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Advanced Ground Systems Engineering LLC.

AM-2811 Cradle AM-2563 Universal Base

CFM56-7 Engine Handling System

for usage on B737-600/700/800/900 Aircraft

ORIGINAL MANUAL DATED 07/08/1995

LATEST MANUAL REVISION LEVEL 07/25/2023 (REV AL)

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NOTICE

1. Alteration, Modification, Reengineering, or Reproduction of Equipment

The alteration, modification, reengineering, or reproduction of AGSE equipment and/or parts is not permitted without prior written authorization from AGSE.

These modifications include but are not limited to:

- Structural changes to AGSE-supplied parts
- Substitution of AGSE-supplied parts, including hardware, with an alternate source or supplier
- Reverse engineering of AGSE equipment and parts.

Requests for modifications should be submitted to AGSE for review – please send modification requests to support@agsecorp.com.

Once reviewed by our Engineering team, a Customer Support Letter (Subject: No Technical Objection) will be issued for any approved modifications.

NOTE

Modifications executed without prior authorization by AGSE may result in a non-compliant product that is unsafe for operation.

Unauthorized modifications void AGSE's and the OEM's (Engine and/ or Airframer) approval and authority to use the product for its intended application.

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1.0 – Revisions

The following is an itemized record of all changes from previous revision.

PAGE	REV	DESCRIPTION OF CHANGE	DATE
8.1	AL	Updated Part Number Item 4812, 4819, 4825-4831 & 4833	7/25/2023
8.2	AL	Updated Part Number Item 4837, 4838, 4839, 4849 & 4851	7/25/2023
8.5	AL	Updated Part Number Item 209, 210, 214, 215, & 220	7/25/2023
8.6	AL	Updated Part Number Item 223, 302, 308, 309 & 331	7/25/2023
8.12	AL	Updated Part Number Item 4211, 4205 & 4207	7/25/2023
8.14	AL	Updated Part Number Item 4205 & 4207	7/25/2023

2.0 – Illustrations

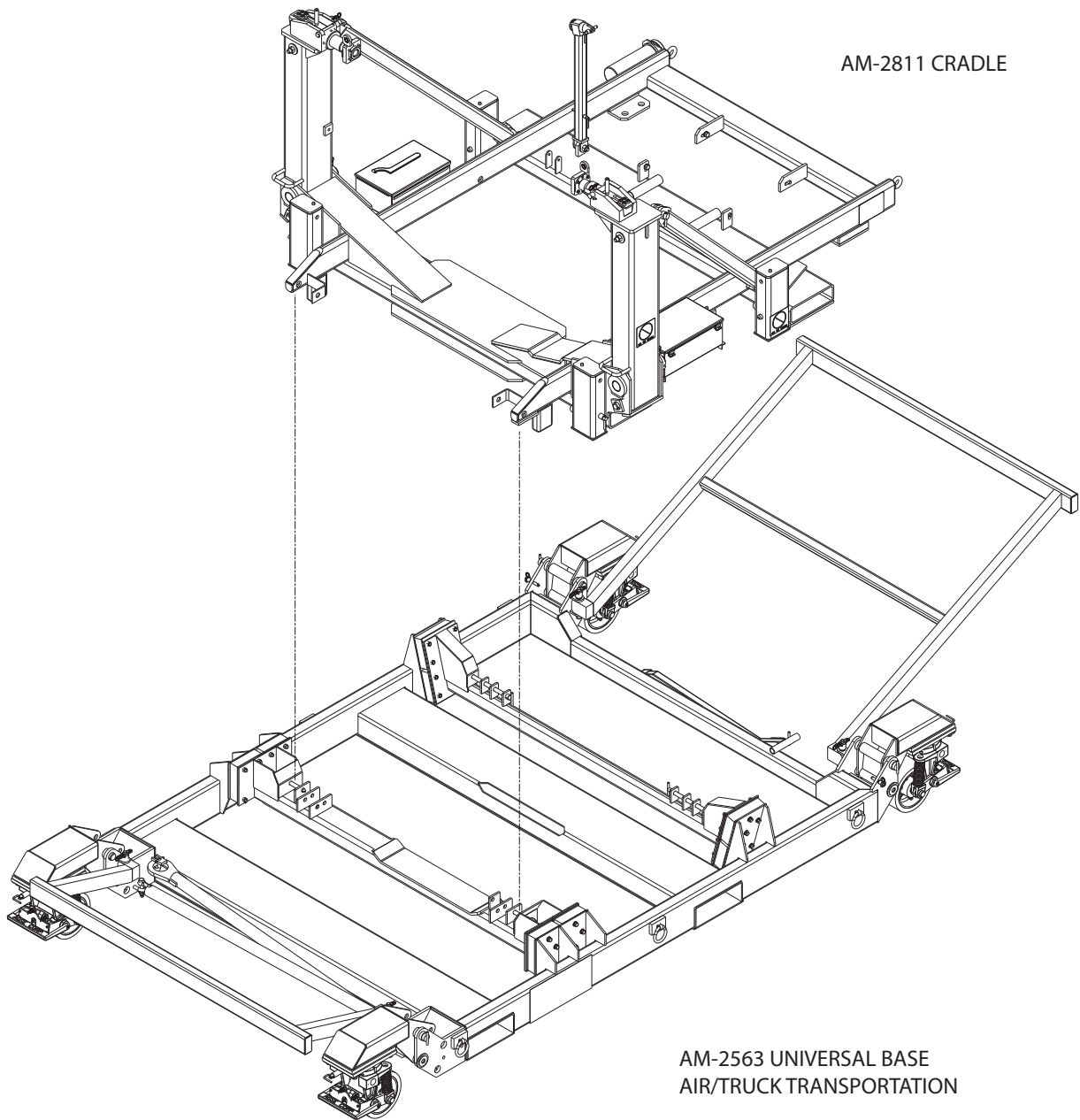


Figure 2.0-1 AM-2811 Cradle and AM-2563 Universal Base

2.0 – Illustrations (Continued)

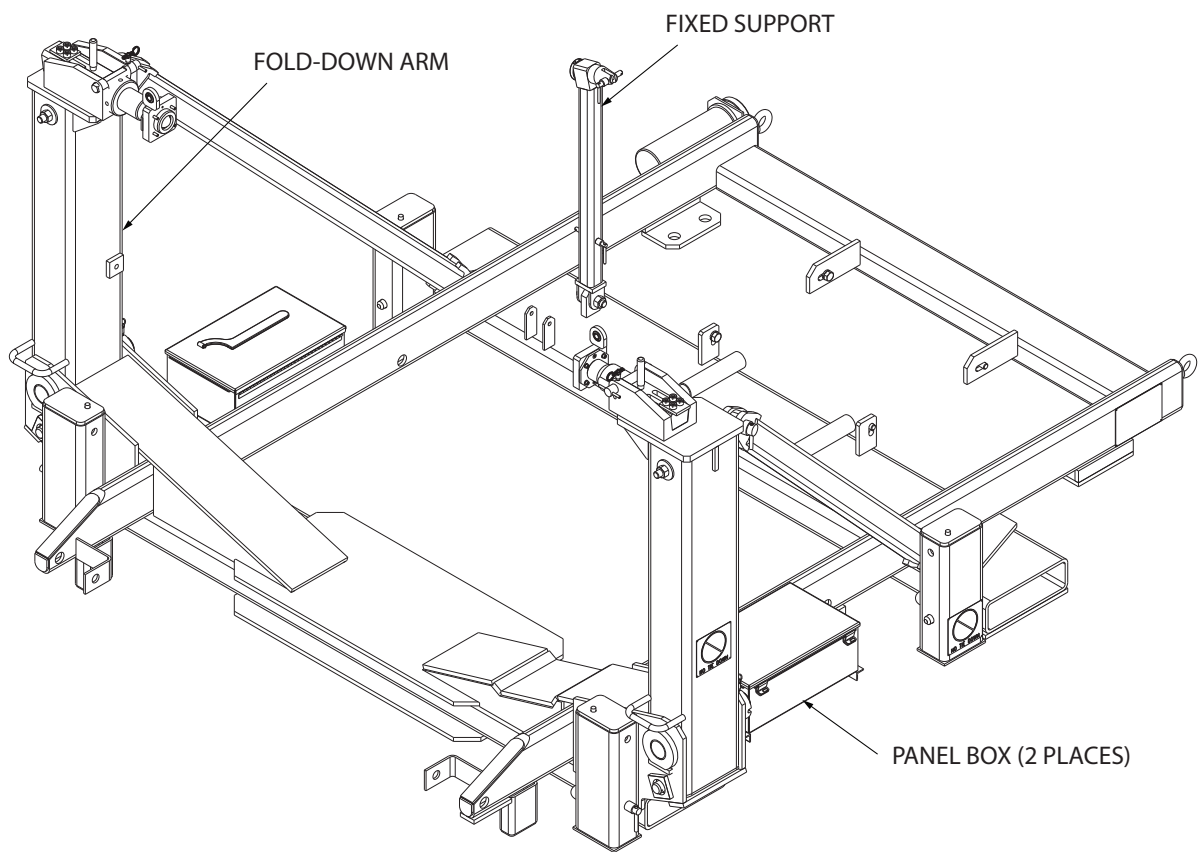


Figure 2.0-2 AM-2811 Cradle

2.0 – Illustrations (Continued)

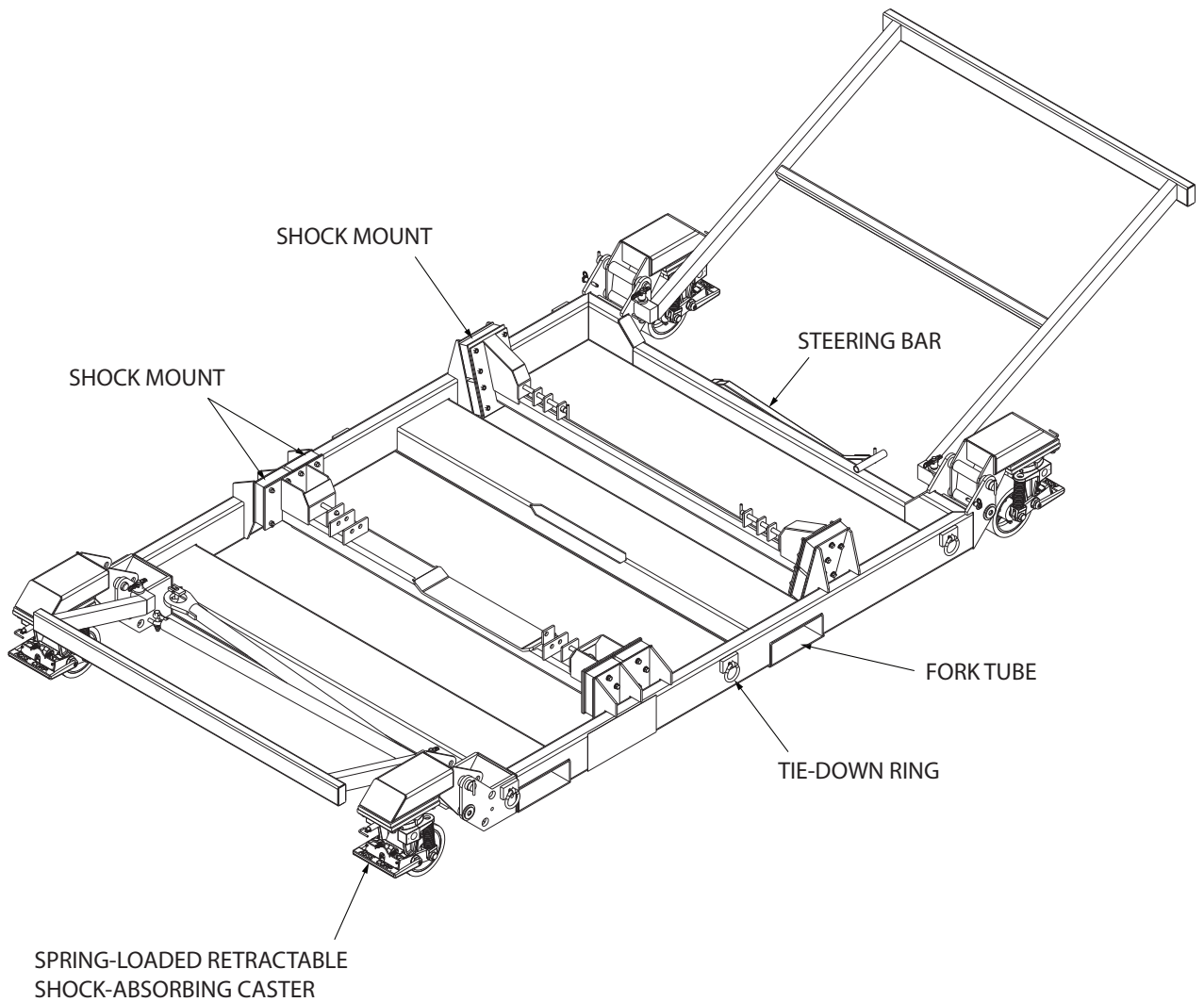


Figure 2.0-3 AM-2563 Universal Base

3.0 – Specification

3.1 General

The AM-2811/2563 Engine Handling System is designed to transport and or store the CFM International CFM56-7 engine in QEC configuration. The Engine handling system is compliant with CFMI specification 9970-957-889 (Air/Road shipping stand, CFM56-7 engine). It is capable of being shipped (with engine) in the cargo bays of the B747, Guppy, L100 Hercules, DC-9, and C130 aircraft. Engine pins securely into place quickly and easily. Bootstrapping capabilities have been incorporated for all engines and aircraft types specified. A document container is secured to the base for all manuals and documents. The Cradle is designed to collapse for shipping.

3.2 Mobility

Transport base unit consists of a frame weldment supported by four wheel caster assemblies. Each caster assembly offers a 5” wide by 10” diameter wheel for easy mobility and a weight capacity of 5000 Lbs. each. Shock absorbing polyurethane tread wheels, position locks and face brakes are standard. All four caster assemblies are designed to pin in an elevated position for air/truck transport of the entire unit, with engine. Tow bar stows on base frame when not in use. Maximum towing speed of unit is 5 km/h (3 MPH). Built-in shock absorbing mounts cushion all transport movements. A series of Tie-down rings (14) offer secure retainment during long distant hauling of unit.

