End Cycle(s)/Notify Maintenance
VREF(S) Out Of Range	3	End Cycle(s)/Notify Maintenance
Wash Tank X Not Emptying	3	Pause Cycle/WP 0020 00
Wash Tank X Not Filling	3	Pause Cycle/WP 0020 00
Water Pump X Overload	3	Pause Cycle/Notify Maintenance
Water Supply Pump Overload	3	Complete Cycle(s)/Notify Maintenance
10 HP Inverter Fault	3	Pause Cycle (s) WP 0020 00
20 HP Inverter Fault	3	Pause Cycle(s)/WP 0022 00

DECALS AND INSTRUCTION PLATES – Continued

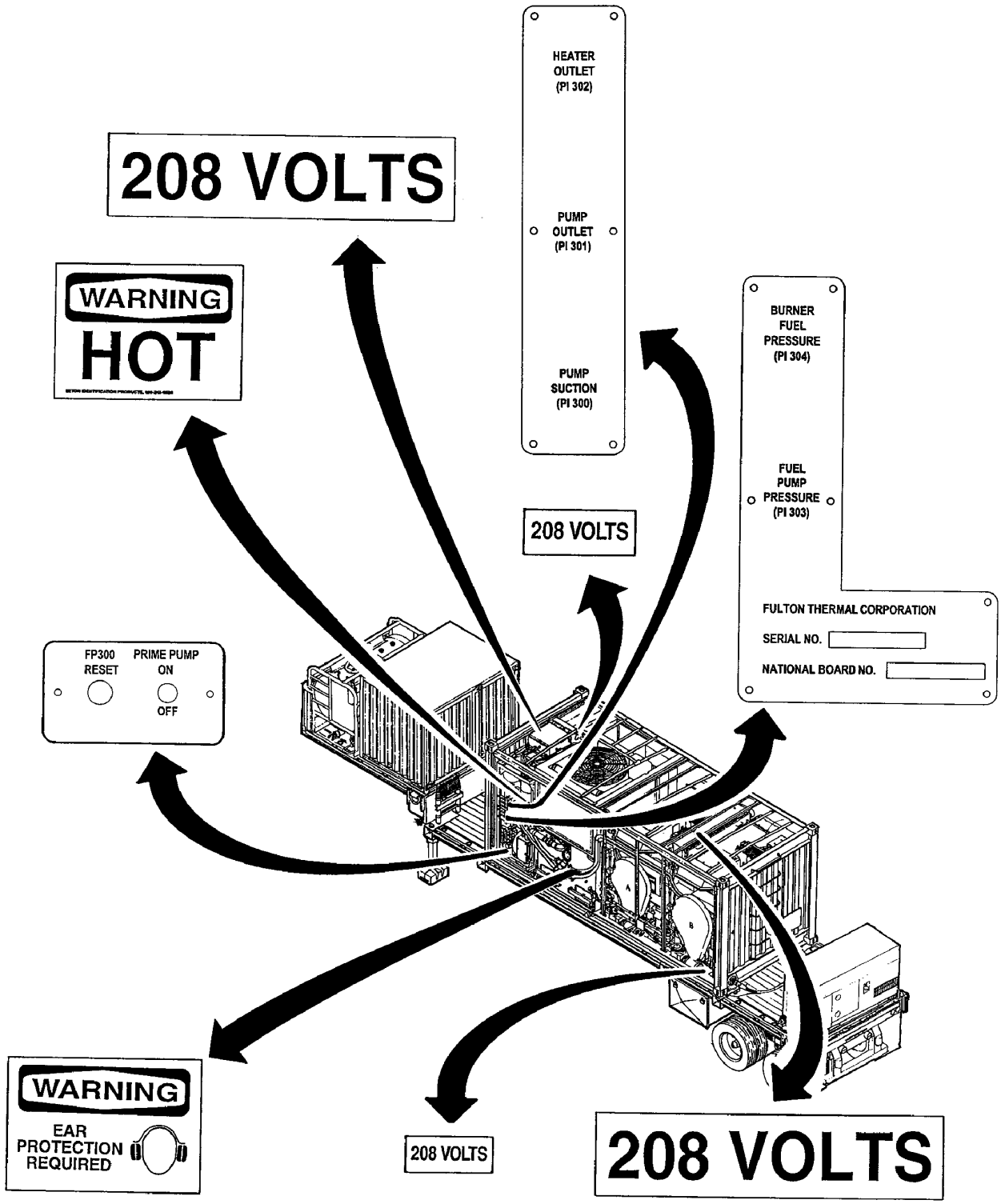


LAUNDRY ADVANCED SYSTEM INPUT INDEX		
ANALOG INPUTS		
SENSOR	FUNCTION	RANGE
LT100A	Wash Tank A Level	0-75 GALS
LT100B	Wash Tank B Level	0-75 GALS
LT101A	Rinse 1 Tank A Level	0-75 GALS
LT101B	Rinse 1 Tank B Level	0-75 GALS
LT102	Rinse 2 Tank Level	0-100 GALS
LT200	Still Level	0-14 INCHES
LT201	Standpipe Level	0-28 INCHES
PT200	Still Internal Pressure	0-8 PSIG
PT300	Thermal Fluid Pump Inlet Pressure	VAC-15 PSIG
PT301	Thermal Fluid Pump Outlet Pressure	0-100 PSIG
PT302	Heater Thermal Fluid Outlet Pressure	0-100 PSIG
PT600	Air Tank Storage Pressure	0-200 PSIG
PT601	Product Air Pressure	0-300 PSIG
TE100	Ambient Air Temperature	-40 - 212 F
TE101A	Dryer A Inlet Temperature	-40 - 392 F
TE101B	Dryer B Inlet Temperature	-40 - 392 F
TE102A	Dryer A Outlet Temperature	-40 - 392 F
TE102B	Dryer B Outlet Temperature	-40 - 392 F
TE103	Rinse 2 Tank Outlet Water Temperature	-40 - 212 F
TE200	Still Internal Temperature	-40 - 392 F
TE201	Still Condenser Outlet Water Temperature	-40 - 392 F
TE202	Rinse 2 Tank Inlet Water Temperature	-40 - 392 F
TE300	Heater Outlet Thermal Fluid Temperature	-40 - 482 F
VREFL	PCB1 Voltage Reference Lo	0.75 - 0.79 VDC
VREFH	PCB1 Voltage Reference Hi	9.20 - 9.28 VDC
DISCRETE INPUTS		
DEVICE	FUNCTION	STATUS
FP300	Flame Programmer Alarm Signal	OFF=Normal/ON=Fault Detected
K100A	Drum A Inverter Fault Signal	OFF=Normal/ON=Fault
K100B	Drum B Inverter Fault Signal	OFF=Normal/ON=Fault
K104	Dryer Blowers A and B Inverter Fault Signal	OFF=Normal/ON=Fault
K200	Still Condenser Fan/Heating System Inverter Fault Signal	OFF=Normal/ON=Fault
K600	Air Compressor Inverter Fault Signal	OFF=Normal/ON=Fault
OL101A	Water Pump A Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL101B	Water Pump B Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL104A	Dryer Blower A Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL104B	Dryer Blower B Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL105	Water Supply Pump Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL200	Still Condenser Fan Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL201	Distillate Pump Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL300	Thermal Fluid Pump Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL301	Burner Blower Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
OL302	Fuel Pump Overload Relay Trip Detector	OFF=Normal/ON=Trip Detected
PBS5A	Operator Panel A SILENCE ALARM Switch	OFF=Released/ON=Depressed
PBS5B	Operator Panel B SILENCE ALARM Switch	OFF=Released/ON=Depressed
PS300	Burner Blower Air Inlet Pressure Switch	OFF=Low Air Press/ON=Normal Air Press
PS301	Burner Blower Air Outlet Pressure Switch	OFF=Low Air Press/ON=Normal Air Press
PS302	Burner Fuel Pressure Switch	OFF=Low Fuel Press/ON=Normal Fuel Press
TS300	Thermal Fluid Temperature Limit Switch	ON=Normal Temp/OFF=High Temp
ZS100A	Drum Door A Position Switch	OFF=Door Open/ON=Door Closed
ZS100B	Drum Door B Position Switch	OFF=Door Open/ON=Door Closed
ZS101A	Drum Door Lock A Position Switch	OFF=Retracted/ON=Extended
ZS101B	Drum Door Lock B Position Switch	OFF=Retracted/ON=Extended
ZS102A	Drum A Rotation Sensor	OFF=Spoke Not Aligned/ON=Spoke Aligned
ZS102B	Drum B Rotation Sensor	OFF=Spoke Not Aligned/ON=Spoke Aligned
ZS103A	Drum A Balance Switch	OFF=Balanced/ON=Not Balanced
ZS103B	Drum B Balance Switch	OFF=Balanced/ON=Not Balanced
ZS200	Still Doors Position Switch	OFF=Door(s) Open/ON=Doors Closed

DECALS AND INSTRUCTION PLATES – Continued



DECALS AND INSTRUCTION PLATES – Continued



END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATION UNDER UNUSUAL CONDITIONS

INITIAL SETUP:

Tools	**Personnel Required** Two Operators
Materials/Parts	**Equipment Conditions**

GENERAL

This work package contains instructions for safely operating the Laundry Advanced System (LADS) under unusual conditions. In addition to normal preventive maintenance service, special care must be taken to keep the LADS operational in extreme environmental weather conditions. This work package also includes references for the decontamination of the LADS.

OPERATION IN COLD

The LADS can not be operated unsheltered when temperatures are below 33° F. To operate below this temperature, the LADS must be placed in an LME. The water supply to the LADS must also be stored in a manner that will assure it will not freeze. For suggested set–up in the LME, refer to sheltering requirements in work package (WP 0009 00).

If temperatures in the LME are expected to drop below 33° F during periods when the LADS is set–up, but not operating, a drain cycle (WP 0013 00) should be performed. This will prevent damage to plumbing caused by freezing water. The hoses between the water supply, water supply pump, and the LADS should also be drained.

To avoid draining the LADS at temperatures between 25° F and 33° F, run a CLEAN/HEAT WASH TANK cycle for both drums every few hours to maintain heat in the system.

STORAGE IN EXTREME COLD

Care must be taken when handling electrical cables. Extreme cold weather can cause insulation material on electrical wire to crack, causing short circuits.

Care must be taken when handling hoses. Extreme cold weather can cause materials to become hard, brittle, and easily damaged or broken.

When sitting for any period of time in temperatures below 0° F, place the LADS in a sheltered area out of the wind. Clean off any buildup of ice or snow. Place a footing of planks or brush under frame to prevent unit from freezing to the ground.

Refer to work package WP 0036 00, for proper lubrication during extreme cold conditions.

OPERATION IN HEAT

When operating at temperatures above 90° F, the still distillation rate can increase to the point where boil–overs can occur. Adding an extra stoke of anti–foam during each cycle will help prevent boil–overs.

OPERATION IN EXTREME HEAT

When operating in extreme heat follow OPERATION IN HEAT guidelines. Perform quarterly PMCS monthly and semi–annual PMCS quarterly.

Refer to work package WP 0036 00, for proper lubrication during extreme heat conditions.

OPERATION IN DUSTY OR SANDY AREAS

When operating in sandy or dusty areas, perform weekly PMCS daily, quarterly PMCS monthly, and semi–annual PMCS quarterly.

Keep the LADS closed when not in use. Ensure all manual drain valves are closed. Close and lock drum doors. Ensure that panels or doors on electrical enclosures and junction boxes are closed. If possible, raise platform and install tarp.

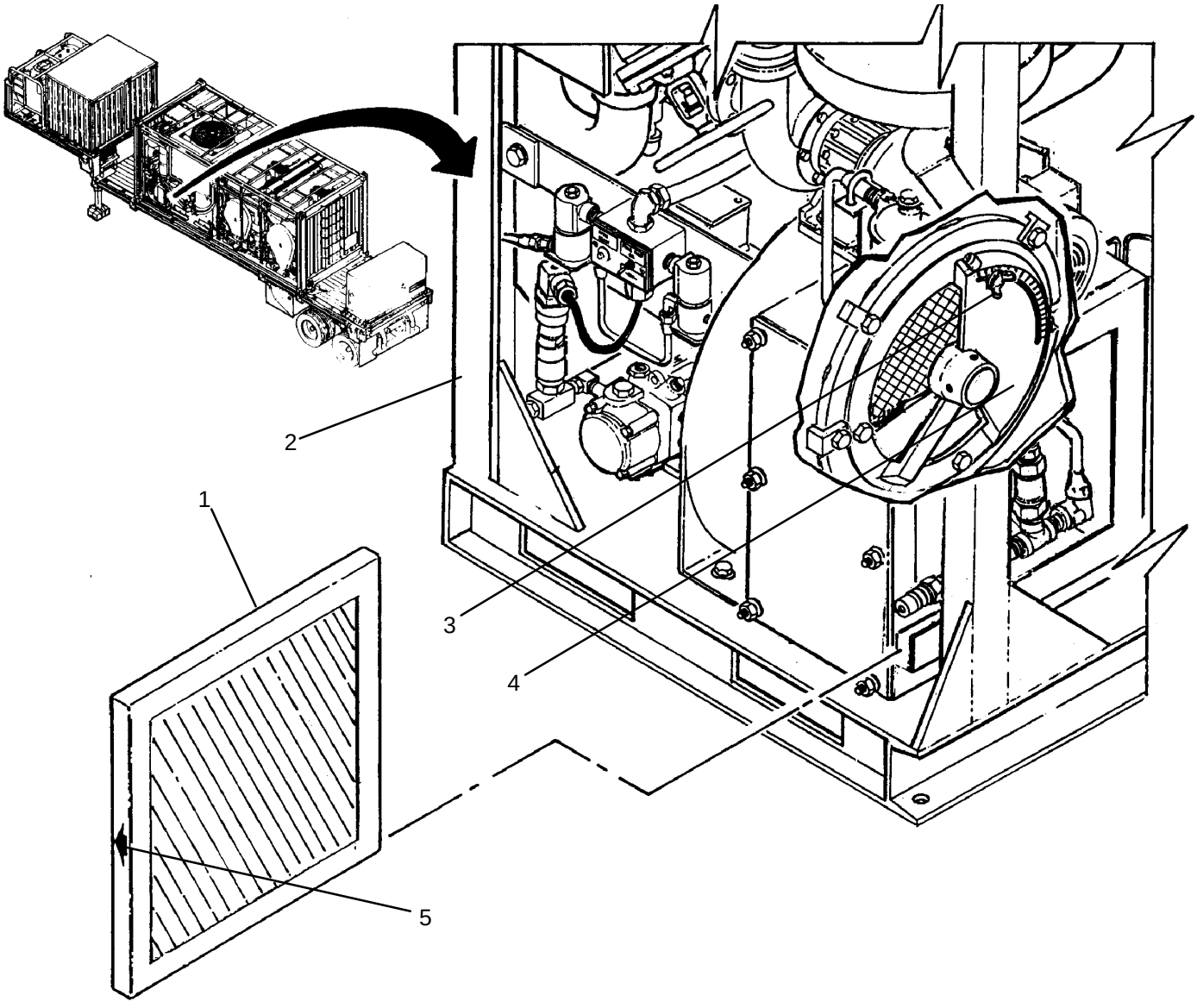
OPERATION AT DIFFERENT ALTITUDES

The LADS heater operation is sensitive to changes in altitude. Whenever the LADS is moved to higher or lower altitudes the fuel/air mixture may need to be readjusted.

1. Slide air inlet filter (1) out of heater (2).
2. Loosen, but do not remove wing screw (3).
3. Pivot inlet plate (4) until wing screw (3) is as listed in Table 1.
4. Hand tighten wing screw (3).
5. Slide air inlet filter (1) back into heater (2) with direction arrow (5) pointing towards heater inlet.

Table 1. Heater Air Inlet Settings.

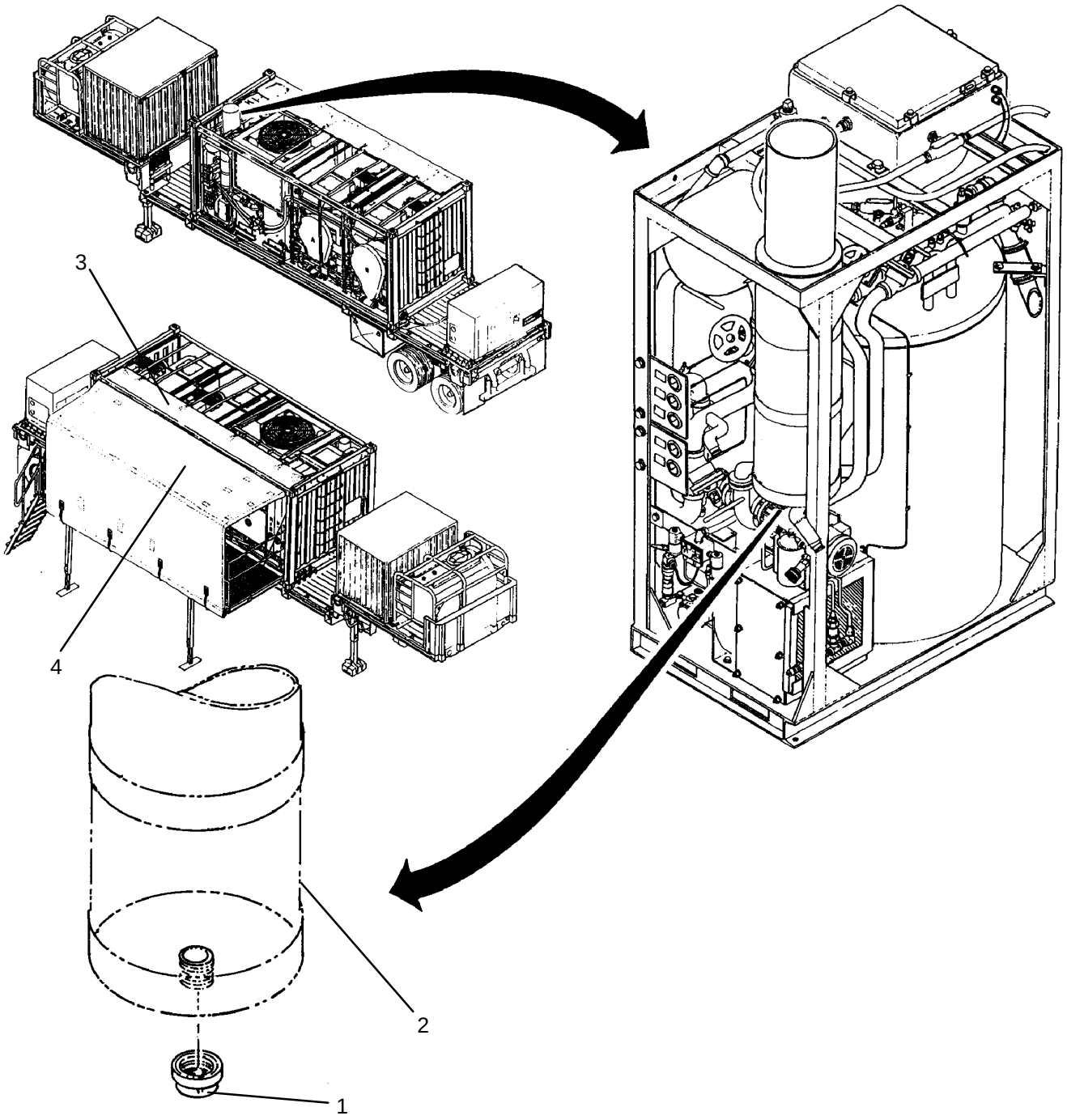
ALTITUDE RANGE (FEET)	ALTITUDE RANGE (METERS)	INLET PLATE POSITION
0 – 2500	0 – 762	Full Closed
2501 – 5000	763 – 1524	Half Open
5001 – 7500	1525 – 2286	Full Open



OPERATION IN RAIN

When the LADS is set–up, but not operating in rainy conditions, the heater exhaust stack may collect water. Prior to operating the LADS after rain, unthread cap (1) from bottom of exhaust stack (2). Allow residual water to drain then thread cap (1) on bottom of exhaust stack (2) hand tight.

When the LADS is set–up, whether operating or not operating in rainy conditions, watch for water collecting on awning extension (3) and awning (4). Periodically push up on bottom of each to drain water.



INTERIM NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) PROCEDURES

Decontamination Procedures

NOTE

DETAILED DECONTAMINATION AND PROTECTION PROCEDURES CAN BE FOUND IN: FM 3–4 & FM 3–5.

GENERAL:

THE FOLLOWING EMERGENCY PROCEDURES CAN BE PERFORMED UNTIL THOROUGH DECON FACILITIES ARE AVAILABLE. THE COMMANDER WILL SUPERVISE, ASSIGN CREW DUTIES, AND ASSIST THE SUPPORTING NBC UNIT.

EMERGENCY PROCEDURES:

IF NBC ATTACK IS KNOWN OR SUSPECTED, INSTALL TARP ON THE LADS FOLLOWING PREPARATION FOR MOVEMENT PROCEDURES. IF THE SEALED SYSTEM IS CONTAMINATED IT MAY BE EVACUATED TO A CLEAN AREA AND THE OUTER PORTION DECONTAMINATED AS AN OPERATIONAL DECON. DO NOT UNMASK UNTIL TOLD TO DO SO.

NUCLEAR DECONTAMINATION:

BRUSH FALLOUT FROM SKIN, CLOTHING, AND EQUIPMENT WITH ANY AVAILABLE (BRUSHES, RAGS, AND TREE BRANCHES). WASH SKIN AND HAVE RADIATION CHECK MADE AS SOON AS TACTICAL SITUATION PERMITS. (YOU CAN FIND INSTRUCTIONS FOR THE CHECK IN FM 3–5).

BIOLOGICAL DECONTAMINATION:

BIOLOGICAL DECONTAMINATION MUST BE COMPATIBLE WITH THE BIOLOGICAL AGENT. FM 3–5 MUST BE USED TO IDENTIFY SPECIFIC PROCEDURES.

CHEMICAL DETECTION AND DECONTAMINATION:

WARNING

DO NOT USE DECONTAMINATION SPRAY ON PERSONNEL: IT COULD CAUSE PERSONAL INJURY.

USE THE CHEMICAL AGENT MONITOR (CAM) TO DETECT THE CHEMICAL AGENT. ALSO THE M8 PAPER FROM THE M256 CHEMICAL AGENT DETECTOR KIT OR M9 PAPER MAY BE USED TO DETERMINE IF LIQUID IS PRESENT ON THE VEHICLE SURFACE.

IF EXPOSURE TO LIQUID AGENT IS KNOWN OR SUSPECTED, CLEAN EXPOSED SKIN, CLOTHING, AND PERSONAL GEAR, IN THAT ORDER, USING M258A1 KIT. USE THE BUDDY SYSTEM. WASH EXPOSED SKIN AND THOROUGHLY DECONTAMINATE AS SOON AS TACTICAL SITUATION PERMITS.

IF THE M8 OR M9 PAPER INDICATES THAT LIQUID CHEMICAL AGENT IS PRESENT ON THE VEHICLE SURFACE USE THE M–13 DECON APPARATUS FOR OPERATIONAL DECON OF THE SERVICING UNIT. AVOID GETTING LIQUID AGENT INTO THE SEALED SYSTEM. SPRAY ONLY SURFACES THAT WILL BE TOUCHED BY THE CREW OR OPERATOR.

DECON PROCEDURES
TAKE TIME. DO AS MUCH
AS YOU CAN BASED ON
THE TACTICAL SITUATION.

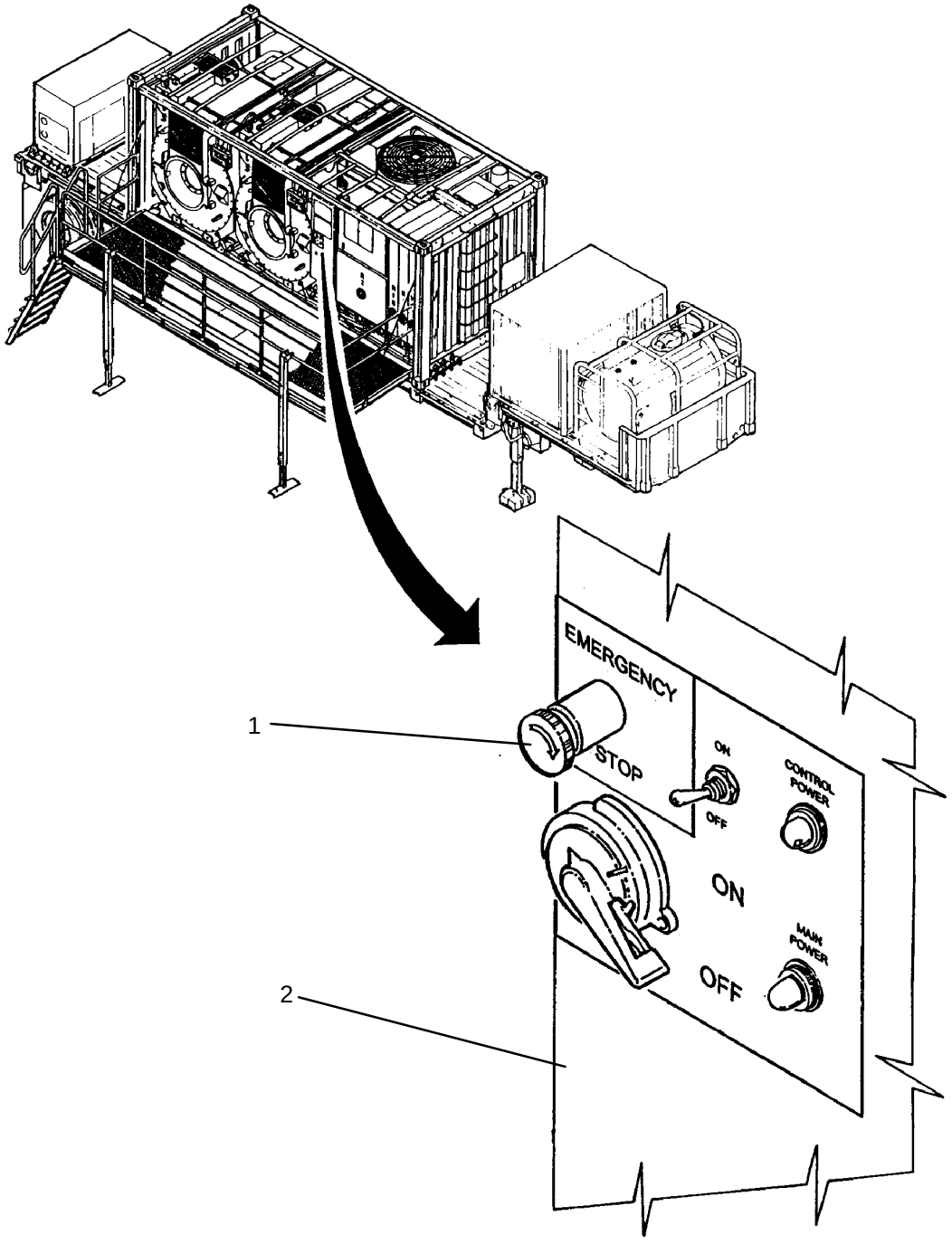
EMERGENCY PROCEDURES

INITIATING AN EMERGENCY STOP

NOTE

When an emergency stop is initiated, the control system will automatically stop operation of the LADS systems.

1. To initiate an emergency stop push in on EMERGENCY STOP switch (1) on main control enclosure (2).
2. To clear an emergency stop condition refer to (WP 0029 00).



END OF WORK PACKAGE

CHAPTER 3

OPERATOR TROUBLESHOOTING PROCEDURES

FOR

LAUNDRY ADVANCED SYSTEM

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

INTRODUCTION TO TROUBLESHOOTING

GENERAL

This chapter contains information for troubleshooting common LADS malfunctions. This chapter cannot list all tests, inspections, and corrective actions needed to correct all malfunctions. If a malfunction is not listed, or if the actions listed do not correct the fault, notify your supervisor.

ALARM CONDITIONS

When the control system detects the need for some type of operator attention relating to a laundry cycle, an audible alarm will sound, and a message will be displayed at operator panel A or B. If a fault occurs, or attention is required on washing/drying system A or B, water recycle system, heating system, air system, or control system, the indication will be provided at operator panel A. There are four alarm levels associated with the LADS operation; Level 1: When the system is operating normally the audible alarms are off, the SYSTEM OPERATIONAL lamps are on, and the ATTENTION REQUIRED lamps are off. Level 2: If the alarm(s) comes on, and remains steady, this indicates that some type of operator action is required. In most cases level 2 alarms alert the operator of a condition that must be corrected, but is not necessarily a fault (i.e. “DRUM DOOR NOT LOCKED”, “ADD ANTI–FOAM”, “ADD FRS”, “UNLOAD LAUNDRY”, etc.). In all cases (except “ADD ANTI–FOAM” and “DRUM WON’T BALANCE”) the operator must perform the required action before the control system will allow laundry cycle(s) to continue. Level 3: If the alarm comes on with a slow pulse a non–critical fault has occurred. In most cases the current laundry cycle(s) may be completed, however, in some cases the current laundry cycle must be ended. Level 4: If the alarm comes on with a fast pulse a critical fault has occurred and LADS operation will be shut–down by the control system. Whenever a level 4 alarm comes on, the ATTENTION REQUIRED lamp(s) will also be on and the SYSTEM OPERATIONAL lamp will be off. When level 3 or 4 alarm messages appear, they should be written down to help your supervisor and/or maintenance personnel when conducting troubleshooting procedures.

EXAMINING SYSTEM STATUS

During water filling, water heating, laundry, cooldown, and draining operations, the status of key system parameters can be monitored using the EXAMINE INPUTS mode. Also, when conducting troubleshooting procedures, references may be made to use the EXAMINE INPUTS mode to observe a particular sensor or switch status. Obtaining access to this information is described below.

1. Monitor display (WP 0008 00, Figure 2,6), it should read:

WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F FILL FROM WASH TANK	PAUSE EXAMINE INPUTS

or

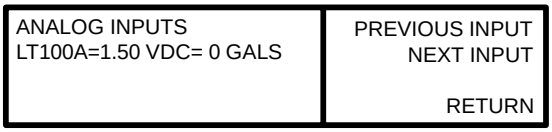
CYCLE PAUSED	CONTINUE CYCLE END CYCLE EXAMINE INPUTS

2. Press MENU SELECTION switch (10) to select EXAMINE INPUTS.
3. Monitor display (6), it should read:

EXAMINE INPUTS	ANALOG INPUTS DISCRETE INPUTS RETURN

EXAMINING SYSTEM STATUS – CONTINUED

4. Press appropriate MENU SELECTION switch as follows:
   a. Select ANALOG INPUTS to monitor status of analog inputs (Refer to Table 1). Proceed to step 5.
   b. Select DISCRETE INPUTS to monitor status of discrete inputs (Refer to Table 2). Proceed to step 5.
   c. Select RETURN to exit examine inputs menu.
5. Monitor display (6), it should read:



or

6. Press appropriate MENU SELECTION switch as follows:
   a. Select PREVIOUS INPUT to monitor previous input.
   b. Select NEXT INPUT to monitor next input.
   c. Select RETURN to exit analog or discrete inputs menu and return to step 4.

TABLE 1. Analog Inputs Data.

SENSOR	FUNCTION	RANGE
LT100A	Wash Tank A Level	0–80 GALS
LT100B	Wash Tank B Level	0–80 GALS
LT101A	Rinse 1 Tank A Level	0–80 GALS
LT101B	Rinse 1 Tank B Level	0–80 GALS
LT102	Rinse 2 Tank Level	0–150 GALS
LT200	Still Level	0–15 INCHES
LT201	Standpipe Level	0–25 INCHES
PT200	Still Internal Pressure	0–5 PSIG
PT300	Thermal Fluid Pump Inlet Pressure	VAC – 15 PSIG
PT301	Thermal Fluid Pump Outlet Pressure	0–100 PSIG
PT302	Heater Thermal Fluid Outlet Pressure	0–100 PSIG
PT500	Air Tank Storage Pressure	0–200 PSIG
PT501	Product Air Pressure	0–200 PSIG

EXAMINING SYSTEM STATUS – CONTINUED

TABLE 1. Analog Inputs Data – Continued.

SENSOR	FUNCTION	RANGE
TE100	Ambient Air	–58 – 212 Degrees F
TE101A	Dryer A Inlet Air Temperature	–58 – 392 Degrees F
TE101B	Dryer B Inlet Air Temperature	–58 – 392 Degrees F
TE102A	Dryer A Outlet Air Temperature	–58 – 392 Degrees F
TE102B	Dryer A Outlet Air Temperature	–58 – 392 Degrees F
TE103	Rinse 2 Tank Outlet Water Temperature	–58 – 212 Degrees F
TE200	Still Internal Temperature	–58 – 392 Degrees F
TE201	Still Condenser Outlet Water Temperature	–58 – 392 Degrees F
TE202	Rinse 2 Tank Inlet Water Temperature	–58 – 392 Degrees F
TE300	Heater Outlet Thermal Fluid Temperature	–58 – 482 Degrees F
VREFL	PCB1 Voltage Reference Lo	0.75–0.79 VDC
VREFH	PCB1 Voltage Reference Hi	9.20–9.25VDC

TABLE 2. Discrete Inputs Data.

DEVICE	FUNCTION	STATUS
FP300	Flame Programmer Alarm Signal	OFF = Normal/ON = Fault Detected
K100A	Drum A Inverter Fault Signal	OFF = Normal/ON = Fault Detected
K100B	Drum B Inverter Fault Signal	OFF = Normal/ON = Fault Detected
K104	Dryer Blowers A and B Inverter Fault Signal	OFF = Normal/ON = Fault Detected
K200	Still Condenser Fan/Heating System Inverter Fault Signal	OFF = Normal/ON = Fault Detected
K500	Air Compressor Inverter Fault Signal	OFF = Normal/ON = Trip Detected
OL101A	Water Pump A Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL101B	Water Pump B Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL104A	Dryer Blower A Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL104B	Dryer Blower B Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL105	Water Supply Pump Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected

EXAMINING SYSTEM STATUS – CONTINUED

TABLE 2. Discrete Inputs Data – Continued.

DEVICE	FUNCTION	STATUS
OL200	Still Condenser Fan Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL201	Distillate Pump Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL300	Thermal Fluid Pump Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL301	Burner Blower Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
OL302	Fuel Pump Overload Relay Trip Detector	OFF = Normal/ON = Trip Detected
PBS5A	Operator Panel A SILENCE ALARM Switch	OFF = Switch Released/ON = Switch Depressed
PBS5B	Operator Panel A SILENCE ALARM Switch	OFF = Switch Released/ON = Switch Depressed
PS302	Burner Fuel Pressure Switch	OFF = No or Low Fuel Pressure/ON = Normal Fuel Pressure
PS300	Burner Blower Inlet Air Pressure Switch	OFF = No or Low Air Pressure/ON = Normal Air Pressure
PS301	Burner Blower Outlet Air Pressure Switch	OFF = No or Low Air Pressure/ON = Normal Air Pressure
TS300	Thermal Fluid Temperature Limit Switch	ON = Normal Temperature/OFF = High Temperature
ZS100A	Drum Door A Position Switch	OFF= Door Open/ON= Door Closed
ZS100B	Drum Door B Position Switch	OFF= Door Open/ON= Door Closed
ZS101A	Drum Door Lock A Position Switch	OFF= Lock Retracted/ON= Lock Extended
ZS101B	Drum Door Lock B Position Switch	OFF= Lock Retracted/ON= Lock Extended
ZS102A	Drum A Rotation Sensor	OFF = Sprocket Spoke Not Aligned/ON = Sprocket Spoke Aligned
ZS102B	Drum B Rotation Sensor	OFF = Sprocket Spoke Not Aligned/ON = Sprocket Spoke Aligned
ZS103A	Drum A Balance Switch	OFF = Drum Balanced/ON = Drum Not Balanced
ZS103B	Drum B Balance Switch	OFF = Drum Balanced/ON = Drum Not Balanced
ZS200	Still Doors Position Switch	OFF= Door(s) Open/ON= Doors Closed

MALFUNCTION/SYMPTOM INDEX

The TROUBLESHOOTING INDEX (WP 0018 00) is a quick reference index for determining the proper disposition of system malfunctions/symptoms. There are two methods for finding malfunctions/symptoms on the LADS. Operators may observe a malfunction or the control system may detect a fault. Malfunction/symptoms are listed in the index as follows: The faults that would normally be observed during startup are listed first. The remaining faults that could be observed at any time during laundry operations are listed next. These malfunctions /symptoms are listed alphabetically by system. The faults that are detected by the control system, and communicated to the operator through the operator panel A display, are listed last in Table 1. This table lists the alarm messages in alphabetical order along with listing of the “ALARM LEVEL” associated with each message. Associated with each malfunction/symptom or alarm message is an “OPERATOR ACTION” column. This column provides information on what action you should take when a fault occurs. Possible dispositions include:

PAUSE CYCLE– If **“PAUSE CYCLE”** is listed, you may be able to troubleshoot and fix the fault during current laundry cycle(s). Cycles can not be paused in the “FILL FROM WASH TANK”, “FILL FROM RINSE1 TANK”, or “FILL FROM RINSE 2 TANK” steps. Pausing a cycle during “WASHING”, “RINSING 1”, or “RINSING 2” steps should be avoided if possible to prevent starting drum rotation from a complete stop with the full weight of the laundry and water in the drum. If a cycle is paused during the “EXTRACT TO STILL”, “EXTRACT TO WASH TANK” or “EXTRACT TO RINSE 1 TANK” steps the control system will automatically go back to the “DRAIN TO STILL”, “DRAIN TO WASH TANK”, or “DRAIN TO RINSE 2 TANK” steps. If a cycle is paused at any time during a “DRY” step, the entire “DRY” step will be repeated. To avoid repeating the “DRY” step, utilize the “DRY ONLY 10 or 20 MIN” cycles after correcting a problem and restarting the cycle. **PAUSE** a laundry cycle as follows:

1. Monitor display (WP 0008 00, Figure 2, 6), it should read:

WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F	PAUSE EXAMINE INPUTS

2. Press MENU SELECTION switch (7) to pause laundry cycle.
3. Monitor display (6), it should read:

CYCLE PAUSED	CONTINUE CYCLE END CYCLE

Once the laundry cycle is paused, perform the referenced troubleshooting work package or notify maintenance as required. After fault has been corrected continue laundry cycle as follows:

1. Monitor display (6), it should read:

CYCLE PAUSED	CONTINUE CYCLE END CYCLE

2. Press MENU SELECTION switch (7) to continue laundry cycle.

COMPLETE CYCLE – If **“COMPLETE CYCLE”** is listed, the fault should not prevent you from completing the current laundry cycle(s). Once the laundry cycle is complete, determine if the alarm message is still being displayed. If so, perform the referenced troubleshooting work package or notify maintenance as required. If you cannot complete the laundry cycle, follow the **“END CYCLE”** instructions.

MALFUNCTION/SYMPTOM INDEX – Continued

END CYCLE – If **"END CYCLE"** is listed, the fault will prevent you from completing the current laundry cycle(s), and therefore, must be terminated as follows:

1. Monitor display (WP 0008 00, Figure 2, 6), it should read:

WASH CYCLE X IN PROGRESS WASH= XXX F DRY= XXX F	PAUSE EXAMINE INPUTS

2. Press MENU SELECTION switch (7) to interrupt laundry cycle.
3. Monitor display (6), it should read:

CYCLE PAUSED	CONTINUE CYCLE END CYCLE EXAMINE INPUTS

4. Press MENU SELECTION switch (8) to end laundry cycle.

Once the laundry cycle has ended, determine if the alarm message is still being displayed. If so, perform the referenced troubleshooting work package or notify maintenance as required. If the laundry cycle cannot be ended follow the "Notify Maintenance" instructions.

NOTIFY MAINTENANCE – If "Notify Maintenance" is listed, the fault will prevent further laundry operations from continuing and maintenance should be notified immediately. When "Notify Maintenance" is required, leave the LADS in power on condition if possible. This will enable maintenance personnel to troubleshoot and correct problems more efficiently and result in bringing the LADS back into operation more rapidly. If power can not be left on, operator personnel should record: 1) the cycle step in progress at the time of the fault, 2) the fault messages displayed or observed, and 3) the level, pressure, and temperature readings using the "EXAMINE INPUTS" mode.

WP 00XX 00 – If a work package is listed, proceed directly to the referenced work package to start the troubleshooting process. Should any one malfunction/symptom require more than one troubleshooting procedure to arrive at the most likely fault, a reference will be made within the starting procedure to lead you to subsequent procedures, until successful fault isolation or disposition is achieved.

