THERMO KING

Installation Manual

Truck Edition
SPECTRUM™ Multi-Temperature Systems
T-800R, T-1000R and T-1200R (ESA ONLY)
T-1080S and T-1280R (TSA)

TK 54481-1-IM (Rev. 11, 09/17)

Ingersoll Rand

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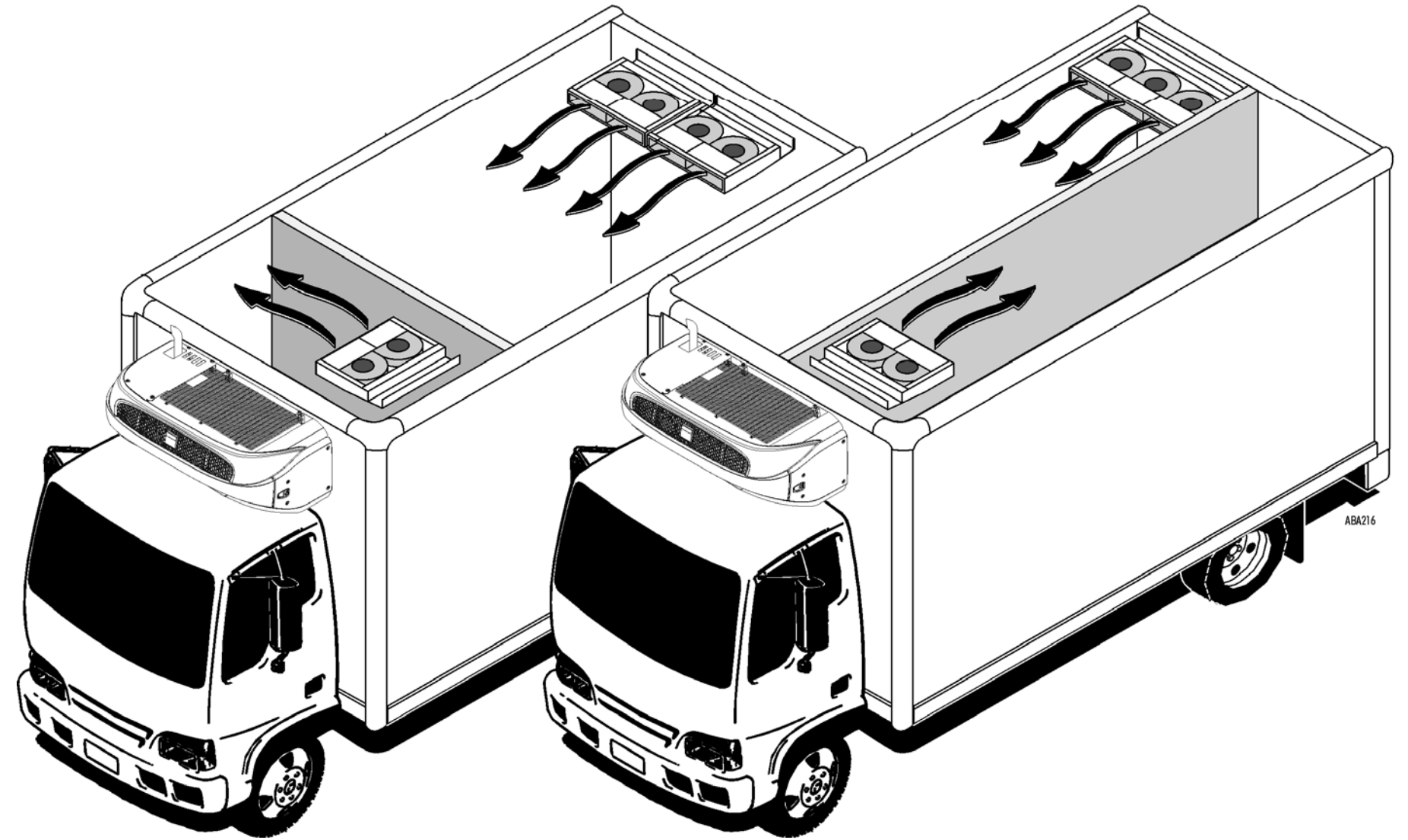
Release History

Rev. 0	(02/10)
Rev. 1	(04/10) Changed the door switch red wire connection from 12Vdc to DSP on pages 112-115, added warning regarding installing the fuel pump onto the supplied bracket and away from the extreme heat generated by the DPF or exhaust components on the truck on page 66.
Rev. 2	(02/11) Pages 16, 18, 20 and 85; Added note, “Beginning first quarter of 2011, all S-2 and S-3 evaporators will now have solder fittings in place of ORS fittings. All refrigerant connections at the evaporator(s) must now be soldered”.
Rev. 3	(04/11) Updated art and text by replacing ORS fittings with solder fittings on S-2 and S-3 evaporators.
Rev. 4	(04/11) Pages 126-127 - Revised content of SYSTEM CHECK LIST and renamed it UNIT CHECK LIST.
Rev. 5	(10/11) Page 8 - Revised safety Precautions to include new Battery Installation and Cable Routing warnings and cautions.
Rev. 6	(02/13) Pages 32,32, 41, 49 and 51 - Changed art to show revised lifting bar with forged clevis and pins, forged connecting links and forged locking hooks used for lifting the unit.
Rev. 7	(10/13) Changed T-1000 to T-1080S for TSA only and added important note on page 9 regarding not using more than 6 total evaporator fans.
Rev. 8	(01/15) Page 62: Added important note about the fuel tank air vent.
Rev. 9	(05/15) Pages 110-114: Updated door switch installation information and added setup procedures.
Rev. 10	(02/16) Pages 28, 30, 42-43, 124-125 and 127: Added evaporator cap plug details, page 115: added note about auxiliary power devices, page 126: added note about TracKing and CargoLink factory installed options requiring additional procedures to activate and added new in-line fuse assembly information.
Rev. 11	(09/17) Added T-1280R.

SPECTRUM™ Multi-Temperature Systems



Introduction

This manual was written to assist with the installation of **Thermo King SPECTRUM™** Multi-Temperature truck condensing units and **SPECTRUM™** remote evaporators onto truck bodies specifically designed and built for these applications.

Due to its complexity, you should not attempt this installation unless you:

- Are an experienced mechanic.
- Can safely lift 34 kilos (75 lbs.).
- Are certified or trained in the repair and maintenance of diesel powered refrigeration systems.
- Have a basic understanding of electricity and electrical wiring.
- Have the necessary tools and equipment to complete the installation.

This manual is published for informational purposes only. Thermo King makes no representations warranties express or implied, with respect to the information recommendations and descriptions contained herein. Information provided should not be regarded as all-inclusive or covering all contingencies. If further information is required, Thermo King Corporation Service Department should be consulted.

Thermo King's warranty shall not apply to any equipment which has been "so installed, maintained, repaired or altered as, in the manufacturer's judgment, to affect its integrity."

Manufacturer shall have no liability to any person or entity for any personal injury, property damage or any other direct, indirect, special, or consequential damages whatsoever, arising out of the use of this manual or any information, recommendations or descriptions contained herein.

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Safety Precautions

⚠ Caution

Thermo King Multi-Temp SPECTRUM™ truck condensing units and SPECTRUM™ remote evaporators are shipped with a 35-69 kPa (5-10 psi) holding charge of nitrogen. This holding charge may be safely vented into the atmosphere.

IMPORTANT: Do not release the holding charge until necessary to prevent moisture from entering the system.

SEVERE COMPRESSOR DAMAGE will result from operating the engine/motor before completing the system installation which includes: installing the components, releasing the condensing unit holding charge, releasing the remote unit holding charge, soldering the refrigeration lines, leak testing the system, evacuation and clean-up, and charging the system.

Recover Refrigerant

At Thermo King, we recognize the need to preserve the environment and limit the potential harm to the ozone layer that can result from allowing refrigerant to escape into the atmosphere.

We strictly adhere to a policy that promotes the recovery and limits the loss of refrigerant into the atmosphere.

Safety Precautions

The  symbol appears next to a point that is particularly important:

DANGER: Addresses a circumstance that, if encountered, will lead to death or serious injury

WARNING: Addresses a circumstance that, if encountered, might lead to death or serious injury.

CAUTION: Addresses a circumstance that, if encountered, may cause damage to equipment or minor injury.

DANGER: Never operate the unit with the discharge valve closed because it could cause the compressor to explode, causing death or serious injury.

DANGER: Never apply heat to a sealed refrigeration system or container because it could explode, causing death or serious injury

DANGER: Fluorocarbon refrigerants, in the presence of an open flame or electrical short, produce toxic gases that are severe respiratory irritants capable of causing death.

DANGER: Be careful when working with a refrigerant or refrigeration system in any enclosed or confined area with a limited air supply (i.e., a trailer, container or the hold of a ship). Refrigerant tends to displace air and can cause oxygen depletion which may result in death by suffocation.

WARNING: Always wear goggles or safety glasses. Refrigerant liquid, refrigeration oil, and battery acid can permanently damage the eyes (see First Aid under Refrigeration Oil).

WARNING: Keep your hands away from fans and belts when the unit is running. This should also be considered when opening and closing the compressor service valves.

WARNING: Make sure gauge manifold hoses are in good condition. Never let them come in contact with a belt, fan motor pulley, or any hot surface.

WARNING: Make sure all mounting bolts are tight and are of correct length for their particular application

WARNING: Never drill holes in the unit unless absolutely necessary. Holes drilled into the unit may weaken structural components. Holes drilled into electrical wiring can cause fire or explosion.

WARNING: When using ladders to install or service refrigeration systems, always observe the ladder manufacturer's safety labels and warnings. A work platform is the recommended method for installations.

WARNING: Exposed coil fins are very sharp and can cause painful lacerations.Wear leather work gloves to prevent injury.

Safety Precautions (continued)

Battery Installation and Cable Routing

WARNING: Improperly installed battery could result in a fire or explosion! A Thermo King approved battery must be installed and properly secured to the battery tray.

WARNING: Improperly installed battery cables could result in fire or explosion! Battery cables must be installed, routed and secured properly to prevent them from rubbing, chaffing or making contact with hot, sharp or rotating components.

WARNING: Do not attach fuel lines or any additional wiring harnesses to the battery cables as this could cause an electrical fire!

CAUTION: Do not connect other manufacturer's equipment or accessories to the Thermo King unit. This could result in severe damage to equipment and void the warranty!

CAUTION: Set all unit electrical controls to the OFF position before connecting battery cables to the battery to prevent unit from starting unexpectedly and causing personal injury.

CAUTION: Always wear protective clothing, gloves and eye wear when handling and installing batteries. Battery acid can cause serious burns when exposed to eyes or skin. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.

CAUTION: Always cover battery terminals to prevent them from making contact with metal components during battery installation. Battery terminals grounding against metal could cause the battery to explode.

Refrigerant

WARNING: Although fluorocarbon refrigerants are classified as safe refrigerants, certain precautions must be observed when handling them or servicing a unit in which they are used. When released to the atmosphere in the liquid state, fluorocarbon refrigerants evaporate rapidly, freezing anything they contact.

First Aid

FROST BITE: In the event of frost bite, the objectives of First Aid are to protect the frozen area from further injury, to warm the affected area rapidly and to maintain respiration.

EYES: For contact with liquid, immediately flush eyes with large amounts of water and get prompt medical attention.

SKIN: Flush area with large amounts of lukewarm water. Do not apply heat. Remove contaminated clothing and shoes. Wrap burns with dry, sterile, bulky dressing to protect from infection/injury. Get medical attention. Wash contaminated clothing before reuse.

INHALATION: Move victim to fresh air and use CPR or mouth-to-mouth ventilation, if necessary. Stay with victim until arrival of emergency medical personnel.

Refrigeration Oil

WARNING: Avoid refrigeration oil contact with the eyes. Avoid prolonged or repeated contact of refrigeration oil with skin or clothing. Wash thoroughly after handling refrigeration oil to prevent irritation.

First Aid

In case of eye contact, immediately flush with plenty of water for at least 15 minutes. CALL A PHYSICIAN. Wash skin with soap and water.

SPECTRUM Multi-Temperature System Selection Guide

Installation Configurations

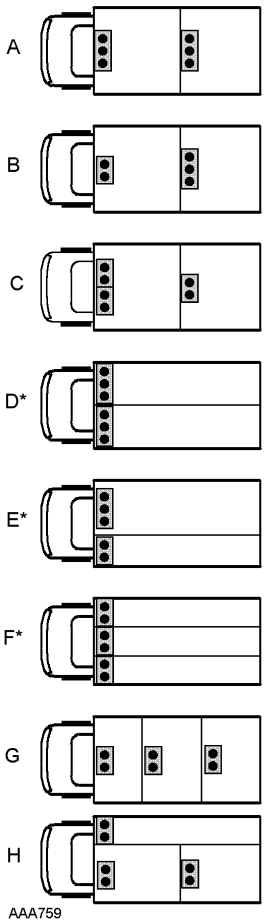


Fig.	Zone 1	Zone 2	Zone 3	2 Zones Tubing Kit 15 m (50 ft.) 720201 OPTION	3 Zones Install Kit 088089 OPTION	Transverse Drain Kit 880041 OPTION	S-2 +S-2 Jumper Kit 800372 OPTION
A	S-3	S-3	---	1	---	2	---
B	S-2	S-3	---	1	---	2	---
C	S-2 + S-2	S-2	---	1	---	2	1
D*	S-3	S-3	---	---	---	2	---
E*	S-3	S-2	---	---	---	4	---
F*	S-2	S-2	S-2	---	1	2	---
G	S-2	S-2	S-2	1	1	4	---
H	S-2	S-2	S-2	1	1	4	---

IMPORTANT: T-1080S SPECTRUM units should not be configured with more than 6 total evaporator fans. Emission control software will restrict capacity performance if the unit is configured with more than 6 fans.

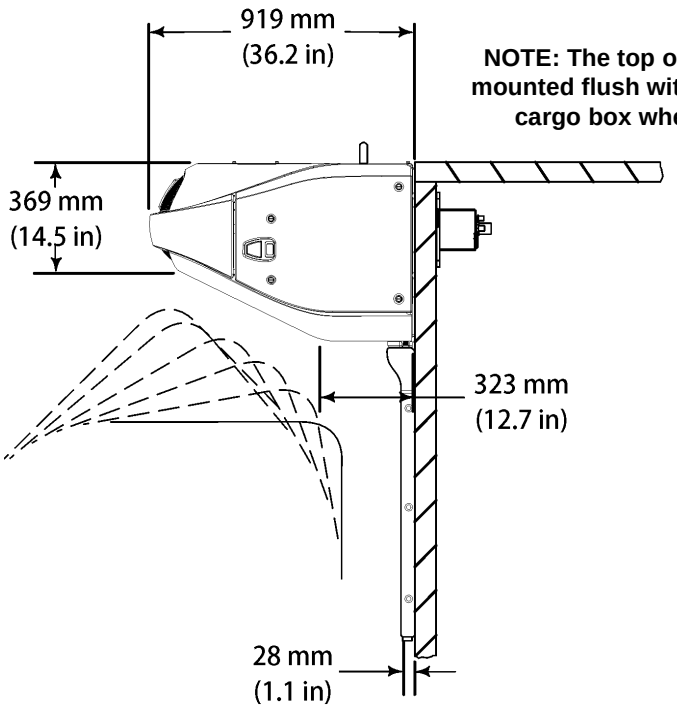
NOTES:

1. S-2 evaporators 901085 include mounting hardware kits 819951.
2. S-3 evaporators 901086 include mounting hardware kits 819951
3. Drain kit **880041** is needed to drain on one side toward the front or back of the truck.
4. Tubes kit **720201** will be supplied per customer request only.
5. Quantities specified are for entire truck.
6. Evaporators can be placed at the back of each zone, however this may require different refrigerant and drain tube routing.

**** = Configurations that will need at least 1 Tube Kit if the evaporators are mounted in the back of the zone.***

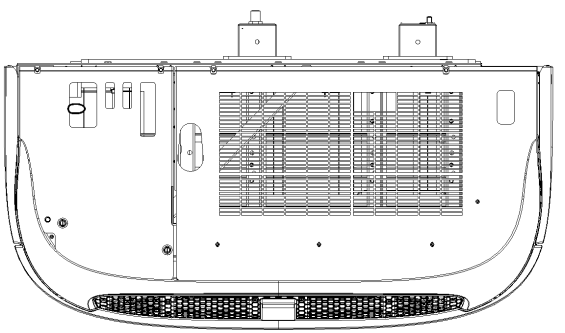
Unit Dimensions - T-800R

SIDE VIEW

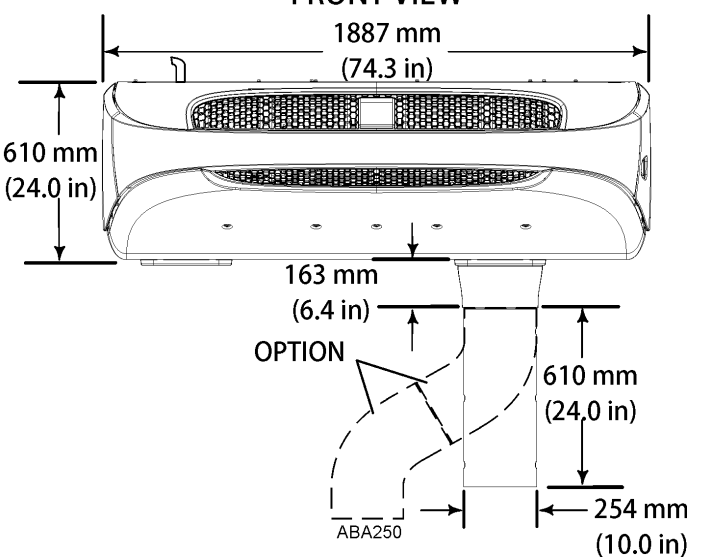


NOTE: The top of the unit to be mounted flush with the top of the cargo box when possible.

TOP VIEW

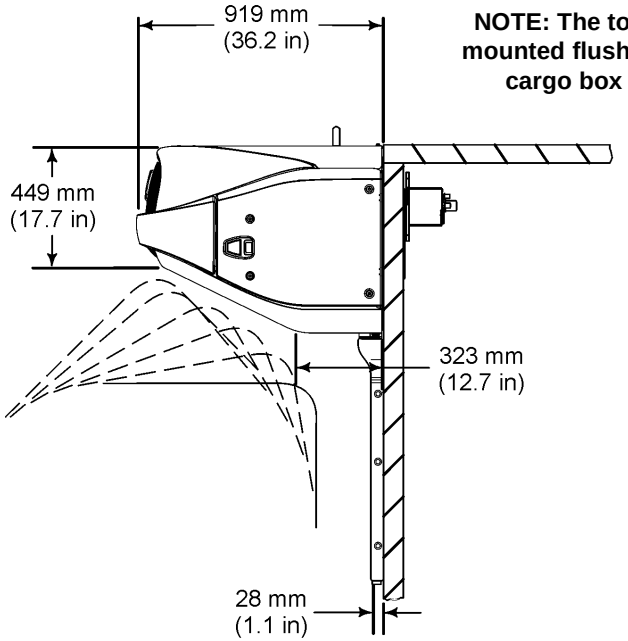


FRONT VIEW



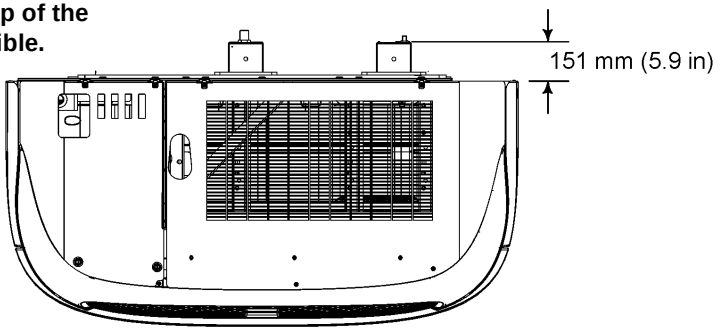
Unit Dimensions - T-1000, T-1000R, T-1080S, T-1200R & T-1280R

SIDE VIEW

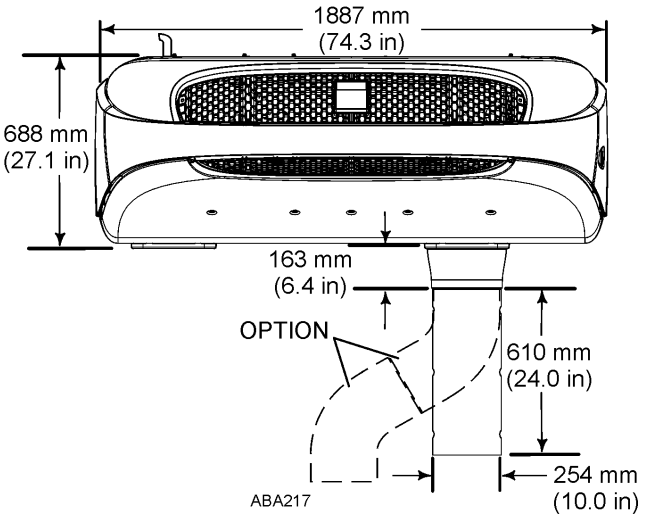


NOTE: The top of the unit to be mounted flush with the top of the cargo box when possible.

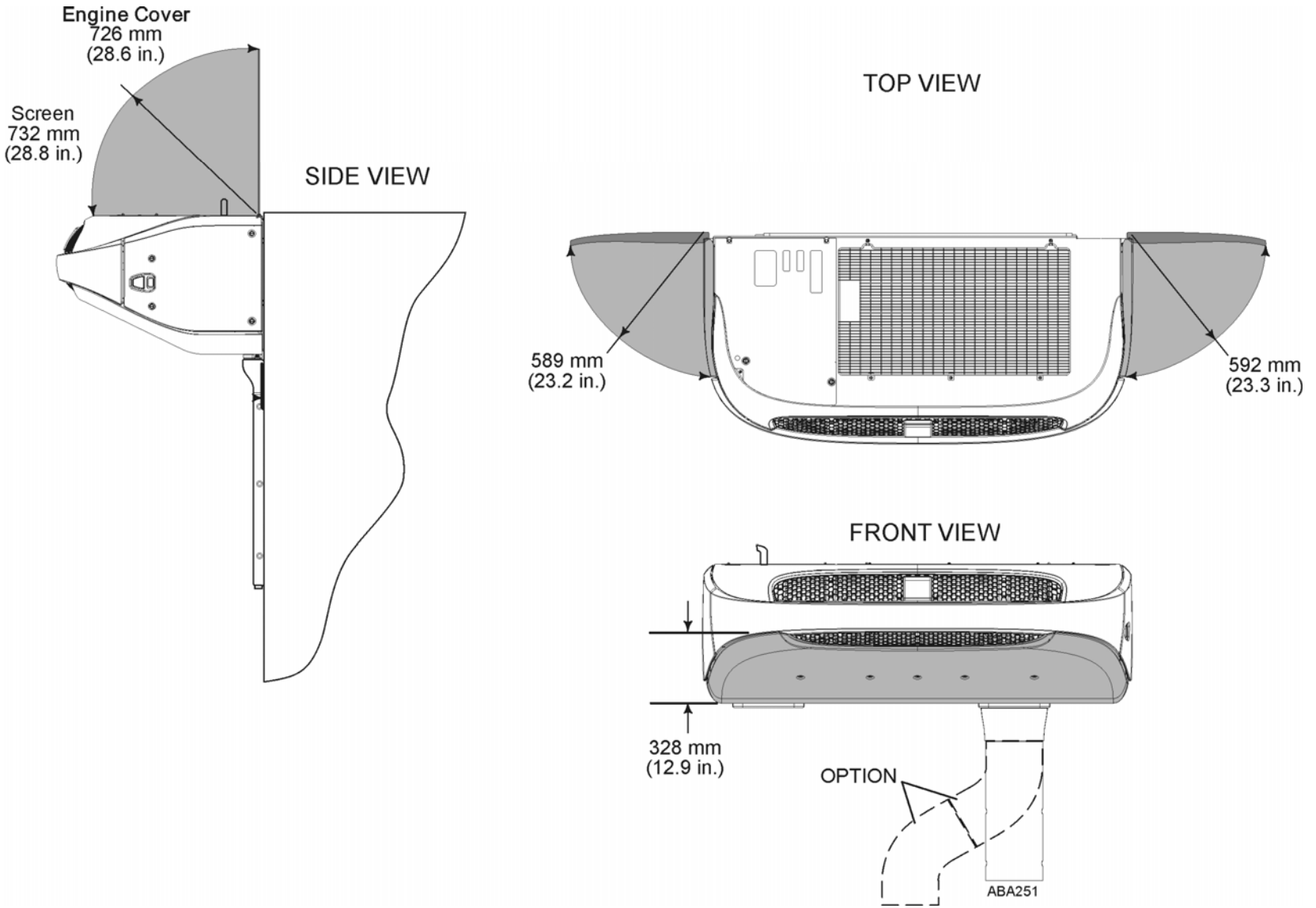
TOP VIEW



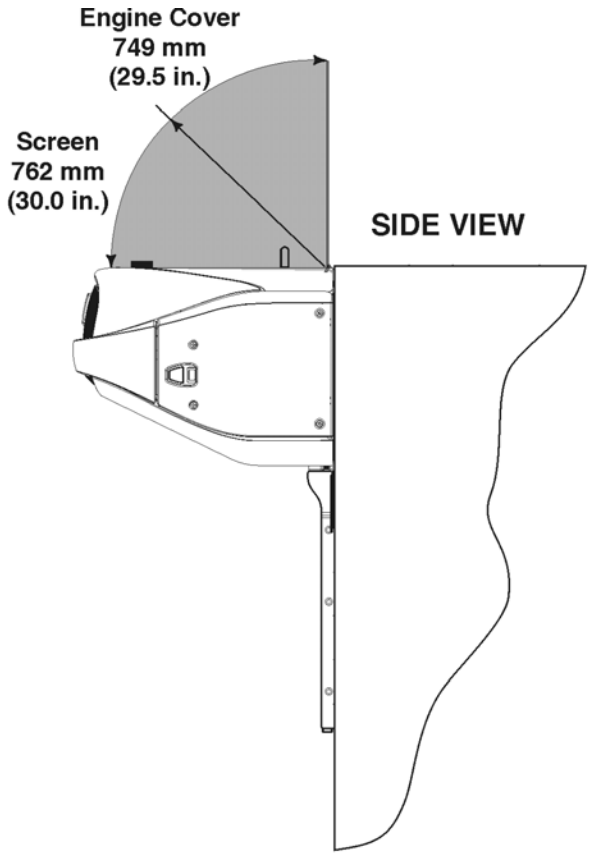
FRONT VIEW

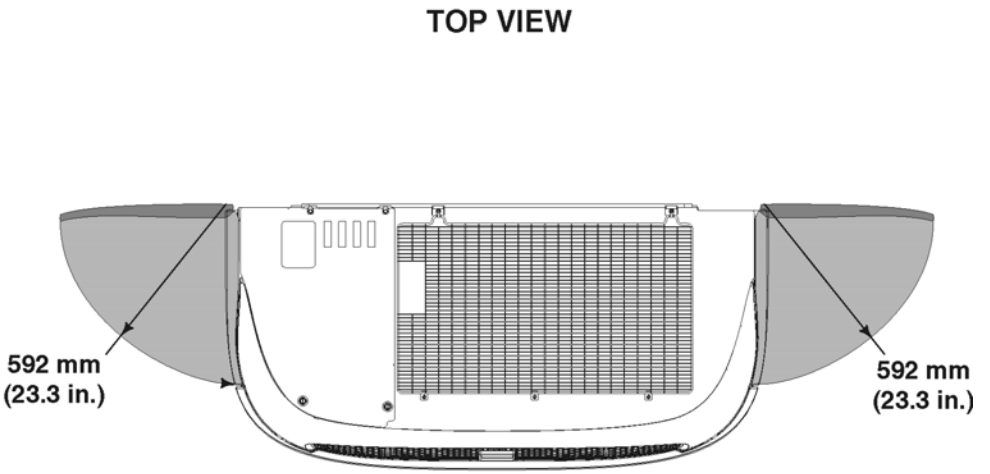


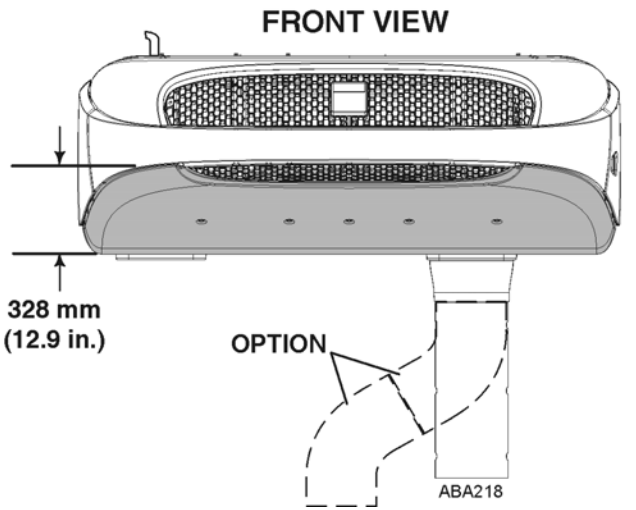
Service Area Dimensions T-800R



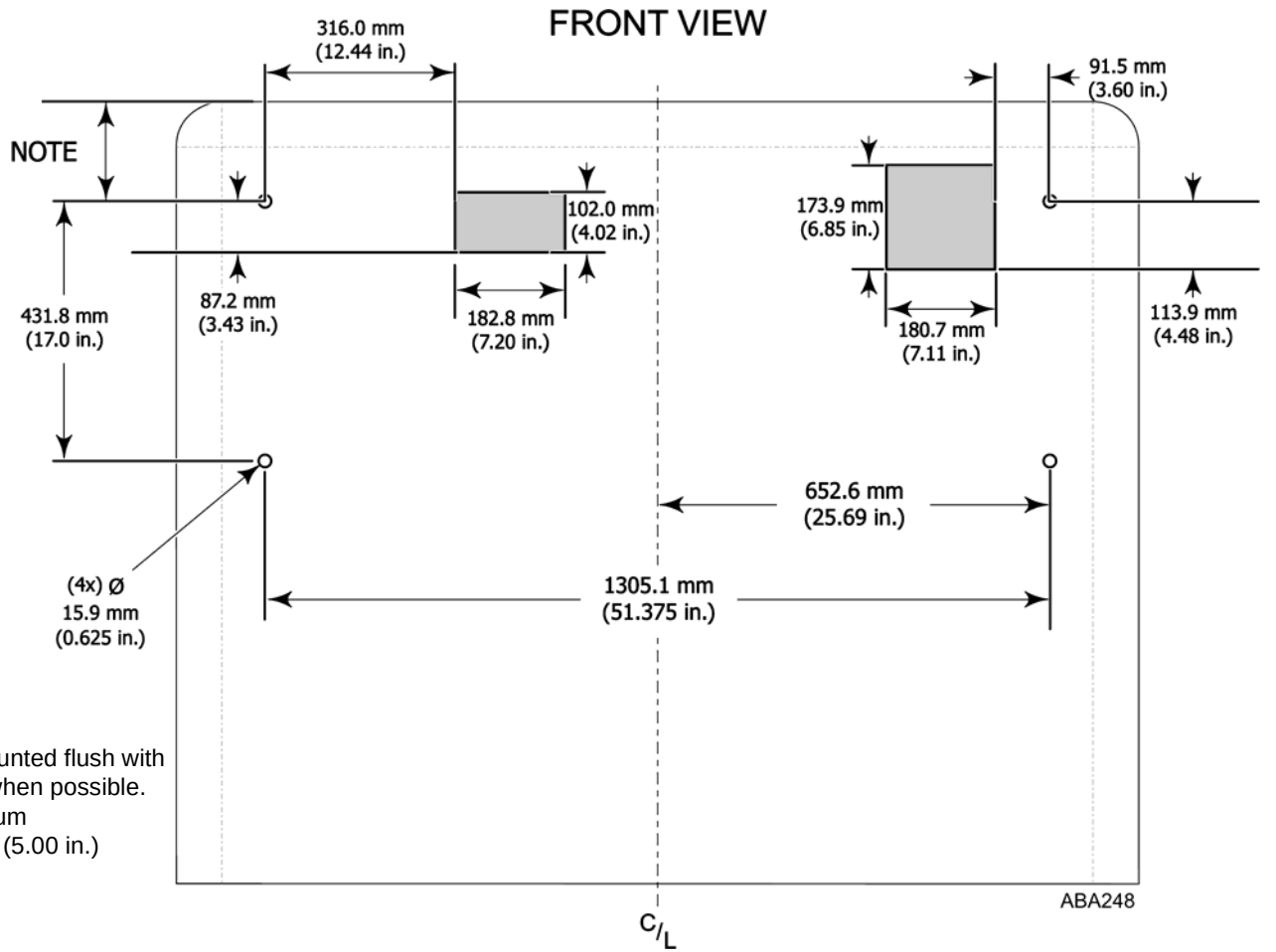
Service Area Dimensions T-1000,T-1000R,T-1080S,T-1200R & T-1280R







Truck Body Opening Dimensions - T-800R

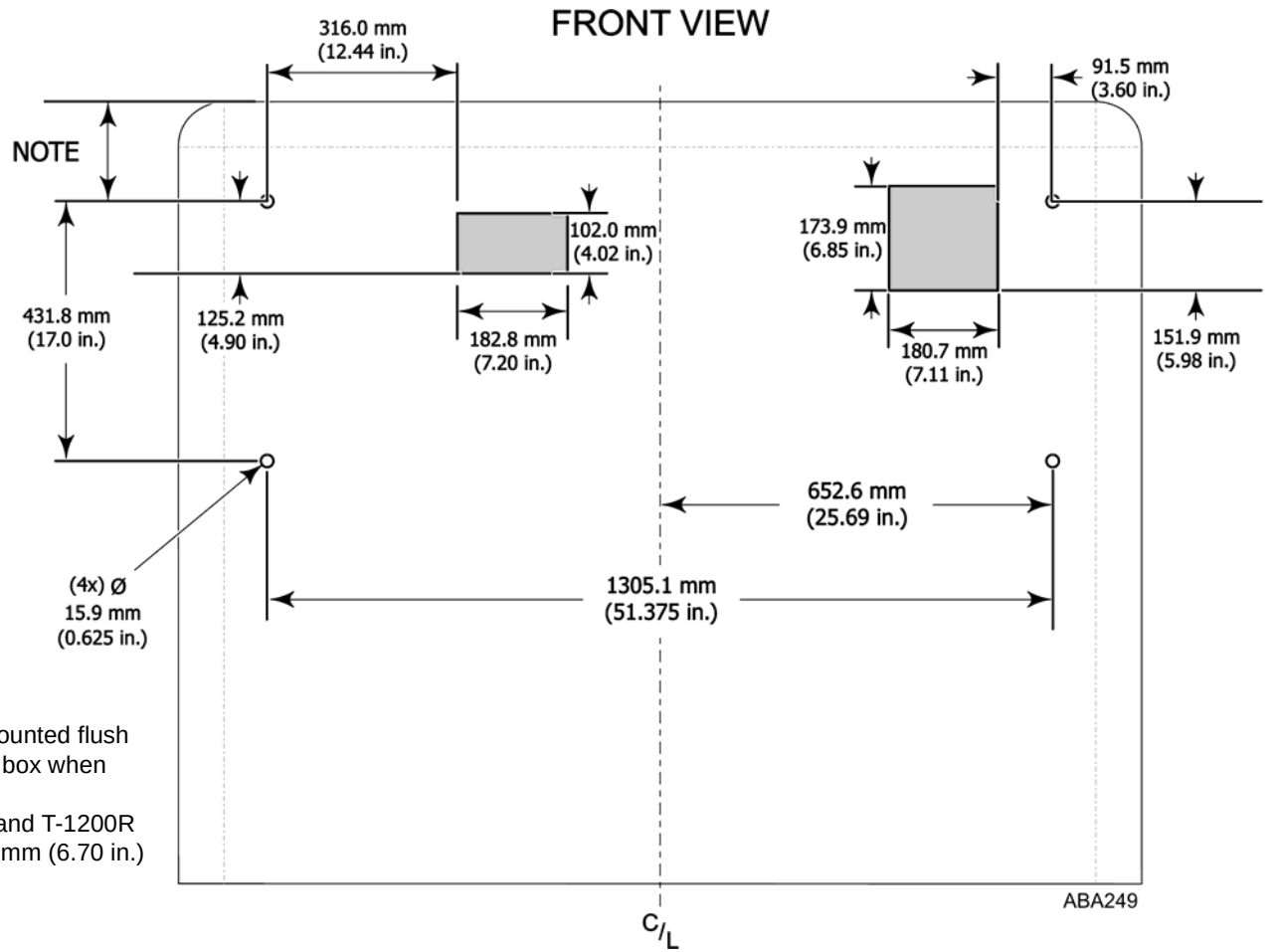


NOTE:
The top of the unit to be mounted flush with the top of the cargo box when possible.
T-800R minimum
dimension = 126 mm (5.00 in.)

Important Installation Requirements:

- Gasket sealing surface of 50.8 mm (2.00 in.) wide is required around the unit opening. This surface must be flat within 6.4 mm (0.25 in.) and free of all rivets or head bolts for proper gasket sealing.
- Unit mounting location must allow for adequate tilt clearance (see Unit Dimensions).

Truck Body Opening Dimensions - T-1000,T-1000R,T-1080S,T-1200R & T-1280R



NOTE:
The top of the unit to be mounted flush with the top of the cargo box when possible.
T-1000/T-1000R, T-1080S and T-1200R minimum dimensions = 170 mm (6.70 in.)

Important Installation Requirements:

- Gasket sealing surface of 50.8 mm (2.00 in.) wide is required around the unit opening. This surface must be flat within 6.4 mm (0.25 in.) and free of all rivets or head bolts for proper gasket sealing.
- Unit mounting location must allow for adequate tilt clearance (see Unit Dimensions).

Remote Evaporator Dimensions - S-2

NOTE: Beginning first quarter of 2011, all S-2 and S-3 evaporators will now have solder fittings in place of ORS fittings. All refrigerant connections at the evaporator(s) must now be soldered.

CAUTION: The cargo box ceiling must be structurally strong enough to support the weight of the SPECTRUM remote evaporator(s).

All mounting locations must be correct to properly install evaporators.

IMPORTANT: Mount all evaporators as close to one side wall as possible to minimize drain tube length and reduce exposure to damage.

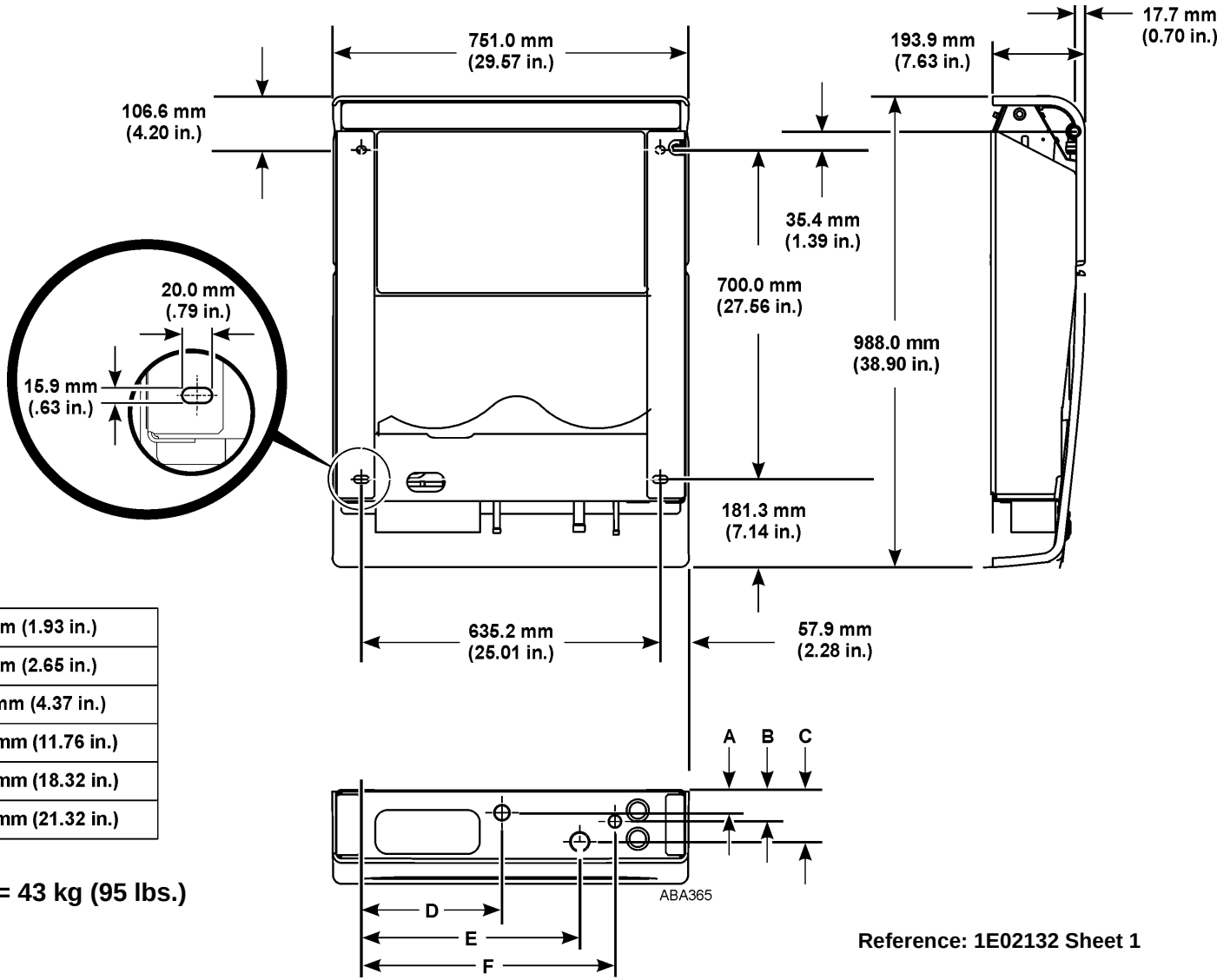
The minimum distance 600 mm (24.00 in.) from the bulkhead to the front of the evaporator must be maintained for proper operation.