CAUTION

Failure to release the parking brakes on all casters will result in flat spots being worn into the caster tread.

Failure to unlock swivel lock on the lead casters (tow bar end) during towing of the unit will damage the casters.

3.3 Cradle (AM-2811)

Unit is designed to securely and safely hold for transport the CFM56-7 engine.

3.4 Base (AM-2563)

Unit is designed to securely and safely transport the AM-2811 Cradle and CFM56-7 engine. Unit is designed with four retractable, shock absorbing. Caster wheels for air and truck transportation.

3.4 Fabrication and Finish

Fabricated from structural steel shapes conforming to ASTM A500, A513 and A36 materials. All bolted connections use A325 structural bolts or grade 5 commercial hardware. Unit is primed and painted with high grade, Skydrol resistant, with optional colors. Pins and miscellaneous hardware are manufactured from corrosion resistant materials, or plated as required.

3.6 Characteristics

	Stand (Operating Config.)	Stand (Shipping Config.)
Length (In.)	171.5	163
Width (In.)	99	99
Height (In.)	67.75	30
Weight (Lbs.)	4610	4610

4.0 – Maintenance and Inspection

4.1 General

Life expectancy of this equipment can be extended if it is properly maintained. By design, there is only minimal periodic servicing required. Annual inspections for damage, weld cracks, or corrosion are recommended. Prior to each use, this equipment should be inspected for obvious signs of abuse or shipping damage. Observed damage should require complete inspection of the affected area to ensure structural integrity is not compromised.

4.2 Cleaning and Painting

This equipment should be cleaned periodically with a soap and water solution and rinsed thoroughly.

CAUTION

Re-lubricate any mechanically moving parts and friction points where needed (bearings, shafts, grease zerk fittings etc.) after cleaning this equipment.

Damaged paint should be touched-up with Skydrol resistant high-grade enamel paint. Superficial scratches are expected during normal usage and will not affect function.

4.3 Scheduled Service

All casters require lubrication every 90 days and periodic visual inspection to determine the condition of the swivel locks and brakes. Use extreme pressure grease, below, or equivalent.

Manufacturer	Product
Mobil Oil Company	Mobilplex E.P. #1
Texaco Oil Company	Texaco E.P. #1
Gulf Oil Corporation	Gulf Crown E.P. #1
Shell Oil Company	Shell Alavania E.P. #1

All non-painted machined surfaces should be coated with a light grade oil spray every 90 days. Spray with rust inhibitor LPS-3 (MIL-C-16173D, Gr. 2) or equivalent. Apply Copper Anti-sieze lubricant to exposed threads on AM-2811-4210 Forward Mount Assembly H4.

4.4 Scheduled Inspection

CAUTION

Prior to each use, this equipment should be inspected for obvious signs of abuse or shipping damage. Observed damage should require complete inspection of the affected area to ensure structural integrity is not compromised.

Annual inspections of machined surfaces, pins, fasteners and structure are recommended. The machined surfaces (wheels, axles, pivots) are to be visually inspected for signs of wear or corrosion. Action is to be taken immediately if areas are determined to be potentially dangerous to operating personnel, or a detriment to the equipment. Pins and fasteners are to be visually inspected for cracks, damage, or corrosion. Loose fasteners should be tightened. The structure is to be visually inspected for damage, weld cracks, or corrosion.

CAUTION

AGSE recommends that shock mounts be replaced every five (5) years. Additionally, periodic inspections should be performed and any of the following conditions are proper cause for replacement of the shock mounts prior to their expiration:

- 1. Visible evidence of cracks.**
- 2. Discoloration: visible damage caused by solvents.**
- 3. Permanent deformation.**
- 4. Mount does not flex during engine loading/unloading.**
- 5. Significant corrosion on shock attach-plate.**

The following exposures can reduce the life of shock mounts and it is recommended to avoid them where possible.

- High humidity and/or salty air
- Direct sunlight
- Solvent, corrosive liquids, and fumes
- Oils, jet fuel, or Skydrol hydraulic fluid
- Extreme temperatures
- Ozone or engine exhaust

4.5 General Maintenance Schedule

NOTE:

This Maintenance Schedule does not supersede the maintenance described by Customers' Company Maintenance Policy. Intervals indicated are recommendations only and should be altered to take into consideration usage factors and environmental conditions.

Component	Task to be Performed	Maintenance Intervals			
		Monthly	3 Months	6 Months	Yearly
General	Inspect for missing parts	1*			
	Inspect paint/plating finish			I	
	Inspect exposed/bare metal for rust		H		
	Function check equipment				2*
	Inspect all stencils/placards/stamps			I	
Casters	Check wheel condition			I	
	Tighten mounting bolts			T	
	Check swivel lock/brake			I	
	Lubricate bearings			L	
Structure	Inspect frame for damage/cracked welds			I	
	Tighten all bolts		T		
	Lubricate/protect moving joints		H	L	
Pins	Inspect for damaged/bent/worn pins			I	
	Inspect for broken/cracked pin handles			I	
	Inspect for broken/cut lanyards			I	
Shock Mount	Check date				3*
	Inspect rubber for cracking/deformation			I	
	Inspect for permanent set/deformation			I	
Manual	Check manual is present/readable			4*	
	Check manual revision is current				5*

1* - Inspection for missing parts before every use.

2* - Carry out function test if equipment has not been used for extended period of time.

3* - AGSE recommends that shock mounts be replaced within five (5) years.

4* - Check that manual is present before every use.

5* - Latest manuals are available from www.agsecorp.com or call (562) 906-9300.

Legend

I - Inspect/Check

T - Tighten

L - Lubricate

H - Spray with rust inhibitor

R - Replace

Recommended Lubricant: Chevron Dura-Lith Grease EP, NLGI2 or equivalent.

5.0 – Operation

5.1 Engine Bootstrapping/ Engine Installation

Steps 1 through 18 of this procedure covers engine stand preparation for engine bootstrapping. Consult aircraft manufacturer's procedure for engine installation to the aircraft. All steps except 6, 7 and 9 are used when installing the engine into the stand using an overhead sling.

- 1) Inspect stand for obvious damage. Repair if necessary to ensure complete safety for use.
- 2) Ensure casters are extended and pinned.
- 3) Ensure cradle and base are pinned.
- 4) Remove forward arm support braces and set aside.
- 5) Remove steering bars from cradle and base.
- 6) Remove lower pin (item 4832) on forward arms and pivot arms outboard.

WARNING

Do not attempt to install the cradle/ base under the engine unless all aircraft landing gear struts are in their normal operating position. The base AFT shock tower will contact the thrust reverser doors if the struts are low or deflated. The operator is responsible to verify clearances.

- 7) Position base and cradle beneath aircraft pylon by approaching the pylon from the forward end. The steering bars can be used to position the caster to aid in alignment. Position as carefully as possible so the engine will lower straight down into the cradle.

WARNING

Minimal clearance exists between the engine and cradle. The operator is responsible to ensure the engine does not contact the cradle. This may require the removal or adjustment of engine components.

CAUTION

Care must be taken when working near suspended loads. Personnel should never work under or stand beneath the suspended load.

- 8) Set caster brakes.
- 9) Remove pins (items 4825 and 4811) on forward cradle trunnion saddles and aft clevis mount pin (item 4810). Slide trunnion shafts outboard.
- 10) Install inserts into engine forward ground handling mounts (H3 and H4) and retain them using the hardware provided. Torque to 7-10 ft-pounds. Hold aft support arm vertically.

CAUTION

Inspect the forward mount 1/4"-28 socket head cap screws for necking, stretching or other damage before use. Replace if damaged. Do not exceed 10 ft-pounds of torque on cap screws. Do not install or remove them with power tools.

- 11) Lower engine into cradle until the trunnion shafts begin to align with the ground handling mount inserts on the engine. Recheck engine-to-cradle alignment and clearances at all times.
- 12) Pivot forward arms inboard and install retaining pins (item 4832)
- 13) Slide LH trunnion shaft inboard into the engine mount insert until the retaining pin (item 4811) can be installed. Install trunnion shaft retaining pin (item 4811). Align aft arm to mate with the aft engine ground handling point (H9). Continue to lower/adjust the engine until the RH forward trunnion shaft is aligned with the engine mount insert. Slide RH trunnion Shaft inboard until fully seated in the insert.
- 14) Install the retaining pin (item 4811) into the RH forward trunnion saddle. Install the ball lock pins (item 4825) in both forward mounts to secure the retaining pins.
- 15) While the engine is still supported by the bootstrap system, verify that the H3 trunnion pin is fully engaged and seated, then adjust the H4 trunnion mount to ensure full pin engagement. A spanner wrench is provided to adjust the spanner nut on the H4 trunnion shaft. Set screw on side of spanner nut is to be loosened before nut is rotated. Re-tighten set screw once spanner nut is secured in final position. Adjust the aft arm trunnion as required to mate with the aft engine ground handling point (H9). Install aft clevis pin (item 4810) and tighten set collar clamp (item 4809) on aft trunnion.

CAUTION

The H4 trunnion must be adjusted as required to ensure full pin engagement on both the H3 and H4 trunnions. If the pins are not fully engaged, the cradle may fail to support the engine during high lateral loading.

- 16) Tighten spanner nut (item 4823) on the lower end of each forward arm until the pivot shaft head is flush against the arm receptacle bracket on the cradle. A spanner wrench is provided to tighten the spanner nuts. Be sure the ball lock pin slots on the spanner nut face away from the support arms. Adjust the spanner nut (item 4823) to align the closest ball lock pin slots to the hole in the pin shaft. Install ball lock pin (item 4835) into slot/hole.
- 17) Lower engine until the stand supports the full engine weight
- 18) Remove bootstrap system or lifting sling.
- 19) Install forward arm support braces.
- 20) Store steering bars on cradle and base.
- 21) Reverify that all pins, fasteners and attach hardware is properly attached and secured.

5.2 Empty Stand Configuration for Minimum Shipping Volume

NOTICE

The AM-2811 Cradle can be configured for minimum shipping volume by removing and storing the forward arms.

- 1) The forward trunnions are not removed from the arms for separate storage. A sprayed application of light machine oil and wrapping the mounts in a plastic wrap is recommended.
- 2) Remove forward arm support braces (items 4802 & 4803) and store as shown in Figure 5.2-1.
- 3) Store brace clevis (item 4816) and nut on the aft cradle fork tube as shown in Figure 5.2-1. Tighten the nut to ensure it will not loosen in transit.
- 4) Remove forward arms by removing the pins, spanner nut, bolt and ball lock pin (items 4832, 4823, 4835). Store the forward arms as shown in Figure 5.2-1. and retain the arms using bolts (item 4838) provided.

NOTICE

The left forward arm stores on the right side of the cradle with the handle facing upward. The right forward arm stores on the left side of the cradle.

- 5) Install the forward arm pins, ball lock pins and spanner nuts as shown in Figure 5.2-1. Tighten the spanner nut to ensure it will not loosen in transit.
- 6) Rotate the aft support arm forward and pin it in the storage position using the pin (item 4845).

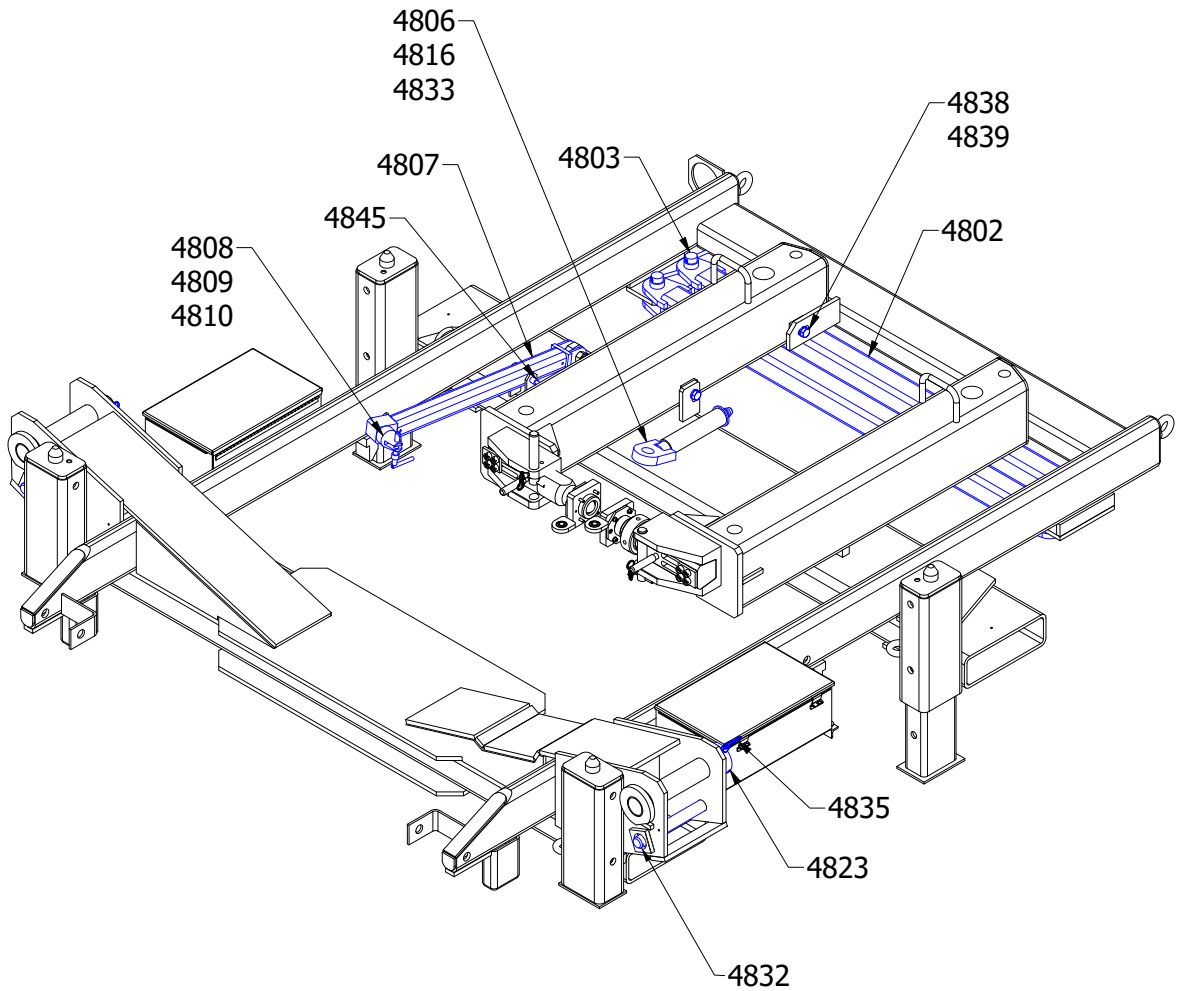


Figure 5.2-1

5.3 Base and Cradle Combination with AM-2811-4200 (H3) and 4210 (H4) Forward Mounts

Purpose: This procedure covers the AGSE engine stands preparation and operation during bootstrapping of the CFM56-7 engine to the aircraft. Consult the appropriate aircraft manual and procedure for engine installation.