TROUBLESHOOTING PROCEDURES

Troubleshooting work packages (WP 0019 00 through WP 0030 00) contain step-by-step procedures of the tests or inspections, and corrective actions required to return the LADS to normal operation or to determine if the malfunction requires a higher level of maintenance be performed. Separate work packages are provided for the observed and displayed faults for the Washing/Drying System, Water Recycle System, Heating System, Air System, and Control System. Within each work package the faults are listed in alphabetical order. Each work package is headed by initial step information that outlines certain conditions that must be met before starting the task. **DO NOT** start a task until you understand what you are to do.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

TROUBLESHOOTING INDEX

Malfunction/Symptom	Troubleshooting Procedure
CONTROL SYSTEM (Main Control Enclosure Indications)	
1. CONTROL POWER lamp is not on	WP 0027 00
2. MAIN POWER lamp is not on	WP 0027 00
CONTROL SYSTEM (Operator Panel Indications)	
1. ALARM does not sound	Complete Cycle/Notify Unit Maintenance
2. ALARM will not turn off when SILENCE ALARM switch is pressed	Complete Cycle/Notify Unit Maintenance
3. ATTENTION REQUIRED lamp is not on	WP 0028 00
4. Display does not come on	WP 0028 00
5. Display comes on but has scrambled or no characters	Notify Unit Maintenance
6. Display state does not change when menu selection switch is pressed	Notify Unit Maintenance
7. SYSTEM OPERABLE lamp is not on	WP 0028 00
CONTROL SYSTEM (Observed Faults)	
1. Inverter enclosure fan does not come on	Notify Unit Maintenance
2. Drum motor cooling fan does not come on	Notify Unit Maintenance
WASHING/DRYING SYSTEM (Observed Faults)	
1. Drum Door Will Not Open	Notify Unit Maintenance
2. Drum Shaking Excessively	Pause Cycle/WP 0019 00
3. Laundry Cycle Can Not Be Started	Notify Unit Maintenance
4. Laundry Not Clean	WP 0019 00
5. Laundry Cycle Remains in Washing Step	Notify Unit Maintenance
6. Laundry Not Drying	WP 0019 00
7. R2 Tank Not Heating	WP 0019 00
8. Water Spraying From Blower During Extract	Complete Cycle/Notify Unit Maintenance
9. Water Not Draining From Drum	Pause Cycle/WP 0019 00
10. Water Visible at Rear Seal of Drum	Complete Cycle/ WP 0019 00

Malfunction/Symptom	Troubleshooting Procedure
WATER RECYCLE SYSTEM (Observed Faults)	
1. Cooldown or Drain Cycle Will Not Finish	Notify Unit Maintenance
2. Recycled Water Temperature High	Complete Cycle(s) WP 0021 00
3. Still Door(s) Will Not Open	WP 0021 00
HEATING SYSTEM (Observed Faults)	
1. Heater Smoking	WP 0023 00
2. Fuel Pump Will Not Prime	WP 0023 00
AIR SYSTEM (Observed Faults)	
1. Air Compressor Does Not Come On	WP 0025 00
2. Water In Air Lines	Complete Cycle(s)/Notify Unit Maintenance
AUXILIARY EQUIPMENT (Observed Faults)	
1. Auxiliary Overhead Light Does Not Turn On	WP 0030 00
CONTROL SYSTEM (Operator Panel Alarm Messages) Refer to Table 1	

TABLE 1. Operator Panel Alarm Messages.

FAILURE MESSAGE	ALARM LEVEL	OPERATOR ACTION
Air Compr Inverter Fault	3	Pause Cycle(s)/WP 0026 00
Air Product Press Lo	4	WP 0026 00
Air Product Press Hi	3	Complete Cycle(s)Notify Unit Maintenance
Air Tank Not Pressurizing	4	WP 0026 00
Air Tank Press Hi	3	Complete Cycle(s)/Notify Unit Maintenance
Ambient Air Temp Hi	3	Complete Cycle(s)/WP 0020 00
Ambient Air Temp Lo	3	Complete Cycle(s)/WP 0020 00
Burner Blwr In Press Lo	3	Pause Cycle(s)/WP 0024 00
Burner Blwr Out Press Lo	3	Pause Cycle(s)/WP 0024 00
Burner Blower Overload	3	Pause Cycle(s)/Notify Unit Maintenance
Condensate Temp Hi	3	Complete Cycle(s)/WP 0022 00
Condensate Temp Lo	3	Complete Cycle(s)/Notify Unit Maintenance
Condenser Fan Overload	3	End Cycle(s)/Notify Unit Maintenance
CPU Test Failure (Only at Startup)	4	WP 0029 00
Distillate Pump Overload	3	Notify Unit Maintenance
Drum A Braking Slow	3	Complete Cycle/Notify Unit Maintenance
Drum A Inverter Fault	3	Pause Cycle/WP 0020 00
Drum A No Rotation	3	Pause Cycle/WP 0020 00
Drum A Stalling	2	Pause Cycle/WP 0020 00
Drum A Will Not Balance	2	WP 0020 00
Drum B Braking Slow	3	Complete Cycle/Notify Unit Maintenance
Drum B Inverter Fault	3	Pause Cycle/WP 0020 00
Drum B No Rotation	3	Pause Cycle/WP 0020 00
Drum B Stalling	2	Pause Cycle/WP 0020 00
Drum B Will Not Balance	2	WP 0020 00
Drum Door A Not Locked	2	WP 0020 00
Drum Door B Not Locked	2	WP 0020 00
Dryer A Inlet Temp Hi	3	Pause Cycle/WP 0020 00
Dryer A Inlet Temp Lo	3	Pause Cycle/WP 0020 00
Dryer B Inlet Temp Hi	3	Pause Cycle/WP 0020 00
Dryer B Inlet Temp Lo	3	Pause Cycle/WP 0020 00
Dryer Blower A Overload	3	Pause Cycle/Notify Unit Maintenance
Dryer Blower B Overload	3	Pause Cycle/Notify Unit Maintenance
Emergency Stop Activated	4	WP 0029 00

TABLE 1. Operator Panel Alarm Messages – Continued.

FAILURE MESSAGE	ALARM LEVEL	OPERATOR ACTION
Fuel Level Lo	4	Pause Cycle(s)/WP 0024 00
Fuel Pressure Lo	3	Pause Cycle(s)/WP 0024 00
Fuel Pump Overload	3	Pause Cycle(s)/Notify Unit Maintenance
Heating System Failure	3	Pause Cycle(s)/WP 0024 00
LT100A Failure	3	Complete Cycle/Notify Unit Maintenance
LT100B Failure	3	Complete Cycle/Notify Unit Maintenance
LT101A Failure	3	Complete Cycle/Notify Unit Maintenance
LT101B Failure	3	Complete Cycle/Notify Unit Maintenance
LT102 Failure	3	End Cycle/Notify Unit Maintenance
LT200 Failure	3	Complete Cycle/Notify Unit Maintenance
LT201 Failure	3	End Cycle(s)/Notify Unit Maintenance
PCB3 SSR 7 FAULT	3	Complete Cycle(s)/Notify Unit Maintenance
PCB3 SSR 8 FAULT	3	Complete Cycle(s)/Notify Unit Maintenance
PCB3 SSR 9 FAULT	3	Complete Cycle(s)/Notify Unit Maintenance
PT200 Failure	4	Notify Unit Maintenance
PT300 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
PT301 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
PT302 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
PT500 Failure	4	Notify Unit Maintenance
PT501 Failure	4	Notify Unit Maintenance
RAM Test Failure (Only at Startup)	4	WP 0029 00
ROM Test Failure (Only at Startup)	4	WP 0029 00
R1 Tank A Not Emptying	3	Pause Cycle/WP 0020 00
R1 Tank A Not Filling	3	Pause Cycle/WP 0020 00
R1 Tank B Not Emptying	3	Pause Cycle/WP 0020 00
R1 Tank B Not Filling	3	Pause Cycle/WP 0020 00
R2 Tank Not Emptying	3	Pause Cycle(s)/WP 0020 00
R2 Tank Not Filling	3	Pause Cycle(s)/WP 0020 00
R2 Water Temp Hi	3	Complete Cycle/WP 0020 00
R2 Water Temp Lo	3	Complete Cycle/WP 0020 00
Stall Sensing Fault	3	Complete Cycle(s)/Notify Unit Maintenance
Standpipe Level Lo	3	Complete Cycle(s)/WP 0022 00
Standpipe Not Emptying	3	WP 0022 00
Still Door(s) Open	2	WP 0022 00
Still Not Boiling Down	3	Complete Cycle(s)/Notify Unit Maintenance
Still Not Filling	3	Complete Cycle(s)/WP 0022 00

TABLE 1. Operator Panel Alarm Messages – Continued.

FAILURE MESSAGE	ALARM LEVEL	OPERATOR ACTION
Still Press Hi	3	WP 0022 00
Still Press Lo	3	Complete Cycle(s)/Notify Unit Maintenance
Still Temp Lo	3	Complete Cycle(s)/Notify Unit Maintenance
TE100 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
TE101A Failure	3	Complete Cycle/Notify Unit Maintenance
TE101B Failure	3	Complete Cycle/Notify Unit Maintenance
TE102A Failure	3	Complete Cycle/Notify Unit Maintenance
TE102B Failure	3	Complete Cycle/Notify Unit Maintenance
TE103 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
TE200 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
TE201 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
TE202 Failure	3	Complete Cycle(s)/Notify Unit Maintenance
TE300 Failure	3	End Cycle(s)/Notify Unit Maintenance
TF Flow Lo	3	End Cycle(s)/WP 0024 00
TF Pump Inlet Press Lo	3	End Cycle(s)/WP 0024 00
TF Pump Outlet Press Hi	3	End Cycle(s)/Notify Maintenance
TF Pump Outlet Press Lo	3	End Cycle(s)/WP 0024 00
TF Pump Overload	3	End Cycle(s)/Notify Unit Maintenance
TF Temp Hi	3	End Cycle(s)/Notify Unit Maintenance
TF Temp Hi Limit	3	End Cycle(s)/Notify Unit Maintenance
TF Temp Lo	3	End Cycle(s)/Notify Unit Maintenance
VREF(S) Out Of Range	3	End Cycle(s)/Notify Unit Maintenance
Wash Tank A Not Emptying	3	Pause Cycle/WP 0020 00
Wash Tank A Not Filling	3	Pause Cycle/WP 0020 00
Wash Tank B Not Emptying	3	Pause Cycle/WP 0020 00
Wash Tank B Not Filling	3	Pause Cycle/WP 0020 00
Water Pump A Overload	3	Pause Cycle/Notify Unit Maintenance
Water Pump B Overload	3	Pause Cycle/Notify Unit Maintenance
Water Supply Pump Overload	3	Continue Cycle(s)/Notify Unit Maintenance
10 HP Inverter Fault	3	Pause Cycle(s)/ WP 0020 00
20 HP Inverter Fault	3	Pause Cycle(s)/WP 0022 00

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
WASHING/DRYING SYSTEM OBSERVED FAULTS

DRUM SHAKING EXCESSIVELY

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE.
2. Unlock and open drum door.

NOTE

If laundry load exceeds 200 lbs, is under 50 lbs, has over–stuffed bags, or if the LADS is not properly leveled, drum will not balance properly.

3. Check for excessive or under–sized load (Over 30 or Under 10 Bags).

   Was too much laundry or not enough laundry loaded?

   YES Properly load drum. Go to step 6.

   NO Go to step 4.

4. Check for laundry bags twisted into large groups.

   Were laundry bags twisted together?

   YES Untwist bags. Go to step 6.

   NO Go to step 5.

5. Check for over–stuffed laundry bags.

   Are bags over–stuffed?

   YES Remove and re–bag any over–stuffed bags. Go to step 6.

   NO Notify maintenance.

6. Close and lock drum door.
7. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select COMPLETE CYCLE.

   Does laundry cycle finish without any shaking or balancing problems?

   YES Return to normal operation.

   NO Notify maintenance.

LAUNDRY NOT CLEAN

1. Determine if laundry was excessively dirty prior to washing.

   Was laundry excessively dirty?

   YES Prior to processing excessively dirty laundry pre–rinse the laundry as described in LAUNDRY PROCESSING GUIDELINES WP 0009 00.

   NO Go to step 2.

2. Check water temperature used versus washing instructions for laundry load.

   Was correct water temperature used?

   YES Go to step 3.

   NO Repeat laundry cycle with proper water temperature.

LAUNDRY NOT CLEAN – Continued

3. Determine which laundry cycle was used to process laundry.

   Was a laundry cycle that has a longer wash time used?

   YES Go to step 4.

   NO Repeat laundry cycle using a longer wash cycle.

4. Check cleanliness of water in the Wash and Rinse 1 tanks.

   Does water appear to be dirty?

   YES Drain dirty water IAW (WP 0013 00), return to normal operation

   NO Repeat

LAUNDRY NOT DRYING

Refer to DRYER A or B INLET TEMP HI/LO FAULT (WP 0020 00).

R2 TANK NOT HEATING

1. Check drain valves on bottom of still.

   Are drain valves open?

   YES Close drain valves. Return to initial adjustments, before use, and self tests (WP 0011 00).

   NO Go to step 2.

2. Check for water leakage at still door gaskets.

   Is water leaking from gasket(s)

   YES Replace still door gasket(s) (WP 0048 00).

   NO Go to step 3.

3. Using EXAMINE INPUTS mode observe reading for TE300 (thermal fluid temperature).

   Is reading >250 degrees F?

   YES Go to step 4.

   NO Go to HEATING SYSTEM FAILURE FAULT (WP 0024 00).

4. At operator panel A use MENU SELECTION switch (WP 0008 00, Figure 2, 9) to select OVERRIDE HEATING.

5. Perform laundry operations on loads better suited for current temperature and allow water to heat–up to desired temperature.

   Does R2 WATER TEMP increase to desired temperature after 3 or less cycles.

   YES Return to normal operation.

   NO Perform laundry operations as necessary then notify maintenance.

WATER NOT DRAINING FROM DRUM

1. Use MENU SELECTION switch (WP 0008, Figure 2, 7) to select PAUSE.
2. Check for debris in water pump strainer (WP 0041 00).

   Is strainer clean?

   YES Go to step 3.

   NO Clean and replace strainer. Select MENU SELECTION switch (WP 0008, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.
3. Disconnect hose from drain port at bottom of drum then check for debris blocking drain port or hose.

   Is drain port or hose blocked with debris?

   YES Remove blockage. Go to step 4.

   NO Go to step 4.
4. Reconnect hose to drain port at bottom of drum.
5. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008, Figure 2, 7) to CONTINUE CYCLE.

   Does water drain from drum?

   YES Return to normal operation.

   NO Notify Maintenance.

WATER VISIBLE AT REAR SEAL OF DRUM

1. Use appropriate MENU SELECTION switch (WP 0008, Figure 2, 7) to select PAUSE.
2. Check for presence of standing water inside drum.

   Is standing water visible through window in drum door?

   YES Go to WATER NOT DRAINING FROM DRUM FAULT.

   NO Go to step 3.
3. Lubricate rear drum seal (WP 0036 00).
4. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008, Figure 2, 7) to CONTINUE CYCLE.
5. Observe rear drum seal during extract portions of laundry cycle.

   Does water come out of rear drum seal?

   YES Notify Maintenance.

   NO Return to normal operation.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
WASHING/DRYING SYSTEM DISPLAYED FAULTS

AMBIENT TEMPERATURE HI OR LO

1. Obtain ambient temperature.

   Is temperature between 33 and 120 degrees F?

   YES Notify maintenance.

   NO Refer to Operation Under Unusual Conditions (WP 0016 00).

DRUM A OR B INVERTER FAULT

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE .
2. Verify drum is not rotating, drum door is closed, and handle is engaged.
3. Check voltage and frequency output from power source.

   Is voltage and frequency set to correct levels?

   YES Go to step 4.

   NO Correct external power source output voltage and/or frequency as necessary. Go to step 4.
4. At inverter enclosure press DRUM A (WP 0008 00, Figure 3, 1) or DRUM B (2) RESET switch.
5. Wait about 20 seconds, then at operator panel where cycle was paused, press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

   Does another “DRUM INVERTER FAULT” occur?

   YES Notify Maintenance.

   NO Return to normal operation.

DRUM A OR B NO ROTATION FAULT

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution. Only maintenance personnel shall conduct servicing beyond trouble-shooting procedures on electrical controls and circuits.

1. Observe status of display (WP 0008 00, Figure 2, 6).

   Does display indicate an INVERTER FAULT message?

   YES Go to DRUM A or B INVERTER FAULT.

   NO Go to step 2.
2. Open door on main control enclosure.
3. Observe position of circuit breaker CB3 (WP 0008 00, Figure 1, 8) for drum A or CB4 (9) for drum B.

   Is circuit breaker ON?

   YES Notify Maintenance.

   NO Go to step 4.

DRUM A OR B NO ROTATION FAULT – Continued

4. Position circuit breaker to ON then close and secure door.
5. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

Does another “DRUM NO ROTATION FAULT” occur?

YES Notify Maintenance.

NO Return to normal operation.

DRUM DOOR A or B NOT LOCKED OR DRUM DOOR A or B OPEN

1. Check position of drum door (1) and handle (2).

Is drum door closed and handle engaged?

YES Go to step 2.

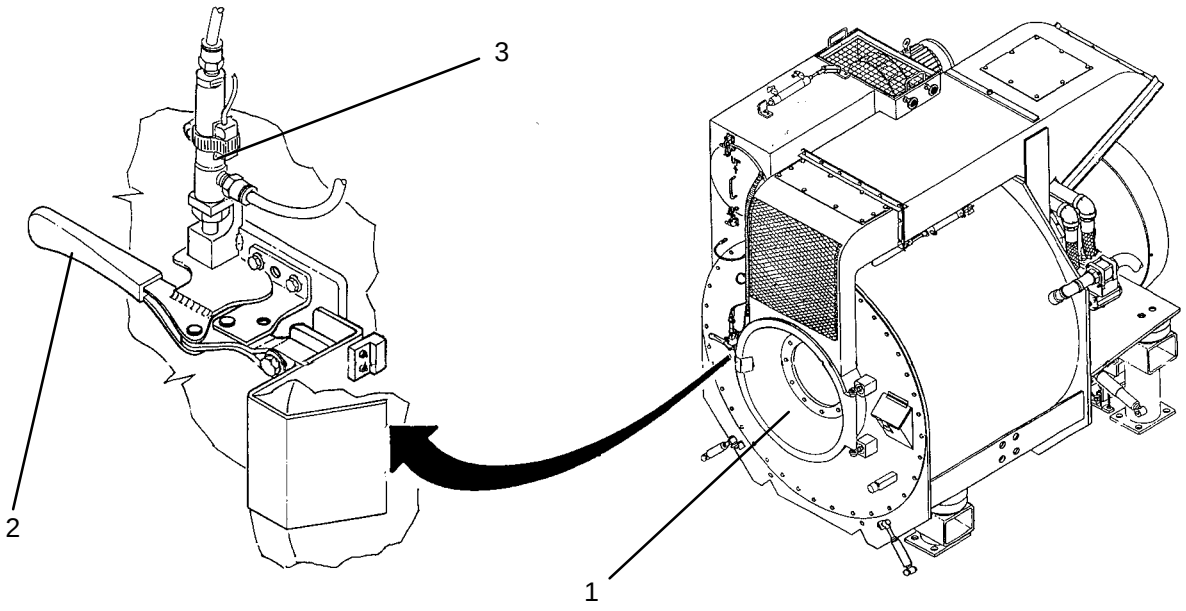
NO Close door and engage handle. Return to normal operation.

2. Move handle (2) back and forth slightly and listen for lock (3) to extend.

Does lock extend when handle is moved?

YES Return to normal operation.

NO Notify maintenance.



DRUM A or B STALLING

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE.
2. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

   Does another drum motor stall occur?

   YES Go to step 3.

   NO Return to normal operation.
3. Check for debris in water pump strainer (WP 0041 00).

   Is strainer clean?

   YES Go to step 4.

   NO Clean and replace strainer. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.
4. Check for presence of standing water inside drum.

   Is standing water visible through window in drum door?

   YES Go to WATER NOT DRAINING FROM DRUM FAULT.

   NO Go to step 5.
5. Check voltage and frequency output from power source.

   Is voltage and frequency set to correct levels?

   YES Notify Maintenance.

   NO Correct external power source output voltage and/or frequency as necessary.

DRUM A OR B WILL NOT BALANCE

Refer to DRUM SHAKING EXCESSIVELY FAULT (WP 0019 00).

DRYER A or B INLET TEMP HI/LO

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE.
2. Remove and inspect lint filter (WP 0039 00).

   Is lint filter clean?

   YES Go to step 3.

   NO Clean and reinstall lint filter. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.
3. Check cleanliness of dryer inlet screen (WP 0037 00).

   Is dryer inlet screen clean?

   YES Go to step 4.

   NO Clean and reinstall dryer inlet screen. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.
4. Check dryer outlet guard for debris (WP 0038 00).

   Is dryer outlet guard clear?

   YES Go to step 5.

   NO Remove debris from dryer outlet guard. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

DRYER A or B INLET TEMP HI/LO – Continued

5. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE then check drying temperature used versus drying instructions for laundry load.

   Was correct drying temperature used?

   YES PAUSE cycle. Go to step 6.

   NO Repeat laundry cycle with proper drying temperature or perform DRY ONLY cycle as desired.

6. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

   Does dryer blower come on?

   YES PAUSE cycle. Go to step 11.

   NO Go to step 7.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution. Only maintenance personnel shall conduct servicing beyond trouble-shooting procedures on electrical controls and circuits.

7. Open door on main control enclosure.
8. Observe position of circuit breaker CB2 (WP 0008 00, Figure 1, 8).

   Is circuit breaker ON?

   YES Notify Maintenance.

   NO Go to step 9.

9. Position circuit breaker to ON then close and secure door.
10. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

    Does dryer blower come on?

    YES Return to normal operation.

    NO Notify Maintenance.

11. Check for debris in water pump strainer (WP 0041 00).

    Is strainer clean?

    YES Go to step 12.

    NO Clean and replace strainer. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

12. Check for debris at drain port in bottom of washing/drying drum.

    Is drain port blocked?

    YES Remove blockage as necessary. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

    NO Run drying cycle to complete current load then notify maintenance.

R1 or WASH TANK NOT FILLING

1. Determine if problem occurred during initial filling or during a laundry cycle.

   Did problem occur during initial filling?

   YES Go to step 2.

   NO PAUSE cycle. Go to step 9.

2. Check water supply.

   Is water supply adequate?

   YES Go to step 3.

   NO Replenish water supply. Return to normal operation.

3. Check hose connections at water supply, water supply pump, and LADS.

   Are hoses properly connected?

   YES Go to step 4.

   NO Properly connect hoses. Return to normal operation.

4. Check electrical cable connection at water supply pump and LADS.

   Is electrical cable properly connected?

   YES Go to step 5.

   NO Properly connect cable. Return to normal operation.

5. Check rotation and proper priming of water supply pump.

   Is pump running properly?

   YES Go to step 6.

   NO Install an operational water supply pump.

6. Check petcock on water supply pump.

   Is petcock open?

   YES Close petcock. Return to normal operation.

   NO Go to step 7.

7. Check caps on water tank manifolds.

   Are caps installed?

   YES Go to step 8.

   NO Properly install cap(s). Return to normal operation.

8. Check all water hose connections for signs of leakage.

   Are any leaks found?

   YES Repair as necessary or notify maintenance.

   NO Notify Maintenance.

9. Check for debris in water pump strainer (WP 0041 00).

   Is strainer clean?

   YES Go to step 10.

   NO Clean and replace strainer. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

R1 or WASH TANK NOT FILLING – Continued

10. Check for presence of standing water inside drum.

    Is standing water visible through window in drum door?

    YES Go to WATER NOT DRAINING FROM DRUM FAULT.

    NO Return to step 3.

R1, R2, or WASH TANK NOT EMPTYING

1. Use MENU SELECTION switch (WP 0008, Figure 2, 7) to select PAUSE.
2. Check for debris in water pump strainer (WP 0041 00).

    Is strainer clean?

    YES Go to step 3.

    NO Clean and replace strainer. Return to normal operation.

3. At operator panel where cycle was paused press MENU SELECTION switch (WP 0008, Figure 2, 7) to CONTINUE CYCLE.

    Does water drain from drum?

    YES Return to normal operation.

    NO Notify Maintenance.

R2 TANK NOT FILLING

1. Determine if problem occurred during initial filling or during a laundry cycle.

    Did problem occur during initial filling?

    YES Go R1 or WASH TANK(S) NOT FILLING FAULT.

    NO Go to step 2.

2. Check drain valves on distillate pump, pre–filter, and coalescer.

    Are any drain valves open?

    YES Close valve(s). Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

    NO Go to step 3.

3. Check eight drain valves on subcooler.

    Are any drain valves open?

    YES Close drain valve(s). Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

    NO Go to step 4.

4. Check drain valves on bottom of still.

    Are drain valves open?

    YES Close drain valves. Press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE and return to normal operation.

    NO Go to step 5.

5. Check all condensate hose connections for signs of leakage.

    Are any leaks found?

    YES Repair as necessary or notify maintenance.

    NO Notify maintenance.

R2 WATER TEMPERATURE HI OR LO

1. Using EXAMINE INPUTS mode observe reading for TE103 R2 tank water temperature.

   Is temperature displayed higher than selected temperature?

   YES Go to step 2.

   NO Go to step 3.

2. Perform laundry operations on loads better suited for current temperature and allow water to cooldown to desired temperature.

   Does R2 WATER TEMP HI fault disappear after 3 or less cycles.

   YES Return to normal operation.

   NO Go to RECYCLED WATER TEMPERATURE HIGH FAULT (WP 0021 00).

3. Perform laundry operations on loads better suited for current temperature and allow water to heat–up to desired temperature.

   Does R2 WATER TEMP LO fault disappear after 3 or less cycles.

   YES Return to normal operation.

   NO Perform laundry operations as necessary then notify maintenance.

10 HP INVERTER FAULT

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE .
2. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
3. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to OFF.
4. Wait about 20 seconds, then position MAIN POWER switch (WP 0008 00, Figure 1, 1) to ON.
5. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
6. At inverter enclosure press 10 HP RESET switch (WP 0008 00, Figure 3, 4).
7. Wait about 20 seconds, then at operator panel where cycle was paused press MENU SELECTION switch (WP 0008 00, Figure 2, 7) to CONTINUE CYCLE.

   Does another “10 HP INVERTER FAULT” occur?

   YES Notify Maintenance.

   NO Return to normal operation.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
WATER RECYCLE SYSTEM OBSERVED FAULTS

RECYCLED WATER TEMPERATURE HIGH

1. Perform cooldown cycle then shut down the LADS (WP 0012 00).
2. Check for debris on subcooler inlet screen (WP 0045 00).

   Is inlet screen clear?

   YES Go to step 3.

   NO Remove debris from inlet screen. Return to normal operation.
3. Remove inlet screen and check for debris on subcooler (WP 0035 00).

   Is subcooler clear?

   YES Continue laundry cycle(s). When laundry cycles are completed notify maintenance.

   NO Remove debris from subcooler. Return to normal operation.

STILL DOORS WILL NOT OPEN

NOTE

Still doors are locked when control power is removed from LADS. Doors will not unlock unless still temperature is less than 150 degrees F and water level is less than four inches.

1. Run cooldown cycle (WP 0012 00).

   Do doors unlock?

   YES Return to normal operation.

   NO Go to step 2.
2. Open drain valves and allow still to drain (WP 0043 00).

   Do doors unlock?

   YES Return to normal operation.

   NO Notify maintenance.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
WATER RECYCLE SYSTEM DISPLAYED FAULTS

CONDENSATE TEMPERATURE HI

NOTE

During continuous operation at high temperatures the condensate temperature may get high enough to cause a “CONDENSATE TEMPERATURE HI” failure message. In this case, the message will disappear within several minutes after the boiling rate in the still decreases. If the fault occurs, and the failure message disappears before the end of the cycle, no operator action will be necessary.

1. Perform a cooldown cycle then shutdown LADS (WP 0012 00).
2. Check for debris on heat exchanger inlet screens (WP 0044 00).

   Are inlet screens clear?

   YES Go to step 3.

   NO Remove debris from inlet screens. Return to normal operation.
3. Remove inlet screens and check for debris on heat exchangers (WP 0035 00).

   Are heat exchangers clear?

   YES Go to step 3.

   NO Remove debris from heat exchangers. Return to normal operation.
4. Check for debris on still condenser fan guard (WP 0032 00).

   Is fan guard clear?

   YES Notify maintenance.

   NO Remove debris from fan guard. Return to normal operation.

STANDPIPE LEVEL LO OR STILL NOT FILLING

1. Check drain valves on bottom of still.

   Are drain valves open?

   YES Close drain valves. Return to normal operation.

   NO Go to step 2.
2. Check for water leakage at still door gaskets.

   Is water leaking from gasket(s)

   YES Replace still door gasket(s) (WP 0048 00).

   NO Go to step 3.
3. Check drain valve on distillate pump.

   Is drain valve open?

   YES Close drain valve. Return to normal operation.

   NO Go to step 4.

STANDPIPE LEVEL LO OR STILL NOT FILLING – Continued

4. Check all condensate hose connections for signs of leakage.

   Are any leaks found?

   YES Repair as necessary or notify maintenance.

   NO Notify maintenance.

STANDPIPE NOT EMPTYING

NOTE

During high speed extracts water bouncing around inside standpipe may get high enough to cause a “STANDPIPE NOT EMPTYING” failure message. In this case the message will disappear within 30 seconds after the extract is completed and no operator action will be necessary.

1. Use EXAMINE INPUTS mode to observe reading for LT201 (standpipe level).

   Is reading > 24 inches?

   YES Go to step 3.

   NO Go to step 2.

2. Continue to observe LT201 reading for approximately five minutes.

   Does reading drop to 3 inches at least once?

   YES Return to normal operation.

   NO Go to step 3.

3. Check for clogged first–stage pre–filter bag (WP 0046 00).

   Is first stage pre–filter clogged?

   YES Replace filter bag. Return to normal operation.

   NO Reinstall filter bag. Go to step 4.

4. Check for clogged second–stage pre–filter bag (WP 0046 00).

   Is second stage pre–filter clogged?

   YES Replace filter bag. Return to normal operation.

   NO Reinstall filter bag. Go to step 5.

5. Check for clogged cartridge in coalescing filter (WP 0047 00).

   Is coalescer cartridge clogged?

   YES Replace coalescer cartridge. Return to normal operation.

   NO Reinstall coalescer cartridge. Go to step 6.

6. Slightly open drain valve on distillate pump.

   Is water coming out of drain valve?

   YES Close drain valve. Go to step 7.

   NO Notify Maintenance.

7. Using EXAMINE INPUTS mode observe LT201 reading for approximately five minutes.

   Does reading drop to 3 inches at least once?

   YES Return to normal operation.

   NO Go to step 8.

STANDPIPE NOT EMPTYING – Continued

8. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution.

9. Open door on main control enclosure.
10. Observe position of circuit breaker CB6 (WP 0008, Figure 1, 11).

Is circuit breaker ON?

YES Notify Maintenance.

NO Go to step 11.

11. Position circuit breaker to ON then close and secure door.
12. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
13. At operator panel A use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
14. Using EXAMINE INPUTS mode observe LT201 reading for approximately five minutes.

Does reading drop to 3 inches at least once?

YES Start or continue laundry operations.

NO Notify Maintenance.

STILL DOOR(S) OPEN

CAUTION

When still doors are properly closed and tightened there should be a gap of approximately 1/8 inch between still door arms target and each position sensor. Never tighten the doors to the point where the target is contacting the sensor. Failure to observe this precaution may result in damage to the target and/or sensor.

1. Check still doors (1).

   Are doors closed?

   YES Go to step 2.

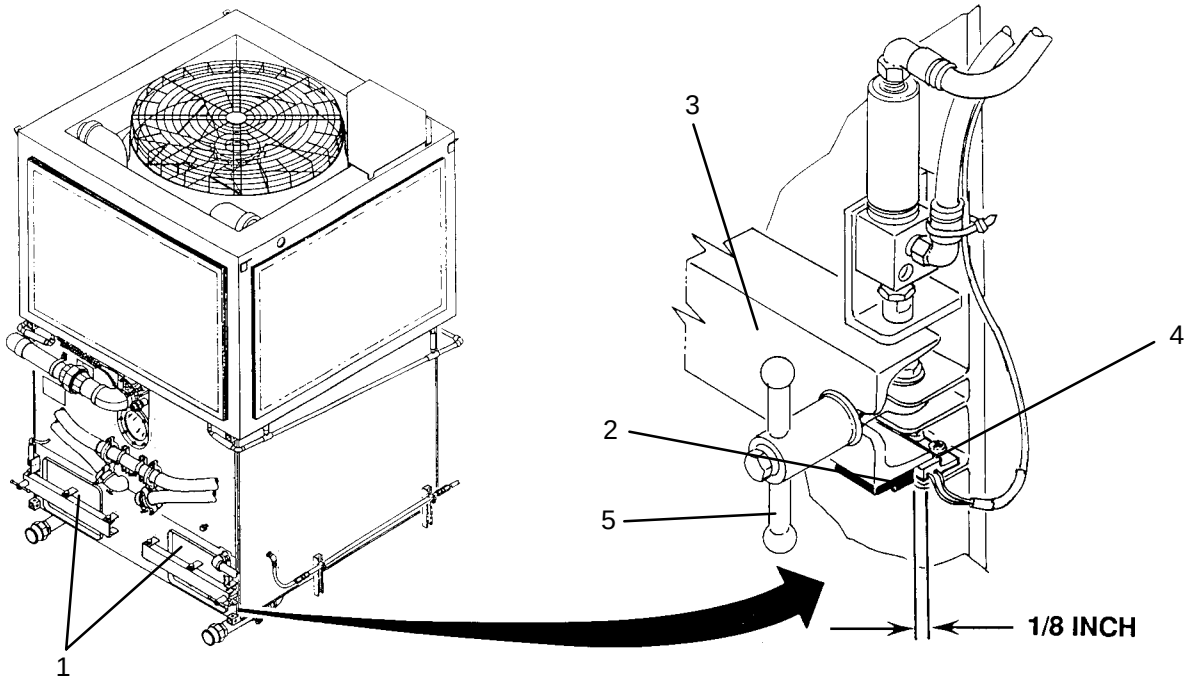
   NO Close still doors. Return to normal operation.

2. Check position of sensor targets (2) on still door arms (3).

   Are targets within 1/8 inch of door sensors (4)?

   YES Notify Maintenance.

   NO Go to step 3.



3. Tighten knobs (5) to achieve proper clearance between still door targets (2) and sensors (4).
4. Observe operator panel A display (WP 0008 00, Figure 2, 6).

   Is "STILL DOOR(S) OPEN displayed?

   YES Notify Maintenance.

   NO Return to normal operation.

STILL PRESSURE HI

NOTE

When a STILL PRESSURE HI fault occurs there is good possibility that a boil over will occur. Boil overs will cause steam loaded with anti–foam to be carried through the distillate plumbing into the coalescing filter. This will result in the premature clogging of the pre–filters and coalescing filter.

Repeated STILL PRESSURE HI faults are an indication that the boiling rate in the still is too fast due not enough anti–foam or too much detergent is being added.

1. Add one full stroke of anti–foam with hand pump.
2. Observe the sight glass on the still.

   Is boiling water or foam visible?

   YES Add anti–foam with hand pump in 1/2 stoke increments as necessary to prevent the still from boiling over if possible.

   NO Go to step 3.
3. Observe operator panel A display (WP 0008 00, Figure 2, 6) for approximately 5 minutes.

   After 5 minutes is “STILL PRESSURE HI” displayed?

   YES Go to step 4.

   NO Return to normal operation.
4. Observe operation of condenser fan.

   Is condenser fan on?

   YES Notify maintenance.

   NO Go to 20 HP INVERTER FAULT.

20 HP INVERTER FAULT

1. Use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PAUSE at both operator panels.
2. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
3. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to OFF.
4. Wait about 20 seconds, then position MAIN POWER switch to ON.
5. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
6. At inverter enclosure press 20 HP RESET switch (WP 0008 00, Figure 3, 4).
7. Wait about 20 seconds, then observe operator panel A display (WP 0008 00, Figure 2, 6).

   Does “20 HP INVERTER FAULT” message disappear?

   YES Go to step 8.

   NO Notify Maintenance.
8. At operator panel A use MENU SELECTION switch (WP 0008 00, Figure 3, 7) to select PRESS TO START.
9. When FILL TANKS option is displayed select OVERRIDE FILLING.
10. When HEAT WATER option is displayed listen for condenser fan to come on.

    Does condenser fan come on?

    YES Go to step 11.

    NO Go to step 12.

20 HP INVERTER FAULT – Continued

11. Observe operator panel A display (WP 0008 00, Figure 2, 6).

    Does another "20 HP INVERTER FAULT" message appear?

    YES Notify Maintenance.

    NO Continued heating water or continue laundry cycles.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution.

12. Open door on main control enclosure.
13. Observe position of circuit breaker CB1 (WP 0008 00, Figure 1, 6).

    Is circuit breaker ON?

    YES Notify Maintenance.

    NO Go to step 14.

14. Position circuit breaker (WP 0008 00, Figure 1, 6) to ON then close and secure door.
15. Repeat steps 2 through 11 to verify correct operation. If CB1 trips again Notify Maintenance.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
HEATING SYSTEM OBSERVED FAULTS

FUEL PUMP WILL NOT PRIME

Refer to FUEL PRESSURE LO FAULT (WP 0024 00).

HEATER SMOKING

Check adjustment on inlet cover (WP 0016 00).

Is inlet plate set properly?

YES Notify Maintenance.

NO Adjust inlet plate as necessary. Return to normal operation.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
HEATING SYSTEM DISPLAYED FAULTS

BURNER BLOWER INLET OR OUTLET PRESSURE LO

1. Observe operator panel A display (WP 0008 00, Figure 2, 6).

   Is "20 HP INVERTER FAULT" message also displayed?

   YES Go to 20 HP INVERTER FAULT (WP 0022 00).

   NO Go to step 2.

2. Observe operation of still condenser fan.

   Is condenser fan on?

   YES Go to step 3.

   NO Go to 20 HP INVERTER FAULT (WP 0022 00).

3. Remove and inspect burner blower inlet filter (WP 0049 00).

   Is inlet filter clean?

   YES Go to step 4.

   NO Clean or replace inlet filter (WP 0049 00). Go to step 5.

4. Check adjustment on inlet cover (WP 0016 00).

   Is inlet cover set properly?

   YES Go to step 5.

   NO Adjust inlet cover as necessary. Go to step 5.

5. At heater press FP300 RESET switch (WP 0008 00, Figure 4, 4).

6. Wait about 30 seconds then observe heater operation.

   Does burner blower come on?

   YES Go to step 7.

   NO Notify Maintenance.

7. Observe operator panel A display (WP 0008 00, Figure 2, 6) for approximately 5 minutes.

   Does another "BURNER BLWR INLET PRESS LO" message appear?

   YES Notify Maintenance.

   NO Return to normal operation.

FUEL PRESSURE LO OR FUEL PUMP WILL NOT PRIME

1. Check fuel supply.

   Is fuel supply adequate?

   YES Go to step 2.

   NO Replenish fuel supply. Go to step 4.

2. Check hose connections at fuel source and at heater.

   Are hoses properly connected?

   YES Go to step 3.

   NO Properly connect hoses. Go to step 4.

FUEL PRESSURE LO OR FUEL PUMP WILL NOT PRIME – Continued

3. Check entire length of fuel hoses for kinks or other obstruction.

   Are hoses kinked or obstructed?

   YES Remove kink(s) or obstruction(s) from hoses. Go to step 4.

   NO Go to step 4.

4. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF and then back to ON.
5. At heater press FP300 RESET switch (WP 0008 00, Figure 4, 4).
6. Observe operator panel A display (WP 0008 00, Figure 2, 6). When FILL TANKS option is displayed select OVERRIDE FILLING.
7. When HEAT WATER option is displayed lift up on PRIME PUMP switch (WP 0008 00, Figure 4,1) and listen for fuel pump to come on.

   Does fuel pump come on?

   YES Go to step 8.

   NO Go to 20 HP INVERTER FAULT (WP 0022 00).

8. Lift up on PRIME PUMP switch (WP 0008 00, Figure 4, 1) and observe fuel pump pressure gage (2) for approximately 2 minutes.

   Does fuel pressure remain steady at or above 135 psi for last 30 seconds of priming?

   YES Go to step 9.

   NO Notify Maintenance.

9. Determine if laundry or water heating operations were in progress when fault occurred.
10. At operator panel A display (WP 0008 00, Figure 2, 6) select OVERRIDE HEATING (to continue laundry cycles) or HEAT WATER then proceed to step 11.
11. Wait about 30 seconds then observe heater operation.

    Does heater come on?

    YES Go to step 12.

    NO Notify Maintenance.

12. Observe operator panel A display (WP 0008 00, Figure 2, 6) for approximately 5 minutes.

    Does another “FUEL PRESSURE LO” message appear?

    YES Notify Maintenance.

    NO Return to normal operation.

HEATING SYSTEM FAILURE

1. Observe operator panel A display (WP 0008 00, Figure 2, 6).

   Is “20 HP INVERTER FAULT” message also displayed?

   YES Go to 20 HP INVERTER FAULT (WP 0022 00).

   NO Go to step 2.

2. Observe operation of still condenser fan.

   Is condenser fan on?

   YES Go to step 3.

   NO Go to 20 HP INVERTER FAULT (WP 0022 00).

3. At heater press FP300 RESET switch (WP 0008 00, Figure 4, 4).

HEATING SYSTEM FAILURE – Continued

4. Wait about 30 seconds then observe heater operation.

   Does burner blower come on?

   YES Go to step 5.

   NO Notify Maintenance.

5. Observe operator panel A display (WP 0008 00, Figure 2, 6) for approximately 5 minutes.

   Does another “HEATING SYSTEM FAILURE” message appear?

   YES Notify Maintenance.

   NO Return to normal operation.

TF FLOW LO, TF PUMP INLET PRESS LO, OR TF PUMP OUTLET PRESS LO

1. Observe operator panel A display (WP 0008 00, Figure 2, 6).

   Is “20 HP INVERTER FAULT” message also displayed?

   YES Go to 20 HP INVERTER FAULT (WP 0022 00).

   NO Go to step 2.

2. Observe operation of still condenser fan.

   Is condenser fan on?

   YES Go to step 3.

   NO Go to 20 HP INVERTER FAULT (WP 0022 00).