A, B, C, D, E, and F indicate locations of solder fittings measured from trailer ceiling and from edge of Spectrum evaporator.

NOTE: A). 50 mm (2.00 in.) is approximate spacing between evaporator and truck side wall for 2590.8 mm (102.00 in.) wide truck with 376.2 mm (3.00 in.) walls. A narrow 2438 mm (96.00 in.) wide truck will allow only 25.4 mm (1.00 in.) spacing depending upon wall thickness.
B). Allow 50.8 - 101.6 mm (2.00 - 4.00 in.) space between the back of the evaporator to the truck wall.

The information above is only relevant to an application where an S-2 is used in one lane and an S-2 + S-2 is used in the adjacent lane.

Remote Evaporator Dimensions - S-2



A	48.9 mm (1.93 in.)
B	67.4 mm (2.65 in.)
C	111.1 mm (4.37 in.)
D	298.7 mm (11.76 in.)
E	465.3 mm (18.32 in.)
F	541.6 mm (21.32 in.)

WEIGHT = 43 kg (95 lbs.)

Reference: 1E02132 Sheet 1

Remote Evaporator Dimensions - S-2 + S-2

NOTE: Beginning first quarter of 2011, all S-2 and S-3 evaporators will now have solder fittings in place of ORS fittings. All refrigerant connections at the evaporator(s) must now be soldered.

CAUTION: The cargo box ceiling must be structurally strong enough to support the weight of the SPECTRUM remote evaporator(s).

All mounting locations must be correct to properly install evaporators.

IMPORTANT: Mount all evaporators as close to one side wall as possible to minimize drain tube length and reduce exposure to damage.

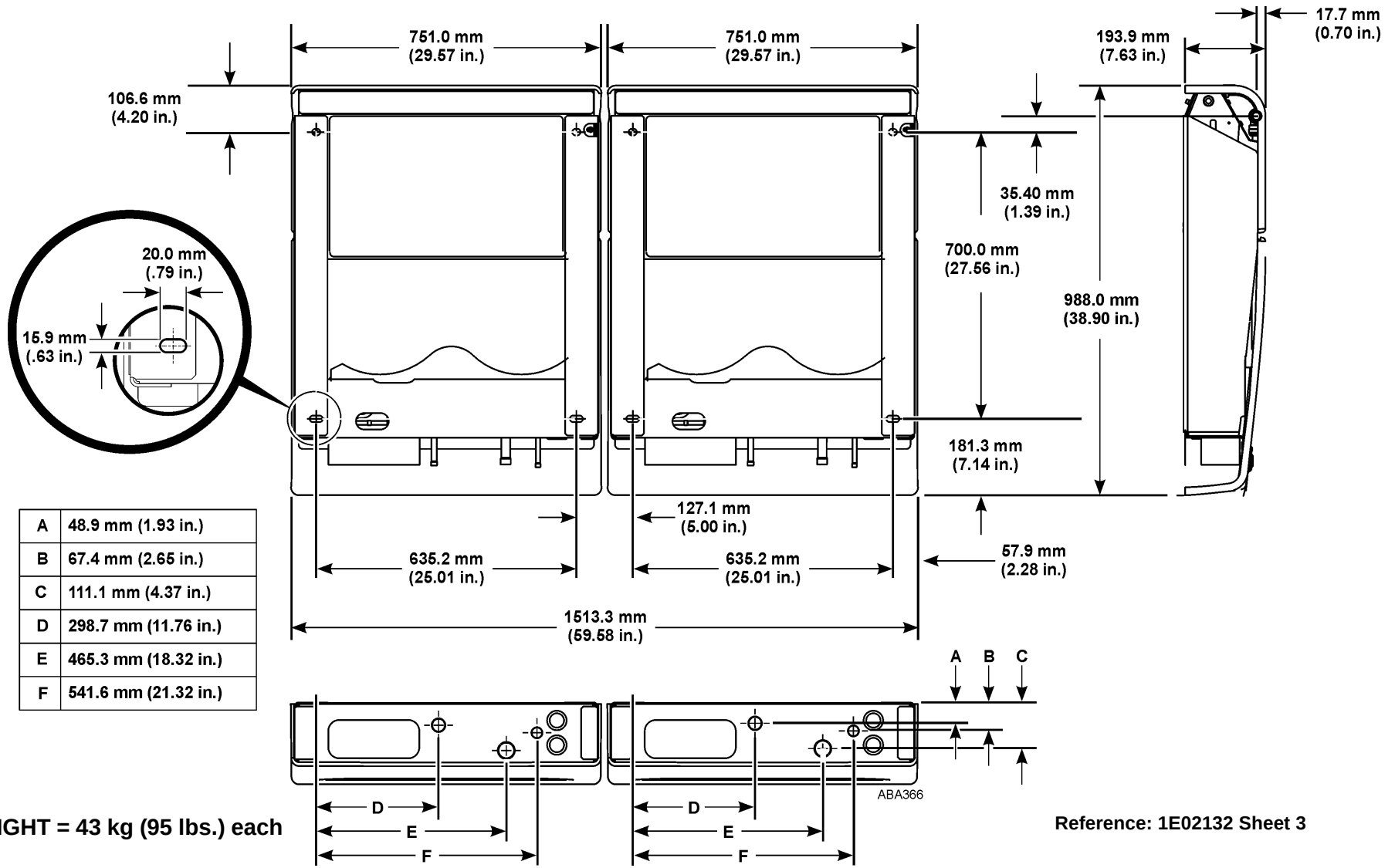
The minimum distance 609.6 mm (24.00 in.) from the bulkhead to the front of the evaporator must be maintained for proper operation.

A, B, C, D, E, and F indicate locations of solder fittings measured from trailer ceiling and from edge of Spectrum evaporator.

NOTE: A). 50 mm (2.00 in.) is approximate spacing between evaporator and truck side wall for 2590.8 mm (102.00 in.) wide truck with 376.2 mm (3.00 in.) walls. A narrow 2438 mm (96.00 in.) wide truck will allow only 25.4 mm (1.00 in.) spacing depending upon wall thickness.
B). Allow 50.8 - 101.6 mm (2.00 - 4.00 in.) space between the back of the evaporator to the truck wall.

The information above is only relevant to an application where an S-2 is used in one lane and an S-2 + S-2 is used in the adjacent lane.

Remote Evaporator Dimensions - S-2 + S-2



A	48.9 mm (1.93 in.)
B	67.4 mm (2.65 in.)
C	111.1 mm (4.37 in.)
D	298.7 mm (11.76 in.)
E	465.3 mm (18.32 in.)
F	541.6 mm (21.32 in.)

WEIGHT = 43 kg (95 lbs.) each

Reference: 1E02132 Sheet 3

Remote Evaporator Dimensions - S-3

NOTE: Beginning first quarter of 2011, all S-2 and S-3 evaporators will now have solder fittings in place of ORS fittings. All refrigerant connections at the evaporator(s) must now be soldered.

CAUTION: The cargo box ceiling must be structurally strong enough to support the weight of the SPECTRUM remote evaporator(s).

All mounting locations must be correct to properly install evaporators.

IMPORTANT: Mount all evaporators as close to one side wall as possible to minimize drain tube length and reduce exposure to damage.

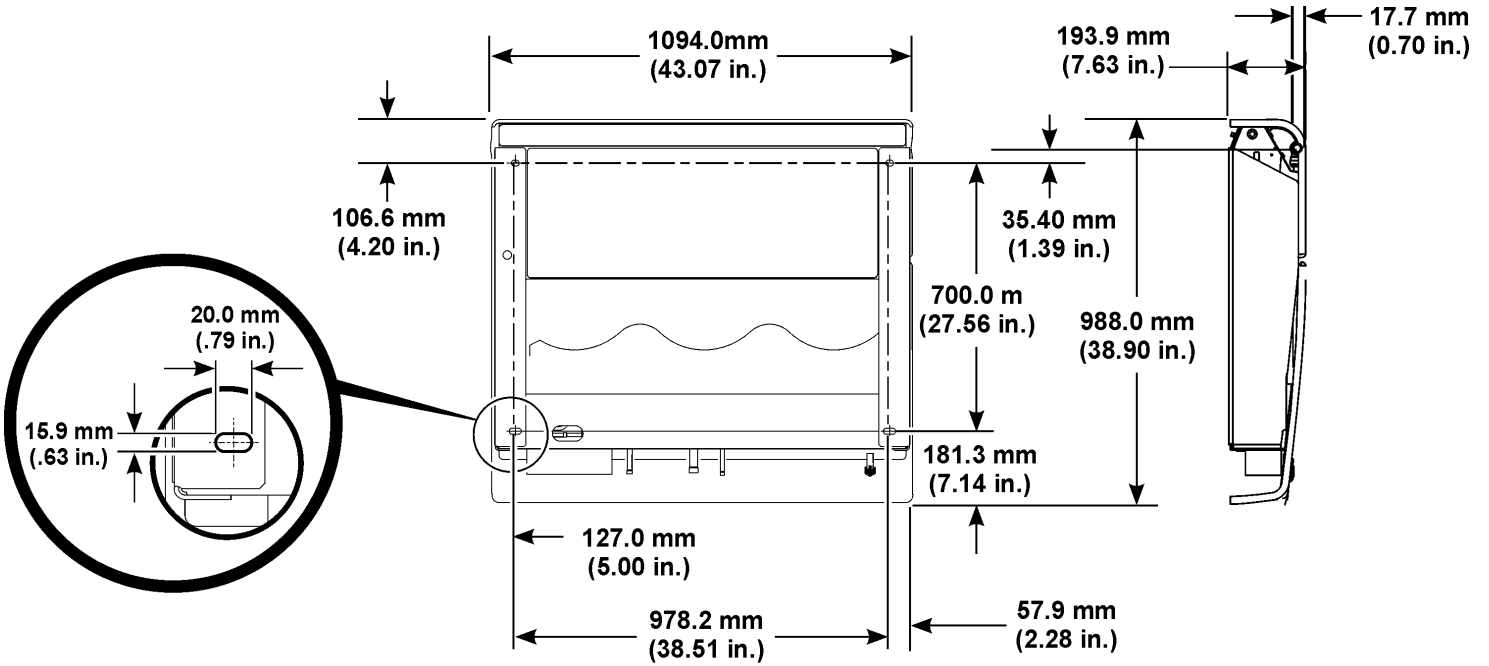
The minimum distance 600 mm (24.00 in.) from the bulkhead to the front of the evaporator *must* be maintained for proper operation.

A, B, C, D, E, and F indicate locations of solder fittings measured from trailer ceiling and from edge of Spectrum evaporator.

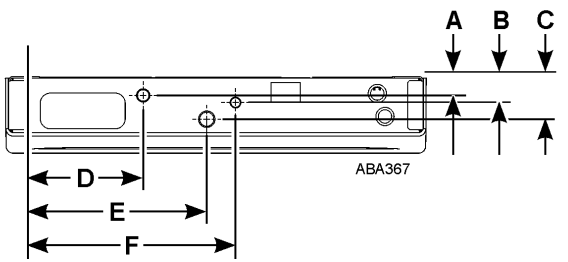
NOTE: A). 50 mm (2.00 in.) is approximate spacing between evaporator and truck side wall for 2590.8 mm (102.00 in.) wide truck with 376.2 mm (3.00 in.) walls. A narrow 2438 mm (96.00 in.) wide truck will allow only 25.4 mm (1.00 in.) spacing depending upon wall thickness.
B). Allow 50.8 - 101.6 mm (2.00 - 4.00 in.) space between the back of the evaporator to the truck wall.

The information above is only relevant to an application where an S-3 is used in one lane and another S-3 is used in the adjacent lane.

Remote Evaporator Dimensions - S-3



A	48.9 mm (1.93 in.)
B	67.4 mm (2.65 in.)
C	111.1 mm (4.37 in.)
D	298.6 mm (11.76 in.)
E	465.4 mm (18.32 in.)
F	541.6 mm (21.32 in.)

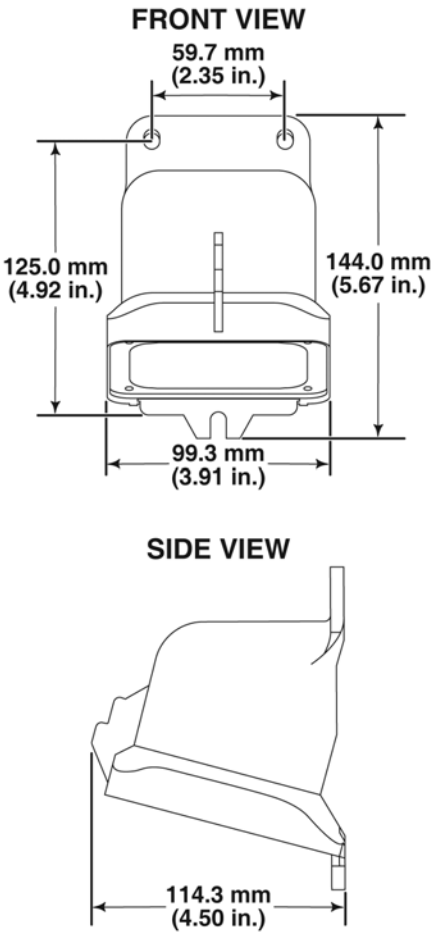


WEIGHT = 52 kg (115 lbs.)

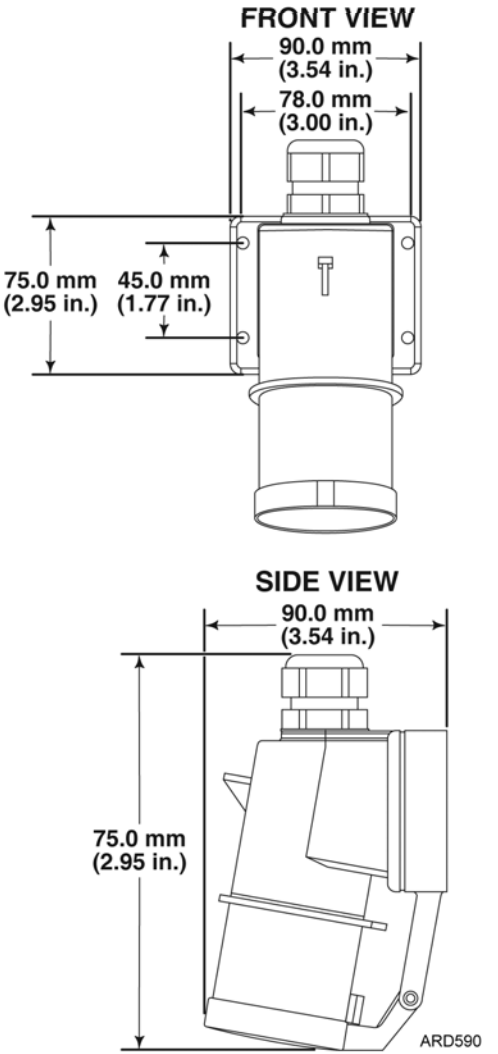
Reference: 1E02132 Sheet 2

Remote Power Receptacle Dimensions (OPTION)

NORTH AMERICAN MODELS

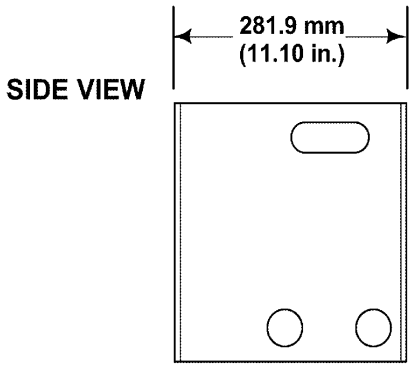


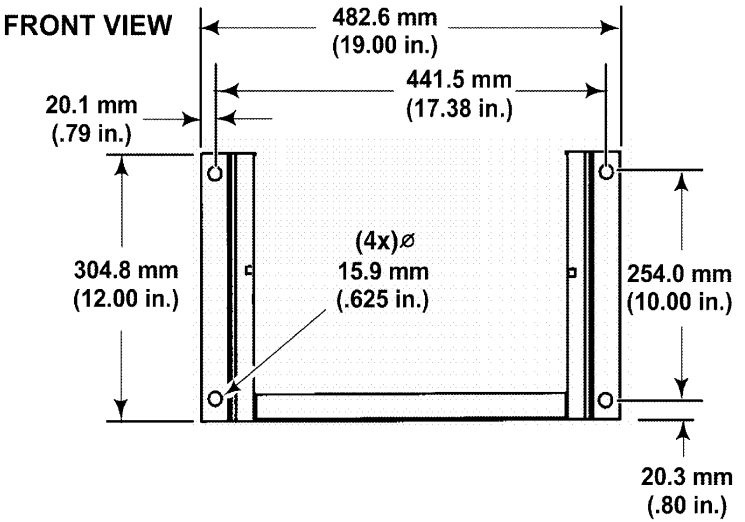
INTERNATIONAL MODELS



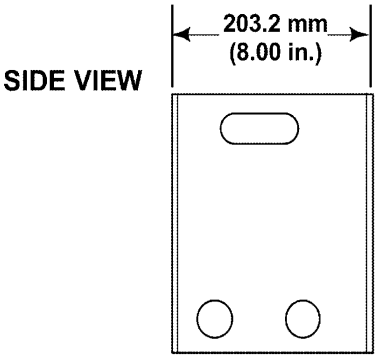
Battery Box Dimensions (OPTION)

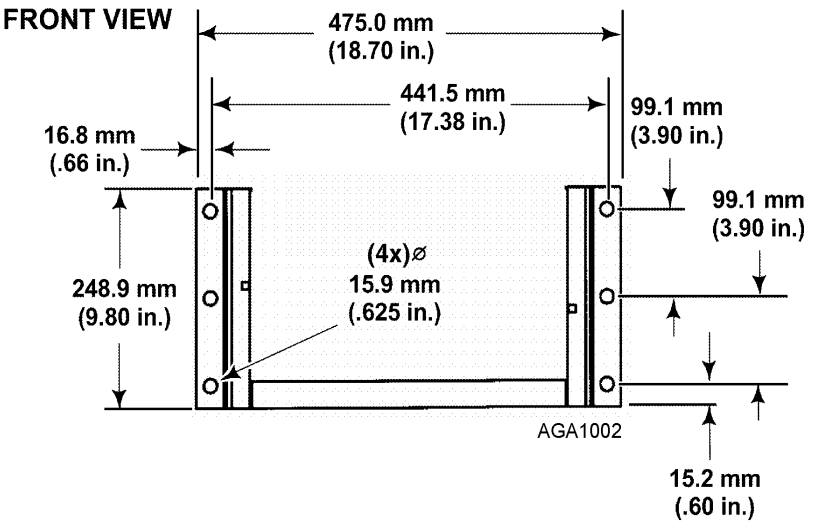
NORTH AMERICAN MODELS



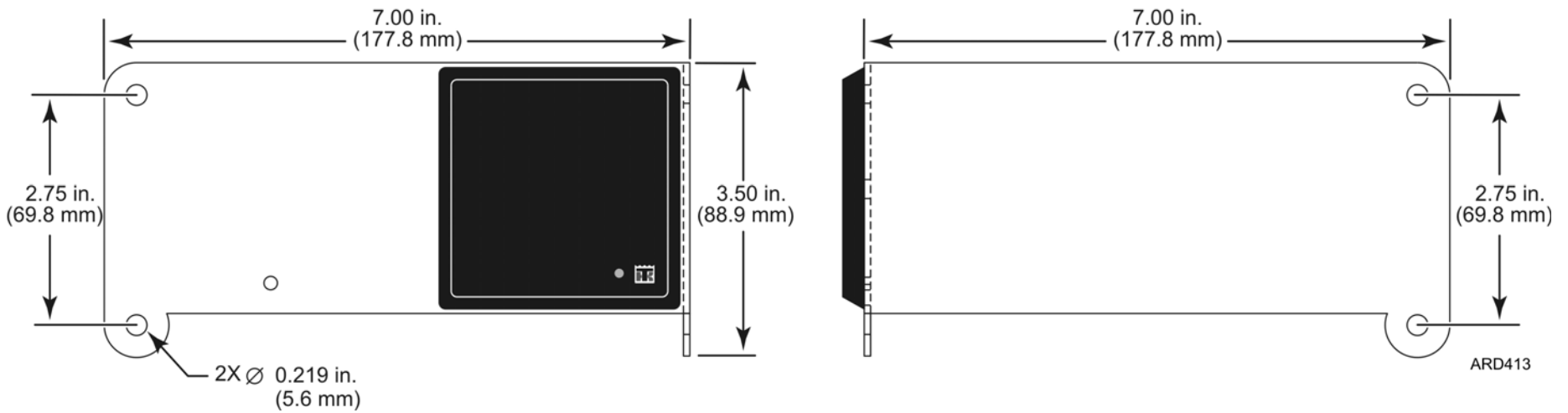


INTERNATIONAL MODELS

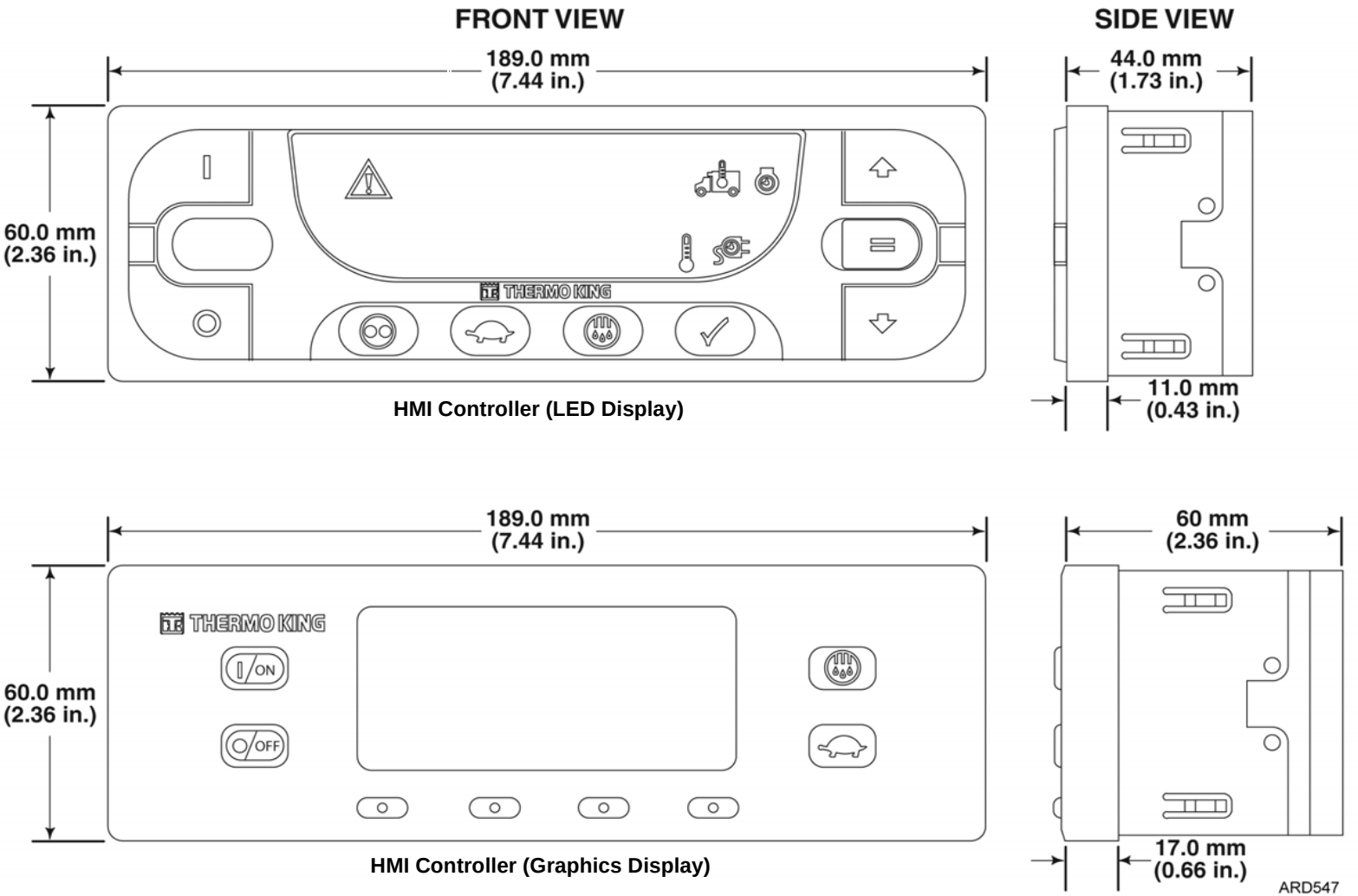




Remote Status Light Dimensions (OPTION)



HMI Dimensions



Important Installation Notes

Safety Precautions

- See “Safety Precautions” on pages 6 - 8 prior to installing and servicing this product.

Evaporator Location

- The best airflow is achieved when the evaporator is installed an equal distance from each side wall.
- It is recommended that moving bulkheads not be allowed closer than 1219 mm (48.00 in.) or 1 pallet from the evaporator outlet **(Detail A)**.
- The minimum clearance from the bottom of the evaporator to the top of the cargo should be 101 mm (4.00 in.) **(Detail A)**. ***NOTE: This minimum clearance is required under the fan intake area only and <u>does not</u> refer to the LOAD LINE.***
- The evaporator should be located a minimum of 51 mm (2.00 in.) from the truck wall **(Detail B)**.

Defrost Drains

- The evaporator must be properly mounted to provide a slope towards the drain. This is accomplished by adding one 3/8 in. and one 3/16 in. washers on the drain side and only one 3/8 in. washer on the other side at each mounting surface.
- Defrost drains must exit the evaporator at a 45° angle. Drains should be 267 mm (10.50 in.) from the evaporator to the truck ceiling **(Detail C)**.

Wall Drain Tube

- CPVC
- 1.00 in. ID (Internal Diameter)

Refrigerant Tubing and Electrical Wiring

- It is important to minimize the amount of time the refrigeration tubes are uncapped and open to ambient conditions. Always keep tubes capped until ready to connect and solder.
- Check tubes and copper fittings for obstructions prior to assembly.
- It is also required that nitrogen or another inert gas be used to purge the tubes while soldering. This prevents oxidation and formation of scale inside tubes.
- Use 35% silver solder for joining all remote refrigerant tubes.
- Insulate suction and hot gas lines.
- All refrigeration tubes should be secured by clamps every 600 mm (24.00 in.).
- All electrical harness should be secured by clamps or tie bands every 600 mm (24.00 in.).
- Only one trough (W = Wall and C = Ceiling) is required **(Detail D & E)**.
- All dual evaporator installations require two suction tubes.

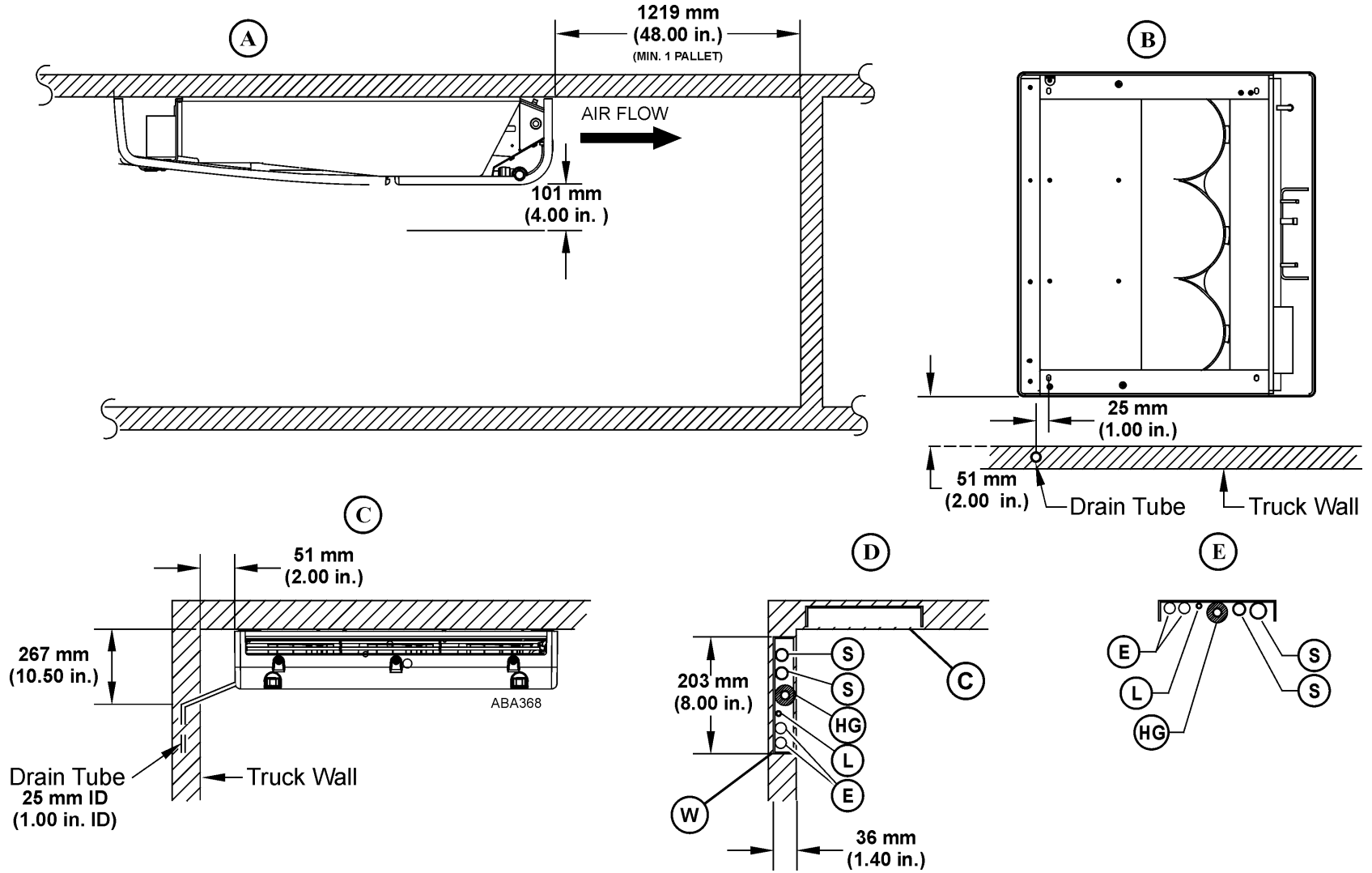
Door Switches

- Door switches automatically turn off remote evaporators when the corresponding door is opened. This avoids the entry of warm, moist air into the load space. Door switches are recommended for all multi-temp installations.

Door Curtains

- It is always recommended to use good quality insulated curtains on all doors to limit the amount of warm, moist air from entering the load space during door openings.

Important Installation Notes



Important Installation Notes

Defrost Drain Tube Connectors

IMPORTANT: Follow the instructions below to prevent defrost drain tube water leaks.

All Spectrum remote evaporators are equipped with a quick disconnect fitting that connects the drain pan to the drain tubes **(Detail I)**.

To properly install the tube make sure that the tube is **fully** inserted past the O-ring and up to the stop inside the coupler **(Detail II)**.

NOTE: The fitting will grip the tube before it seals with the o-ring.

When the tube is in the correct position the O-ring will seal and the teeth will grip the tube keeping it in place. Check the fit by pulling on the tube(s) to insure that it will not pull out of the fitting **(Detail III)**.

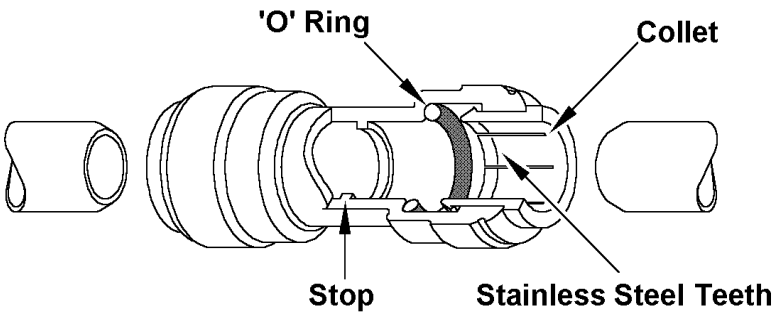
To disconnect the tube from the fitting: press the collet into the fitting. Hold the collect in place and pull the tube out. The fitting can be re-used. Clean any burrs off the tube before re-inserting it into the fitting **(Detail IV)**.

Evaporator Cap Plugs

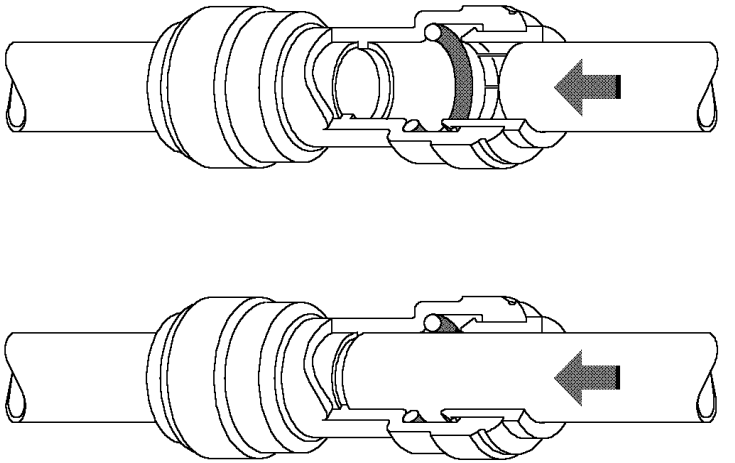
Cap plugs are provided to plug the two evaporator mounting access holes located directly above the drain pan. These plugs must be installed to prevent water in the drain pan from spilling out of these holes and into the cargo area. **See pages 124-125 and 127 for details.**

Important Installation Notes

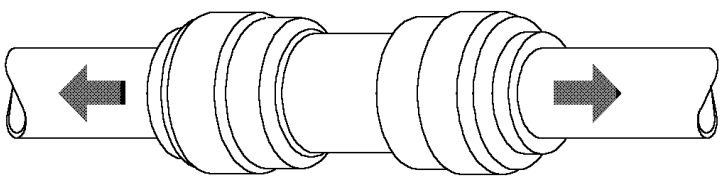
DETAIL I



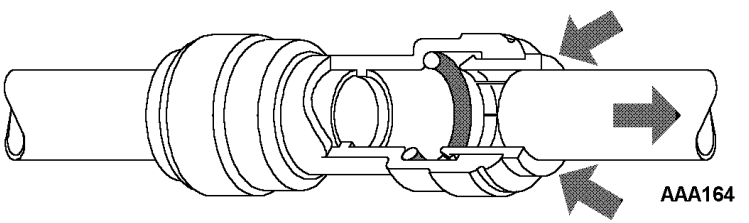
DETAIL II



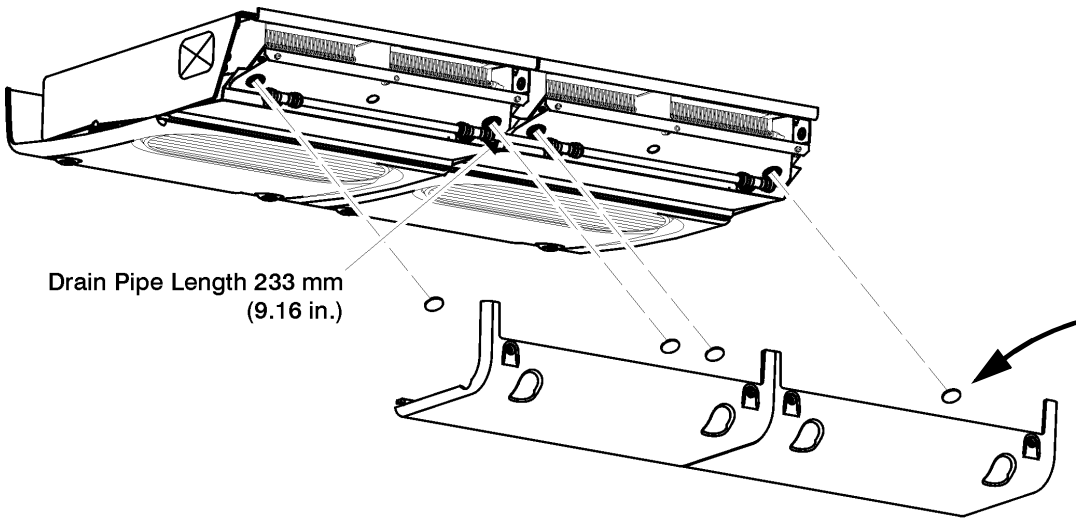
DETAIL III

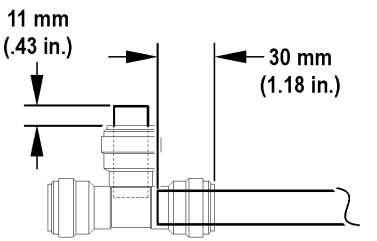


DETAIL IV

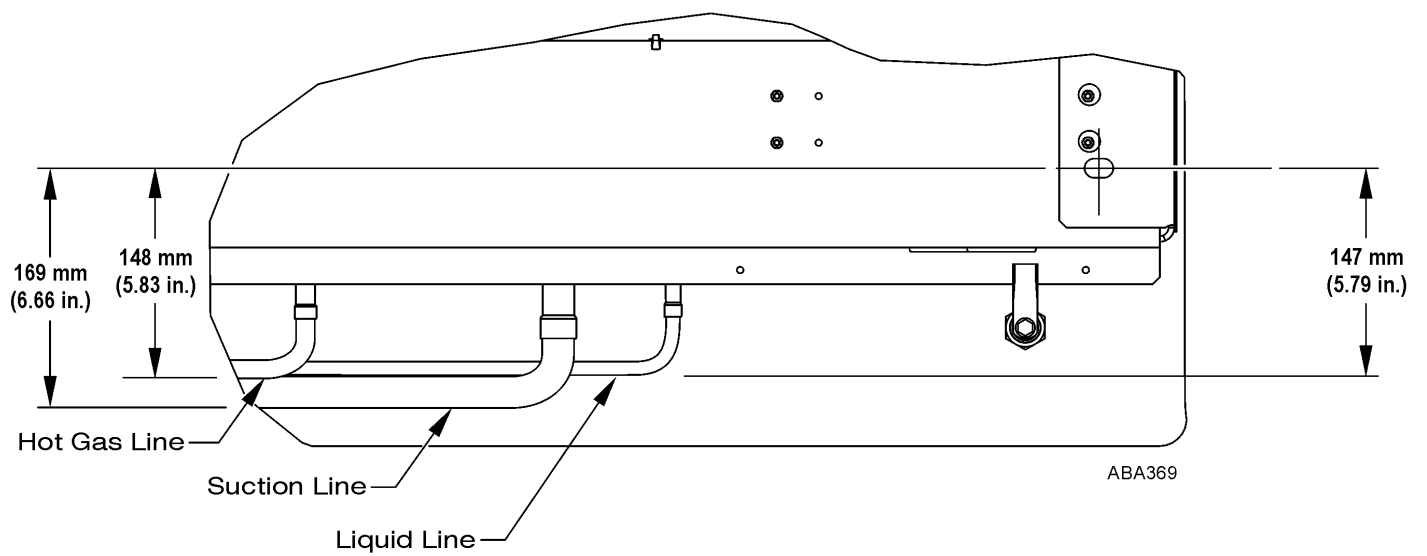


Important Installation Notes

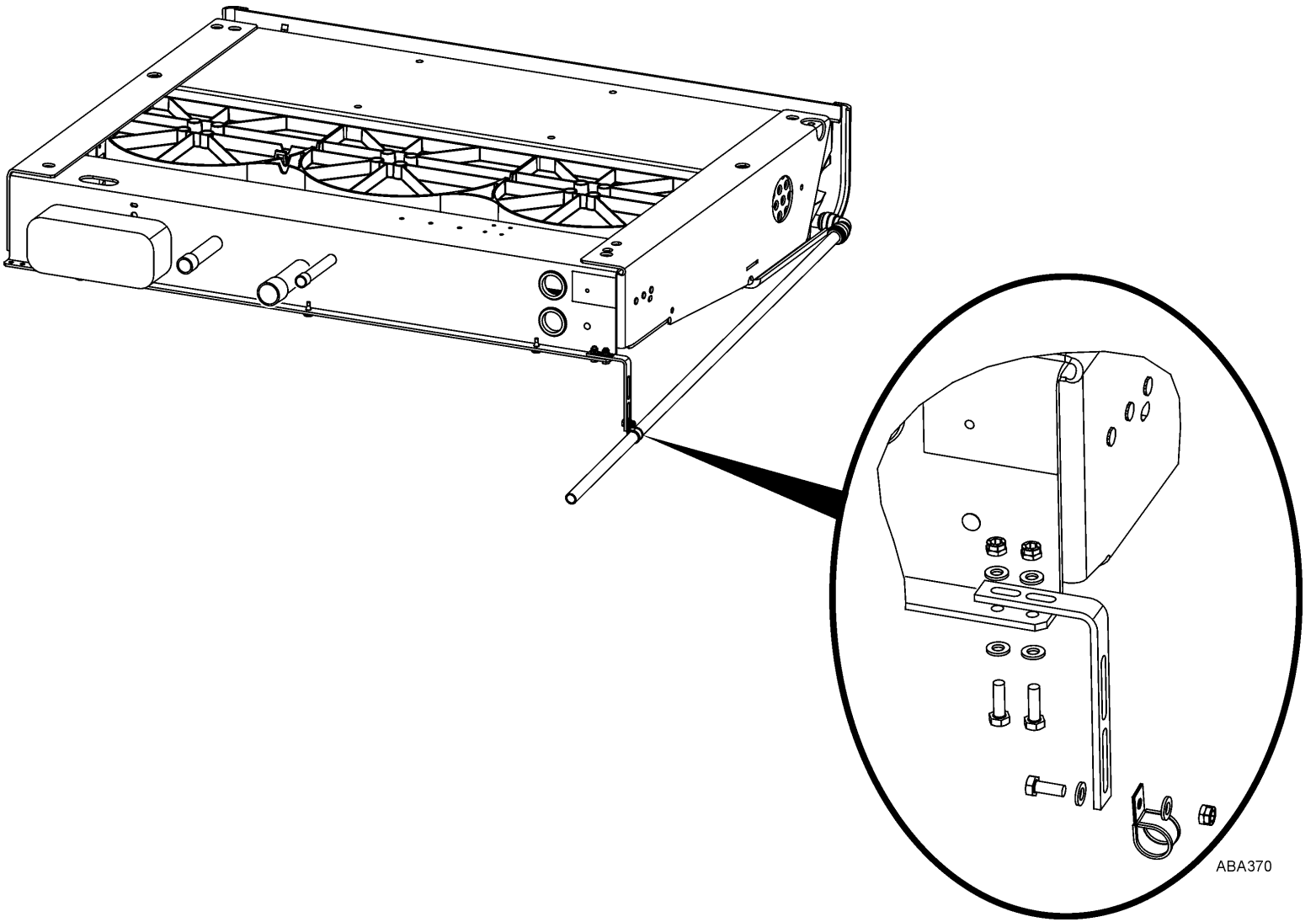




IMPORTANT: Supplied cap plugs (2 per evap) must be installed to prevent water in drain pan from spilling out of these holes and into cargo area.



