

# Installation, Operation and Maintenance Manual

## Mark V and Heavy Duty Mark V



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## Introduction

This manual provides information necessary for the installation, operation and maintenance of the SAF-HOLLAND® Mark V and Heavy Duty Mark V model landing gears.

Read this manual before using or servicing this product and keep it in a safe location for future reference. Updates to this manual, which are published as necessary, are available on the internet at [www.safholland.us](http://www.safholland.us).

When replacement parts are required, SAF-HOLLAND highly recommends the use of only SAF-HOLLAND Original Parts. A list of technical support locations that supply SAF-HOLLAND Original Parts and an Aftermarket Parts Catalog are available on the internet at [www.safholland.us](http://www.safholland.us) or contact Customer Service at 888-396-6501.

## Warranty

Refer to the complete warranty for the country in which the product will be used. A copy of the written warranty is included with the product or available on the internet at [www.safholland.us](http://www.safholland.us).

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## Notes, Cautions, and Warnings

Before starting any work on the unit, read and understand all the safety procedures presented in this manual. This manual contains the terms "NOTE", "IMPORTANT", "CAUTION", and "WARNING" followed by important product information. These terms are defined as follows:

**NOTE:** Includes additional information to enable accurate and easy performance of procedures.

**IMPORTANT:** Includes additional information that if not followed could lead to hindered product performance.

### CAUTION

Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

### ⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

### ⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

## 1. Safety Instructions

### General and Servicing Safety Instructions

- Read and observe all Warning and Caution hazard alert messages. The alerts provide information that can help prevent serious personal injury, damage to components, or both.

**⚠ WARNING** Failure to follow the instructions and safety precautions in this manual could result in improper servicing or operation leading to component failure which, if not avoided, could result in death or serious injury.

- All maintenance should be performed by a properly trained technician using proper/special tools, and safe procedures.

**NOTE:** In the United States, workshop safety requirements are defined by federal and/or state Occupational Safety and Health Act (OSHA). Equivalent laws may exist in other countries. This manual is written based on the assumption that OSHA or other applicable employee safety regulations are followed by the location where work is performed.

**IMPORTANT:** Verify before installation that the landing gear selected will withstand the load and have the correct travel/extension requirements for the trailer.

- DO NOT operate the landing gear if it is cracked, bent, or any other damage is present. Using damaged landing gear could result in death or serious injury.

**⚠ WARNING** Failure to check condition of landing gear prior to operating could result in unexpected performance which, if not avoided, could result in death or serious injury.

**⚠ WARNING** Using damaged landing gear could result in unexpected performance which, if not avoided, could result in death or serious injury.

- Properly support and secure the vehicle from unexpected movement when servicing the landing gear.

**NOTE:** If possible, unload the trailer before performing any service procedures.

**⚠ WARNING** Failure to secure the trailer from rolling, when operating the landing gear, could result in death, serious injury or property damage.

**⚠ WARNING** Failure to properly support and secure the trailer during installation of landing gear could create a crush hazard which, if not avoided, could result in death or serious injury.

- DO NOT walk/crawl underneath a trailer during coupling/uncoupling.
- If possible, unload the trailer before performing any maintenance or service procedures.

**⚠ WARNING** Failure to keep clear from underneath the trailer could create a crush hazard which, if not avoided, could result in death or serious injury.

## 2. Model Identification

### Mark V and Heavy Duty Mark V

The Mark V and Heavy Duty Mark V identification code is located, behind the grease fittings of each landing gear leg (**Figure 1**). The first number is the serial number, described below, and the second number is the part number. In order to properly identify the HOLLAND® landing gear and its components when communicating with SAF-HOLLAND or a dealer, please record the part and serial numbers below and refer to them when ordering replacement parts.

### Part Number

**XA - S8 - 3 A 0 2 4 - 7**

#### Grease

Blank - Standard Low Temp Grease  
7 - No Lube™ (Lifetime Warranty)

#### Footware

01 - Self Leveler 12" DIA  
05 - Sandshoe 4.5"x 10"x 12"  
07 - Sandshoe 5.0"x 14"x 12"  
10 - No Footware  
12 - Heavy Duty Self Leveler 14"x 14"  
Sandshoe 5.0"x 12"x 16"  
13 - Sandshoe 2.0"x 10"x 12"  
14 - Cushion Foot 2.4"x 10"x 12"  
15 - Sandshoe 3.8"x 10"x 10"  
24 - R.C.F. 10"x 10"  
ZZ - Special

#### Axle Type

0 - No Axle  
1 - Hollow Axle  
3 - Solid Axle

#### Mounting

A - Universal Mount - .66" Ø Holes  
B - Inside Mount - .66" Ø Holes  
C - Outside Mount - .66" Ø Holes  
D - I-Beam Mount - .66" Ø Holes  
F - Extended I-Beam Mount - .66" Ø Holes  
Z - Special

#### Travel

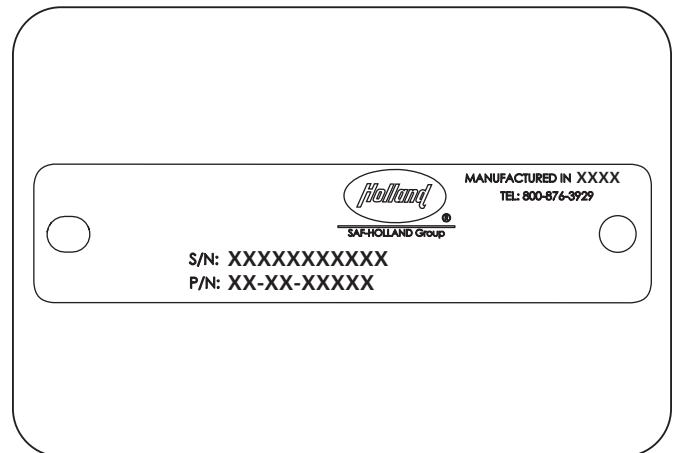
0 - 12.5" (10.0" for Skid Foot Models)  
1 - 13.5"  
2 - 15.0"  
3 - 16.5"  
4 - 17.6"  
5 - 18.7"  
Z - Special

\*Contact SAF-HOLLAND for Heavy Duty Travel Lengths

### Model

XA-S8 – Standard Duty Mark V 2-Speed Leg  
XA-S9 – Standard Duty Mark V Single Speed Leg  
XA-H8 – Heavy Duty Mark V 2-Speed Leg  
XA-H9 – Heavy Duty Mark V Single Speed Leg

Figure 1



Part No. \_\_\_\_\_

Serial No. \_\_\_\_\_

Purchase date: \_\_\_\_\_

### 3. Pre-Installation Instructions

Prior to installation of the landing gear, correctly size the legs to the trailer. It is recommended to have 12" (305 mm) minimum ground clearance when the landing gear is fully retracted.