3. Observe operator panel A display (WP 0008 00, Figure 2, 6) for approximately 5 minutes.

   Does another “TF FLOW, PUMP IN PRESS, or PUMP OUT PRESS LO” message appear?

   YES Notify Maintenance.

   NO Continue heating water or continue laundry cycles.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
AIR SYSTEM OBSERVED FAULTS

AIR COMPRESSOR DOES NOT COME ON

1. Observe operator panel A display (WP 0008 00, Figure 2, 6).

   Is "AIR COMPR INVTR FAULT" message also displayed?

   YES Go to AIR COMPRESSOR INVERTER FAULT (WP 0026 00).

   NO Go to step 2.

2. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution. Only maintenance personnel shall conduct servicing beyond trouble-shooting procedures on electrical controls and circuits.

3. Open door on main control enclosure.
4. Observe position of circuit breaker CB6 (WP 0008 00, Figure 1, 11).

   Is circuit breaker ON?

   YES Notify Maintenance.

   NO Go to step 5.

5. Position circuit breaker to ON then close and secure door.
6. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
7. At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
8. Open access door to air system.
9. Observe air compressor operation.

   Is air compressor on?

   YES Go to step 10.

   NO Notify Maintenance.

10. Wait about 15 minutes to verify correct operation.

    Does air compressor stay on until air system is pressurized?

    YES Continue water filling, water heating, or laundry cycles.

    NO Notify Maintenance.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
AIR SYSTEM DISPLAYED FAULTS

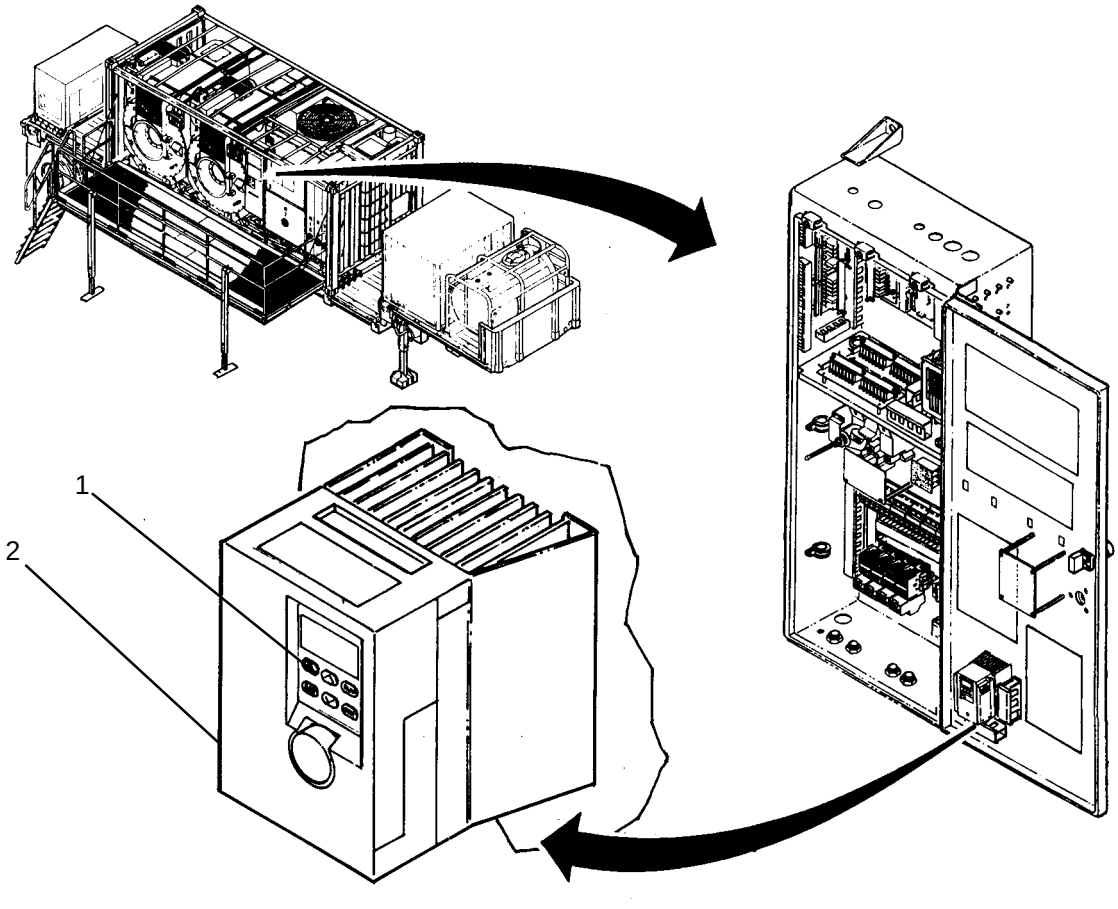
AIR COMPRESSOR INVERTER FAULT

1. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution.

2. Open door on main control enclosure.
3. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
4. Press PRG/RESET key (1) on air compressor inverter (2)
5. Close and secure door to main control enclosure.



6. Observe operator panel A display (WP 0008 00, Figure 2, 6) for about 20 seconds.

Does “AIR COMPR INVTR FAULT” message disappear?

YES Go to step 7.

NO Notify Maintenance.

AIR COMPRESSOR INVERTER FAULT – Continued

7. At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
8. Open access door to air system.
9. Observe air compressor operation.

   Is air compressor on?

   YES Close access door and return to normal operation.

   NO Notify Maintenance.

AIR TANK NOT PRESSURIZING OR PRODUCT PRESSURE LO

1. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF and then back to ON.
2. At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
3. Open access door to air system.
4. Observe air compressor operation.

   Is air compressor on?

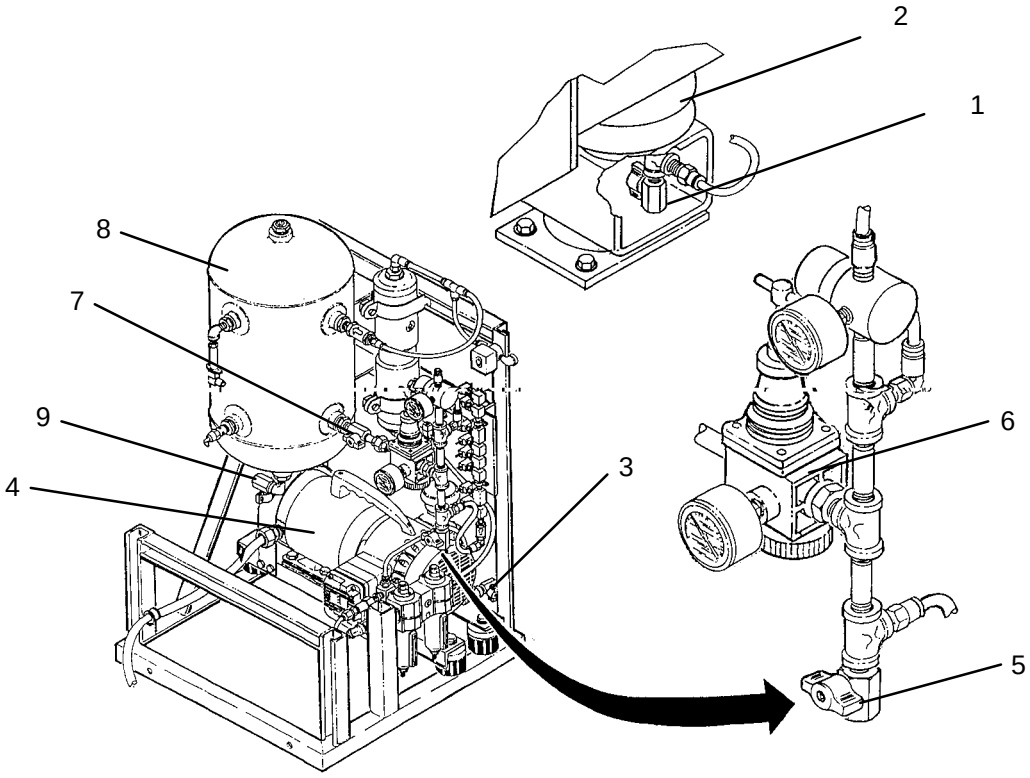
   YES Go to step 5.

   NO Go AIR COMPRESSOR DOES NOT COME ON FAULT (WP 0025 00).
5. Check for air venting from manual valves (1) on front air bags (2).

   Is air venting from manual valve(s)?

   YES Close manual valve(s). Return to normal operation.

   NO Go to step 6.



AIR TANK NOT PRESSURIZING OR PRODUCT PRESSURE LO – Continued

6. Check for air venting from manual valve (3) at outlet of air compressor (4).

   Is air venting from manual valve?

   YES Close manual valve and access door. Return to normal operation.

   NO Go to step 7.

7. Check for air venting from manual valve (5) at outlet of pressure regulator (6).

   Is air venting from manual valve?

   YES Close manual valve and access door. Return to normal operation.

   NO Go to step 8.

8. Check position of manual valve (7) at outlet of air tank (8).

   Is valve open?

   YES Go to step 9.

   NO Open valve and close access door. Return to normal operation.

9. Check manual valve (9) at bottom of air tank (8).

   Is manual valve open?

   YES Close manual valve.

   NO Go to step 10.

10. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
11. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to OFF.
12. Replace inlet filter (WP 0050 00).
13. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to ON.
14. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
15. At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
16. Wait about 15 minutes to determine if air system pressurizes.

    Does air system pressurize?

    YES Continue water filling, water heating, or laundry cycles.

    NO Go to step 17.

17. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
18. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to OFF.
19. Replace first and second stage outlet filter (WP 0051 00).
20. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to ON.
21. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
22. At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START.
23. Wait about 15 minutes to determine if air system pressurizes.

    Does air system pressurize?

    YES Continue water filling, water heating, or laundry cycles.

    NO Notify maintenance.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
MAIN CONTROL ENCLOSURE INDICATIONS

CONTROL POWER LAMP IS NOT ON

1. Check status of MAIN POWER lamp (WP 0008 00, Figure 1, 2).

   Is MAIN POWER lamp on?

   YES Go to step 2.

   NO Go to MAIN POWER LAMP IS NOT ON.

2. Check position of CONTROL POWER switch (WP 0008 00, Figure 1, 3).

   Is switch in ON position?

   YES Go to step 3.

   NO Position CONTROL POWER to ON. Return to normal operation.

3. Replace CONTROL POWER lamp (WP 0053 00).

   Does lamp come on?

   YES Return to normal operation.

   NO Notify maintenance.

MAIN POWER LAMP IS NOT ON

1. Verify external power is connected to LADS and is on line.

   Is external power connected and on–line?

   YES Go to step 2.

   NO Connect external power or bring power on line. Return to normal operation.

2. Check position of MAIN POWER switch (WP 0008 00, Figure 1, 1).

   Is SW1 in ON position?

   YES Go to step 3.

   NO Position SW1 to ON. Return to normal operation.

3. Replace MAIN POWER lamp (WP 0053 00).

   Does lamp come on?

   YES Return to normal operation.

   NO Go to step 4.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution.

4. Open door on main control enclosure.
5. Observe position of circuit breaker CB7 (WP 0008 00, Figure 1, 12).

   Is circuit breaker ON?

   YES Go to step 9.

   NO Go to step 6.

MAIN POWER LAMP IS NOT ON – Continued

6. Position circuit breaker (WP 0008 00, Figure 1, 12) to ON then close and secure door.
7. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to ON.
8. Determine if MAIN POWER lamp (WP 0008 00, Figure 1, 2) comes on.

   Does MAIN POWER lamp come on?

   YES Return to normal operation.

   NO Notify Maintenance.

9. Check voltage and frequency output from MEP–805A generator (TM 9–6115–644–10) or request authorized power generation personnel to check voltage and frequency output from the power source.

   Is voltage in 208–212 VAC range and frequency in 50–60 Hz range?

   YES Notify Maintenance.

   NO Adjust voltage and/or frequency at MEP–805A generator or request authorized power generation personnel to correct voltage and frequency output from the power source.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
OPERATOR PANEL INDICATIONS

ATTENTION REQUIRED LAMP IS NOT ON

1. Observe status of SYSTEM OPERABLE lamp (WP 0008 00, Figure 2, 2).

   Is lamp on?

   YES No attention is required. Return to normal operation.

   NO Go to step 2.

2. Observe status of display (WP 0008 00, Figure 2, 6).

   Does display indicate a failure message?

   YES Go to step 3.

   NO Notify maintenance.

3. Replace ATTENTION REQUIRED lamp (WP 0054 00).

   Does lamp come on?

   YES Return to normal operation.

   NO Notify maintenance.

DISPLAY DOES NOT COME ON

1. Check status of CONTROL POWER lamp (WP 0008 00, Figure 1, 4).

   Is CONTROL POWER lamp on?

   YES Notify maintenance.

   NO Go to CONTROL POWER LAMP IS NOT ON FAULT (WP 0027 00).

SYSTEM OPERABLE LAMP IS NOT ON

1. Observe status of ATTENTION REQUIRED lamp (WP 0008 00, Figure 2, 3).

   Is lamp on?

   YES Perform appropriate corrective action.

   NO Go to step 2.

2. Observe status of display (WP 0008 00, Figure 2, 6).

   Does display indicate a failure message?

   YES Perform appropriate corrective action.

   NO Go to step 3.

3. Replace SYSTEM OPERABLE lamp (WP 0054 00).

   Does lamp come on?

   YES Return to normal operation.

   NO Notify maintenance.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
CONTROL SYSTEM DISPLAYED FAULTS

EMERGENCY STOP ACTIVATED

WARNING

Before attempting to clear an emergency stop make sure condition causing the emergency shutdown has been corrected. Failure to follow this precaution may result in equipment damage and/or serious personal injury or death.

1. Determine cause of emergency stop condition.

   Was emergency stop selected by operator or maintenance personnel?

   YES Correct unsafe condition. Go to step 2.

   NO Go to step 8.

2. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF.
3. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to OFF.
4. Twist and pull out on EMERGENCY STOP switch (WP 0008 00, Figure 1, 5).
5. Position MAIN POWER switch (WP 0008 00, Figure 1, 1) to ON.
6. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to ON.
7. At operator panel A, observe display (WP 0008 00, Figure 2, 6).

   Does “EMERGENCY STOP” message appear?

   YES Go to step 8.

   NO At operator panel A select use MENU SELECTION switch (WP 0008 00, Figure 2, 7) to select PRESS TO START. Continue water filling, water heating, or laundry cycles.

8. Observe position of EMERGENCY STOP switch.

   Is EMERGENCY STOP switch pulled out?

   YES Go to step 9.

   NO Return to step 2.

9. Check voltage and frequency output from MEP–805A generator (TM 9–6115–644–10) or request authorized power generation personnel to check voltage and frequency output from the power source.

   Is voltage in 208–212 VAC range and frequency in 50–60 Hz range?

   YES Notify Maintenance.

   NO Adjust voltage and/or frequency at MEP–805A generator or request authorized power generation personnel to correct voltage and frequency output from the power source.

CPU, RAM, OR ROM TEST FAILURE

NOTE

Rapidly turning the CONTROL POWER switch ON and OFF sometimes causes voltage spikes on the control system. These voltage spikes can lead to false self–test computer failure messages. Cycling the CONTROL POWER switch OFF then back ON will clear the fault unless an actual computer failure has occurred.

1. Position CONTROL POWER switch (WP 0008 00, Figure 1, 3) to OFF, wait a few seconds, then slowly position switch back to ON.
2. Observe display (WP 0008 00, Figure 2, 6) at operator panel A.

Does “CPU, RAM, or ROM TEST FAILURE” message reappear?

YES Notify Maintenance.

NO Return to normal operation.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

OPERATIONAL CHECKOUT AND TROUBLESHOOTING PROCEDURES
AUXILIARY EQUIPMENT

OVERHEAD LIGHT DOES NOT TURN ON

1. Check electrical connection at outlet box.

   Is light cable connected?

   YES Go to step 2.

   NO Properly connect cable. Return to normal operation.

2. Check RESET button on GFI receptacle.

   Is button tripped?

   YES Press RESET button. Go to step 6.

   NO Go to step 3.

WARNING

High voltage is present in main control enclosure. Use extreme caution when working inside. Never place hands or tools on exposed wire connections. Death on contact may result if personnel fail to observe this safety precaution.

3. Open door on main control enclosure.
4. Observe position of circuit breaker CB8 (WP 0008 00, Figure 1,14).

   Is circuit breaker ON?

   YES Go to step 7.

   NO Go to step 5.

5. Position circuit breaker to ON then close and secure door.
6. Check overhead light.

   Is light(s) on?

   YES Return to normal operation.

   NO Notify maintenance.

7. Check lamp in overhead light.

   Is lamp burnt out?

   YES Replace lamp. Return to normal operation.

   NO Notify maintenance.

END OF WORK PACKAGE

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CHAPTER 4

OPERATOR MAINTENANCE INSTRUCTIONS

FOR

LAUNDRY ADVANCED SYSTEM

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

GENERAL

Preventive Maintenance Checks and Services (PMCS) are performed to keep the LADS in operating condition. The checks are used to find, correct, or report problems. Operators are to do the PMCS jobs as shown in the PMCS table. PMCS are done every day the LADS is operated, using the PMCS table. Pay attention to WARNING and CAUTION statements. A WARNING means someone could get hurt. A CAUTION means equipment could be damaged.

Before you begin operating the LADS equipment, do Before PMCS.

During operation, do During PMCS.

After operation, do After PMCS.

Do Weekly PMCS once a week while performing After PMCS when the LADS is set–up and operating.

Do Monthly PMCS once a month while performing After PMCS when the LADS is set–up and operating.

Do Quarterly PMCS once a every three months while performing After PMCS when the LADS is set–up and operating.

Do Post–Deployment PMCS after returning from any deployment requiring the LADS to moved, set–up, operated for laundry processing, drained, and packed–up.

If you find something wrong when performing PMCS, fix it if you can, using troubleshooting procedures and/or maintenance procedures. If you do not have the tools required to perform a repair, or if repair is too difficult, notify unit maintenance.

The right–hand column of the PMCS table lists conditions that make the LADS not fully mission capable. Write up items not fixed on DA Form 2404 for unit maintenance. For further information on how to use this form, see DA PAM 738–750.

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 SF 368, Product Quality Deficiency Report. Use of keywords such as “corrosion, “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem.

The form should be submitted to the address specified in DA PAM 738–750, The Army Maintenance Management System (TAMMS).

LEAKAGE DEFINITION

CAUTION

Equipment operation is allowable with minor leakages except for fuel (no class allowable) or thermal fluid leaks (class I allowable). Of course, consideration must be given to the fluid capacity of the item or system being checked. When in doubt, ask your supervisor.

When operating with class I or II fluid leaks, continue to check fluid levels as required in your PMCS.

Class III leaks should be reported immediately to your supervisor.

It is necessary to know how fluid leakage affects the status of the LADS. The following are definitions of the classes of leakage an maintainer needs to know to be able to determine the condition of the leak. Learn and then be familiar with them, and REMEMBER – WHEN IN DOUBT, ASK YOUR SUPERVISOR.

Leakage definitions for Operator PMCS.

CLASS I – Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.

CLASS II – Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked.

CLASS III – Leakage of fluid great enough to form drops that fall from the item being checked.

INSPECTION

Look for signs of a problem or trouble. Senses can help here. You can feel, smell, hear, or see many problems. Be alert when inspecting LADS.

Inspect to see if items are in good condition. Are they correctly assembled, stowed, secured, excessively worn, leaking, corroded, or properly lubricated? Correct any problems found.

There are some common items to check all over the LADS. These include the following:

1. Bolts, clamps, nuts, and screws: Continuously check for looseness. Look for chipped paint, bare metal, rust, or corrosion around bolt and screw heads and nuts. Tighten them when you find them loose. If tools are not available, notify unit maintenance.

2. Welds: Many items on the LADS are welded. To check these welds look for chipped paint, rust, corrosion, or gaps. When these conditions exist, notify unit maintenance on DA Form 2404.

3. Electrical wires, connectors, and harnesses: Tighten loose connectors. Look for cracked or broken insulation, bare wires and broken connectors. If any are found, notify unit maintenance.

4. Hoses and fluid lines: Look for wear, damage and leaks, and make sure clamps and fittings are tight. Wet spots mean a leak. A stain by a fitting or connector can also mean a leak. Correct any problems found. If tools are not available, notify unit maintenance.

LUBRICATION SERVICE INTERVALS

For safer, more trouble free operations, make sure that your LADS is serviced when it needs it.

Your LADS will require extra service and care when you operate under unusual conditions. High or low temperatures, long periods of hard use, or continued use in sand, water, mud, or snow will break down the lubricant, requiring you to add or change the lubricant more often.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

PREVENTIVE MAINTENANCE CHECKS And SERVICES (PMCS)
BEFORE OPERATION

TABLE 1. Operator Before PMCS.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before		Fuel supply	Check for adequate supply of fuel (JP–8) in fuel tank (1).	Fuel supply is < 350 gals
				Ensure supply hoses (2) are not damaged and are connected at fuel tank and heater (3).	Supply hoses are damaged or not connected
				Ensure supply hose (4) is not damaged and is connected at supply hose (2) and generator (5).	Supply hose is damaged or not connected
2	Before		Heater	Ensure blower air inlet screen (6) is not blocked with debris.	Screen is blocked
				Check fuel lines (7) for evidence of leakage.	Any class I leak is detected

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 1 and 2.

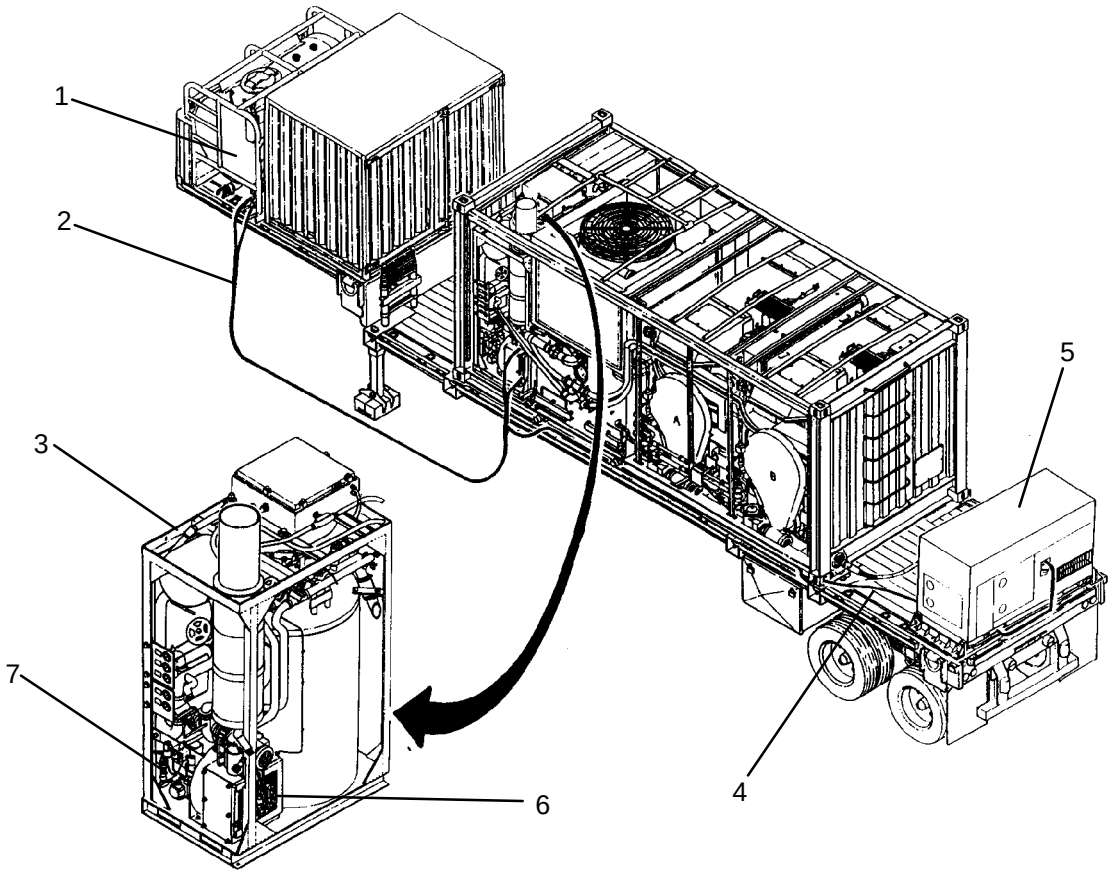


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	Before		Thermal fluid plumbing	Check thermal fluid plumbing (8) for evidence of leakage.	Any class II leak is detected
4	Before		Still	Ensure doors (9) are closed and knobs (10) are handtight.	Doors are open and knobs are not tightened
				Ensure drain valves (11) are closed.	Valves are open
5	Before		Still Condenser	Ensure heat exchanger inlet screens (12) are not blocked with debris.	Screens are blocked

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 3 through 5.

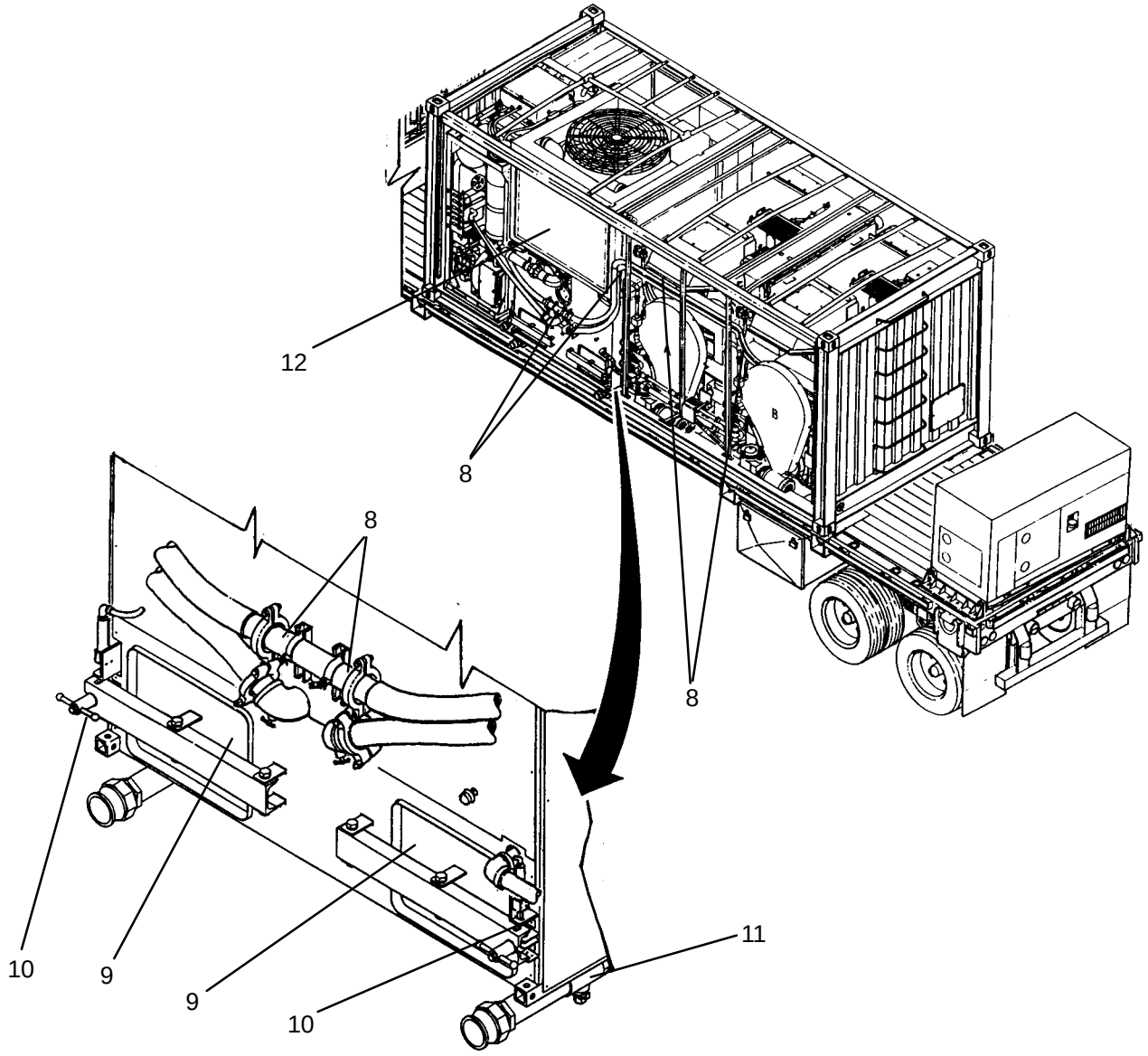


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	Before		Water supply	Check for adequate supply of water in external container (13).	Water supply is < 500 gals
				Ensure supply hoses (14) are not damaged and are connected at external container, water supply pump (15), and LADS piping connections (16).	Supply hoses are damaged or not connected
7	Before		Water supply pump	Check electrical cable (17) on water supply pump (15) for damage and proper connection at junction box (18).	Electrical cable is damaged or not connected
8	Before		Water pumps	Ensure manual valves (19) are closed.	Manual valves are open
				Ensure pump cover (20) is properly installed.	Cover is not properly installed
9	Before		Water plumbing	Check water plumbing (21) for evidence of leakage.	Any class III leak is detected
				Ensure shut–off valve (22) for utility hose is closed.	Valve is not closed

TABLE 1. Operator Before PMCS – Continued.

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 6 through 9.

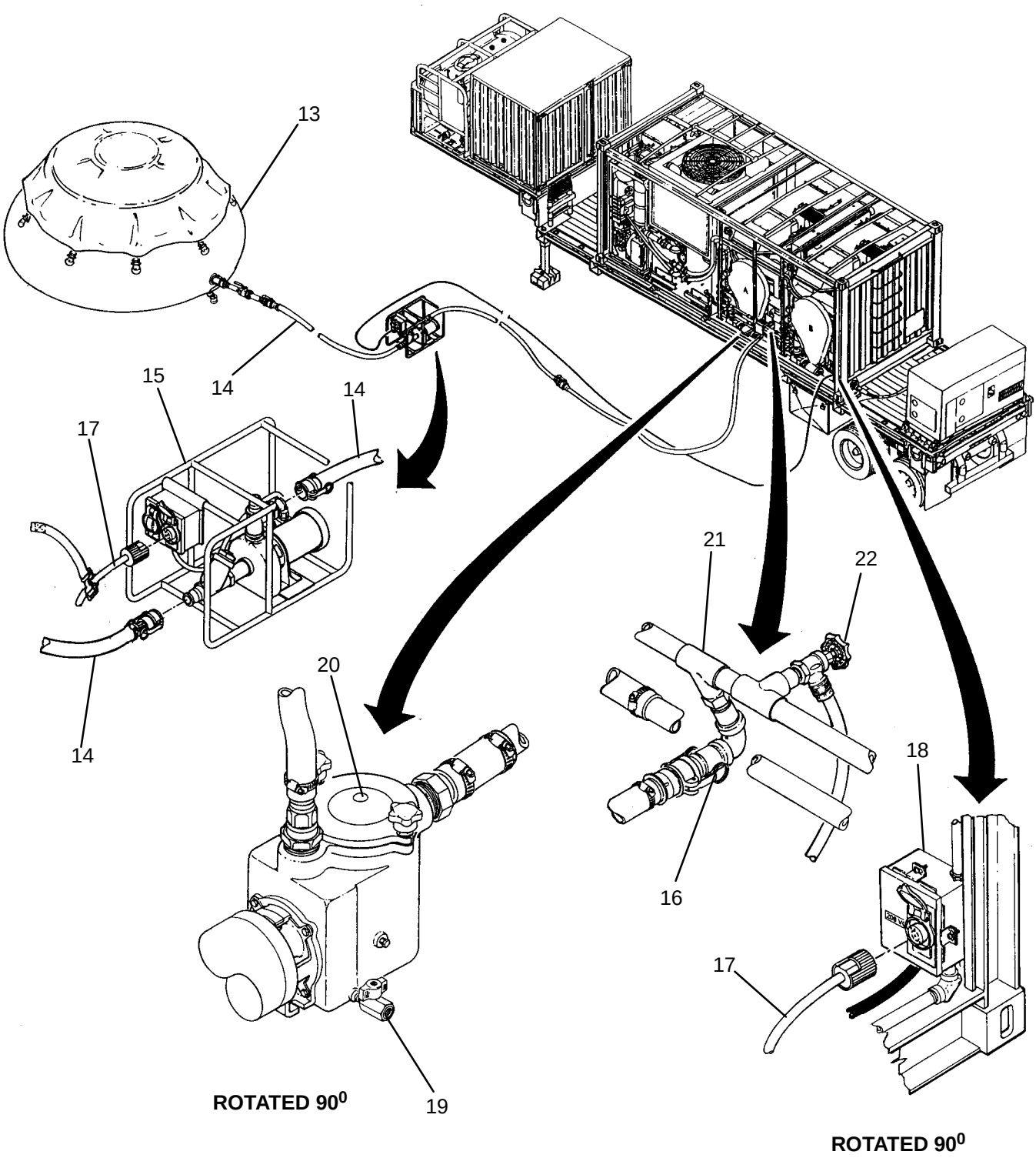


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	Before		Washing/drying drums	Ensure dryer inlet screens (23) are installed and there is no debris blocking air flow.	Screens are not installed or are blocked
				Ensure load binders (24) are not installed.	Load binders are installed
11	Before		Inverter enclosure	Ensure inlet door (25) is open and not blocked with debris.	Door is closed or blocked
12	Before		Air System	Ensure shutoff valve (26) is open.	Valve is closed

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 10 through 12.

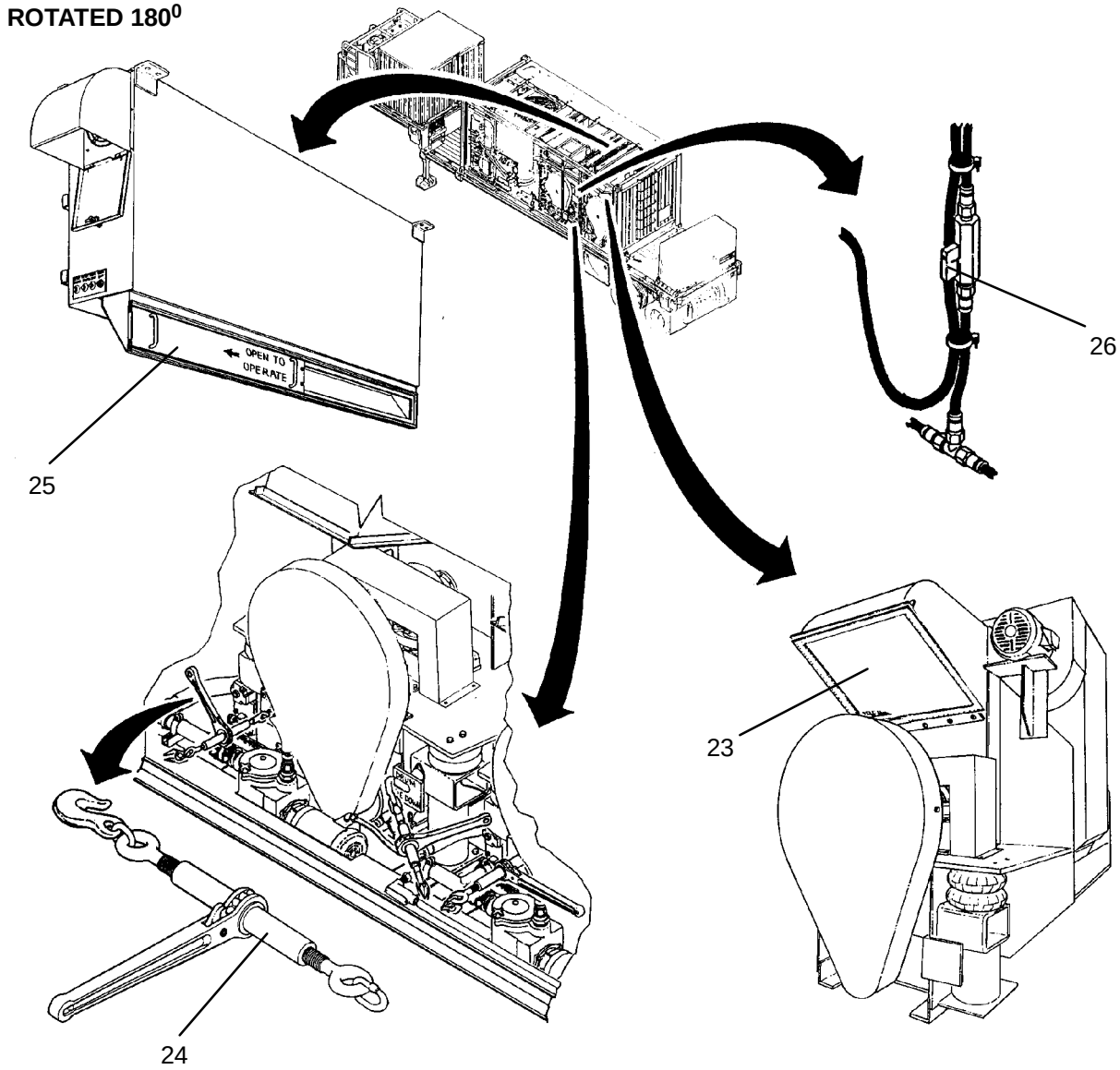


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
13	Before		Electrical supply	Ensure external electrical power is available. If power is supplied by TQG ensure all PMCS has been done per TM 9–6115–644–10.	External electrical power is not available
				Check main electrical cable (27) for damage and proper connection at external power source (28) and at the LADS electrical box (29).	Electrical cable is damaged or not connected
				Check ground wires (30) for proper connection at ISO frame (31) and trailer (32).	Ground wire is not properly connected

The callouts on these illustrations match the callouts in the BEFORE PMCS item number 13.

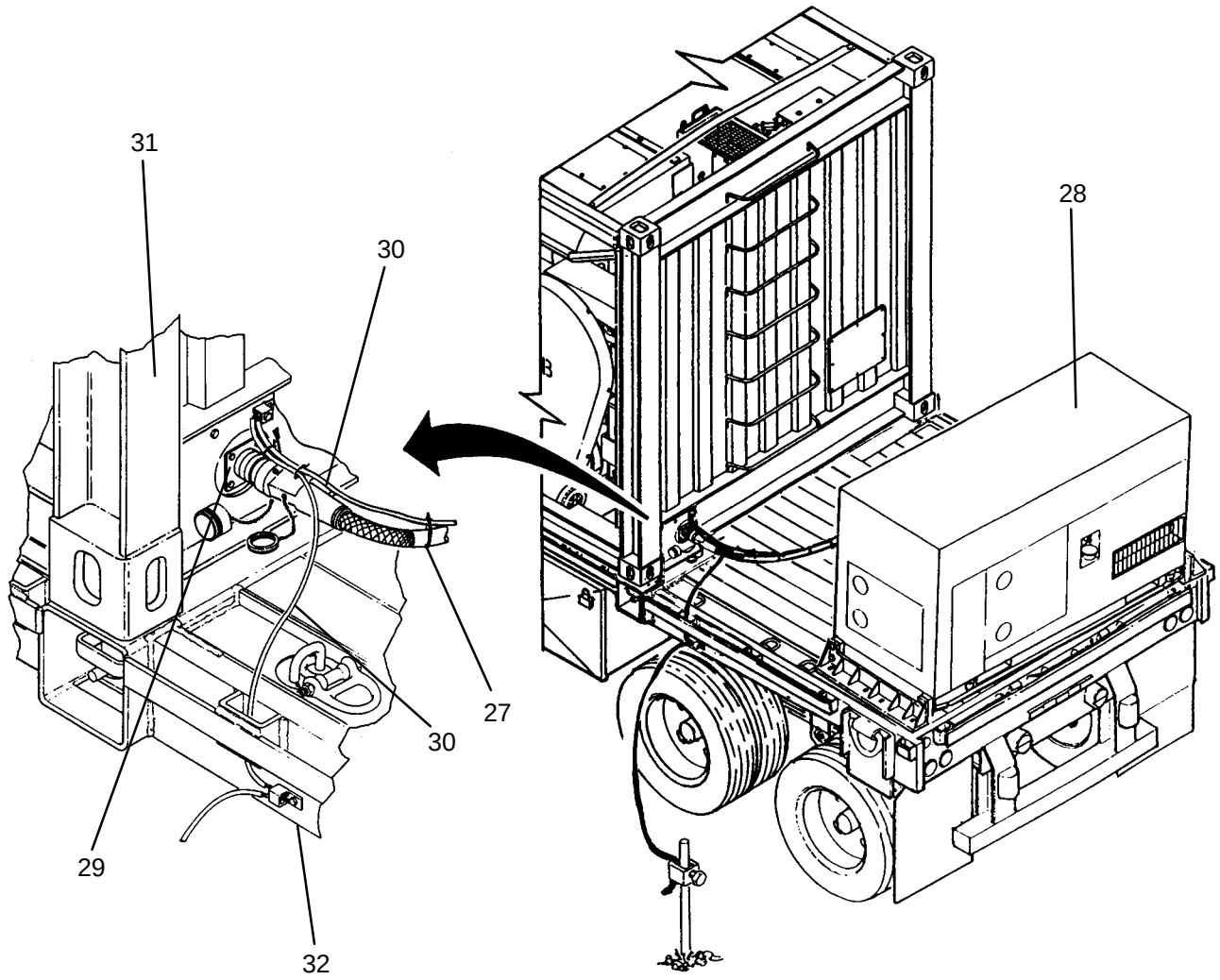


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	Before		Dryer air outlet guards	Ensure dryer blower outlet guards (33) are not blocked with debris.	Guards are blocked
15	Before		Still condenser	Ensure fan guard (34) and inlet shroud (35) are not blocked with debris.	Guard or shroud are blocked
16	Before		Heater	Ensure exhaust duct (36) is not blocked with debris.	Exhaust duct is blocked

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 14 through 16.