Important Installation Notes



Lifting Bar Details

IMPORTANT: SPECTRUM T-600, T-600R, T-800, T-800R, T-1000, T-1000R, T-1080S and T-1200R series truck units require a new lifting bar. This new bar must be used to safely lift and install these series units. This new lifting bar can also be used to install earlier series truck units.

WARNING: Thermo King requires a 3 point lifting bar to safely lift and install units. A lifting bar can be made from the drawings provided.

WARNING: All hardware used to assemble the lifting bar must be DIN 931 class 10.9 (SAE Grade 8). The use of hardware other than specified may cause personal injury, severe damage to the equipment and void the warranty.

WARNING: Use forged clevis and pins, forged chain links and forged locking hooks with strength equal to total lift capacity of hoist mechanism and that meet all safety standards.

Lifting Bar Details

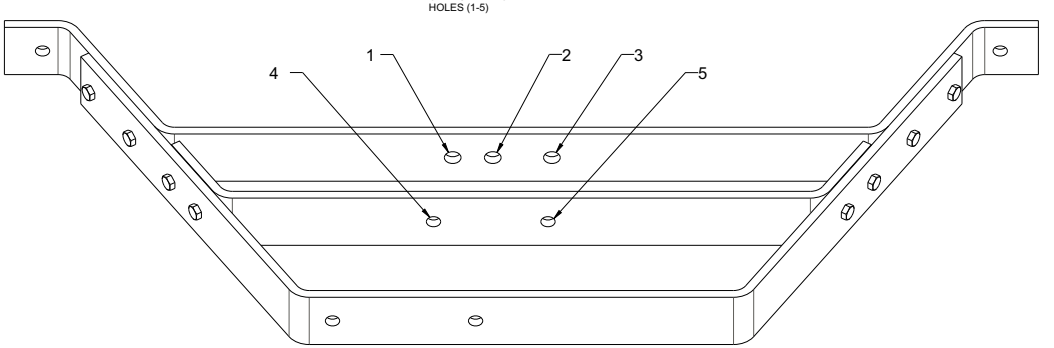
RELEASED 14/Jan/2013

UNIT TYPE	FRONT CHAIN LIFT HOLE LOCATION	ENTIRE UNIT CLEVIS LIFTING HOLE LOCATION
TS 200/300/500/600 - 30	LEFT HOLE	1
TS 200/300/500/600 - 50	LEFT HOLE	2
SPECTRUM TS	LEFT HOLE	4
MD II, MD 200, MD 300 - 30	RIGHT HOLE	1
MD II, MD 200, MD 300 - 50	RIGHT HOLE	2
KD II - 30	RIGHT HOLE	1
KD II - 50	RIGHT HOLE	2
RD II - 30	RIGHT HOLE	1
RD II - 50	RIGHT HOLE	2
T SERIES - 30/50	LEFT HOLE	3
T SERIES SPECTRUM	LEFT HOLE	5

REVISIONS

CHANGE ORDER	REV	DESCRIPTION	DATE	APPROVED
529536	F	MOVED LIFTING HOLES ALONG REAR BAR, ADDED BRIDGING BAR FOR SPECTRUM TS LIFTING POINT. ADDED WELD SYMBOLS, RE-LABLED ALL LIFTING POINTS.	18-Jun-08	M GILMAN
532334	G	ADDED LIFTING HOLES FOR NEW UNITS, ADDED BRIDGING BAR FOR MULTI-TEMPS.	25-Mar-09	M GILMAN
539147	H	DIM 17.22 WAS 16.42. DIM 11.12 WAS 10.42. ADDED TSERIES SPECTRUM VIEW	20-Jan-10	E KIRBY
543699	I	CHG DRAWING AND VIEWS, MOVED HOLES 1-6, ADDED TABLE FOR ALL TRUCK UNITS.	14-Jun-10	M GILMAN
665985	J	REMOVED CHAINS, BOLTS FROM VIEW SHT 1. DEL NOTE 2.	27-NOV-12	J.DAVIES

ENTIRE UNIT
CLEVIS LIFTING
HOLES (1-5)



NOTES:
2. ~~USE TWO CHAIN LINKS WITH A CHAIN LINK MASTER AS SHOWN.~~
3. USE THREE FORGED CLEVIS AND PINS TO ATTACH LIFTING CHAINS.
4. EACH ASSEMBLY MUST HAVE STRENGTH EQUAL TO MINIMUM OF 1.5 TIMES THE WEIGHT OF THE HOIST AND MEET ALL SAFETY STANDARDS.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. INTERPRET DIM AND TOL PER ASME Y14.5M - 1994

THIRD ANGLE PROJECTION

FINISH -

CAD GENERATED DRAWING
DO NOT MANUALLY UPDATE
UNLESS OTHERWISE SPECIFIED TOLERANCES ON DIMENSIONS PER 70-0070

DRAWN	JO	1/20/88
CHECKED	TB	6/15/90
APPROVED	RL	6/15/90
ENG APPVL	-	-

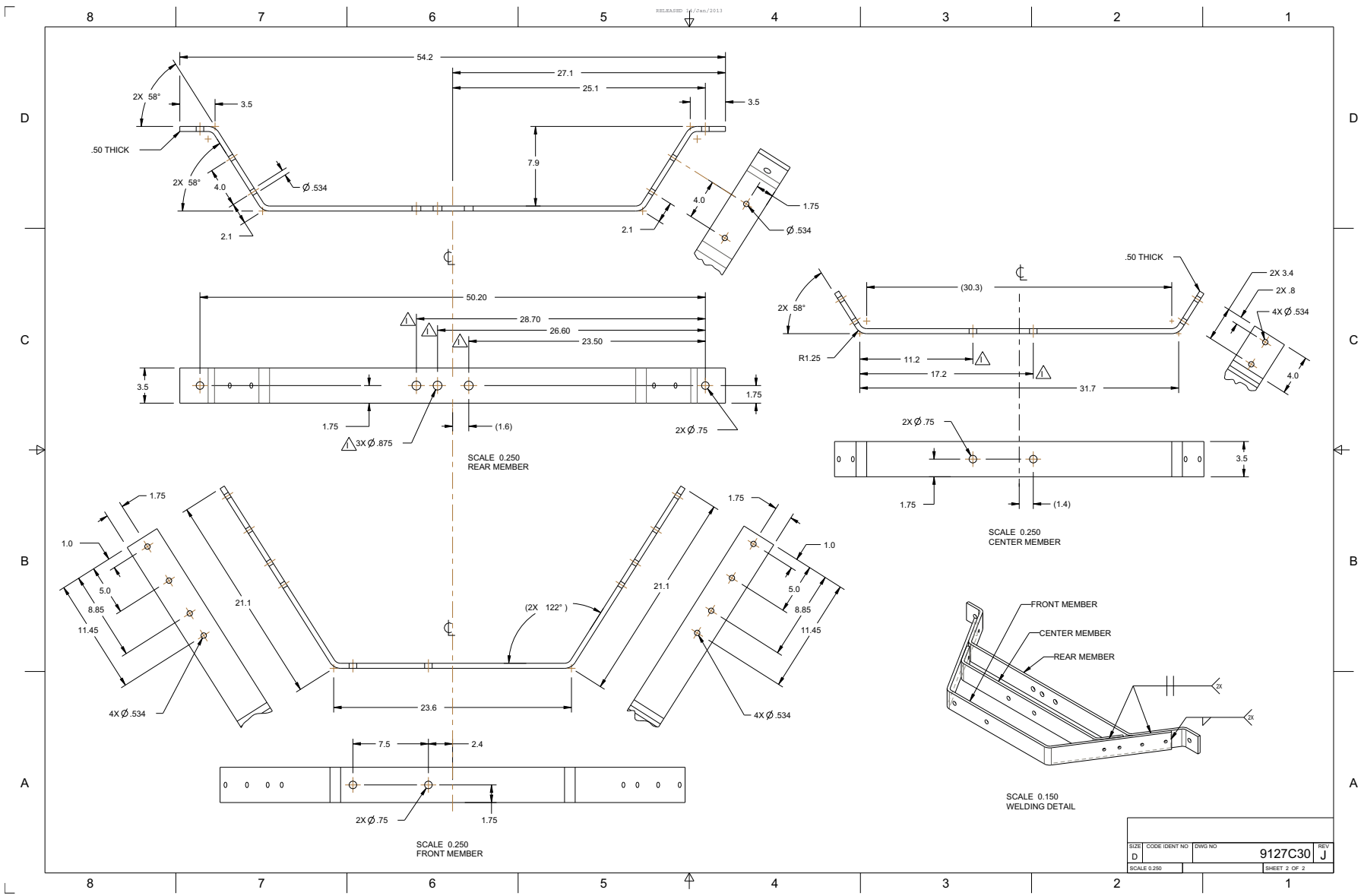
Ingersoll Rand. Thermo King

TITLE
DIAGRAM-LIFTING BAR ASS'Y
FOR SELF-POWERED
LARGE TRUCK

SIZE	CODE IDENT NO	DWG NO	REV
D		9127C30	J

SCALE 0.250 SHEET 1 OF 2

Lifting Bar Details



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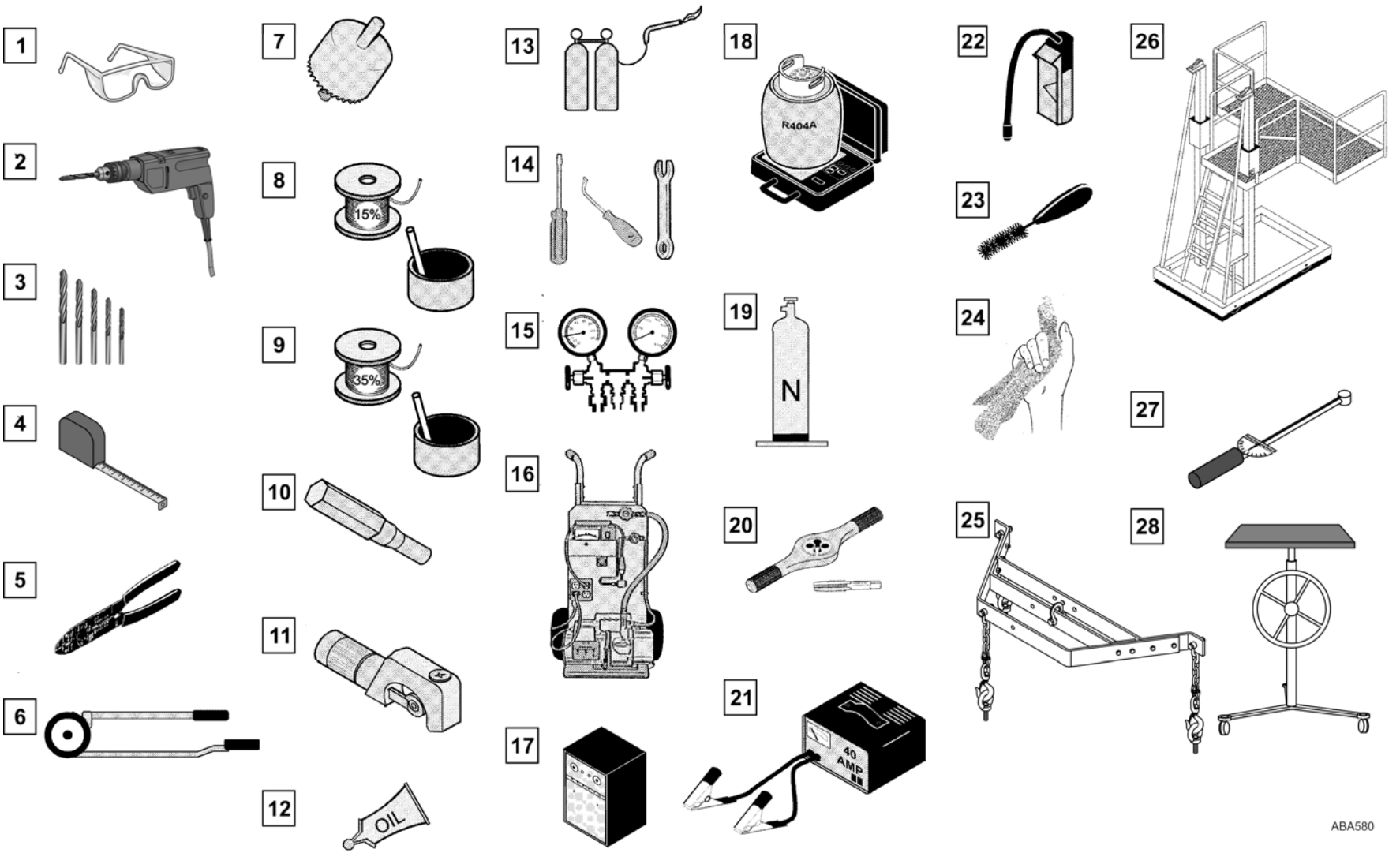
Required Tools

1. Safety Glasses
2. Drill
3. Drill Bits
4. Tape Measure
5. Wire Crimpers
6. Tube Benders
7. Hole Saw
8. 15% Solder & Flux (copper to copper)
9. 35% Solder & Flux (copper to brass)
10. Swage
11. Tubing Cutter
12. Refrigerant Oil
13. Torch Set
14. Mechanics Tools
15. Manifold Set
16. Evacuation Station
17. Reclaiming Station
18. Refrigerant & Scale
19. Dry Nitrogen
20. Tap and Die Set
21. Battery Charger
22. Electronic Leak Detector
23. Tubing Brushes
24. Scotch Brite Pads
25. 3 Point Lifting Fixture with forged clevis and pins, forged connecting links and forged locking hooks.
26. Work Platform (Recommended)
27. Torque Wrench
28. Mechanical Lift

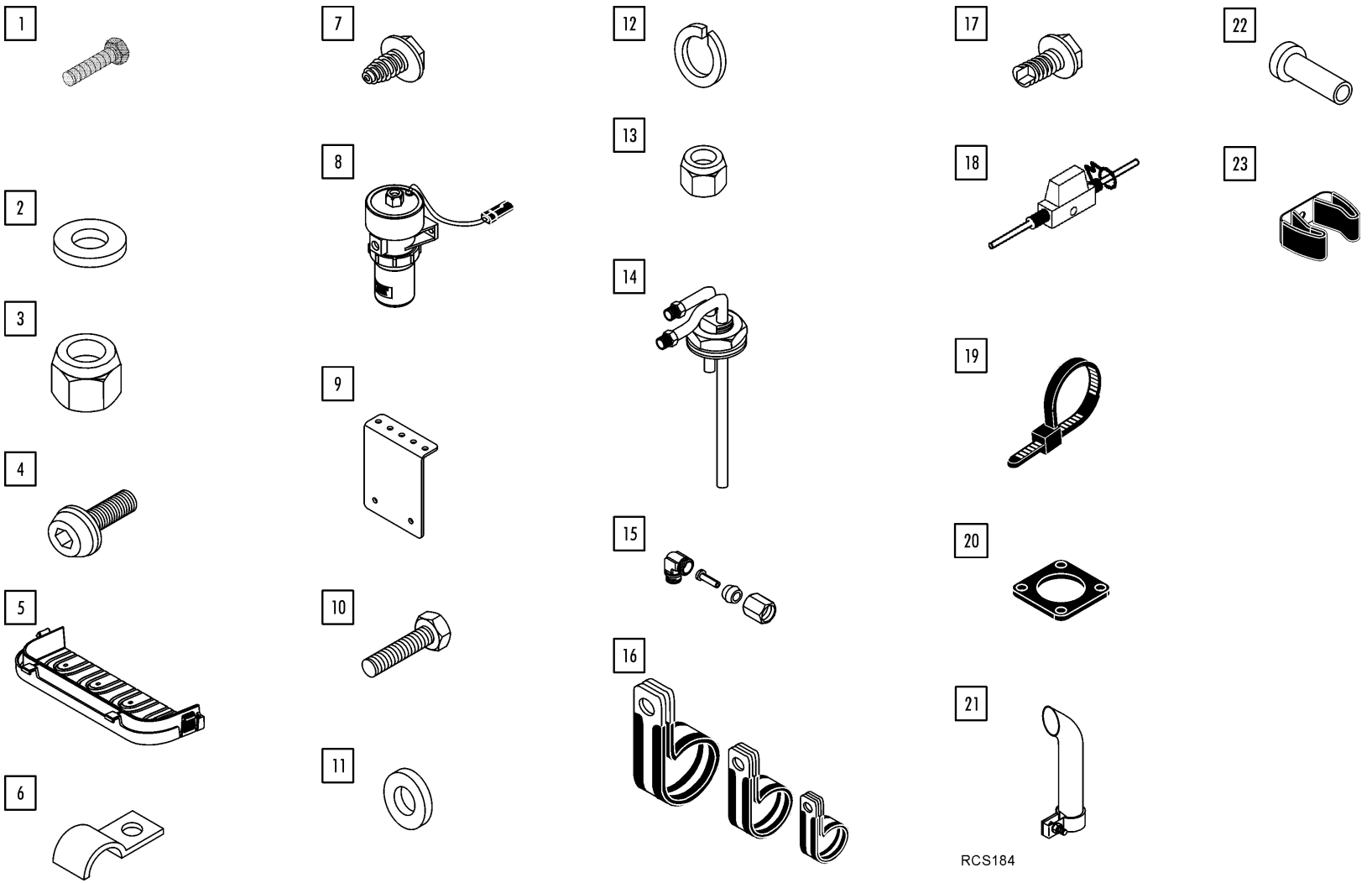
Required Tools



Condensing Unit Installation Components

1. T-Bolts (International Models Only)
2. Unit Mounting Washers
3. Locking Nuts 1/2-13
4. M6 Torx Head Screws
5. Hose Management Caps
6. Hold Down Clamps
7. Self Tapping Screws #14
8. Fuel Pump
9. Fuel Pump Bracket
10. Screws HH 1/4-20 SS
11. Flat Washers 1/4-20 SS
12. Lock Washer 1/4 SS
13. Locking Nuts 1/4-20 SS
14. Fuel Pickup Tube
15. Fuel Hose Fittings
16. Insulated Clamps
17. Self Tapping Screws #10
18. In-Line Fuse Holder
19. Muffler Gasket
20. Exhaust Tube Extension
21. Nut-Blind
22. Oil Drain Hose Retainer

Condensing Unit Installation Components



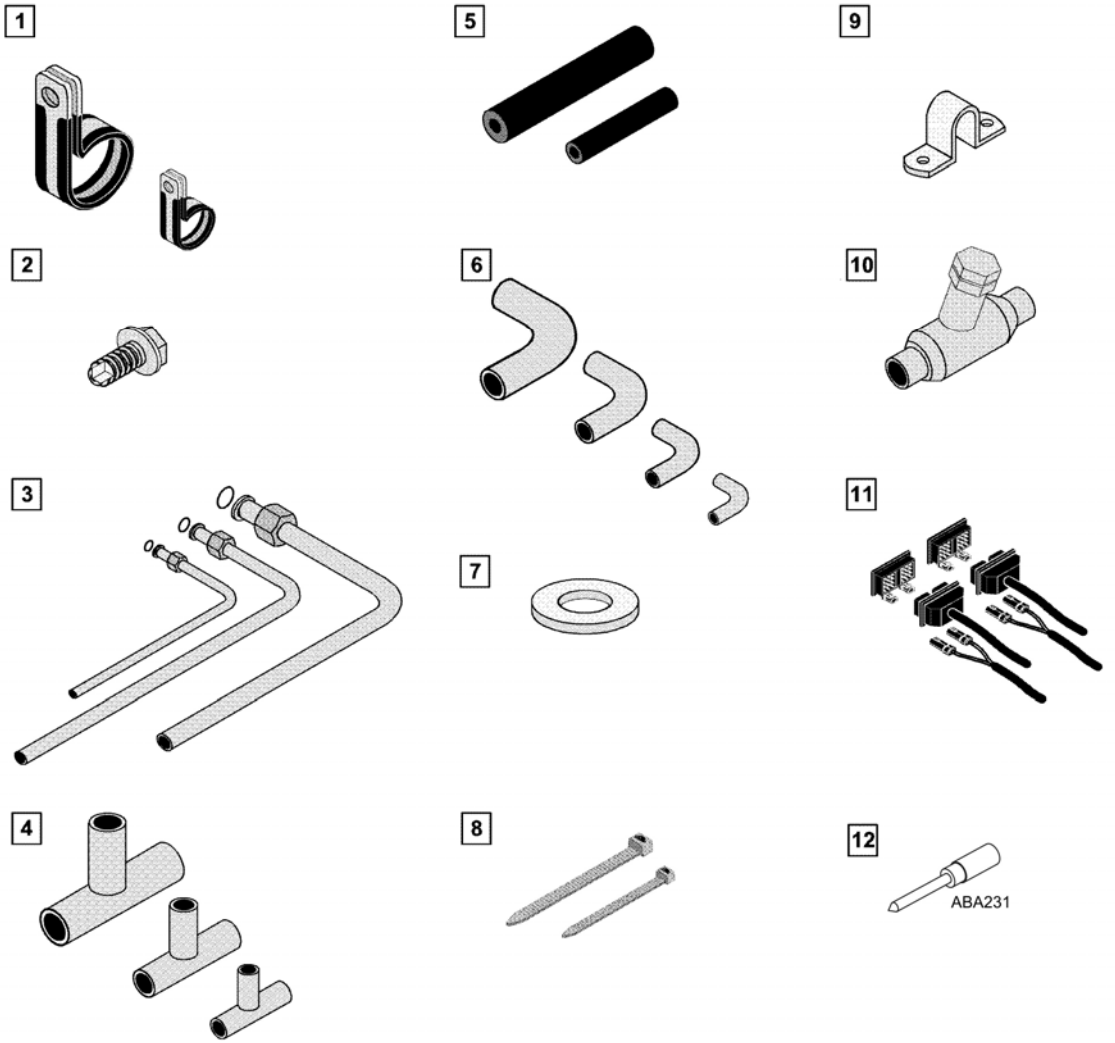
Evaporator Installation Components

Components Shipped with Condensing Unit

1. Insulated Clamps
2. Screws Self-tapping
3. Pre-Bent Tubes and ORS Fittings
4. Copper Tees
5. Tube Insulation
6. Copper Elbows
7. Mounting Spacers
8. Cable Ties
9. Clamps
10. Check Valves
11. Electrical Harnesses
12. Terminal Sockets (Gold 18 Ga.)

Evaporator Installation Components

Components Shipped with Condensing Unit



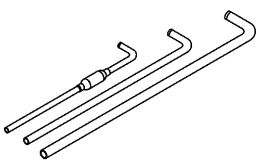
Evaporator Installation Components

Components Shipped with S-2 or S-3 Evaporators

1. Pre-Bent Tubes
2. Pre-formed Drain Hose
3. Hose Clamps
4. Water Drain Pipe
5. Water Drain Elbows
6. Terminal Forks
7. Terminal Rings
8. Refrigeration Oil
9. Mounting Spacers (3 sizes)
10. Locking Nuts 1/2 -13
11. Washer 1/2”
12. Washer 3/8”
13. Locking Nuts M10
14. Cap Plug
15. Tubing Clamp
16. Screws 1/4-20
17. Flat Washers 1/4”
18. Locking Nuts 1/4-20
19. Copper Elbows

Evaporator Installation Components

Components Shipped With S-2 or S-3 Evaporators

1 

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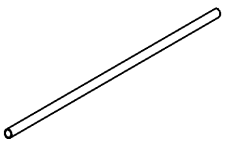
4 

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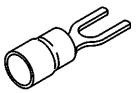
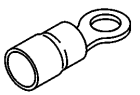
6 

7 

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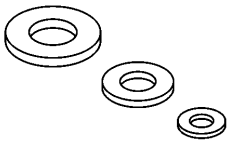
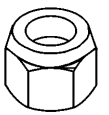
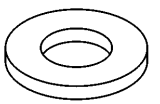
9 

10 

11 

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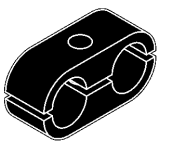
15 

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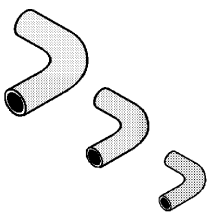
19 

ABA233

Uncrating the Condensing Unit

Important Unit Lifting Information

NOTE: The T-600, T-600R, T-800, T-800R, T-1000, T-1000R, T-1080S, T-1200R and T-1280R series truck units require a new lifting bar. This new bar must be used to safely lift and install these series units. See "Lifting Bar Details" on page 32.

WARNING: Thermo King requires a 3 point lifting bar to safely lift and install units. A lifting bar can be made from the drawings provided. See "Lifting Bar Details" on page 32.

WARNING: Use forged clevis and pins, forged chain links and forged locking hooks with strength equal to total lift capacity of hoist mechanism and that meet all safety standards.

WARNING: Installer supplied lifting eyebolts must be forged steel, 12 mm, 1.75 pitch, minimum 20.5 mm long. Substitutions are not acceptable!

WARNING: Use only locking lifting hooks to attach to the lifting eyebolts (Detail A).

WARNING: The point shown in Detail B below is not a major lifting point. It is used only to level and balance the unit during installation (Detail B).

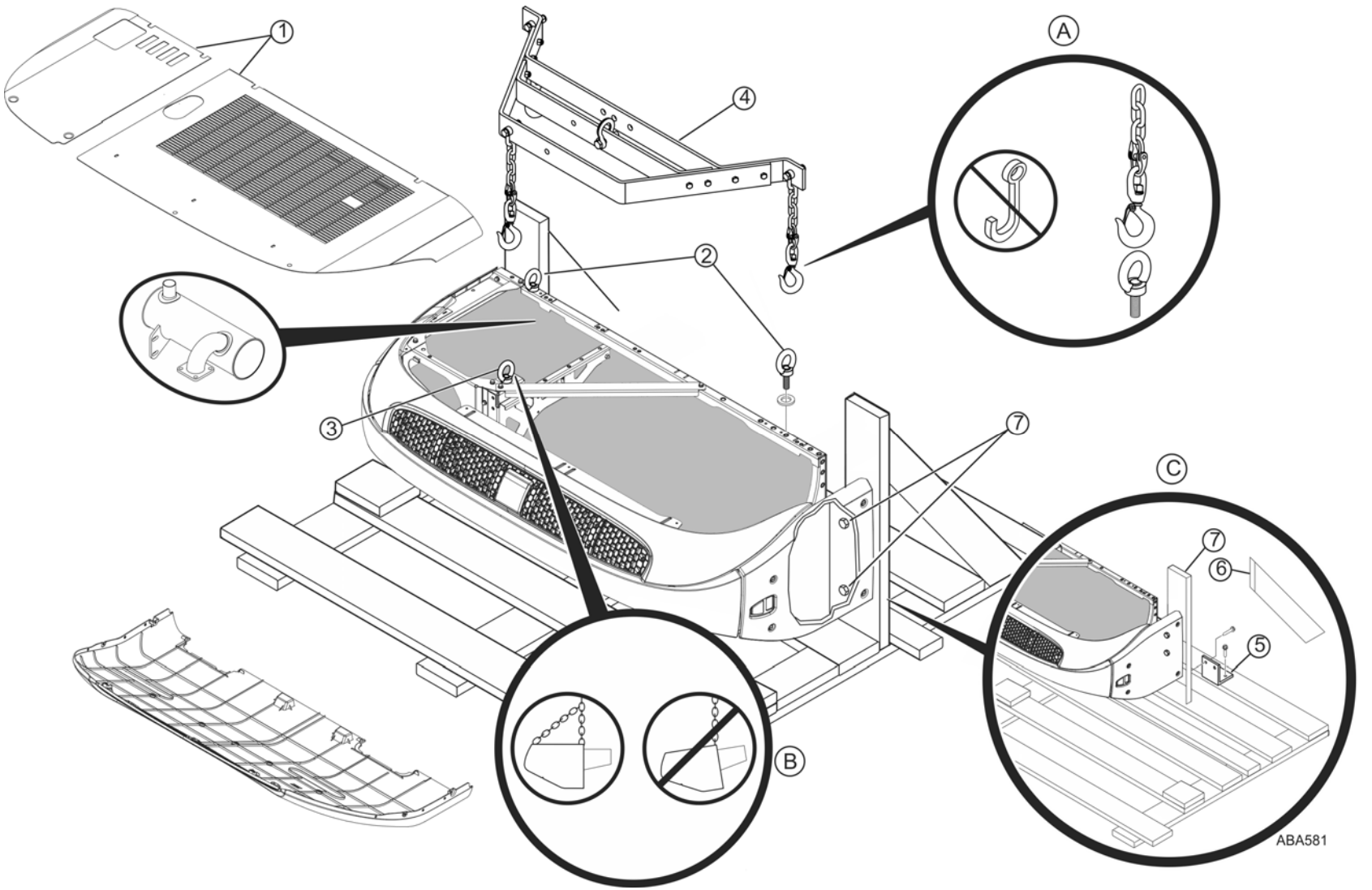
Uncrating the Unit

Carefully remove the top and side crate member and remove the bottom panel and installation kit components shipped loose with the unit.

1. Remove the top covers, top screen (if equipped) and the muffler from the unit.
2. Install two M12 eyebolts and washers into the lifting holes in the rear frame rails, and tighten securely. ***NOTE: M12 eyebolts must be used as M12 nuts are factory installed inside the rear frame channel.***
3. Install a third M12 eyebolt, washer and locking nut into the provided hole in the support channel as shown and tighten hardware securely.
4. Attach the new three point lifting bar securely to the three eyebolts and ***slightly*** raise the unit.
5. Remove the eight skid bracket screws securing the unit to the of the crate **(Detail C).**
6. Remove the two rear members of the crate and raise the unit from base approximately 304.8 mm (12.0 in.) **(Detail C).**
7. Remove the four mounting bolts securing the two upright members to the unit **(Detail C).**

The unit is now ready to install.

Uncrating the Condensing Unit



Installing the Condensing Unit

Important Unit Lifting Information

NOTE: The T-600, T-600R, T-800, T-800R, T-1000, T-1000R, T-1080S, T-1200R and T-1280R series truck units require a new lifting bar. This new bar must be used to safely lift and install these series units. See "Lifting Bar Details" on page 32.

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WARNING: Use only locking lifting hooks to attach to the lifting eyebolts (Detail A).

WARNING: The point shown in Detail B below is not a major lifting point. It is used only to level and balance the unit during installation (Detail B).

NOTE: The T-600, T-600R, T-800, T-800R, T-1000, T-1000R, T-1080S, T-1200R and T-1280R series truck units have dual mounting hole patterns in the frame.

- ***T-600, T-600R, T-800 and T-800R use the lower dual mounting hole patterns.***
- ***T-1000, T-1000R, T-1080S, T-1200R and T-1280R use the upper mounting hole patterns.***

Installing the unit

NOTE: The muffler must not be installed before mounting the unit.

1. Use the new 3 point lifting bar to carefully lift the unit up to the truck opening.
2. Install four M12 (1/2-13 in. Grade 5) mounting bolts through the wall of the truck box.

NOTE: The mounting bolts should protrude 73.3 mm (2.90 in.) full thread from the front wall of the cargo box (Detail B). Carefully slide the unit into the opening and over mounting bolts.

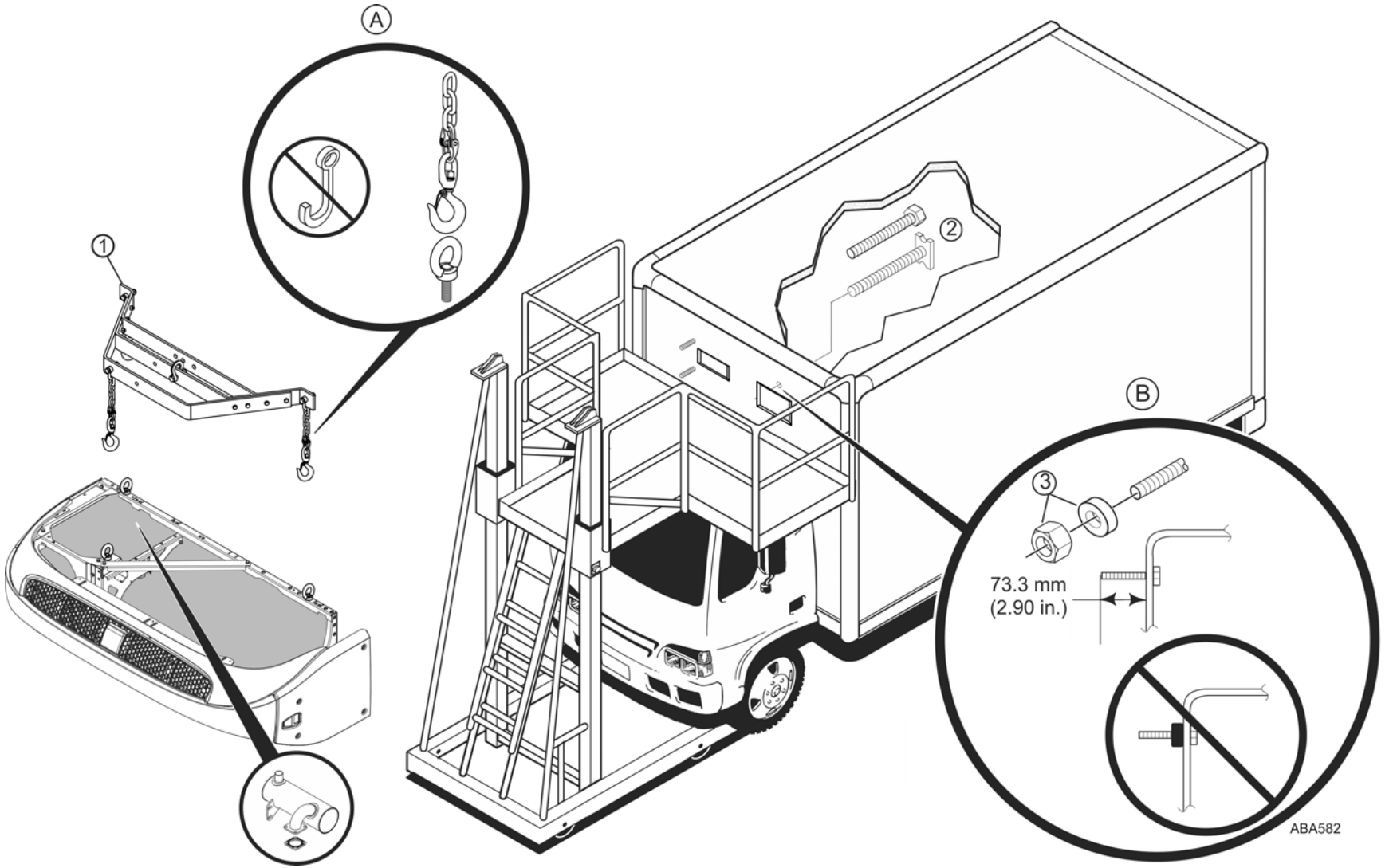
IMPORTANT: DO NOT INSTALL ANY COMPRESSIBLE WASHERS OR OTHER MATERIALS BETWEEN THE UNIT AND THE TRUCK!

3. On the inside of the unit frame, install the four 4.8 mm (0.188 in.) mounting washers and the locking nuts provided in the installation kit.
   - Torque the mounting hardware to 81.4 N•m (60 ft. lbs.).
   - Disconnect and remove the lifting bar.

NOTE: Depending on your particular installation, excess threads of the upper roadside unit mounting bolt may need to be cut off to prevent interference with the muffler.

4. Reinstall the muffler and the new gasket supplied in kit onto the engine.
   - Torque the muffler mounting bolts to 18.4 N•m (13.6 ft. lbs).
   - Install the exhaust pipe onto the muffler and tighten securely.
5. Remove and save the three M12 eyebolts installed earlier.
6. Reinstall the top cover or screen (if applicable) securely.
7. Install the bottom pan securely using the supplied M6 Torx head mounting hardware.

Installing the Condensing Unit



Installing the Hose Management Caps

Hose Management Caps (STANDARD)

Hose management caps provide a exit point under each side of the unit for routing the individual fuel lines and electrical cables. The caps are provided with cutout guide marks. Always remove any sharp edges after cutting the caps.

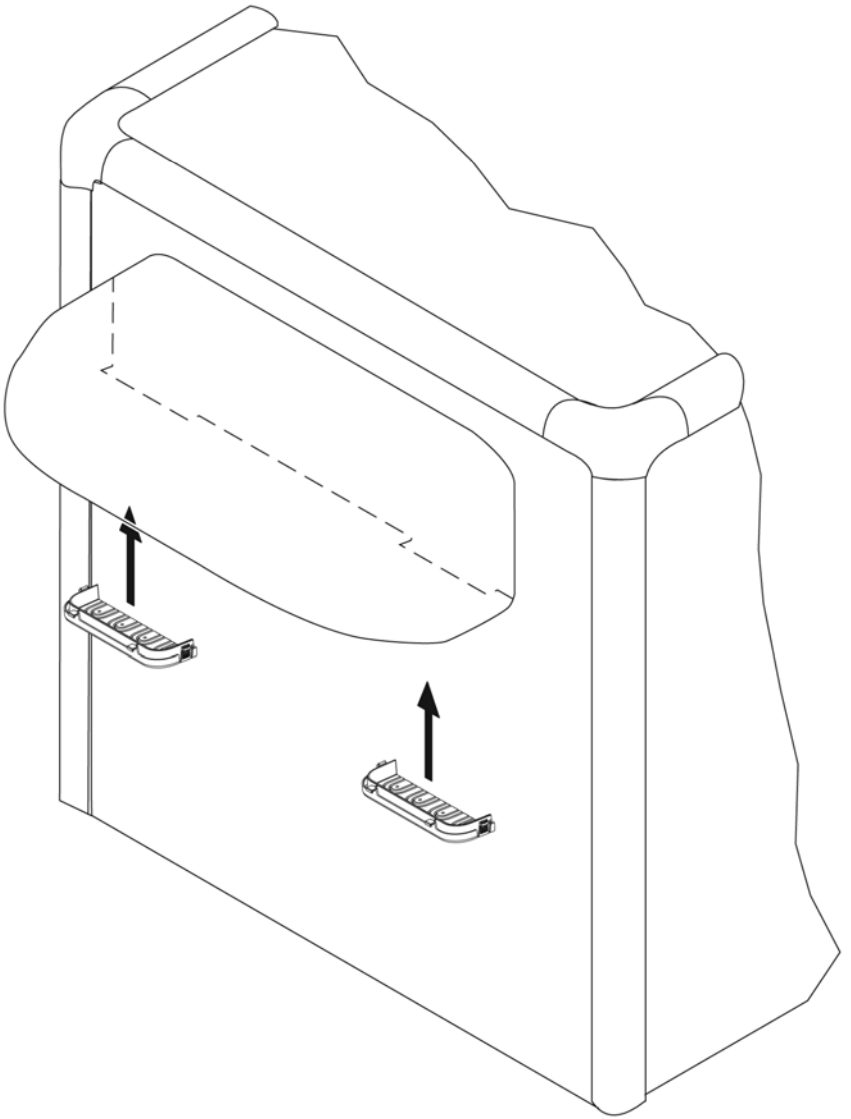
Roadside Cap

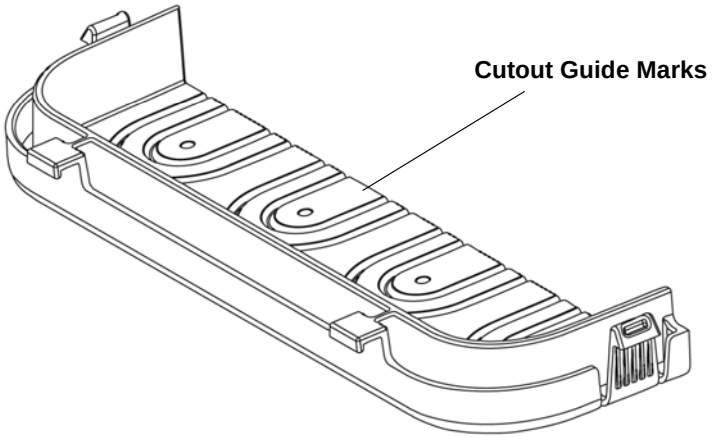
1. Route the following items out of the roadside cutout of the bottom pan and down the front exterior wall of the cargo box:
   - In-Cab Controller Harness
   - Remote Receptacle Power Cable (Model 50 Units Only)

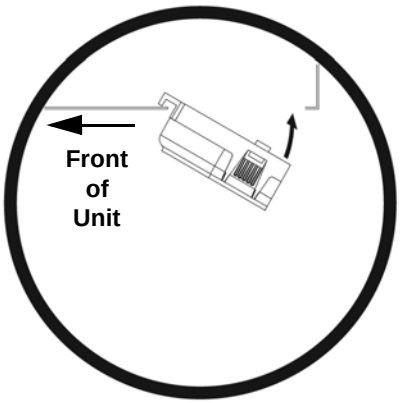
Curbside Cap

2. Route the following items out of the curbside cutout of the bottom pan and down the front exterior wall of the cargo box:
   - Coolant Overflow Hoses (2)
   - Fuel Supply and Return Lines (2)
   - Positive and Negative Battery Cables (2)
   - Unit Control Power Wire
   - Fuel Pump Harness
   - Oil Drain Hose (See “Securing the Oil Drain Hose” on page 52).
3. Trim the cutout areas on the caps as required.
4. Install each cap securely into the bottom pan.