5.3-A. Engine on Wing Removal:

- 1) Inspect the stand for visual damage and repair as required to ensure proper operation and complete safety during use.
- 2) Ensure casters are extended and pinned.
- 3) Visually check that all cradle to base pins are installed with lanyard safety pin. Handles should be oriented away from possible engine interference positions.
- 4) Remove forward arm axial support braces and set aside.
- 5) Remove the steering bars from the cradle and base.
- 6) Remove the forward engine ground handling inserts from the shipping containers.
- 7) Remove the forward mount trunnion-retaining pins from both left (H3) and right (H4) saddles (item 4811 and item 4825).
- 8) Slide the left hand (H3) forward mount trunnion shaft (item 4815) outboard.
- 9) On the right hand forward mount (H4), loosen the spanner nut (item 4821) to allow the trunnion shaft to fully retracted (outboard position).
- 10) Install the right and left hand mount insert assemblies, items 4223 and 4224, to the engine mount positions H3 and H4. Torque the ¼ inch diameter socket head retaining screws (item 4206) to 7 Ft-Lbs. Install the bootstrap systems hoist connector to the insert lugs. Follow the bootstrap systems installation instructions for the aft mount position.
- 11) Remove the forward support arm retaining pins (item 4832) and swing the arms outboard until they come to rest.
- 12) Position the base and cradle beneath the engine by approaching from the forward end. Align the forward mount trunnion with the installed inserts, per Figure 5.3-1. The steering bars can be used to position the casters to aid in stand alignment.
 - 13) Set caster brakes once in position and after any additional relocation.
 - 14) Lower the engine into the cradle until the forward arms can be swung back to the vertical position with the trunnion shaft ends clear, per Figure 5.3-2. Reinstall the forward arm lower support pins to maintain the vertical position. Check and reposition the stand as required to align the trunnion shafts with the engine mounts.
- 15) Slide the left hand (H3) trunnion ball inboard into the insert until the flat end surface rests against the inserts surface. Install the saddle retaining pin (item 4811) with ball lock pin (item 4825) to retain.

- 16) Slide the right hand (H4) trunnion ball inboard into the insert until the flat end surface rests against the inserts surface. Install the saddle retaining pin (item 4811) with ball lock pin (item 4825) to retain.
- 17) Position the engine to align the aft engine mount arm at the (H9) position. Loosen the aft support arms threaded set collar to allow the trunnion clevis to slide in the mount arm. Attach the clevis end to the H9 engine position with retaining pin (item 4810).

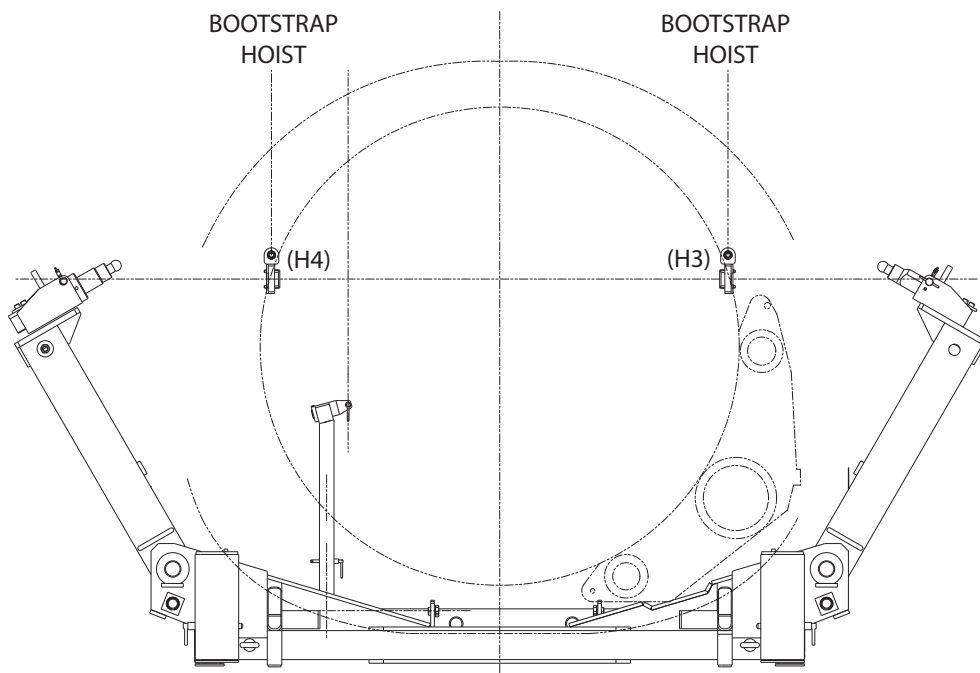


Figure 5.3-1

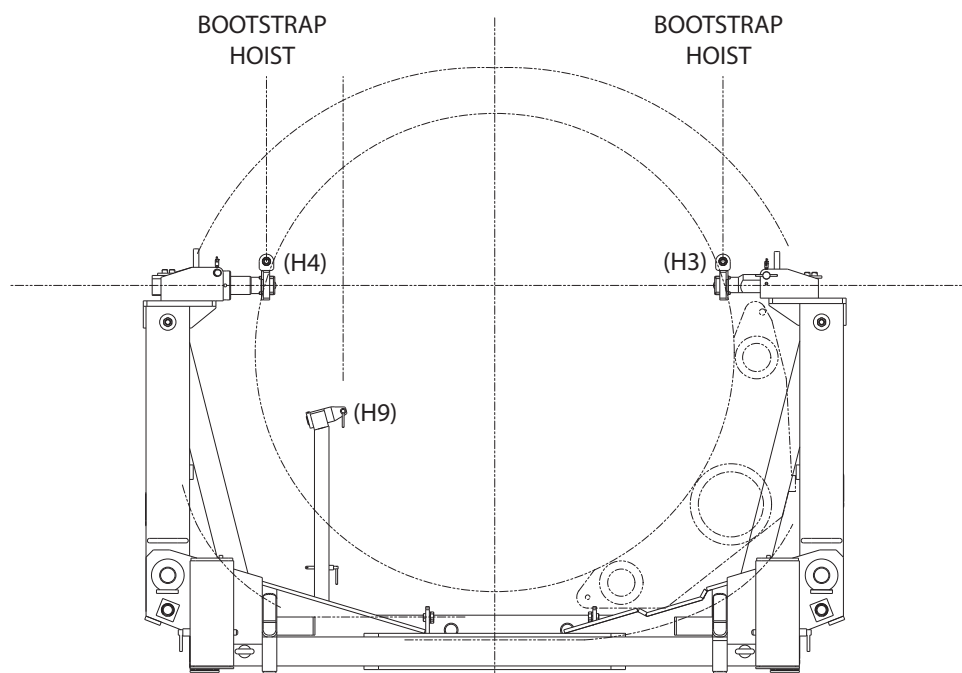


Figure 5.3-2

- 18) The engine should still be suspended by the bootstrap system while the mounts are adjusted for transportation. Both forward mount trunnion shafts should rest in the saddles with their bottom surfaces in full contact. Adjust the engine position to ensure full contact along the full length of the saddle.
- 19) Thread the right hand (H4) spanner nut outboard until it tightly rests against saddle face.
- 20) Tighten the spanner nut with the wrench provided to force the forward support arms outboard to restrict the arms deflection. Prior to and during the adjustment of the spanner nut ensure that the left hand (H3) trunnion has indexed against the retaining pin. Fully extend the trunnion until there is no more travel left in the slots of the trunnion.
- 21) Lock the spanner nut into position by tightening the set screw in the spanner nut.

CAUTION

The H4 trunnion must be adjusted as required to ensure full pin engagement on both the H3 and H4 trunnion. If not fully engaged, the cradle may fail to support engine during high lateral loading.

- 22) Check to ensure that the trunnion bottom surface is in full contact with the saddle surface and that, when unpinned, the trunnions slide freely in and out. The screw heads should have an approximate gap of 0.01” under each and tie-wired with stainless steel wire as shown in Figure 5.3-3 to prevent rotation.
- 23) Tighten the aft mount (H9) set collar to rigidly connect the aft support into position. Lock the set collar into position by tightening the set screw.
- 24) The engine maybe fully lowered and supported by the engine stand and the bootstrap hoist connections removed, as shown in Figure 5.3-4.
- 25) Install the forward support arms axial braces (item 4802) to the cradle base with retaining pins supplied. Tighten the brace attachment lug, located near the top on the forward face of the support tube to reduce slack.
- 26) Install caster steering bars in their storage position and spanner wrench into the forward mount storage box.
- 27) Prepare the engine and stand for transport per aircraft manufacture’s instructions for transport.

TIE WIRE BOLT
HEADS AS SHOWN

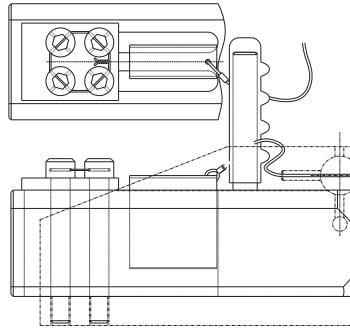


Figure 5.3-3

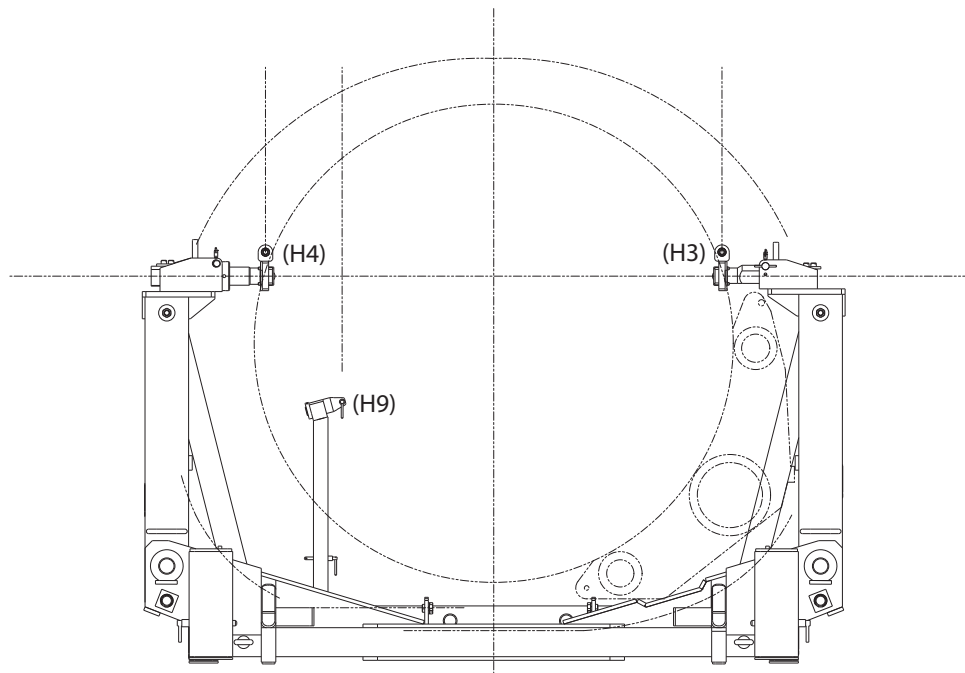


Figure 5.3-4

5.3-B. Engine Installation on Wing:

- 1) Inspect the stand for visual damage and repair as required to ensure proper operation and complete safety during use.
- 2) Ensure casters are extended and pinned.
- 3) Ensure cradle and base are pinned.
- 4) Remove the forward arm support braces (item 4802) and set aside.
- 5) Remove steering bars from cradle and base.

- 6) Position the engine, base, and cradle beneath the aircraft pylon by approaching from the forward end. The steering bars can be used to position the casters to aid in alignment.
- 7) Set caster brakes once in position and after any additional relocation.
- 8) Install the bootstrap systems hoist connector to the insert lugs. Follow the bootstrap systems installation instructions for the aft mount position.
- 9) Suspend the weight of the engine with the bootstrap hoist as specified by the aircraft manufacturer.
- 10) Remove the aft (H9) engine support by unthreading clevis trunnion adjustment set collar and removing the pin (item 4810). Rotate the aft support arm to rest on the cradle.
- 11) If the trunnion does not slide freely when the retaining pins are removed, remove the tie wire, Figure 5.3-3, from the four ½ inch diameter socket head cap screws located at the outboard ends of the H3 and H4 forward mount trunnion and loosen until there is an approximate 0.01” gap under each screw head. Use Stainless steel tie-wire to secure screws from unwanted rotation. See Figure 5.3-3.
- 12) Disengage the spanner adjustment nut located on the right forward H4 mount. Thread the nut inboard almost to the end of the threaded shaft.
- 13) Remove both forward mount retaining pins from the left (H3) and right (H4) saddles, (items 4811 and 4825). The engine may need to be raised and lowered to remove its weight to allow the pins to be withdrawn.
- 14) Slide the item 4201 (H3) and item 4214 (H4) trunnion shafts outboard until stopped by the socket head cap screw and the end support balls are clear of the inserts, see Figure 5.3-2.
- 15) Remove both support arm lower retaining pin (item 4832) and rotate the arms outboard until they come to rest, see Figure 5.3-1.
- 16) Raise the engine and mount to the pylon per aircraft manual procedures.
- 17) Release the caster brakes.
- 18) Remove the base and cradle from under the engine towards the forward direction. The caster steering bars may be used to position the casters in the proper direction.
- 19) Remove the forward mount insert assemblies (items 4323 and 4224) from the H3 and H4 engine mount positions and store in the mount storage boxes.
- 20) Pin the forward mount trunnion shafts to prevent movement during shipping of empty stand.
- 21) Rotate the forward support arms to the vertical position and insert the item 4832, lower retaining pin. Store the aft H9 support arm by pinning it to the cradle frame with the support clips provided.