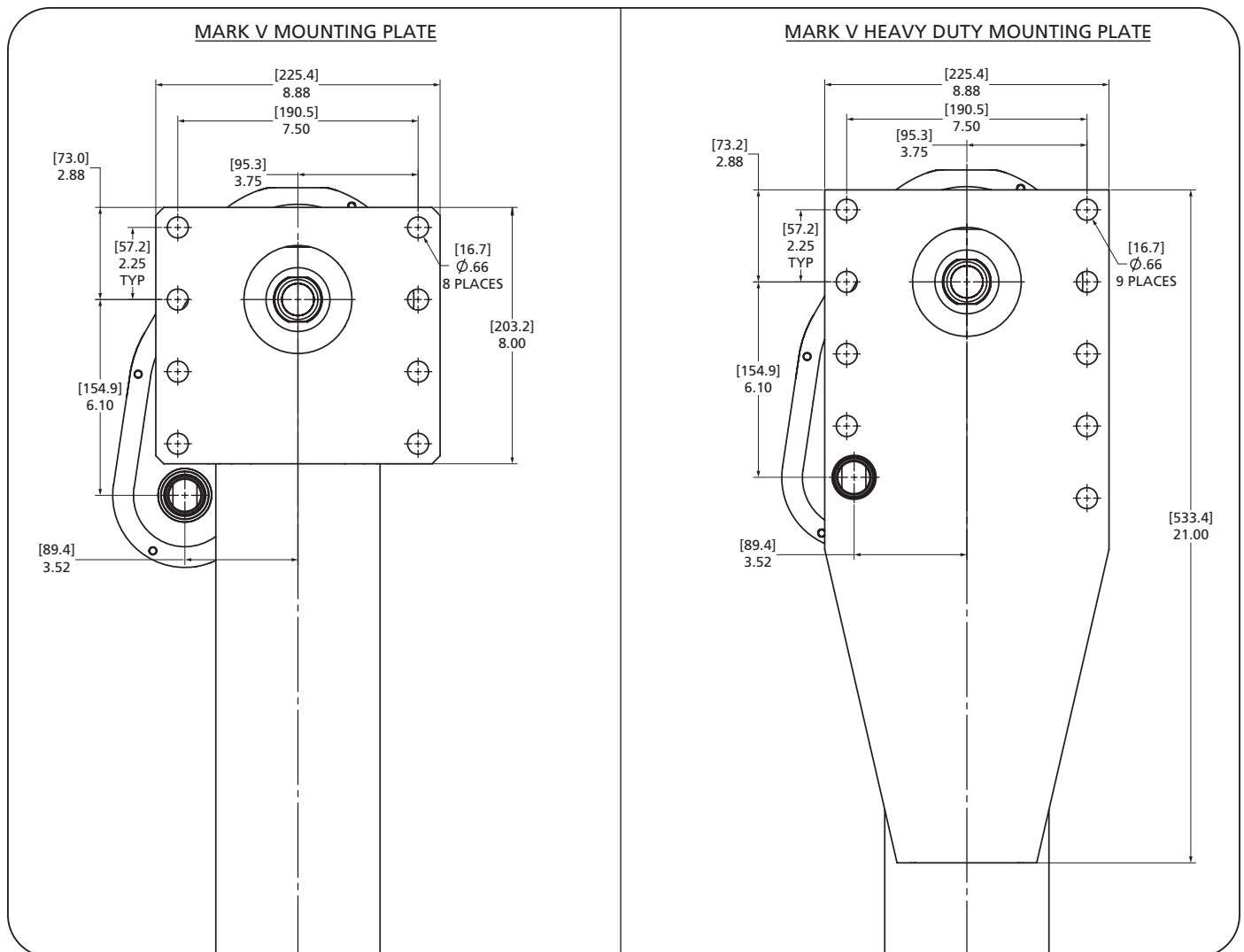
Ensure that the legs have sufficient travel to raise the trailer from the fifth wheel a minimum of 1" (25 mm), preferably 3" (76 mm) without over-extension. DO NOT attempt to force the landing gear past its stops.

#### CAUTION

Failure to prevent maximum extension or retraction including repeated winding to its physical stops could cause hard cranking which, if not avoided, could result in minor/ moderate injury or component damage.

Ensure that there is adequate clearance for the landing gear mounting plate bolt pattern (**Figure 2**).

**Figure 2**



**IMPORTANT:** Provide adequate clearance between the jack shaft bushings, jack shaft, shift shaft and the trailer frame. If the bushings or shafts are tight against the frame, damage and hard cranking will result (**Figure 3**).

**CAUTION** Failure to provide adequate clearance between the jack shaft bushings, jack shaft, shift shaft, and the trailer could cause hard cranking and wear which, if not avoided, could result in minor/moderate injury or component damage.

Before installation of the landing gear, ensure that both legs are in the fully retracted position. Both landing gear legs **MUST** be extended equally at all times.

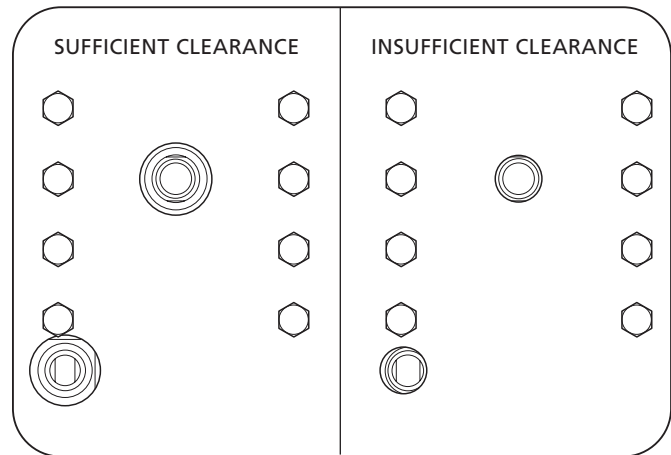
**WARNING** Failure to extend the legs evenly could cause trailer to tip over, which, if not avoided, could result in death, serious injury, or property damage.

**WARNING** Failure to extend the legs evenly could increase the potential for landing gear spring back, which, if not avoided, could result in death or serious injury.