Installing the Hose Management Caps







ARD549

Installing the Hose Management System (OPTION)

Hose Management System (OPTION)

The hose management system organizes the routing of the electrical cables and fuel lines down the truck wall. White plastic covers protect these components from damage while providing a cleaner, finished installation.

The kit consists of a funnel cap, clip assemblies, straight covers and mounting hardware. Additional kits with offset covers are also available.

IMPORTANT: See "Securing the Oil Drain Hose" on page 52.

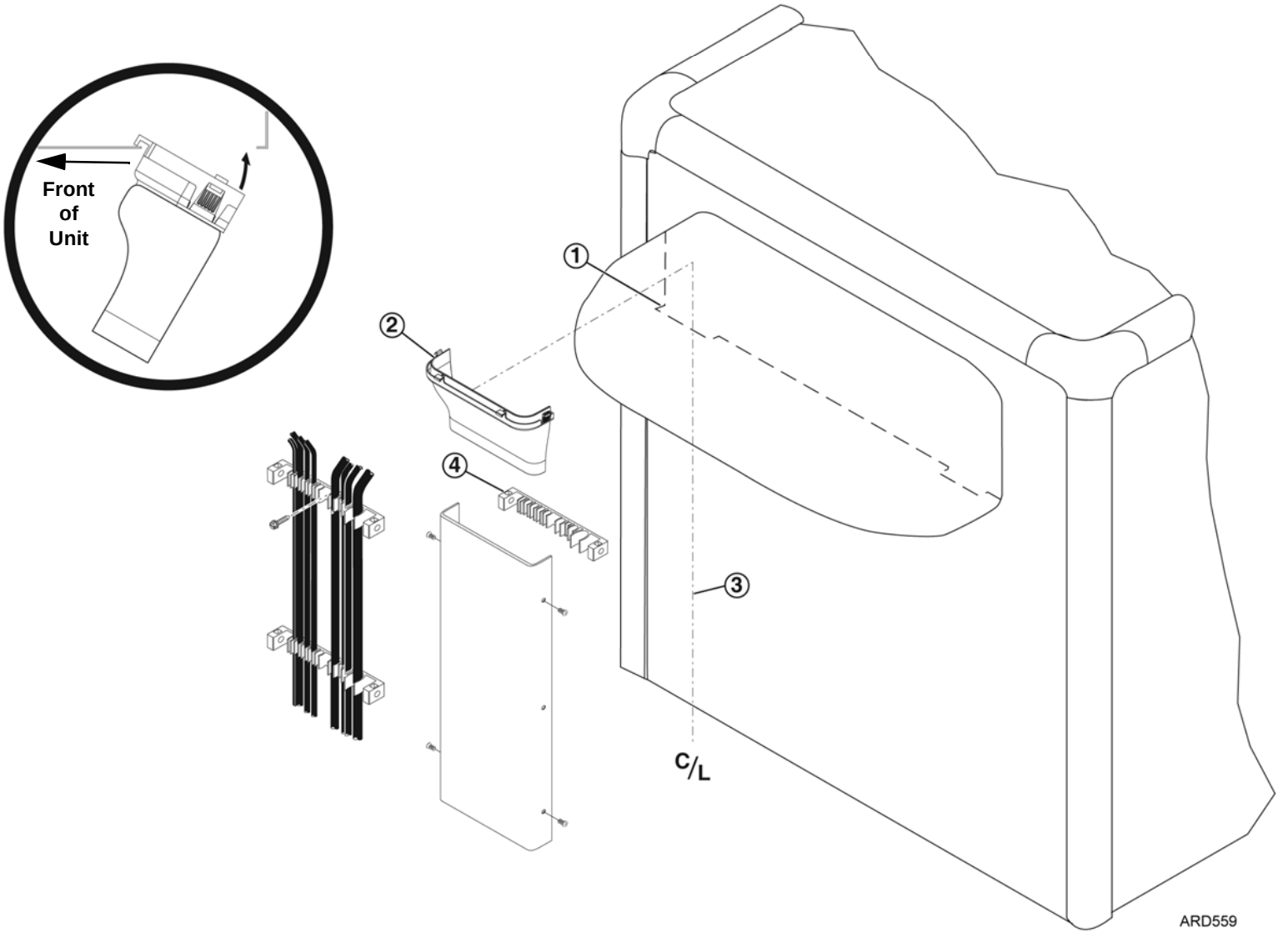
1. Route the following items out of the curbside cutout of the bottom pan and down the front exterior wall of the cargo box:
    - Engine Overflow Hose
    - Fuel Supply and Return Lines
    - Positive Battery Cable
    - Unit Control #2 Power Wire
    - Fuel Pump Harness
    - Negative Battery Cable
2. Install the funnel cap into the bottom pan securely.
3. Mark a line from the center of the funnel cap down the truck box wall.
4. Install two clip assemblies onto each cover with supplied hardware.
    - Insure the surface area of the truck box is clean, flat and uniform.
    - Clean the surface area thoroughly with 50:50 mixture of isopropyl and water.
    - Peel the backing off the adhesive strips. Using the center line, position the covers and press firmly into position.
    - Remove the covers from the clips.

NOTE: If adequate bond was not possible, attach the clips securely with self-drilling screws.

5. Route and install the hoses and cables in the clips as shown.
6. Reinstall the covers securely.
7. Installation on the roadside is similar.

NOTE: For 50 Models ONLY. Route the standby power cable down the center of the clip assemblies.

Installing the Hose Management System (OPTION)

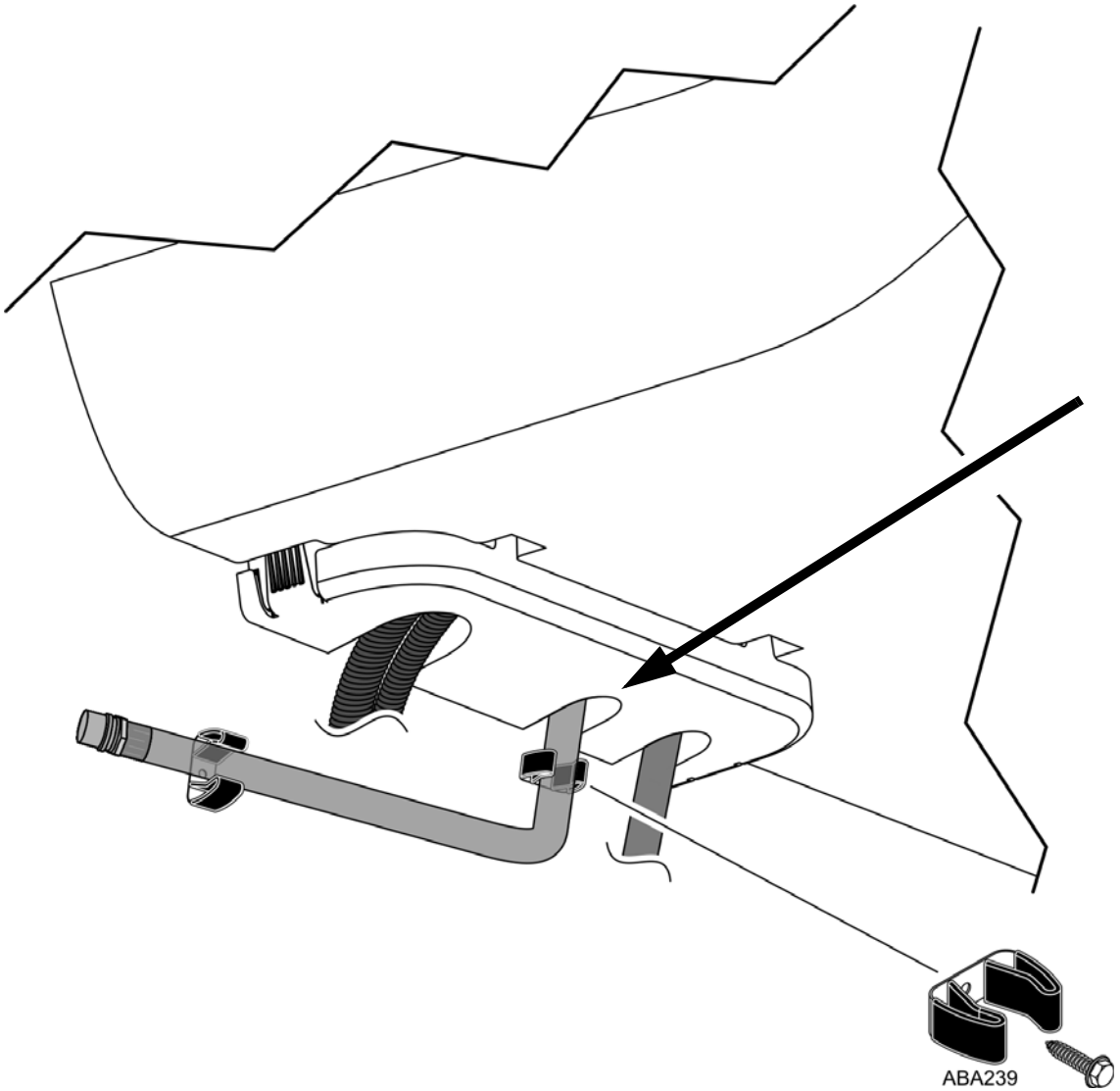


Securing the Oil Drain Hose

Oil Drain Hose

1. Secure the oil drain hose directly under the unit to the cargo box with the two supplied retaining clips and self tapping screws as shown.
2. Ensure there is no contact and adequate clearance between the oil drain hose and the hose management caps. The cutout in the hose management cap should be as large as possible with no sharp edges.
3. Lower retaining clip should be positioned in an location easily accessible for servicing the unit. Your actual location will depend on the distance between the bottom of unit to top of cab, etc.

Securing the Oil Drain Hose



The cutout in the hose management cap should be as large as possible with no sharp edges.

Installing the Fuel Pickup Tube Into a Steel or Aluminum Tank

NOTE: The fuel pickup tube supplied in the installation kit will not be needed when installing an optional Thermo King aluminum fuel tank. The aluminum tank is already equipped with fuel inlet, fuel outlet and vent fittings.

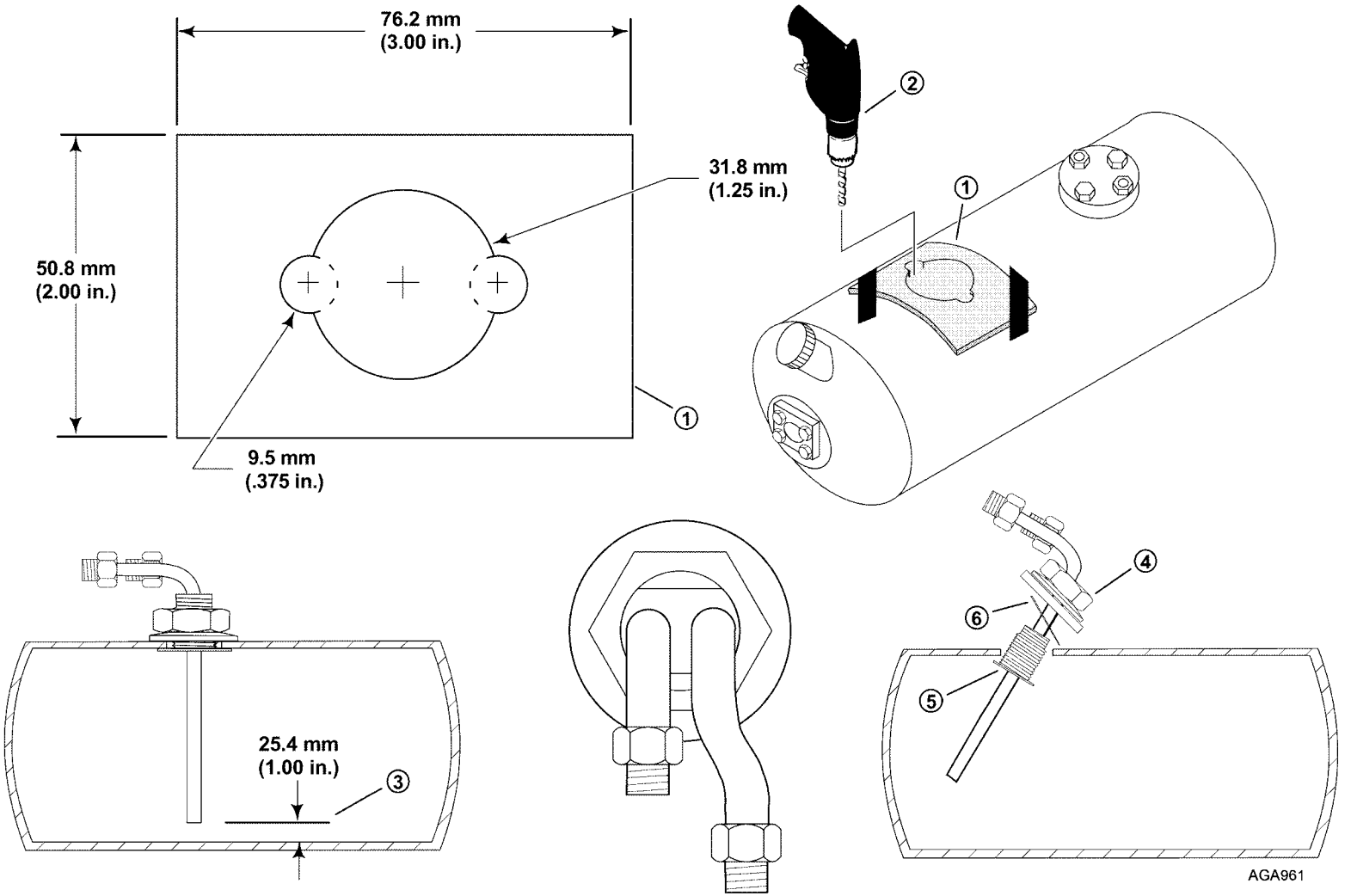
DANGER: Diesel fuel vapors are potentially explosive. Use extreme caution when drilling in or around the diesel fuel tank. Sparks from an electric drill or drill bit could cause an explosion. Do not smoke while working near the diesel fuel tank. Drain all diesel fuel from the tank and use nitrogen or an inert gas to purge the diesel fuel vapors from the tank prior to drilling. Keep the diesel tank filled with inert gas while drilling.

1. Tape the paper template (supplied with pickup tube) to the desired location on the diesel fuel tank and center punch the three holes.

   NOTE: Use a magnet, grease or special hole saws/drills that will minimize metal or aluminum chips from entering the fuel tank. Thoroughly clean and flush the tank to remove any chips.

2. Drill:
   - 9.5 mm (0.375 in.) diameter holes first.
   - 31.8 mm (1.250 in.) diameter hole next.
   - Remove the template from the tank and remove any burrs from the hole.
3. Cut the end of the pickup tube so approximately 25 mm (1.00 in.) is above the bottom of the fuel tank.
4. Loosen the nut and slide all the parts to the top of the pickup tube assembly.
5. Hold the parts in position and slide the assembly into the hole at a slight angle until the bushing is inside the hole.
6. Tip the backup washer and slide it through the hole and position it onto the bushing. Thread the nut onto the bushing, position as needed to facilitate fuel line connections and tighten to 54 Nm. (40 ft-lb.).

Installing the Fuel Pickup Tube Into a Steel or Aluminum Tank



Installing the Fuel Pickup Tube Into a Plastic Tank

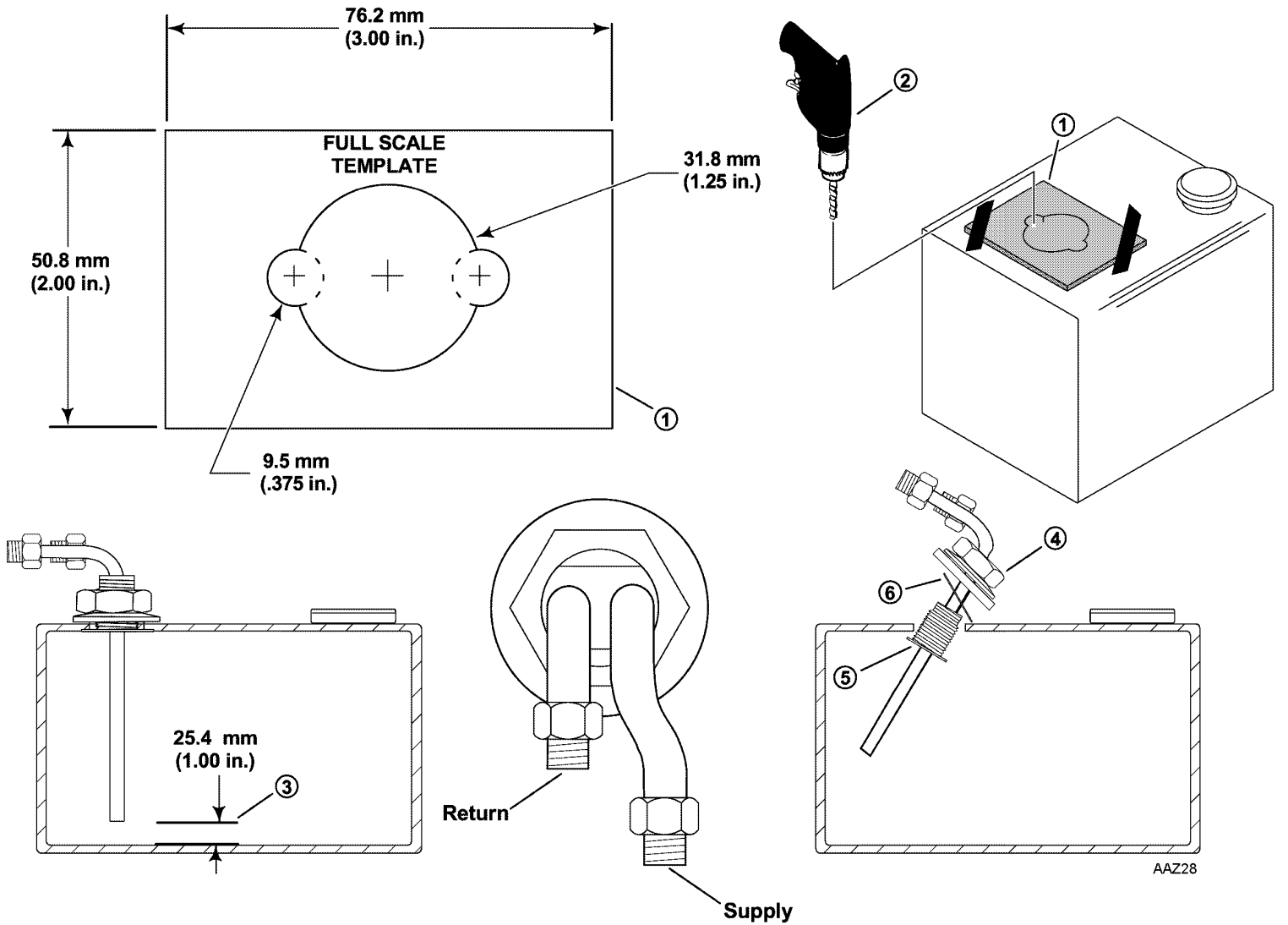
DANGER: Diesel fuel vapors are potentially explosive. Use extreme caution when drilling in or around the diesel fuel tank. Sparks from an electric drill or drill bit could cause an explosion. Do not smoke while working near the diesel fuel tank. Drain all diesel fuel from the tank and use nitrogen or an inert gas to purge the diesel fuel vapors from the tank prior to drilling. Keep the diesel tank filled with inert gas while drilling.

1. Tape the paper template (supplied with pickup tube) to the desired location on the diesel fuel tank and center punch the three holes.

   NOTE: Use grease or special hole saws/drills that will minimize plastic chips from entering the fuel tank Thoroughly clean and flush the tank to remove any chips.

2. Drill:
   - 9.5 mm (0.375 in.) diameter holes first.
   - 31.8 mm (1.250 in.) diameter hole next.
   - Remove the template from the tank and remove any burrs from the hole.
3. Cut the end of the pickup tube so approximately 25 mm (1.00 in.) is above the bottom of the fuel tank.
4. Loosen the nut and slide all the parts to the top of the pickup tube assembly.
5. Hold the parts in position and slide the assembly into the hole at a slight angle until the bushing is inside the hole.
6. Tip the backup washer and slide it through the hole and position it onto the bushing. Thread the nut onto the bushing, position as needed to facilitate fuel line connections and tighten to 54 Nm. (40 ft-lb.).

Installing the Fuel Pickup Tube Into a Plastic Tank



Installing the Steel Fuel Tank (OPTION)

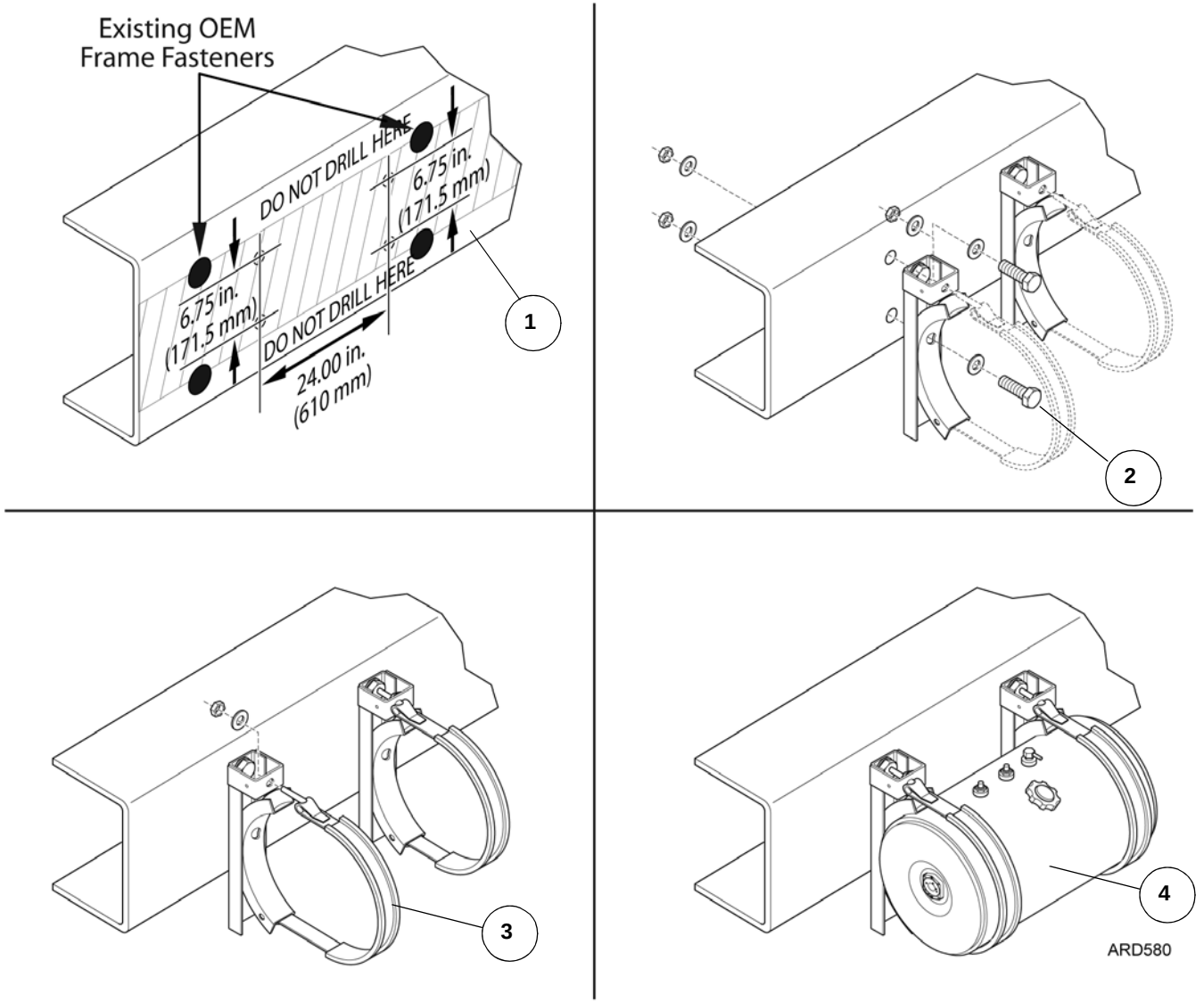
DANGER: An improperly installed fuel tank could lead to serious injury or death! Consult your truck's chassis manufacturer for specific details on proper fuel tank installation and recommendations.

IMPORTANT: Observe the positioning of existing OEM fasteners on the vehicle frame. The four fasteners used to install the fuel tank brackets must be located on the frame no higher and no lower than any existing OEM fasteners.

1. The fuel tank mounting brackets should be positioned 610 mm (24.00 in.) apart to properly support the combined weight of 118 kg (260 lbs.) which includes the fuel tank, mounting brackets and 30 gallons of diesel fuel.
   - Measure and mark the location of the four mounting holes on the frame.
   - Use a 17 mm (11/16 in.) drill bit and drill four holes in the frame.
2. Install each fuel tank mounting bracket securely onto the truck's frame with two, 1/2 -13, Grade 5 bolts, flat washers and locking nuts. ***Substitutions are not acceptable!***
   - Torque the bolts to 81-88 N•m (60-65 ft-lb.).
3. Install the mounting bands T-bolts onto the mounting brackets with flat washers and locking nuts.
4. Install the fuel tank into the mounting bands.
   - Torque the upper mounting band T-bolts to 47 N•m (35 ft-lb.).

IMPORTANT: Do not over tighten the mounting band bolts or damage to the bands will result!

Installing the Steel Fuel Tank (OPTION)



Installing the Aluminum Fuel Tank (OPTION)

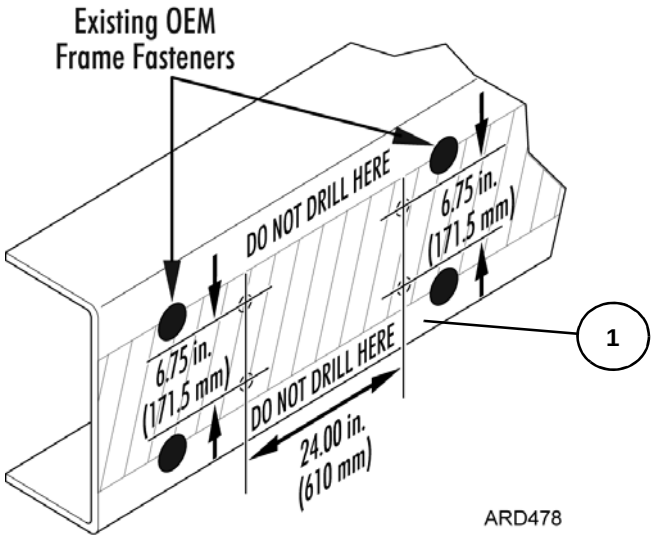
DANGER: An improperly installed fuel tank could lead to serious injury or death! Consult your truck's chassis manufacturer for specific details on proper fuel tank installation and recommendations.

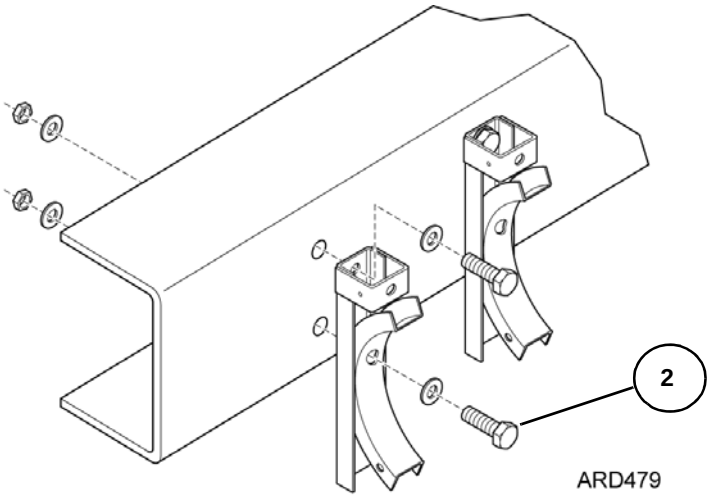
IMPORTANT: Observe the positioning of existing OEM fasteners on the vehicle frame. The four fasteners used to install the fuel tank brackets must be located on the frame no higher and no lower than any existing OEM fasteners.

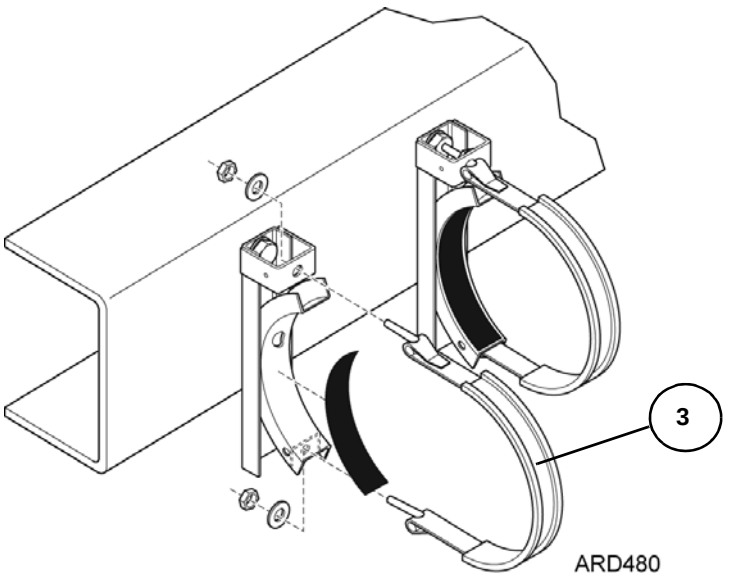
1. The fuel tank mounting brackets should be positioned 610 mm (24.00 in.) apart to properly support the combined weight of 118 kg (260 lbs.) which includes the fuel tank, mounting brackets and 30 gallons of diesel fuel.
   - Measure and mark the location of the four mounting holes on the frame.
   - Use a 17 mm (11/16 in.) drill bit and drill four holes in the frame.
2. Install each fuel tank mounting bracket securely onto the truck's frame with two, 1/2 -13, Grade 5 bolts, flat washers and locking nuts. ***Substitutions are not acceptable!***
   - Torque the bolts to 81-88 N•m (60-65 ft-lb.).
3. Install the mounting bands onto the mounting brackets with flat washers and locking nuts.
   - Tighten only the lower T-bolt to 47 N•m (35 ft-lb.).
   - Install the self-adhesive rubber strips onto each mounting bracket as shown.
4. Install the fuel tank into the mounting bands.
   - Confirm the rubber strips on both the mounting bands and the mounting brackets are positioned correctly to prevent metal to aluminum contact.
   - Torque the upper mounting band T-bolts to 47 N•m (35 ft-lb.).

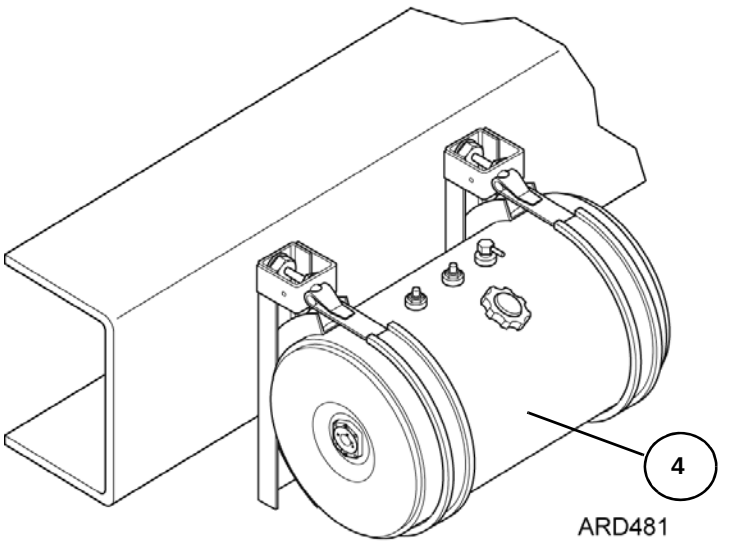
IMPORTANT: Do not over tighten the mounting band bolts or damage to the bands will result!

Installing the Aluminum Fuel Tank (OPTION)









Installing the Fuel Pump and Fuel Lines

DANGER: The Thermo King fuel pump should be installed onto the supplied mounting bracket. The fuel pump and fuel lines should be installed a safe distance away from the extreme heat generated by the Diesel Particulate Filter (DPF) or exhaust system components on the truck. Failure to do so could result in damage to equipment or fire!

DANGER: Leaking fuel lines could cause a fire resulting in death or serious injury All fuel lines must be tight and leak free!

DANGER: Do not route fuel lines with battery cables or electrical wires, as this could cause a fire!

NOTE: Do not connect unit fuel lines into any truck/trailer fuel lines.

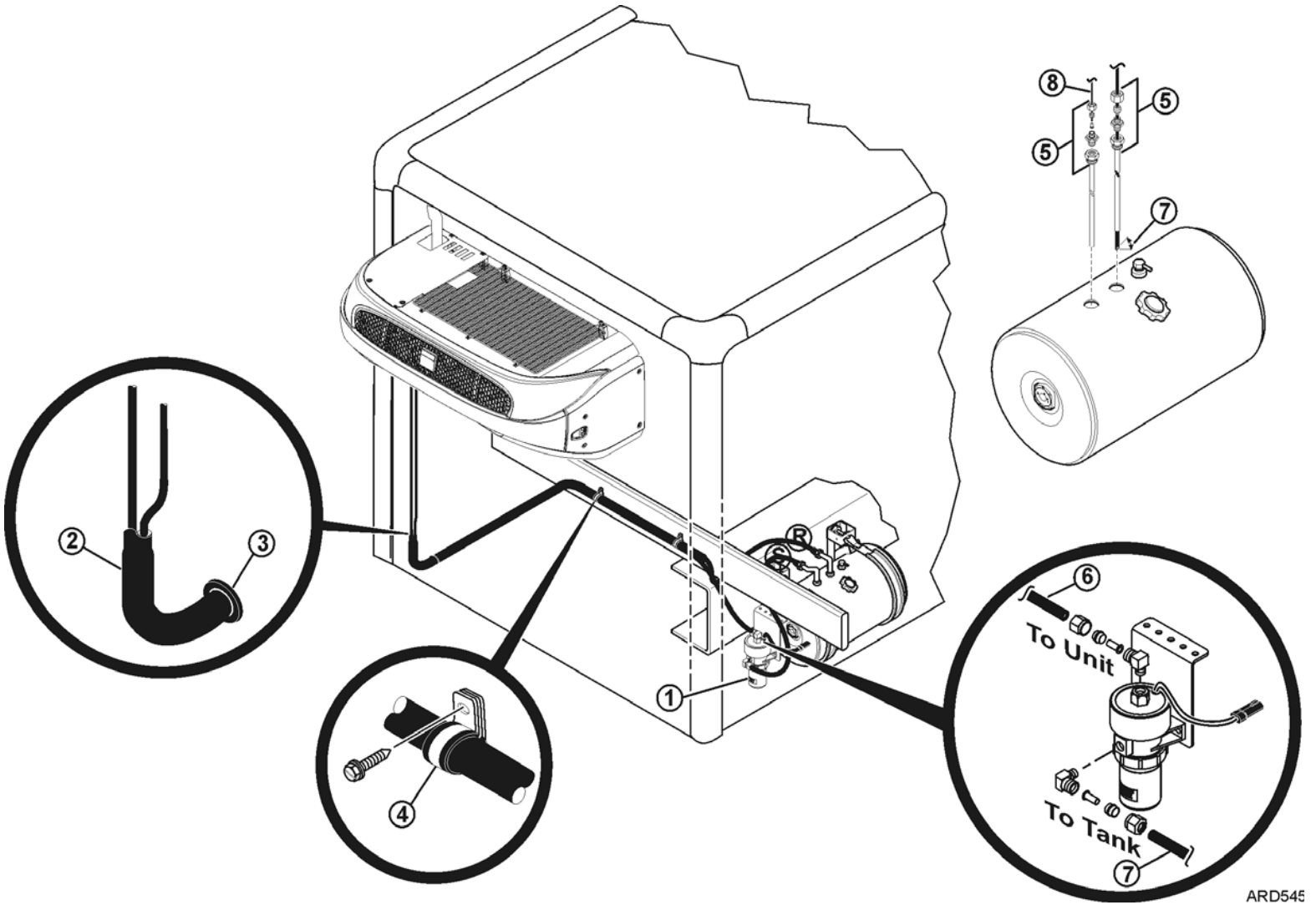
S=Supply R=Return

1. The fuel pump must be installed as close to the fuel tank as possible and not more than 762 mm (30.00 in.) above the fuel in the fuel tank.
2. Fuel lines should be routed in a protective housing with no kinks or sharp bends.
3. Rubber grommets must be used when routing fuel lines through sheet metal.
4. Secure all fuel lines with provided clamps.
5. Remove the protective plugs from each of the fuel pick up tubes on the fuel tank and install fuel line fittings.
6. From the unit, route and install the **fuel supply** line to the upper fuel line fitting on the fuel pump. Tighten the fuel line fittings securely.
7. From the fuel pump, route the lower **fuel supply** line to the fuel tank.
   - Cut the end of the nylon fuel supply line at a 45 degree angle and insert into one of the fuel line fittings.
   - Feed the fuel line down into the tank until it hits bottom, then pull it back up 25 mm (1.00 in.) and tighten the fuel line fitting securely.
8. From the unit, route the **fuel return** line to the fuel tank.
   - Insert the fuel return line into the other fuel line fitting and tighten the fuel line fitting securely.
9. Remove the plastic cap from the fuel vent and point the outlet towards the rear of the truck.

IMPORTANT: The factory installed fuel tank air vent must be in place and functional for the Thermo King unit's fuel system to operate correctly and for the fuel tank to remain in compliance with Federal Motor Carrier Safety Administration specifications (title 49, paragraph 393.67). A plugged or restricted fuel tank air vent can result in premature damage to the fuel pump and could also cause severe damage to the fuel tank. NEVER remove or install any other component in place of the fuel tank air vent.

10. Operate the unit and check all fuel line fittings for fuel leaks.

Installing the Fuel Pump and Fuel Lines

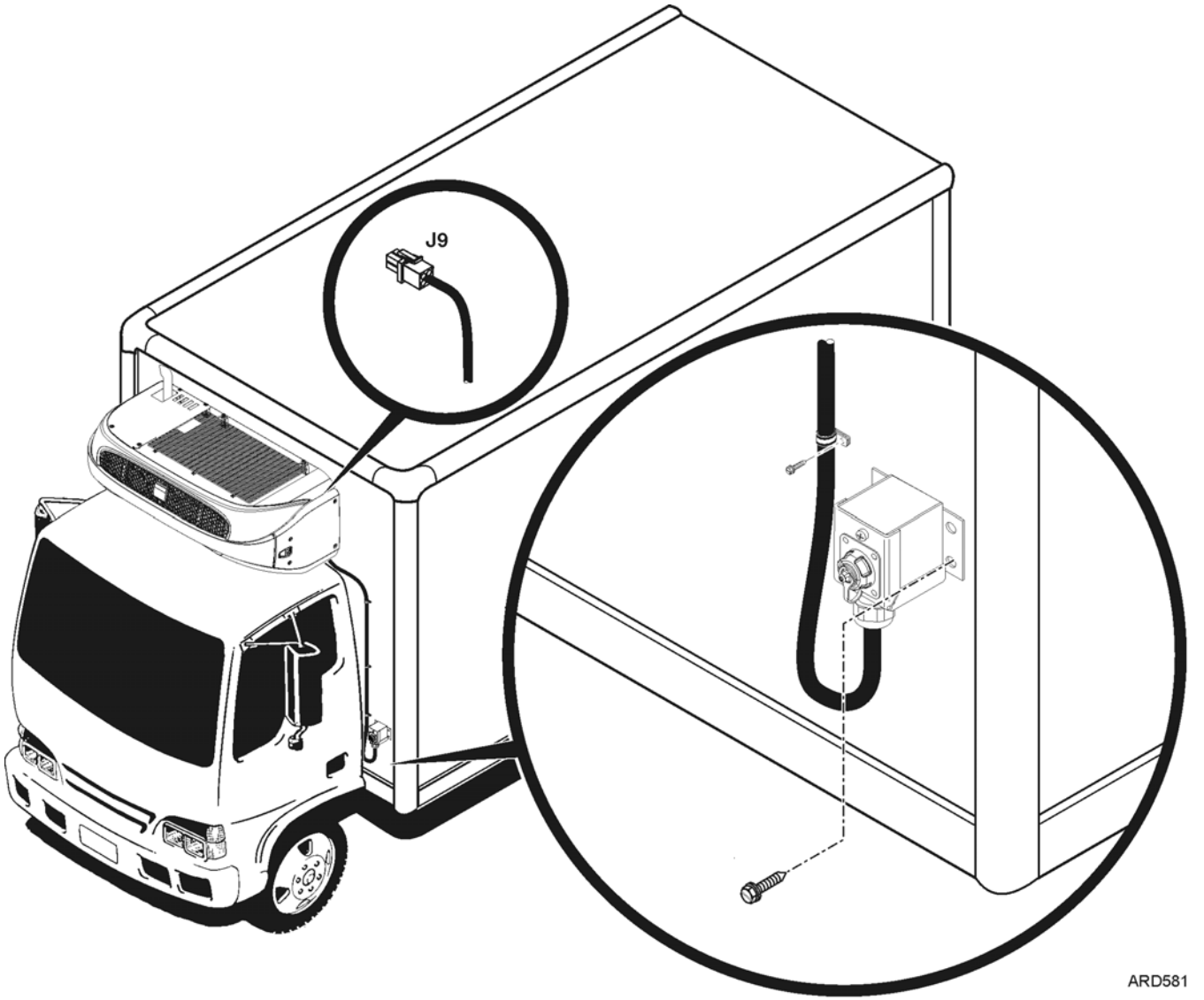


Installing the ServiceWatch™ Remote Download Port (OPTION)

Installation

1. Remove the bottom pan from the unit.
2. Open the control box door:
   - Route the remote download port harness into the control box through the access hole in the bottom of the box.
   - Locate and unplug the existing 4-pin connector at **J9** on the interface board.
   - Plug the 4-pin connector from the remote download port harness into **J9** on the interface board.
   - Secure the unused 4-Pin connector and the remote download cable neatly in place with tie bands and close the control box door.
3. Reinstall the bottom pan.
4. Choose an appropriate location to mount the ServiceWatch port that provides for safe and easy access for connecting the download cable. The download port can be rotated to fit your particular installation.
5. Attach the download port securely to the truck box with four TEK screws.
6. Provide a drip loop and secure the harness with supplied clamps and screws.