5.4 Stand Preparation for Transportation

- 1) If the stand is on the casters, raise the stand with a forklift to remove any loading on the casters.
- 2) Remove the safety pin assembly.
- 3) Rotate the casters to their transport position and reinstall the safety pin assembly.

CAUTION

Do not rotate the forward caster mounts to a vertical position when an engine with fan cowl is in the stand otherwise damage can occur to the Inlet cowl.

6.0 – SAFETY

6.1 Stress

Design stress safety factors are compliant with industry standards.

6.2 General

Most accidents are the result of violating standard safety rules in operation or improper servicing and maintenance of equipment.

Many safety features have been incorporated into the design to assist in safe operation of this equipment. These items do not fool-proof the equipment nor do they replace the operator's responsibility to operate the equipment in a safe manner.

6.3 Prevention

A good preventative maintenance program should include periodic lubrication, adjustment, and immediate correction of defects revealed through inspections. Preventive maintenance will not only contribute to safe operation, but will also extend useful service life as well.

6.4 Risk Assessment

6.4.1 Limits of the Machinery

The AM-2811/AM-2563 Engine Handling System is a commercial product designed specifically only to store and/or transport the CFM International CFM56-7 engine. The equipment is to be used only by trained mechanics free from physical impairment and who are familiar with this or similar fixture. The equipment is not to be used or made available to the general public.

6.4.2 Risk Assessment and Residual Risk

The risk evaluation performed was based on objective observation based on the experience of AGSE with similar equipment. Necessary Warning and Caution Notes have been incorporated into the Operation Section of the CFM56-7 Engine Handling System Operation Manual along with instructions. Stencils also have been put on the equipment to identify hazardous and/or potential risk areas.

The operation of the AM-2811/AM-2563 Engine Handling System can be with medium risk of injury and is considered safe to use under supervision. Low residual risks include potential pinch points during operation of the equipment.

Equipment detailed in this manual has undergone stringent safety analyzing using methods and standards set forth within European Standard EN 1050 and is considered to be safe for its intended use. Reports on risk analysis and evaluation according to 2006/42/EC Machinery Directive (17 May 2006) are available upon request.



EC DECLARATION OF CONFORMITY

The machinery listed below fulfills all relevant provisions of the directives listed:

- 2006/42/EC Machinery Directive (2006/05/17)

Machinery covered by this Declaration:

Description: Engine Cradle/Base Assembly, CFM56-7
Model: AM-2811 & AM-2563
Part Number: AM-2811-4800 Cradle
AM-2563-200 Base
Serial Number: _____

Harmonized Standards:

- ISO 12100:2010 Safety of Machinery - General Principles for Design - Risk Assessment and Risk Reduction
- ISO/TR 14121-2:2012 Safety of Machinery - Risk Assessment - Part 2: Practical Guidance and Examples of Methods

Standards and Specifications:

- CFM Intl. CFM56-7 Engine Air/Road Shipping Stand Specification, No. 9970-957-889
- AGSE Quality System Procedure Number QSP-006
- Aerospace Recommended Practice Standard, SAE ARP 1840, 2007/02 Rev B

Place: Santa Fe Springs, California, USA

Date: _____

Signed: _____
Quality Representative

Technical File: Pedro Fernandes
Advanced Ground Systems Engineering
Pct Ana Maria Bastos, N20
A-dos-Cunhados, Portugal 2560-005
+351-96-520-4851

EC DECLARATION OF CONFORMITY

The machinery listed below fulfills all relevant provisions of the directives listed:

- 2006/42/EC Machinery Directive (2006/05/17)

Machinery covered by this Declaration:

Description: Engine Cradle/Base Assembly, CFM56-7
Model: AM-2811 & AM-2563
Part Number: AM-2811-4800 Cradle
AM-2563-227 Base
Serial Number: _____

Harmonized Standards:

- ISO 12100:2010 Safety of Machinery - General Principles for Design - Risk Assessment and Risk Reduction
- ISO/TR 14121-2:2012 Safety of Machinery - Risk Assessment - Part 2: Practical Guidance and Examples of Methods

Standards and Specifications:

- CFM Intl. CFM56-7 Engine Air/Road Shipping Stand Specification, No. 9970-957-889
- AGSE Quality System Procedure Number QSP-006
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EC DECLARATION OF CONFORMITY

The machinery listed below fulfills all relevant provisions of the directives listed:

- 2006/42/EC Machinery Directive (2006/05/17)

Machinery covered by this Declaration:

Description: Engine Cradle/Base Assembly, CFM56-7
Model: AM-2811 & AM-2563
Part Number: AM-2811-6400 Cradle
AM-2563-200 Base
Serial Number: _____

Harmonized Standards:

- ISO 12100:2010 Safety of Machinery - General Principles for Design - Risk Assessment and Risk Reduction
- ISO/TR 14121-2:2012 Safety of Machinery - Risk Assessment - Part 2: Practical Guidance and Examples of Methods

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EC DECLARATION OF CONFORMITY

The machinery listed below fulfills all relevant provisions of the directives listed:

- 2006/42/EC Machinery Directive (2006/05/17)

Machinery covered by this Declaration:

Description: Engine Cradle/Base Assembly, CFM56-7
Model: AM-2811 & AM-2563
Part Number: AM-2811-6400 Cradle
AM-2563-227 Base
Serial Number: _____

Harmonized Standards:

- ISO 12100:2010 Safety of Machinery - General Principles for Design - Risk Assessment and Risk Reduction
- ISO/TR 14121-2:2012 Safety of Machinery - Risk Assessment - Part 2: Practical Guidance and Examples of Methods

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Place: Santa Fe Springs, California, USA

Date: _____

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Quality Representative

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Advanced Ground Systems Engineering
Pct Ana Maria Bastos, N20
A-dos-Cunhados, Portugal 2560-005
+351-96-520-4851

7.0 – Statement of Warranty

7.1 Statement of Warranty

Advanced Ground Systems Engineering LLC (AGSE) warrants to original purchasers that its products will be free of defects in material and workmanship under normal use and conditions for claims received within a period of one year from date of purchase (final billing date), and to the extent that if any AGSE product fails in operation because of such defect, the company will replace or repair, at its option, the defective article. Prior to the repair or replacement of any defective product, the company shall be notified in writing as to the nature of the defect. The company shall assume no liability for freight, disassembly, removal, refitting and installation charges on any article returned unless such charge(s) is approved by AGSE in writing prior to the return. On component items purchased by AGSE for incorporation into an AGSE manufactured product, only the component manufacturer's warranty (if any) shall apply to that component. Said manufacturer's warranty shall be passed on to AGSE's customer to the extent permitted. This warranty is applicable only when AGSE products are operated for intended purposes within the recommended procedures, load limits, properly maintained, not damaged or abused, etc., including as indicated in company manuals, catalogs, and drawings. All warranty claims must be applied for within sixty days from when the defect becomes known. The foregoing warranty is in lieu of all other warranties, or liabilities, either expressed or implied, and AGSE expressly excludes all implied warranties of merchantability and fitness for a particular purpose and all non-infringement warranties as well as disclaims all liabilities to third parties. In no event shall AGSE be liable for any amounts in excess of the purchase price of the product.

CAUTION

Failure to conduct periodic inspections, routine maintenance, or improper operation will result in the voiding of the warranty.

8.0 – Parts Breakdown

8.1 General

The following pages can be used in the identification of components used in the product described in this manual. Parts Lists are broken down by “ITEM”, “PART NUMBER”, “QTY”, and “DESCRIPTION”.

NOTICE

“ITEM” numbers are for reference to the Illustrated Parts Breakdown (IPB) only. Do not order replacement parts by “ITEM” number.

8.2 Illustrated Parts Breakdown

NOTE: The AM-2811-2100 cradle assembly has been superseded by AM-2811-4800.

IPB Figure 1 - AM-2811 Cradle Assembly (-4800/-6400)

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2811-4800	-	Cradle Assy (Figures 8.1-1 and 8.1-2)
	AM-2811-6400	-	Cradle Assy (Figures 8.1-1 and 8.1-2)
4801	AM-2811-2700	1	Cradle Weldment
4802	AM-2811-335	2	Brace
4803	AM-2811-2004	4	Retainer Pin
4806	AM-2811-1844	2	Brace Bolt
4807	AM-2811-1300	1	Aft Mount Support
4808	AM-2718-C6	1	Trunion
4809	TCL-20-12-SS	1	Thread Collar, 1-1/4-12 UNF-SS
4810	AM-2811-1314	1	Retainer Pin
4811	AM-2811-1306	2	Retainer Pin
4812	AGSE-S00104-12C048A01	1	Screw, Hex Head
4813	7SF12	1	Spherical Bearing
4814	AM-2811-2000	4	Retainer Pin
4815	AM-2811-4200	1	Mount Assy - H3
4816	AM-2811-1309	2	Plate Washer
4817	AM-2811-3900	1	Fwd Arm
4818	AM-2811-3901	1	Fwd Arm
4819	AGSE-S00144-12CA05	1	Lock Nut
4821	AM-2811-4210	1	Mount Assy - H4
4823	AM-2811-505	2	Arm Shaft Lock Nut
4825	AGSE-S00202-P02	2	Ball Lock Pin
4828	AGSE-S00205-P01	1	Document Holder
4831	AGSE-S00125-P02	4	Drive Screw
4832	AM-2811-3507	2	Retainer Pin
4833	AGSE-S00153-12CA01	2	Nut, Locking
4835	CL-6-BLPR-3.00	2	Ball Lock Pin

IPB Figure 1 - AM-2811 Cradle Assembly (Continued)

ITEM	PART NUMBER	QTY	PART DESCRIPTION
4837	AM-2811-4837	2	TS 1" Dia. OD x .083wl 1018, 3/8", Zinc Plt
4838	AGSE-S00104-10C020A01	4	Screw, Hex Head
4839	AGSE-S00135-10A17	4	Washer, Locking
4840	AGSE-S00196-P01	1	Spanner Wrench
4841	AGSE-S00308-04C006A05	15	Screw, Button Head
4842	A16106CH	2	Continuous Hinge Panel Box With Fast Open Clamps A-L23
4843	AM-2811-4843	2	Foam Cutout
4845	AM-2811-1310	1	Retainer Pin
4846	Commercial	8	Hex Hd Mach Screw - 1/4"-20 UNC x 3/4" Lg - Zinc Plt
4849	AGSE-S00150-04CA01	8	Nut
4850	AM-2811-509	2	Arm Pivot Shaft/Arm Nut Weldment
4851	AGSE-S00135-04A17	8	Washer, Locking
4852	AM-2260	4	NO TIE DOWN Placard
4853	AM-2811-4853	2	Foam Cutout
4854	AM-2811-4854	2	Rubber
4855	AM-2811-4855	A/R	Contact Cement