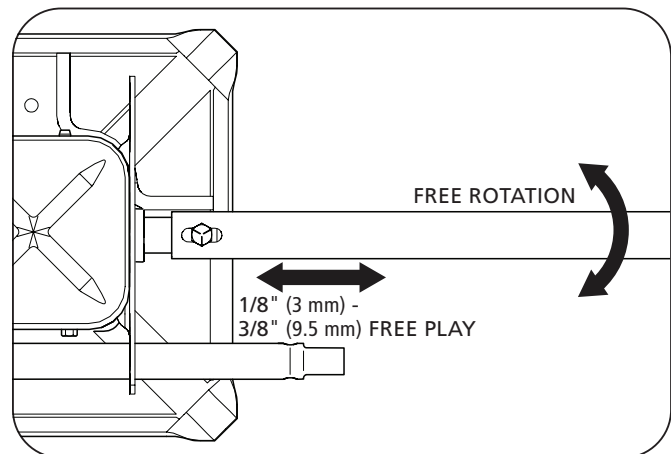
Ensure that the cross-shaft is of adequate length for the application. When installed, the cross-shaft should have 1/8" (3 mm) to 3/8" (9.5 mm) of side to side free play. It should also rotate freely with the jack shaft when installed (**Figure 4**). A cross shaft which is too long will cause binding resulting in stiff operation and excessive bushing wear.

**CAUTION** Failure to ensure that the cross-shaft is installed at adequate length and has free play could result in stiff operation which, if not avoided, could result in property damage.

**Figure 3**



**Figure 4**



## 4. Recommended Bracing

Installers are responsible to ensure that the mounting structure and mounting method are adequate for the intended imposed loads, use and application in accordance with trailer design specifications.

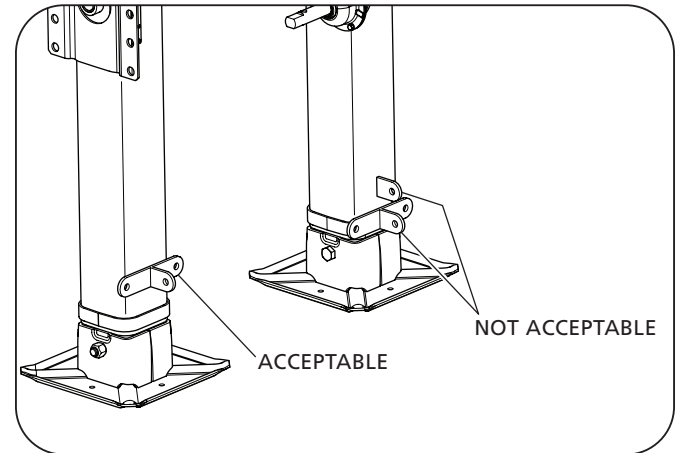
Published ratings are based on physical tests wherein the mounting plate of the tested landing gear legs was attached to a rigid fixture using Grade 8, 5/8" diameter bolts and nuts with hardened washers. The lower end of the upper housing tubes were rigidly braced in a lateral and longitudinal direction. All fasteners were torqued according to the fastener manufacturer's recommendations.

**NOTE:** DO NOT install strut brackets in the center of the housing without proper backing (**Figure 5**).

**NOTE:** Install the brackets as low as possible on the housing. DO NOT install the brackets to the housing leg band (**Figure 5**).

**NOTE:** DO NOT allow weld for strut brackets to penetrate through the housing and make contact with the retract tube.

**Figure 5**



### **⚠ WARNING**

Failure to install proper bracing on the landing gear could create a crush hazard which, if not avoided, could result in death, serious injury or property damage.

### **⚠ CAUTION**

Failure to install proper bracing on the landing gear could cause faulty operation which, if not avoided, could cause property damage and void the warranty.

## 5. Top Coating

All Mark V Landing Gear is produced with a black primer that can be left as the primary metal treatment or can be top coated with most industry paints.

If top coating is desired and blast surface preparation is required, keep blast media away from shaft seals, bushings and any area where the media could enter into the inner landing gear assembly.

### **⚠ WARNING**

Failure to keep blast media from entering the inner assembly could cause a premature wear out condition of the lifting screw or nut which, if not avoided, could create a crush hazard resulting in death or serious injury.

## 6. Welding Standards

### 6.1 Welding Standards

This specification applies to all components supplied by SAF-HOLLAND, and its products. The customer assumes full responsibility for weld integrity if weld material and procedures differ from those listed below.

### 6.2 Workmanship

All welding on SAF-HOLLAND products MUST be performed by a welder qualified according to the appropriate AWS standard for the weld being made or an equivalent standard. It is the responsibility of the customer to provide good workmanship when welding on SAF-HOLLAND products.

### 6.3 Material

Items to be welded that are made from low carbon or high-strength alloy steel are to be welded with AWS filler metal specification AWS A5.18, filler metal classification ER-70S-3, ER-70S-6 or equivalent unless specified on the installation drawing.

**NOTE:** Any substitution for filler material from the above standard MUST comply, as a minimum, with the following mechanical properties:

Tensile Strength - 72k psi (496 MPa)

Yield Strength - 60k psi (414 MPa)

Charpy V Notch - 20ft.-lbs. (27 N•m) at 0° F (-17.7° C)%

Elongation - 22%

The recommended welding gas for gas metal arc welding (GMAW) is 90% Argon / 10% CO<sub>2</sub>. If a different gas is used, welds MUST comply with penetration requirements illustrated (**Figure 6**). Where the installation drawing specifies different than above, the drawing shall prevail.