Installing the ServiceWatch™ Remote Download Port (OPTION)



Installing the Remote Power Receptacle (OPTION)

DANGER: To prevent serious injury or death, the electric standby power cord must not be connected to the unit during installation!

Choose an appropriate location to mount the power receptacle that provides for safe and easy access for connecting the power cord.

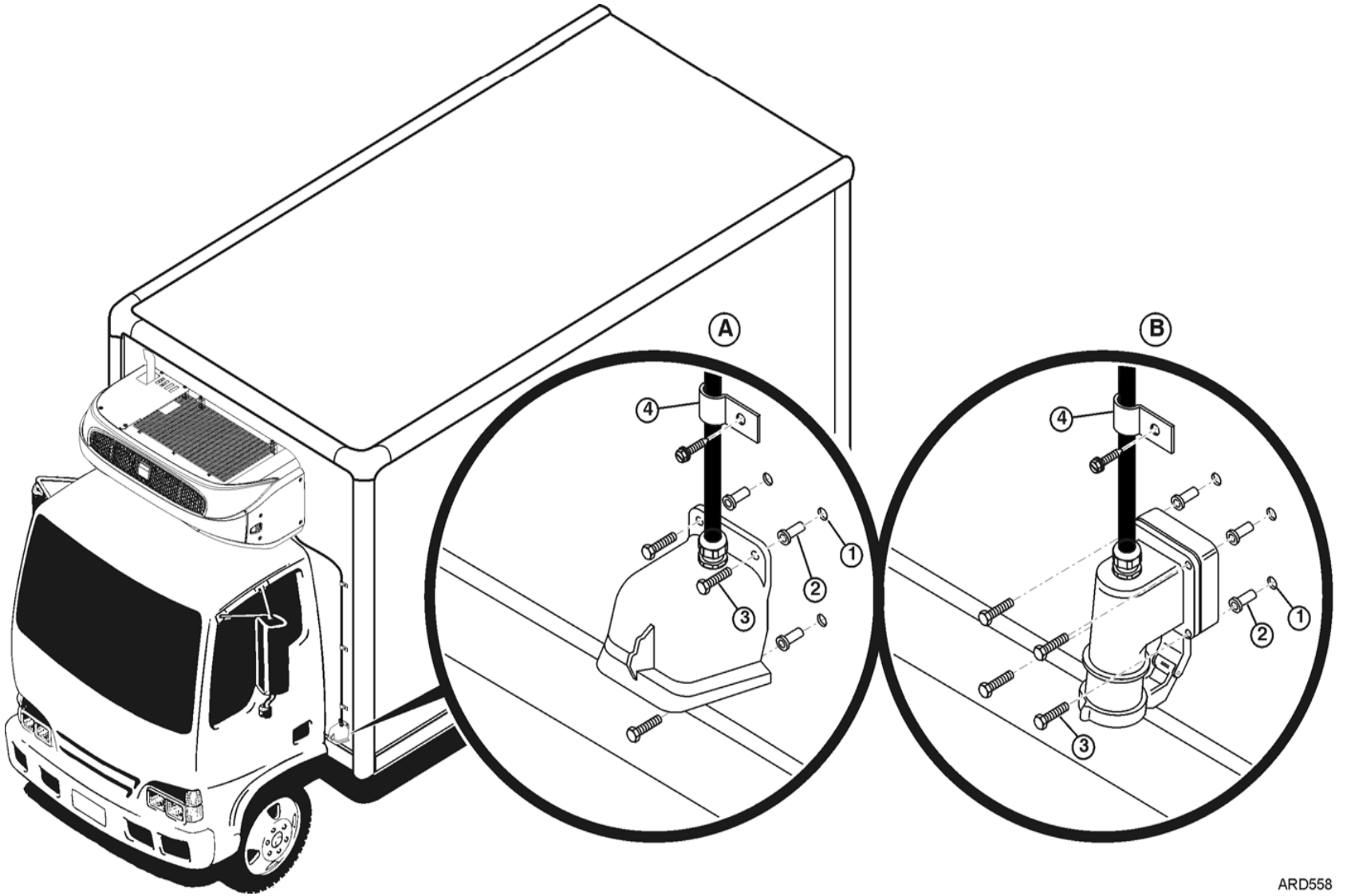
North American Units (Detail A)

1. Measure and drill three 13 mm (.500 in.) holes into truck body.
2. Insert the supplied rubber blind nuts into each hole in truck body.
3. Install the receptacle to the truck box with the supplied 1/4 x 20 mounting hardware and tighten securely.
4. Route and secure the harness with supplied clamps and screws.

International Units (Detail B)

1. Measure and drill four 9.5 mm (.375 in.) holes into truck body
2. Insert the supplied rubber blind nuts into each hole in truck body.
3. Install the receptacle to the truck box with the supplied 10-32 mounting hardware and tighten securely.
4. Route and secure the harness with supplied clamps and screws.

Installing the Remote Power Receptacle (OPTION)



Installing the HMI Controller

NOTE: Route and secure the controller harness to prevent rubbing, chafing or making contact with sharp, moving or hot components. Allow excess harness for tilt cab applications. The supplied rubber grommets must be used when routing harness through sheet metal holes.

Inside Cab DIN Mounting

1. Install DIN (ISO 7736) mounting sleeve into driver panel DIN opening. Bend the mounting sleeve tabs to secure.
2. Route the controller harness from the unit to inside the cab and through the mounting sleeve.

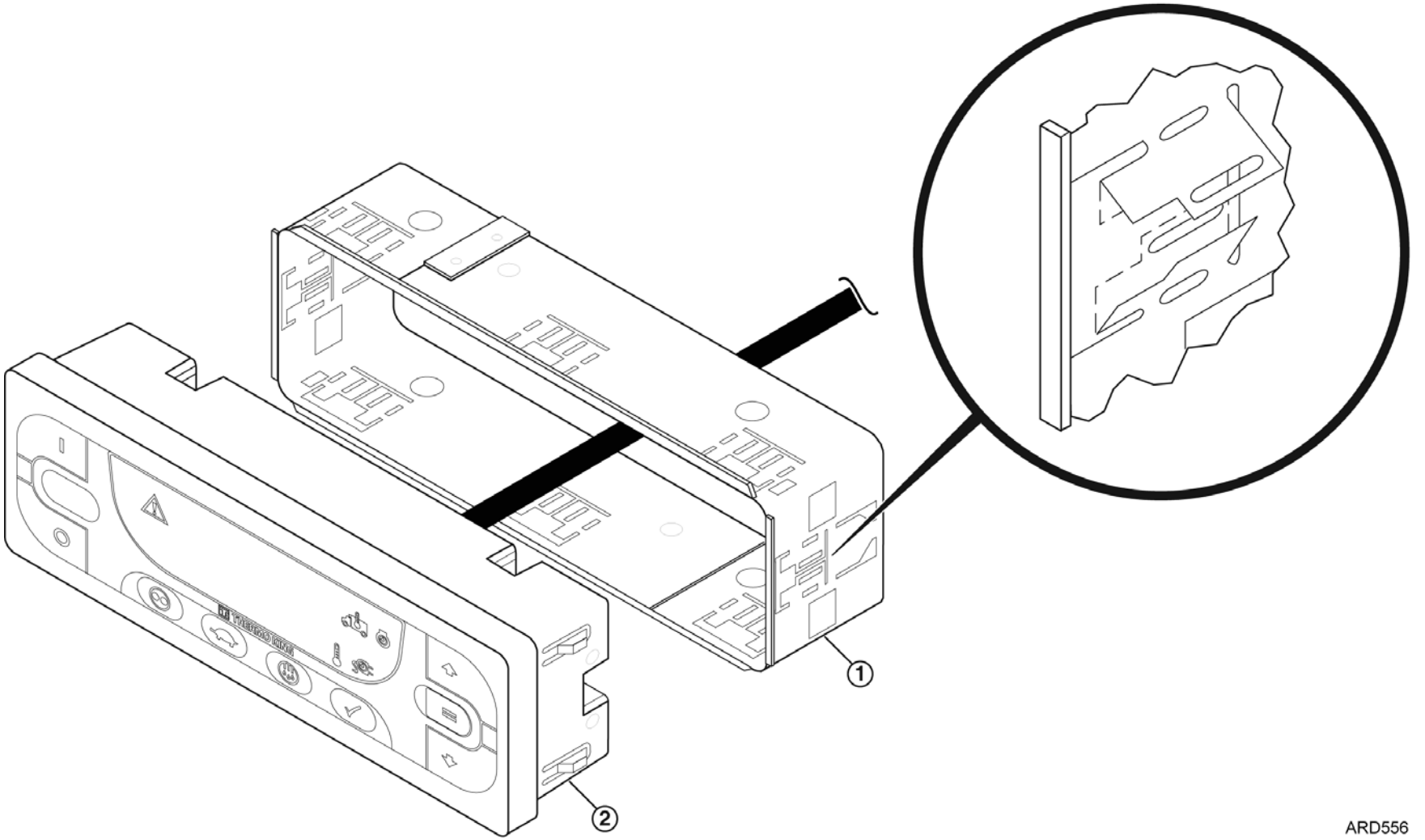
HMI Controller (LED Display) - Insert the controller harness to the mating connector at the rear of the HMI controller until it locks firmly in position.

- Lightly pull on the harness to confirm the harness is locked securely.
- Install the plug cover onto the rear of the controller with the two supplied screws.

HMI Controller (Graphics Display) - Install the harness plug cover onto the rear of the controller with the four supplied screws.

3. Install the HMI controller into mounting sleeve until it locks in position.

Installing the HMI Controller



NOTE: HMI with LED Display shown, HMI with Graphics Display installs the same.

Installing the HMI Remote Control Box (OPTION)

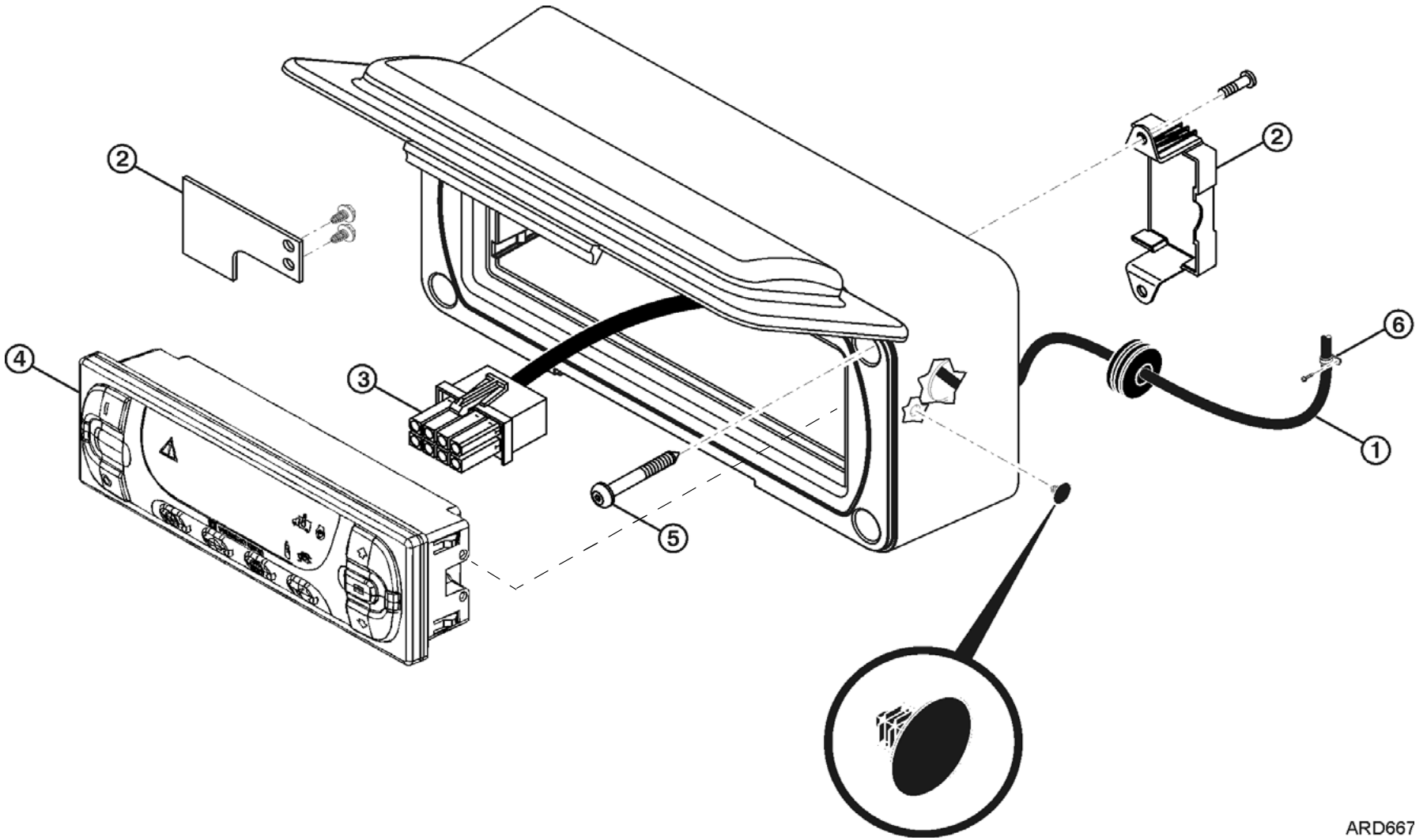
NOTE: Route and secure the controller harness to prevent rubbing, chafing or making contact with sharp, moving or hot components. Allow excess harness for tilt cab applications. The supplied rubber grommets must be used when routing harness through sheet metal holes.

1. Route the HMI controller harness to the location chosen to mount the remote box.
2. Remove the harness retainer covers from the remote control box and the HMI controller.
3. Route the controller harness through the remote control box and insert the mating connector into the rear of the HMI controller until it locks firmly in position.
    - Lightly pull on the harness to confirm the harness is locked securely into the HMI controller.
    - Reinstall the harness retainer cover onto the rear of the HMI controller.
    - Install the split rubber grommet over the harness and into the cutout at the rear of the control box.
4. Insert the HMI controller into the remote box.
    - Secure the HMI into the control box by inserting the four plastic retainers into the holes found inside the rear of the box.
    - Lightly pull on the harness to remove any slack and then reinstall the harness retainer cover securely to the remote control box.
5. Raise the remote box cover to access the four mounting holes.
    - Install four mounting screws to secure the remote box to the cargo box.

CAUTION: Do not overtighten the mounting screws or the plastic remote box may be damaged.

6. Provide a drip loop and secure the excess controller harness adequately with insulated clamps.

Installing the HMI Remote Control Box (OPTION)



Installing the Flush Mount Rear Remote Controller (OPTION)

Foamed-in-Place Installation

NOTE: Verify mounting location and all dimensions before installing the remote controller.

Dimensions	
A	69.8 mm (2.75 in.)
B	196.8 mm (7.75 in.)

DANGER: Do not route electrical harness together with fuel lines as this could cause a fire resulting in death or serious injury!

CAUTION: Do not drill holes into refrigeration, electrical or mechanical components or severe damage to the equipment will result!

CAUTION: Rubber grommets must be used when routing electrical harnesses through metal holes!

Preferred Wire Routing (Steps 1, 2, 6-10)

NOTE: The preferred routing of the electrical harness chase and interface harness is from the <u>bottom</u> of the controller box.

1. Connect a harness chase to the bottom of the flush mount controller box while providing a drip loop.
2. Install and route a 1/2 in. CPVC drain hose from the bottom of the flush mount controller box down and out of the cargo box floor.

Alternative Wire Routing (Steps 3-10)

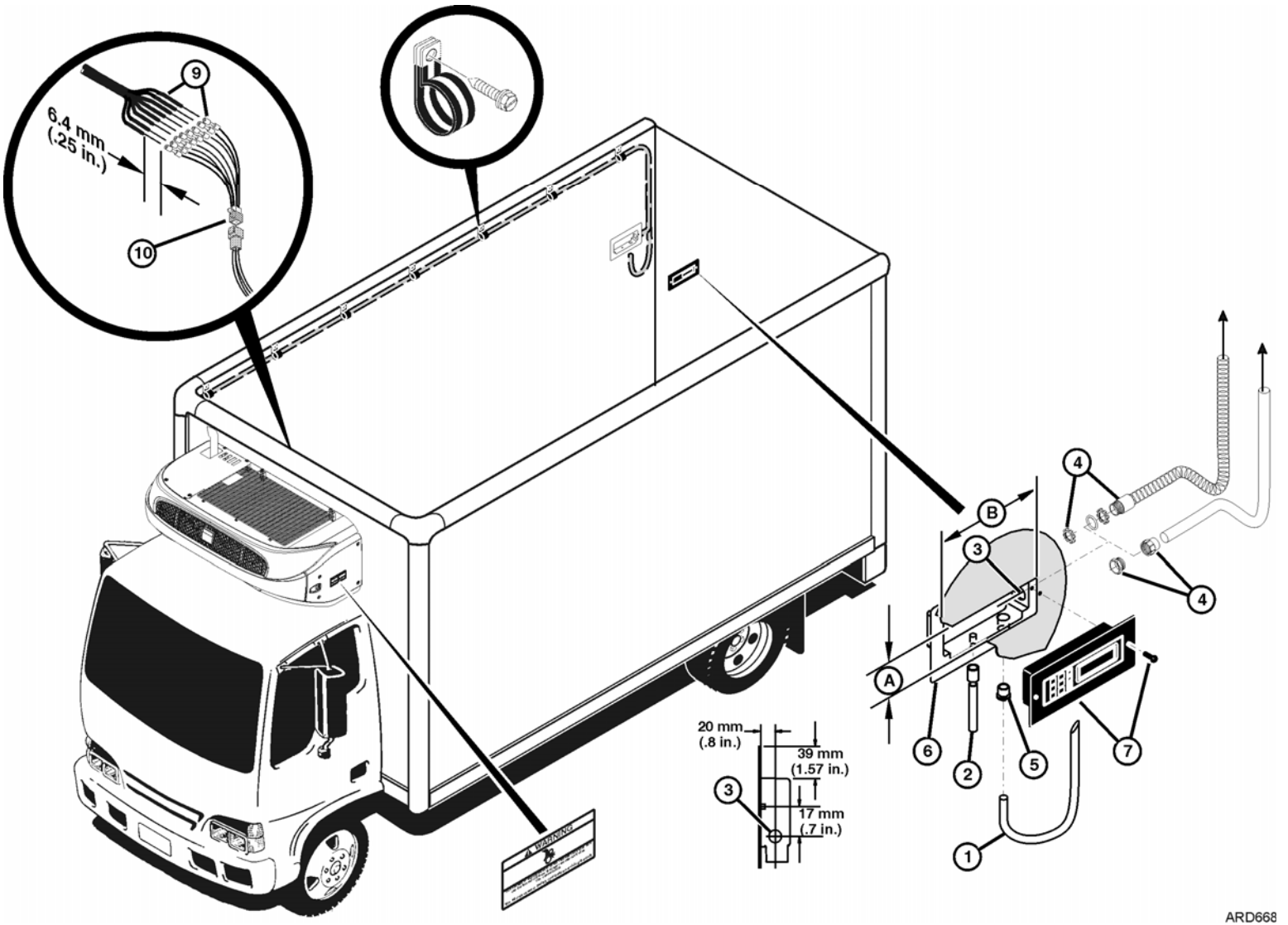
NOTE: The alternative routing of the electrical harness chase and interface harness is from the <u>side</u> of the controller box.

3. Drill an appropriate size hole in the flush mount controller box for the harness chase coupling.
4. Install the harness chase coupling.

NOTE: Coupling should not protrude more than 6.4 mm (.25 in.) inside the controller box.

5. Install a cap in bottom of flush mount controller box ***before*** foaming cargo box wall.
6. Apply chalking around the flush mount controller box and install it securely into the cargo box wall.
7. Apply Superlube (or equivalent) to the interface harness connector and attach it securely to back of the controller. Route the interface harness into the chase. Secure the controller to the flush mount controller box with the provided screws.
8. Route the chase and interface harness to the rear of condensing unit. Secure harness adequately with clamps.
9. Cut off excess interface harness and strip wire ends. Crimp securely the interface harness onto the 8-pin connector harness and use heat shrink covering.
10. Apply Superlube (or equivalent) and connect the 8-pin connector to the mating connector located at the rear of the condensing unit.
11. Install the supplied warning nameplate to the outside the roadside door.

Installing the Flush Mount Rear Remote Controller (OPTION)



Installing the Flush Mount Rear Remote Controller (OPTION)

Retro-Fit Installation

NOTE: Verify mounting location and all dimensions before installing the remote controller.

DANGER: Do not route electrical harness together with fuel lines as this could cause a fire resulting in death or serious injury!

CAUTION: Do not drill holes into refrigeration, electrical or mechanical components or severe damage to the equipment will result!

CAUTION: Rubber grommets must be used when routing electrical harnesses through metal holes!

1. Cut opening in cargo box wall per dimensions shown.

Dimensions	
A	203 mm (8.0 in.)
B	107.9 mm (4.25 in.)
C	38 mm x 12.7 mm (1.5 in. x .5 in.)

2. Install and route a 1/2 in. CPVC drain hose and 0.88 O.D. harness chase from the bottom of the controller box out of the cargo box.
3. Apply chalking around the flush mount controller box and install it securely into the cargo box wall.

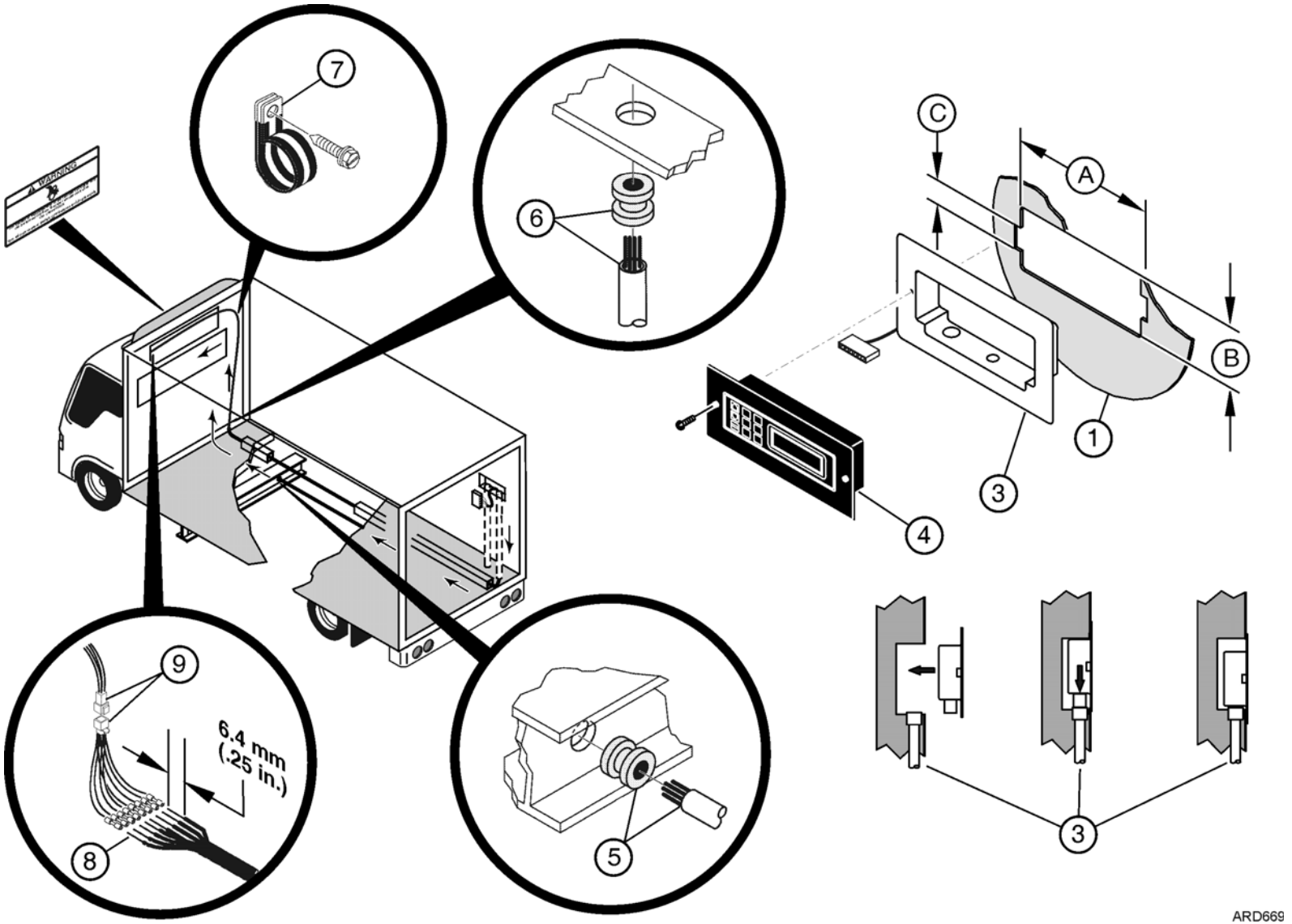
   NOTE: Make sure the drain hose and harness chase are connected properly.

4. Apply Superlube (or equivalent) to the interface harness connector and attach it securely to back of the controller. Route the interface harness into the chase. Secure the controller to the flush mount controller box with the provided screws.
5. From under the cargo box, route the interface harness through a chase in floor or I-beam cross members towards the condensing unit.
6. From inside the cargo box, measure and drill an appropriate size hole and route the harness up into the cargo box towards the unit.

   NOTE: Ensure hole is properly sealed after routing harness.

7. Adequately secure the interface harness to the backside of the unit with clamps.
8. Cut off excess interface harness and strip wire ends. Crimp securely the interface harness onto the 8-pin connector harness and use heat shrink covering.
9. Apply Superlube (or equivalent) and connect the 8-pin connector to the mating connector located at the rear of the condensing unit.
10. Install the supplied warning nameplate to the outside the roadside door.

Installing the Flush Mount Rear Remote Controller (OPTION)



Installing the EZ™ Read Thermometer (OPTION)

Connecting the Harness to the Thermometer

1. Remove the four 10-32 screws and separate the cover from the thermometer box assembly.
2. Remove the nut and sealing bushing from the liquid tite connector.
   - Slide the nut over the ends of the **sensor harness** and **thermometer harness**.
   - Route each harness through separate holes in the sealing bushing.
   - Connect the terminal rings from the **sensor harness** to the terminals marked **SENSOR** at the back of the thermometer. These connections are not polarity specific.
   - Connect the terminal forks from the **thermometer harness** to the terminals at the back of the thermometer. **BLK to (-),WH to (+)**.
3. Reinstall the nut and sealing bushing back into the liquid tite connector and tighten securely.
4. Reinstall the cover back onto the box securely.
5. Choose a location on the exterior of the truck to mount the box assembly and secure with installer supplied TEK screws.

Installing the Sensor

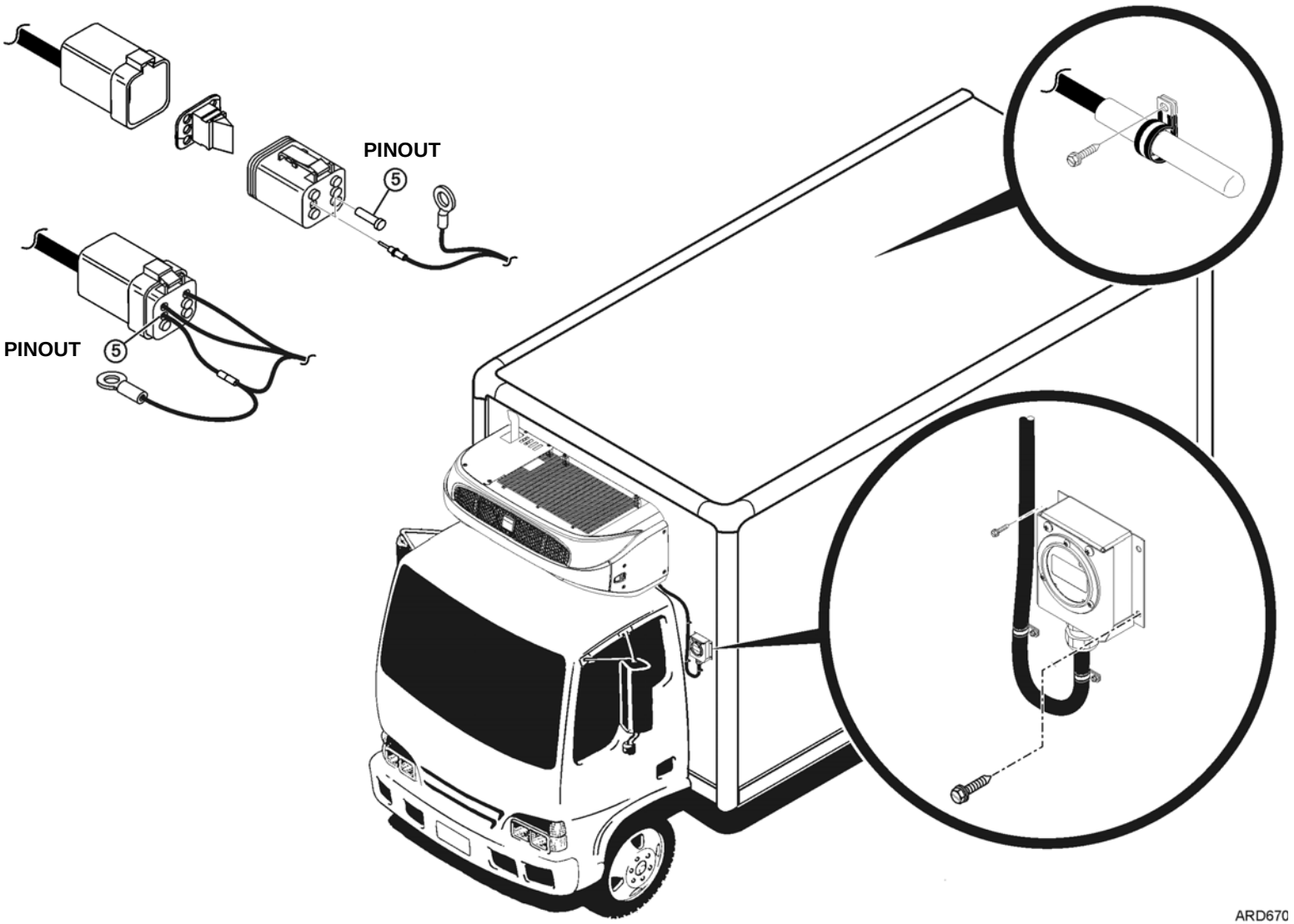
6. Route the sensor harness into the cargo area by drilling an appropriate size hole into the cargo box. Seal the hole with chalking.
   - The sensor should be mounted to the rear of the compartment to be monitored, typically on the ceiling.
   - Secure the sensor bulb with the suppled insulated clamp.
   - Secure the harness inside the cargo box neatly with clamps.

Connecting the Thermometer Harness

7. Route the thermometer harness towards the bottom of the unit.
8. Remove the bottom pan from the unit.
9. Locate the 6-pin connector and harness under the unit near the control box. **SEE NOTE BELOW.**
   - Remove the blank 6-pin connector plug from the harness.
   - Remove the locking wedge from the connector.
   - Remove the sealing plug from pin #5 on the connector.
   - Insert wire (WH) with the terminal pin into pin #5 until it "clicks". Gently pull on the wire to confirm it is locked in place.
   - Reconnect the 6-pin plug into the harness under the unit.
10. Route the ground wire (BLK) to the main unit ground plate located under the control box.
    - Attach the ground wire to securely to a ground stud on the plate.
11. Reinstall the bottom pan.
12. Provide a drip loop and secure the harnesses to the cargo box with insulated clamps.
13. Turn unit ON to verify thermometer operation.

NOTE: Units equipped with the Remote Light Option Only. If your unit is equipped with the Remote Light Option, you will need cut the terminal pin off of the WH wire from the thermometer harness and splice the wire into the REDL-01 wire (Pin #5) of the Remote Light Harness.

Installing the EZ™ Read Thermometer (OPTION)

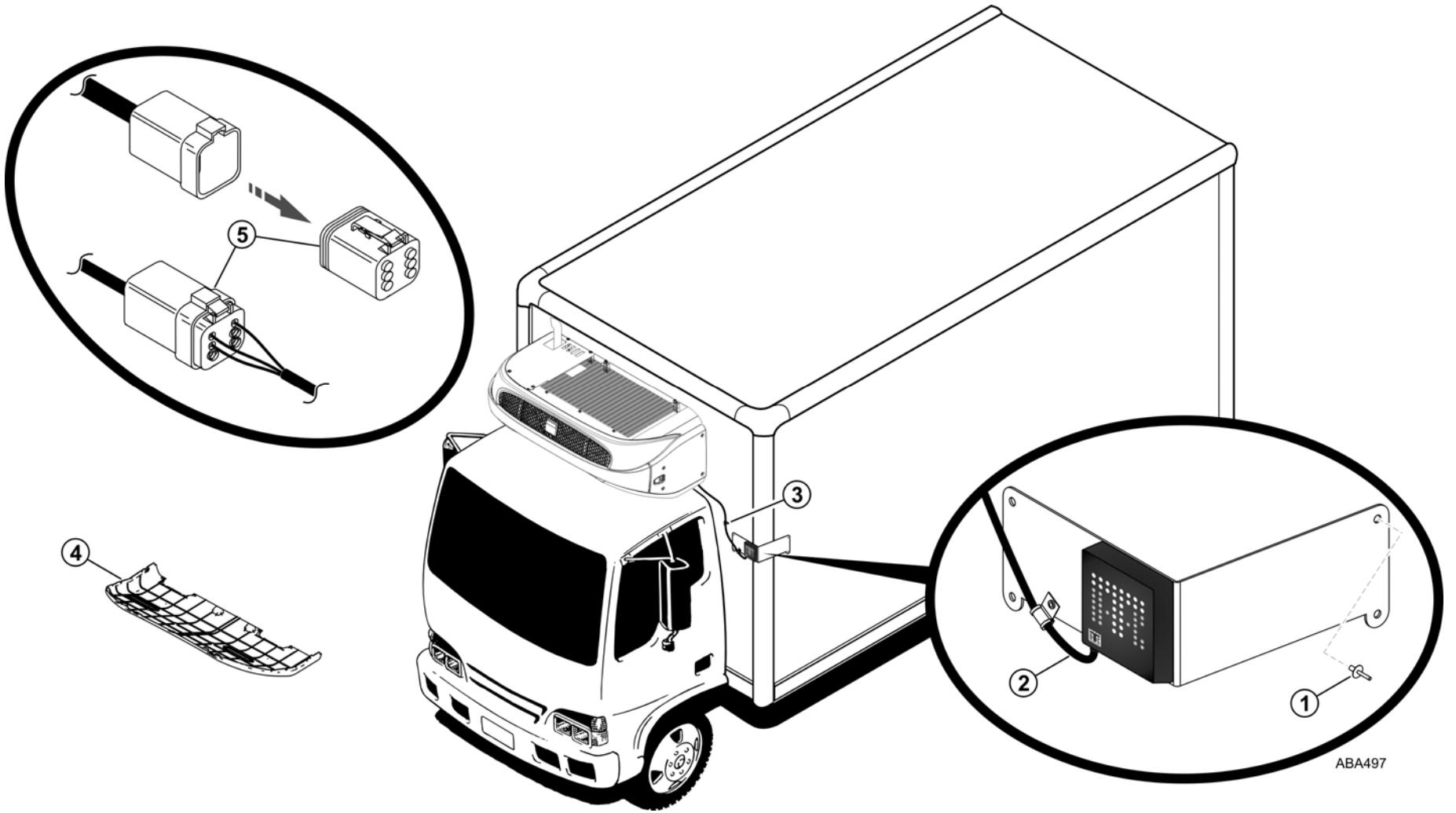


Installing the Remote Status Light (OPTION)

Installation

1. Mount the Status Light in a location so that is visible to the driver in the truck’s mirror.
   - Mark and drill the four mounting holes using a 3/16" drill.
   - Mount the status light securely with the supplied rivets.
2. Provide a “drip-loop” to prevent water from migrating into the Status Light and route the harness towards the bottom of the unit.
3. Secure harness to the truck box using the supplied clamps and rivets.
4. Remove the bottom pan from the unit and locate the 6-pin connector under the unit near the control box.
5. Remove the blank plug and attach the Status Light connector securely.
6. Secure excess harness up under the control box with band wraps.
7. Reinstall bottom pan.

Installing the Remote Status Light (OPTION)



Installing the Battery Box and Battery (OPTION)

Battery Box Installation

CAUTION: Battery boxes and covers must be installed securely with proper hardware to prevent them from falling off.

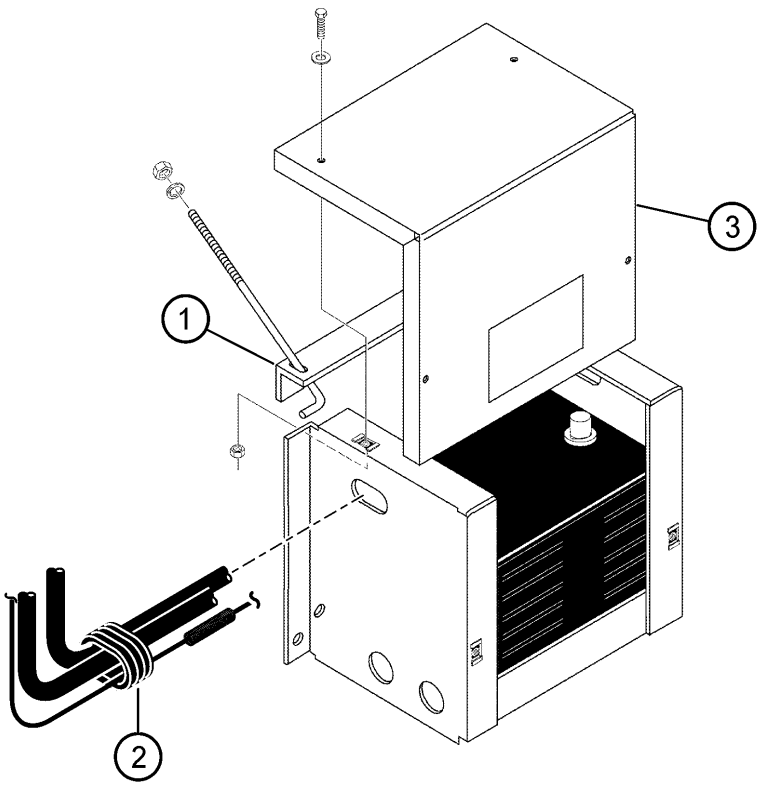
Battery installation

CAUTION: Battery cables must be properly routed and secure to prevent rubbing, chafing or making contact with sharp, moving or hot components.

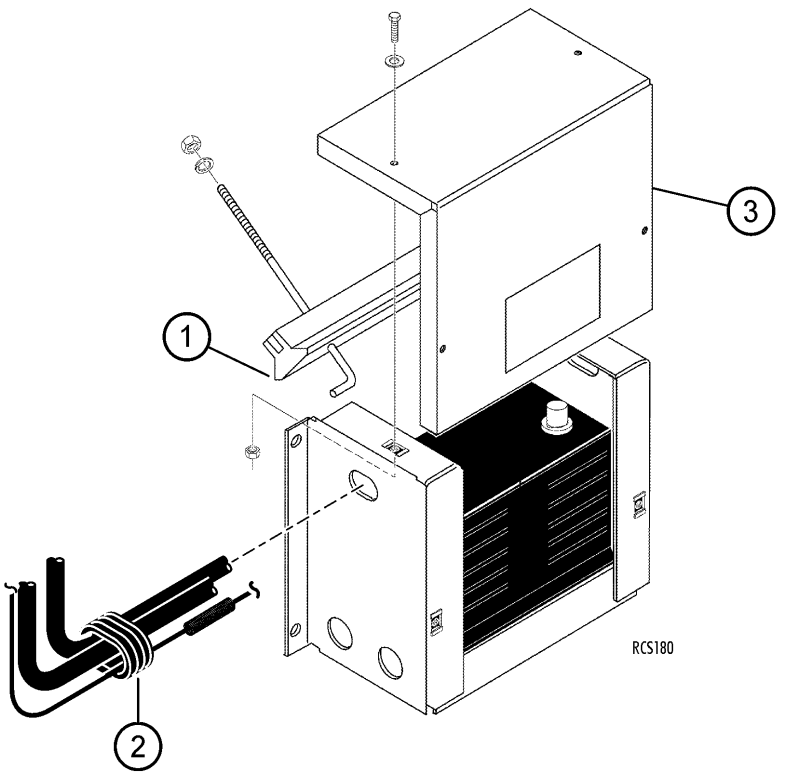
1. Secure battery in place with hold down bracket and rod.
2. Rubber grommets must be used where cables enter box.
3. ***DO NOT*** install protective battery cover. This will be installed later.