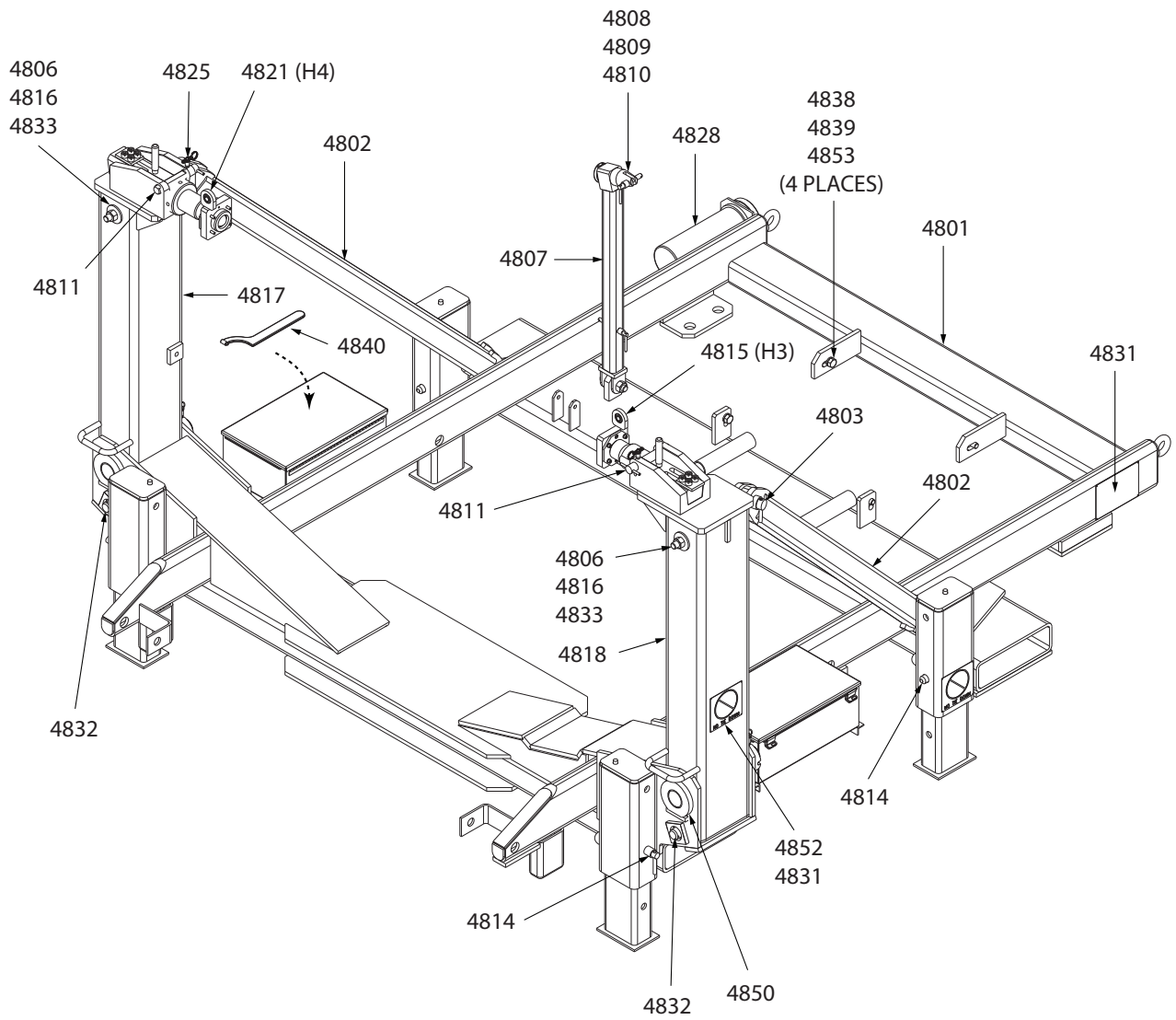


Figure 8.1-1 AM-2811-4800/-6400 Cradle Assembly

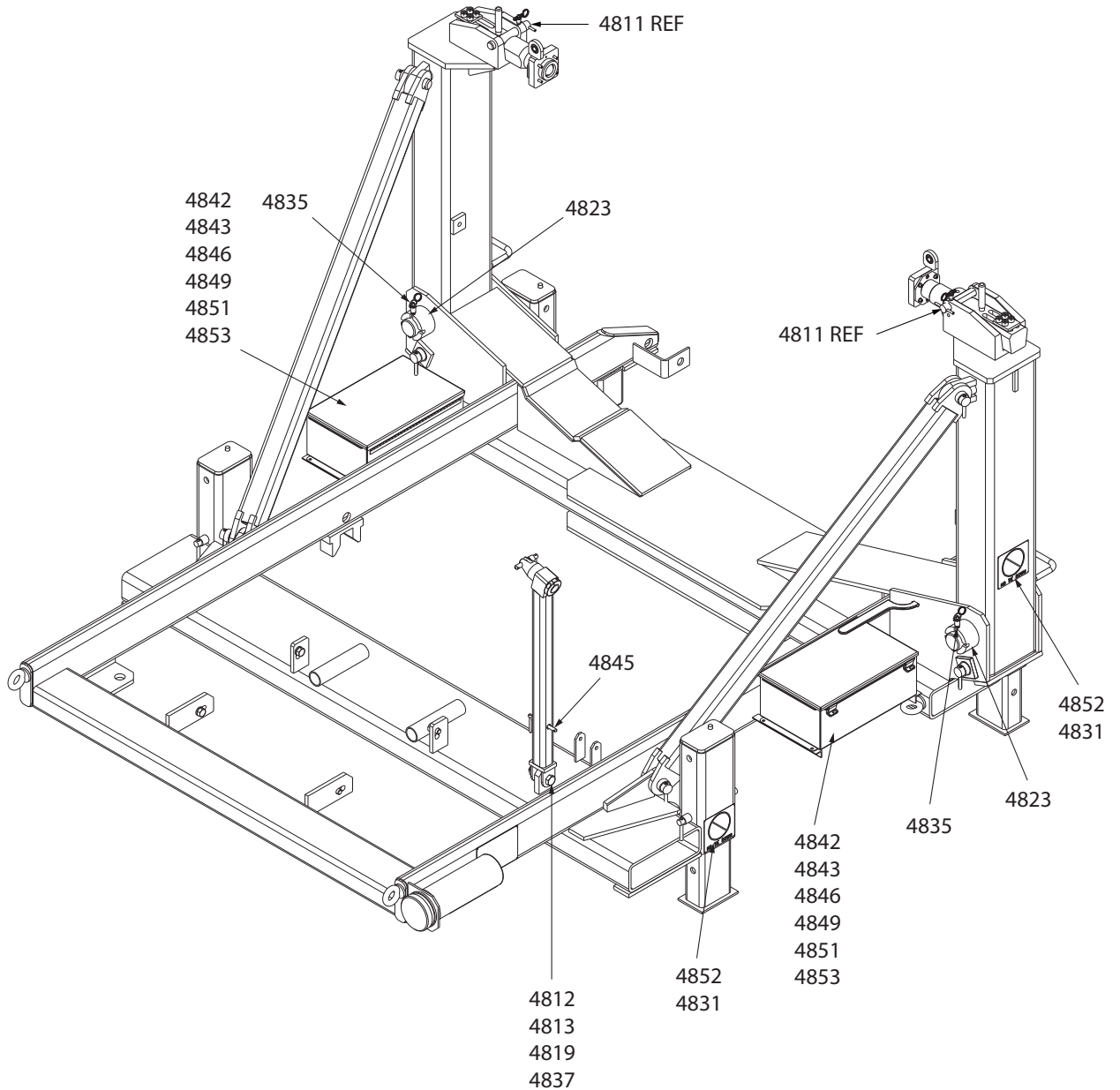


Figure 8.1-2 AM-2811-4800/-6400 Cradle Assembly

IPB Figure 2 - AM-2563 Base Assembly (-200 & -227)

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2563-200	-	Base Assy (Figures 8.2-1 and 8.2-4)
	AM-2563-227	-	Base Assy (Figures 8.2-1 and 8.2-2)
201	AM-2563-400	1	Main Frame (Used on AM-2563-200 Only)
203	AGSE-S00105-08F016A01	64	Screw, Hex Head
204	AGSE-S00175-08A17	64	Flat Washer - Mil-Spec - 1/2" - Stl - Zinc Plt
206	AM-1803-801	2	Caster Mount - AFT (For use With Item # 208-B)
207	AGSE-S00304-P04	8	Shock Mount
208	AM-2079-2	4	AGSE Caster Assy - 5,000 Lb Cap
208-B	47PY-10809-SBBL - SL4WB-SPD-5264	4	Caster Assy (Alternate)
208-C	E-9591	4	Caster Assy (Alternate)
209	AGSE-S00104-08C028A01	16	Screw, Hex Head
210	AGSE-S00135-08A17	16	Washer, Locking
212	CL-8-BLP-B-1.50	2	Ball Lock Pin
213	AM-1803-701	2	Caster Mount - AFT (For Use With Item 208 & 208-C)
214	AGSE-S00104-10C028A01	8	Screw, Hex Head
215	AGSE-S00135-10A17	16	Washer, Locking
216	AM-1803-622	2	Tow Bar Storage Bar
217	AM-2563-900	1	AFT Cross Member
218	AM-1803-601	1	AFT Bumper (Optional)
220	AGSE-S00104-10C024A01	8	Screw, Hex Head

IPB Figure 2 - AM-2563 Base Assembly (Continued)

ITEM	PART NUMBER	QTY	PART DESCRIPTION
223	AGSE-S00104-04C032A01	2	Screw, Hex Head
224	AM-2811-2011	1	Steering Bar
225	AM-90250-32T	1	Safety Pin Assy
226	AM-2563-600	1	Main Frame (Used on AM-2563-227 Only)
302	AGSE-S00153-04CA01	2	Nut, Locking
304	AM-1803-802	2	Caster Mount - FWD (For Use With Item #208-B)
306	AM-1803-724	4	Safety Pin Assy
307	AM-1803-732	4	Safety Pin Assy
308	AGSE-S00131-24A17	4	Washer
309	S00166-188D032A17	4	Cotter Pin
310	AM-90750-60T	1	Safety Pin
312	AM-2563-312	1	Safety Pin (FWD Locking)
313	AM-2563-313	2	Safety Pin (AFT Locking)
314	AM-1803-719	2	Tow bar
316	AM-2563-501	1	FWD Cross Member
317	AM-256302-S02	1	FWD Bumper Assy (Optional)
318	AM-1803-708	2	Caster Mount - FWD (For Use With Item #208 & 208-C)
331	AGSE-S00131-10A17	16	Washer

NOTE:

AM-2563-227 Main Frame Assembly is the same as AM-2563-200 except as noted and the fork pockets formed to provide a 4 1/2" x 12 1/2" opening.

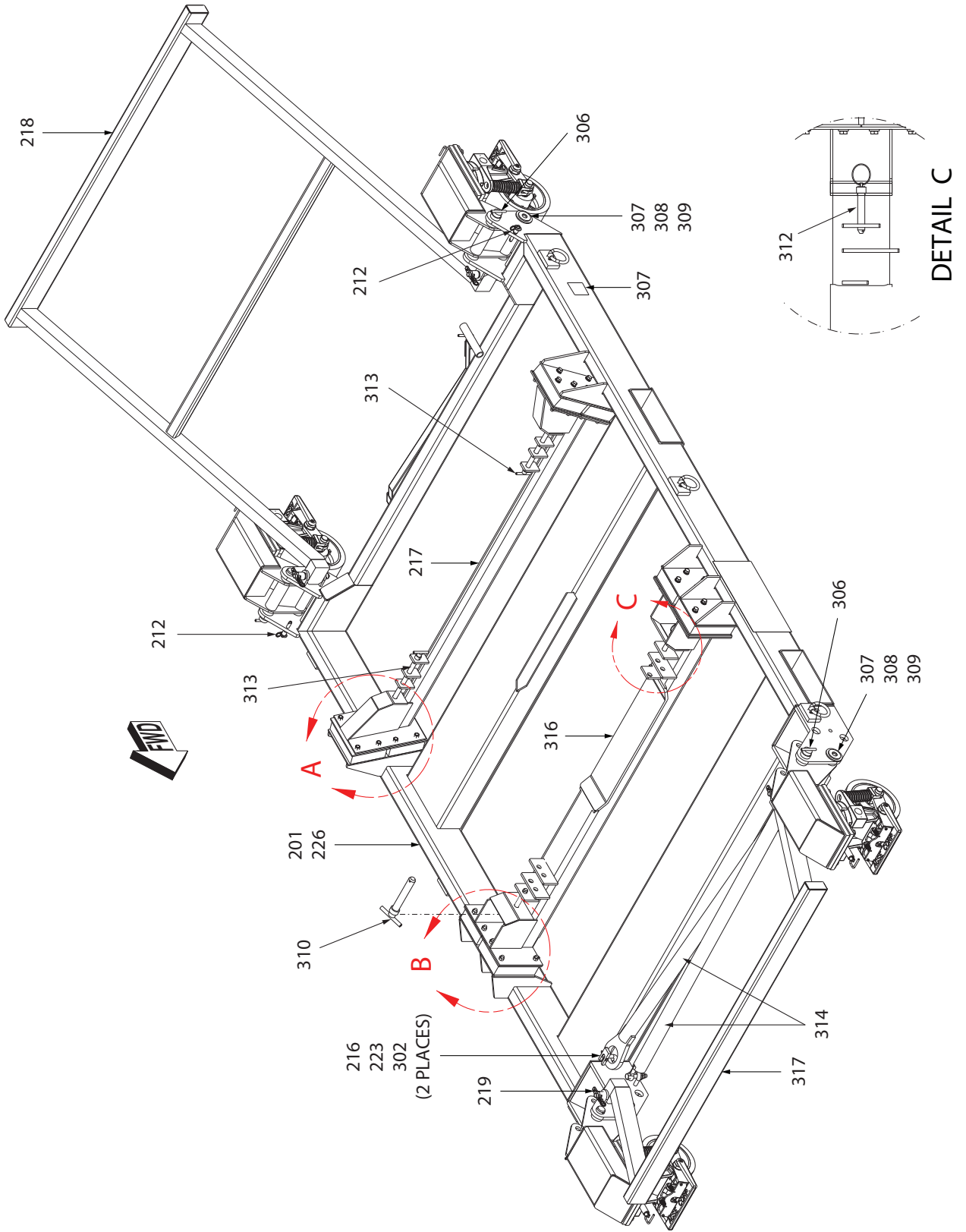
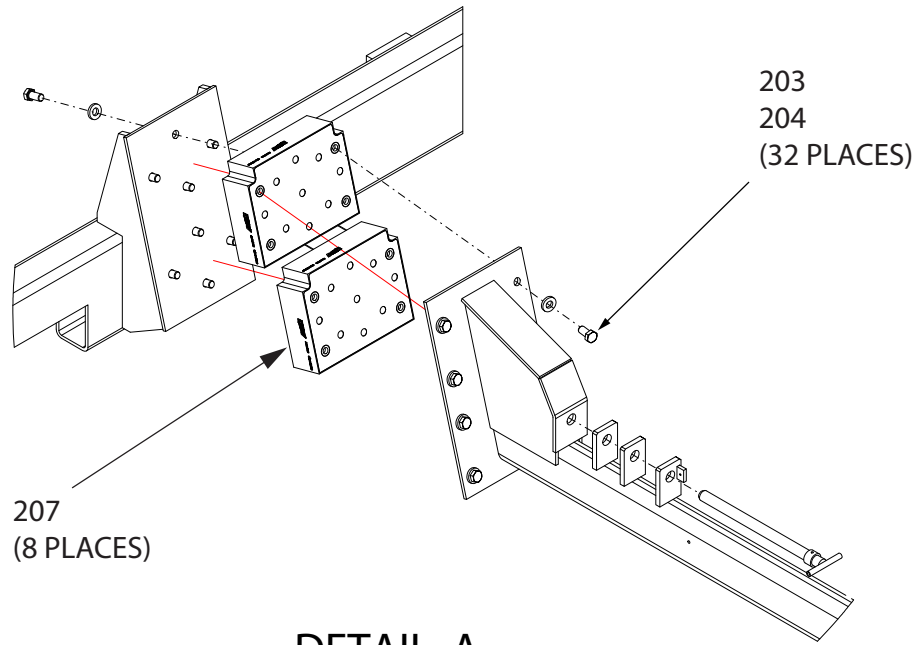
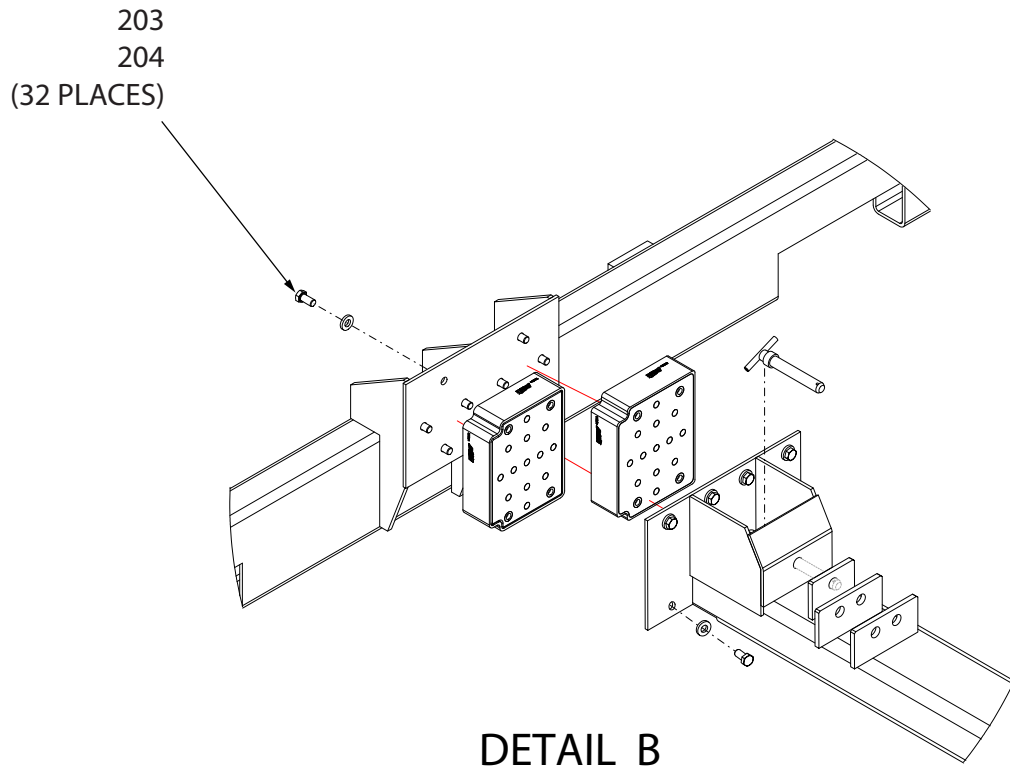