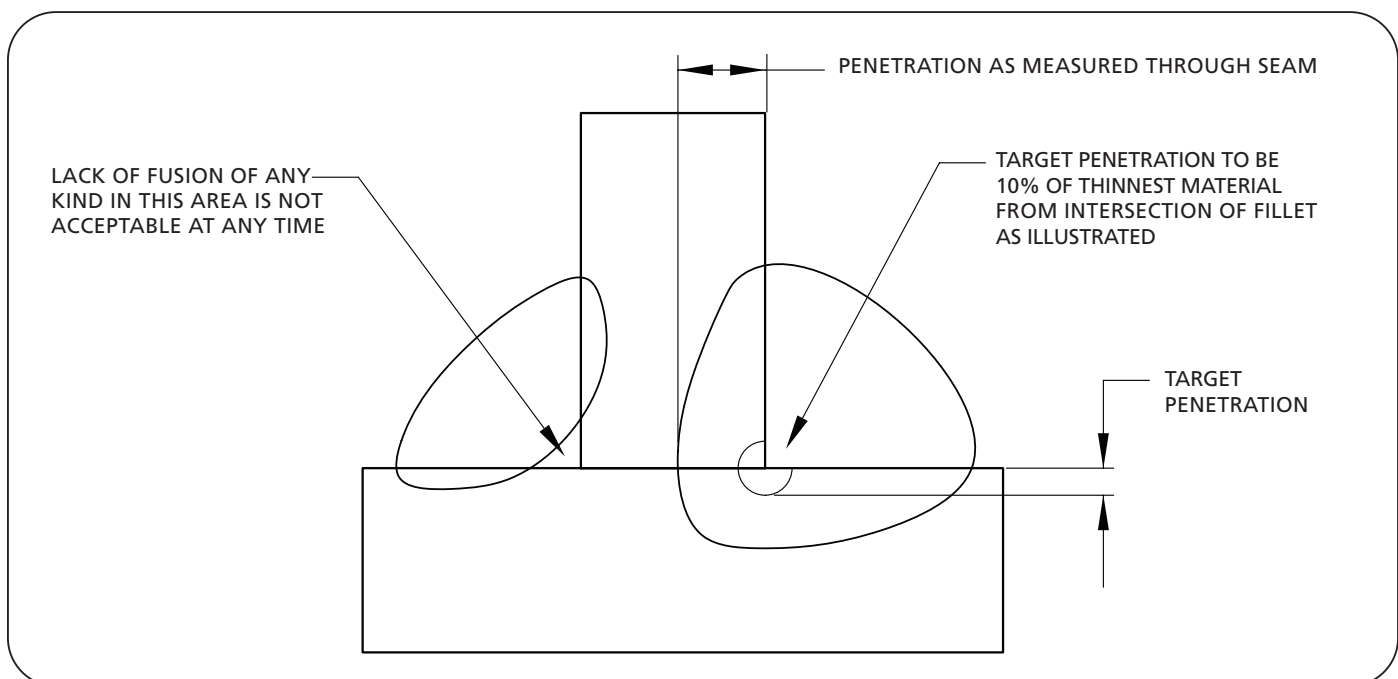
### 6.4 Procedures

Tack welds used for positioning components are to be located in the center of the final weld, where practical. Tack weld should be completely fused to the finish weld. DO NOT break arc at the end of the weld. Back up all finish welds at least 1/2" (12.7 mm) or a sufficient amount to prevent craters at the end of the weld. Where weld is shown to go around corners, it is assumed the corner represents a stress concentration area. DO NOT start or stop weld within 1" (25.4 mm) of the corner. Particular care should be taken to prevent undercutting in this area.

### 6.5 Weld Size

If weld size is NOT specified, the effective throat of the weld MUST be no smaller than the thinnest material being welded (**Figure 6**).

**Figure 6**





## 7. Installation Instructions

1. On a level surface, support the front of the trailer with either a kingpin stand, or while coupled to a tractor (**Figure 7**).
2. Set the parking brakes and chock the tires.

**⚠ WARNING** Failure to properly support the trailer and chock the tires during installation of landing gear could create a crush hazard which, if not avoided, could result in death or serious injury.

3. Using a square, check that the trailer landing gear mounting surfaces are perpendicular to the ground and parallel to each other.
4. Install the landing gear legs and cross-shaft to the trailer frame. Torque mounting bolts to manufacturer's specifications. Ensure the cross shaft lock nuts are snug, but cross-shaft is allowed side to side free-play.
5. Install the bracing. Refer to Section 4, (Recommended Bracing), for the minimum bracing requirements. Torque fasteners to manufacturer's specifications.

**IMPORTANT:** After installing the bracing, use a square to ensure that the legs have remained aligned with the trailer and each other as illustrated (**Figure 8**).

6. Install the crank handle onto the shift shaft. Position the washers on the outside of the crank handle. Insert the bolt through both the washers and the shaft, and secure with nut (**Figure 9**).
7. Ensure proper operation by extending and retracting the landing gear. Verify the crank handle is allowed to engage and disengage freely.
8. Extend the landing gear to ensure that both legs reach the ground simultaneously.

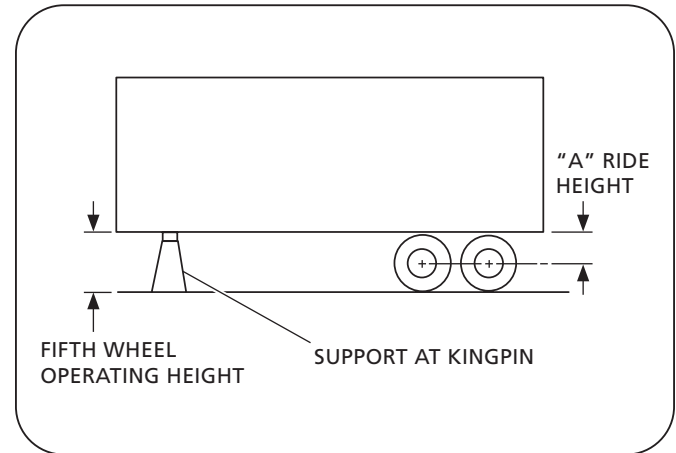
**⚠ WARNING** Failure to maintain two hand control of handle and release SLOWLY could cause spring back which, if not avoided, could result in death or serious injury.

9. Install the crank hanger, and ensure that the handle can be adequately secured.

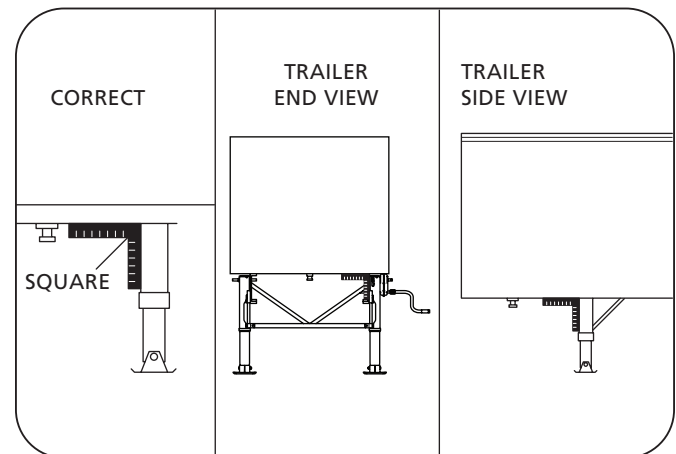
**CAUTION** Failure to secure the crank handle when NOT in use could allow unplanned landing gear extension which, if not avoided could result in property damage.

10. Verify that all braces, crank handle and foot ware are properly attached and that all bolts are tightened to fastener manufacturer torque specifications.

