



LANDING GEAR

OPERATING, MAINTENANCE, AND REPAIR PROCEDURES



Formula 150 Landing Gear – Maersk Sealand (Manufactured after March 1, 2000)

Do not deviate from these instructions. Any changes or deviations will void all warranties, expressed or implied, unless written consent is first obtained from the factory.

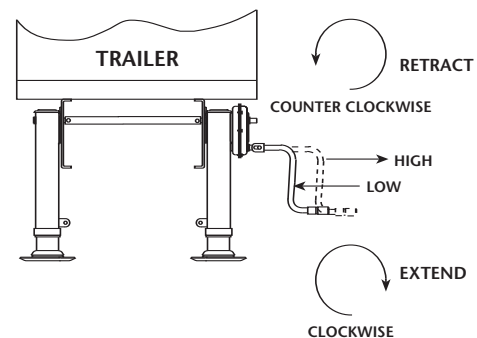
OPERATION OF HOLLAND FORMULA 150 LANDING GEAR:

NOTE: Holland Formula 150 2-speed gearbox has high and low range gears. High range gear is to be used only for rapid traverse up from and down to the ground and is not intended to lift or lower any load. For additional information, see Holland publication XL-FW302-XX, entitled "Fifth Wheel Operating Instructions."

CAUTION

- Always grip crank handle securely. Failure to do so could result in possible injury.
- Always grip crank handle securely with both hands before shifting. Failure to do so could result in possible injury.
- Never shift landing gear under load because lock up may occur resulting in possible injury.
- Never leave the crank unsecured because movement may occur resulting in change of trailer position.
- Never raise or lower a loaded trailer in high gear because lock up may occur resulting in possible injury.

OUTSIDE MOUNT



- Push crank handle in for **low** speed.
- Pull crank handle out for **high** speed.
- Turn crank:
Counterclockwise = extend
Clockwise = retract

TO EXTEND:

On outside mounted landing gear, engage the crank with the crankshaft and turn the crank clockwise. Using high gear, lower the landing gear until the footwear make contact with the ground. To reduce the load on the fifth wheel, shift to low gear and crank an additional four to eight turns. Leave the landing gear in low gear and store the crank handle in the holder provided.

TO RETRACT:

On outside mounted landing gear, engage crank with crankshaft and turn the crank counterclockwise. Retract the landing gear using low gear until unloaded. Then shift to high gear and continue cranking until fully retracted. Leave the crankshaft engaged to prevent road vibration wind-down. Store the crank in the holder provided.

MAINTENANCE:

LUBRICATION:

Although Formula 150 landing gear are adequately greased and packed with high quality lubricants when manufactured, it may be necessary to periodically supplement this lubrication to maintain satisfactory performance for your particular application.

1. Lube both legs with a molybdenum-type grease through the grease fittings provided in the legs two times a year or as required. Add one quarter pound grease at each grease fitting.
2. Lube 2-speed gears through the grease fitting in the gearbox two times a year or as required. Add one quarter pound grease at each grease fitting.

TROUBLE SHOOTING: HARD-TURNING LANDING GEAR – CHECK THE FOLLOWING:

1. Binding cross shaft. Bolts in the cross shaft must not be over tightened to prevent lateral movement of the cross shaft.
2. To determine which leg turns hard, remove the cross shaft and operate each leg individually.
3. Landing gear may be bent or damaged.
4. Alignment—legs must be parallel and extend and retract evenly.
5. Legs and gearbox may need additional lubrication.
6. If a crankshaft extension is used, check for alignment with crankshaft.
7. Binding shaft bushings—bushings must have adequate clearance for operation. Check mounting for proper clearance.
8. Examine nut and screw assembly for damage caused by dropping of the trailer.

TROUBLE SHOOTING—GENERAL:

Follow the dismantling and assembly instructions in this manual.

If crankshaft jams or skips while turning: examine parts (10 and 13) and all gearbox gears for worn, broken, or missing teeth.

If the landing gear will not stay in gear while cranking—check the condition of shifter spring (29), shifter grooves in crankshaft (27) and cluster gear (28). Replace as required.