Figure 8.2-1 Base Assembly (-200 & -227)



DETAIL A



DETAIL B

Figure 8.2-2 Shock Mount

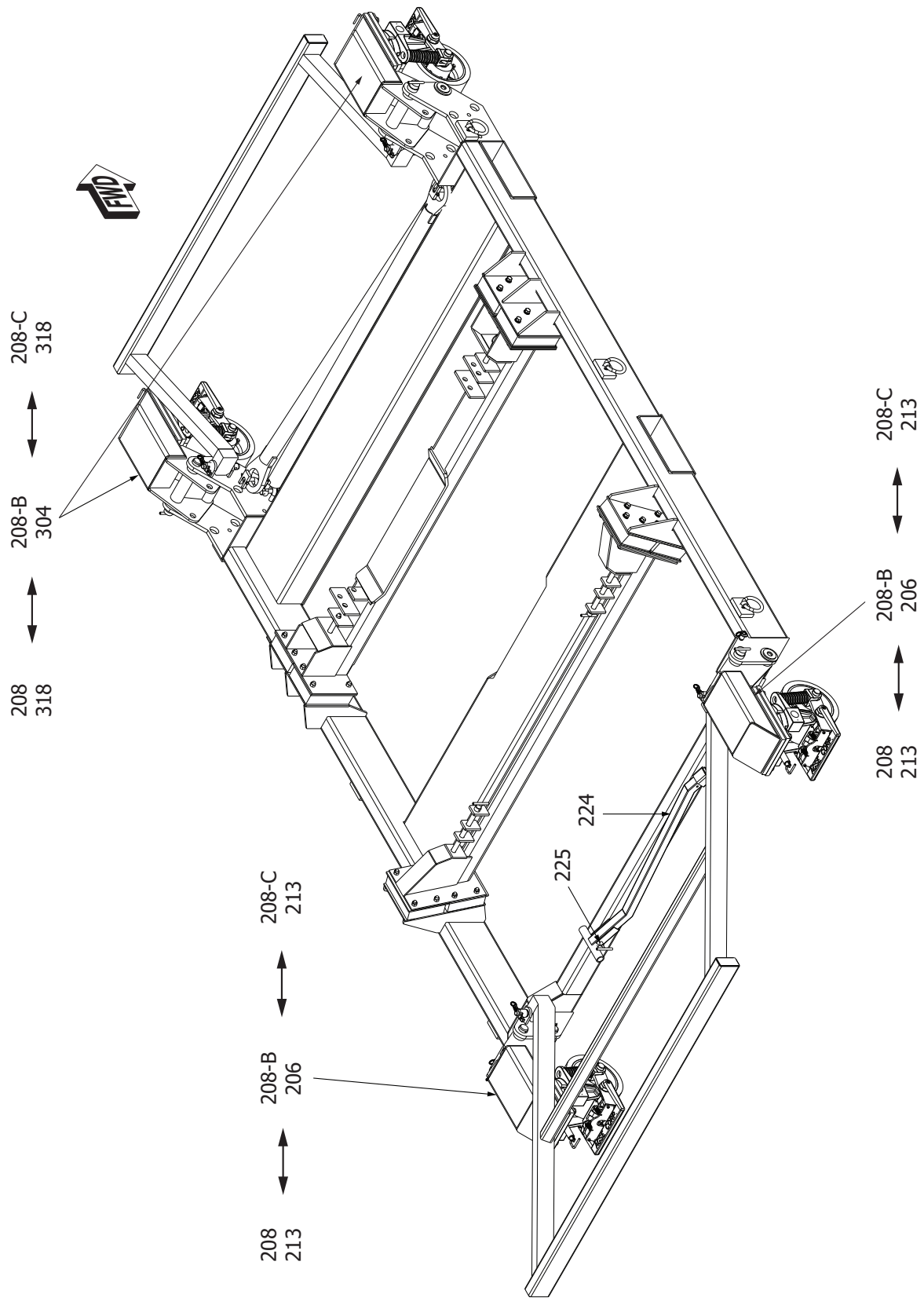


Figure 8.2-3 Base Assembly

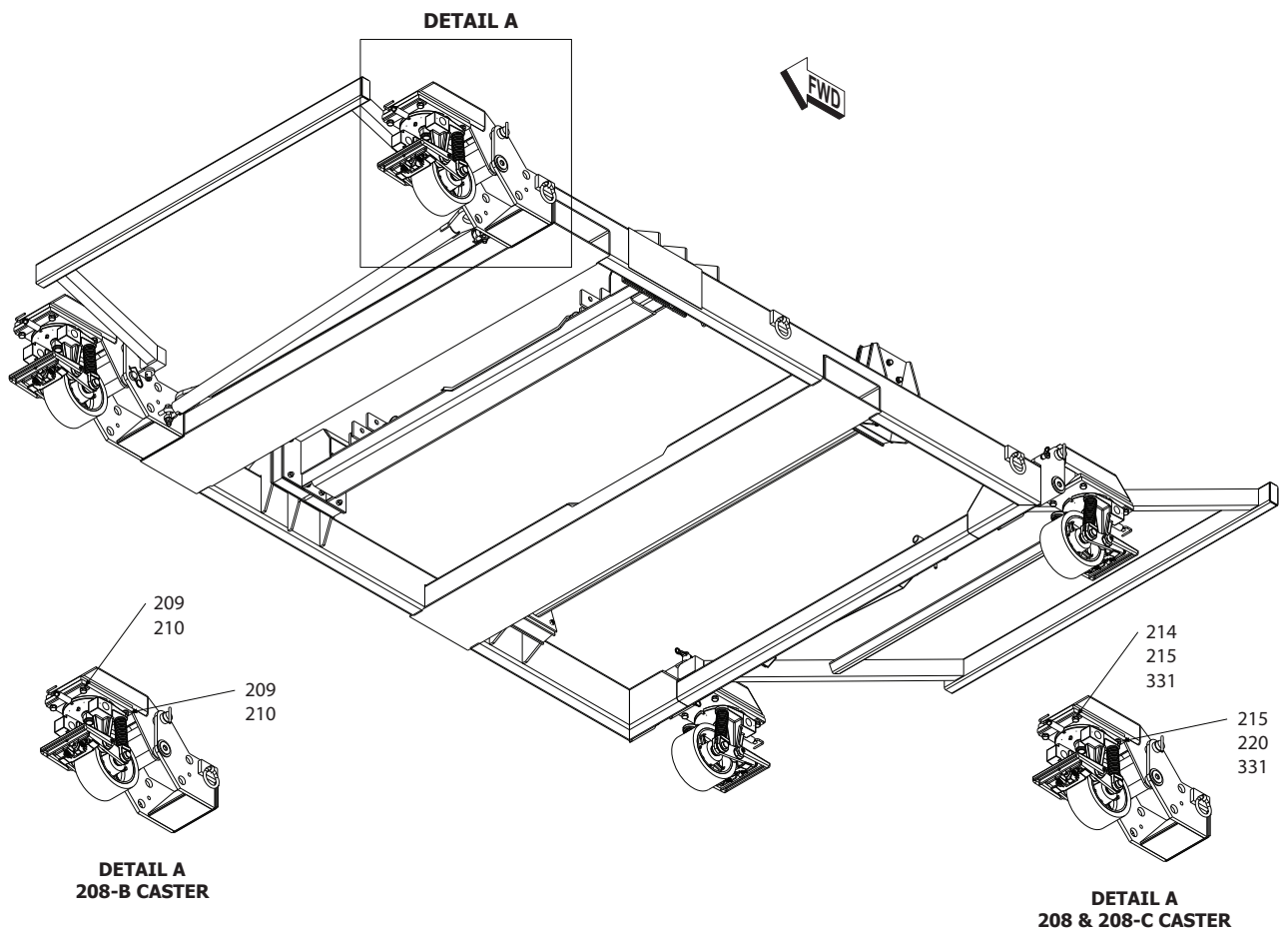


Figure 8.2-4 Base Assembly Caster

IPB Figure 3

Engine Adapter Set for AM-2811-4800 Cradle for CFM56-7

ITEM	PART NUMBER	QTY	PART DESCRIPTION
4821	AM-2811-4210	1	Fwd Mount (H4)
4815	AM-2811-4200	1	Fwd Mount (H3)
4810	AM-2811-1314	1	Retainer Pin
4808	AM-2718-C6	1	Trunion Aft Mount
4809	TCL-20-12-SS	1	Threaded Set Collar

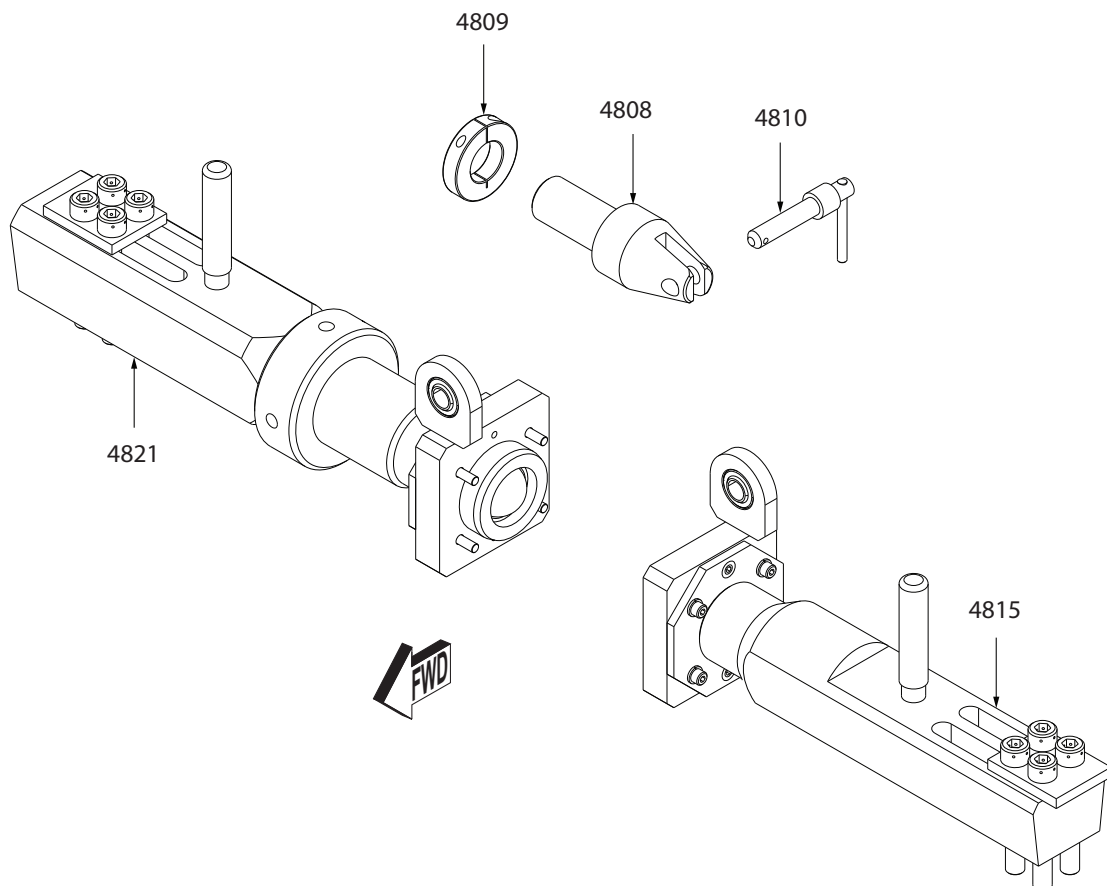


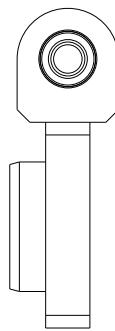
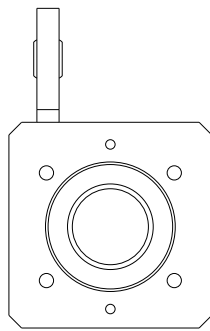
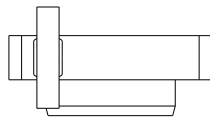
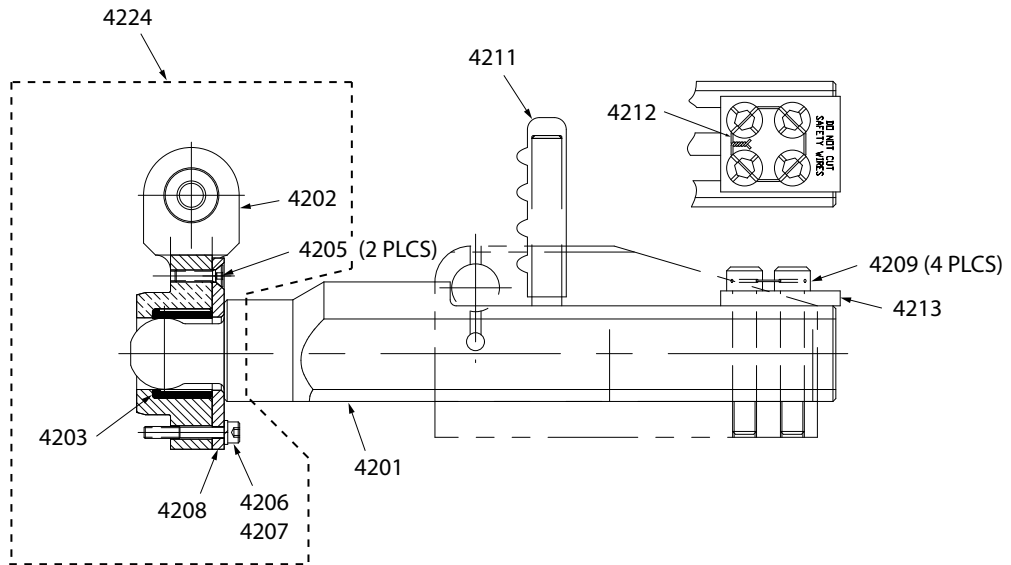
Figure 8.3-1 Engine Adapter Set CFM56-7