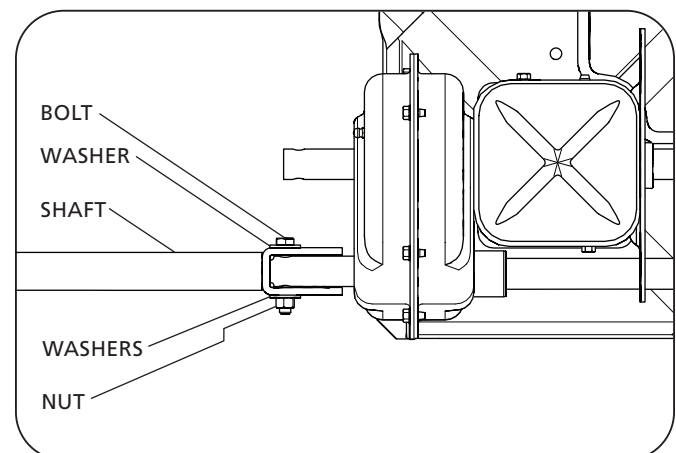
**Figure 7**



**Figure 8**



**Figure 9**



## 8. Landing Gear Operation

### 8.1 Pre-Operation Inspection

The landing gear should be visually inspected prior to use. Ensure that the legs are square to the trailer on both sides. Visually check for damaged, loose or broken components. Repair or replace the damaged landing gear.

#### **⚠ WARNING**

Failure to check the condition of the landing gear prior to operating could result in use of damaged product which, if not avoided, could result in death or serious injury.

### 8.2 Landing Gear Orientation

Determine if the landing gear is an outside (conventional) or an inside (reverse) mount before operation. The mount determines how the landing gear operates.

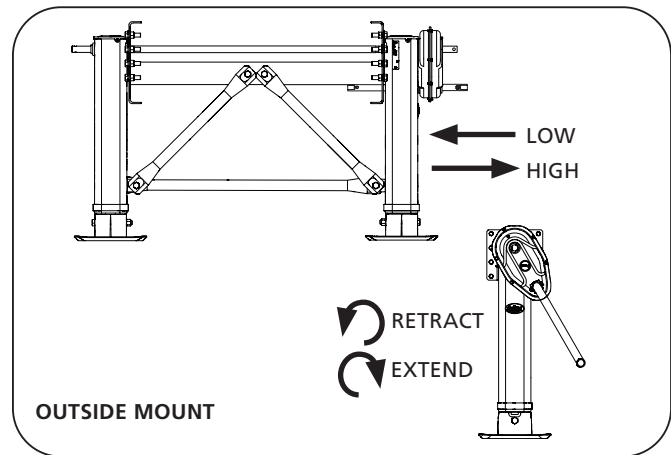
Landing gear with an outside mount (**Figure 10**):

- Pull the crank handle out for high speed.
- Push the crank handle in for low speed.
- Turn the crank counter-clockwise to retract the leg.
- Turn the crank clockwise to extend the leg.
- Always stow handle in hanger while in low gear. (push in)

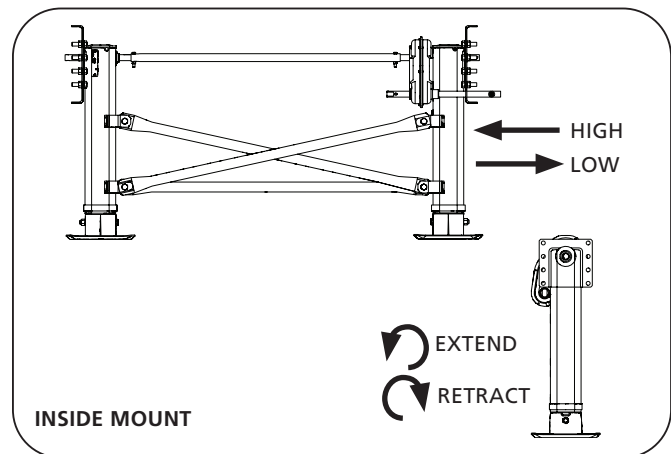
Landing gear with an inside mount (**Figure 11**):

- Pull the crank handle out for low speed.
- Push the crank handle in for high speed.
- Turn the crank counter-clockwise to extend the leg.
- Turn the crank clockwise to retract the leg.
- Always stow handle in hanger while in low gear. (pull out)

**Figure 10**



**Figure 11**



### 8.3 Landing Gear Operation During Coupling

**CAUTION** Failure to perform procedures in a lighted area that is clear of obstacles and personnel could lead to a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTE:** For specific coupling instructions relating to the fifth wheel, tractor, and the trailer, refer to the respective manufacturer's instructions.

1. Ensure that the coupling area is flat, level and clear of persons and obstacles.
2. Prepare the fifth wheel, tractor and trailer for coupling per the manufacturer's instructions.
3. Back up to the trailer per the fifth wheel, tractor, and trailer manufacturer's instructions, centering the kingpin with the throat of the fifth wheel as illustrated (**Figure 12**).

**IMPORTANT:** DO NOT attempt to couple until steps 4-6 are completed.

**IMPORTANT:** DO NOT couple the tractor and trailer at an angle.

**CAUTION** Failure to align the tractor and the trailer properly could result in damage to the landing gear.

4. Engage the tractor parking brake, and chock the trailer wheels. Connect the brake lines and the electrical connections. Support the slack in the line to prevent interference.
5. Ensure that the landing gear is in low gear and engage the crank handle (**Figure 13**).

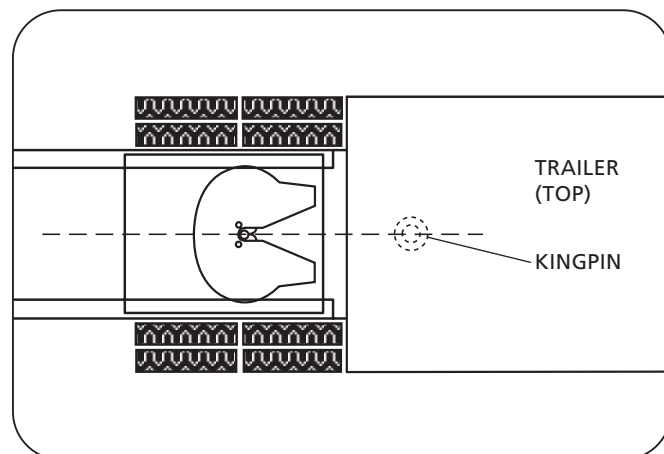
**CAUTION** Failure to lift and lower the trailer in LOW GEAR could result in damage to the landing gear.

6. With two hands on the crank handle, adjust the trailer height according to the fifth wheel, tractor, and trailer manufacturer's recommendations.