Installing the Battery Box and Battery (OPTION)

NORTH AMERICAN MODELS



INTERNATIONAL MODELS



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STOP

⚠ Caution

Thermo King Multi-Temp SPECTRUM™ truck condensing units and SPECTRUM™ remote evaporators are shipped with a 35-69 kPa (5-10 psi) holding charge of nitrogen. This holding charge may be safely vented into the atmosphere.

IMPORTANT: Do not release the holding charge until necessary to prevent moisture from entering the system.

SEVERE COMPRESSOR DAMAGE will result from operating the engine/motor before completing the system installation which includes: installing the components, releasing the condensing unit holding charge, releasing the remote unit holding charge, soldering the refrigeration lines, leak testing the system, evacuation and clean-up, and charging the system.

NOTE: Beginning first quarter of 2011, all S-2 and S-3 evaporators will now have solder fittings in place of ORS fittings. All refrigerant connections at the evaporator(s) must now be soldered.

Removing the Holding Charges

CAUTION: Thermo King Multi-Temp SPECTRUM truck condensing units and SPECTRUM remote evaporators are shipped with a 35-39 kPa (5-10 psi) holding charge of nitrogen. This holding charge may be safely vented into the atmosphere.

CAUTION: Holding charges must be removed before opening system to avoid serious injury.

HG = Hot Gas **S = Suction** **L = Liquid**

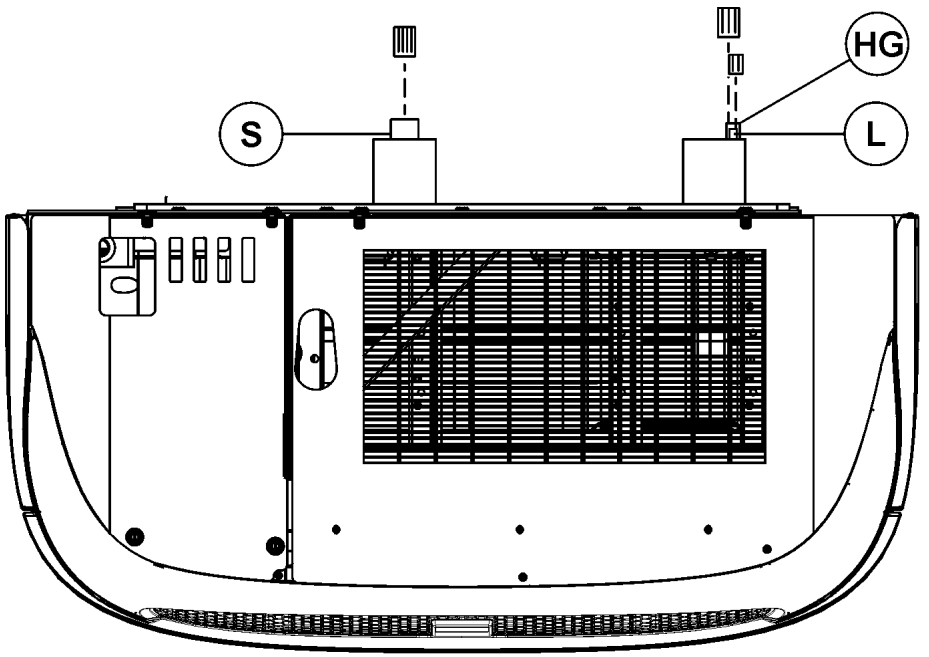
SPECTRUM Condensing Unit

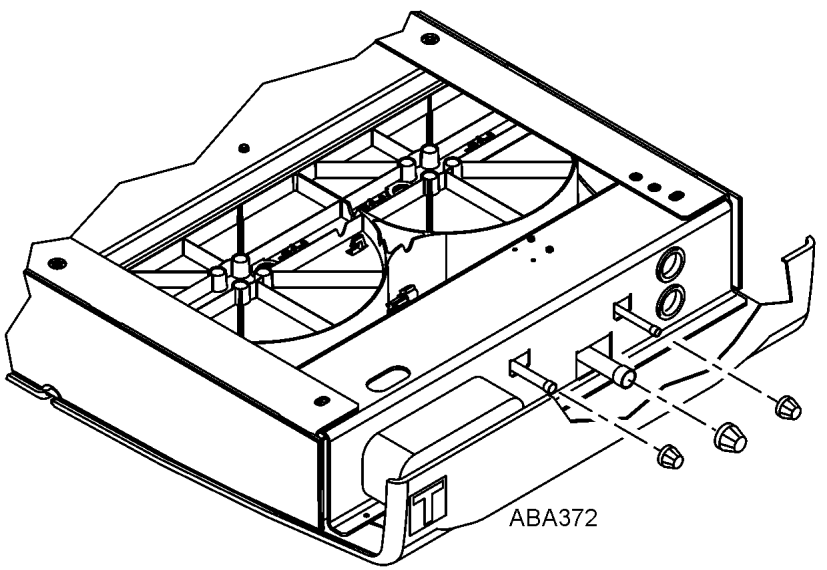
To release nitrogen holding charge, slowly remove ORS caps from hot gas, liquid and suction lines.

SPECTRUM Evaporator

To release nitrogen holding charge, slowly remove plugs from hot gas, liquid and suction lines.

Removing the Holding Charges





Installing S-2 or S-3 Evaporators

Ceiling Preparation

IMPORTANT: The ceiling must be flat and the mounting locations correct for proper SPECTRUM evaporator installation. The foam insulation in the ceiling must be removed from the evaporator mounting area and aluminium spacers must be installed between the evaporator mounting plate and trailer ceiling.

- For ceiling mounting ***stud*** applications, weld a nut (same thread as stud) onto a 44.45 mm (1.75 in.) hole saw and turn the nut onto the mounting stud using a socket wrench **(Detail A)**.
- For ceiling mounting ***bolt*** applications, weld a bolt (same thread as tapped hole) onto a 44.45 mm (1.75 in.) hole saw and turn into the tapped mounting hole using a socket wrench **(Detail A)**.
- Alternative method is to remove the mounting studs or bolts and use a hole saw with a standard pilot drill small enough to run up into the threaded hole without damaging the threads. Reinstall mounting studs or bolts.

Mounting Stud or Bolt Requirements

The mounting studs or bolts used to attach the evaporator(s) to the ceiling must be 10.0 mm, (0.50 in., Grade 5, U.S. applications only), Medium Carbon Steel, 120000 PSI Tensile Strength, Zinc Plate and Dichromate finish. Studs to extend below ceiling 38.0 mm (1.50 in.) to 50.1 mm (2.00 in.)

Evaporator Installation

1. Remove evaporator cover to access mounting holes.

   NOTE: The installation kit provides both metric and imperial nuts and washers. Be sure to use the correct ones for your application.

Mounting Stud Installations

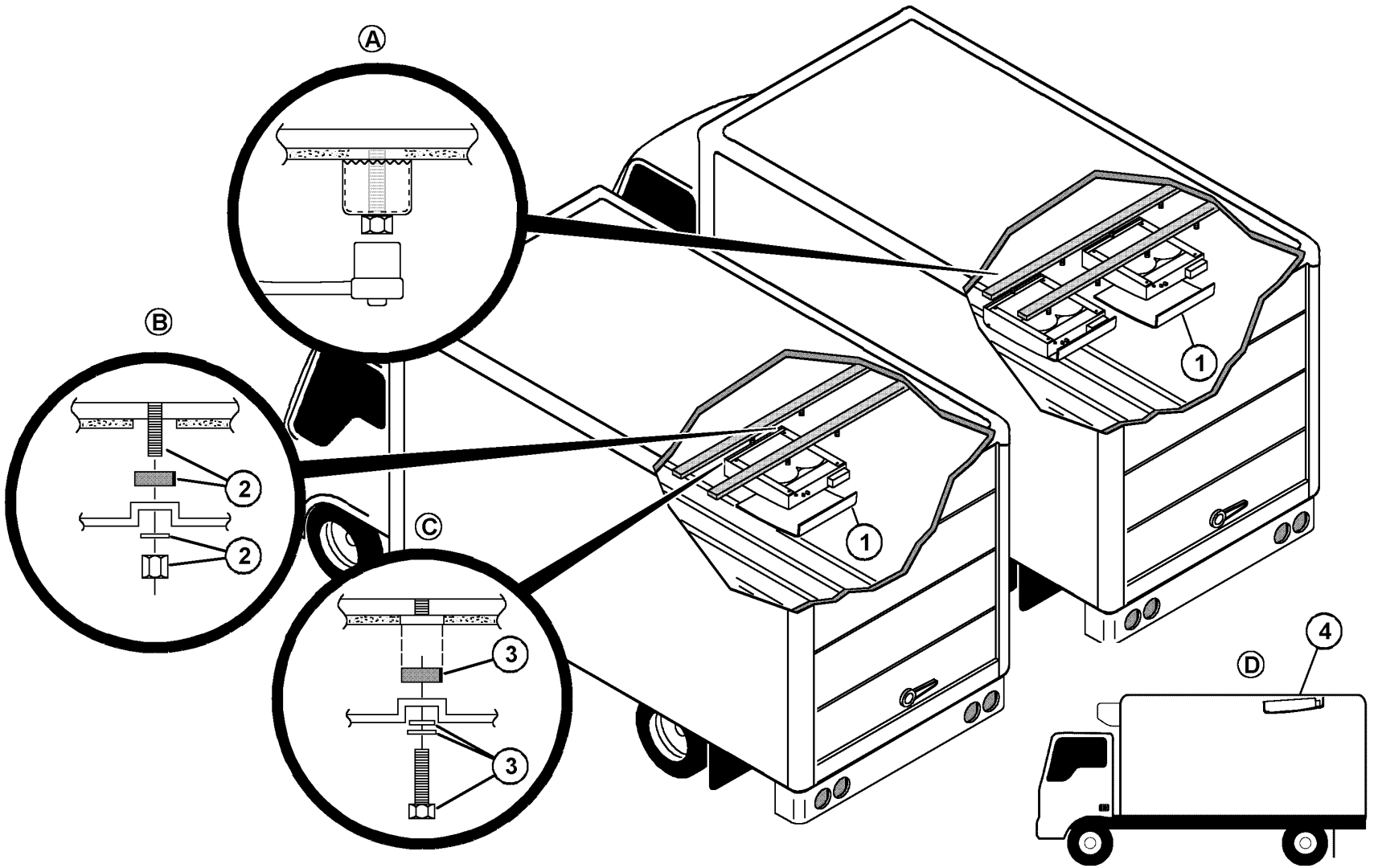
2. Install the aluminum spacers onto the ceiling mounting studs and raise the evaporator into position. Secure the evaporator onto the mounting studs with flat washers and locking nuts. **(Detail B)**.
   Torque to 81.3 N•m (60 ft-lb).

Mounting Bolt Installations

3. Install the mounting bolts, lock washers and flat washers onto the evaporator and raise into position. Install the aluminium spacers and secure the evaporator to the ceiling. **(Detail C)**.
   Torque to 81.3 N•m (60 ft-lb).
4. A properly installed evaporator will slope slightly toward the drain tubes to allow for water drainage **(Detail D)**.

Two additional washers are included in the kit to help assist sloping the evaporator towards the drain.

Installing S-2 or S-3 Evaporators



Refrigeration Tubing Connections to S-2 or S-3 Evaporators

AT THE CONDENSING UNIT

CAUTION: Remove holding charge from condensing unit before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail A). It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

NOTE: Discard O-rings that come with the condensing unit. Oil and install new O-rings supplied in kit.

- Clean all threads on ORS fittings prior to installation.
- Apply refrigerant oil to the O-rings only. **DO NOT APPLY OIL TO THE ORS FITTING THREADS.**
- When tightening ORS tubing connections, always use a backup wrench to hold the backside of the ORS fitting to prevent the refrigeration tube from twisting.
- Torque ORS fittings on the condenser as shown in the table.

Specifications for ORS Fittings				
Tube	**Size**	**Thread**	**Torque**	**O-ring Gaskets**
Liquid	3/8 in.	11/16-16	30 ft-lb	331222
Hot Gas	1/2 in.	13/16-16	40 ft-lb	331015
Suction	7/8 in.	1-3/16-16	60 ft-lb	330566

Copper Fittings		
Item	**Description**	**Part Number**
#2	Tee, 1-1/8 in. x 7/8 in. x 7/8 in.	558968
#3	90°, Elbow 7/8 in. x 7/8 in.	553326
#7, #9	90°, Elbow 3/8 in. x 3/8 in.	552876
#8	Tee, 3/8 in. x 3/8 in. x 3/8 in.	553251
#11, #13	90°, Elbow 1/2 in. x 1/2 in.	558812
#12	Tee, 1/2 in. x 1/2 in. x 1/2 in.	552296

SUCTION TUBES - (Detail B)

1. Oil new O-ring and install pre-bent 90° 1-1/8 in. tube onto suction ORS fitting of condensing unit.
2. Install 1-1/8 in. x 7/8 in. x 7/8 in**.** tee onto suction tube.
3. Install 7/8 in. x 7/8 in**.** elbow onto suction tube tee.
4. Each zone needs to have a separate suction line with a check valve installed as close as possible to condensing unit.

   NOTE: Remove internal components of valves before soldering and use 35% silver solder.
5. Fabricate 7/8 in. tubes and install onto check valves.

LIQUID TUBES - (Detail B)

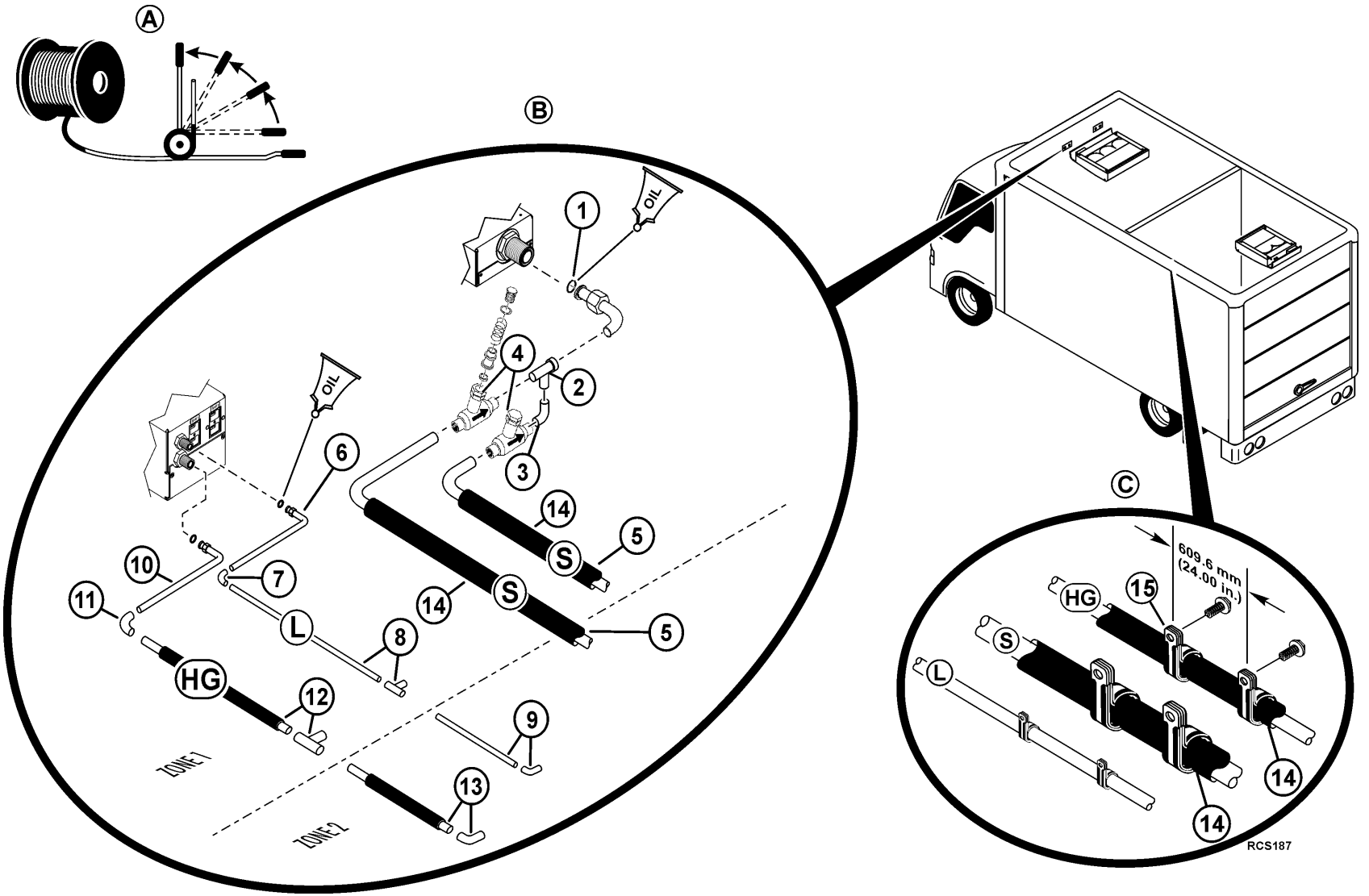
6. Oil new O-ring and install pre-bent 90° 3/8 in. tube onto liquid ORS fitting of condensing unit. Route this tube to the ceiling or wall trough.
7. In the trough, attach 3/8 in. x 3/8 in. elbow onto the liquid tube.
8. Fabricate 3/8 in. tube with 3/8 in. x 3/8 in. x 3/8 in. tee going to Zone 1.
9. From the tee, fabricate 3/8 in. tube with 3/8 in. x 3/8 in. elbow going to Zone 2.

HOT GAS - (Detail B)

10. Oil new O-ring and install pre-bent 90° 1/2 in. tube onto hot gas ORS fitting of condensing unit. Route this tube to the ceiling or wall trough.
11. In trough, attach a 1/2 in. x 1/2 in. elbow onto hot gas tube.
12. Fabricate 1/2 in. tube with 1/2 in. x 1/2 in. x 1/2 in. tee going into Zone 1.
13. From the tee, fabricate 1/2 in. tube with a 1/2 in. x 1/2 in. elbow going to Zone 2.
14. Add insulation to suction and hot gas tubes only **(Detail C)**.
15. Secure all tubing with provided clamps **(Detail C)**.

Refrigeration Tubing Connections to S-2 or S-3 Evaporators

AT THE CONDENSING UNIT



Refrigeration Tubing Connections to S-2 or S-3 Evaporators

AT THE EVAPORATOR

CAUTION: Remove holding charge from the evaporator(s) before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable. It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

IMPORTANT: Clean all tubes and fittings prior to installation and soldering.

Copper Fittings		
Item	**Description**	**P/N**
A	Elbow, 90° 7/8 in. x 7/8 in.	553326
B	Tee,1/2 in. x 1/2 in. x 1/2 in.	552296
C	Tee, 3/8 in. x 3/8 in. x 3/8 in.	553251

SUCTION TUBES

1. Fabricate a 7/8 in. suction tube from the condensing unit and route in the trough, install 7/8 in. x 7/8 in. elbow, attach to the 7/8 in. preformed tube and connect to the evaporator 7/8 in. tube. Solder all fittings.

HOT GAS TUBES

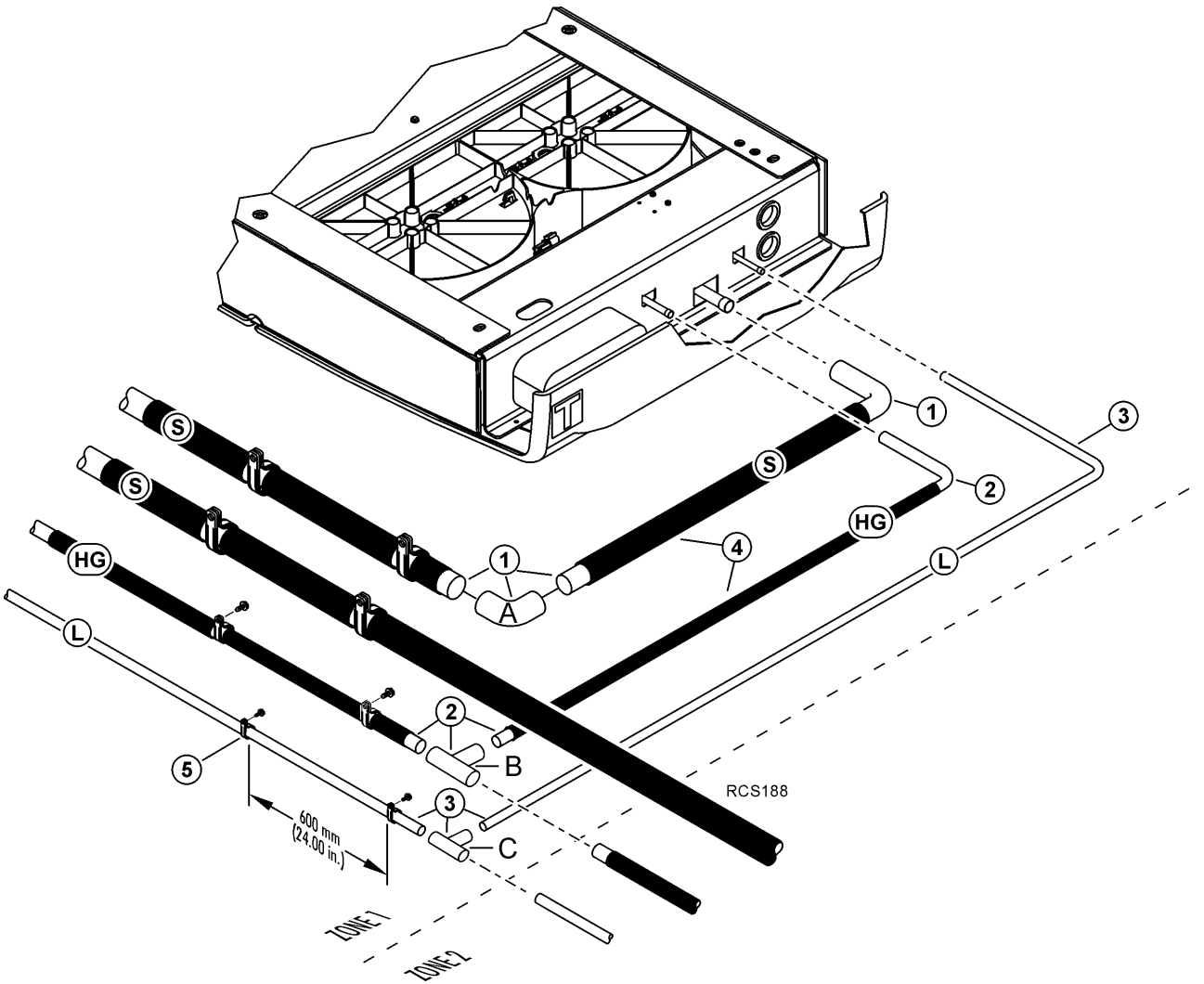
2. Fabricate a 1/2 in. hot gas tube from the condensing unit and route in the trough, install 1/2 in. x 1/2 in. tee, attach to the 1/2 in. preformed tube and connect to the evaporator 1/2 in. tube. Solder all fittings.

LIQUID TUBES

3. Fabricate a 3/8 in. liquid tube from the condensing unit and route in the trough, install 3/8 in. x 3/8 in. tee, attach to the 3/8 in. preformed tube and connect to the evaporator 3/8 in. tube. Solder all fittings
4. Insulation should be added to all segments of suction and hot gas tubes.
5. Secure all tubing with provided clamps.

Refrigeration Tubing Connections to S-2 or S-3 Evaporators

AT THE EVAPORATOR



Refrigeration Tubing Connections to S-2 + S-2 Evaporators

AT THE CONDESING UNIT

CAUTION: Remove holding charge from condensing unit before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail A). It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

NOTE: Discard O-rings that come with the condensing unit. Oil and install new O-rings supplied in kit.

- Clean all threads on ORS fittings prior to installation.
- Apply refrigerant oil to the O-rings only. **DO NOT APPLY OIL TO THE ORS FITTING THREADS.**
- When tightening ORS tubing connections, always use a backup wrench to hold the backside of the ORS fitting to prevent the refrigeration tube from twisting.
- Torque ORS fittings on the condenser as shown in the table.

Specifications for ORS Fittings				
Tube	**Size**	**Thread**	**Torque**	**O-ring Gaskets**
Liquid	3/8 in.	11/16-16	30 ft-lb	331222
Hot Gas	1/2 in.	13/16-16	40 ft-lb	331015
Suction	7/8 in.	1-3/16-16	60 ft-lb	330566

Item	Description	Part Number
#2	Tee, 1-1/8 in. x 1- 1/8 in. x 7/8 in.	559517
#3	Tee, 1-1/8 in. x 7/8 in. x 7/8 in.	558968
#4	Elbow, 90° 7/8 in. x 7/8 in.	553326
#8, #10	Elbow, 90° 3/8 in. x 3/8 in.	552876
#9	Tee, 3/8 in. x 3/8 in. x 3/8 in.	553251
#12, #14	Elbow, 90° 1/2 in. x 1/2 in.	558812
#13	Tee, 1/2 in. x 1/2 in. x 1/2 in.	552296

SUCTION TUBES - (Detail B)

1. Oil new O-ring and install pre-bent 90° 1-1/8 in. tube onto suction ORS fitting of condensing unit.
2. Install 1-1/8 in. x 1-1/8 in x 7/8 in**.** tee onto suction tube.
3. Install 1-1/8 in. x 7/8 in. x 7/8 in**.** tee onto suction tube.
4. Install 7/8 in. x 7/8 in**.** elbow onto suction tube tee.
5. Each zone needs to have a separate suction line with a check valve installed as close as possible to condensing unit.

   NOTE: Remove internal components of valves before soldering and use 35% silver solder.
6. Fabricate 7/8 in. tubes and install onto check valves.

LIQUID TUBES - (Detail B)

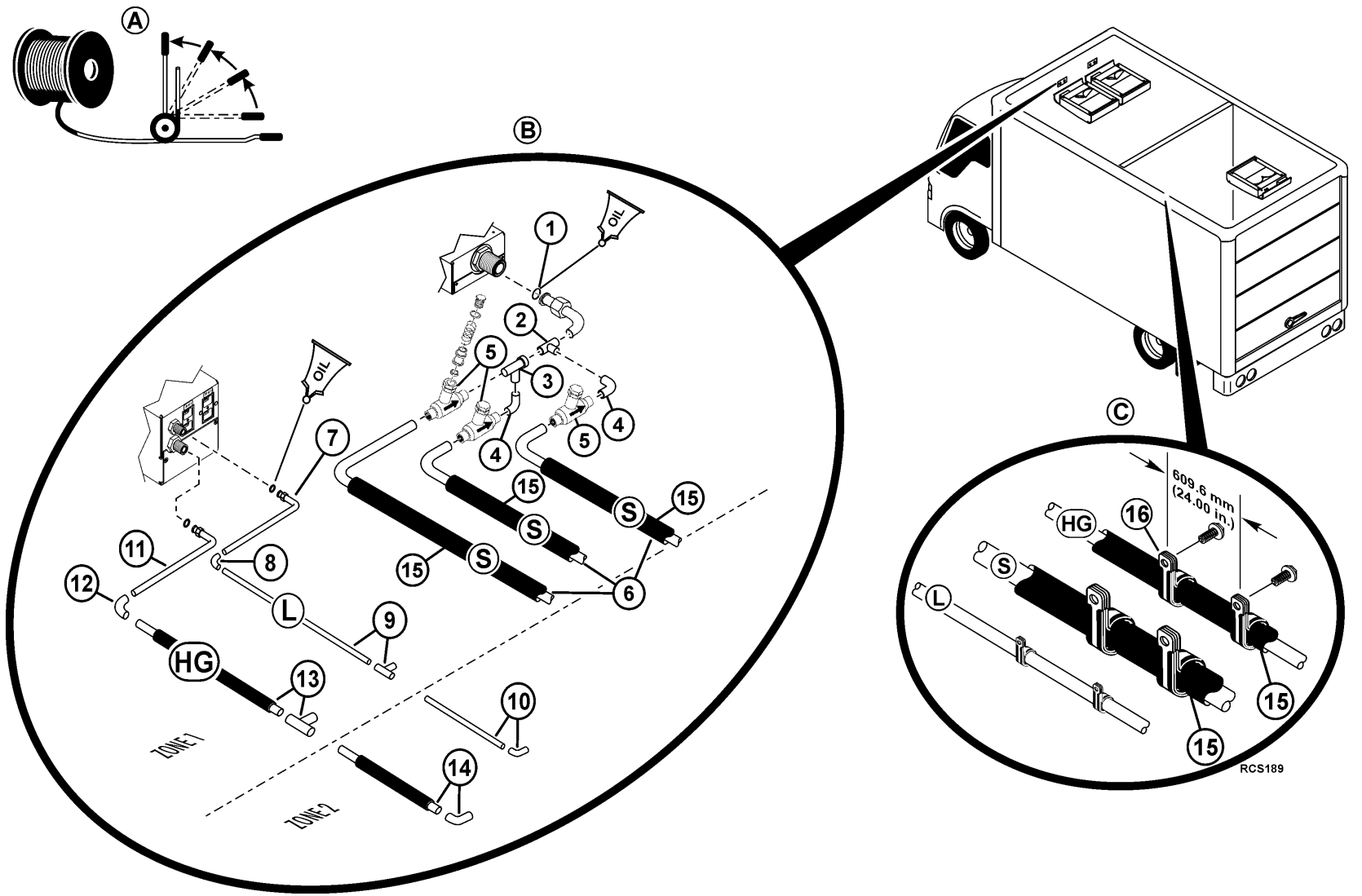
7. Oil new O-ring and install pre-bent 90° 3/8 in. tube onto liquid ORS fitting of condensing unit. Route this tube to the ceiling or wall trough.
8. In the trough, attach 3/8 in. x 3/8 in. elbow onto the liquid tube.
9. Fabricate 3/8 in. tube with 3/8 in. x 3/8 in. x 3/8 in. tee going to Zone 1.
10. From the tee, fabricate 3/8 in. tube with 3/8 in. x 3/8 in. elbow going to Zone 2.

HOT GAS TUBES - (Detail B)

11. Oil new O-ring and install pre-bent 90° 1/2 in. tube onto hot gas ORS fitting of condensing unit. Route this tube to the ceiling or wall trough.
12. In the trough, attach a 1/2 in. x 1/2 in. elbow onto hot gas tube.
13. Fabricate 1/2 in. tube with 1/2 in. x 1/2 in. x 1/2 in. tee going into Zone 1.
14. From the tee, fabricate 1/2 in. tube with a 1/2 in. x 1/2 in. elbow going to Zone 2.
15. Add insulation to suction and hot gas tubes only (**Detail C**).
16. Secure all tubing with provided clamps (**Detail C**).

Refrigeration Tubing Connections to S-2 + S-2 Evaporators

AT THE CONDESING UNIT



Refrigeration Tubing Connections to S-2 + S-2 Evaporators

AT THE EVAPORATOR

CAUTION: Remove holding charge from the evaporator(s) before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable. It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

IMPORTANT: Clean all tubes and fittings prior to installation and soldering.

Copper Fittings		
Items	**Description**	**Part Number**
A	Elbow 90° 7/8 in. x 7/8 in.	553326
B	Tee 1/2 in. x 1/2 in. x 1/2 in.	552296
C	Tee 3/8 in. x 3/8 in. x 3/8 in.	553251

IMPORTANT: You must connect one suction line from the condensing unit to <u>each</u> evaporator.

SUCTION TUBES

1. Fabricate a 7/8 in. suction tube from the condensing unit and route in the trough, install 7/8 in. x 7/8 in. elbow, attach it to the 7/8 in. preformed tube and connect to the <u>second</u> evaporator 7/8 in. tube. Solder all fittings.
2. Fabricate a second 7/8 in. suction tube from the condensing unit and route in the trough, install 7/8 in. x 7/8 in. elbow, attach it to the 7/8 in. preformed tube and connect to the <u>first</u> evaporator 7/8 in. tube. Solder all fittings.

HOT GAS TUBES

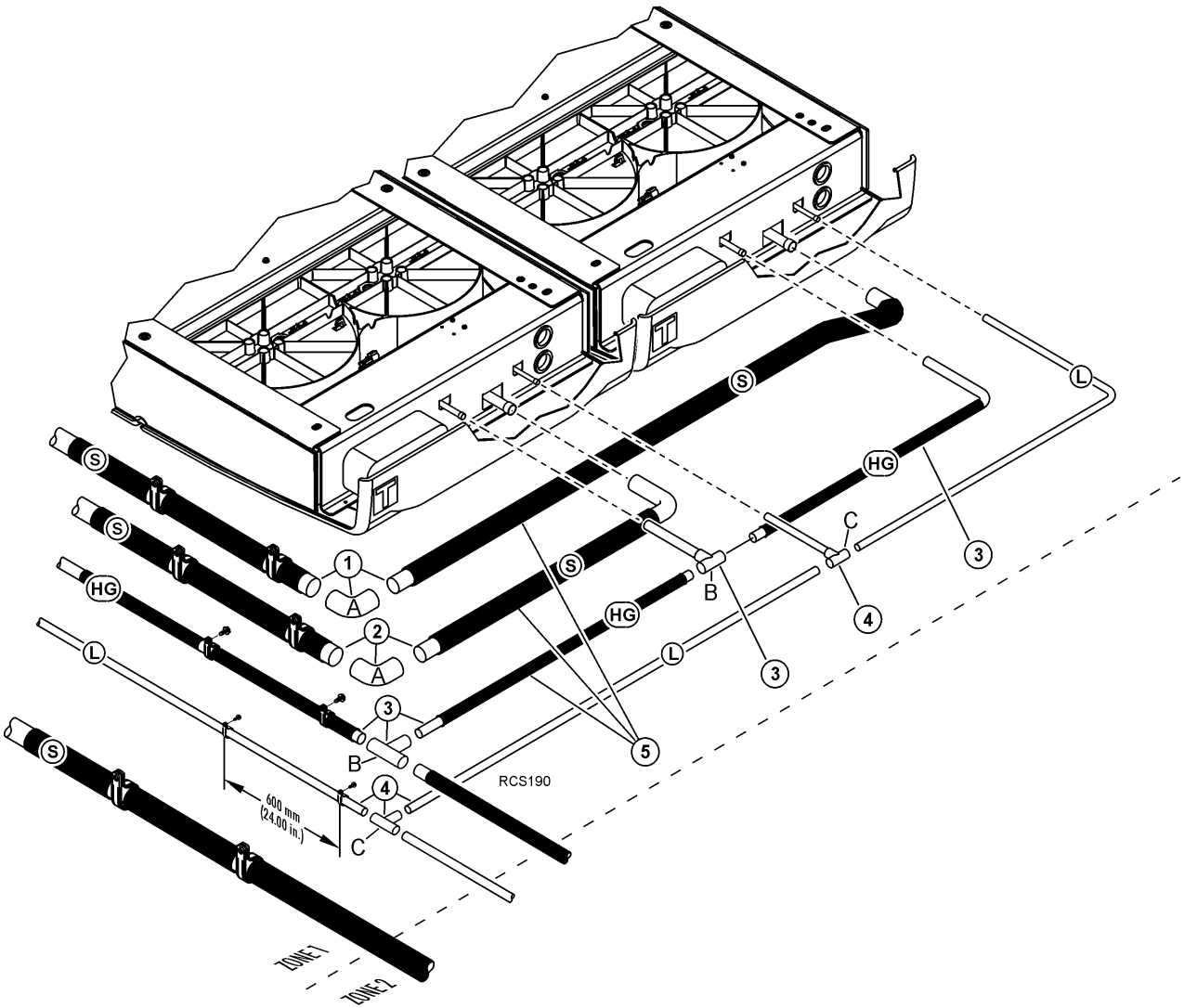
3. Fabricate a 1/2 in. hot gas tube from the condensing unit and route in the trough, install 1/2 in. x 1/2 in. tee, fabricate a 1/2 in. tube, connect to the 1/2 in. x 1/2 in. x 1/2 in. tee, attach it to the 1/2 in. preformed tube and connect to the evaporator 1/2 in. tube. Solder all fittings.

LIQUID TUBES

4. Fabricate a 3/8 in. liquid tube from the condensing unit and route in the trough. Install 3/8 in. x 3/8 in. tee, fabricate a 3/8 in. tube, connect to the 3/8 in. x 3/8 in. x 3/8 in. tee, attach it to the 3/8 in. preformed tube and connect to the evaporator 3/8 in. tube. Solder all fittings.
5. Insulation should be added to all segments of suction and hot gas tubes.
6. Secure all tubing with provided clamps.

Refrigeration Tubing Connections to S-2 + S-2 Evaporators

AT THE EVAPORATOR



Refrigeration Tubing Connections for 3 Zone Systems

AT THE CONDENSING UNIT

CAUTION: Remove holding charge from condensing unit before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable (Detail A). It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

NOTE: Discard O-rings that come with the condensing unit. Oil and install new O-rings supplied in kit.

- Clean all threads on ORS fittings prior to installation.
- Apply refrigerant oil to the O-rings only. **DO NOT APPLY OIL TO THE ORS FITTING THREADS.**
- When tightening ORS tubing connections, always use a backup wrench to hold the backside of the ORS fitting to prevent the refrigeration tube from twisting.
- Torque ORS fittings on the condenser as shown in the table.

Specifications for ORS Fittings

Tube	Size	Thread	Torque	O-ring Gaskets
Liquid	3/8 in.	11/16-16	30 ft-lb	331222
Hot Gas	1/2 in.	13/16-16	40 ft-lb	331015
Suction	7/8 in.	1-3/16-16	60 ft-lb	330566

Copper Fittings

Item	Description	Part Number
#2	Tee,1-1/8 in. x 1- 1/8 in. x 7/8 in.	559517
#3	Tee,1-1/8 in. x 7/8 in. x 7/8 in.	558968
#4	Elbow, 90° 7/8 in. x 7/8 in.	553326
#8	Tee,3/8 in. x 3/8 in. x 3/8 in.	553251
#9	Elbow, 90° 3/8 in. x 3/8 in.	552876
#12	Tee, 1/2 in. x 1/2 in. x 1/2 in.	552296
#13	Elbow, 1/2 in. x 1/2 in.	558812

SUCTION TUBES - (Detail B)

1. Oil new O-ring and install pre-bent 90° 1-1/8 in. tube onto suction ORS fitting of condensing unit**.**
2. Install 1-1/8 in. x 1-1/8 in. x 7/8 in. tee onto suction tube.
3. Install 1-1/8 in. x 7/8 in. x 7/8 in. tee onto suction tube.
4. Install 7/8 in. x 7/8 in. elbows onto suction tube tee's.
5. Each zone needs to have a separate suction line with a check valve installed as close as possible to condensing unit.

   NOTE: Remove internal components of valves before soldering and use 35% silver solder.
6. Fabricate 7/8 in. tubes and install onto check valves.

LIQUID TUBES - (Detail B)

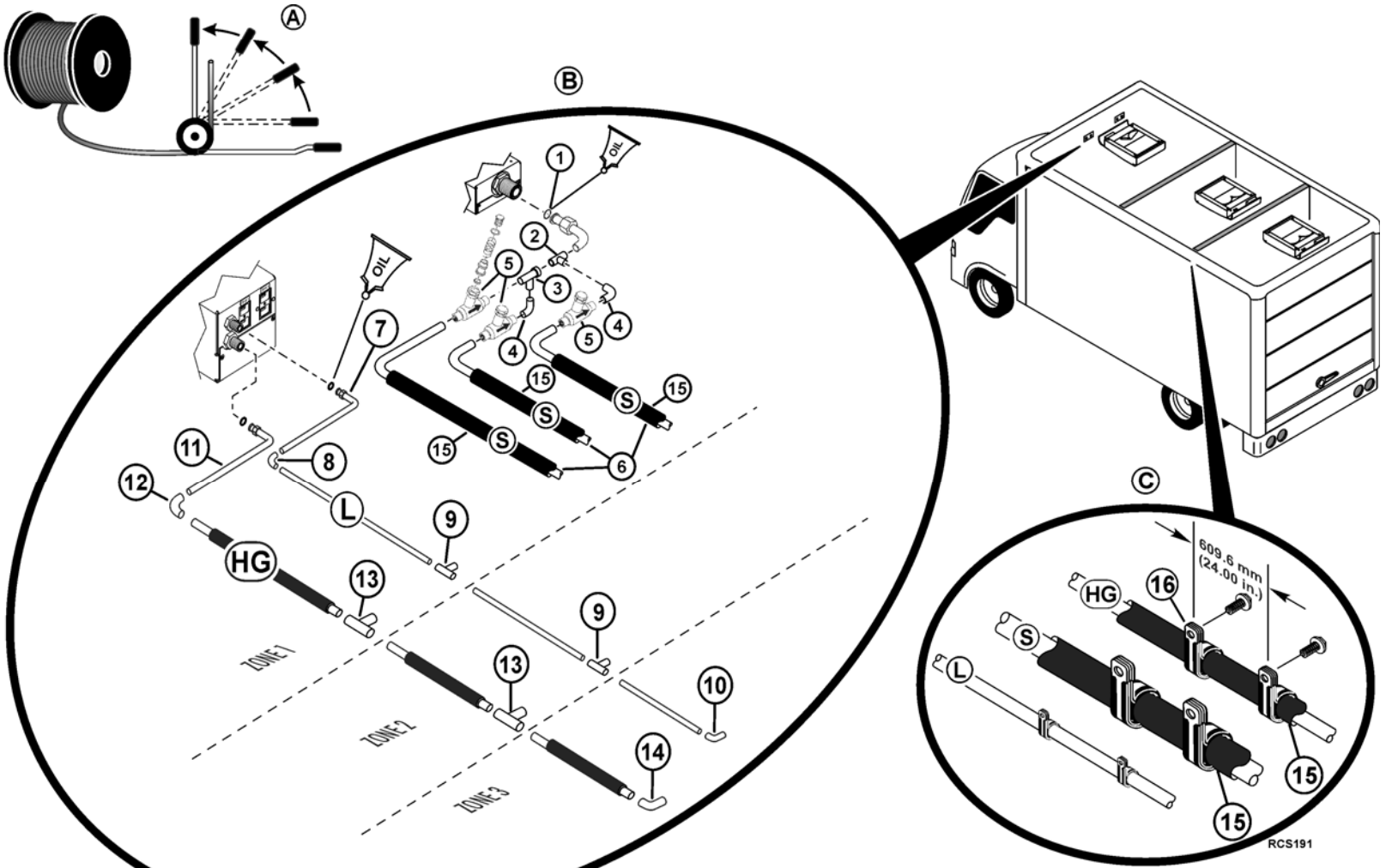
7. Oil new O-ring and install pre-bent 90° 3/8 in. tube onto liquid ORS fitting of condensing unit (Detail B). Route this tube to the ceiling or wall trough.
8. In the trough, attach 3/8 in. x 3/8 in. elbow onto the liquid tube.
9. Fabricate 3/8 in. tubes with 3/8 in. x 3/8 in. x 3/8 in. tee's going into Zone 1 and Zone 2 (Detail B).
10. In Zone 3, install 3/8 x 3/8. elbow onto liquid tube.