IPB Figure 4 - AM-2811-4200 FWD Mount Assembly H3

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2811-4200	-	FWD Mount Assy H3 (Figures 8.4-1)
4201	AM-2811-4500	1	Fwd Mtg Shaft H3
4209	AM-2811-4317	4	Bolt - Modified
4211	AGSE-S00207-P01	1	Handle Grip
4212	Commercial	A/R	Safety Wire - .032 Dia. - SS
4213	AM-2811-4312	1	Washer Plate
4224	AM-2811-4224	1	Insert Assembly (Components Detailed Below)

AM-2811-4224 Insert Assembly - Details

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2811-4224	-	Insert Assembly (Figure 8.4-1)
4202	AM-2811-4315	1	Insert
4203	AM-2811-4311	1	Bushing
4205	AGSE-S00114-04C016A27	2	Screw, Flat Head
4206	AM-2811-4314	4	Captive Screw
4207	AGSE-S00135-04A05	4	Washer, Locking
4208	AM-2811-4305	1	Retainer



ORIENTATION DETAIL OF ITEM 4202 (AM-2811-4315),
 INSERT FOR AM-2811-4200 H3 MOUNT ASSEMBLY

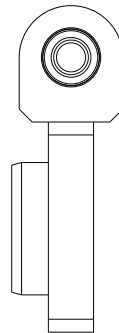
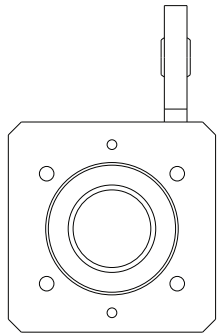
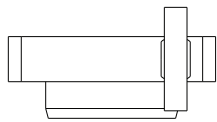
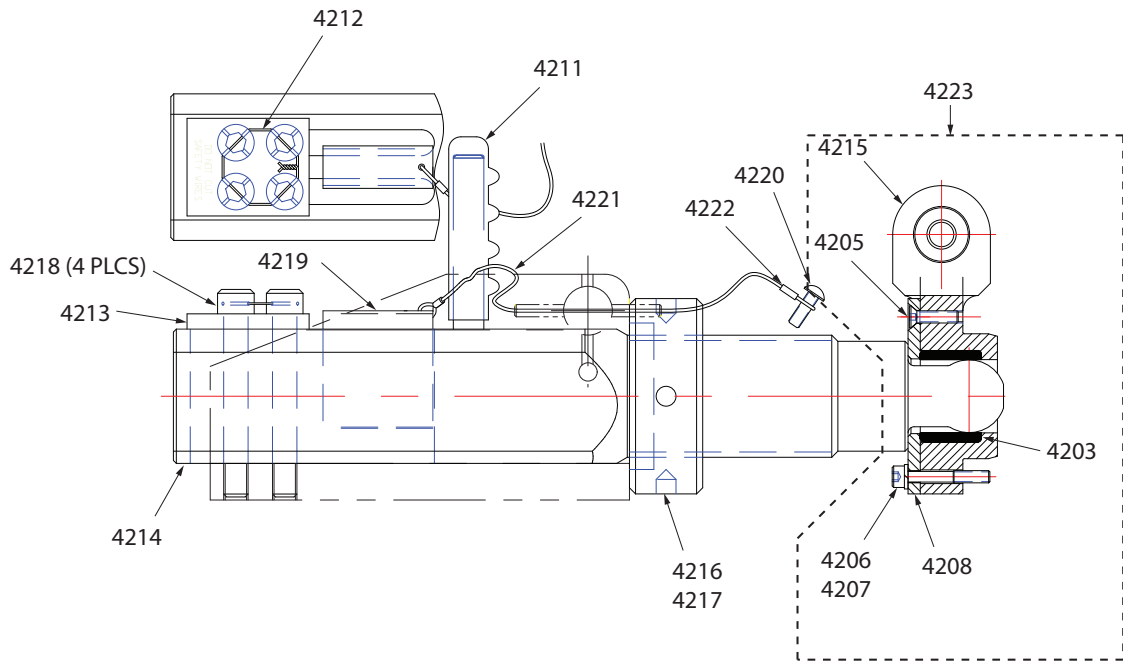
Figure 8.4-I-FWD Mount Assembly H3 - LH

IPB Figure 5 - AM-2811-4210 FWD Mount Assembly H4

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2811-4210	-	Mount Assy H4 (Figure 8.5-1)
4211	AGSE-S00207-P01	1	Handle Grip
4212	Commercial	A/R	Safety Wire - .032 Dia. - SS
4213	AM-2811-4312	1	Washer Plate
4214	AM-2811-4503	1	Fwd Mtg Shaft H4
4216	90291A537	1	Set Screw - Nylon Tipped 1/4-20 UNC x 1/2" Lg. - SS
4217	AM-2811-4313	1	Mtg Adjust Nut
4218	AM-2811-4318	4	Bolt - Modified
4219	AM-2811-5400	1	Spring Clip
4220	Commercial	1	Round Head Slotted Machine Screw 1/4-20 UNC x 3/4" Lg. - Zinc Plt
4221	CL-4-C	1	Nylon Cable - 15" Lg.
4222	CL-5-F	1	Ferrule
4223	AM-2811-4223	1	Insert Assy (Components detailed below)

AM-2811-4223 Insert Assembly - Details

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2811-4223	-	Mount Assy H4 (Figure 8.5-1)
4203	AM-2811-4311	1	Bushing
4205	AGSE-S00114-04C016A27	2	Screw, Flat Head
4206	AM-2811-4314	4	Captive Screw
4207	AGSE-S00135-04A05	4	Washer, Locking
4208	AM-2811-4305	1	Retainer
4215	AM-2811-4316	1	Insert



ORIENTATION DETAIL OF ITEM 4215 (AM-2811-4316),
 INSERT FOR AM-2811-4210 H4 MOUNT ASSEMBLY

Figure 8.5-1 FWD Mount Assembly H4 - RH

9.0 – Stencils, Decals, and Placards

9.1 General

Various stencils, decals, and placards are added to the equipment to provide warnings, cautions, and general information. These items should be reviewed and understood by maintenance and user personnel.

9.2 Stencils and Placards

ITEM	PART NUMBER	QTY	PART DESCRIPTION
	AM-2563-2600	-	Stencil Kit for Base
	AM-2811-6900	-	Stencil Kit for Cradle

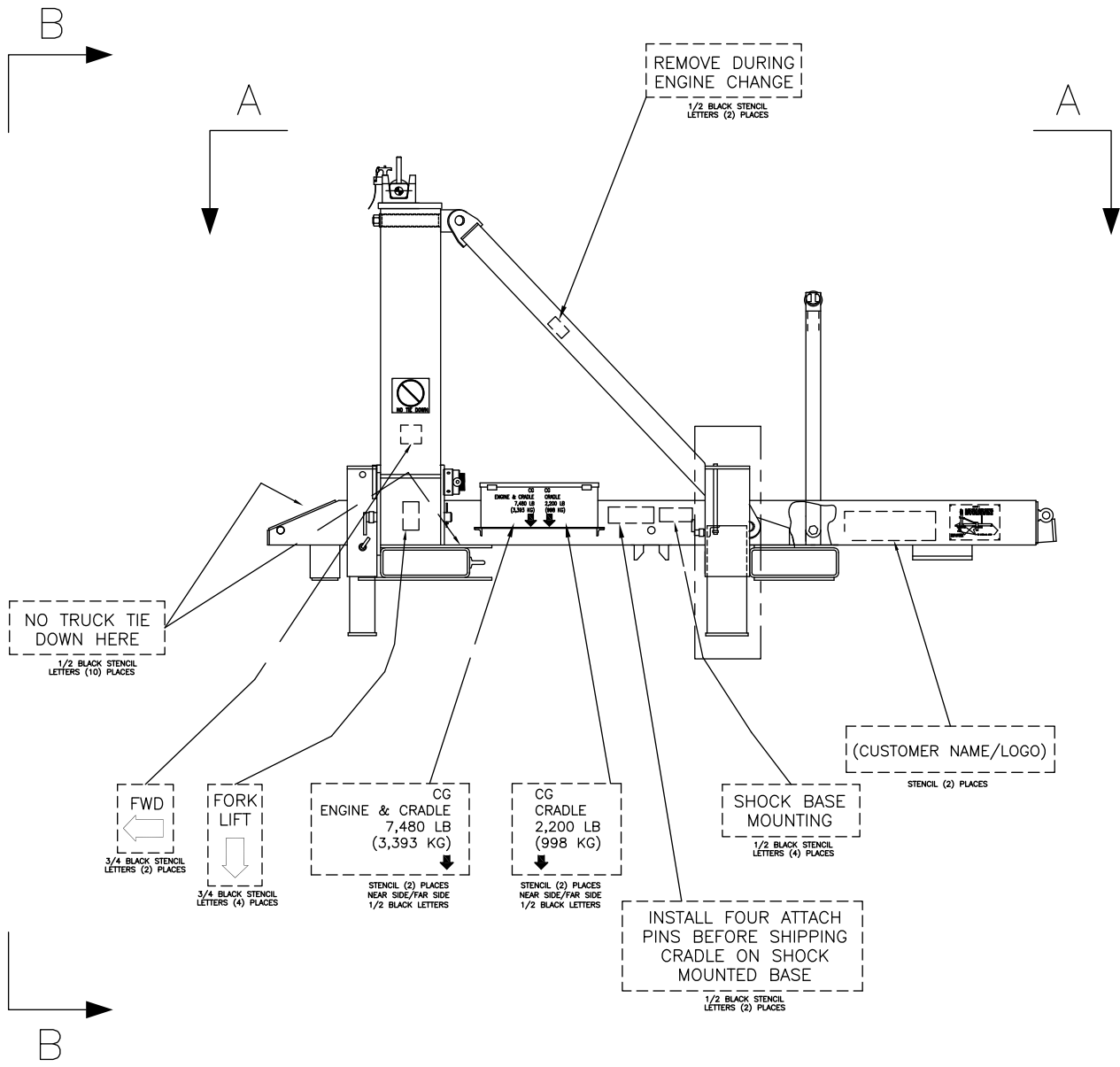
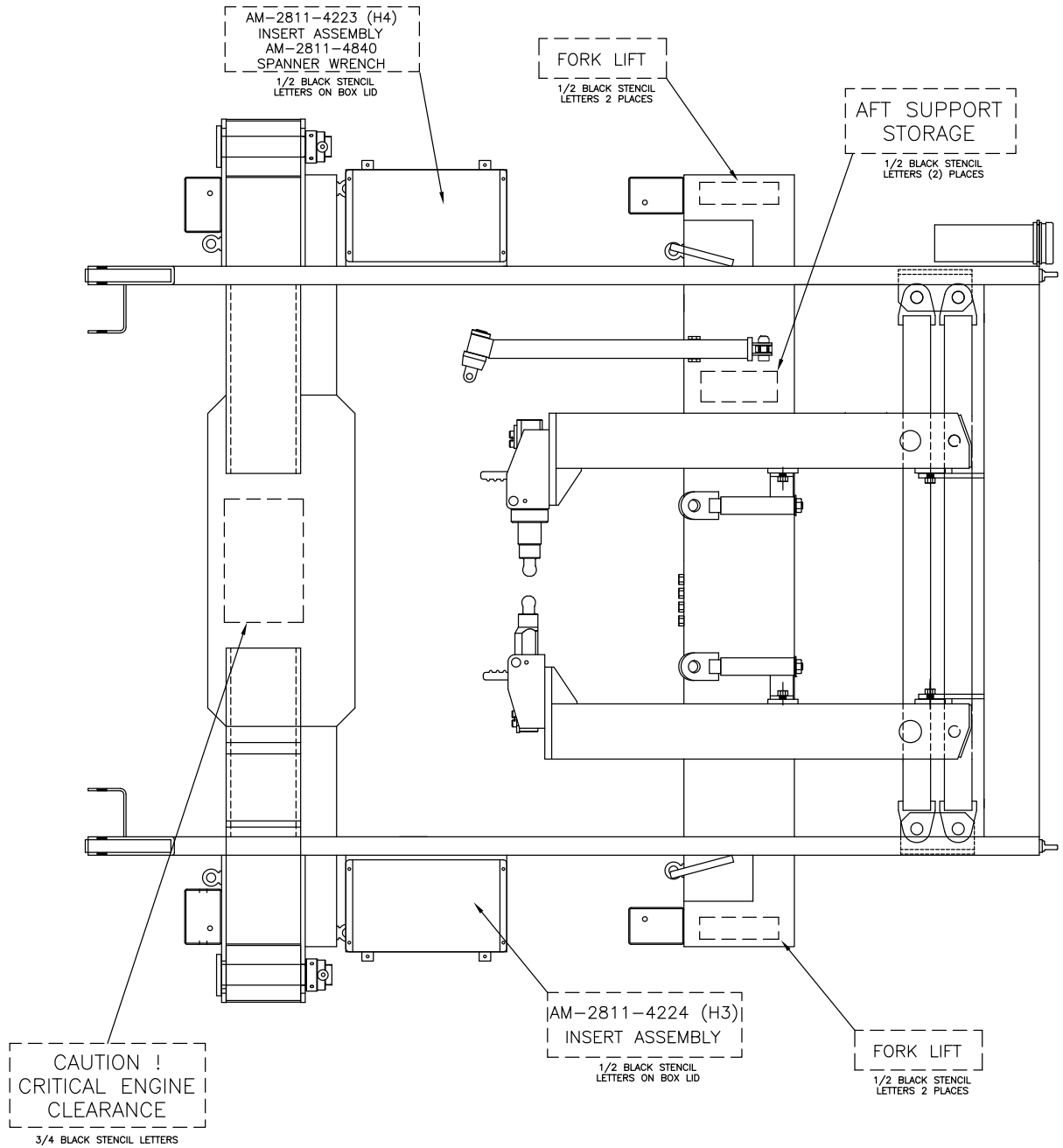
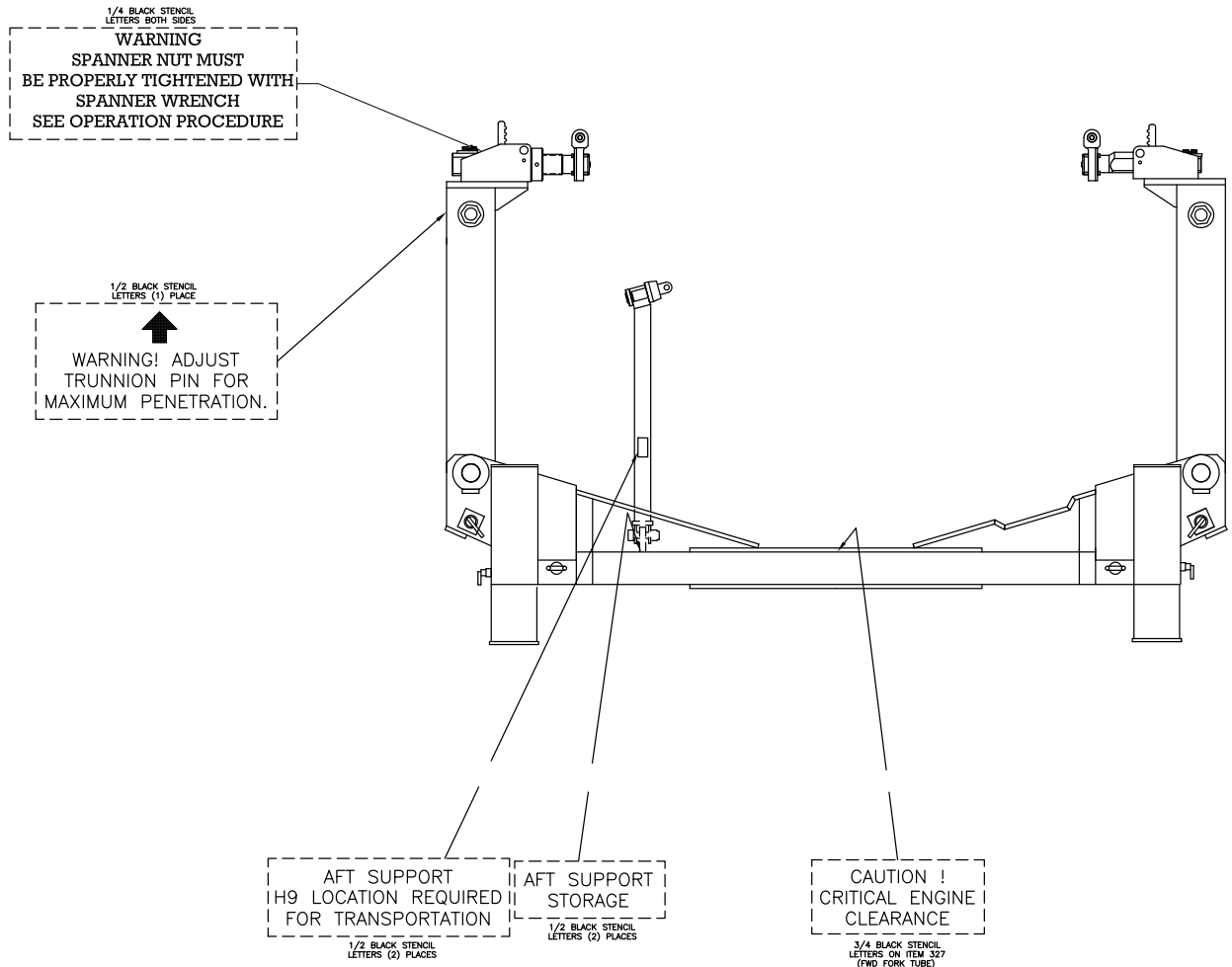