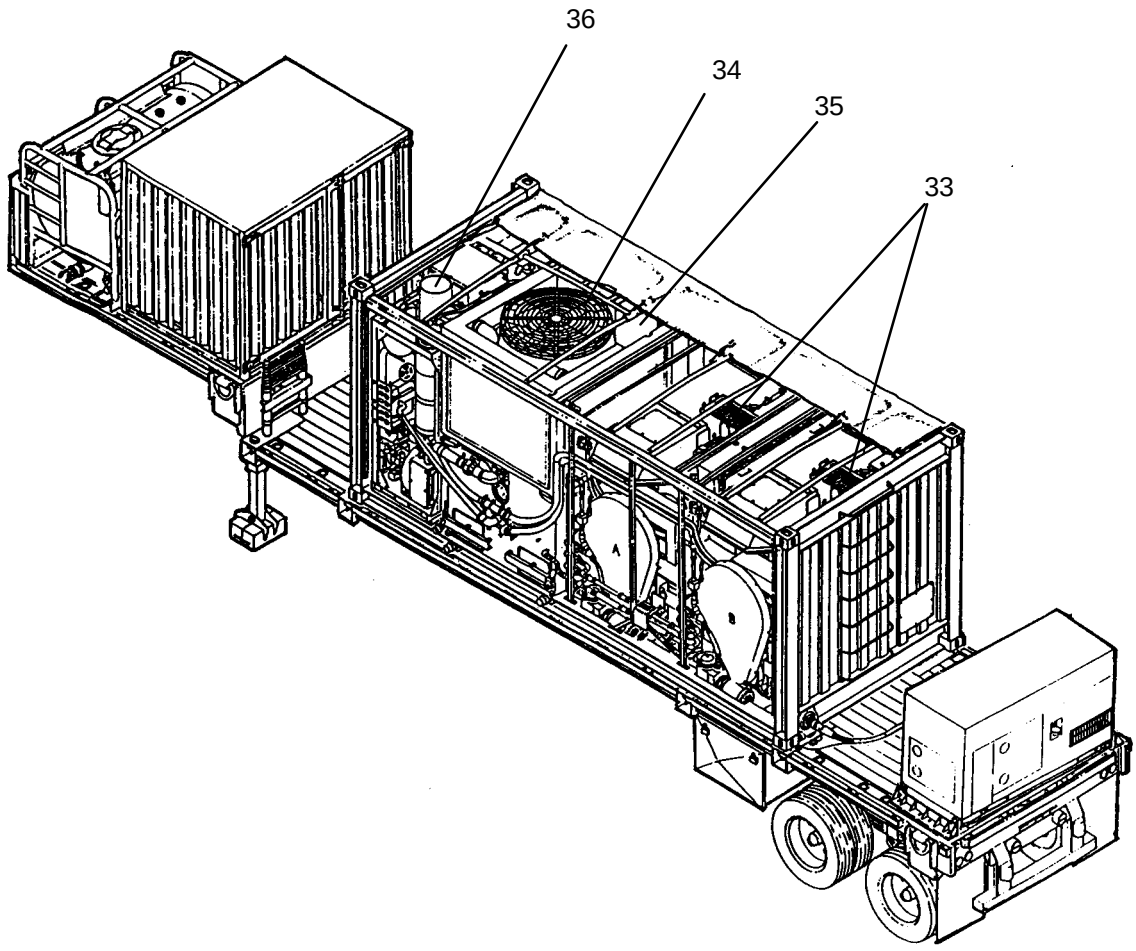


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	Before		Anti–foam supply	Check for adequate supply of anti–foam in external container (37).	Anti–foam supply is < 1 gal
				Shake anti–foam container (37) to mix solution.	Anti–foam has clumps.
				Ensure hand pump (38) is inserted completely into container(37).	Hand pump is not fully inserted
18	Before		Detergent supply	Check for adequate supply of detergent in external container (39).	Detergent supply is < 1 gal

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 17 and 18.

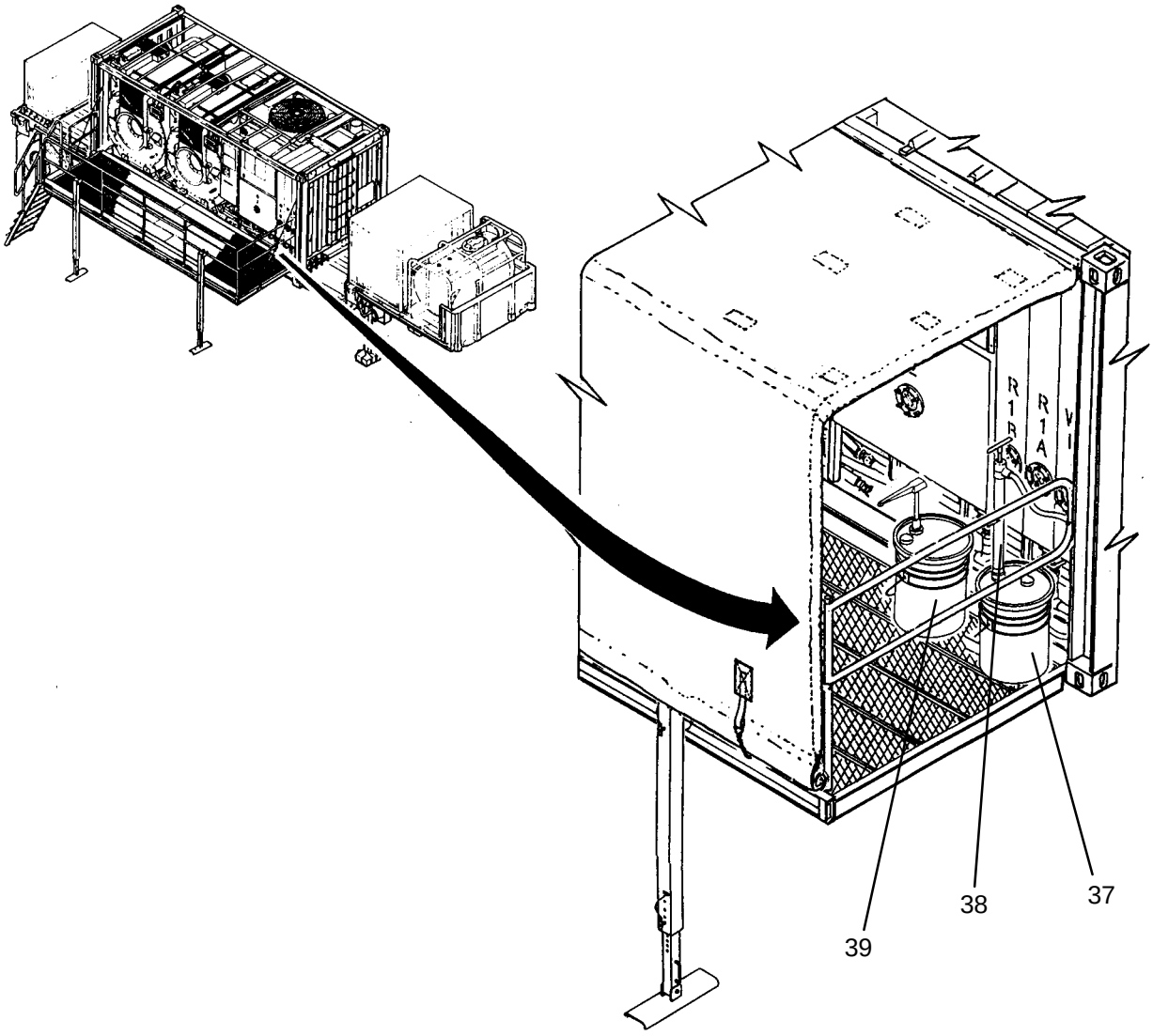


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
19	Before		Subcooler	Ensure inlet screen (40) is not blocked with debris. Ensure eight manual valves (41) are closed.	Screen is blocked Manual valves are open
20	Before		Pre–filter	Ensure manual valve (42) is closed.	Manual valve is open
21	Before		Coalescer	Ensure manual valve (43) is closed. Ensure petcock (44) is closed.	Manual valve or petcock is open
22	Before		Distillate pump	Ensure manual valve (45) is closed.	Manual valve is open

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 19 through 22.

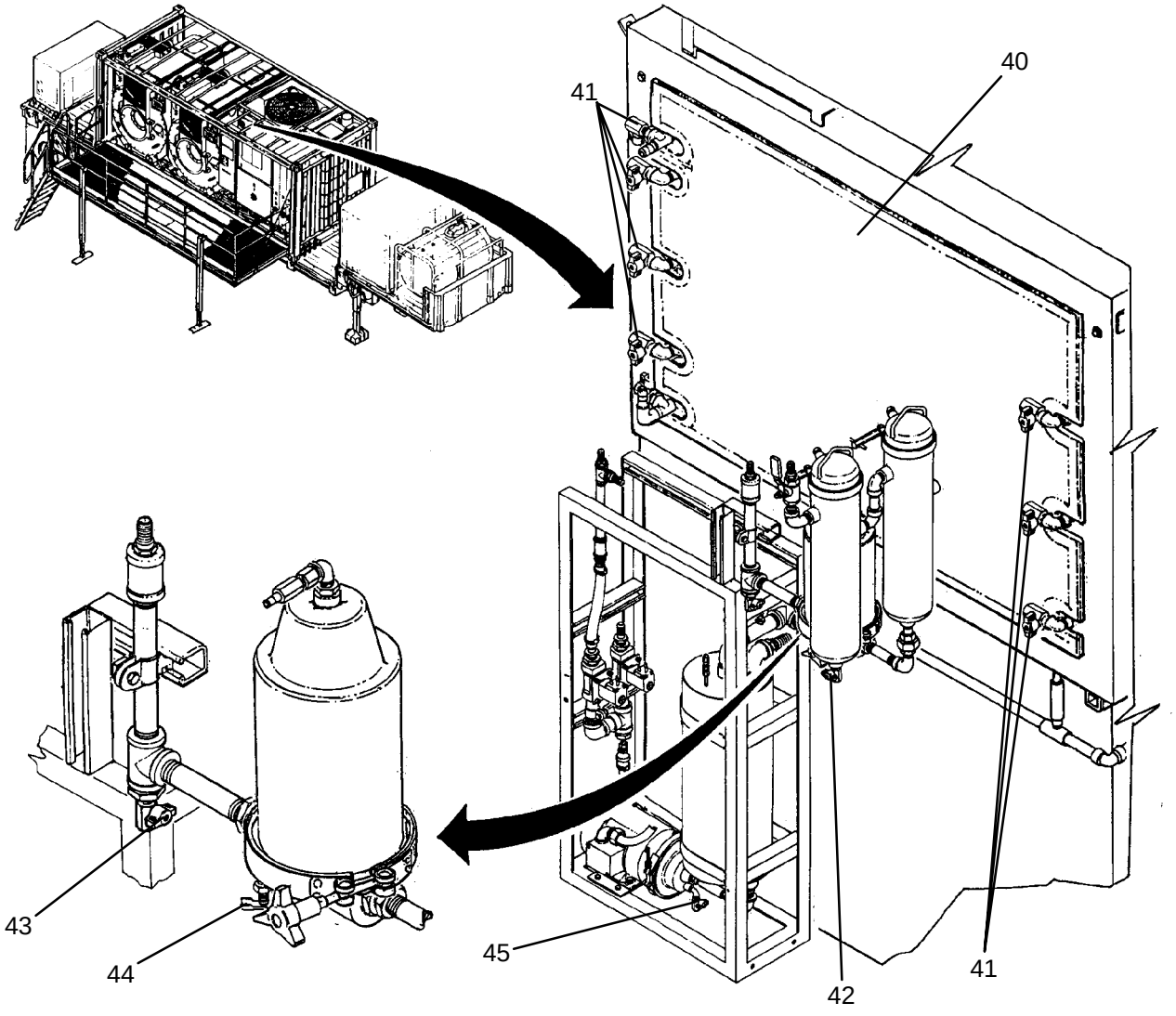


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
23	Before		Air system	Ensure three manual valves (46) are closed.	Manual valves are open
				Ensure manual valve (47) is open.	Manual valve is closed
24	Before		Inverter enclosure	Ensure outlet door (48) is open and not blocked with debris.	Door is closed or blocked

The callouts on these illustrations match the callouts in the BEFORE PMCS item numbers 23 and 24.

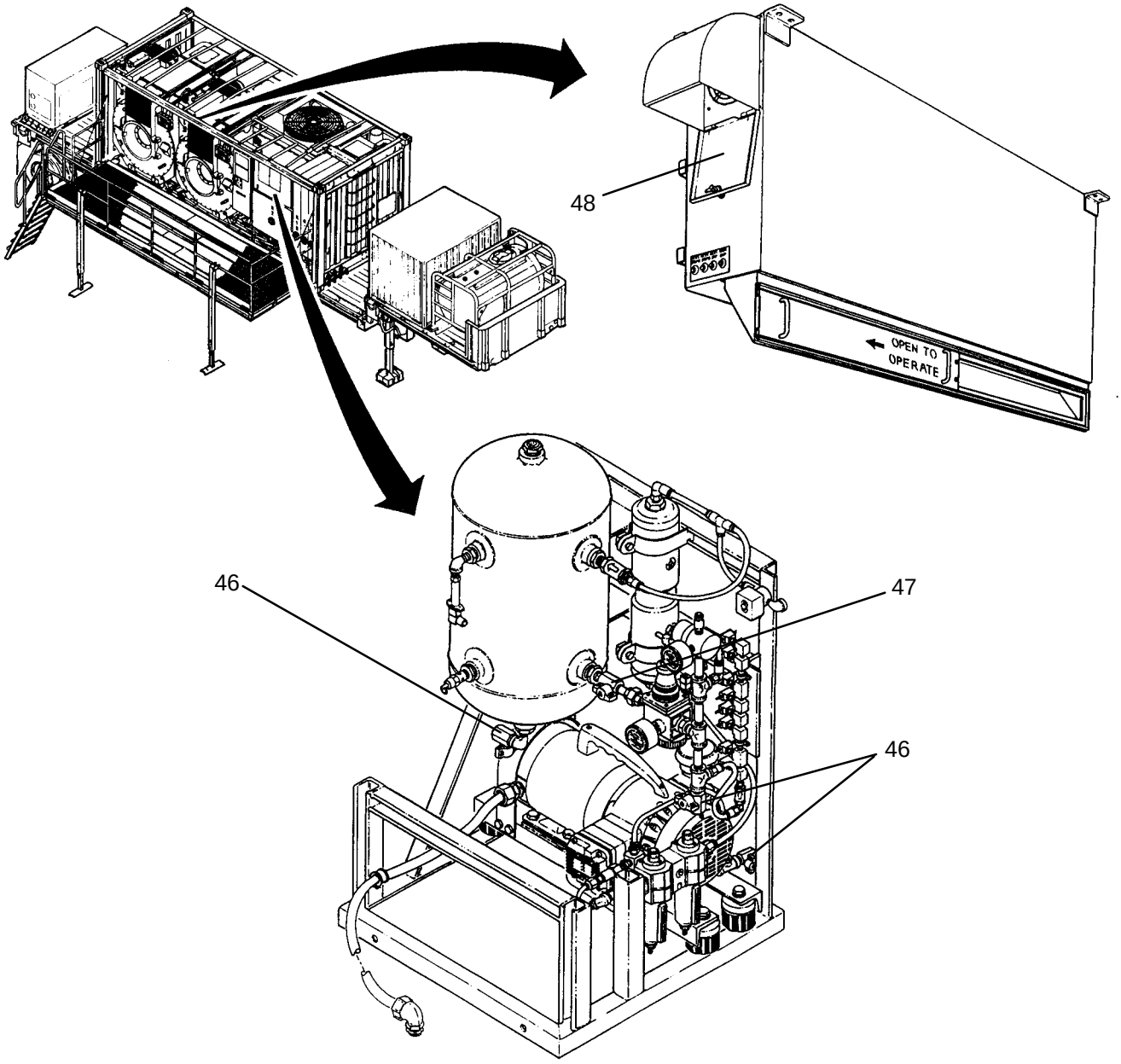
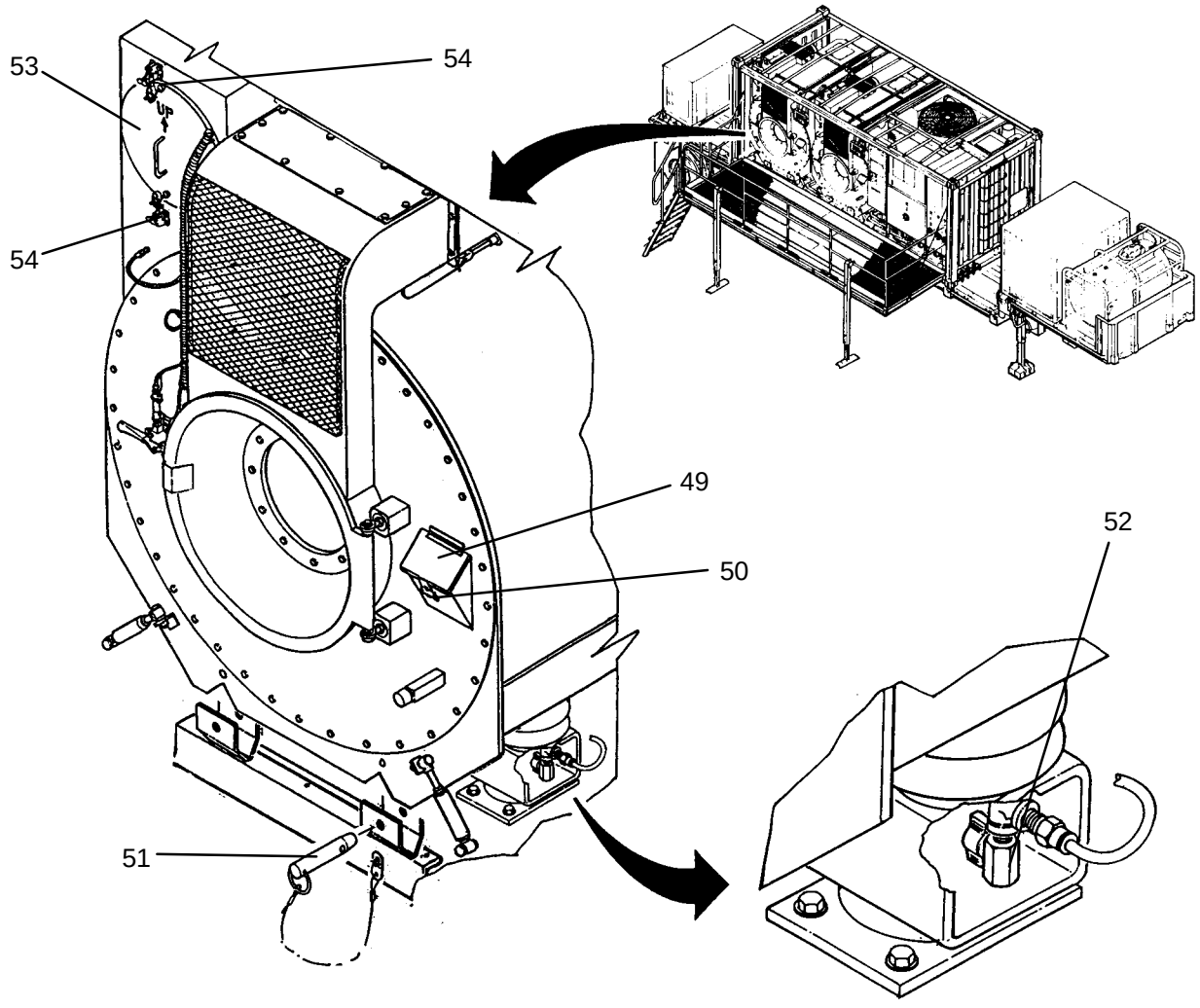


TABLE 1. Operator Before PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
25	Before		Washing/drying drums	Ensure sluice lids (49) are closed and latches (50) are engaged.	Lids are not closed and locked
				Ensure retaining pins (51) are not installed.	Pins are installed
				Ensure four air bag manual valves (52) are closed.	Manual valves are open
				Ensure lint filters (53) are cleaned and installed and latches (54) are engaged.	Lint filter is not clean, not installed or latches are not engaged

The callouts on these illustrations match the callouts in the BEFORE PMCS item number 25.



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

PREVENTIVE MAINTENANCE CHECKS And SERVICES (PMCS)
DURING OPERATION

TABLE 1. Operator During PMCS

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	During (At Start–up)		Inverter enclosure fan	Ensure fan (1) is blowing air out of enclosure after start–up.	Filters are damaged or not clean
2	During (At Start–up)		Drum motor cooling fans	Ensure fans (2) are blowing air around drive motors after start–up.	Filters are damaged or not clean
3	During (At Start–up)		Air system outlet filters	When air compressor (3) is on, ensure indicators (4) on both outlet filters (5) are green.	Either indicator is red

The callouts on these illustrations match the callouts in the DURING PMCS item numbers 1 through 3.

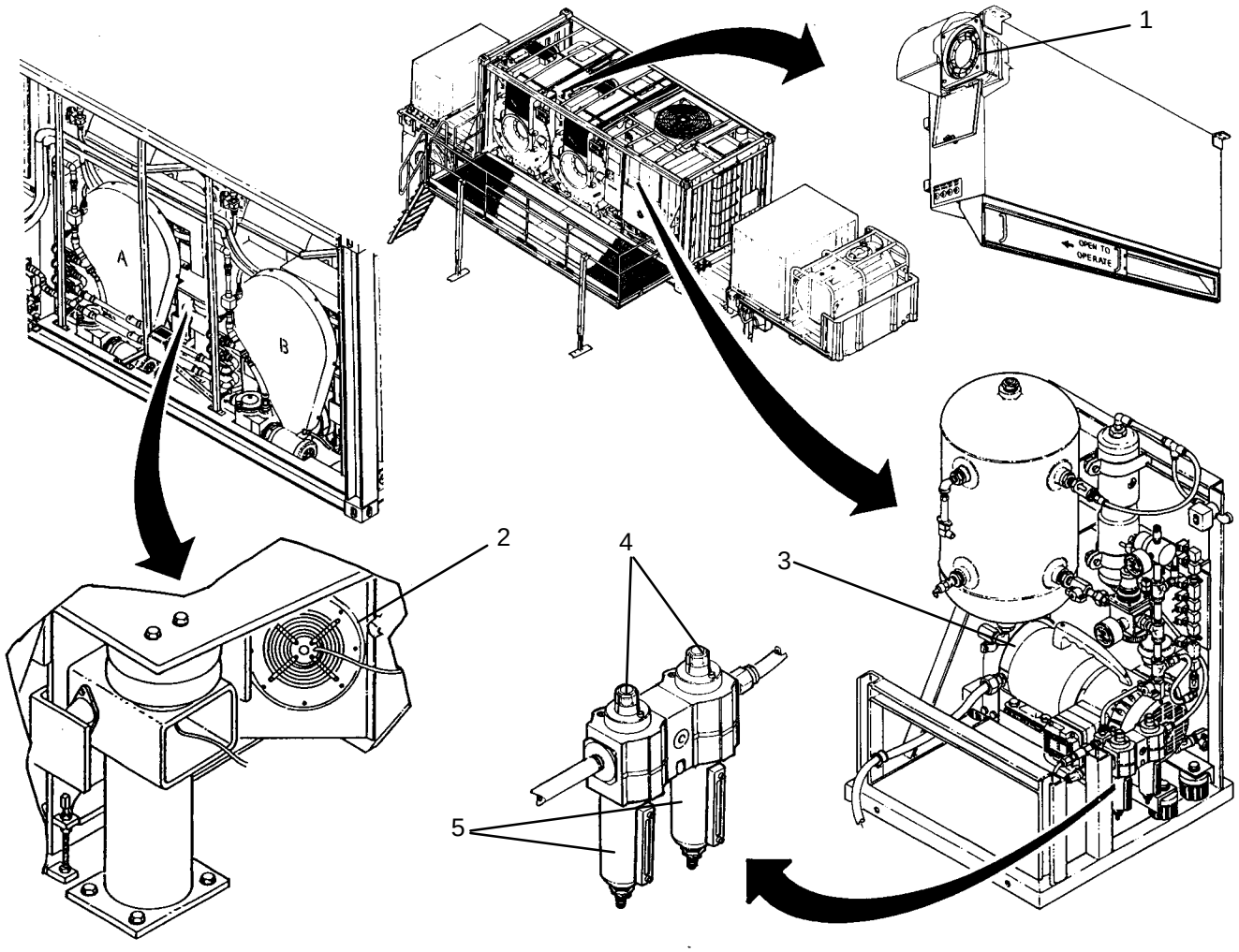
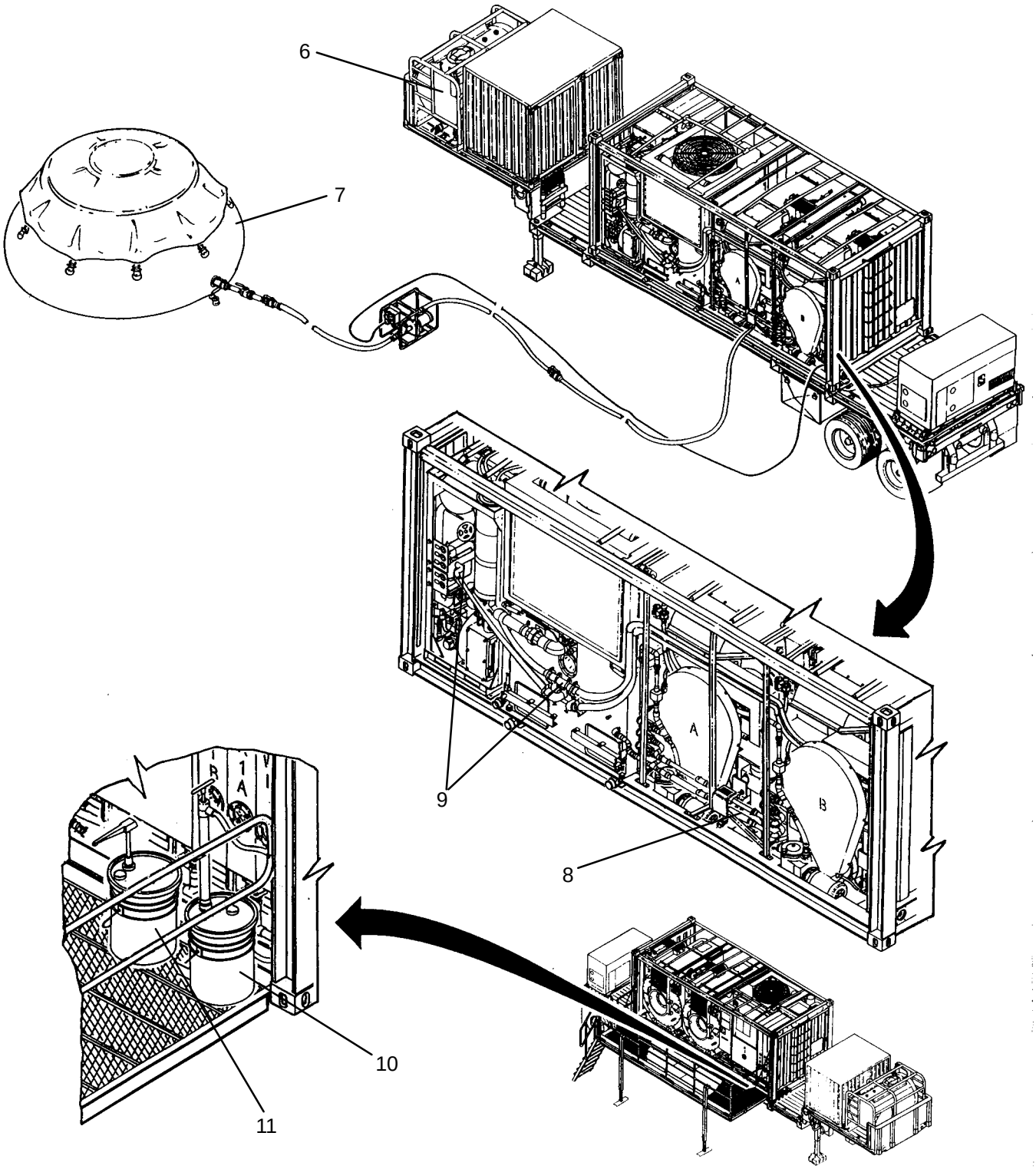


TABLE 1. Operator During PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
4	During		Dryer lint filters	Clean/Inspect lint filters (WP 0039 00) after each laundry cycle.	Filters are damaged or not clean
5	During		Water pump strainer	Clean strainers (WP 0041 00) after every fifth laundry cycle.	Strainers are damaged or not clean
6*	During		Fuel supply	Check for adequate supply of fuel (JP–8) in external container (6).	Fuel supply is < 100 gals
7*	During		Water supply	Check for adequate supply of water in external container (7).	Water supply is < 300 gals
8*	During		Water plumbing	Check water plumbing (8) for evidence of leakage.	Any class III leak is detected
9*	During		Thermal fluid plumbing	Check thermal fluid plumbing (9) for evidence of leakage.	Any class II leak is detected
10*	During		Anti–foam supply	Check for adequate supply of anti–foam in external container (10).	Anti–foam supply is < 1 gal
11*	During		Detergent supply	Check for adequate supply of detergent in external container (11). **NOTE** – Items marked * should be checked at shift change by the on coming shift.	Detergent supply is < 1 gal

TABLE 1. Operator During PMCS – Continued.

The callouts on these illustrations match the callouts in the DURING PMCS item numbers 4 through 11.



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

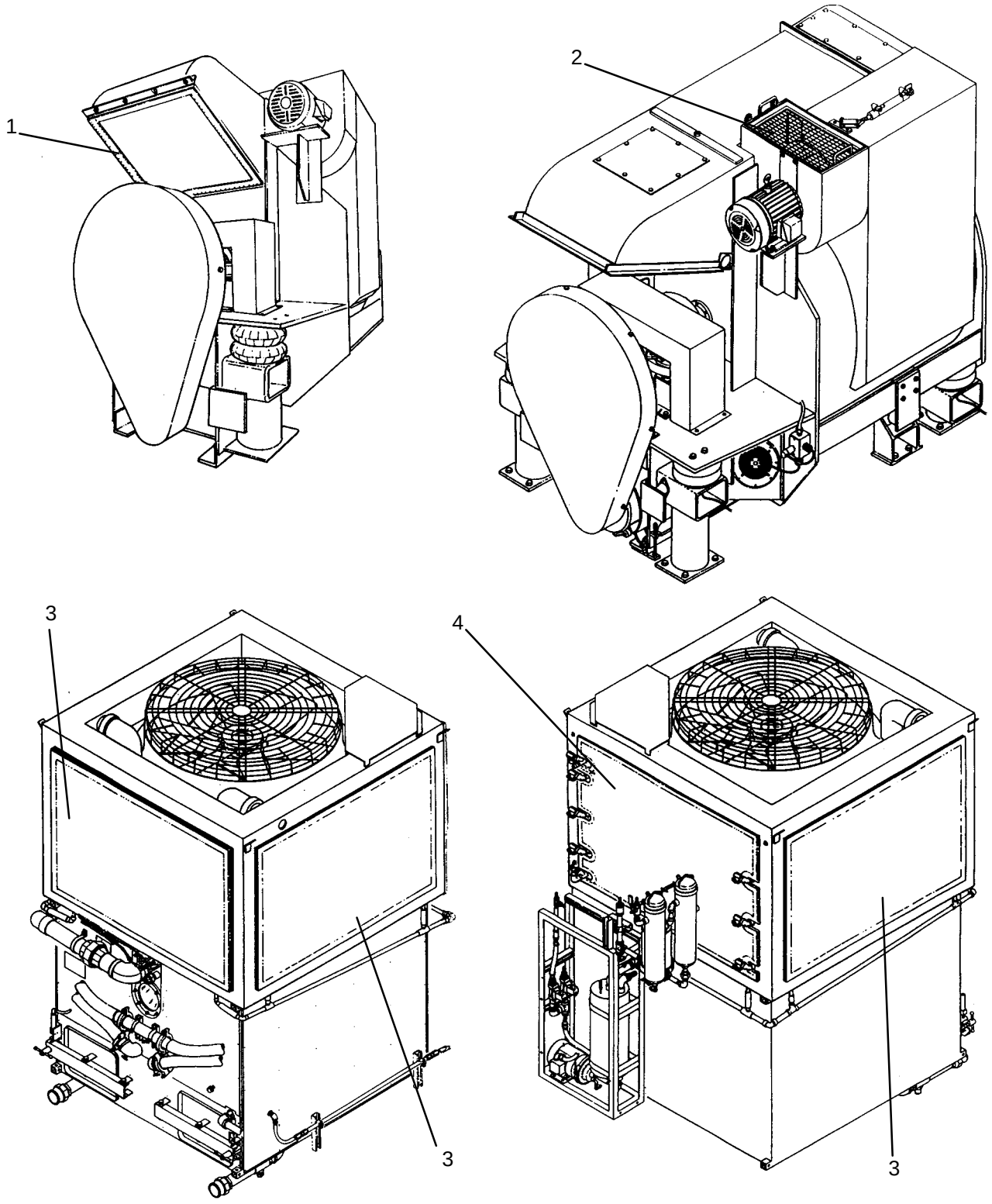
PREVENTIVE MAINTENANCE CHECKS And SERVICES (PMCS)
AFTER OPERATION

TABLE 1. Operator After PMCS.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	After		Dryer inlet screens	Ensure dryer inlet screens (1) are not blocked with debris. If necessary clean screens (WP 0037 00).	Screens are blocked
2	After		Dryer outlet guards	Ensure dryer outlet guards (2) are not blocked with debris. If necessary clean guards (WP 0038 00).	Screens are blocked
3	After		Water pump strainers	Clean/Inspect strainers (WP 0041 00).	Strainers are damaged or not clean
4	After		Still	Drain and clean still (WP 0043 00).	Still is not clean
5	After		Still condenser air inlet screens	Ensure three heat exchanger air inlet screens (3) are not blocked with debris. If necessary clean screens (WP 0044 00).	Screens are blocked
6	After		Subcooler air inlet screen	Ensure air inlet screens (4) are not blocked with debris. If necessary clean screen (WP 0045 00).	Screen is blocked

TABLE 1. Operator After PMCS – Continued.

The callouts on these illustrations match the callouts in the AFTER PMCS item numbers 1 through 6.



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

PREVENTIVE MAINTENANCE CHECKS And SERVICES (PMCS)
OTHER INTERVALS

TABLE 1. Operator PMCS

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
				NOTE When already operating, perform WEEKLY, QUARTERLY, and SEMI–ANNUAL checks as part of AFTER PMCS.	
1	Weekly		Water tanks	Drain and refill water tanks (WP 0013 00 and WP 0012 00).	Water tanks are not filled with fresh water.
2	Quarterly or Post–Deployment		Washing/Drying drums	Inspect heat exchangers (1) for debris blocking fins, also check for bent fins. Clean fins as necessary.	Fins are blocked with debris or are bent.
3	Quarterly or Post–Deployment		Still condenser	Inspect heat exchangers (2) for debris blocking fins, also check for bent fins. Clean fins as necessary.	Fins are blocked with debris or are bent.
4	Quarterly or Post–Deployment		Subcooler	Inspect subcooler (3) for debris blocking fins, also check for bent fins. Clean fins as necessary.	Fins are blocked with debris or are bent.

The callouts on these illustrations match the callouts in the QUARTERLY PMCS item numbers 2 through 4.

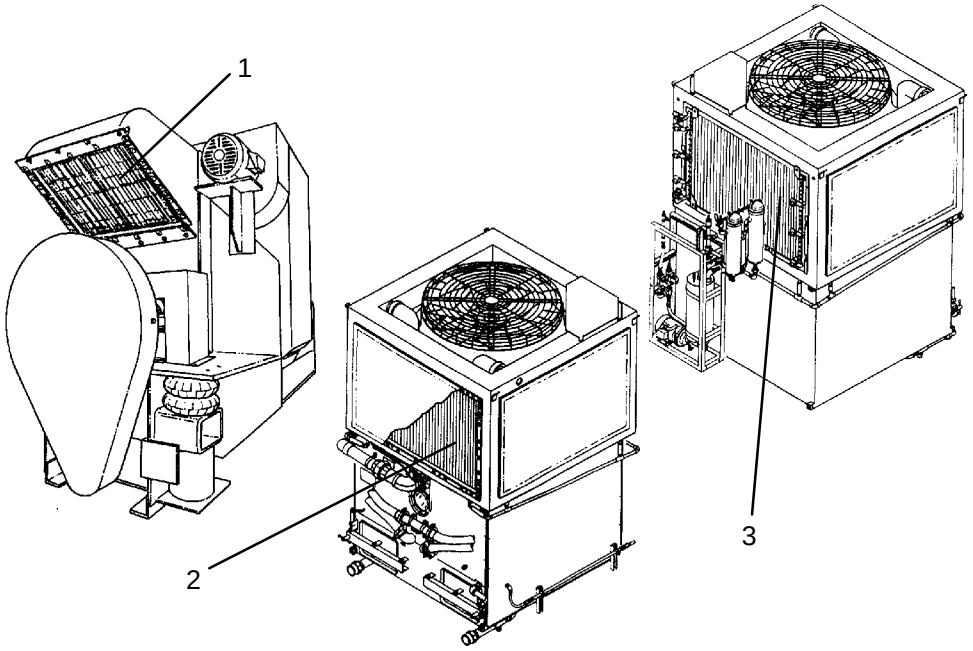


TABLE 1. Operator PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	Semi–Annually or Post–Deployment		Washing/Drying drums	Lubricate drive bearings (WP 0036 00).	Not lubricated
				Lubricate drive motors (WP 0036 00).	Not lubricated
				Lubricate rear seals (WP 0036 00).	Not lubricated
				Lubricate brake calipers (WP 0036 00).	Not lubricated
6	Semi–Annually or Post–Deployment		Still	Lubricate still door clamping knobs (WP 0036 00).	Not lubricated
7	Semi–Annually or Post–Deployment		Heater	Lubricate thermal fluid pump motor (WP 0036 00).	Not lubricated
				Clean heater air inlet filter (WP 0049 00).	Filter is not clean
8	Semi–Annually or Post–Deployment		Air system	Replace inlet filter (WP 0050 00).	Filter element is not clean
				Replace outlet filter elements (WP 0051 00).	Element(s) is not clean.
9	Semi–Annually or Post–Deployment		Load binders	Lubricate drum stowage load binders (WP 0036 00).	Not lubricated
10	Semi–Annually or Post–Deployment		Grounding lug	Lubricate grounding lug (WP 0036 00).	Not lubricated
11	Annually or Post–Deployment		LADS	Clean the LADS (WP 0055 00).	LADS is not clean
12	Annually or Post–Deployment		Water tanks	Clean inside of water tanks (WP 0042 00).	Water tanks are not filled with fresh water.
13	Annually or Post–Deployment		Air system	Replace outlet filter automatic drains (WP 0052 00).	Filter element is not clean
					Element(s) is not clean.

TABLE 1. Operator PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	Annually or Post–Deployment		Tarp/Awning	Inspect tarp (4) for tears in material, fraying on edges, security of straps (5), and missing or damaged buckles (6). If damage is found repair as necessary	Tarp is damaged.

The callouts on these illustrations match the callouts in the ANNUAL PMCS item number 14.