NOTE: Individual parts are indicated in bold numbers throughout the following text, and may be referenced to the exploded view found on page 4.

SINGLE SPEED LEG DISASSEMBLY:

1. Remove the landing gear from the trailer.
2. Remove rust and burrs from the end of the shaft (11), and lubricate to ease removal.
3. Remove the screws (5) from the cover (6), then remove the cover and gasket (7). Remove excess grease.
4. Remove the spring pin (8) from the mounting plate side of the drive shaft (11).
5. Slide the drive shaft (11) until the woodruff key (9) is exposed from inside the pinion gear (10). Remove the woodruff key.

6. Continue sliding the drive shaft (11) out to remove the pinion gear (10) and washer (12).
7. Remove the bevel gear (13) from the top of the screw. This may require a 4" two-arm gear puller, or, the landing gear can be turned upside down and tapped on a block of wood to remove the bevel gear.

CAUTION Step 8 will allow the inner leg to drop out of the outer leg which may cause injury. Stand clear.

8. Slide the groove pin (14) out, and then remove the washer (15).

NOTE: The groove pin is easier to remove if it is rotated from corner to corner.

9. Lift the outer leg (2 or 3) off the inner leg (1).
10. Remove the thrust bearing (17) and collar (18) from the top of the screw. If the collar is hard to remove, tap it lightly with a hammer from below.

SINGLE SPEED LEG REASSEMBLY

1. Replace all worn or broken parts.
2. Install the collar (18) onto the screw of the inner leg (1), contoured side down, and tap down until it is well seated on the shoulder of the screw. Place the thrust bearing (17) on top of the collar.
3. Place the outer housing (2 or 3) over the inner leg (1). The hole in the top of the screw should be clearly visible.
4. Install the washer (15) over the top of the screw. Slide the groove pin (14) through the hole in the top of the screw. Corner to corner rotation of the hole facilitates this operation.

Install the bevel gear (13) over the top of the screw and position it so that the slot in the bottom of the gear captures the groove pin (14). The screw should be level or slightly higher than the top of the bevel gear.

5. Slide the drive shaft (11) through the bushing in the front (non-mounting plate side) of the outer housing (2) then through the pinion gear (10) and washer (12). Make sure the pinion gear is oriented toward the mounting plate side of the housing, as shown in the exploded view on page 4, and the keyway (in the drive shaft) for the woodruff key (9) is facing up.
6. Install the woodruff key (9) into the drive shaft (11). Align the key with the slot in the pinion gear (10). Slide the drive shaft in as far as it will go. Check to see that the gears turn freely.
7. Press the spring pin (8) into the hole in the drive shaft (11) on the mounting plate side of the housing.
8. Fill the top of the outer housing (2 or 3) with approximately one pound of permanent type grease — to the bottom of the drive shaft (11).
9. Install the gasket (7), top cover (6), and screws (5). Do not over tighten the screws.
10. Reinstall the landing gear onto the trailer. Make sure both legs are extended to the same length before bolting them to the trailer. After the legs are bolted to the trailer, install the cross-drive shaft (36) with hex bolts (20) and nuts (19). The cross-drive shaft must have enough end play, and must rotate freely.

The mounting bolts should be torqued to 100 ft-lbs. minimum.

TWO SPEED LEG DISASSEMBLY

1. Remove the landing gear from the trailer.
2. Remove the nut (19), bolt (20), washers (21), and crank (22).
3. Remove rust and burrs from the ends of the shafts (27 and 32), and lubricate to ease removal.
4. Remove the spring pin (8) and washer (43) from the gearbox side of the drive shaft (32).
5. Remove the nuts (23) and bolts (24) from the gearbox.
6. Remove the outside gearbox half (25) and the gearbox gasket (26). Remove excess grease.
7. Slide the crank shaft (27) out. The cluster gear (28) will be attached to the shaft. To remove the gear from the shaft, remove the roll pin (30) and slide the gear back to expose the other pin (31). Remove the pin (31) from the crank shaft.
8. Remove the screw (5) and shifter spring (29) from inside the gearbox half.
9. Remove the screw (5) from the cover. Then, remove the cover (6) and gasket (7). Remove excess grease.
10. Slide the drive shaft (32) until the woodruff key (9) is exposed from inside the pinion gear (10). Remove the woodruff key.
11. Continue sliding the drive shaft to remove the spacer (37), cluster gear (33), woodruff key (9), spacer (16) from the gearbox.
12. Slide the drive shaft (32) through the housing and remove the washer (12) and pinion gear (10).
13. Follow steps 7 through 10 in the "Single Speed Leg Disassembly" instructions, found on page 2, to finish the disassembly of the landing gear.