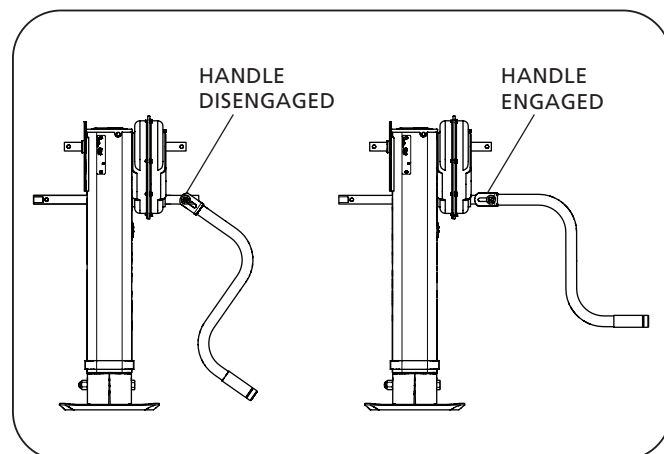
**WARNING** Failure to maintain two hand control of the handle and release SLOWLY could cause spring back, which, if not avoided, could result in death or serious injury.

7. Release the tractor parking brake. Couple and verify that the fifth wheel jaws are locked per the fifth wheel manufacturer's recommendations.
8. Engage the tractor parking brake. While still in low gear, retract the landing gear until the pads just come off the ground (**Figure 14**).

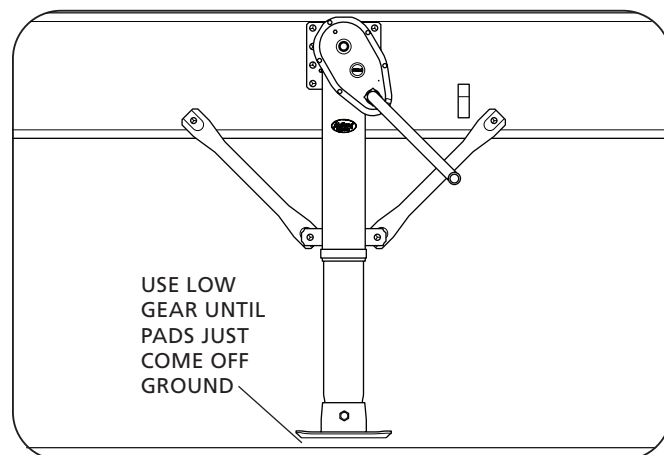
**Figure 12**



**Figure 13**



**Figure 14**



9. Shift the landing gear into high gear and fully retract. Shift the landing gear into low gear and secure the crank handle (**Figure 15**).

## CAUTION

Failure to retract the landing gear fully before moving the trailer could result in property damage.

## CAUTION

Failure to secure the crank handle when NOT in use could allow unplanned landing gear extension which, if not avoided, could result in property damage.

10. Complete all pre-trip inspection and operation procedures.

## 8.4 Landing Gear Operation During Uncoupling

**NOTE:** For specific uncoupling instructions relating to the fifth wheel, tractor, and trailer, refer to the respective manufacturer's instructions.

1. Position the tractor and the trailer on a well lit level surface, clear of persons and obstacles. Verify that the surface beneath the landing gear is capable of supporting the trailer weight. Also ensure that the tractor and trailer are in line with each other.

**NOTE:** If necessary, place landing gear pads on a support plank to prevent the landing gear from sinking into the supportive surface. (This is especially important with liquid cargo, where a shift in the contents could overturn the trailer).

## CAUTION

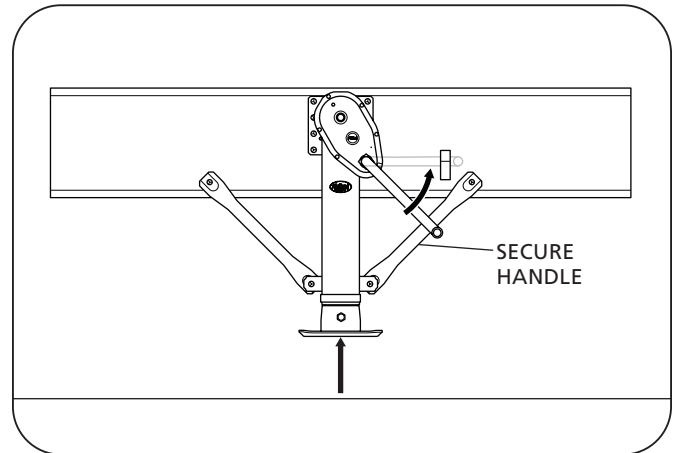
Failure to align the tractor and trailer properly could result in damage to the landing gear.

## WARNING

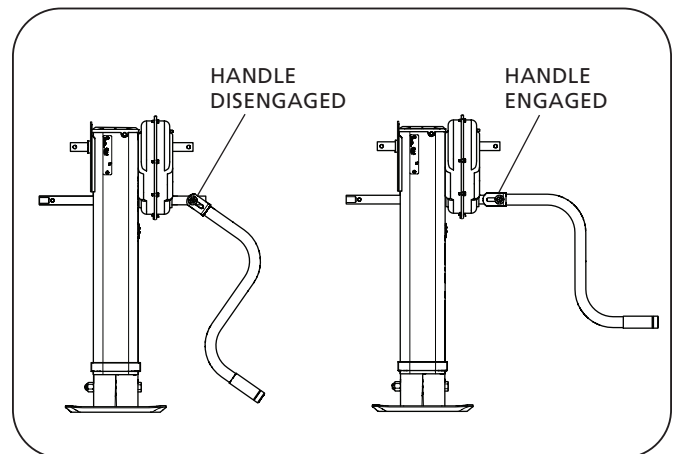
Failure to rest the landing gear pads on a hard, flat surface, could result in trailer tip-over which, if not avoided, could result death or serious injury.

2. Engage the trailer brakes. Slowly back tractor tightly against the trailer. Set the tractor brakes, and chock the trailer wheels.
3. Engage the landing gear crank handle and shift to high gear (**Figure 16**).

**Figure 15**



**Figure 16**



4. Extend the landing gear until the pads just touch the ground. (**Figure 17**).

**CAUTION** Failure to prevent maximum extension or retraction including repeated winding to its physical stops could cause hard cranking which, if not avoided, could result in minor/moderate injury or component damage.

**WARNING** Failure to maintain two hand control of the handle and release **SLOWLY** could cause spring back which, if not avoided, could result in death or serious injury.