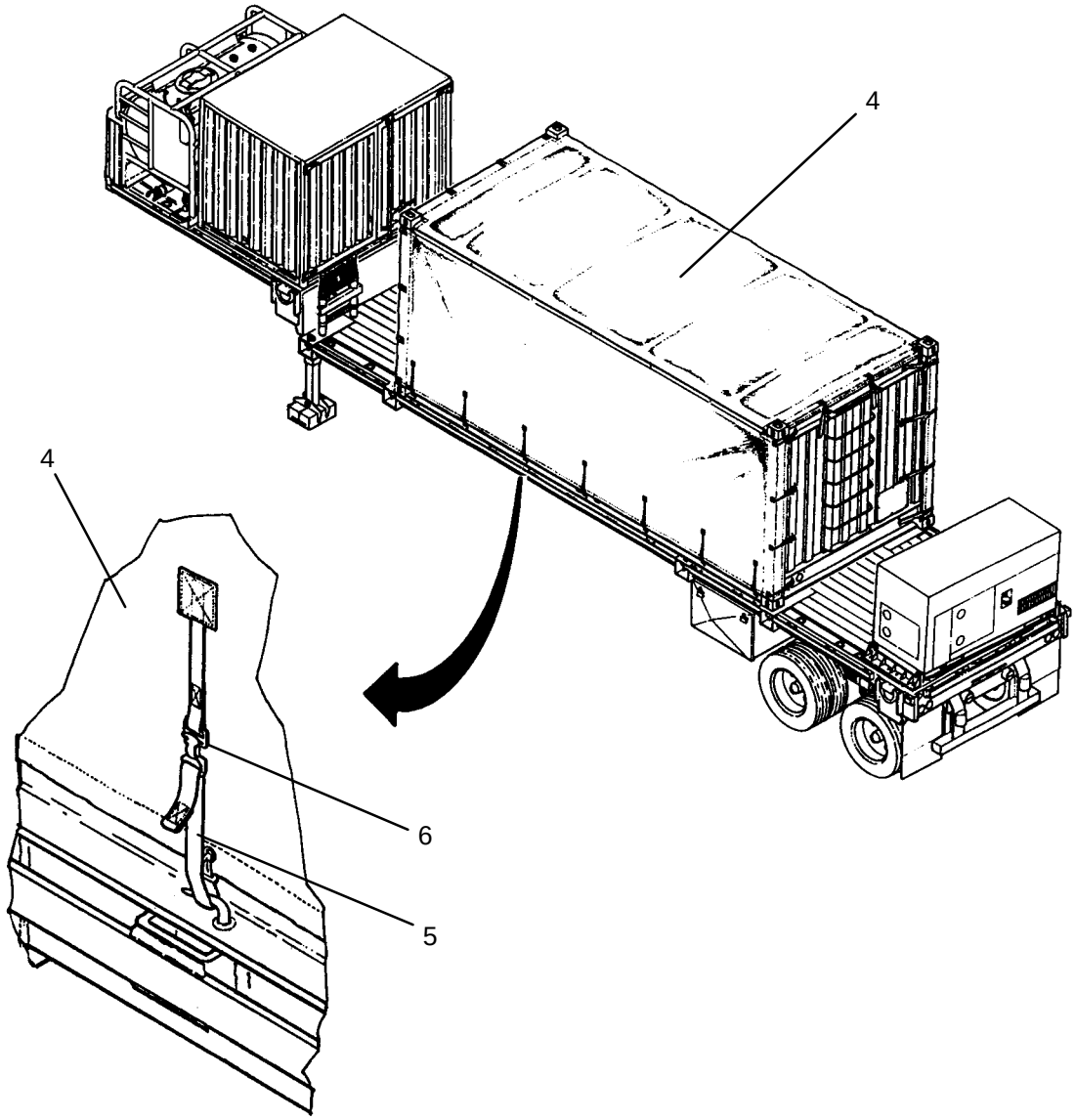


TABLE 1. Operator PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
15	Annually or Post–Deployment		Platform	Inspect welds on platform (7). Check security of railing (8) and support legs (9).	Cracks in welds are present. Railings or legs are loose.
				Inspect welds on railing (8) and gate (10). Check security of gate. Check for damaged or missing quick–connect (QC) pins (11).	Cracks in welds are present. Gate is loose. QC pins are missing or damaged.
				Inspect stow handles (12), stow rods (13), and stow bars (14) for damage. Ensure stow bars properly lock into ISO frame (15).	Stow linkage is damaged or does not lock platform in place.
				Inspect support legs for damage to handles (16), feet (17), rail retainers (18), and legs (19). Check for damaged or missing QC pins (20).	Legs or leg parts are damaged. QC pins are missing or damaged.
				Inspect safety cables (21) for kinks and fraying. Ensure cables are secured to platform (7) and ISO frame (15).	Cables are kinked, frayed, or not secure.
				Inspect winch cable (22) for kinks or fraying. Ensure cable is riding inside pulleys (23). Check shackle (24) for cracks and bending. Ensure clamps (25) are tight.	Cable is kinked, frayed, or out of pulleys. Shackle is damage or clamps are loose.
				Inspect snatch blocks (26) for security. Ensure fasteners (27 and 28) are hand–tight.	Snatch block fasteners are loose.

TABLE 1. Operator PMCS – Continued.

The callouts on these illustrations match the callouts in the ANNUAL PMCS item number 15.

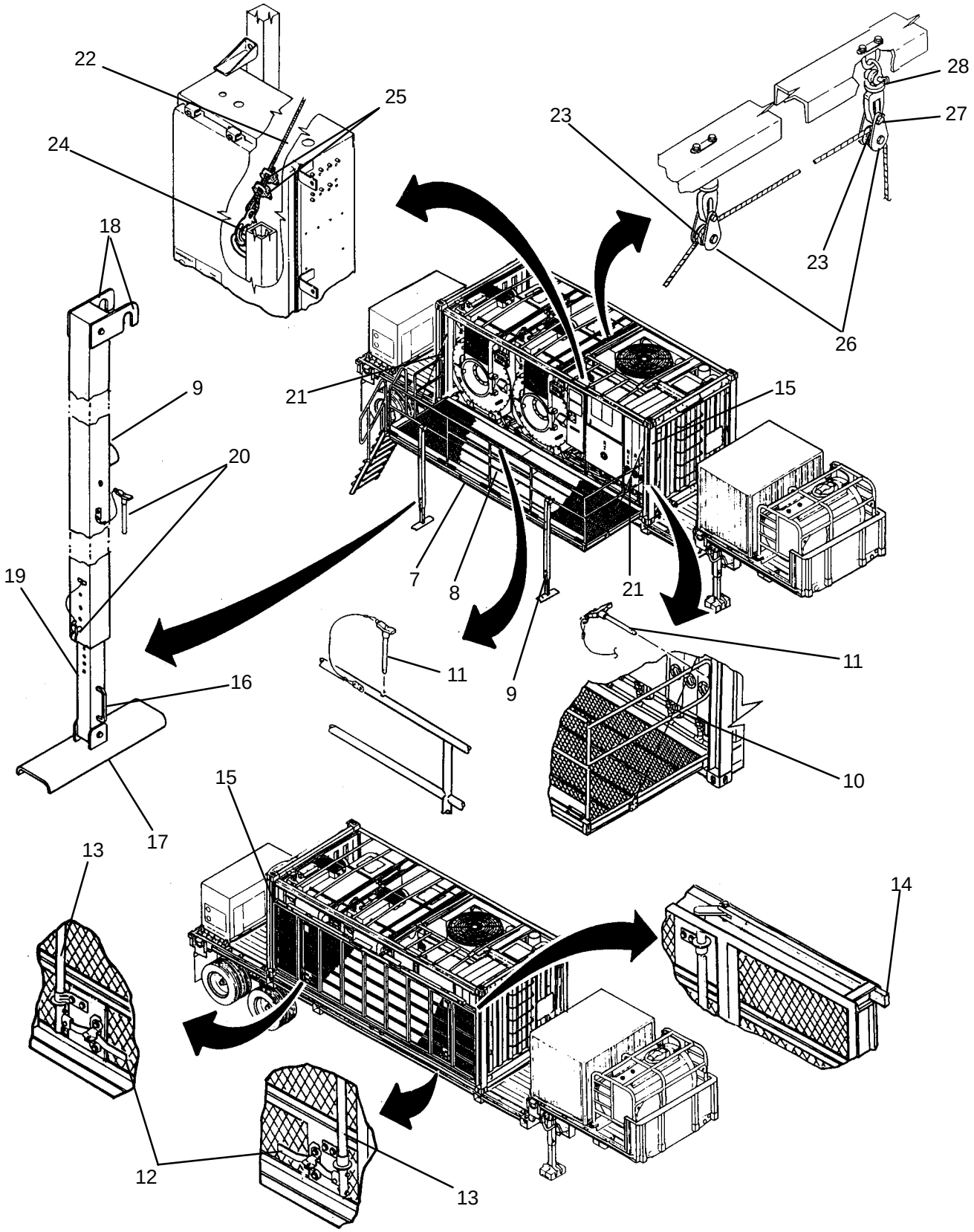
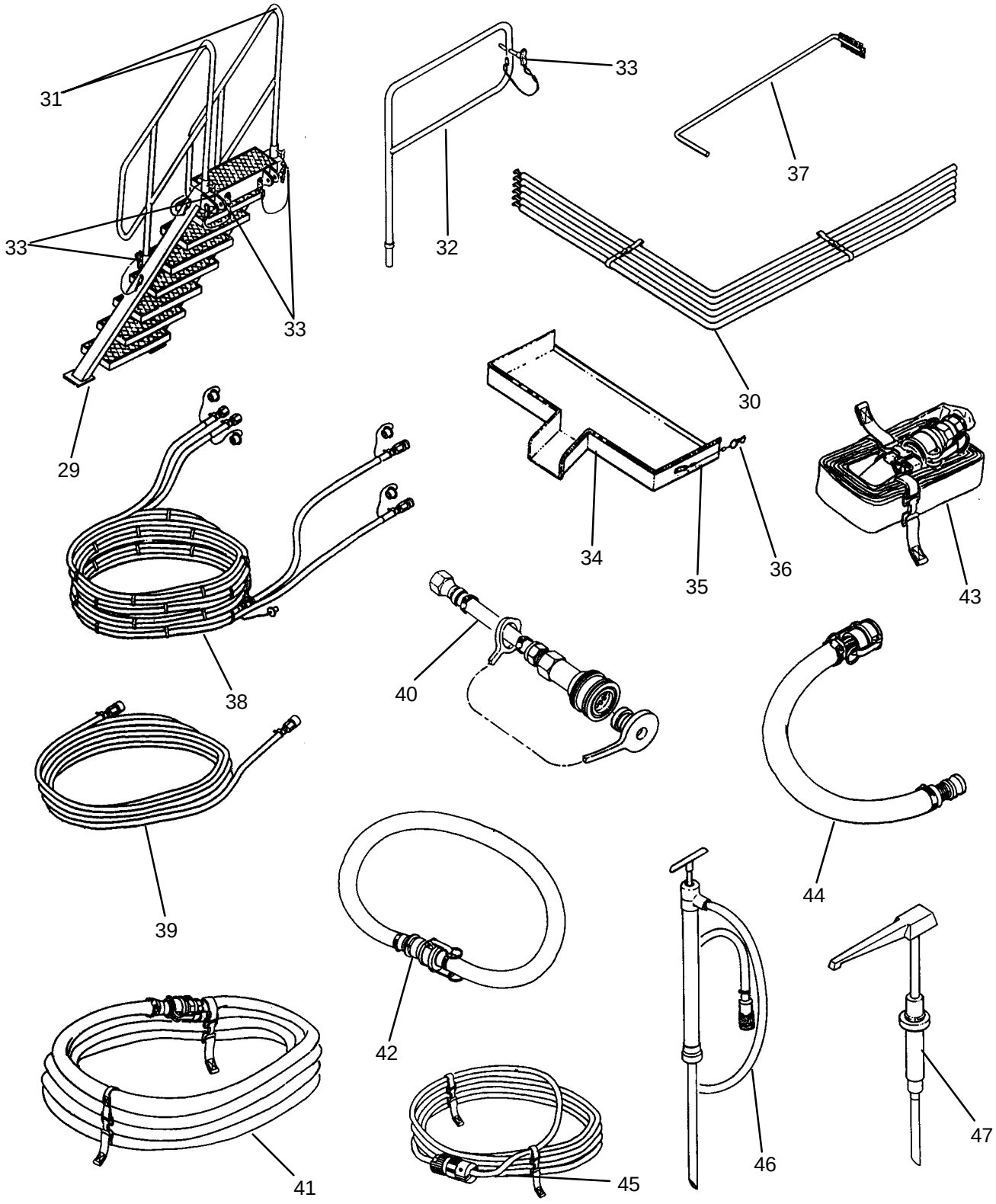


TABLE 1. Operator PMCS – Continued.

ITEM NO.	INTERVAL	MAN–HOUR	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
16	Annually or Post–Deployment		Accessories	Inspect welds on stairs (29), awning supports (30), and railings (31 and 32).	Cracks in welds are present.
				Inspect stairs (29) and railing (32) for damaged or missing QC pins (33).	QC pins are damaged or missing.
				Inspect sluice tray (34) for damage. Check for damaged or missing lanyards (35) and S–hooks (36).	Sluice tray is bent. Lanyards or S–hooks are missing.
				Inspect rake (37) for damage and worn out bristles.	Rake is bent or bristles are worn out.
				Inspect fuels hoses (38, 39, and 40), water hoses (41 and 42), and drain hoses (43 and 44) for cracks, splits, and holes. Ensure clamps are tight and end connections are not damaged.	Hoses are leaking, clamps are loose, or connections are damaged.
				Inspect water supply pump electrical cable (45) for fraying and damaged connections.	Cable is frayed or connections are damaged.
				Inspect anti–foam and detergent hand–pumps (46 and 47) for leakage and damage.	Hand–pumps are leaking or damaged.

TABLE 1. Operator PMCS – Continued.

The callouts on these illustrations match the callouts in the ANNUAL PMCS item number 16.



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

LUBRICATION INSTRUCTIONS

GENERAL

The Laundry Advanced System must receive lubrication with approved lubricants at recommended intervals in order to be mission–ready at all times.

The lubrication chart, Figure 1, shows lubrication points, components to be lubricated, the required lubricant, and recommended intervals for lubrication. Any special lubrication instructions required for specific components are contained in the NOTES section of Figure 1.

Recommended intervals are based on normal conditions of operation, temperature, and humidity. When operating under extreme conditions, lubricants should always be changed more frequently. When in doubt, notify your supervisor.

Keep all lubricants in a closed container and store in a clean, dry place away from extreme heat. Keep container covers clean and do not allow dust, dirt, or other foreign material to mix with lubricants. Keep all lubrication equipment clean and ready for use.

Maintain a record of lubrication performed and report any problems noted during lubrication. Refer to DA PAM 738–750 for maintenance forms and procedures to record and report any findings.

Keep all external parts of equipment not requiring lubrication free of lubricants. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

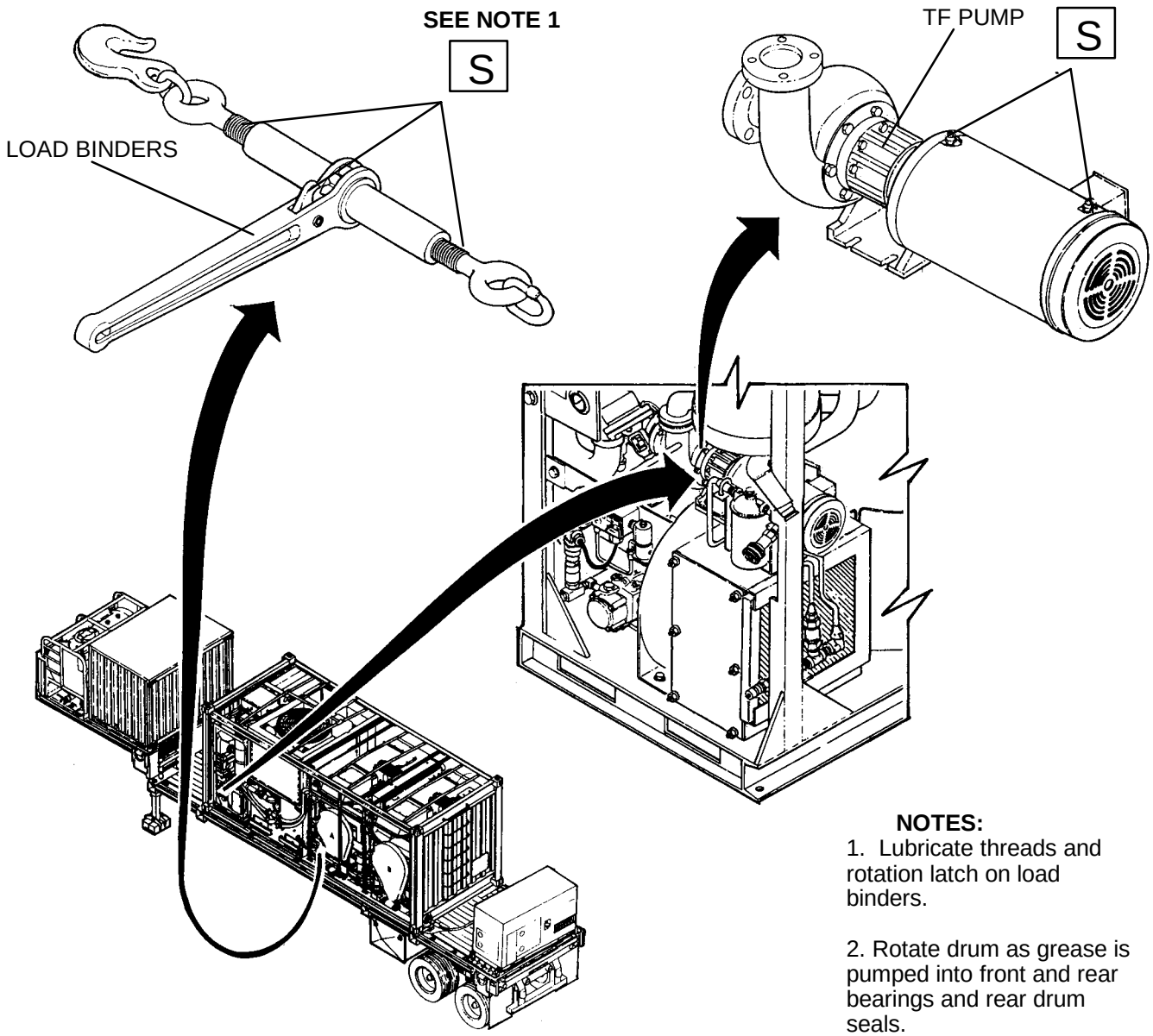
Refer to FM 9–207 for lubrication instructions in cold weather.

After operation in mud, sandy, or dusty conditions, clean and inspect all points of lubrication for fouled lubricants. Change lubricants, if required.

Clean all fittings and the area around lubrication points with a lint free cloth or equivalent before lubricating equipment. After lubrication, wipe off excess oil or grease to prevent accumulation of foreign matter.

If dust caps are installed, re–install after lubrication is complete.

LUBRICATION INSTRUCTIONS – Continued



NOTES:

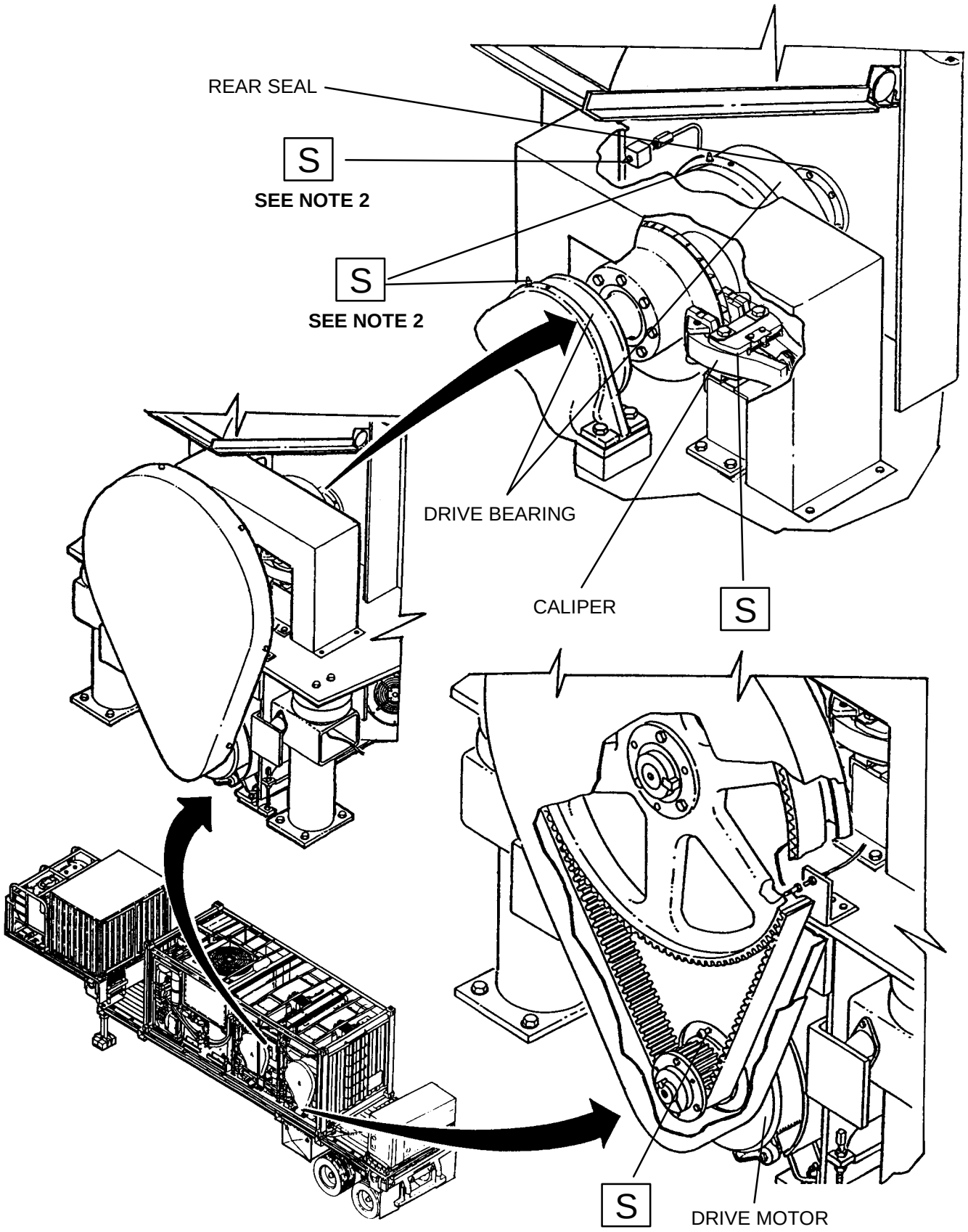
1. Lubricate threads and rotation latch on load binders.

2. Rotate drum as grease is pumped into front and rear bearings and rear drum seals.

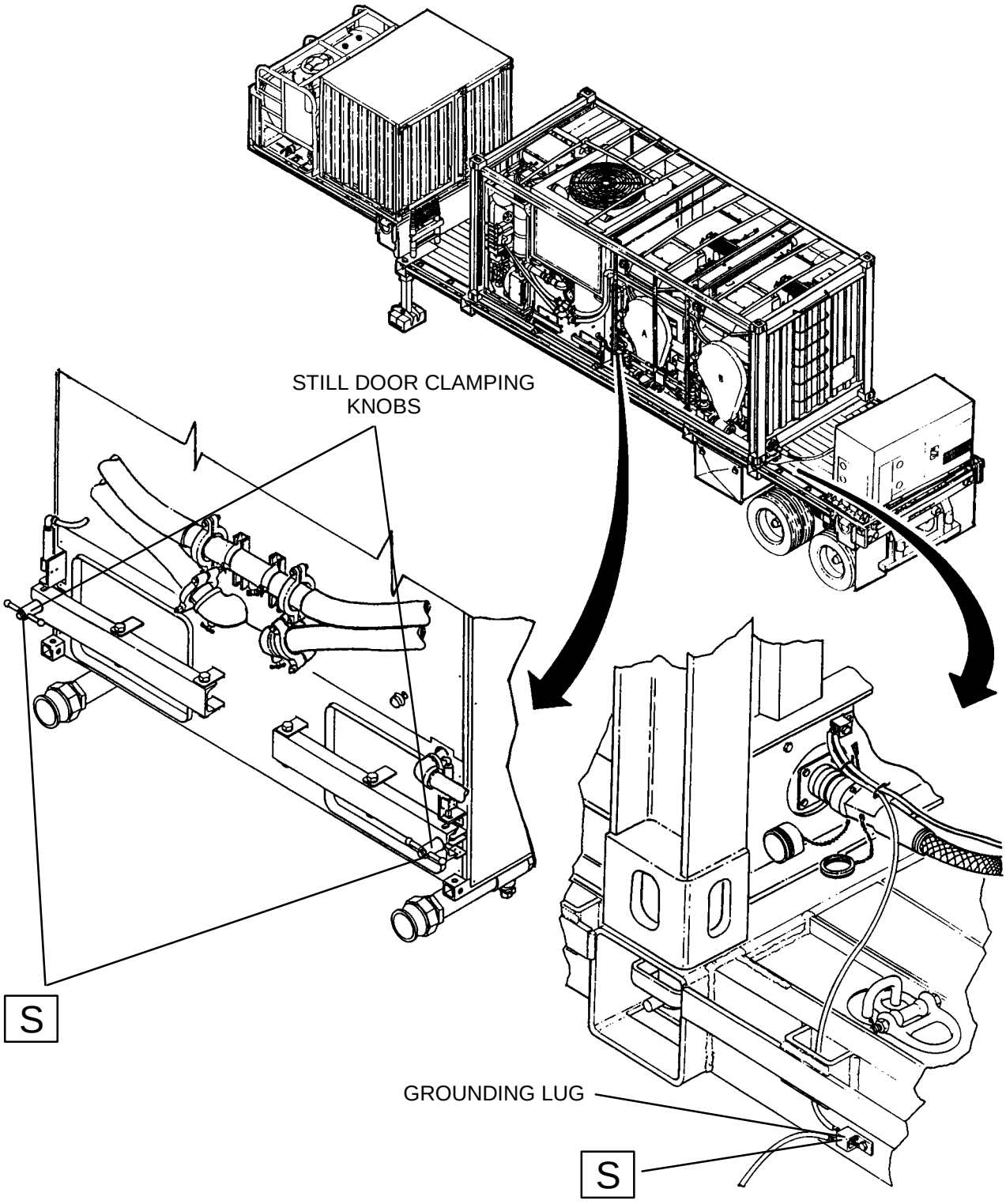
TABLE OF LUBRICANTS		
IDENTIFICATION LETTER	SPECIFICATION	TYPE OF LUBRICANT
Item 8, WP 0059 00	NLGI #2, Lithium, Complex EP	Grease, General Purpose

SYMBOLS	FREQUENCY	METHOD OF APPLICATION
S	SEMI–ANNUALLY	

LUBRICATION INSTRUCTIONS – Continued



LUBRICATION INSTRUCTIONS – Continued



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

DRYER INLET SCREEN SERVICING CLEANING

INITIAL SETUP:

Tools	**Personnel Required**
Ladder, Folding, (Item 12, Table 1, WP 0057 00)	One
Materials/Parts	**Equipment Conditions**

CLEANING

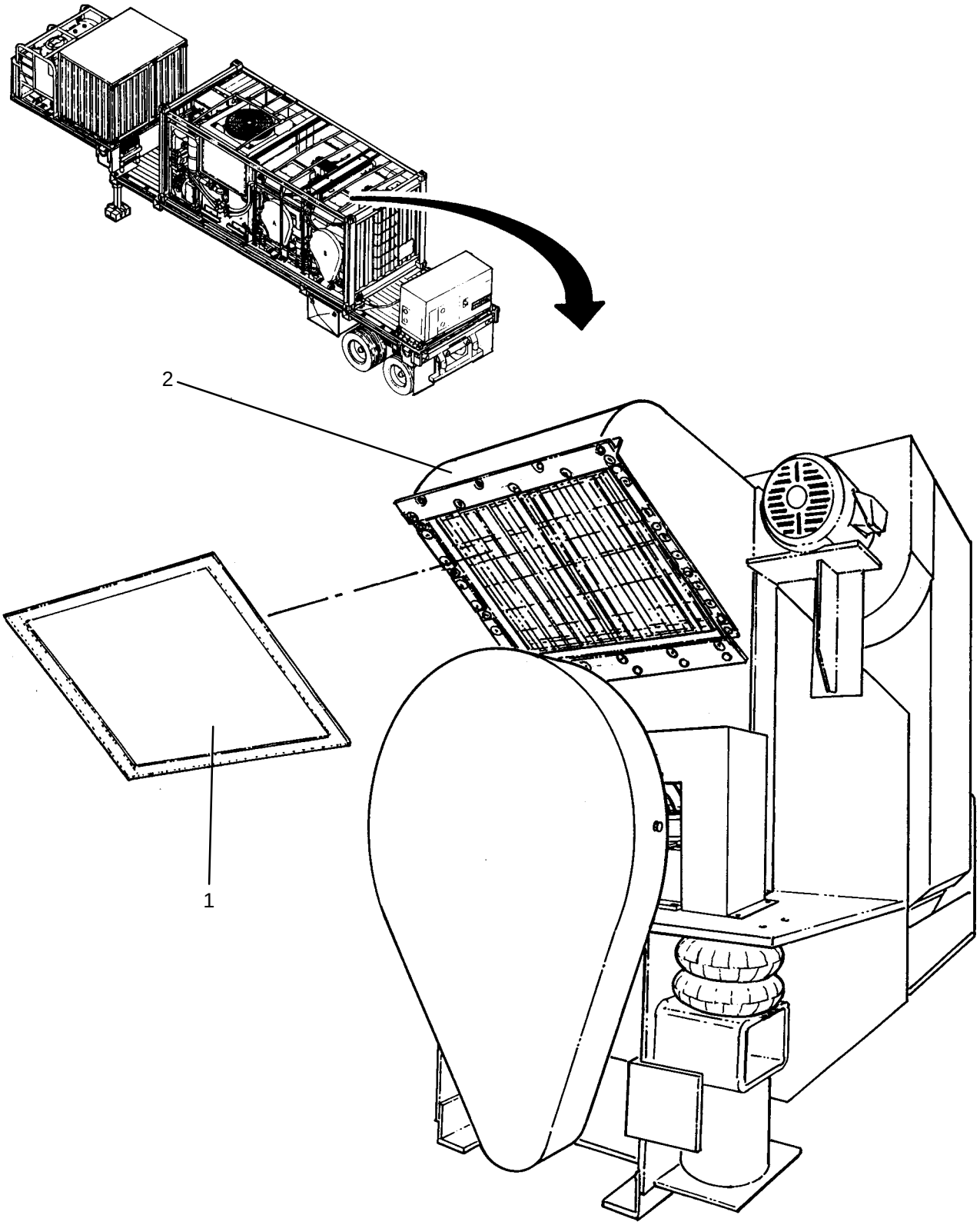
WARNING

Thermal fluid can reach temperatures near 400 degrees F when the heating system is operating. Make sure cooldown cycle has been run prior to performing maintenance. Always wear gloves and eye protection. Failure to follow this precaution could result in severe burn injuries.

Keep hands and fingers away from hinge points on ladder halves when opening and closing. Keep hands and fingers away from inner and outer rungs of ladder when adjusting. Never climb on ladder unless knobs and locking devices are properly tightened, footings are placed securely on the ground and/or ladder is placed securely upon the LADS. Failure to observe this precaution may result in severe personal injury.

1. Remove screens (1) from dryer ducting (2).
2. Rinse screens (1) with water until all debris is removed.
3. Inspect screens (1) for tears. Replace if torn.
4. Reinstall screens (1) onto dryer ducting (2).

CLEANING – Continued



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

DRYER OUTLET GUARD SERVICING
CLEANING

INITIAL SETUP:

Tools

Personnel Required
One

Materials/Parts

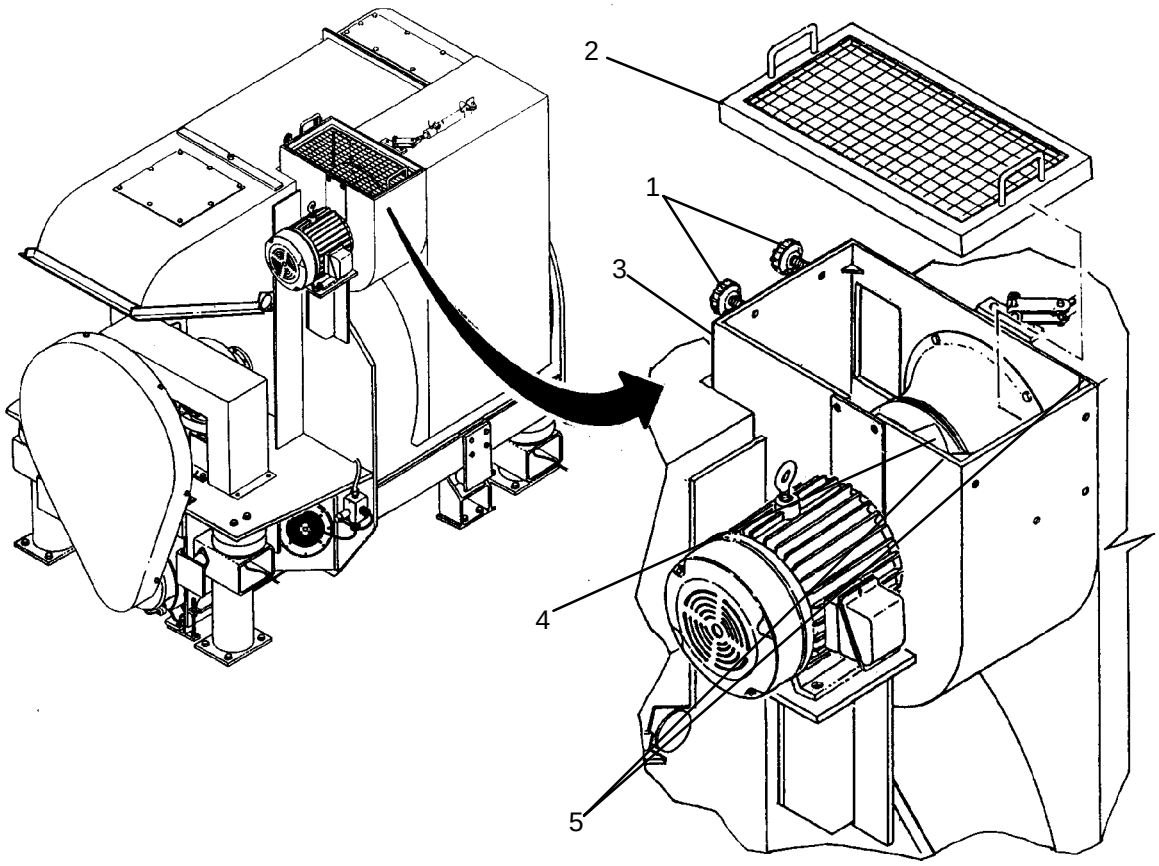
Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00) or with the LADS in AFTER PMCS mode.

CLEANING

WARNING

Dryer blower fan blades are sharp. Ensure power is removed from LADS prior to removing guard. Never spin fan blades by hand. Failure to follow this precaution could result in serious injury.

1. Loosen two knobs (1), then remove guard (2) from dryer duct (3).
2. Remove any lint buildup on guard (2), dryer duct (3), and fan blades (4).
3. Insert guard (2) into gussets (5) on dryer duct (3), then tighten two knobs (1).



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

DRYER LINT FILTER SERVICING
CLEANING, INSPECTION

INITIAL SETUP:

Tools

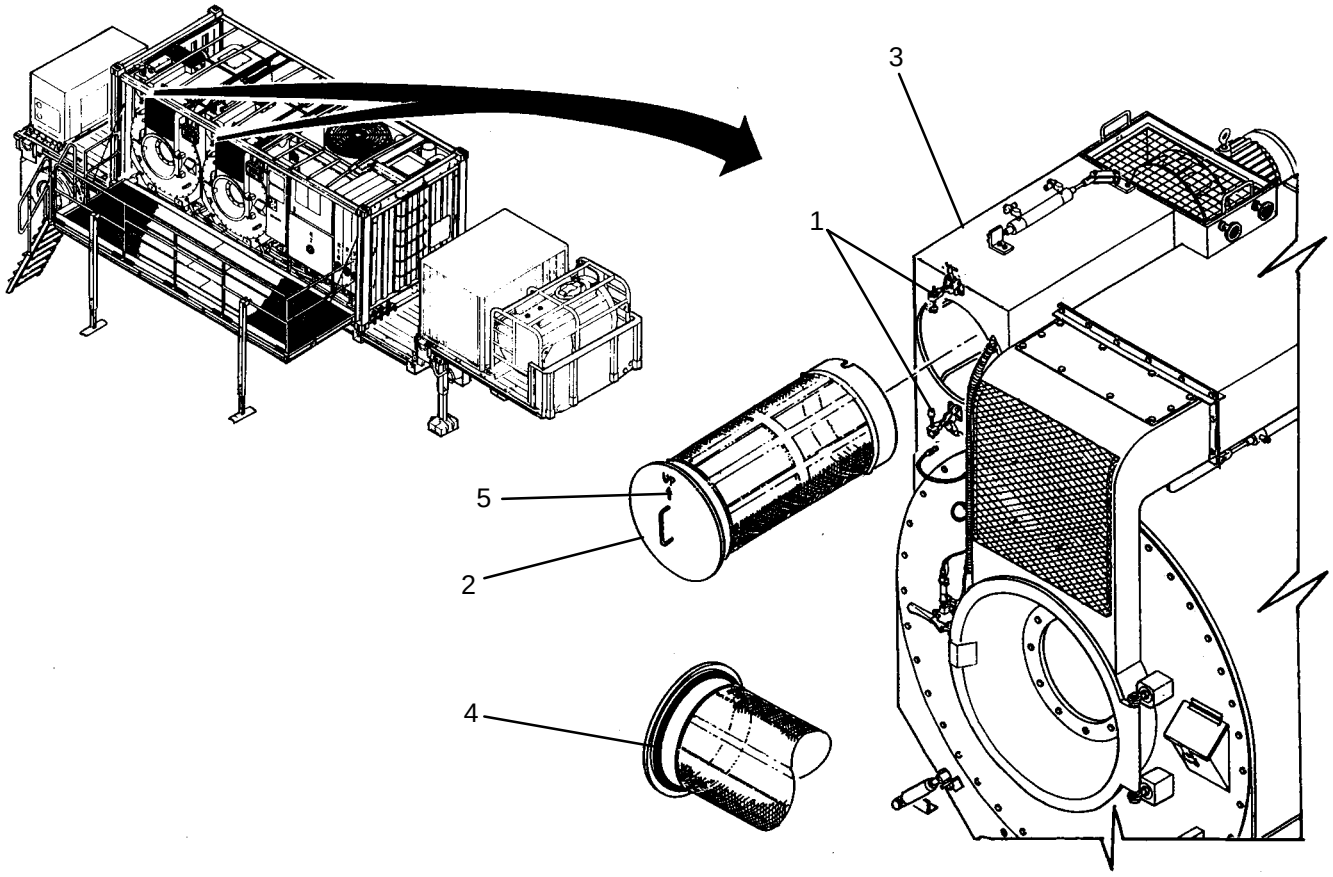
Personnel Required
One

Materials/Parts

Equipment Conditions

CLEANING

1. Unlock latches (1).
2. Slide lint filters (2) out of dryer ducting (3).
3. Brush lint off of lint filters (2).
4. Inspect lint filters (2) for tears or obvious damage. Replace if torn or damaged (WP 0040 00).
5. Inspect gaskets (4) on back side of lint filters (2) for tears or obvious damage. Notify maintenance if torn or damaged.
6. Reinstall lint filters (2) with direction arrow (5) pointing up.
7. Engage latches (1) to secure lint filter (2).



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

DRYER LINT FILTER REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

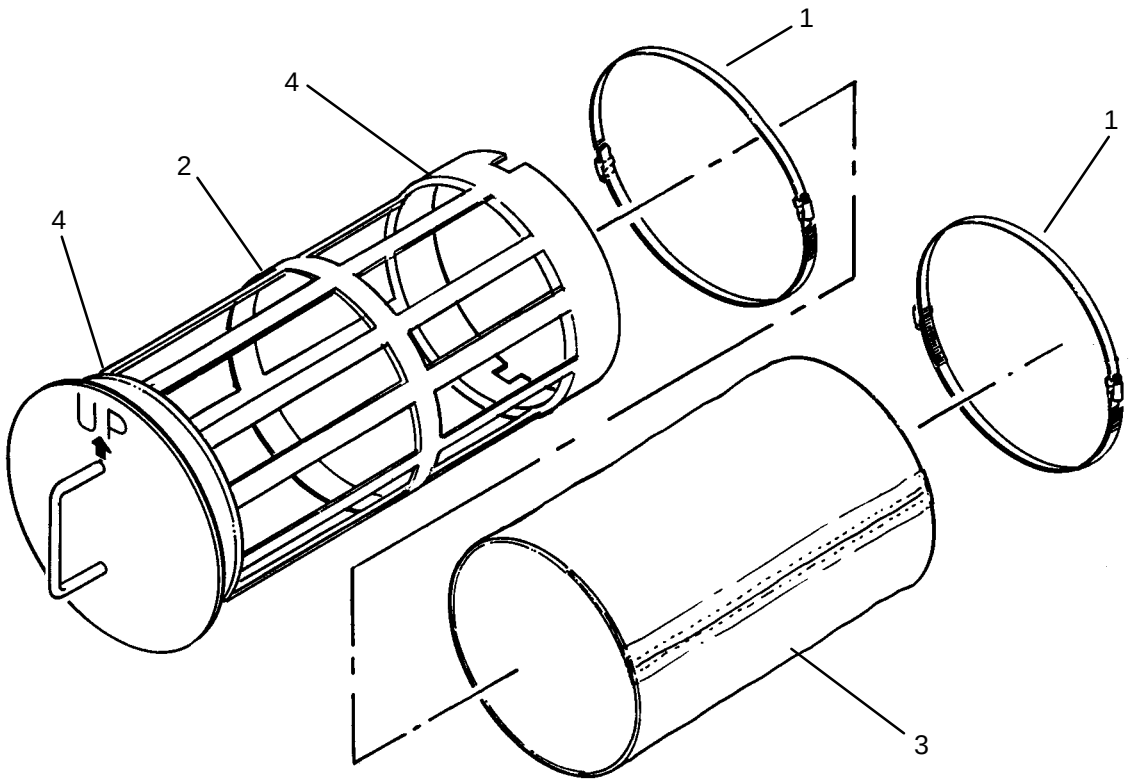
Personnel Required
One

Materials/Parts
Element, Lint Filter (4X630) 863–110133
NSN 3510–01–481–7830

Equipment Conditions

REMOVAL

1. Remove lint filter from drum (WP 0039 00).
2. Loosen two clamps (1) and slide off of frame (2).
3. Slide filter element (3) off of frame (2).



INSTALLATION

1. Slide new filter element (3) onto frame (2).
2. Slide two clamps (1) over filter element (3).
3. Tighten two clamps (1) ensuring clamps are seated in grooves (4) on frame (2).
4. Install lint filter into drum (WP 0039 00).