HOT GAS TUBES - (Detail B)

11. Oil new O-ring and install pre-bent 90° 1/2 in. tube onto hot gas ORS fitting of condensing unit (Detail B). Route this tube to the ceiling or wall trough.
12. In trough, attach a 1/2 in. x 1/2 in. elbow onto hot gas tube.
13. Fabricate 1/2 in. tubes with 1/2 in. x 1/2 in. x 1/2 in. tee's going into Zone 1 and Zone 2.
14. In Zone, 3 install 1/2 in. x 1/2 in. elbow onto hot gas tube **(Detail B)**.
15. Add insulation to suction and hot gas tubes only **(Detail B).**
16. Secure all tubing with provided clamps **(Detail C)**.

Refrigeration Tubing Connections for 3 Zone Systems

AT THE CONDENSING UNIT



Refrigeration Tubing Connections for 3 Zone Systems

AT THE EVAPORATORS

CAUTION: Remove holding charge from the evaporator(s) before proceeding to avoid personal injury.

NOTE: Thermo King requires the use of bulk rolled refrigeration tubing and tube benders to reduce fittings and solder joints where applicable. It is also required that the use of nitrogen or another inert gas be used to purge the tubes before soldering. This prevents oxidation and formation of scale inside tubes.

IMPORTANT: Clean all tubes and fittings prior to installation and soldering

Copper Fittings		
Item	**Description**	**P/N**
A	Elbow, 90° 7/8 in. x 7/8 in.	553326
B	Elbow, 90° 1/2 in. x 1/2 in.	551483
C	Elbow, 90° 3/8 in. x 3/8 in.	556359

IMPORTANT: You must connect one suction line from the condensing unit to <u>each</u> evaporator.

SUCTION TUBES

1. Fabricate a 7/8 in. suction tube from the condensing unit and route in the trough, install 7/8 in. x 7/8 in. elbow, attach to the 7/8 in. preformed tube and connect to the evaporator 7/8 in. fitting in Zone 1. Solder all fittings. Repeat for Zone 2 and Zone 3 evaps.

HOT GAS TUBES

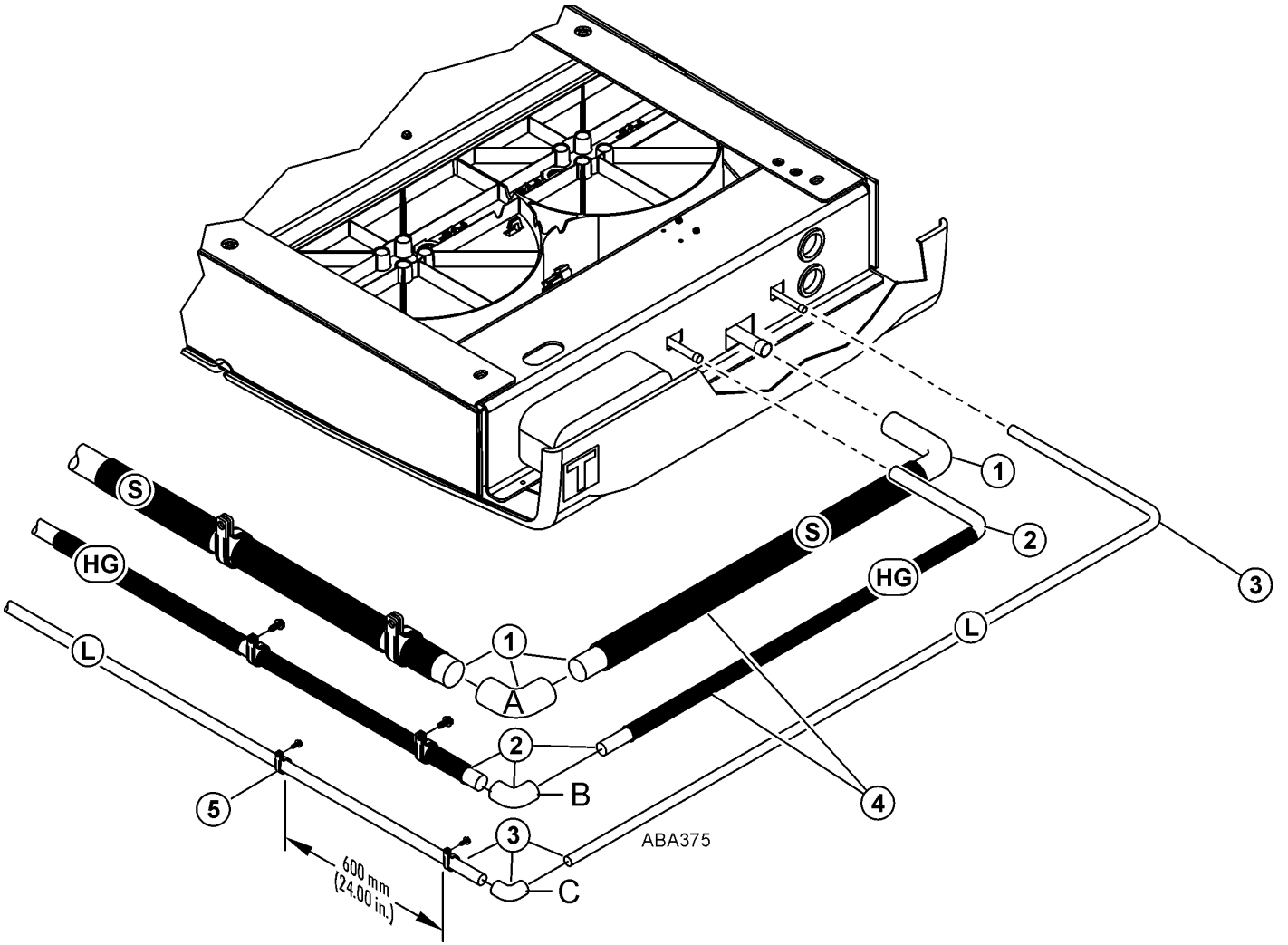
2. From the condensing unit, attach the 1/2 in. preformed tube and connect to the evaporator 1/2 in. fitting in Zone 1. Solder all fittings. Repeat for Zone 2 and Zone 3 evaps

LIQUID TUBES

3. From the condensing unit, install 3/8 in. preformed tube and connect to the evaporator 3/8 in. fitting in Zone 1. Solder all fittings. Repeat for Zone 2 and Zone 3 evaps.
4. Insulation should be added to all segments of suction and hot gas tubes.
5. Secure all tubing with provided clamps.

Refrigeration Tubing Connections for 3 Zone Systems

AT THE EVAPORATORS



Wire Connections to S-2 or S-3 Evaporators

S-2 or S-3 Evaporators

IMPORTANT: For the system to operate correctly, all Zone One harnesses at the condensing unit must be connected only to the Zone One evaporator, and all Zone Two harnesses at the condensing unit must be connected only to the Zone Two evaporator.

Superlube (203-524 or equivalent) must be applied to all electrical connections.

1. **ZONE HARNESS** - Attach the 24 pin connector to the correct (Zone One or Zone Two) mating connector at the back of condensing unit **(Detail A)**.
   - Route the 5 bare wires (SLS, LLS, HGS, SC and DH) to the terminal block of the correct (Zone One or Zone Two) evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block of the evaporator **(Detail B)**.
2. Attach the sensor connectors to the mating connectors located in the correct (Zone One or Zone Two) evaporator **(Detail C)**:
   - Coil Temperature Sensor (CTN, CTP)
   - Discharge Air Temperature Sensor (DTN, DTP)
   - Return Air Temperature Sensor (RTN, RTP)

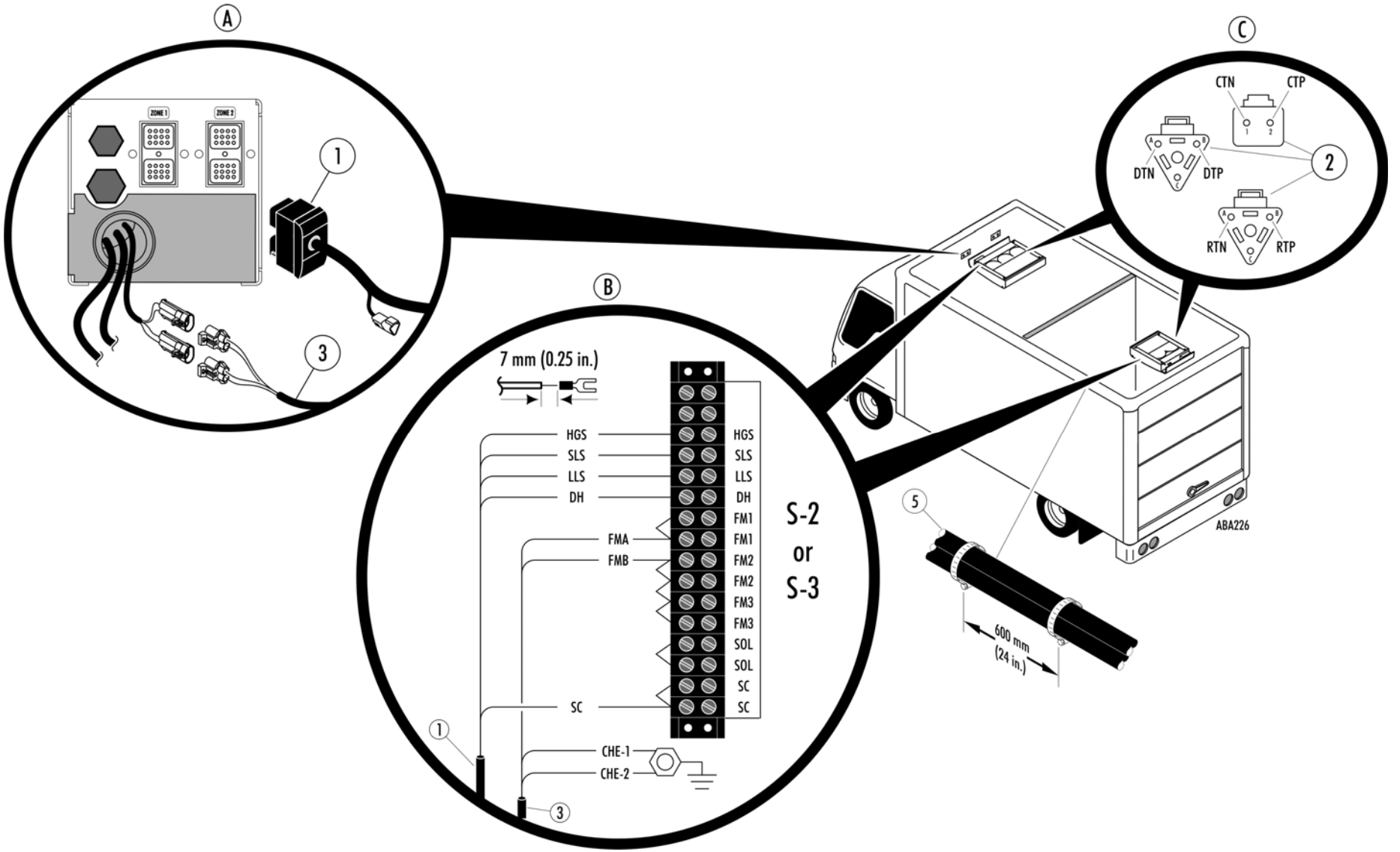
IMPORTANT: The gold terminal pins supplied in the installation kit must be used if the sensor harnesses are cut to length.

3. **FAN HARNESS** - Attach the 2 pin connectors (FMA, CHE-1 and FMB, CHE-2) to the correct (Zone One or Zone Two) mating connectors at the back of the condensing unit **(Detail A)**.

ZONE ONE	ZONE TWO
FM1A, CHF-1 FM1B, CHF-2	FM2A, CHF-3 FM2B, CHF-4

   - Route the 4 bare wires (CHE-1, CHE-2, FMA and FMB) to the terminal block on the correct (Zone One or Zone Two) evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block and ground stud of the evaporator **(Detail B)**.
4. Secure all harnesses with adequate clamps or ties approximately every 600 mm (24 in.).

Wire Connections to S-2 or S-3 Evaporators



Wiring Connections to S-2 + S-2 Evaporators

S-2 + S-2 Evaporators

IMPORTANT: For the system to operate correctly, all Zone One harnesses at the condensing unit must be connected only to the Zone One evaporator, and all Zone Two harnesses at the condensing unit must be connected only to the Zone Two evaporator.

Superlube (203-524 or equivalent) must be applied to all electrical connections.

1. **ZONE HARNESS** - Attach the 24 pin connector to the correct (Zone One or Zone Two) mating connector at the back of condensing unit **(Detail A)**.
   - Route the 5 bare wires (SLS, LLS, HGS, SC and DH) to the terminal block of the correct (Zone One or Zone Two) evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block of the evaporator **(Detail B)**.
2. Attach the sensor connectors to the mating connectors located in the evaporator **(Detail C)**:
   - Coil Temperature Sensor (CTN, CTP)
   - Discharge Air Temperature Sensor (DTN, DTP)
   - Return Air Temperature Sensor (RTN, RTP)

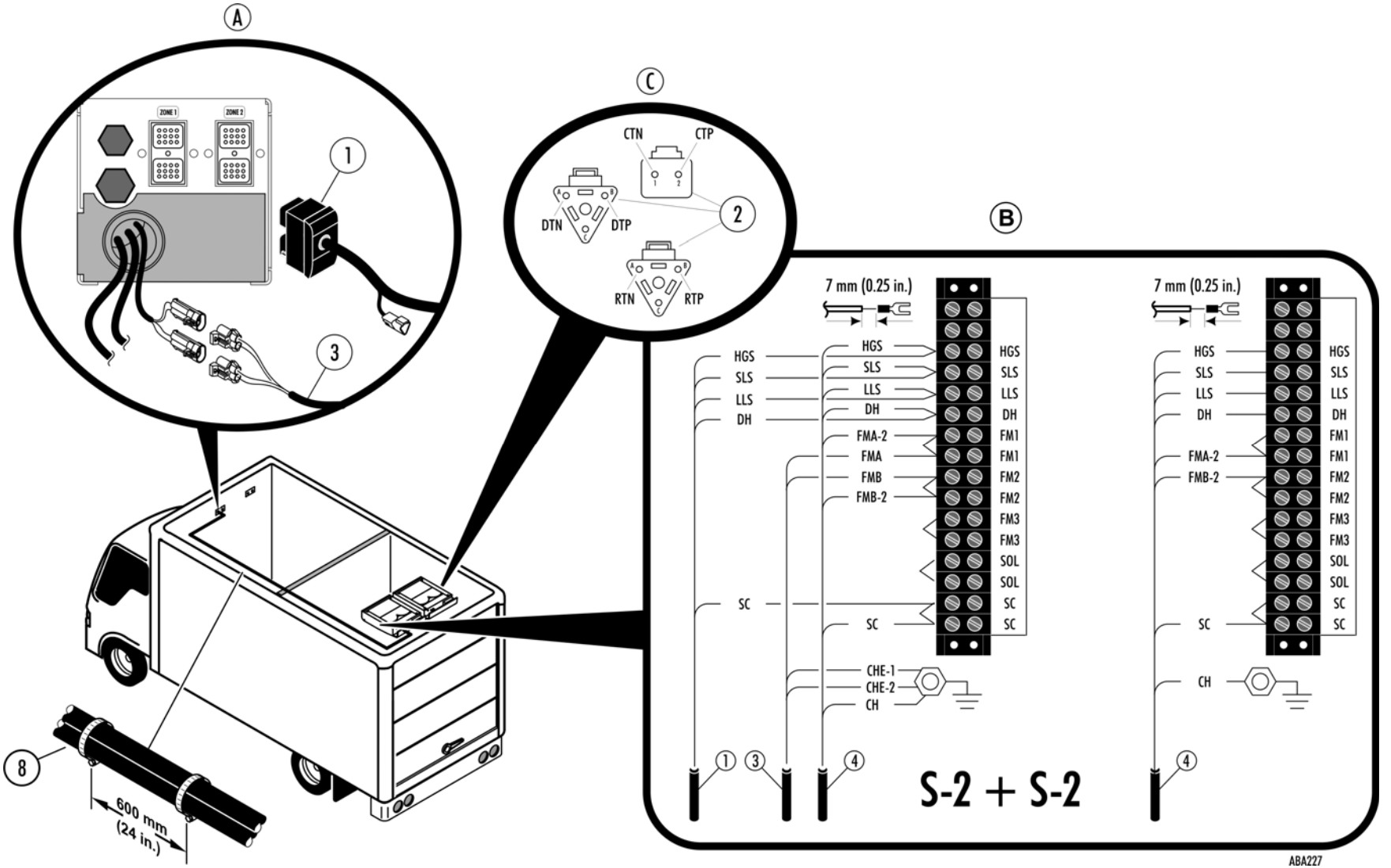
IMPORTANT: The gold terminal pins supplied in the installation kit must be used if the sensor harnesses are cut to length.

3. **FAN HARNESS** - Attach the 2 pin connectors (FMA, CHE-1 and FMB, CHE-2) to the correct (Zone One or Zone Two) mating connectors at the back of the condensing unit **(Detail A)**.

ZONE ONE	ZONE TWO
FM1A, CHF-1 FM1B, CHF-2	FM2A, CHF-3 FM2B, CHF-4

   - Route the 4 bare wires (CHE-1, CHE-2, FMA and FMB) to the terminal block on the evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block and ground stud of the evaporator **(Detail B)**.
4. **Interconnect Harness -** Connect the 8 terminals onto the terminal strip and ground stud of one of the evaporators **(Detail B)**.
   - Route the 8 bare wires (FMA-2, FMB-2, CH, HGS, LLS, SLS, SC and DH) t o the second evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block and ground stud of the second evaporator **(Detail B)**.
5. Secure all harnesses with adequate clamps or ties approximately every 600 mm (24 in.).

Wiring Connections to S-2 + S-2 Evaporators



Wiring Connections for 3 Temperature Systems

IMPORTANT: For the system to operate correctly, all Zone One harnesses at the condensing unit must be connected only to the Zone One evaporator, all Zone Two harnesses at the condensing unit must be connected only to the Zone Two evaporator and all Zone Three harnesses at the condensing unit must be connected only to the Zone Three evaporator.

Superlube (203-524 or equivalent) must be applied to all electrical connections.

1. **ZONE HARNESS** - Attach the 24 pin connector to the correct (Zone One, Zone Two or Zone Three) mating connector at the back of condensing unit **(Detail A)**.
   - Route the 5 bare wires (SLS, LLS, HGS, SC and DH) to the terminal block of the correct (Zone One, Zone Two or Zone Three) evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block of the evaporator **(Detail B)**.
2. Attach the sensor connectors to the mating connectors located in the evaporator **(Detail C)**:
   - Coil Temperature Sensor (CTN, CTP)
   - Discharge Air Temperature Sensor (DTN, DTP)
   - Return Air Temperature Sensor (RTN, RTP)

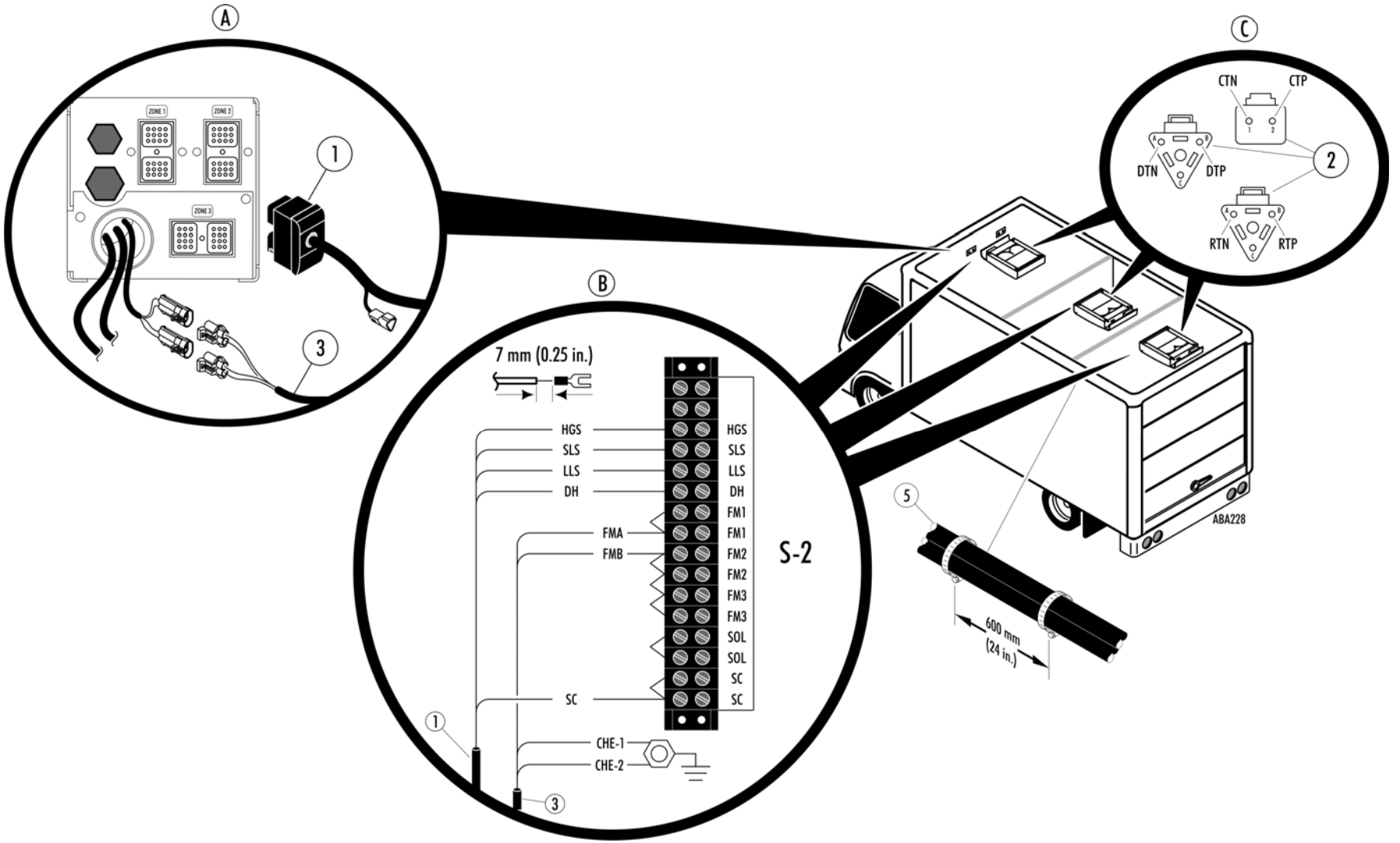
IMPORTANT: The gold terminal pins supplied in the installation kit must be used if the sensor harnesses are cut to length.

3. **FAN HARNESS** - Attach the 2 pin connectors (FMA, CHE-1 and FMB, CHE-2) to the correct (Zone One, Zone Two or Zone Three) mating connectors at the back of the condensing unit **(Detail A)**.

ZONE ONE	ZONE TWO	ZONE THREE
FM1A, CHF-1 FM1B, CHF-2	FM2A, CHF-3 FM2B, CHF-4	FM3A, CHF-5 FM3B, CHF-6

   - Route the 4 bare wires (CHE-1, CHE-2, FMA and FMB) to the terminal block on the evaporator.
   - Cut the wires to length, strip 7 mm (0.25 in.) from the ends and attach the terminals securely.
   - Connect each wire to the terminal block and ground stud of the evaporator **(Detail B)**.
4. Secure all harnesses with adequate clamps or ties approximately every 600 mm (24 in.).

Wiring Connections for 3 Temperature Systems



Evaporator Drain Hose Installation

Drain Hose Resistance Wires

DANGER: Never bundle resistance wires together as the amount of heat produced could result in a fire!

IMPORTANT: DO NOT CUT RESISTANCE WIRES!

See “Evaporator Drain Hose Resistance Wire Installation Guide” on page 108 for details on how to properly install the resistance wires.

Drain Hoses

NOTE: For proper drainage the drain hose must slope down continuously from the evaporator to the wall drains with no kinks or droop.

NOTE: Make sure drain tubes are properly seated on tube fittings before mounting to evaporator.

See “Defrost Drain Tube Connectors” on page 28 for details on how to properly install the drain tube connectors.

S-2 and S-3 Applications (Detail A)

1. Route each resistance wire from the evaporator through the plastic drain hose and **insert the entire length of one resistance wire into each wall drain tube**.
2. Connect the single drain hose to the wall drain tube using a short piece of plastic drain hose and clamp as required.
3. Replace drain t-fitting with elbow fitting.

S-2 + S-2 Applications (Detail B)

4. Route each resistance wire from the evaporator through the plastic drain hose and **insert the entire length of one resistance wire into each wall drain tube**.
5. Connect each drain hose to each wall drain tube using a short piece of plastic drain hose and clamps as required.

Wall Mounted Tube Applications (Detail C)

Insert the entire length of the resistance wire into the wall drain tube. Connect the plastic drain hose from the evaporator.

Wall Mounted Channel Applications (Detail D)

Insert the entire length of the resistance wire into the plastic drain hose. Feed the plastic drain hose down through the wall channel until it exits the bottom of the truck.

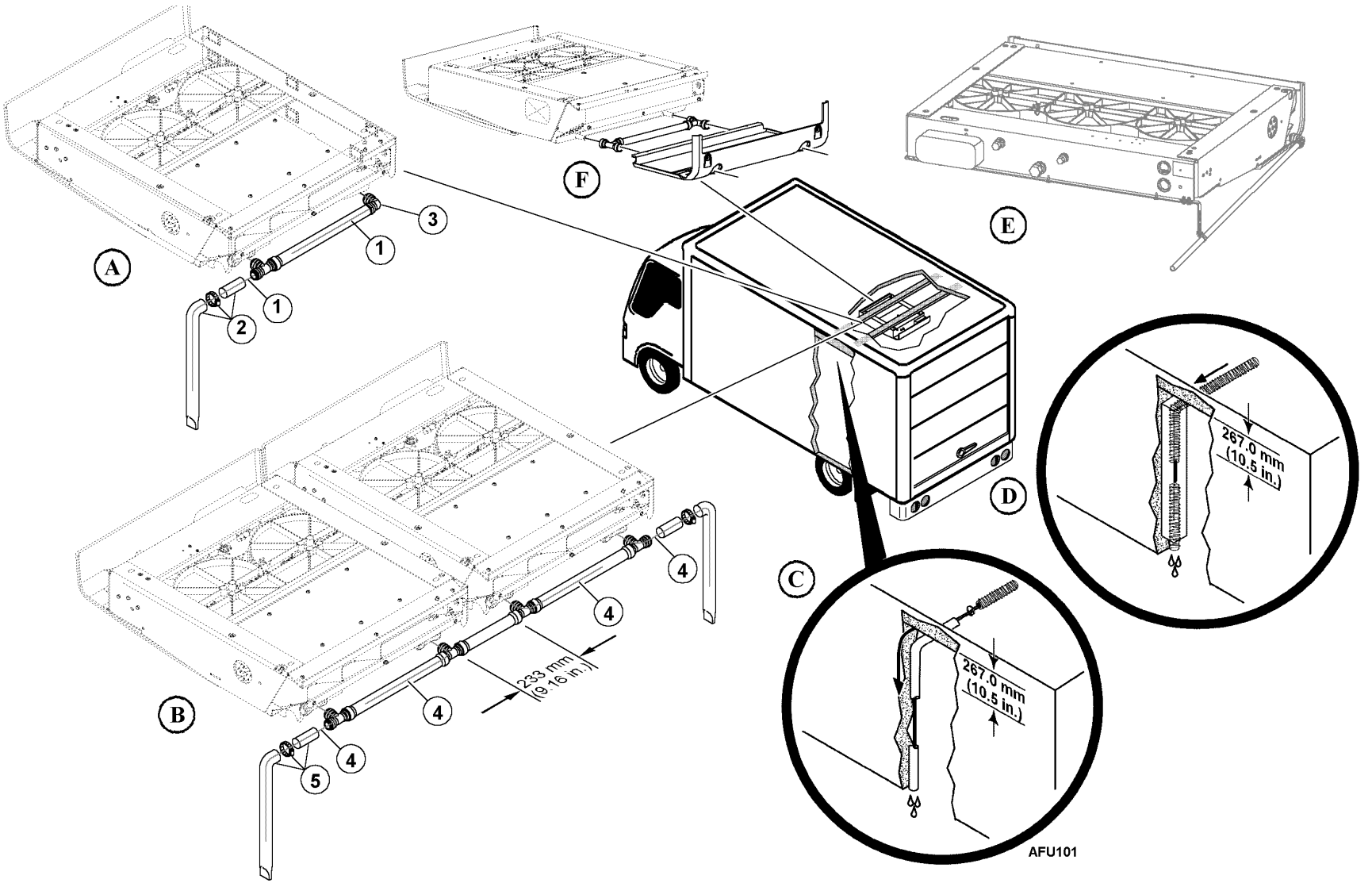
Optional Drain Hose Support (Detail E)

The use of the optional drain hose support bracket is recommended when the evaporator drain tube cannot be directly routed into a wall drain.

Front Drain Hose Applications (Detail F)

Install drain t-fittings to allow drain tube to exit the front of the evaporator, **insert the entire length of one resistance wire into each drain hose,** and route hose out the front of the cover to the wall drain.

Evaporator Drain Hose Installation



Evaporator Drain Hose Resistance Wire Installation Guide

IMPORTANT: The following information is provided as a guide to help ensure the proper routing of the drain hose resistance wires. You should supplement this guide with whatever other documentation is required for your facility.

Drain Hose Resistance Wire Installation Guide

1. Remove the resistance wire from the evaporator drain tube and pull the wire out straight.
2. Locate the evaporator defrost drain furthest from the wall (i.e. in the middle of the cargo box), and measure 33.00 in. (838 mm) of the resistance wire from the drain pan outlet **(Detail I)**.

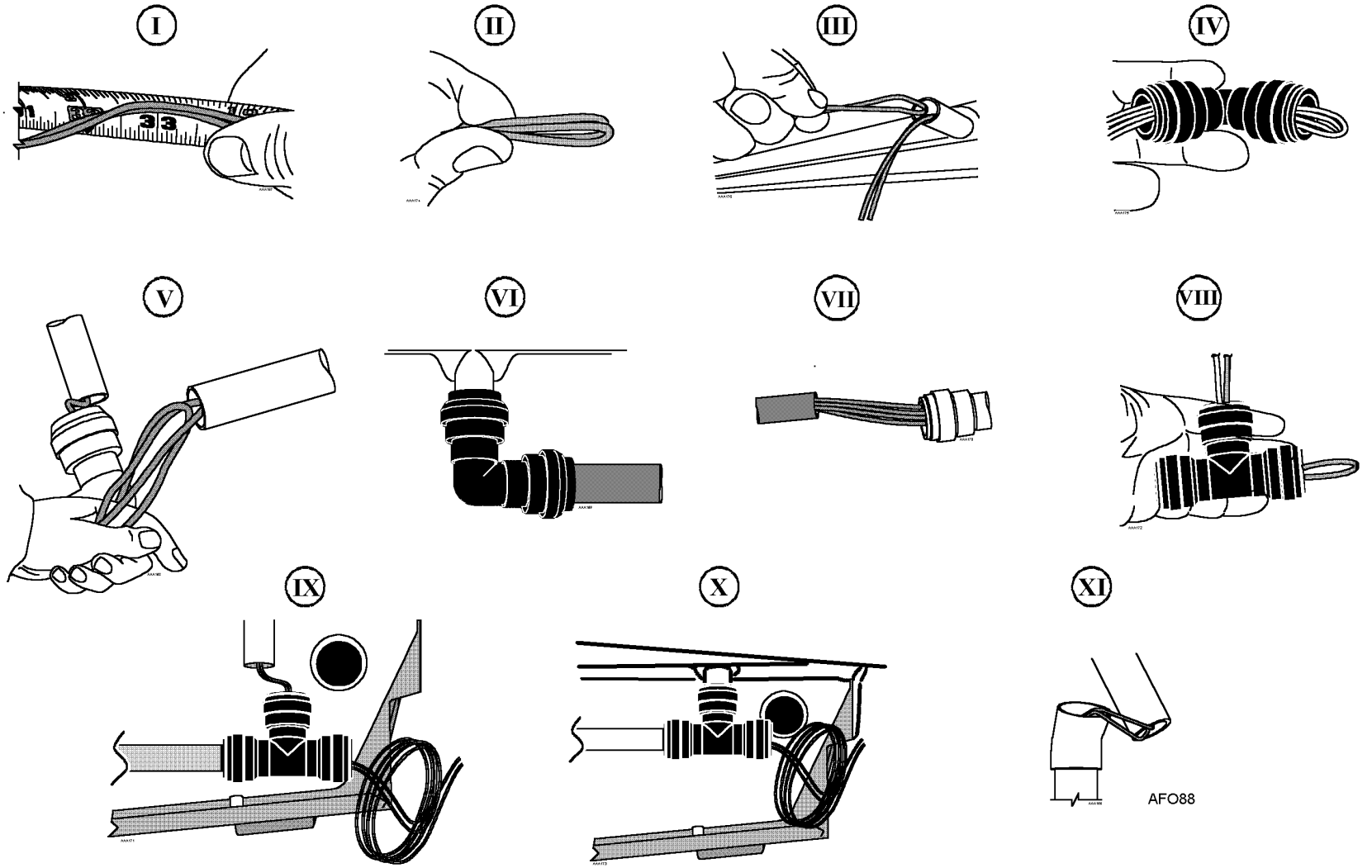
   NOTE: 20.00 in. (508 mm) for S-2 evaporators.
3. Bend the resistance wire at this point and double it over **(Detail II)**.
4. After doubling the resistance wire over (Step #3) take the excess wire and insert it back into the evaporator drain tube **(Detail III)**.
5. Insert the doubled over end of the resistance wire into the drain Tee or 90 degree connector **(Detail IV)** and then into the crossover drain tube **(Detail V)**.

   NOTE: The use of either white or blue drain tubes is acceptable when interconnecting multiple evaporators.
6. Attach the drain Tee or 90 degree connector to the evaporator drain tube and push the connector on firmly to engage the O-ring **(Detail VI)**.
7. Pull the resistance wire through the interconnecting drain tube as far as possible and make sure it is not bunched up **(Detail VII)**.
8. Insert the other resistance wire into the other drain Tee connector and as shown **(Detail VIII)**.

   IMPORTANT: At no time should resistance wires from one side of the drain pan overlap the resistance wires from the other side.
9. Attach the interconnecting drain tube to the opposite Tee connector by pushing the Tee connector on firmly to engage the O-ring **(Detail IX)**.
10. Attach the Tee connector to the evaporator drain tube by pushing the Tee connector on firmly to engage the O-ring **(Detail X)**.
11. Attach and route the evaporator drain tube over to the wall drain. Insert the resistance wire into the wall drain and pull it as far down the wall drain as possible **(Detail XI)**.

    IMPORTANT: Only <u>one</u> resistance wire should be installed in the wall defrost drain tube. Only the resistance wire from the drain tube <u>closest</u> to the wall should be installed in the trailer drain tube.

Evaporator Drain Hose Resistance Wire Installation Guide



Installing the Door Switch (OPTION)

NOTE: These instructions are intended as reference guide only to assist with a typical hard wired, 3-wire door switch installation. Your installation may be different depending on the cargo box, the amount and types of doors and the customers particular requirements. After the door switches are installed they need to be activated through the HMI. See "Door Switch Setup Procedures (OPTION)" on page 114.

- When installing CargoLink wireless door switches, see TK 55151 CargoLink Installation Manual.

3-Wire Door Switch Components

The door switch consists of a magnet, a switch, non-magnetic mounting hardware and a interface harness to connect to the host unit. If alternate hardware is used it must also be non-magnetic or the door switch will not operate properly.

- The ***magnet*** is always mounted on the door.
- The ***switch*** (with harness) is always mounted to a stationary location.
- Two short ***interface harnesses*** are available:
  41-7281 allows a single door switch in a single zone to activate a unit shutdown.
  41-7282 allows two door switches (**maximum two doors**) in the same zone to each activate a unit shutdown.

Installer is to supply and fabricate the harness connecting the interface harness to the door switch per the illustrations. The harness should be 18 AWG or better, 3 wires, color coded RED, BLACK and WHITE.

Mounting Locations

The door switch can be mounted on the inside or outside of either swing out or roll-up doors and can be mounted in various positions to accommodate particular applications.

IMPORTANT INSTALLATION NOTES:

- The door switch must be installed away from traffic (i.e. forklifts) or protected from it.
- The door switch and magnet must be installed parallel to each other, not perpendicular. Long cross hair aligns to long cross hair.
- It is important that a maximum gap of 19 mm (0.75 in.) is maintained between the door switch and the magnet. Shims may be required and must be a non-magnetic material (aluminum, wood, plastic, etc.) or the door switch will not operate properly.

(Detail A) Ceiling - Right Angle Mounting

1. Mount the **magnet** flush with the top edge of the door and secure with supplied hardware.
2. Close the door and mount the **switch** to the door sill parallel with the magnet, being sure the "cross hairs" are aligned and that the maximum gap of 19 mm (0.75 in.) is maintained.

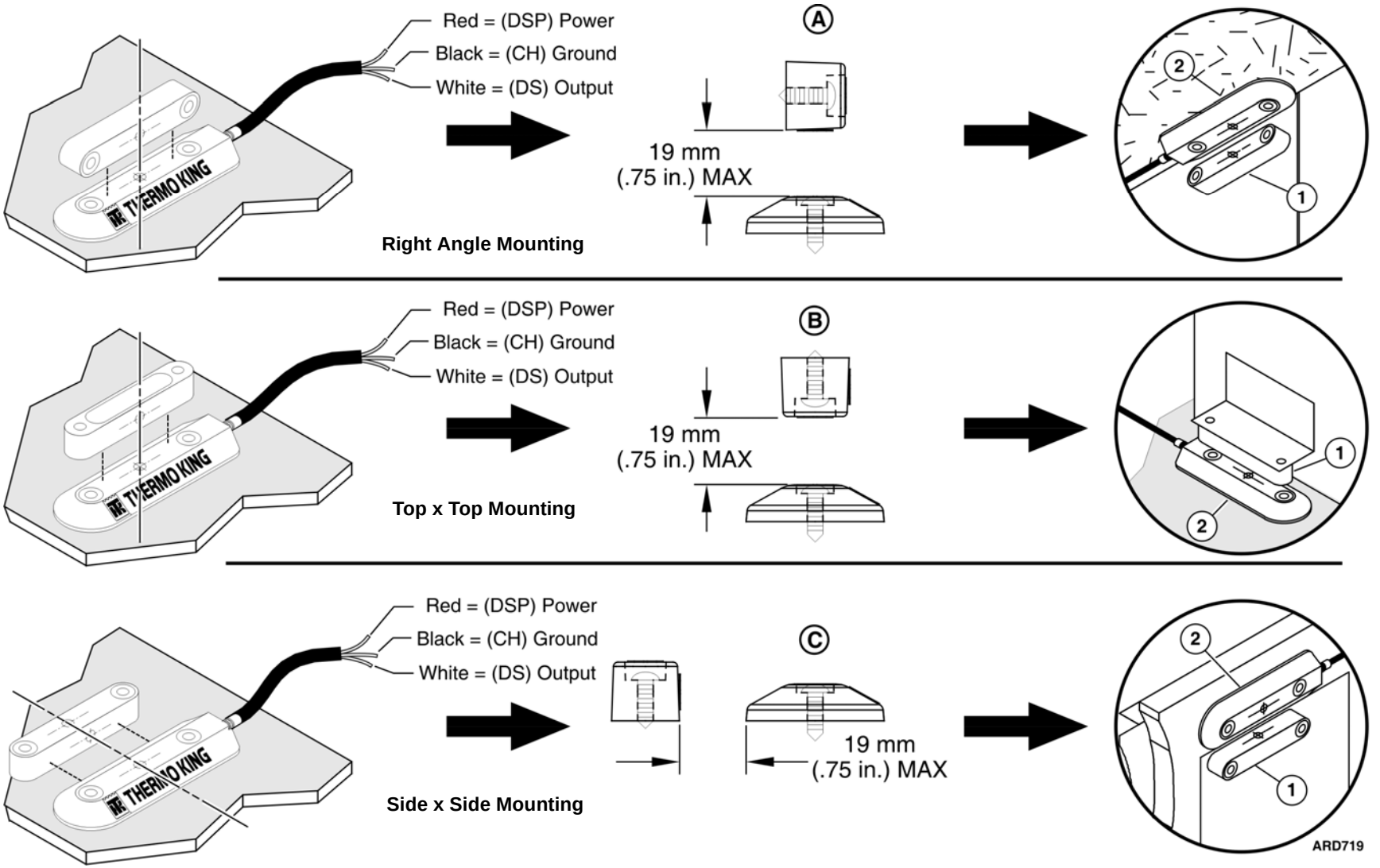
(Detail B) Floor - Top x Top Mounting

1. Mount the **magnet** flush with the bottom edge of the door and secure with supplied hardware.
2. Close the door and mount the **switch** to the floor parallel with the magnet, being sure the "cross hairs" are aligned and that the maximum gap of 19 mm (0.75 in.) is maintained.