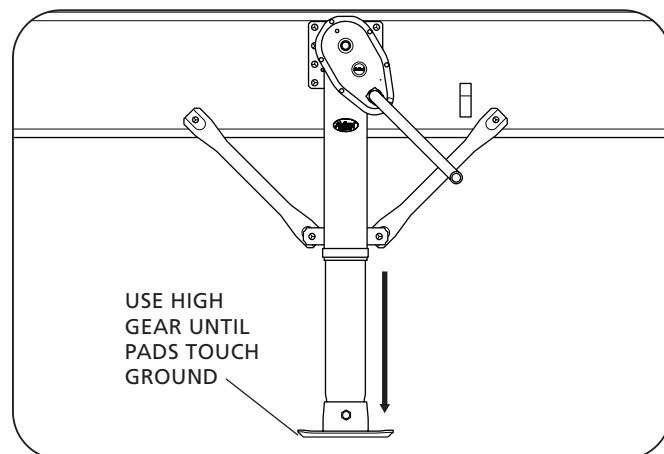
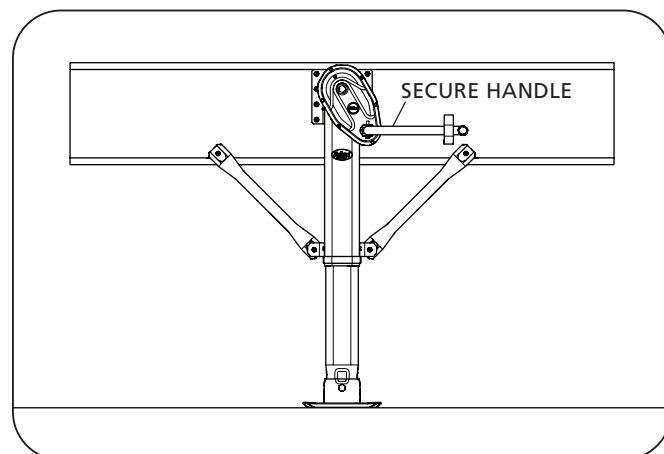
5. Shift the landing gear into low gear and secure the crank handle in the crank hanger (**Figure 18**).

**CAUTION** Failure to secure the crank handle when NOT in use could, allow unplanned landing gear operation which, if not avoided, could result in property damage.

6. Per the manufacturer's instructions, release the fifth wheel, disconnect the air lines and the electrical cord. Release the tractor brakes. Slowly drive away from the trailer until the fifth wheel disengages from the kingpin but remains under the trailer.
7. Engage the tractor parking brake. Get out and inspect the landing gear and the support surface for proper trailer support.

**WARNING** Failure to properly support the trailer could result in trailer instability which, if not avoided, could result in death, serious injury or property damage.

8. Complete the uncoupling procedures per the fifth wheel, tractor, and trailer manufacturer's recommendations.

**Figure 17**

**Figure 18**


## 9. Routine Service and Inspection

### 9.1 Landing Gear Inspection (Before Use)

Before use, inspect the landing gear for cracks, bent components, or damaged/missing hardware, and any noticeable defects (**Table 1**). The landing gear **MUST** be repaired prior to operation to avoid damage and possible injury.

**⚠ WARNING** Failure to check the condition of landing gear prior to operating could result in use of damaged product which, if not avoided, could result in death or serious injury.

### 9.2 Lubrication

The landing gear requires lubrication whether it is used frequently or sits idle for extended periods of time. If left idle and un-greased, hard cranking could result. Use high quality grease for normal applications. For low temperature applications, use low temperature grease. Follow these steps to maintain expected performance (**Figure 19**):

**⚠ CAUTION** Failure to properly lubricate the landing gear when required could result in damage to the landing gear.

1. Place the trailer on level ground, chock the tires, and support the trailer independently of the landing gear.
2. Fully retract the landing gear, then using high gear, extend the leg 2-3 turns and lubricate the lift-screw assembly through grease fitting "A". Apply 1/2 lb. of grease.
3. Lubricate the gearbox, using grease fitting "B". Apply 1/4 lb. of grease
4. Lubricate the bevel gear using grease fitting "C". Apply 1/4 lb. of grease.
5. Distribute the lubrication by fully extending and retracting the leg several times.

### 9.3 Cleaning

No special cleaning of the landing gear is required; however, the landing gear should be cleaned with the rest of the vehicle.

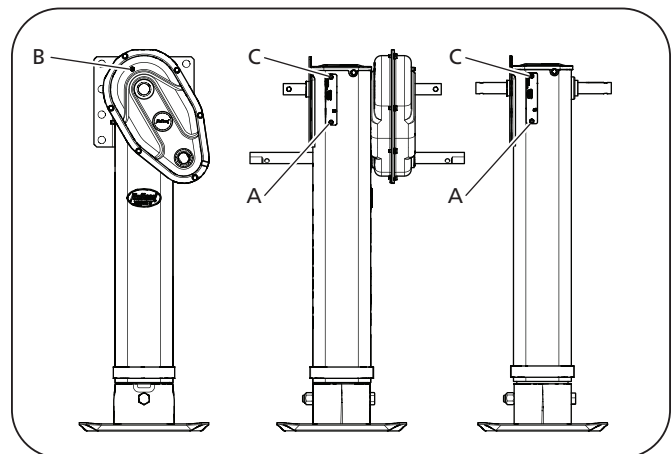
**NOTE:** DO NOT directly aim water at the landing gear shafts and bushings or up into the retract assembly. Water infiltration into the gearbox and housing may cause corrosion.

**⚠ CAUTION** Failure to prevent water infiltration into the shafts, bushings and retract assembly, could result in damage to the landing gear.

**Table 1**

Procedure	Interval	Notes
Landing Gear Inspection	Every use	Replacement/repair required if components visibly damaged, loose, or broken.
Hard to Crank	Every use	Replace/repair required
Lubrication	Every 6 months *Unless No lube option selected.	More frequently in excessively moist and dusty conditions, as well as if not used for extended periods of time.
Cleaning	With the vehicle	
Hardware Inspection	Every 6 months	
Landing Gear Alignment	Every 6 months	Inspection required if landing gear are visibly bent or damaged.

**Figure 19**



## 9.4 Hardware Inspection

Perform the following procedures to ensure the landing gear is in proper working order:

1. Tighten or replace the mounting bolts as necessary.
2. Inspect the mounting bracket for cracks or other signs of damage.
3. Repair or replace any broken or damaged part of the landing gear assembly or mounting structure.

### **WARNING**

Failure to repair or replace damaged landing gear components can result in unsafe product conditions which, if not avoided, could result in death or serious injury.

4. Inspect the crank handle bolt and the lock nut. Tighten or replace as necessary.
5. Inspect the crank handle. If the handle connecting tabs, tube or grip are bent or damaged, replace the handle.
6. Cross shaft connection bolts and lock nuts should be secure, but allow side-to-side play in the cross shaft.
7. Inspect the footware for damage and replace if the components are bent or cracked. If removable footware is present, ensure all mounting bolts and fasteners are tightened and footware is secure.
8. Check for proper shift shaft engagement in both high and low gear and proper shifting between gears. Rebuild if necessary.