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

WATER PUMP SERVICING
CLEANING, INSPECTION

INITIAL SETUP:

Tools	**Personnel Required**
	One
Materials/Parts	**Equipment Conditions**

CLEANING

1. Open manual valve (1) on water pump (2)
2. Allow water to drain then close manual valve (1).
3. Loosen clamping knobs (3) securing cover (4) to pump housing (5).
4. Rotate cover (4) to clear clamping knobs (3) then remove cover.
5. Pull strainer (6) out of pump housing (5).
6. Remove gasket (7) from pump housing (5).

CAUTION

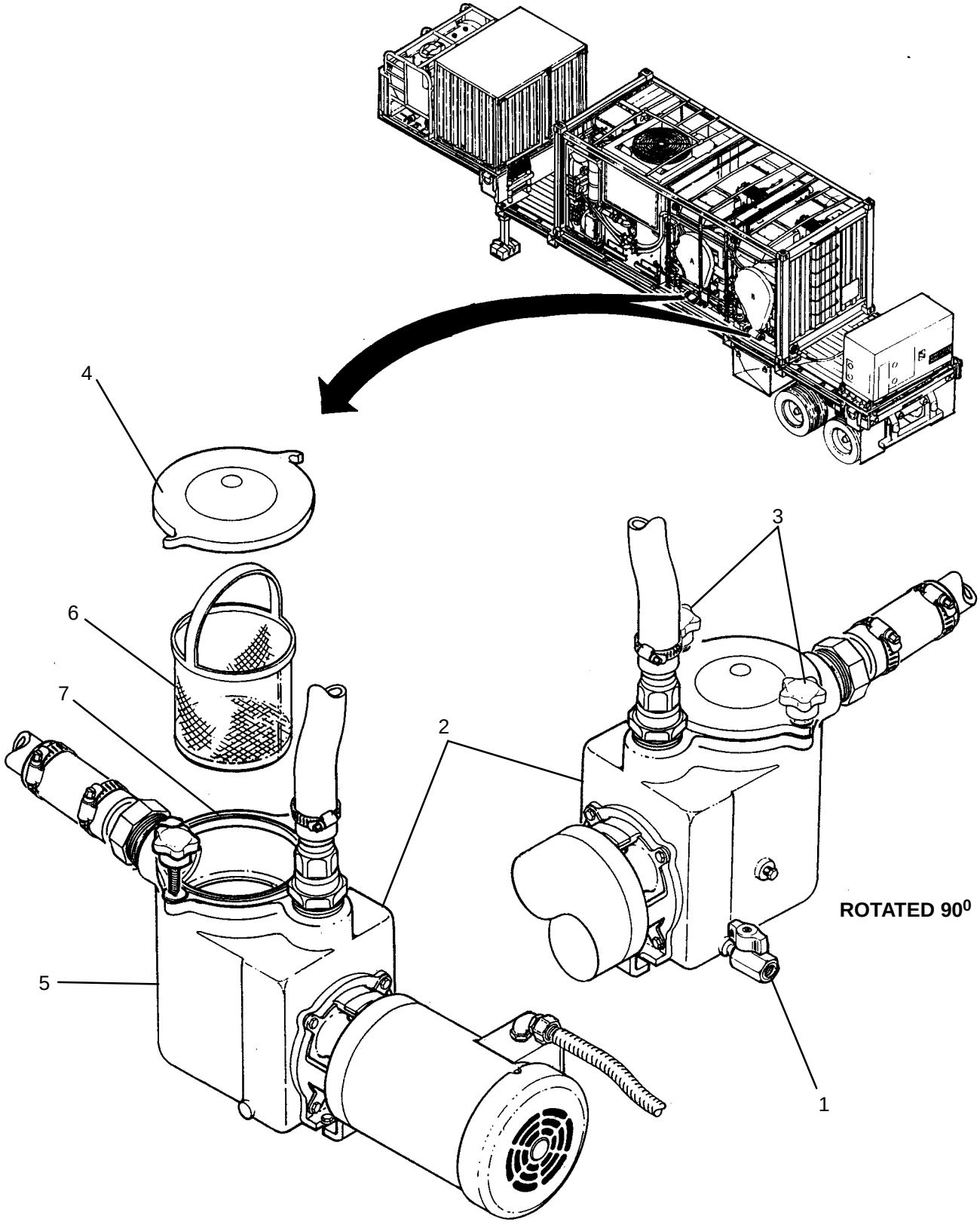
Do not attempt to remove debris from strainer by striking it against a solid object. Doing so will cause strainer to go out–of–round and prevent re–installation into pump housing

NOTE

Remove debris stuck in mesh of strainer from the inside. Trying to pull debris through the mesh from the outside is harder and causes debris to get stuck.

7. Remove debris from inside strainer (6).
8. Rinse strainer (6) with water to remove all loose debris.
9. Rinse cover (4) and gasket (7) with water to remove all loose debris.
10. Inspect strainer (6) and gasket (7) for obvious damage. Replace if damaged.
11. Insert strainer (6) into pump housing (5).
12. Place gasket (7) in groove on pump housing (5).
13. Install cover (4) and rotate under clamping knobs (3).
14. Hold cover (4) in place, then evenly hand–tighten clamping knobs (3).

CLEANING– Continued



END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

WATER TANK SERVICING
CLEANING

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

Personnel Required
One

Materials/Parts

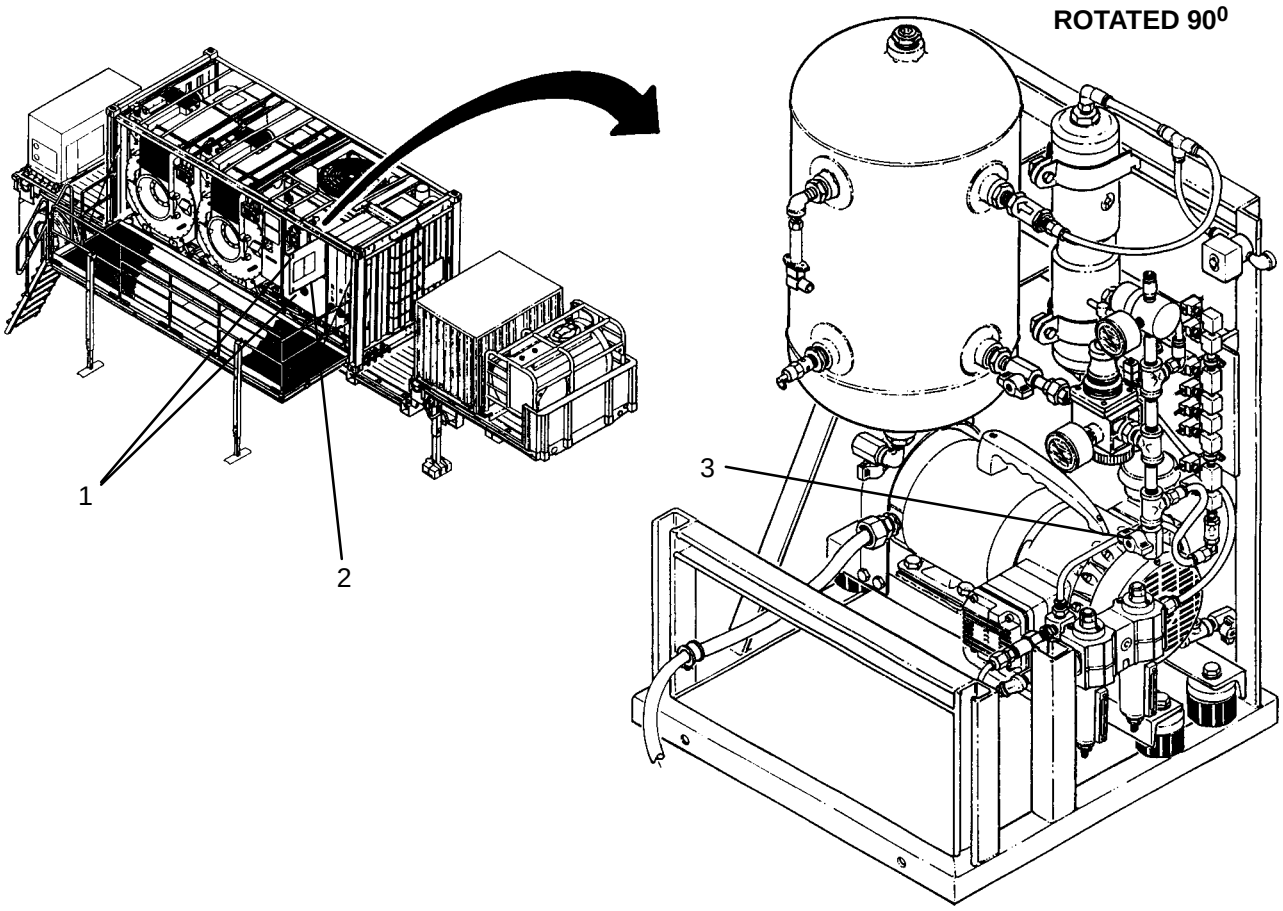
Equipment Conditions
LADS power shut off at main control enclosure (WP 0012 00)

CLEANING

WARNING

Air pressure must be vented from system prior to disconnecting air tubes. Always wear eye protection. Failure to follow this precaution could result in serious injury.

1. Disengage two latches (1), then open access door (2).
2. Open manual valve (3). Allow air to vent, then close valve.
3. Close door (2) and secure with two latches (1).



CLEANING – Continued

4. Remove caps (4) from manifolds (5, 6, 7 and 8).
5. Manually open water control valves (9 and 10) on manifolds (6 and 8) as follows:

CAUTION

Water control valve air tubes must be connected to proper location for valve to operate correctly. To avoid mixing up connections never disconnect both tubes from one valve at the same time or from more than one valve on a manifold at the same time. Switching connections will result in malfunctions when water is transferring during system filling and laundry cycle operations.

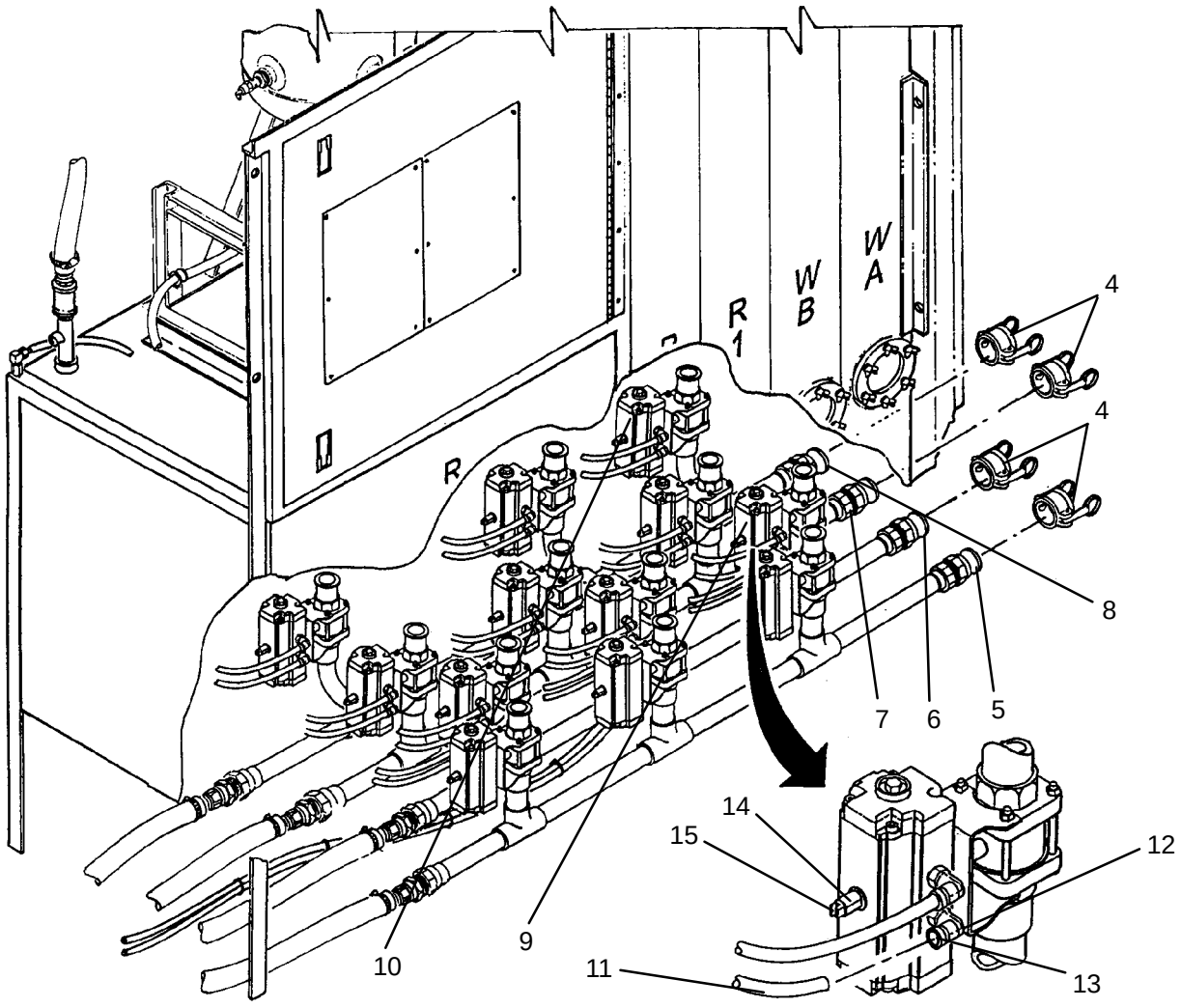
NOTE

Tubes connected to water control valves where you **can not** see the elbows on the front of the valve have the exhaust ”E” tube at the top. Tubes connected to valves where you **can** see the elbows have the exhaust ”E” tube at the bottom.

a. Disconnect exhaust air tube (11) from elbow (12) by pushing back on ring (13) and pulling on tube.

b. Rotate stem (14) so that slot (15) is vertical.

c. Reconnect exhaust air tube (11) to elbow (12) by inserting tube back into elbow.



CLEANING – Continued

6. Gain access to wash tank A (16) as follows:

CAUTION

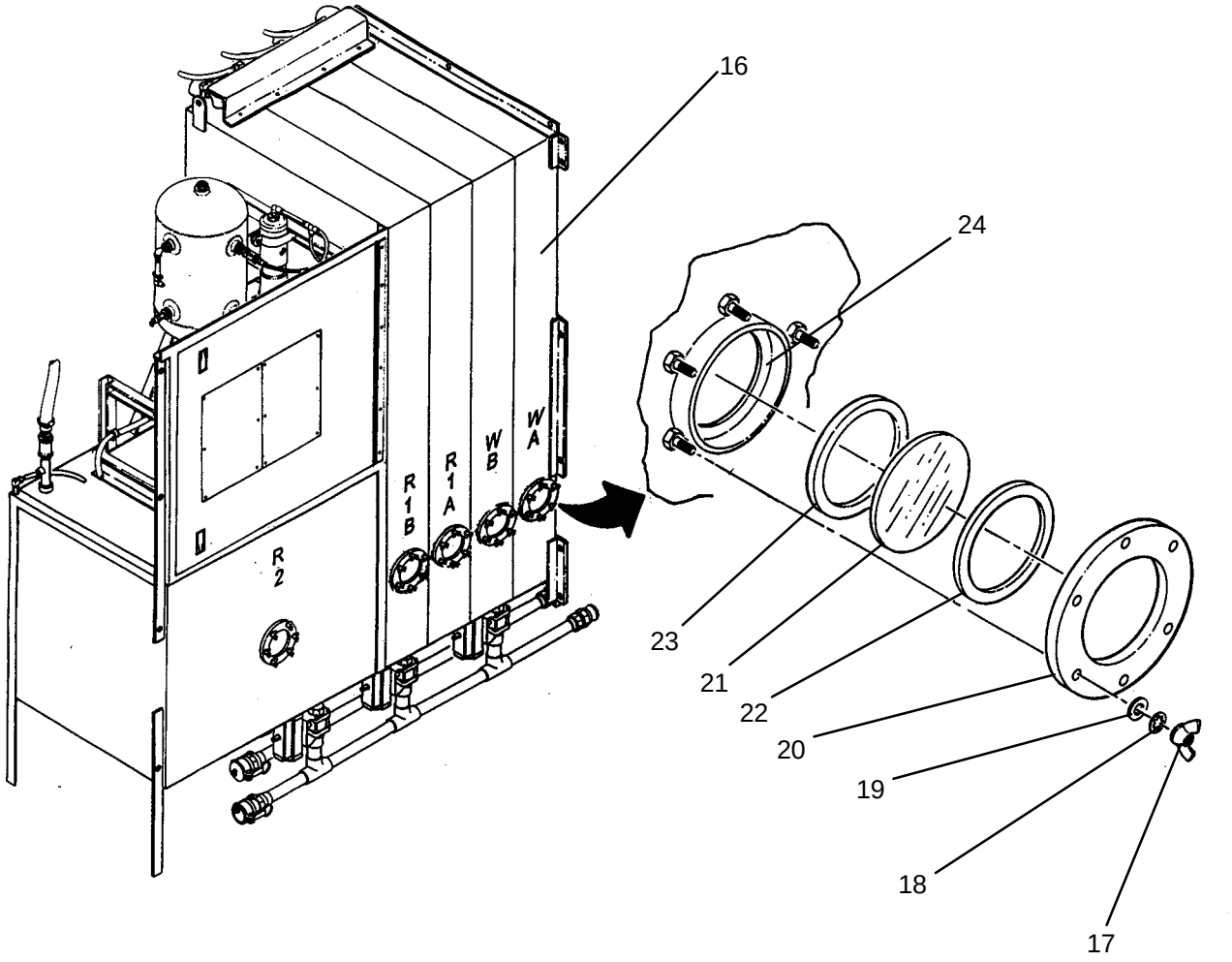
Be careful when handling sight glass. Sight glass will shatter if dropped on edge.

a. Remove six wing nuts (17), lock washers (18), and flat washers (19).

b. Remove ring (20), sight glass (21), and gaskets (22 and 23).

c. Set aside all loose parts for re–installation after tanks are cleaned.

7. Clean and rinse out wash tank A (16) with water.
8. Clean and rinse off sight glass (21) and gaskets (22 and 23).
9. Ensure all debris and dirt is removed from sealing area (24).



CLEANING – Continued

10. Close–out wash tank A (16) as follows:

CAUTION

Be careful when installing slight glass not to pinch or cut gasket on tank sealing area. A damaged gasket will cause water leakage around sight glass.

NOTE

Installation of sight glass requires the sight glass, gaskets, and ring be held in place while attaching hardware is installed.

Wing nuts must be tighten evenly to ensure pressure is applied equally around sight glass

a. Place first gasket (23) on sealing area (24), then place sight glass (21) and second gasket (22) on top.

b. Install ring (20) over sight glass (21).

c. Loosely install six flat washers (19), lock washers (18), and wing nuts (17)

d. Ensure outer gasket (22) is inside of sealing area (24).

e. Evenly hand–tighten wing nuts (17) until ring (20) contacts sealing area (24).

11. Open valves (25 and 26) on manifolds (5 and 7), then clean wash tank B (27) following steps 4 through 9.

12. Open valves (28 and 29) on manifolds (6 and 8), then clean rinse 1 tank A (30) following steps 4 through 9.

13. Open valves (31 and 32) on manifolds (5 and 7), then clean rinse 1 tank B (33) following steps 4 through 9.

14. Open valves (34 to 37) on manifolds (5 through 8), then clean rinse 2 tank (38) following steps 4 through 9.

NOTE

Debris and dirt rinsed out of water tanks will either flow to manifold drains or towards water pumps depending on the slope of the terrain.

15. Rinse all debris and dirt from area where manifolds (5 through 8) drain.

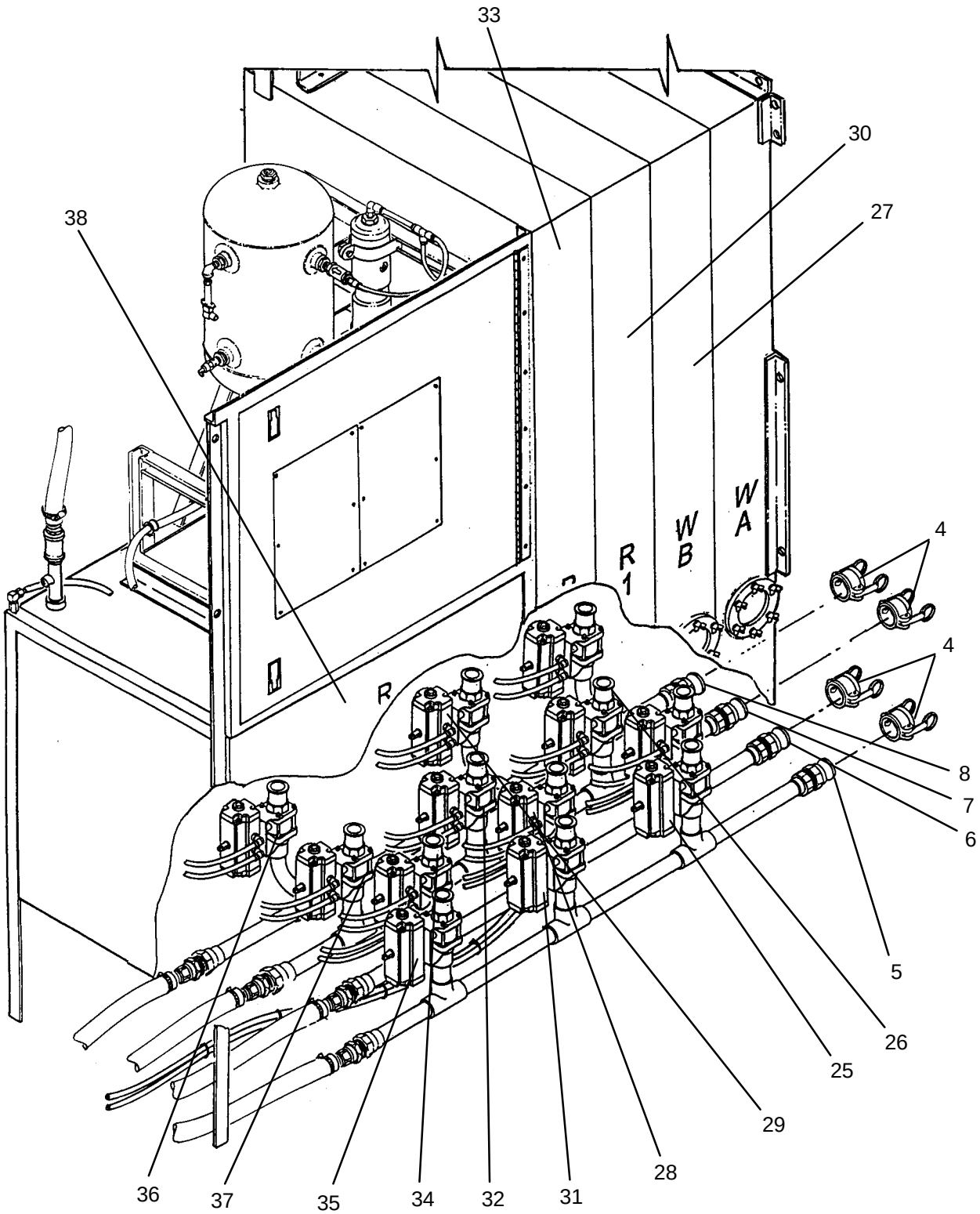
16. Clean and re–install water pump strainers (WP 0041 00).

NOTE

There is no need to manually close the twelve water control valves under the water tanks. If the air tubes were properly reconnected the valves will automatically close as soon as the air system pressurizes during the next start–up sequence.

17. Install caps (4) onto manifolds (5 through 8).

CLEANING – Continued



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

STILL SERVICING
CLEANING, INSPECTION

INITIAL SETUP:

Tools	**Personnel Required**
	One
Materials/Parts	**Equipment Conditions**

CLEANING

WARNING

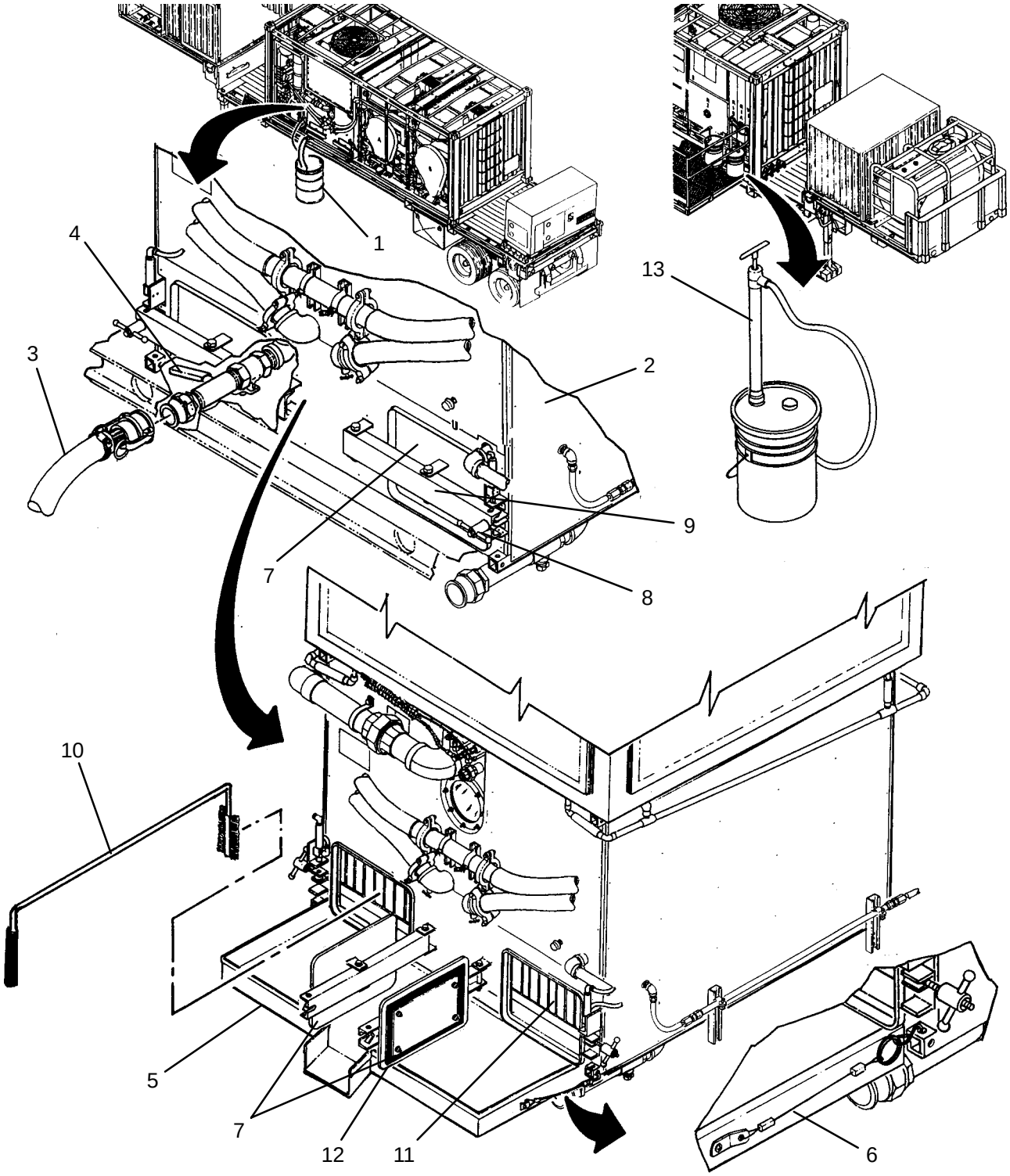
Still can reach temperatures near 220 degrees F when operating. Make sure cooldown cycle has been run prior to performing maintenance. Be aware that temperature of water inside still may be near 180 degrees F even after cooldown cycle is finished. Stand clear of door when opening. Avoid contact with hot surfaces. Wear impermeable gloves and goggles for protection. Failure to follow this precaution could result in severe burn injuries.

1. Place an empty 55–gallon container (1) below still (2).
2. Connect 5 ft drain hose (3) to still (2). Place hose in container.
3. Open drain valve (4) on side of still (2) where hose (3) is connected.
4. Wait for still to drain (approximately 40 gallons).
5. Install sluice tray (5) under still (2) then connect two lanyards (6).
6. Open doors (7) on still (2) as follows:
   a. Loosen clamping knobs (8), but do not pivot off of doors (7).
   b. Pull doors (7) outward and allow any residual water to drain into sluice tray (5).
   c. Pivot clamping knobs (8) off of door arms (9) and swing doors (7) open.
7. Use rake (10) to scrape residue out of still (2) into container (1).
8. Use rake (10) to brush residue off of heat plates (11).
9. Rinse inside of still (2) with water until all residue is removed. Repeat steps 7 and 8 if necessary.
10. Rinse and wipe off door gaskets (12) and door openings of still (2) to remove any residue.
11. Rinse and wipe off sluice tray (5) and rake (10).
12. Disconnect lanyards (6) then remove sluice tray (5).
13. Rinse entire area around still to remove any residue.
14. Close drain valve (4).
15. Remove hose (3) from container and disconnect hose from still (2). When container is full, place cover to container and dispose of container contents per local regulations.
16. Inspect surface of door gaskets (12) for cuts or tears. Replace if damaged (WP 0048 00).
17. Close doors (7) as follows:
   a. Swing doors (7) closed and insert into openings on still (2).
   b. Pivot and push doors (7) until they seat tight against still (2).
   c. Pivot clamping knobs (8) onto door arms (9).

CLEANING – Continued

d. Hand–tighten clamping knobs (8) until gasket compression is felt, then tighten two more turns.

18. Stroke hand pump (13) one time to inject anti–foam into still (2).



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

HEAT EXCHANGER INLET SCREEN SERVICING CLEANING, INSPECTION

INITIAL SETUP:

Tools	**Personnel Required**
Ladder, Folding, (Item 12, Table 1, WP 0057 00)	One
Materials/Parts	**Equipment Conditions**

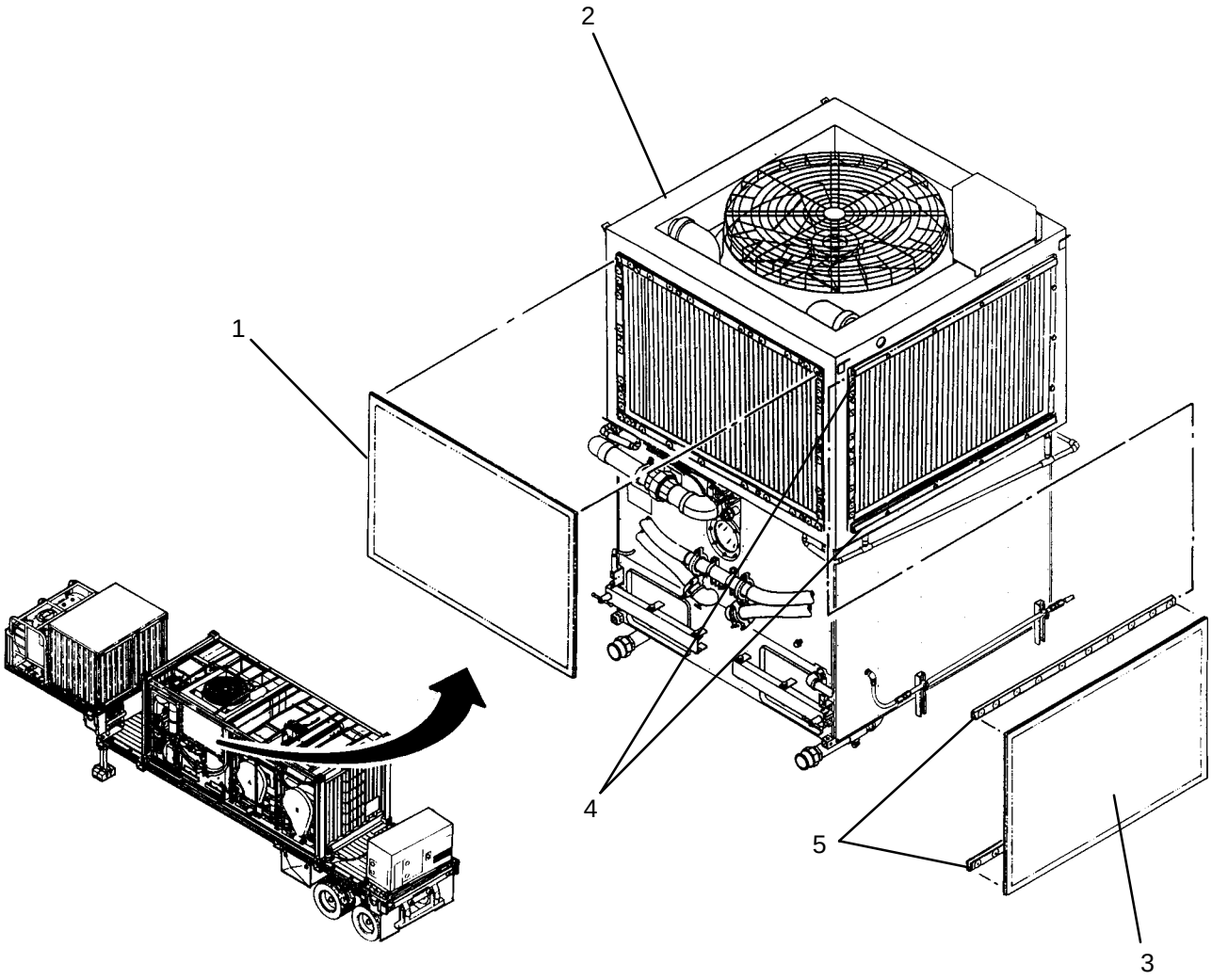
CLEANING

WARNING

Keep hands and fingers away from hinge points on ladder halves when opening and closing. Keep hands and fingers away from inner and outer rungs of ladder when adjusting. Never climb on ladder unless knobs and locking devices are properly tightened, footings are placed securely on the ground and/or ladder is placed securely upon the LADS. Failure to observe this precaution may result in severe personal injury.

1. Remove rear screen (1) from still condenser (2).
2. Slide side screens (3) out of tracks (4).
3. Remove tracks (5) from screens (3).
4. Clean, then rinse screens (1 and 3) with water until all debris is removed.
5. Inspect screens (1 and 3) for tears or obvious damage. Replace if torn or damaged.
6. Reinstall tracks (5) onto screens (3).
7. Slide side screens (3) into tracks (4).
8. Reinstall screen (1).

CLEANING – Continued



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

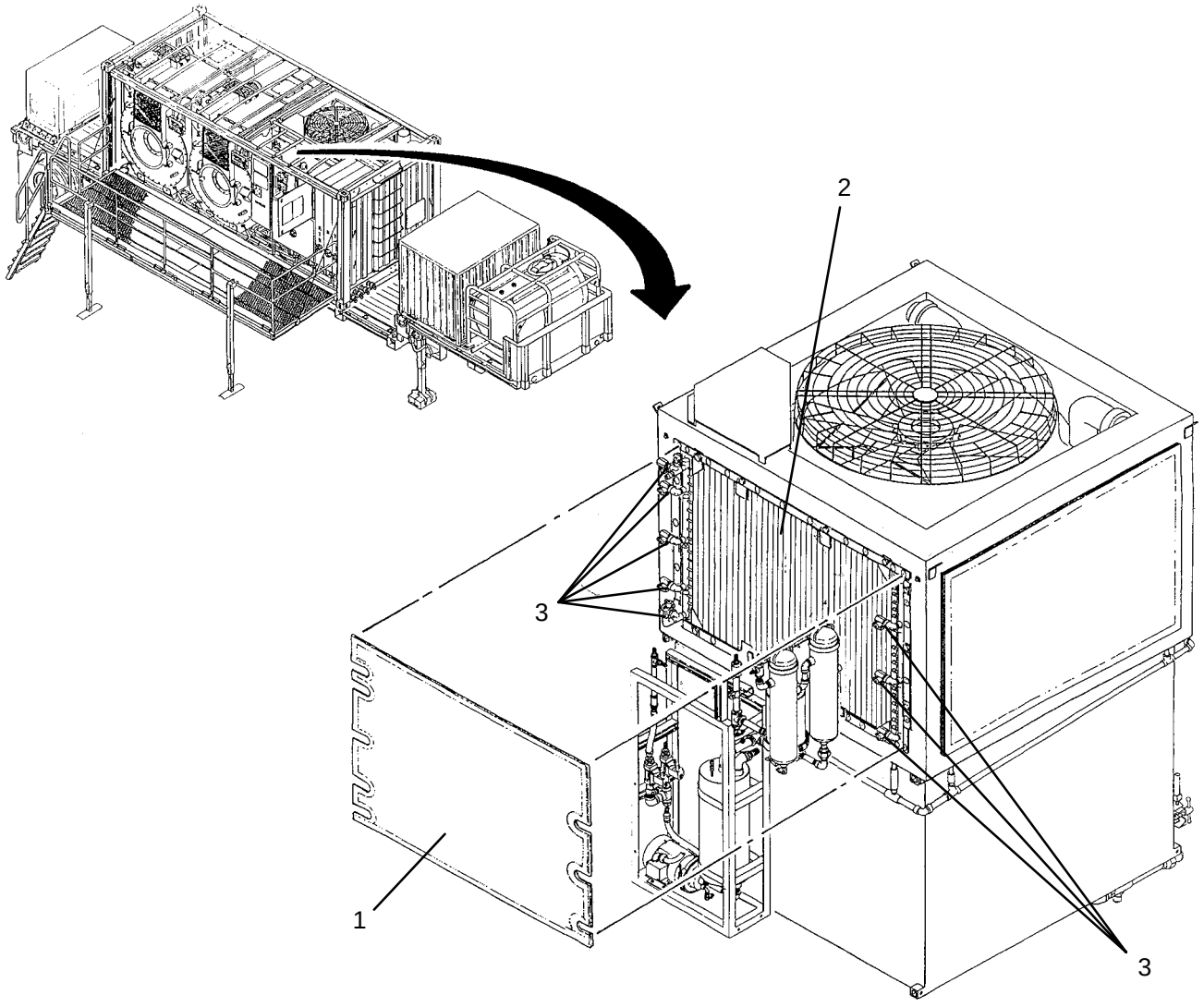
SUBCOOLER AIR INLET SCREEN SERVICING
CLEANING, INSPECTION

INITIAL SETUP:

Tools	**Personnel Required**
	One
Materials/Parts	**Equipment Conditions**

CLEANING

1. Remove screen (1) from subcooler (2) being careful not to tear screen on manual valves (3).
2. Clean, then rinse screen (1) with water until all debris is removed.
3. Inspect screen (1) for tears or obvious damage. Replace if torn or damaged.
4. Reinstall screen (1) onto subcooler (2).



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

PRE–FILTER BAG REPLACEMENT
REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

Personnel Required
One

Materials/Parts
Filter, Bag, 5 Micron, (39428) 5162K18
Filter, Bag, 10 Micron, (39428) 5162K82

Equipment Conditions

REMOVAL

WARNING

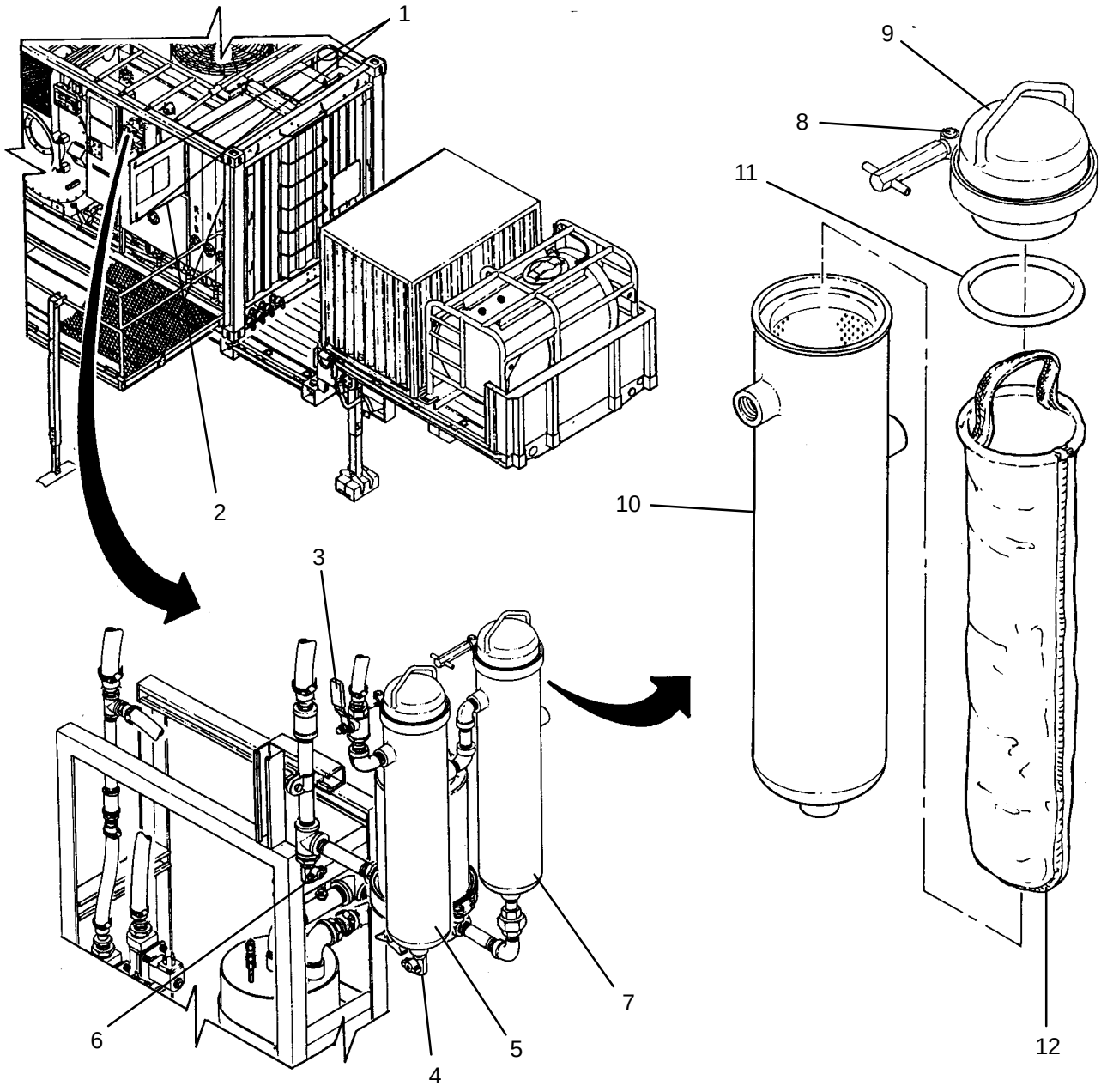
Distillate piping can reach temperatures near 200 degrees F when the water recycle system is operating. Avoid contact with hot surfaces. Wear impermeable gloves and goggles for protection. Failure to follow this precaution could result in severe burn injuries.