(Detail C) Outside Door - Side x Side Mounting

1. Mount the **magnet** flush with the top edge of the door and secure with supplied hardware.
2. Close the door and mount the **switch** to the door sill parallel with the magnet, being sure the "cross hairs" are aligned and that the maximum gap of 19 mm (0.75 in.) is maintained

Installing the Door Switch (OPTION)



Installing the Door Switch (OPTION)

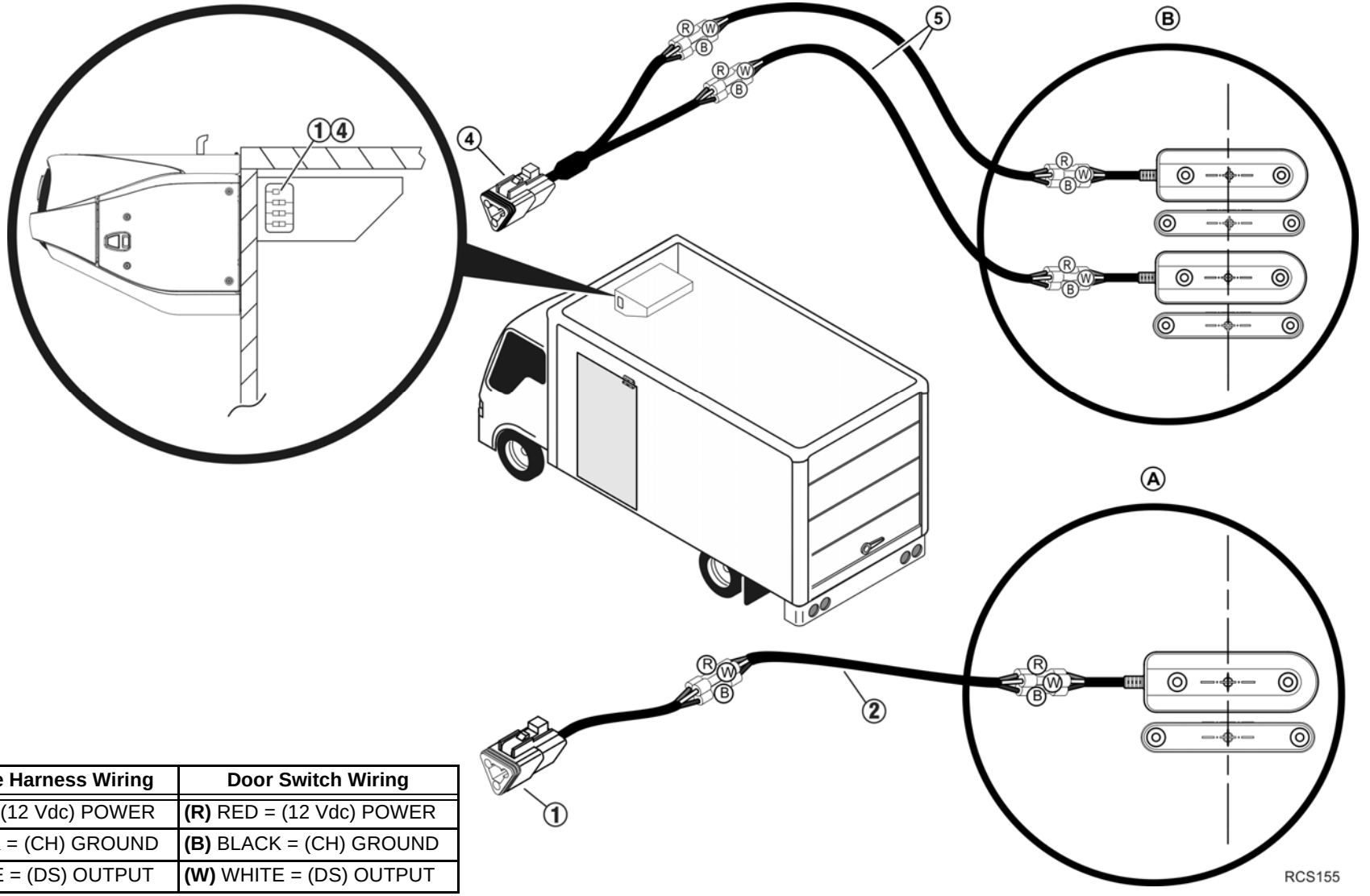
Single Door Switch Activation / Single Zone (Detail A)

1. Attach the interface harness **(41-7281)** to the door switch connector located at the rear of the unit.
2. Route a 3 wire harness **(installer supplied)** from the interface harness to a **single** door switch. Connect matching wires per the table below **(RED/RED, WHITE/WHITE, BLACK/BLACK)** to each door switch using splice connectors. Crimp splice connectors securely and apply heat with a heat gun.
3. All harnesses should be installed, routed and properly secured to protect from damage.

Multiple Door Switch Activation / Single Zone (Detail B)

4. Attach the interface harness **(41-7282)** to the door switch connector located at the rear of the unit.
5. Route a 3 wire harness **(installer supplied)** from the interface harness to **each** door switch - **Maximum Two Doors**. Connect matching wires per the table below **(RED/RED, WHITE/WHITE, BLACK/BLACK)** to each door switch using splice connectors. Crimp splice connectors securely and apply heat with a heat gun.
6. All harnesses should be installed, routed and properly secured to protect from damage

Installing the Door Switch (OPTION)



Interface Harness Wiring	Door Switch Wiring
(R) RED = (12 Vdc) POWER	**(R)** RED = (12 Vdc) POWER
(B) BLACK = (CH) GROUND	**(B)** BLACK = (CH) GROUND
(W) WHITE = (DS) OUTPUT	**(W)** WHITE = (DS) OUTPUT

Door Switch Setup Procedures (OPTION)

Accessing the Guarded Access Menu

- From the Standard Display press the MENU key. The controller will display the Operator Menu.
- From the first Operator Menu display (either Alarms or Language) press and hold both the EXIT key and the key with no label above it for 5 seconds.
- After 5 seconds the controller will display the Maintenance Menu. Press the NEXT key until the Time and Date Menu appears.
- From the Time and Date Menu press and hold both the EXIT key and the key with no label above it for 5 seconds.
- After 5 seconds the controller will display a Security Code challenge. If no Security Code has been set the display will show “1”.
- Press the YES key to enter the Guarded Access Menu. If a Security Code has been set the operator is prompted to enter the correct code and press the YES key to enter the Guarded Access Menu. If the correct Security Code is not entered, access to the Guarded Access Menu will be denied.
- Enter Programmable Features Menu, then scroll to DOOR ACTION (or DOOR OPEN FORCES) display.

Door Open is Enabled

This feature allows the Door Open Feature to be enabled or disabled. If Door Open is set ENABLED the door switch will operate as selected with the Door Action feature below. If the Door Open is set DISABLED the door switch has no function. The default setting is DISABLED.

Door Action

This feature allows the door switch function to be set to operate in one of the following schemes.

1. **Running in Null -** Place the zone in Running Null when the zone door is opened for 2 seconds and allow the zone to run when zone door is closed for 5 seconds. If the unit is operating as a single zone or zone Running Null is not allowed the unit will be forced to Null (unit off).
2. **Null -** Force the zone into Null (zone off) when the zone door is opened for 2 seconds and allow the zone to run 5 seconds after zone door is closed. If the unit is operating as a single zone or zone Null is not allowed, the unit will be forced to Null (unit off). Door switch Null is not allowed if all other zones are in Null.
3. **Timed Off -** The unit will shut down for the time interval selected by Select Time Off. After this time period elapses the unit will restart even if the door is still open.
   Select Time Off - This feature only appears if Timed Off operation is selected. Select Time Off sets a time limit for door open event. If the time is exceeded, unit operation resumes even if the door is still open. The time range is from 1 to 4 hours in 10 minute increments. The default setting is 1 hour.
4. **Log Only -** Log door opening and closing only. No other unit action. There is a 4 second delay to log door open and door closed.
5. **Unit Off** - Force the unit into Null (unit off) when any door is opened for 2 seconds and allow the unit to run when all doors are closed for 5 seconds.

The default setting is Running in Null.

NOTE: Refer to TK-51652-1-OD for complete information about the microprocessor.

Auxiliary Electrical Accessories

NOTE: Thermo King does not recommend adding auxiliary electrical accessories to the electrical system of T-80 Series Self Powered Truck Units equipped with SR-3 Controllers and Tier 4 Engines.

Connecting the Battery

Important Battery Information

IMPORTANT: See Safety Precautions - "Battery Installation and Cable Routing" on page 8 for additional information.

NOTE: Thermo King units are designed for one 12 volt, group 31 battery. The battery must be suitable for deep cycling, heavy duty and rated with a minimum of 95 amp/hr.

Positive Cable

1. At the unit, locate the large black cable marked **POS+**. Route this cable to the battery, cut to the proper length and add battery cable lug from installation kit. This cable will be attached to the battery later.

In-Line Fuse Installation

IMPORTANT: You must read and follow the instructions included with the in-line fuse kit.

2. Cut <u>one</u> in-line fuse wire to a maximum length of 12.00 in. (305 mm) and strip 0.50 in. (12 mm) from the end.
3. Slide the heat shrink tubing onto the wire and position it away from the connection.
4. Securely crimp and solder the correct size ring terminal onto the wire.
5. Position the heat shrink tubing over the body of the terminal and the wire and then apply heat.
6. Cut the other end of the in-line fuse wire and the unit's power **(2)** wire to appropriate lengths and strip 0.50 in. (12 mm) from the ends of each wire.
7. Slide the heat shrink tubing onto one wire and position it away from the connection.
8. Using the supplied butt splice connector, securely crimp and solder the two wires together.
9. Position the heat shrink tubing over the entire connection and then apply heat.
10. Attach the ring terminal onto the positive (+) battery lug and tighten securely.
11. Route and secure the in-line fuse to the vehicle or alongside the positive battery cable with the supplied cable ties.
    - The in-line fuse should be positioned **vertically** to help promote water drainage.
    - Fuses mounted **horizontally** must have the slit in the sleeving pointing downwards.

Cable ties should be positioned within 5.00 in. (127 mm) on each side of fuse as shown and no further than 10.00 in. (254 mm) apart

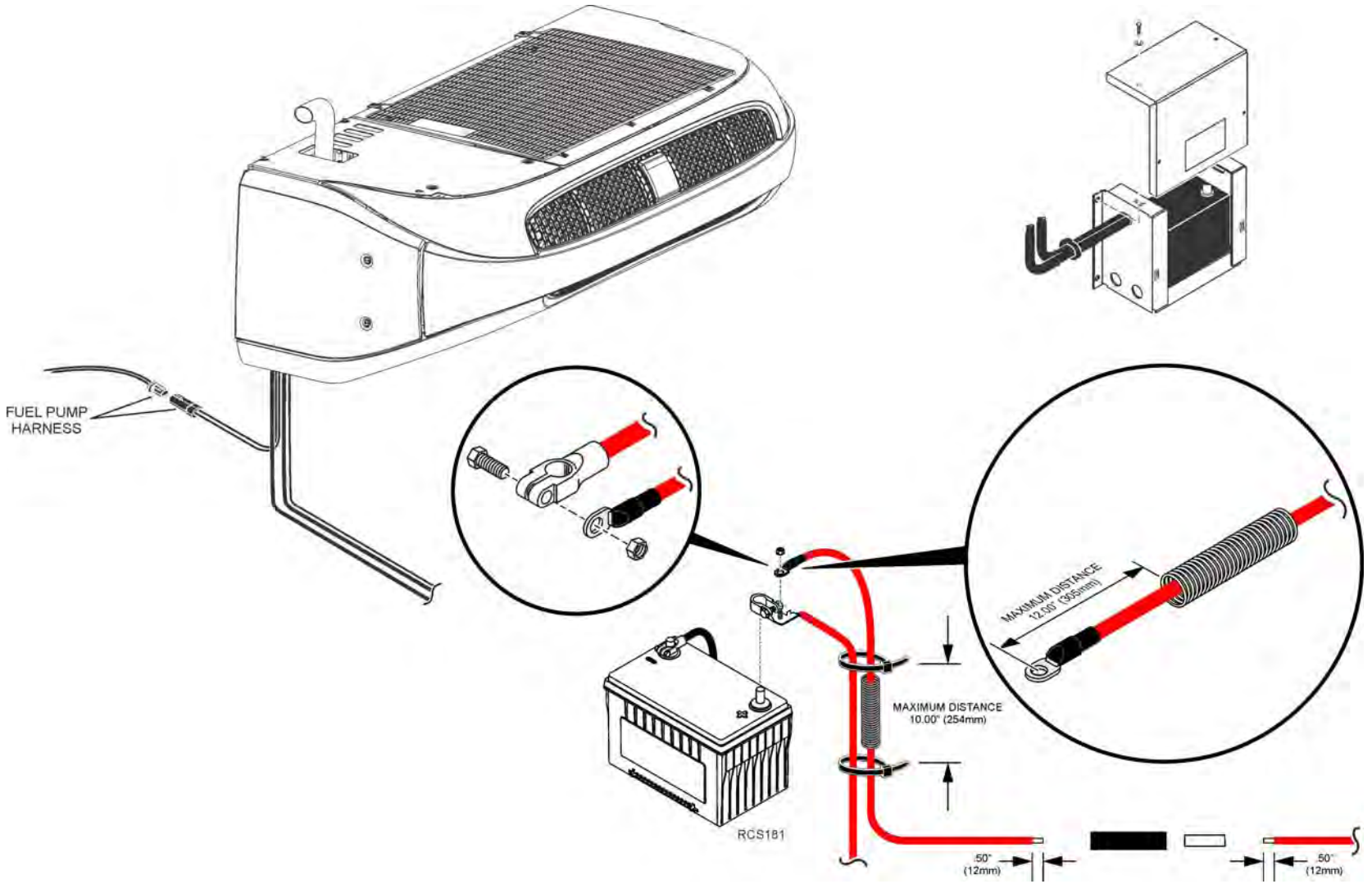
Fuel Pump Harness

12. Route and connect the fuel pump harness to the fuel pump.

Negative Cable

13. At the unit, locate the large black cable marked **NEG -**. Route this cable to the battery, cut to the proper length and add the battery lug from installation kit.
    - Route the negative cable **(NEG -)** to the battery and connect to the **NEGATIVE** terminal of battery **(Detail B)**.
14. All harnesses and battery cables should be neatly routed and secured with provided clamps.
15. Install battery box cover if applicable.

Connecting the Battery



System Leak Check Procedures

Set-up Unit

Place microprocessor in Evacuation Mode to leak check, evacuate and charge unit. With the SPECTRUM microprocessor in the evacuation mode all solenoid valves in the refrigeration system are open. This allows the refrigeration system to be properly evacuated.

NOTE: Refer to appropriate Operation & Diagnosis Manual for complete information about the microprocessor.

Use the following procedure to place the SPECTRUM microprocessor in the Evacuation Mode:

A. Connect unit battery and attach a battery charger to the battery. The battery must be capable of at least 20 amperes output. This will maintain the charge level of the battery during the time required to leak check, evacuate and charge the unit.

B. Turn the unit on. (DO NOT allow the diesel engine or electric motor to start).

C. From the main screen on the HMI, enter the Menu screen by pushing MENU.

D. At the first Operator Menu screen that appears; either the Language Display or the Alarms Display, press and hold the unlabeled soft key and the EXIT key for 5 seconds.

E. The Maintenance Hourmeter Menu will appear. Press the NEXT key as required to show the Evacuation Mode Menu.

F. When the Evacuation Mode Menu is shown press the SELECT key.

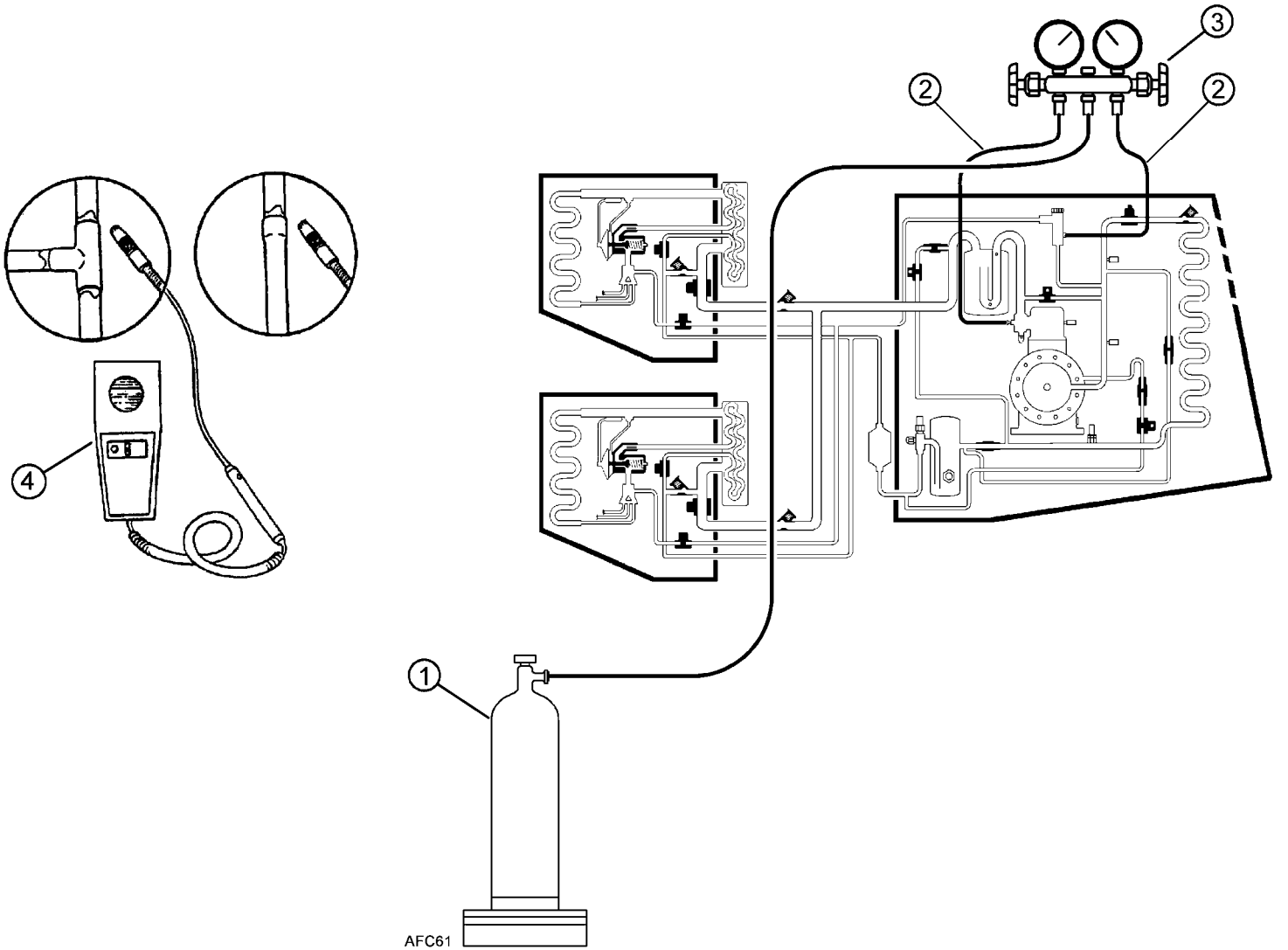
G. The unit will stay in Evacuation Mode until the battery voltage falls below a minimum voltage or the EXIT key is pressed.

Leak Check the System

NOTE: Refer to Diagnosing Thermo King Refrigeration Systems (TK-5984-10) for leak detection procedures.

1. Connect leak test gas (R-404a) supply to center hose of gauge manifold.
2. Attach gauge manifold hoses to the suction service valve and the discharge service port.
3. Pressurize the system with leak test gas. If desired, system pressure may be boosted using nitrogen gas.
4. Check connections made during installation for leaks using electronic leak detector and or soap bubbles.
5. Recover test gas to repair leaks. System must be vented while repairing solder joint leaks. Pressurize the system and check again after a leak has been repaired.
6. If no leaks are found recover test gas to 0 psig.

System Leak Check Procedures



System Evacuation Procedures

System Evacuation

IMPORTANT: Do not evacuate unit until it is leak free. Unit with less than a full refrigerant charge should be leak checked and all leaks must be repaired.

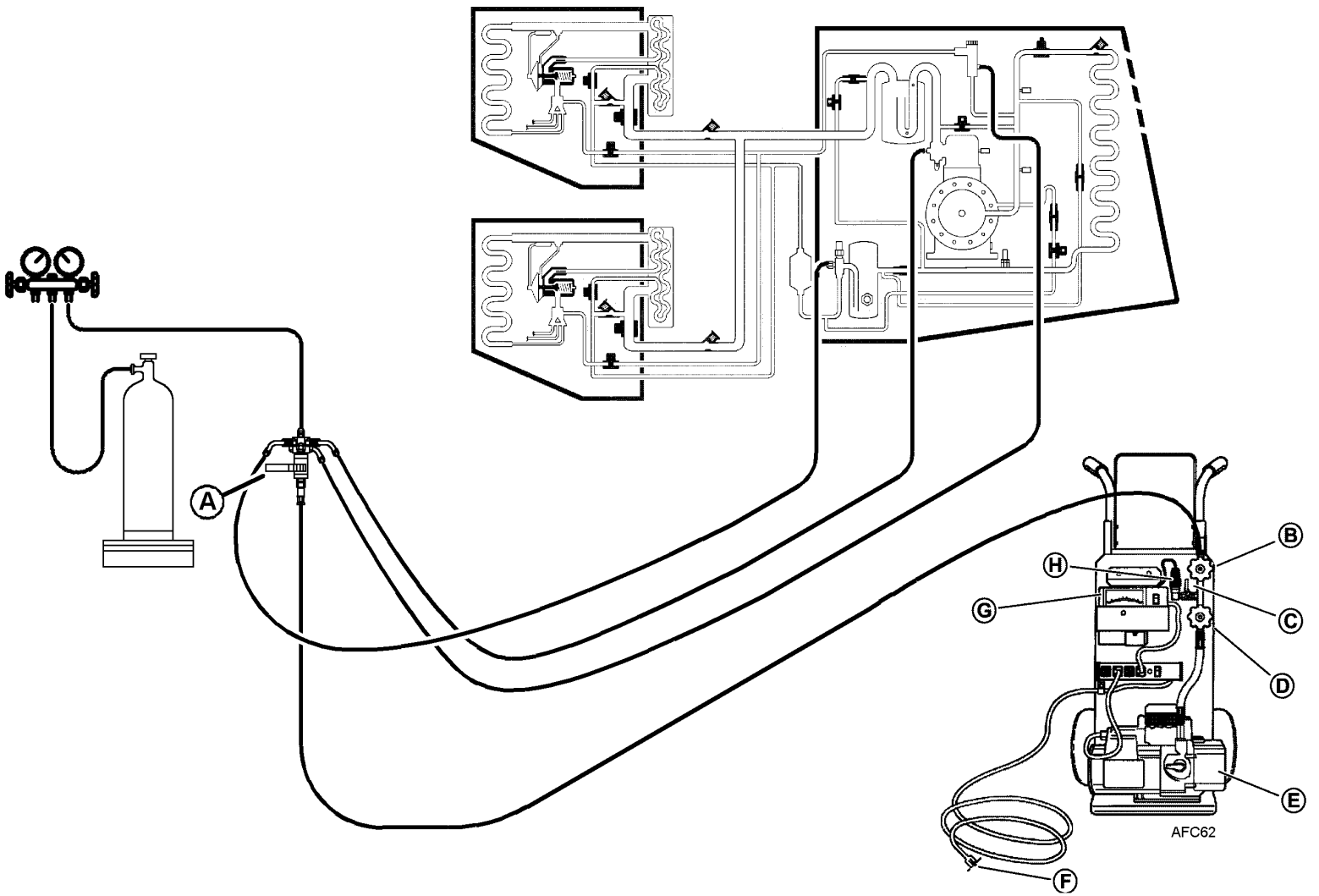
NOTE: Use of Thermo King Evacuation Station (P/N 2040725) and Evacuation Station Operation and Field Application Instructions (TK-40612-2) is required.

1. Recover any refrigerant to 0 psig. (Regulations may require recovery machine to pull system pressure lower than 0 psig).
2. Before connecting refrigerant hoses to unit, close valves V1 and V4 on the evacuation system and turn micron gauge ON.
3. Back seat suction and receiver tank service valves. Attach evacuation hoses to these two valves as well as the discharge service port (check condition of hose seals).
4. With service valves fully back seated, turn evacuation pump ON and open valve V1 (V2 and V3 should also be open). Micron gauge should move to a deep vacuum.
5. Open valve V4. Micron reading will rise. If micron gauge returns to reading less than 500 microns, proceed to step 6. If micron reading remains high, a leak exists at hose fittings or packing glands. Locate and correct problem. Packing glands that do not seal can be corrected by installing valve stem covers (see step 6).
6. If step 5 was successful, close valve V2 to isolate thermistor. Open suction, discharge and receiver service valves to port. Install brass and steel valve stem covers (with sealing washers) on service valves and tighten. Let vacuum pump continue to operate.
7. After 5 minutes of evacuation, open valve V2 to access thermistor and micron gauge. Micron reading now shows system pressure.
8. Evacuate system to 500 microns or lowest achievable level between 500 and 1000 microns. Multi-Temp units should be evacuated for an additional hour once 500 microns is reached.
9. When acceptable micron level is achieved (500 to 1000 microns plus on hour for Multi-Temp units), close valve V1 to isolate pump. Turn pump OFF.
10. Observe reading on micron gauge after 5 minutes have elapsed. If vacuum level exceeds 2000 microns after 5 minutes, leak is present or additional evacuation time is required.
11. If vacuum level is acceptable, start pump and open valve V1 to evacuate pressure rise (5 minutes).
12. With vacuum pump running, back seat suction service valve. Observe micron gauge and continue to operate vacuum pump until an acceptable micron level is achieved.
13. Close valve V1 and stop pump.Observe micron gauge to confirm that system remains in a deep vacuum. Close valve V4.
    Unit is ready to charge.

Legend for Evacuation and Charging Diagram below.

A.	V-4	E.	Two Stage Vacuum Pump
B.	V-3	F.	To AC Power
C.	V-2	G.	Micron Gauge
D.	V-1	H.	Thermistor

System Evacuation Procedures



System Charging Procedures

System Charging

IMPORTANT: Unit must be leak checked and fully evacuated before charging.

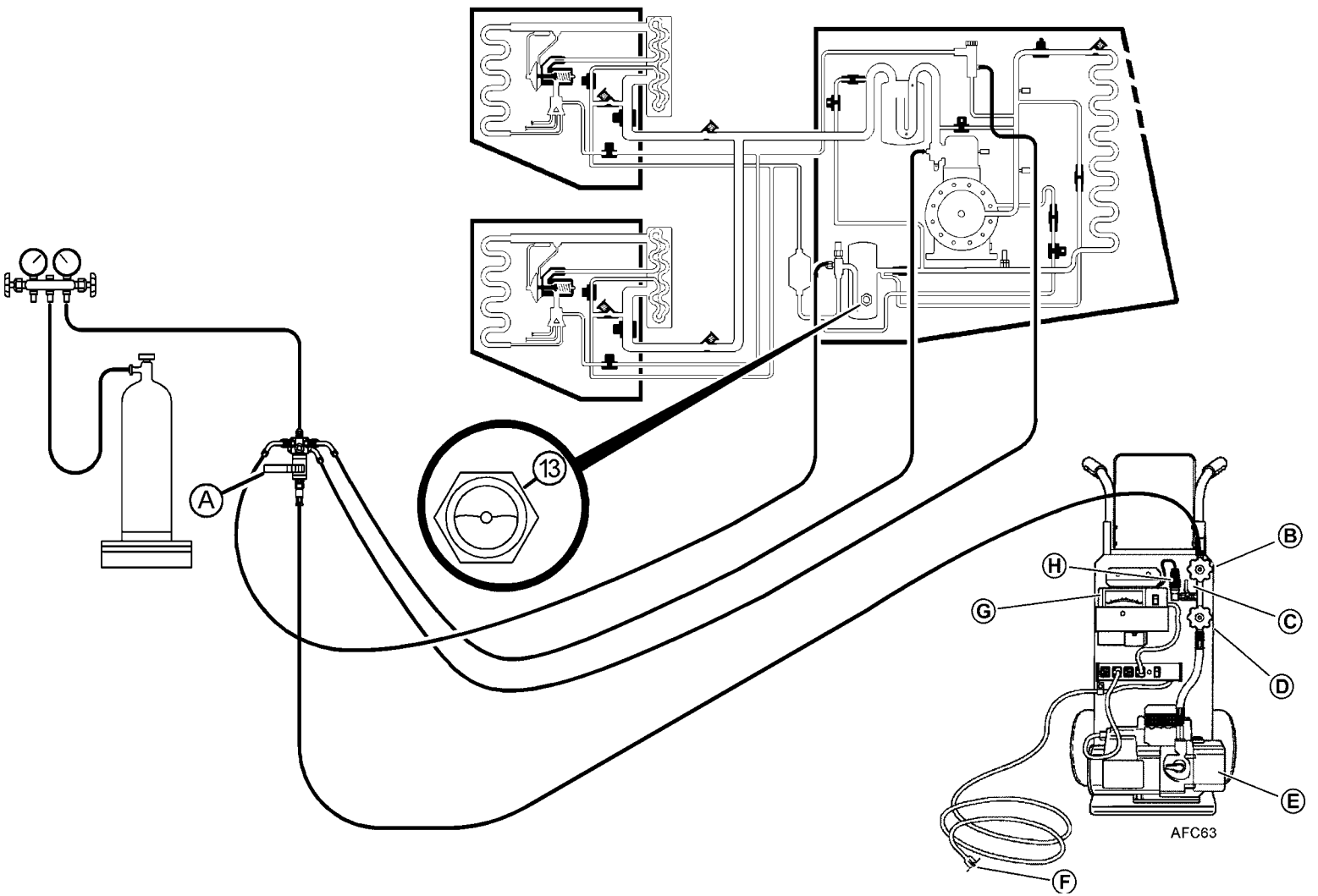
1. Install a gauge manifold. Attach the low side gauge to the service port on the suction service valve. Attach the high side gauge to the service port on the discharge line near the condenser.
2. Close the valves on the gauge manifold.
3. Mid seat the compressor suction service valve.
4. Connect a refrigerant supply to the gauge manifold service line and purge the line.
5. Set the refrigerant supply bottle to liquid and open the hand valve.
6. Open the high side gauge manifold valve. Add a partial charge of 10 lbs. (4.5 kg) of liquid refrigerant and close the high side gauge manifold valve. The reminder of the charge will be added as a liquid through the low side gauge manifold valve.
7. Set both zones to HIGH SPEED COOL through the HMI Service Test Mode.
8. Observe the suction pressure and slowly open the low side gauge manifold valve to allow liquid refrigerant to flow into the compressor suction service valve.
9. Control the liquid flow so the suction pressure increases approximately 20 psi (138 kPa).
10. Maintain a discharge pressure of at least 300 psig (2068 kPa) while adding refrigerant.
11. Close the low side gauge manifold valve when the receiver sight glass shows 1/2 to 3/4 full.
12. Establish a return air temperature of 0 F (-18 C), a suction pressure of 13 to 18 psig (90 to 124 kPa), and a discharge pressure of 300 psig (2068 kPa).
13. Check the receiver tank sight glass. The refrigerant level should remain between 1/2 and 3/4 full over a period of no less than 5 minutes.

NOTE: At these conditions the Liquid Injection Valve will cycle on and off. As this happens the refrigerant level in the receiver tank sight glass will raise and lower. Therefore, monitoring the receiver tank sight glass for a period of 5 minutes to make sure that the average level of refrigerant over this five-minute period is between 1/2 and 3/4 full is required.

Legend for Evacuation and Charging Diagram below

A.	V-4	E.	Two Stage Vacuum Pump
B.	V-3	F.	To AC Power
C.	V-2	G.	Micron Gauge
D.	V-1	H.	Thermistor

System Charging Procedures



Installing the Evaporator Covers

Installing Cap Plugs

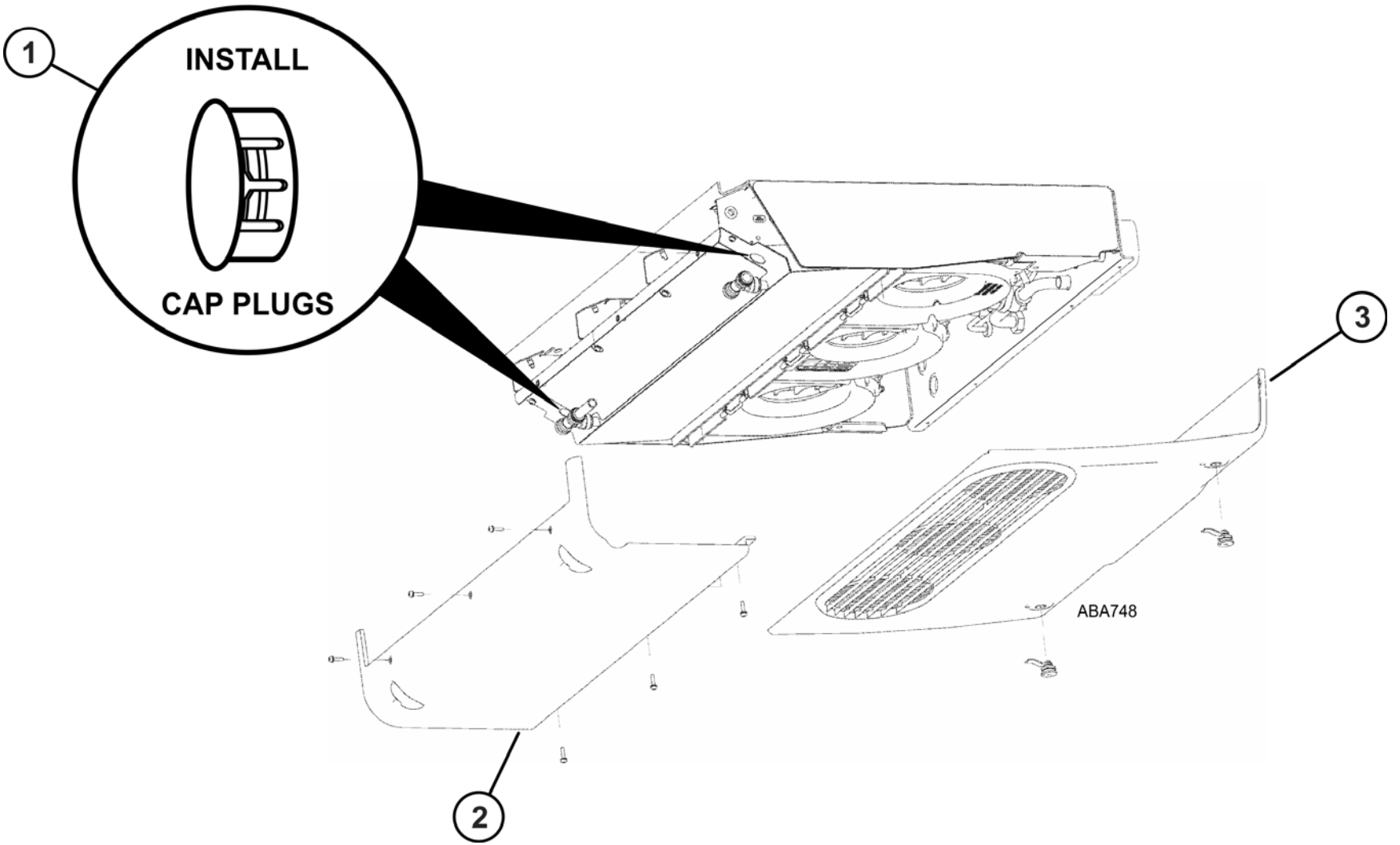
Cap plugs are provided to plug the two evaporator mounting access holes located directly above the drain pan. These plugs must be installed to prevent water in the drain pan from spilling out of these holes and into the cargo area.

1. Install the supplied cap plugs - 2 per evaporator.

Installing Covers

2. Install **FRONT COVER** into support channel of evaporator. Secure with screws.
3. Install **BACK COVER** into support lip of front cover. Secure with screws.

Installing the Evaporator Covers



Units with Factory Installed TracKing or CargoLink Options

NOTE:

TracKing Option - Units equipped with factory installed TracKing option require additional procedures to activate the system. See TracKing Cellular Installation Manual TK 56186 for activation procedures.

CargoLink Option - Units equipped with factory installed CargoLink option require additional procedures to activate the door or fuel level sensors. See CargoLink Installation Manual TK 55151 for activation procedures or view the installation video available on TSA Info Central.

UNIT CHECK LIST

UNIT CHECK LIST

- ☐ Visually inspect the unit for transit and handling damage. File claim with delivery carrier.
- ☐ Install the unit as outlined in the Thermo King Installation Manual.
- ☐ If the unit has a separate fuel tank add 10 gallons of fuel to the tank.

BEFORE STARTING THE UNIT

- ☐ Check battery and battery cable installation.
- ☐ Inspect fuel line routing checking for rubbing, chaffing or laying on hot surfaces.
- ☐ Visually inspect the unit for the following: Loose or improperly fitting bolts, brackets, hardware, hose connections and hose routing.
- ☐ Inspect all wiring connections and routing.
- ☐ Check defrost drain hoses and kazoos.
- ☐ Check unit mounting hardware for tightness.
- ☐ Check compressor and engine mounts.
- ☐ Check compressor clutch if equipped.
- ☐ Install refrigeration gauge manifold. (Multi-Temp units only)
- ☐ Check engine oil level.
- ☐ Check condenser and evaporator section for cleanliness and signs of refrigerant leaks.
- ☐ Check front bulkhead and air chute if equipped.
- ☐ Check damper door, bushings and springs.

MULTI-TEMP UNITS (REMOTE EVAPORATORS)

- ☐ Check evaporator(s) sections for cleanliness.
- ☐ Leak test interconnecting tubing.
- ☐ Check for damage, loose or missing bolts and hardware on remote evaporator(s).
- ☐ Check that cap plugs were installed in access mounting holes.
- ☐ Check for proper installation of drain tubes, drain kazoos and drain tube heater wires.
- ☐ Check for properly routed refrigerant lines wiring harnesses for remote evaporator(s). Check for properly routed harnesses for remote controller.
- ☐ Check for proper installation of remote evaporator guards if equipped.
- ☐ Check remote harness wiring plugs in the host evaporator.
- ☐ Check wiring, connections, and terminals in the remote evaporator(s).
- ☐ Check compartment bulk head(s) for proper fit if equipped.
- ☐ Check for proper configuration of microprocessor and set Time/Date.

START AND RUN UNIT (ON MULTI-TEMP UNITS START ONLY THE HOST UNIT)

- ☐ Check for proper oil pressure, coolant temperature, oil, fuel, or coolant leaks.
- ☐ Check alternator charge.
- ☐ Cycle the unit and ensure the unit functions in the correct modes and the mode indicators are working.
- ☐ Set for continuous run with thermostat set point at 32 F (0 C) and run the unit to 32 F (0 C).

UNIT CHECK LIST (continued)

- ☐ Observe and record refrigerant operating pressures in relation to ambient and box temperatures.
- ☐ Verify the readings above are correct for the conditions.
- ☐ When box reaches 32 F (0 C) check calibration of thermostat, thermometer and data logger.
- ☐ Run unit for 30 minutes at 32 F (0 C). During this period check for correct cycling.
- ☐ Reset thermostat to 50 F (10 C).
- ☐ Check throttling valve while in the heat cycle.
- ☐ Check operation of Modulation system if equipped.
- ☐ For Single Temp units perform a controlled check of the refrigerant level. For Multi-temps check the charge per multi-temp unit procedures.

MULTI-TEMP UNITS

- ☐ Install the compartment bulk head(s) if equipped.
- ☐ Check for correct rotation of remote evaporator fans.
- ☐ Check for correct cycling and operation of remote evaporator fans.

ALL UNITS

- ☐ Initiate and check defrost operation and termination.Check operation and adjustment of damper door and remote fans. Each zone on multi-temps must be checked for proper operation.
- ☐ Set the unit for Cycle Sentry Operation.
- ☐ Check for proper operation of all door switches.
- ☐ Remove the compartment bulk head(s) if equipped.
- ☐ Set the unit for continuous run. Continue to run the unit with the back doors open, alternating between high speed cool and heat until at least 6 hours (10 hours preferred) are shown on the engine run time hour meter to ensure complete break in of the engine, time for the belts and other moving parts to take out the initial tension and adjustment.

ELECTRIC STANDBY OPERATIONAL CHECKS

- ☐ Test AC electrical contacts and connections by connecting to AC power and running.
- ☐ Check for correct electric motor rotation.
- ☐ Cycle thermostat and check for correct modes of operation.
- ☐ Power source not available to test AC.

STOP UNIT

- ☐ On Multi-temp units leak test interconnecting tubing.
- ☐ Check and readjust all belt tensions using TK belt gauge 204-427.
- ☐ Check for oil, fuel, coolant, refrigerant and exhaust leaks.
- ☐ Check engine oil and coolant level.
- ☐ Check entire unit for loosened hardware and fittings.
- ☐ Check and adjust all skin, door and panels for correct alignment and operation.
- ☐ Complete the commissioning registration process.
- ☐ Release unit.

Ingersoll Rand's Climate Solutions sector delivers energy-efficient HVACR solutions for customers globally. Its world class brands include Thermo King, the leader in transport temperature control and Trane, a provider of energy efficient heating, ventilating and air conditioning systems, building and contracting services, parts support and advanced controls for commercial buildings and homes.

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