**NOTE:** The crank shaft should shift approximately 1" between high and low gear.

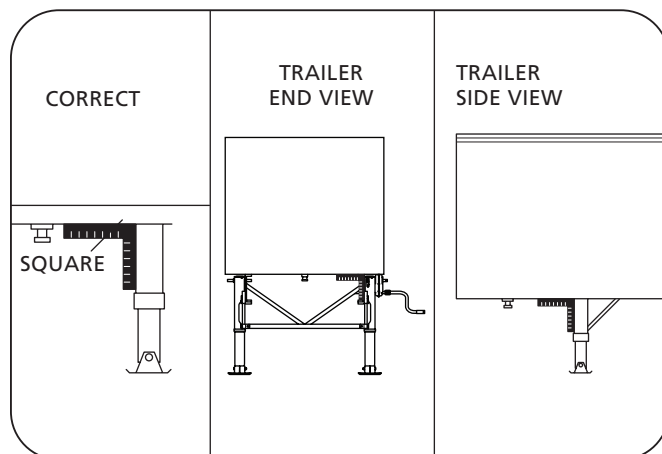
9. Rebuild or replace the landing gear with excessive play in the shafts and bushings.

## 9.5 Landing Gear Alignment

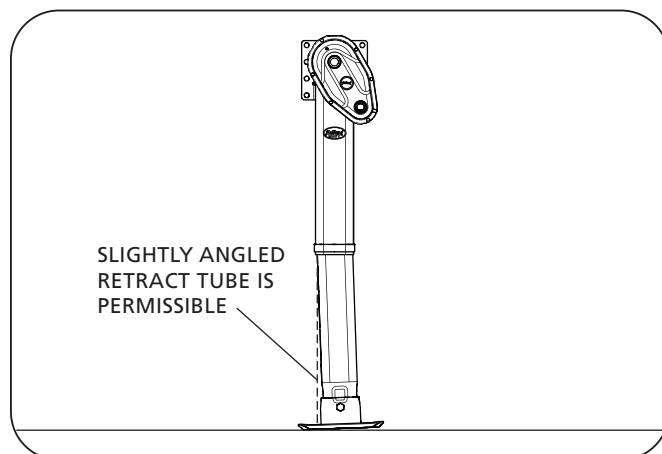
Check to make sure the landing gear is in alignment with the trailer and parallel with each other using a square (**Figure 20**). Bent or damaged legs are an indication of possible damage to the lift screw, lift nut or other internal components and should be replaced.

**NOTE:** A retract tube that appears to be angled slightly compared to the upper housing DOES NOT constitute a damaged leg (**Figure 21**). However, if the landing gear housing shows signs of fracture or cracking around the band area, the landing gear must be replaced.

**Figure 20**



**Figure 21**



## 10. Troubleshooting

PROBLEM	POSSIBLE CAUSE	RESOLUTION
Hard to Crank Landing Gear	Turning the crank in the wrong direction	Refer to "Landing Gear Operation" for proper crank rotation.
	Attempting to raise or lower trailer in high gear.	Shift into low gear. DO NOT ATTEMPT TO LIFT OR LOWER IN HIGH GEAR. Doing so could result in damage to the landing gear.
	Cross shaft binding.	Inspect cross shaft bolts. Back off bolts to allow lateral (side to side) movement of the cross shaft. Straighten or shorten cross shaft to eliminate binding.
	Misaligned landing gear legs.	Legs MUST be parallel and extend and retract evenly. Disconnect cross drive shaft and adjust landing gear legs to same height.
	Lack of grease.	Grease landing gear legs as provided in the "Lubrication" section.
	Damaged lift screw or nut.	Check landing gear for signs of impact (accident) damage. Disconnect cross shaft and crank legs individually to determine which leg is damaged. Replace entire retract assembly or damaged leg.
	Interference between powder metal bushing or jack shaft of gearbox and trailer mounting surface.	Trailer mounting surface may need to be modified to ensure no interference between bushing or jack shaft and trailer surface.
	Upper housing or retract tube may be bent.	Replace damaged part(s) or landing gear.
	Excessive wear or damage to pinion, bevel, input, idler and/or output gears.	Replace damaged gears.
	Weld blow through where strut bracket is welded to housing.	Grind weld as required and re-weld. (With no-load on landing gear, the retract tube should have free play inside the housing.)
Hard to crank landing gear under load only.	Damaged thrust bearing.	Replace the thrust bearing.
Crankshaft jams or skips while turning.	Inner leg screw damaged.	Examine the lift nut and screw of the inner leg assembly for impact (accident) damage. Replace components or leg as necessary.
	Worn, broken, or damaged gears (missing teeth).	Examine pinion, bevel pinion and all gearbox gears for missing teeth or other signs of damage or wear. Replace components as necessary.
Gearbox leg operates but opposite leg DOES NOT.	Broken/damaged cross drive shaft bolt.	Replace cross drive shaft bolt.
	Broken/damaged cross drive shaft.	Replace cross drive shaft.
	Bevel gear pin/pinion gear pin sheared in non-gearbox leg.	Remove upper leg cover. Check for damaged or missing pins under bevel gear, or in pinion gear and replace as necessary.
	Bevel gear/pinion gear damaged in non-gearbox leg.	Remove upper leg cover. Check for damaged gears and replace as necessary.
Non-gearbox leg operates, but gearbox leg DOES NOT.	Bevel gear pin/pinion gear pin sheared in gearbox leg.	Remove upper leg cover. Check for damaged or missing pins under bevel gear, or in pinion gear and replace as necessary.
	Bevel gear/pinion gear damaged in gearbox leg.	Remove upper leg cover. Check for damaged gears and replace as necessary.
Both legs will NOT operate, shift shaft will turn but output shaft DOES NOT turn.	Damaged input, idler, and/or output gear.	Remove gearbox cover. Inspect and replace broken gears.
	Gear pin(s) sheared in gearbox.	Remove gearbox cover. Inspect and replace broken pins.
Both legs will NOT operate, but shift shaft and output shaft turn.	Bevel gear pin/pinion gear pin sheared in both legs.	Remove upper leg covers. Check for damaged or missing pins under bevel gear, or in pinion gear and replace as necessary.
	Bevel gear/pinion gear damaged in both legs.	Remove upper leg covers. Check for damaged gears and replace as necessary.
Legs locked and will NOT turn	Bent retracting screw or damaged riser nut and screw.	Check landing gear for signs of impact (accident) damage. Disconnect cross shaft and attempt to crank legs individually to determine which leg is damaged. Replace entire retract assembly or damaged leg.
Gearbox leg will NOT crank in high gear, but will in low gear.	Lack of lube on idler shaft.	Remove gearbox cover. Inspect and add grease to idler shaft.











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