NOTE

The procedures for replacing the first and second stage pre–filters are the same except where noted.

1. Disengage two latches (1), then open access door (2).
2. Close manual valve (3).
3. Open manual valve (4) to drain first stage pre–filter (5) or manual valve (6) for second–stage pre–filter (7).
4. Allow water to drain from pre–filter (5) or (7) then close manual valve (4) or (6).
5. Loosen clamp (8) then separate cover (9) from housing (10).
6. Remove gasket (11) from housing (10).
7. Remove and discard bag filter (12).
8. Rinse cover (9) and gasket (11) with water.
9. Inspect gasket (11) for cuts or tears. Replace if damaged.

REMOVAL – Continued



INSTALLATION

1. Insert new bag filter (12) into housing (10).
2. Install gasket (11) onto cover (9).
3. Mate cover (9) with housing (10).
4. Install and tighten clamp (8).
5. Open manual valve (3).
6. Close access door (2) and secure by engaging two latches (1).

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

COALESCER FILTER CARTRIDGE REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

Personnel Required
One

Materials/Parts
Cartridge, Filter, (87405) CC–21–7
NSN 4330–00–001–7841

Equipment Conditions

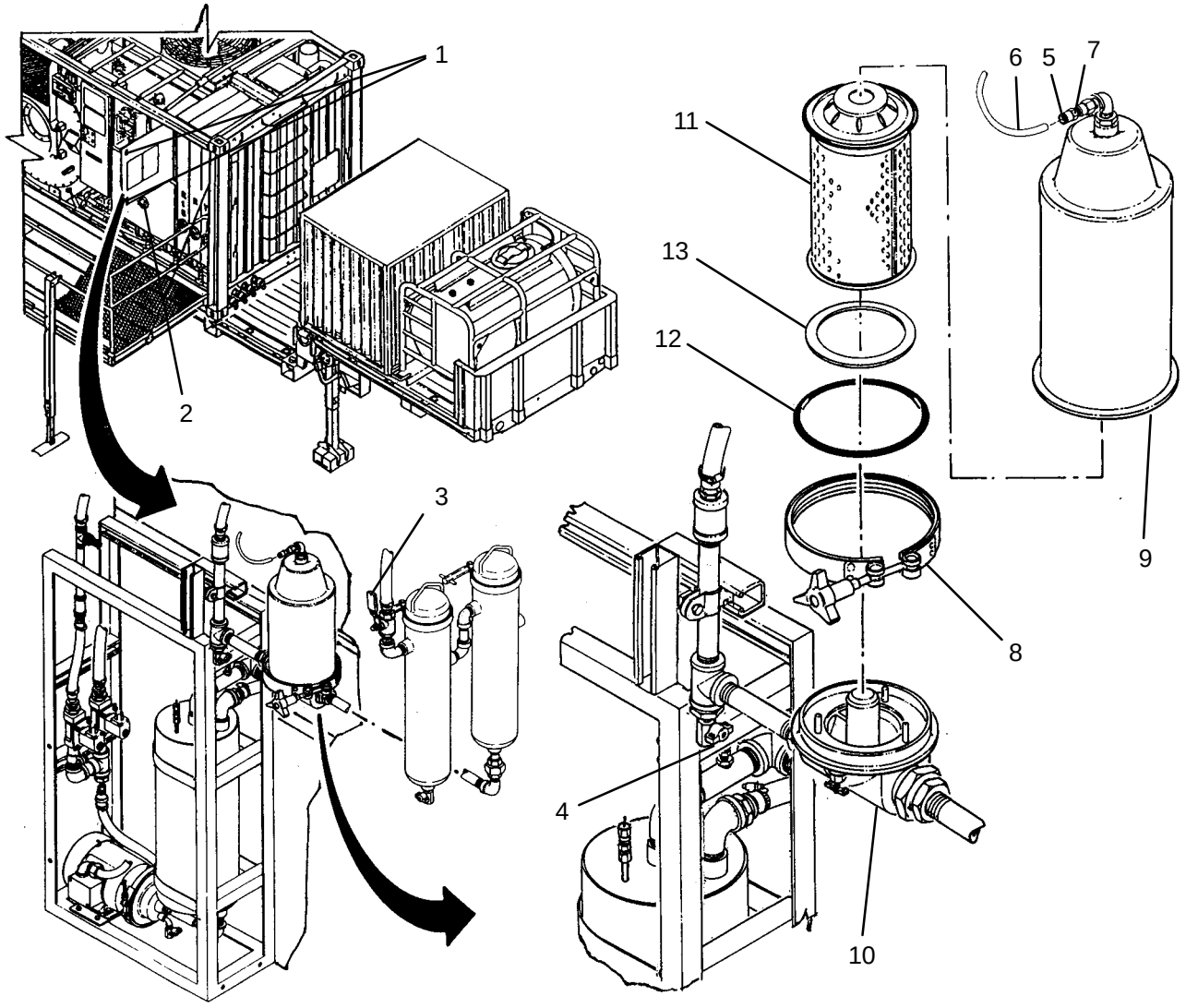
REMOVAL

WARNING

Distillate piping can reach temperatures near 200 degrees F when the water recycle system is operating. Avoid contact with hot surfaces. Wear impermeable gloves and goggles for protection. Failure to follow this precaution could result in severe burn injuries.

1. Disengage two latches (1), then open access door (2).
2. Close manual valve (3).
3. Open manual valve (4).
4. Allow water to drain, then close manual valve (4).
5. Push in on end of ring (5), then pull drain tube (6) out of fitting (7).
6. Loosen clamp (8) then separate cover (9) from body (10).
7. Remove and discard cartridge (11) and gasket (12).
8. Rinse inside of cover (9) and body (10) with water.

REMOVAL – Continued



INSTALLATION

NOTE

The filter cartridge has a flat gasket installed on the bottom to allow for use on several different model filters. The filter model used on LADS requires that the flat gasket be removed prior to installation.

1. Remove flat gasket (13) from bottom of new cartridge (11) and discard gasket.
2. Install new gasket (12) into body (10).
3. Install cartridge (11) onto body (10).
4. Mate cover (9) with body (10).
5. Install and tighten clamp (8).
6. Push drain tube (6) back into fitting (7).
7. Open manual valve (3).
8. Close access door (2) and secure by engaging two latches (1).

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

STILL DOOR GASKET REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

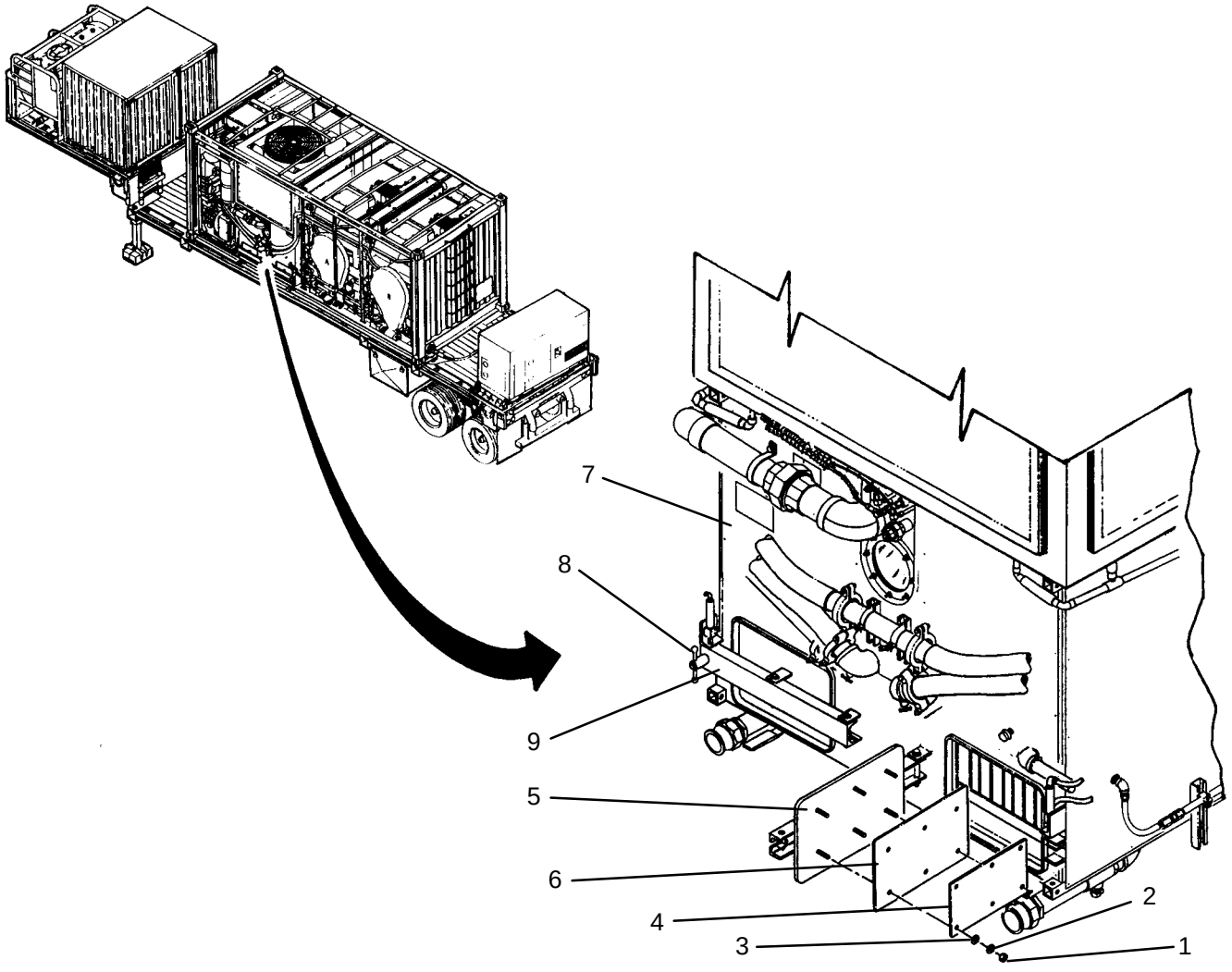
Personnel Required
One

Materials/Parts
Gasket, Still Door, (4X630) 863–210111
NSN 5330–01–481–1846

Equipment Conditions

REMOVAL

1. Drain and clean still (WP 0043 00).
2. Remove six nuts (1), lock washers (2), and flat washers (3) securing cover plate (4) to door (5).
3. Remove cover plate (4) and gasket (6) from door (5).



INSTALLATION

1. Install new gasket (6) onto door (5).
2. Install cover plate (4) over gasket (6) then secure with six nuts (1), lock washers (2), and flat washers (3).
3. Close door (5) as follows:
   a. Swing door (5) closed and insert into opening in still (7).
   b. Pivot and push door (5) until it seats tight against still (7).
   c. Pivot clamping knobs (8) onto door arms (9).
   d. Hand–tighten clamping knobs (8) until gasket compression is felt, then tighten two more turns.

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

HEATER AIR INLET FILTER SERVICING CLEANING, INSPECTION

INITIAL SETUP:

Tools

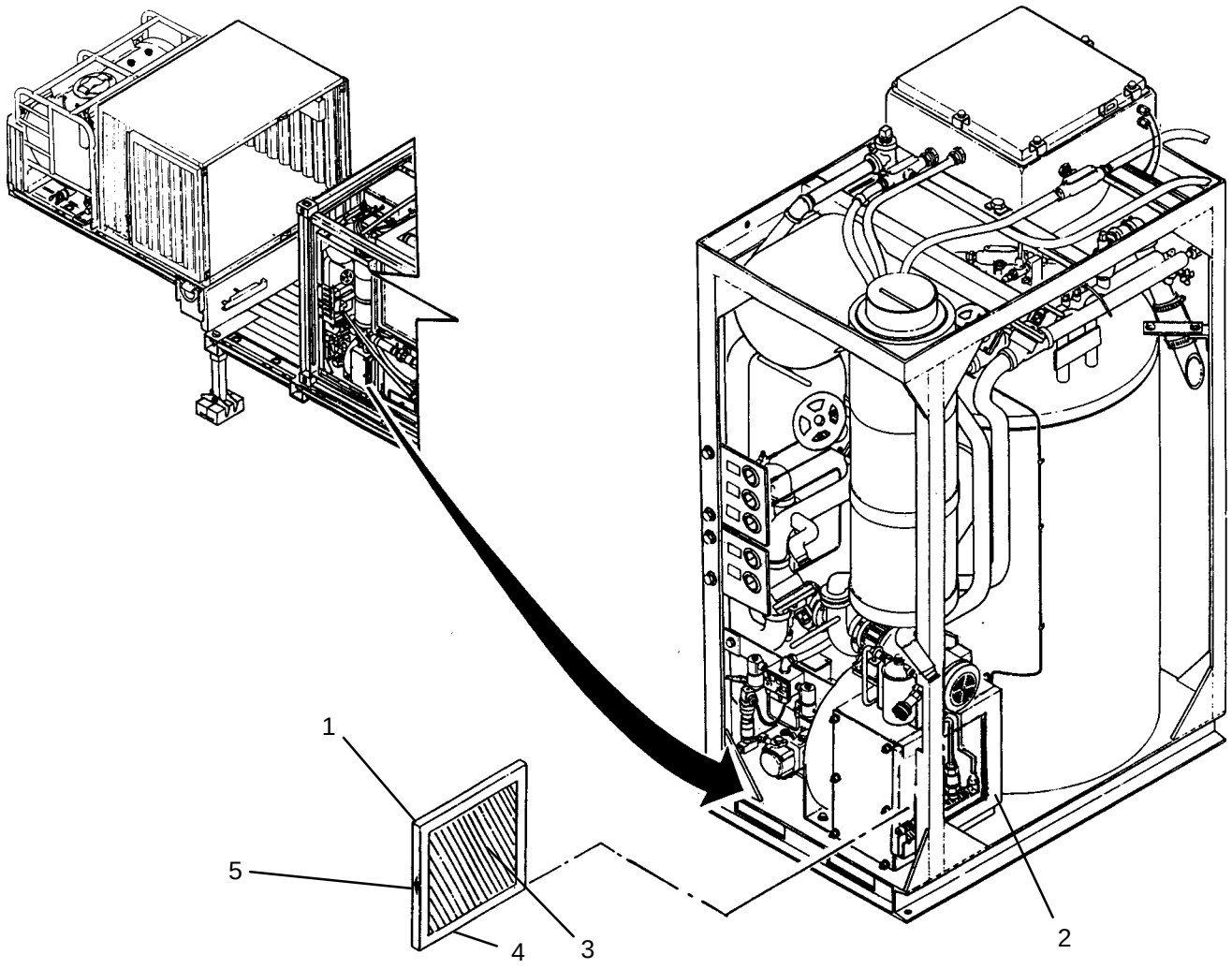
Personnel Required
One

Materials/Parts

Equipment Conditions

REMOVAL

1. Slide filter (1) out of track (2).
2. Clean and rinse filter (1) with water.
3. Inspect filter (1) for damage to screen mesh (3) or frame (4). Replace if necessary.
4. Slide filter (1) into track (2) with direction arrow (5) pointing towards heater inlet.



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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

AIR INLET FILTER SERVICING
REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

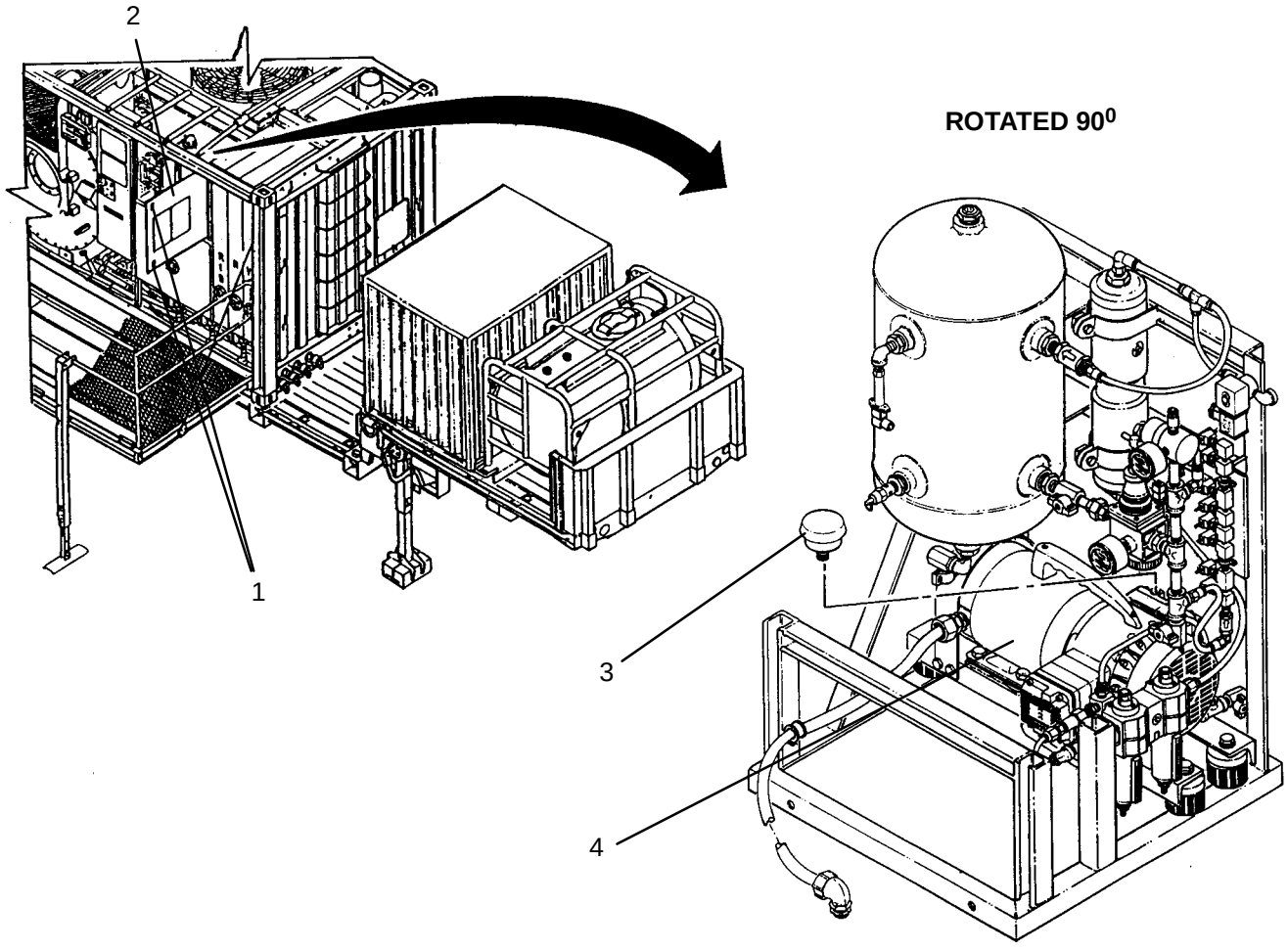
Personnel Required
One

Materials/Parts
Filter, Air Inlet, (0UPS6) C87714
NSN 5855–01–073–1384

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

REMOVAL

1. Disengage two latches (1), then open access door (2).
2. Unthread inlet filter (3) from compressor (4).



INSTALLATION

1. Thread new inlet filter (3) onto compressor (4).
2. Close access door (2) and secure by engaging two latches (1).

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

AIR OUTLET FILTER ELEMENT REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

Personnel Required
One

Materials/Parts
Element, Coalescing Filter, (43990) 4444–01
NSN 4330–01–481–7604
Element, Particulate Filter, (43990) 4438–01
Kit, Filter Gasket, (4X630) 863–410500

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

REMOVAL

NOTE

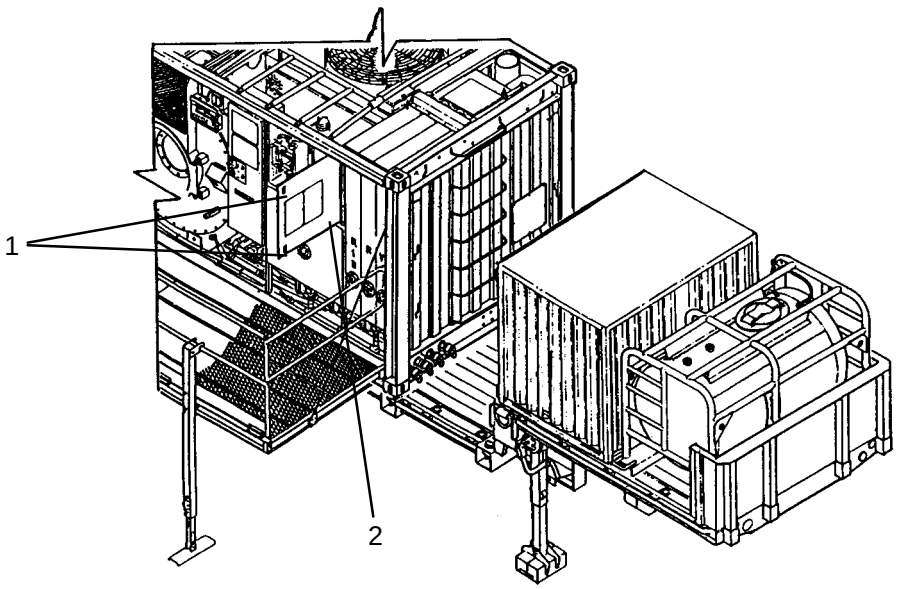
This procedure covers replacement of the first and second–stage outlet filters.

1. Disengage two latches (1), then open access door (2).
2. Open manual valve (3), allow air to vent from air line (4), then close valve.

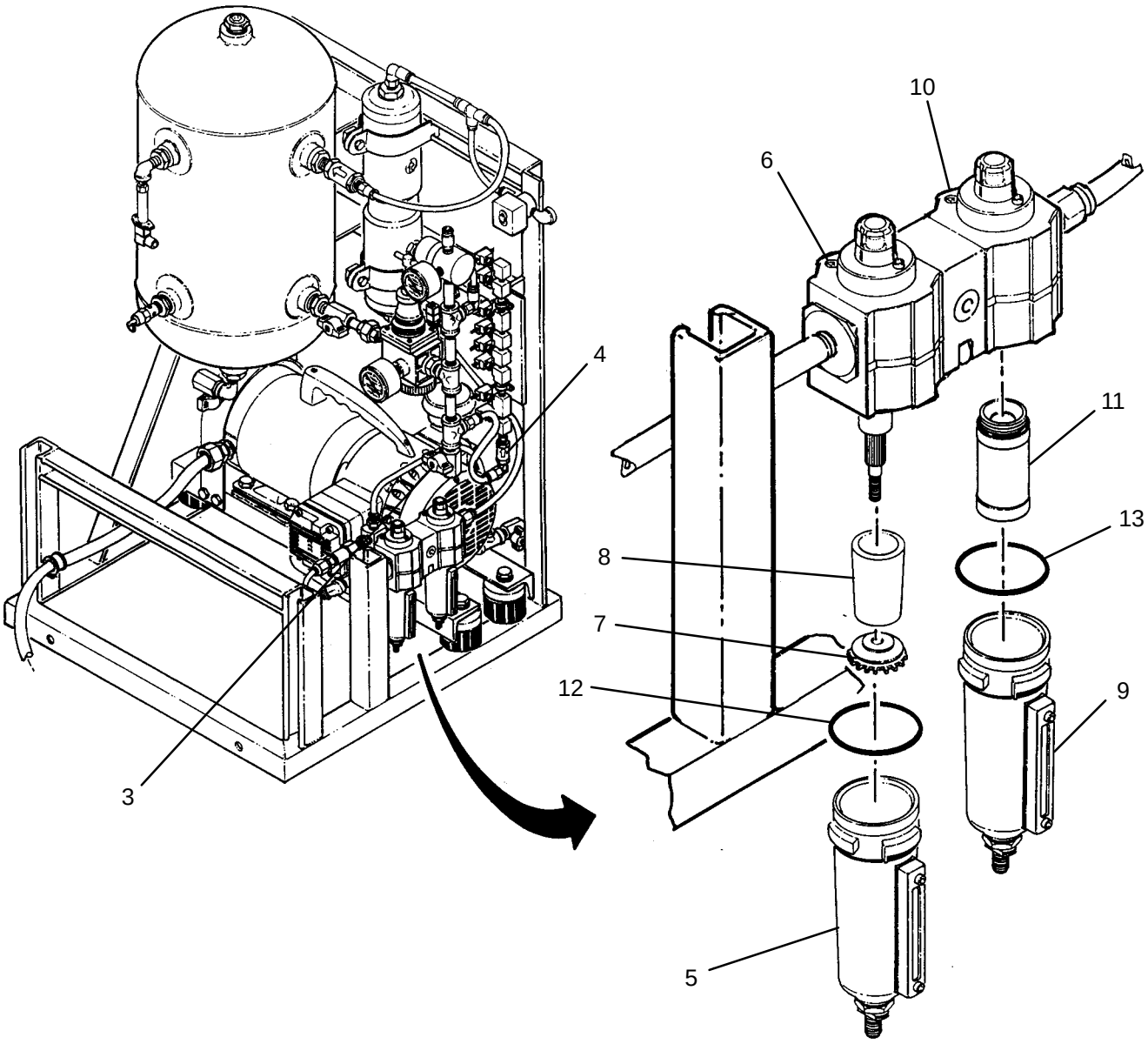
CAUTION

Floats for filter automatic drains are loose in filter bowls. Turning bowls upside down may cause floats to fall out and be damaged.

3. Push up slightly, then rotate, and remove bowl (5) from first–stage filter (6).
4. Unthread retainer (7), then remove filter element (8).
5. Push up slightly, then rotate, and remove bowl (9) from second–stage filter (10).
6. Unthread filter element (11).
7. Remove preformed packings (12 and 13) from bowls (5 and 9).
8. Wipe away any debris from areas where bowls (5 and 9) mate with filters (6 and 10).



REMOVAL – Continued



INSTALLATION

1. Apply a thin coat of grease to new preformed packings (12 and 13).
2. Install preformed packings (12 and 13) onto bowls (5 and 9).
3. Thread new filter element (11) into second–stage filter (10), then hand–tighten.
4. Insert bowl (9) into second–stage filter (10), then rotate to engage.
5. Install new filter element (8) on first–stage filter (6), then install, and hand–tighten retainer (7).
6. Insert bowl (5) into second–stage filter (6), then rotate to engage.
7. Close access door (2) and secure by engaging two latches (1).

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

AIR OUTLET FILTER AUTOMATIC DRAIN REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

Personnel Required
One

Materials/Parts
Drain, Automatic, (43990) 4000–51R
NSN 4820–01–477–9033
Packing, Pre–formed, (4X630) 863–410510

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

REMOVAL

NOTE

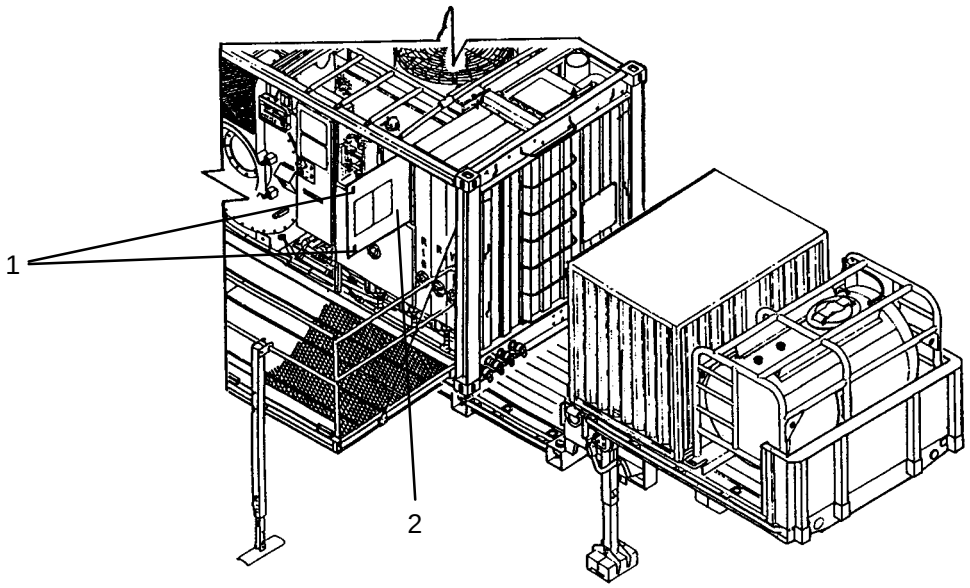
This procedure covers replacement of the automatic drain in the first or second–stage outlet filter.

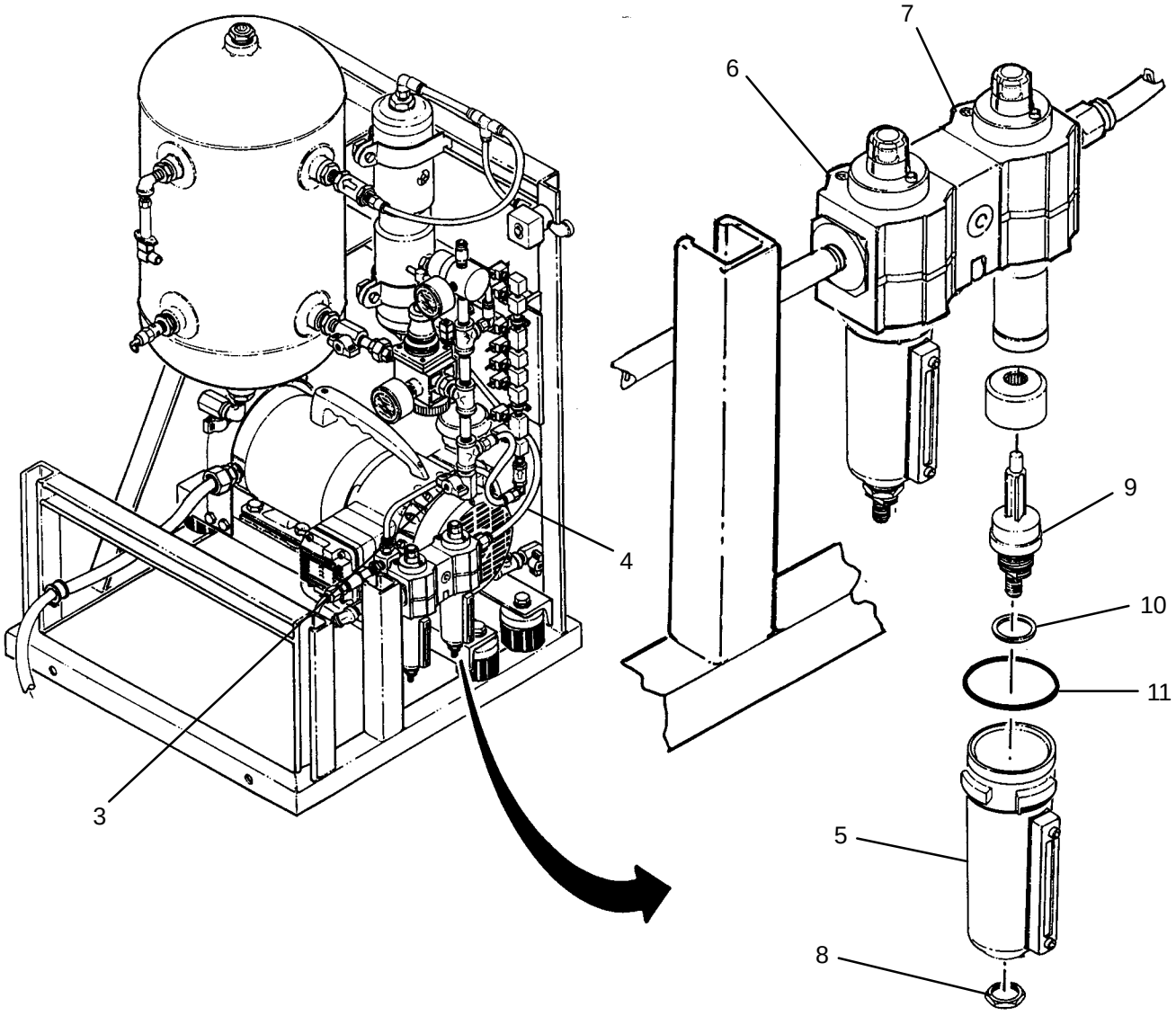
1. Disengage two latches (1), then open access door (2).
2. Open manual valve (3), allow air to vent from air line (4), then close valve.

CAUTION

Float for filter automatic drain is loose in filter bowl. Turning bowl upside down may cause float to fall out and be damaged.

3. Push up slightly, then rotate, and remove bowl (5) from first–stage filter (6) or second–stage filter (7).
4. Remove nut (8) from bottom of bowl (5).
6. Remove automatic drain (9) and gasket (10) from bowl (5).
7. Remove preformed packing (11) from bowl (5).
8. Rinse bowl (5) with water and wipe away any debris.
9. Wipe away any debris from area on filter (6 or 7) where bowl (5) is attached.





INSTALLATION

1. Apply a thin coat of grease to new gasket (10) and new preformed packing (11).
2. Install gasket (10) on new automatic drain (9).
3. Insert automatic drain (9) into bowl (5) ensure gasket (10) remains on automatic drain.
4. Thread nut (8) onto automatic drain (9). Tighten nut until compression of gasket (10) is felt.
5. Install preformed packing (11) onto bowl (5).
6. Insert bowl (9) into first–stage (6) or second–stage filter (7), then rotate to engage.
7. Close access door (2) and secure by engaging two latches (1).

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

LED LAMP REPLACEMENT
REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

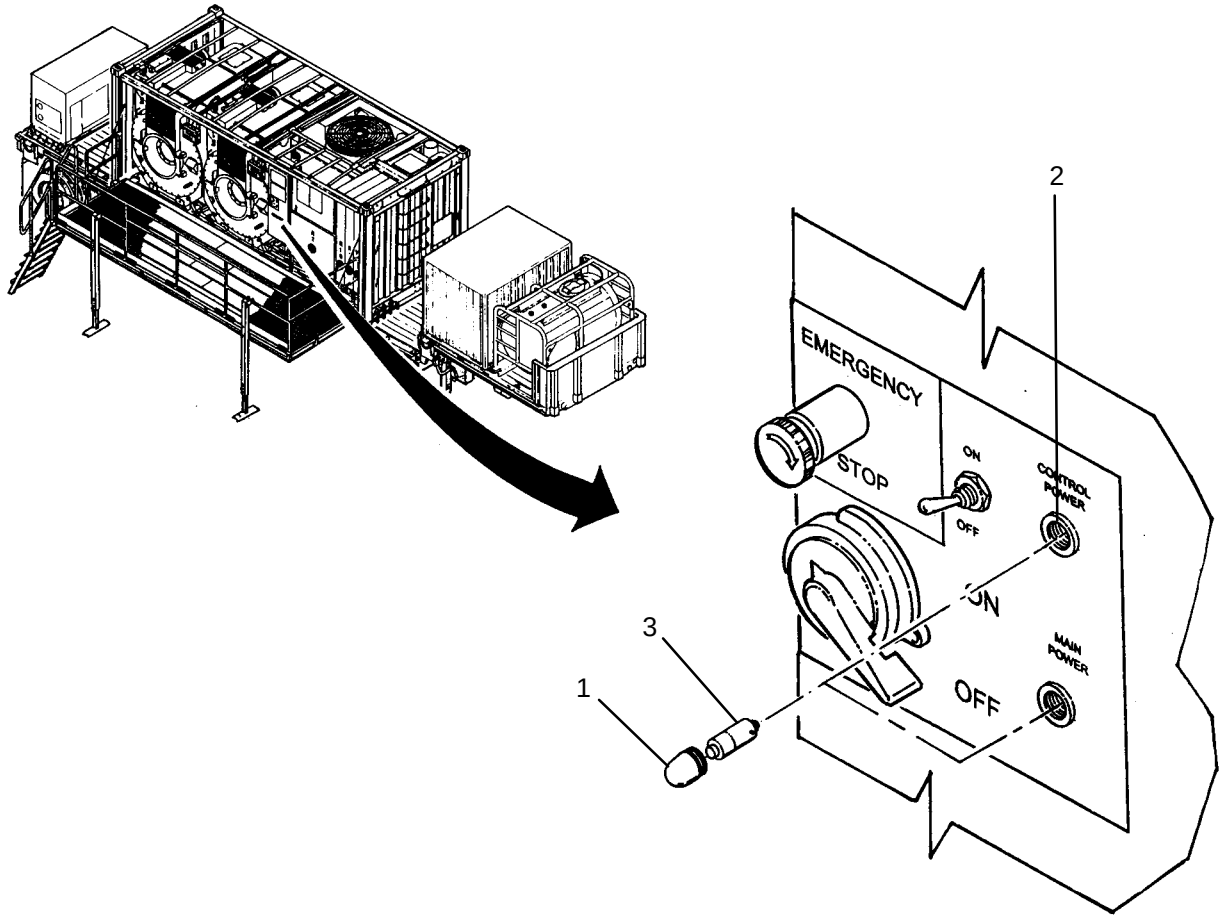
Personnel Required
One

Materials/Parts
Lamp, LED, (24446) 080BAS120LB
NSN 5980–01–493–5664

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

REMOVAL

1. Unthread lens (1) from lamp socket (2).
2. Push in and twist lamp (3) to remove from lamp socket (2).



INSTALLATION

1. Insert new lamp (3) into lamp socket (2) then push in and twist to lock in place.
2. Thread lens (1) onto lamp socket (2).
3. Perform SYSTEM START–UP (WP 0012 00) then check lamp operation.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

12 VDC LAMP REPLACEMENT REMOVAL, INSTALLATION

INITIAL SETUP:

Tools

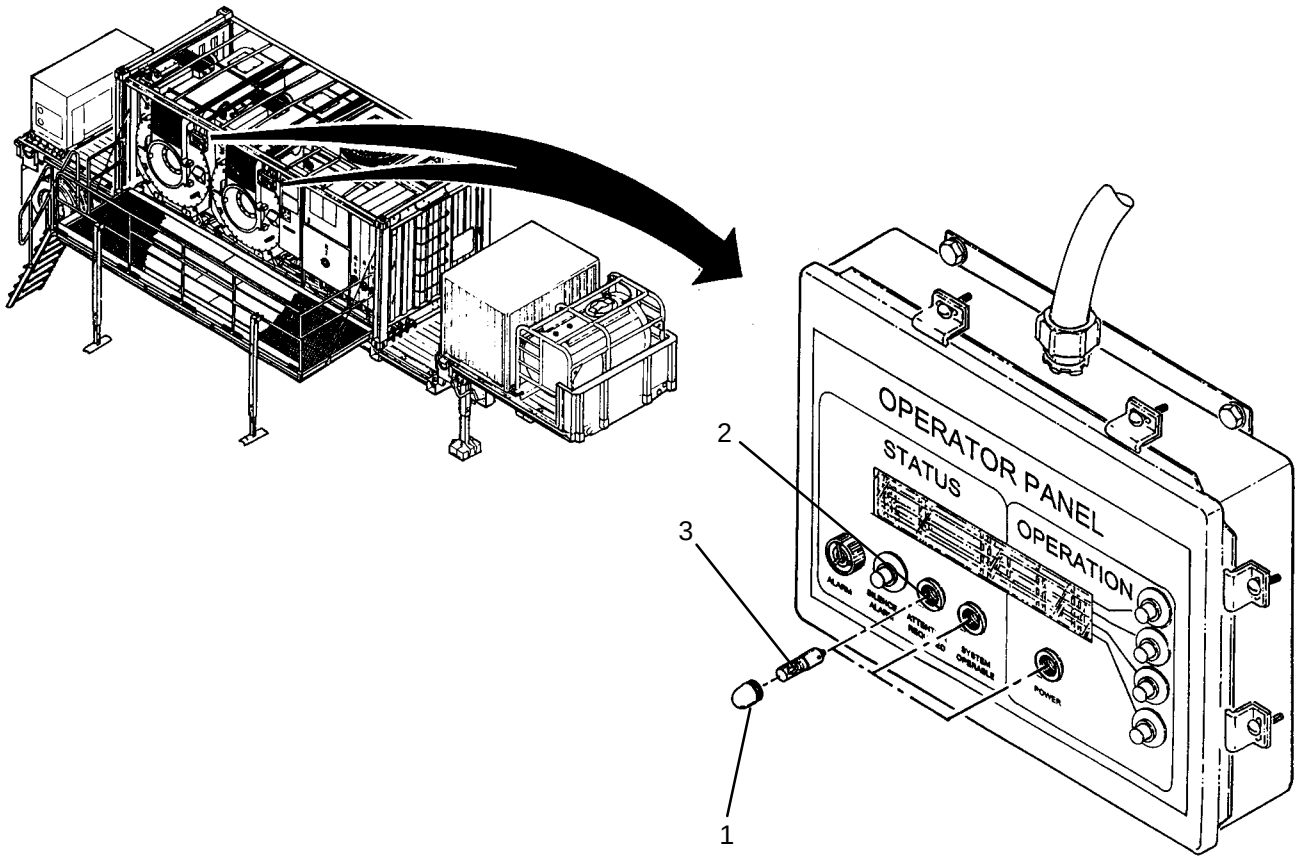
Personnel Required
One

Materials/Parts
Lamp, T–2 1/2 12V, (88204) 12MB
NSN 6240–00–001–9404

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

REMOVAL

1. Unthread lens (1) from lamp socket (2).
2. Push in and twist lamp (3) to remove from lamp socket (2).



INSTALLATION

1. Insert new lamp (3) into lamp socket (2) then push in and twist to lock in place.
2. Thread lens (1) onto lamp socket (2).
3. Perform SYSTEM START–UP (WP 0012 00) then check lamp operation.