TWO SPEED LEG REASSEMBLY

1. Replace all worn or broken parts.
2. Follow steps 2 through 4 in the "Single Speed Leg Reassembly" instructions, found on page 2.
3. Slide the drive shaft (32) through the bushing on the mounting plate side of the outer housing (3).

Orient the washer (12) and the pinion gear (10) next to the gearbox, as shown in the exploded view on page 4. Continue to slide the shaft through the pinion gear and washer, and into the gearbox.

Rotate the shaft so the last keyway is facing up. Install the woodruff key (9) and slide the shaft in as far as it will go.
4. Slide the spacer (16) onto the drive shaft (32) with the open side facing out.

Insert a second woodruff key (9) into the keyway on the shaft, and slide the cluster gear (33), large side first, onto the shaft.

Align the slot in the cluster gear with the key, and slide the gear on as far as it will go.

Slide the spacer (37) onto the drive shaft (32) until it contacts the cluster gear.

5. Insert the pin (31) into the crank shaft (27). Slide the cluster gear (28) onto the shaft until the pin engages the slot in the gear.

Insert the roll pin (30) into the hole in the crankshaft, in front of the cluster gear.

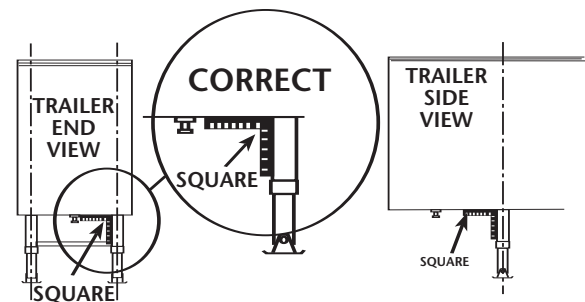
CAUTION The roll pin (30) must not extend more than 1/8" above the shaft surface because interference may occur resulting in difficult shifting.

6. Install the shifter spring (29) into the inside gearbox half and lightly tighten the screw (5) which holds the shifter spring in position.
7. Insert the crank shaft (27) through the shifter spring (29), then through the gearbox bushing.