Figure 9.1-1 Cradle Stencils - Front View



SECTION A-A

Figure 9.1-2 Cradle Stencils - Top View



SECTION B-B

Figure 9.1-3 Cradle Stencils - Side View

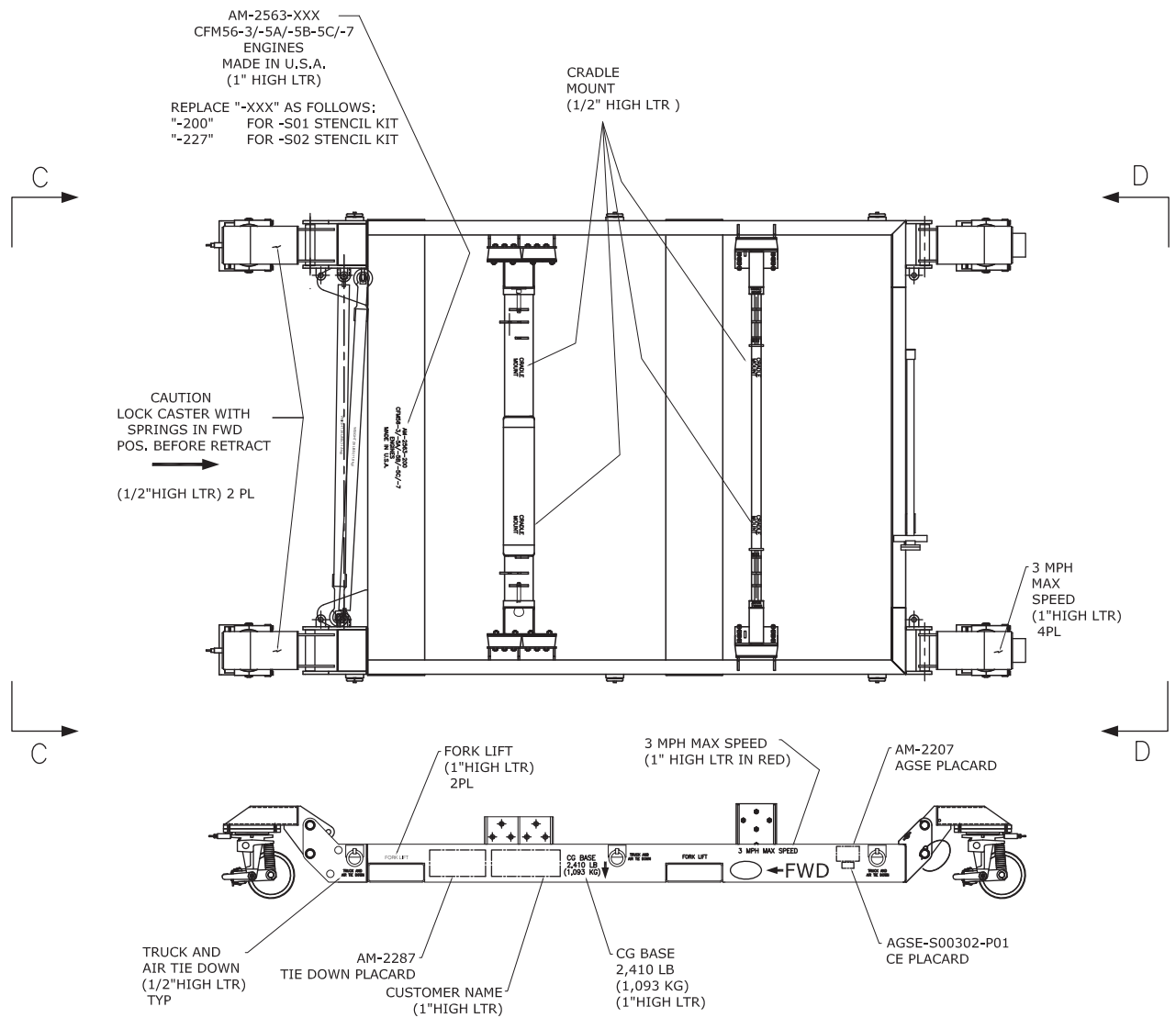
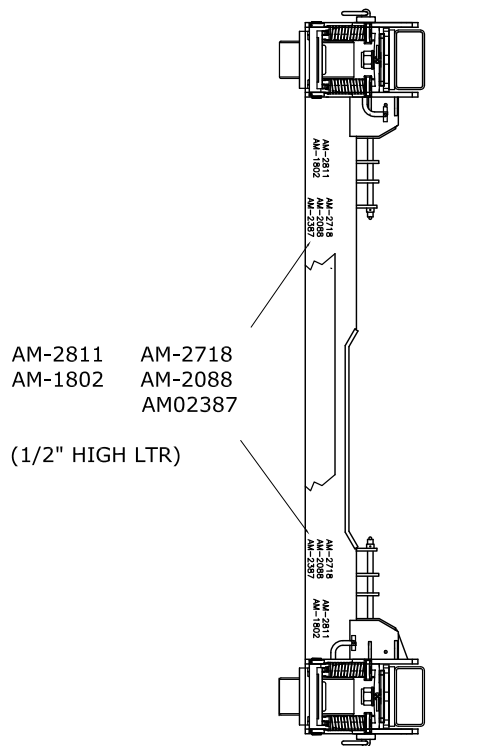
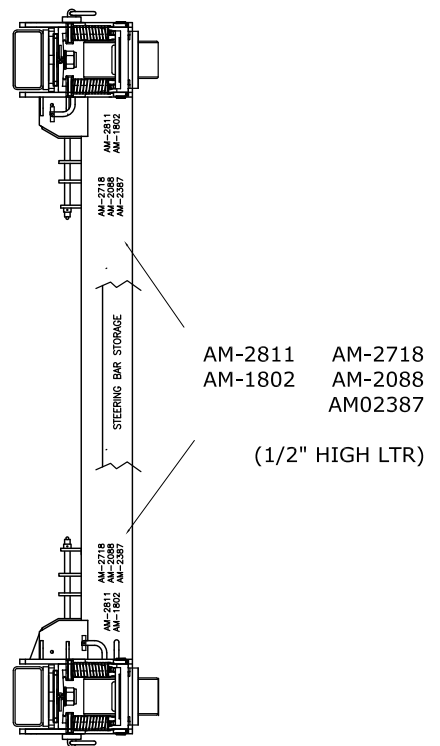


Figure 9.1-4 Base Stencils - Front & Top Views



SECTION C-C



SECTION D-D

Figure 9.1-5 Base Stencils - Side View

10.0 – Recommended Spares

10.1 Critical Items

AGSE defines “critical” items as those items, if broken or missing, that would render the equipment inoperable or severely impair equipment operation. Since most of these items are also long leads, it is AGSE’s recommendation that such items be identified, purchased, and stocked by the customer. In the remote event of “critical” item failure, the equipment can be quickly repaired and placed back in service with minimal down time.

AGSE does not typically stock all components used with the equipment, so immediate shipment of “critical” items may not always be possible. AGSE will respond to customer requests for quotation on any spare parts, and expedite orders for spare parts as required. The customer should never assume immediate delivery is always possible.

It is the responsibility of the operator of the equipment to review the recommended spares list and balance costs against equipment down-time. The list can be adjusted by the operator based on the actual service life of components experienced during equipment usage.

ITEM	PART NUMBER	QTY	PART DESCRIPTION
			* Base Assembly *
207	AGSE-S00304-P04	2	Shock Mount
208	AM-2079-2	1	Caster
212	CL-8-BLP-B-1.50	2	Ball Lock Pin
224	AM-2811-2011	1	Steering Bar
225	AM-90250-32T	1	Safety Pin Assembly
306	AM-1803-724	4	Safety Pin Assembly
307	AM-1803-732	4	Safety Pin Assembly
310	AM-90750-60T	1	Safety Pin
312	AM-2563-312	1	Safety Pin (Fwd Locking)
313	AM-2563-313	1	Safety Pin (Aft Locking)
314	AM-1803-719	1	Tow Bar

ITEM	PART NUMBER	QTY	PART DESCRIPTION
			* Cradle Assembly *
4803	AM-2811-2004	2	Retainer Pin
4808	AM-2718-C6	1	Trunnion
4809	TCL-20-12-SS	1	Thread Collar, 1 1/4-2UNF-SS
4810	AM-2811-1314	1	Retainer Pin
4811	AM-2811-1306	1	Retainer Pin
4814	AM-2811-2000	4	Retainer Pin
4815	AM-2811-4200	1	Mount Assy - H3
4821	AM-2811-4210	1	Mount Assy - H4
4825	AGSE-S00202-P02	1	Ball Lock Pin
4835	CL-6-BLPR-3.00	2	Ball Lock Pin
4840	AM-2811-1310	1	Retainer Pin