END OF WORK PACKAGE

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LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

LADS SERVICING
CLEANING

INITIAL SETUP:

Tools
Tool Kit Assembly, Operator
(Item 10, Table 2, WP 0057 00)

Personnel Required
One

Materials/Parts

Equipment Conditions
LADS power shutoff at main control enclosure (WP 0012 00)

CLEANING

NOTE

The LADS must be positioned in a wash rack or parking area where water utilities or a pressure washer are available.

1. Start with LADS in the ready–for–transport (storage) configuration.
2. Clean the outside of tarp (1) and end walls of ISO frame (2).
3. Loosen all straps (3) on tarp (1).
4. Flip front section of tarp (1) over top of LADS.
5. Clean the exposed portion of tarp (1) and exposed underside of platform (4).
6. Clean outside of storage locker (5).

CAUTION

Ensure all openings on fuel tank are sealed or closed before washing. Contaminating fuel supply with water can lead to failures of the heater fuel system.

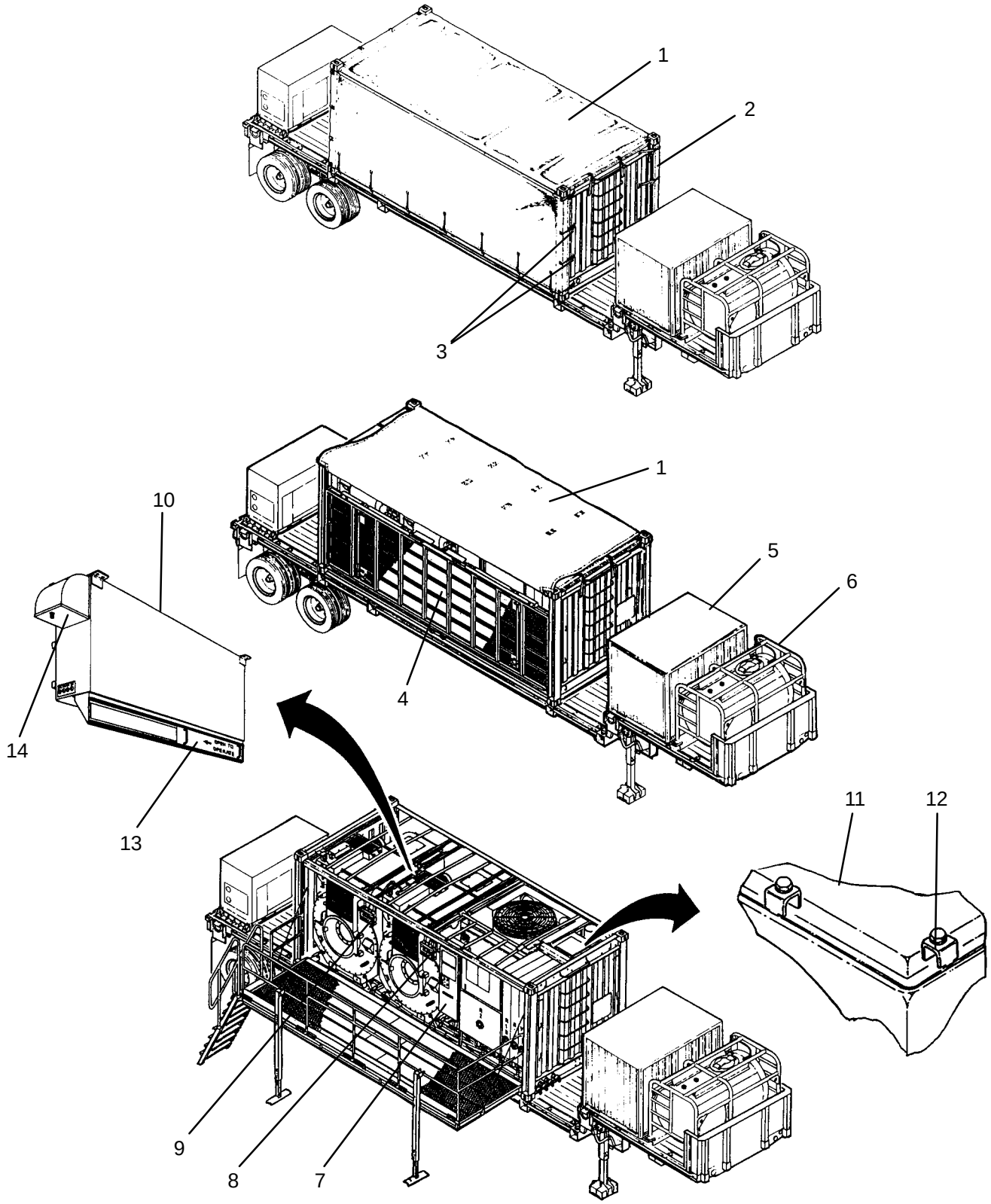
7. Clean outside of fuel tank (6).
8. Clean MEP–805A generator as specified in TM 9–6115–644–10.
9. Clean M871A3 trailer as specified in TM 9–2330–326–14&P.
10. Set–up LADS per Assembly and Preparation for Use Procedures (WP 0010 00). Except completely deploy awning without securing any straps.

CAUTION

Never aim high–pressure water spray directly at controls, electrical connections, conduit penetrations, and edges around enclosure doors. Water can cause damage to electrical and electronic components and cause short circuits in wiring.

11. Ensure main control enclosure (7), operator panels (8 and 9), inverter enclosure (10), and heater enclosure (11) are all closed and door latches (12) are tight.
12. Ensure inverter enclosure inlet duct (13) and outlet duct (14) are closed.
13. Remove the following items for cleaning as specified in PMCS tables (WP 0034 00) and (WP 0035 00).
    a. Dryer inlet screens, qty 2
    b. Dryer outlet guards, qty 2
    c. Heater air filter
    d. Lint filters, qty 2
    e. Water pump strainers, qty 2
    f. Condenser screens, qty 3
    g. Subcooler screen

CLEANING – Continued



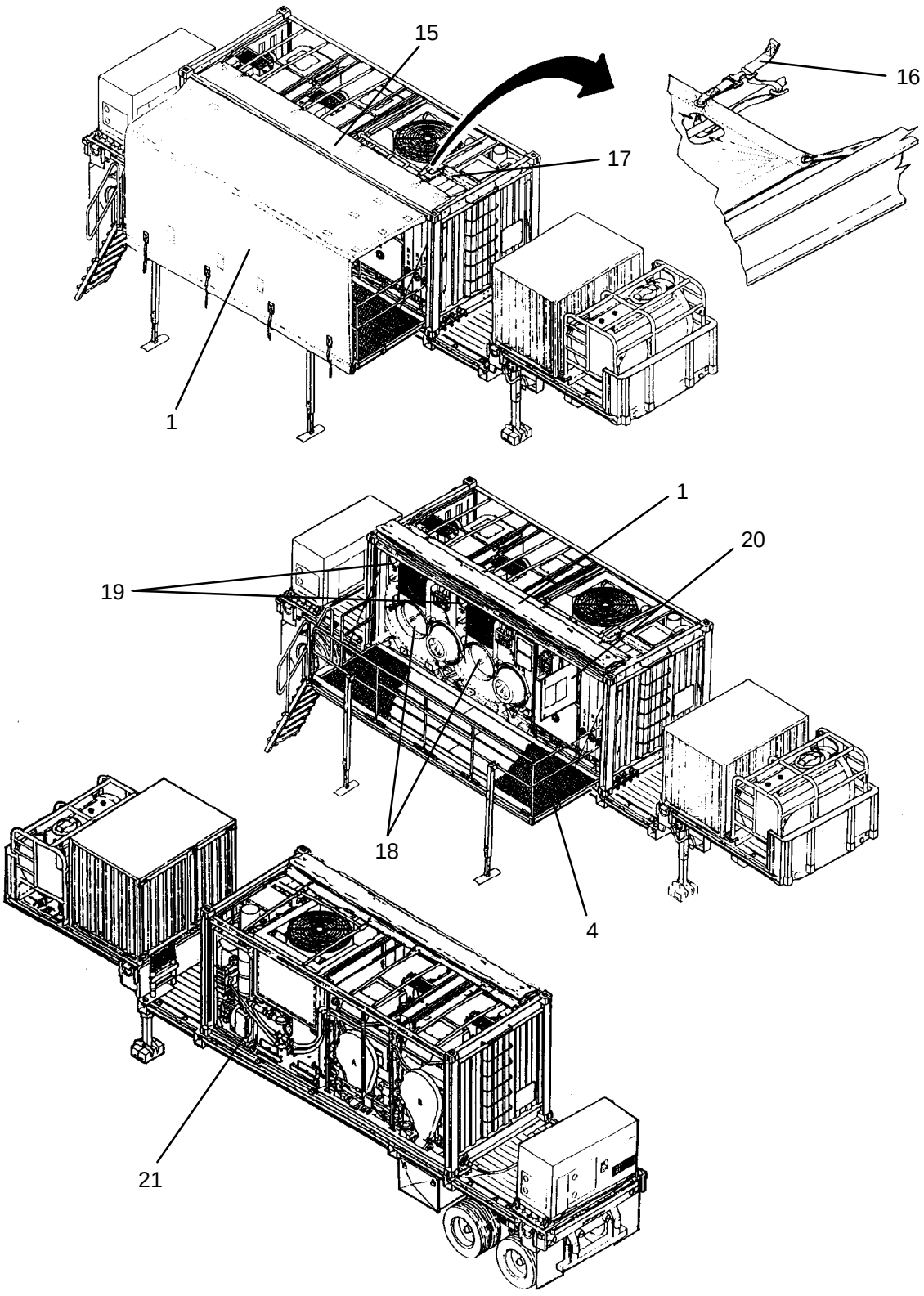
CLEANING – Continued

CAUTION

Be careful when walking on LADS not to step on conduit runs, electrical cables, air tube harness, fan guards, and water piping. When cleaning back side of unit utilize the supplied ladder to access hard to reach areas. Damage to these areas can result in multiple failures when LADS is restarted.

14. Clean top of LADS as follows:
    a. Clean awning extension (15) and exposed portion of tarp (1).
    b. Loosen straps (16) and flip awning extension (15) out of the way.
    c. Clean exposed surfaces on top of LADS.
    d. Clean out trough (17). After cleaning ensure water flows out of trough.
    e. Reposition awning extension (15) and secure with straps (16).
    f. Fold front and back sections of tarp (1) on top of awning extension (15).
15. Clean front of LADS as follows:
    a. Clean exposed surfaces starting at top and working down. Flush all dirt and debris towards back of LADS.
    b. Clean inside drum basket areas (18) and lint filter areas (19).
    c. Open access door (20). Clean backside of door and exposed LADS surfaces.
    d. Clean top, bottom, and sides of platform (4).
16. Clean back of LADS as follows:
    a. Clean exposed surfaces starting at top and working down. Flush all dirt and debris out back of LADS.
    b. Clean out trough (21). After cleaning ensure water flows out of trough.
17. Perform a final rinse of exposed LADS surfaces.
18. Perform all other applicable operator PMCS (WP 0034 00) and (WP 0035 00).
19. Ensure all applicable maintenance PMCS is performed TM 10–3510–221–24.
20. Ensure LADS is operational following guidelines set forth in **Preparation for Deployment** (WP 0009 00).
21. Return LADS to stowed configuration per **PREPARATION FOR MOVEMENT** (WP 0014 00).

CLEANING – Continued



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CHAPTER 5

SUPPORTING INFORMATION

FOR

LAUNDRY ADVANCED SYSTEM

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LAUNDRY ADVANCED SYSTEM
(NSN 3510–01–463–0114)
REFERENCES

SCOPE

This work package lists all Forms, Field Manuals, and Technical Manuals referenced in this manual.

FORMS

Recommended Changes to Publications and Blank Forms . . . . . DA Form 2028
Recommended Changes to Equipment Technical Publications . . . . . DA Form 2028–2
Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404
Product Quality Deficiency Report SF–368

FIELD MANUALS

Theater of Operations Electrical Systems, ... FM 5–424
Lubrication Instructions for Cold Weather . . . . . FM 9–207
Quartermaster Principles . . . . . FM 10–1
Field Sanitation and Hygiene . . . . . FM 21–10
Techniques and Procedures for Quartermaster Field Service Companies . . . . . FM 42–414

TECHNICAL MANUALS

Destruction of Army Material to Prevent Enemy Use . . . . . TM 750–244–3
Inspection, Care and Maintenance of Anti–friction Bearings . . . . . TM 9–214
Medium Tactical Vehicles (MTV) 5 ton 6 X6 M1083 Series Operator's Instructions . . . . . TM 9–2320–366–10
Tactical Dual–Purpose Breakbulk/Container Transport Semi–Trailer Operator, Unit, Direct Support, General Support Maintenance Manual, with RPSTL . . . . . TM 9–2330–326–14&P
Tactical Quiet Skid Mounted Generator Set Operator's Manual . . . . . TM 9–6115–644–10
Welding Theory and Application . . . . . TM 9–237
Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Material and Related Materials Including Chemicals . . . . . TM 9–247
Lightweight Maintenance Enclosure (LME) Operator, Unit, Direct Support Maintenance, Manual with RPSTL . . . . . TM 10–5410–284–13&P

MISCELLANEOUS

Mobile Field Laundry Clothing Exchange, and Bath Operations . . . . . AR 700–135
The Army Logistics Readiness and Sustainability . . . . . AR 700–138
The Army Maintenance Management System (TAMMS) . . . . . DA PAM 738–750
The Army Maintenance Management System–Aviation (TAMMS–A) . . . . . DA PAM 738–751

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LAUNDRY ADVANCED SYSTEM
(NSN 3510–01–463–0114)
COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

INTRODUCTION

SCOPE

This work package lists COEI and BII for the LADS 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 LADS. 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 LADS in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the LADS 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 number of the item illustrated.

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

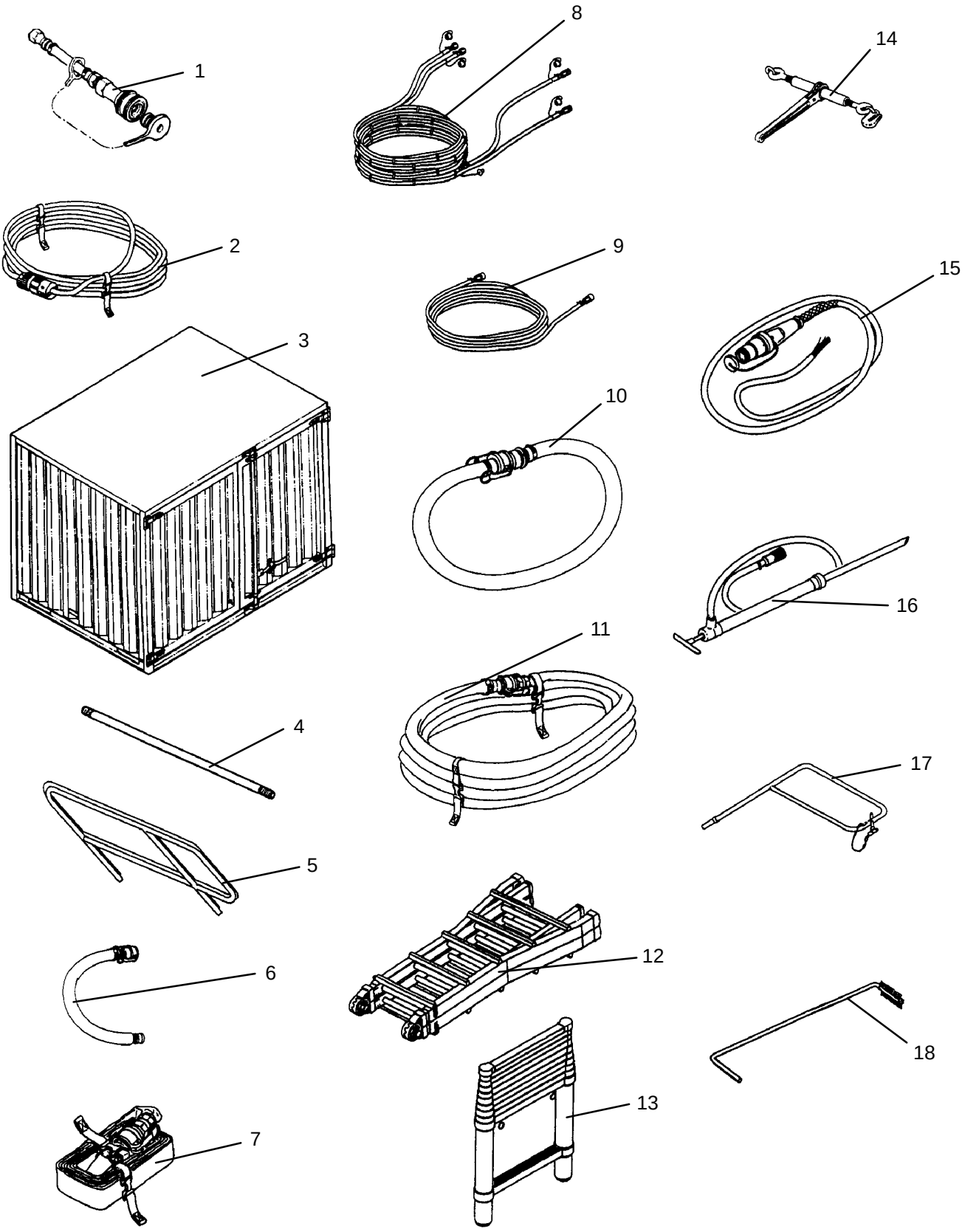
Column (3) – Description, CAGEC and Part Number. Identifies the Federal item name, followed by a minimum description when needed. The last line below the description is the (CAGEC) Commercial Government Entity Code (in parentheses) and the part number.

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

Column (5) – Unit of Measure (U/M). 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.

COMPONENTS OF END ITEM (COEI) LIST



COMPONENTS OF END ITEM (COEI) LIST – Continued.

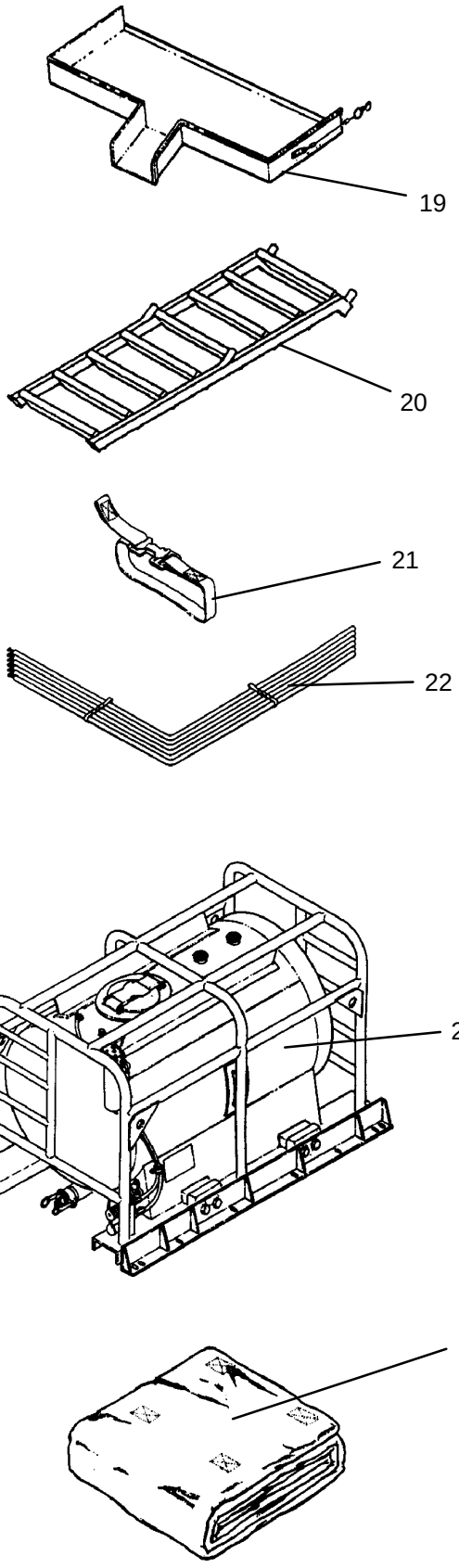
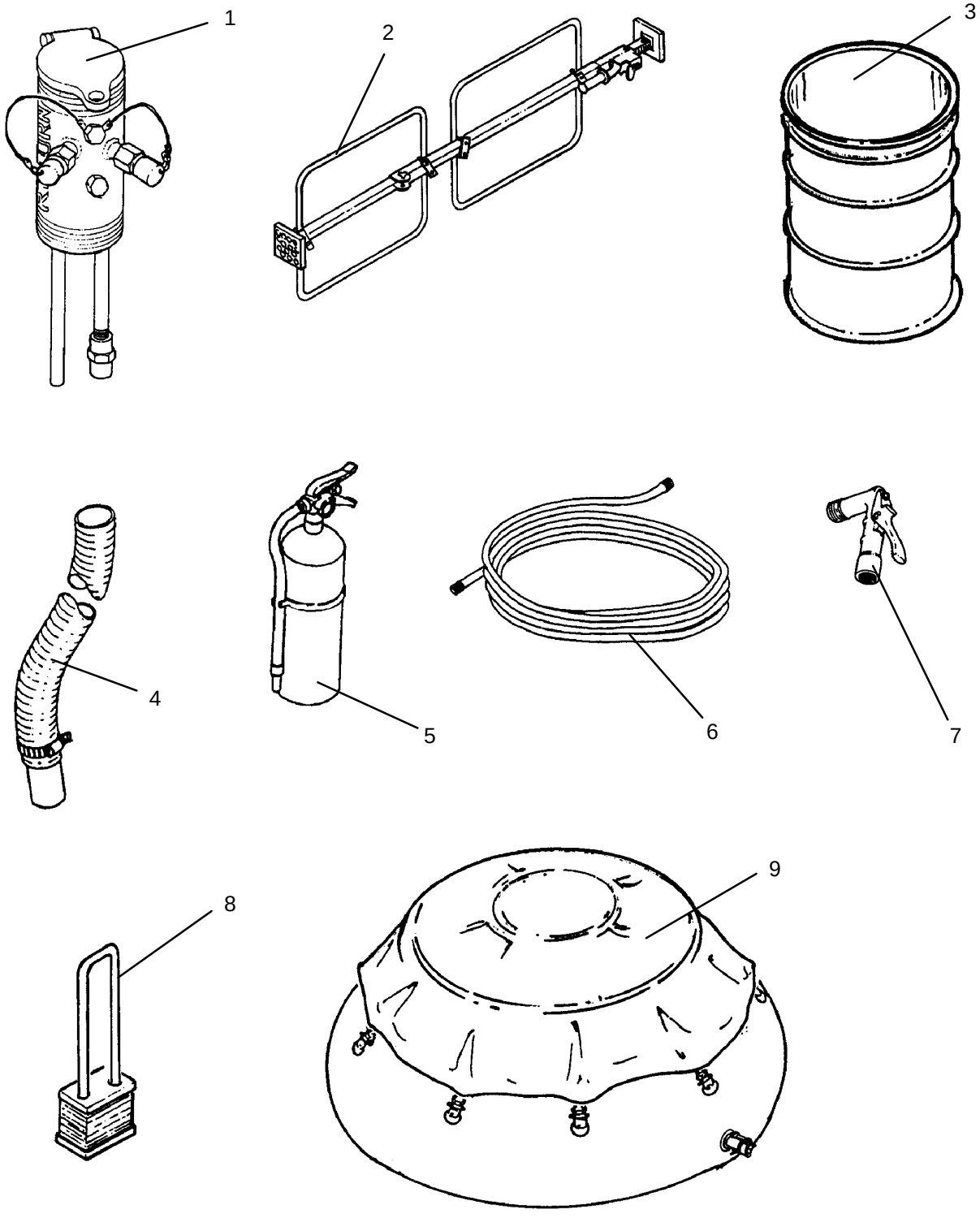


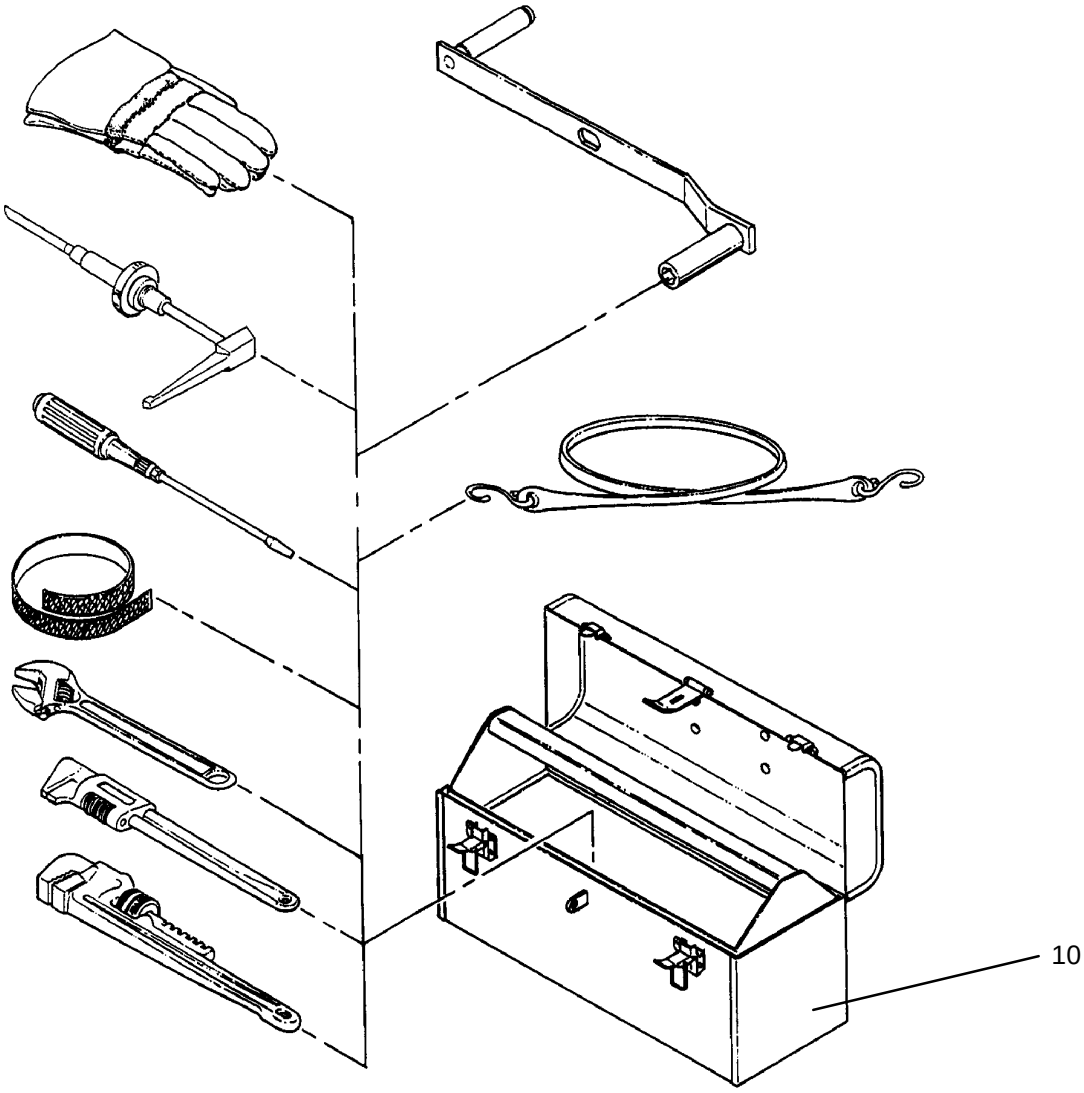
Table 1. Components of End Item List.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQR
1		ADAPTER ASSEMBLY, FUEL HOSE (4X630) 863–870120		EA	1
2		CABLE ASSEMBLY, WATER PUMP, 100 FT (4X630) 863–850120		EA	1
3		CONTAINER, STORAGE, (4X630) 863–880100		EA	1
4	4710–01–493–4683	EXTENSION, DRUM FILL ADAPTER, (4X630) 863–870140		EA	1
5	5340–01–493–5219	HANDRAIL, STAIRS, (4X630) 863–840030		EA	2
6		HOSE ASSEMBLY, 5 FT (4X630) 863–860100		EA	1
7		HOSE ASSEMBLY, 50 FT (4X630) 863–860110		EA	2
8		HOSE ASSEMBLY, FUEL, 30 FT (4X630) 863–870090		EA	1
9		HOSE ASSEMBLY, FUEL, 25 FT (4X630) 863–870110		EA	1
10		HOSE ASSEMBLY, WATER SUPPLY, 10 FT (4X630) 863–850110		EA	1
11		HOSE ASSEMBLY, WATER SUPPLY, 50 FT (4X630) 863–850100		EA	3
12	5440–01–481–3355	LADDER, FOLDING (39428) 8034T58		EA	1
13		LADDER, TELESCOPING (39428) 8148T5		EA	2
14	3990–01–481–3300	LOAD BINDER (4X630) 863–890010		EA	4
15		PIGTAIL ASSEMBLY, POWER 12 FT (4X630) 863–740400		EA	1
16		PUMP ASSEMBLY, ANTI–FOAM, MANUAL (4X630) 863–860040		EA	1
17		RAILING ASSEMBLY, SHORT (4X630) 863–810230		EA	1
18	3510–01–481–3299	RAKE, STILL (4X630) 863–860030		EA	1
19		SLUICE ASSEMBLY (4X630) 863–860010		EA	1
20		STAIR ASSEMBLY (4X630) 863–840010		EA	1
21	5340–01–481–1669	STRAP ASSEMBLY (4X630) 863–830120		EA	12
22		SUPPORT ASSEMBLY, AWNING (4X630) 863–830020		EA	6
23		TANK, FUEL, 400 GALLON (4X630) 863–000090		EA	1
24		TARP/AWNING (4X630) 863–830000		EA	1

BASIC ISSUE ITEMS (BII) LIST



BASIC ISSUE ITEMS (BII) LIST – Continued



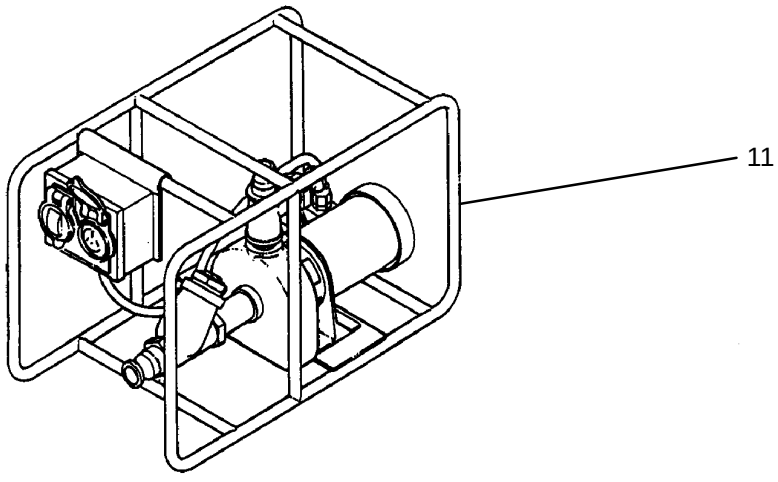


Table 2. Basic Issue Items List.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQR
1	4510–01–214–9139	ADAPTER ASSEMBLY, FUEL (81337) 6–1–8285		EA	1
2		BAR, CARGO STABILIZER, (4X630) 863–820200		EA	2
3	8110–00–597–2353	DRUM, 55 GALLON		EA	1
4		EXTENSION, GENERATOR EXHAUST (4X630) 863–900010		EA	1
5	4210–00–889–2491	EXTINGUISHER, FIRE, 10 LB., ABC		EA	1
6	4720–01–447–8759	HOSE, UTILITY, 50 FT (58358) 29–58050		EA	1
		MANUAL, TECHNICAL, OPERATOR'S, LADS (4X630) TM–10–3510–221–10		EA	1
		MANUAL, TECHNICAL, REPAIR PARTS & SPECIAL TOOL LIST, LADS (4X630) TM–10–3510–221–24P		EA	1
		MANUAL, TECHNICAL, UNIT, DIRECT & GENERAL SUPPORT MAINTENANCE, LADS (4X630) TM–3510–221–24		EA	1
7		NOZZLE, GARDEN HOSE (77860) 352444–588C		EA	1
8	5340–01–247–9650	PADLOCK (39428) 1176A41		EA	3
9	5430–01–359–4774	TANK, FABRIC, COLLAPSIBLE (05476) 90074		EA	1
10		TOOL KIT, ASSEMBLY, OPERATOR (4X630) 863–880020		EA	1
	5140–01–482–0015	BOX, TOOL (4X630) 863–880030		EA	1
	8415–01–481–4429	GLOVES, HEAT RESISTANT (4X630) 863–000487		EA	1
	5340–01–481–3206	HANDLE, WINCH (4X630) 863–710122		EA	1
		PUMP, MANUAL, 1 OZ STROKE (39428) 4249K18		EA	1
	5120–01–482–0016	SCREWDRIVER, SLOTTED ROUND BLADE, 6" (39428) 5720A13		EA	1
		STRAP, HOOK & LOOP, 1" X 12" (4X630) 863–830140		EA	12
	5340–01–274–2744	STRAP, ELASTIC, 24" (39428) 3891T18		EA	4
	5120–00–449–8083	WRENCH, ADJUSTABLE, 10" (11083) 1B7536		EA	1

Table 2. Basic Issue Items List – Continued.

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) USABLE ON CODE	(5) U/M	(6) QTY RQR
10		TOOL KIT, ASSEMBLY – Continued		EA	1
	5120–01–481–8391	WRENCH, MONKEY, 11” (39428) 5382A2		EA	1
	5120–01–481–8392	WRENCH, PIPE, 2” JAW (39428) 5357A125		EA	1
11	4320–01–245–6936	WATER PUMP, CENTRIFUGAL (81337) 6–1–9932		EA	1

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM

(NSN 3510–01–463–0114)

ADDITIONAL AUTHORIZATION LIST (AAL)

INTRODUCTION

SCOPE

This work package lists additional items you are authorized for the support of the LADS.

GENERAL

This list identifies items that do not have to accompany the LADS and that do not have to be turned in with it. These items are 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, Commercial and Government Entity Code (CAGEC), and Part Number (P/N). Identifies the Federal item name (in all capital letters), followed by a minimum description when needed. The last line below the description is the CAGEC (in parentheses) and the part number.

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) – Unit of Measure (U/M) 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 1. Additional Authorization List.

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGEC, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
	ADAPTER ASSEMBLY, FUEL HOSE (4X630) 863–870120		EA	1
	ADAPTER, MANIFOLD, 2 IN MALE TO 1–1/2 IN FEMALE, (4X630) 863–850140		EA	2
	ADAPTER, MANIFOLD, 2 IN FEMALE TO 1–1/2 IN FEMALE, (4X630) 863–850150		EA	2
	ADAPTER, MANIFOLD, 2 IN FEMALE TO 1–1/2 IN MALE, (4X630) 863–850160		EA	2
	ADAPTER, MANIFOLD, 1–1/2 IN MALE TO MALE, (4X630) 863–850170		EA	2
6150–01–220–5587	CABLE ASSEMBLY, POWER, ELECTRICAL,100 AMP, 50 FT, (81349) MIL–C–29184		EA	2
	HOSE ASSEMBLY, 70 FT, (4X630) 863–870100		EA	2

Table 1. Additional Authorization List – Continued.

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION, CAGEC, AND PART NUMBER	(3) USABLE ON CODE	(4) U/M	(5) QTY RECM
	MANIFOLD, WATER SUPPLY, (4X630) 863–850130		EA	2

END OF WORK PACKAGE

LAUNDRY ADVANCED SYSTEM
(NSN 3510–01–463–0114)
EXPENDABLE AND DURABLE ITEMS LIST

INTRODUCTION

SCOPE

This work package lists expendable and durable items that you will need to operate and maintain the LADS. 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), or CTA 8–100, Army Medical Department Expendable/Durable Items.

EXPLANATION OF COLUMNS IN THE EXPENDABLE AND DURABLE ITEMS LIST

Column (1) – Item Number. This number is assigned to the entry in the list and may be referenced in other work packages (e.g., Grease, General Purpose (Item 8, WP 0059 00).).

Column (2) – Level. This column indicates the lowest level of maintenance that requires the listed item (C=Operator/Crew).

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, Commercial and Government Entity Code (CAGEC), and Part Number (P/N). This column provides the other information you need to identify the item.

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

Table 1. Expendable and Durable Items List.

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION, CAGEC, AND PART NUMBER	(5) U/M
1		NONE	Anti–Foam, (0YTZ6) SAG 30	5 GAL
2		NONE	Bag, Mesh, Laundry, Blue (1RKW1) LS–LMSH–2430/Z–BLU	EA
3		NONE	Bag, Mesh, Laundry, Green (1RKW1) LS–LMSH–2430/Z–GRN	EA
4		NONE	Bag, Mesh, Laundry, White (1RKW1) LS–LMSH–2430/Z–WHT	EA
5		NONE	Detergent, Kindet, (None) 70201	5 GAL
6		8415–01–441–0149	Gloves, Impermeable, (1H8U7) 50801	PG10
7		8415–01–481–4429	Goggles, Protetctive, (65420) 9305	EA
8		NONE	Grease, General Purpose, NLGI #2, Lithium, Complex EP	TU
9		7920–00–205–3570	Rag, Wiping 58536	BE
10		NONE	Sanitizer, (None) 44150	5 GAL
11		8030–01–408–9444	Water Repellent Compound, FRS, Stormshed, 01ZB8	5 GAL

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By Order of the Secretary of the Army:

By Order of the Secretary of the Army:

PETER J. SCHOOMAKER
General, United States Army
Chief of Staff

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JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army
0325904

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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: amssbriml@natick.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.

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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)* COMMANDER U.S. ARMY SOLDIER AND BIOLOGICAL CHEMICAL COMMAND ATTN: AMSSB-RIM-L KANSAS STREET NATICK, MA 01760-5052	FROM: *(Activity and location) (Include ZIP Code)* *PFC Jane Doe* *CO A 3rd Engineer BR* *Ft. Leonardwood, MO 63108*

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

PUBLICATION/FORM NUMBER	DATE	TITLE
TM 10-1670-296-23&P	30 October 2002	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*	*In table 1, Sewing Machine Code Symbols, the second sewing machine code symbol should be MD ZZ not MD 22.* *Change the manual to show Sewing Machine, Industrial: Zig-Zag; 308 stitch; medium-duty; NSN 3530-01-181-1421 as a MD ZZ code symbol.*

**Reference to line numbers within the paragraph or subparagraph.*

TYPED NAME, GRADE OR TITLE	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
Jane Doe, PFC	508-233-4141	Jane Doe *Jane Doe*

DA FORM 2028, FEB 74 REPLACES DA FORM 2028, 1 DEC 68, WHICH WILL BE USED. USAPPC V3.00

TO: (*Forward direct to addressee listed in publication)*	FROM: (*Activity and location) (Include ZIP Code)*	DATE
COMMANDER U.S. ARMY SOLDIER AND BIOLOGICAL CHEMICAL COMMAND ATTN: AMSSB-RIM-L KANSAS STREET NATICK, MA 01760-5052	*PFC Jane Doe* *CO A 3rd Engineer BR* *Ft. Leonardwood, MO 63108*	*21 October 2003*

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

PUBLICATION NUMBER	DATE	TITLE
TM 10-1670-296-23&P	30 October 2002	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*			*Callout 16 in figure 4 is pointed to a D-Ring. In the Repair Parts List key for figure 4, item 16 is called a Snap Hook. Please correct one or the other.*

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

UASPPC V3.00

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
TO: *(Forward to proponent of publication or form) (Include ZIP Code)* COMMANDER U.S. ARMY SOLDIER AND BIOLOGICAL CHEMICAL COMMAND ATTN: AMSSB-RIM-L 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	DATE	TITLE
TM 10-3510-221-10	31 OCTOBER 2003	Laundry Advanced System (LADS)

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: (*Forward direct to addressee listed in publication)*	FROM: (*Activity and location) (Include ZIP Code)*	DATE

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

PUBLICATION NUMBER	DATE	TITLE
TM 10-3510-221-10	31 OCTOBER 2003	Laundry Advanced System (LADS)

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

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

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

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

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
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	5/9 (after subtracting 32)	Celsius temperature	_C

PIN: 078210–000