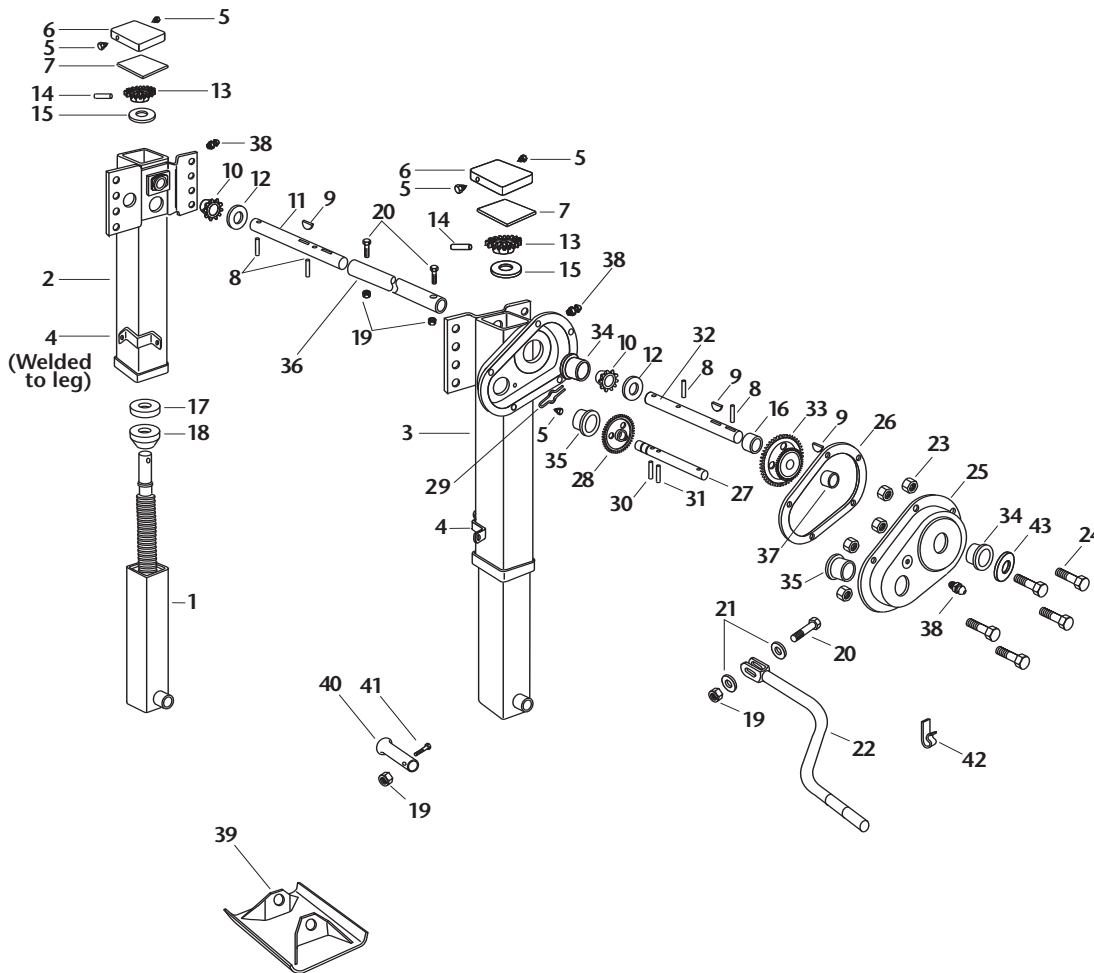
Tighten the screw (5) that locates the shifter spring. Continue sliding the crank shaft until the shifter spring seats in either groove in the shaft, and there is full engagement between cluster gear (28) and cluster gear (33).
8. Grease the gearbox gears with one pound of permanent type grease. Install the gasket (26), gearbox cover (25), bolts (24), and nuts (23). Tighten to 10 ft.-lbs. torque.
9. Follow steps 8 through 10 in the "Single Speed Leg Reassembly" instructions, found on page 2, for the rest of the assembly and installation instructions.

ALIGNMENT:

Using a square, check that both landing gear legs are square with the trailer and parallel with each other as shown. Bent or damaged legs are an indication of possible damage to the lift screw, lift nut or other internal components and should be replaced.



LG150-1CV-CS502 Parts Explosion *(manufactured after 3-1-2000)*



ITEM	PART NUMBER	QTY.	PART DESCRIPTION	ITEM	PART NUMBER	QTY.	PART DESCRIPTION
1	LG2158-03	2	Inner leg and screw assembly	23	XB-3103	5	Locknut, 1/4 x 28"
2	LG2161-02	1	Single speed outer leg	24	XB-CX-14-28-F-58	5	Hex bolt, 1/4-28 x 5/8"
3	LG2160-02	1	2-speed outer leg	25	XA-06224-A-502	1	Gearbox case
4	XA-01782	2	Brace ear	26	XB-01791	1	Gearbox gasket
5	XB-ST5-008-11	5	Self-tapping screws, 1/4-20x1/2"	27	XA-06226-C-402	1	Crank shaft
6	XA-LG0880	2	Upper leg cover	28	XA-0306-1	1	Drive cluster gear .88" bore
7	XB-LG0893	2	Leg cover gasket	29	XB-03370-1	1	Shifter spring
8	XB-SP-014-27	4	Spring pin, 1/4 x 1 1/2"	30	XB-21-S-187-1000	1	Roll pin 3/16" x 1"
9	XB-KEY-018-02	3	Woodruff key, #807	31	XA-01792	1	Pin
10	XB-LG1823-01	2	Pinion gear	32	LG0947-02	1	2-speed drive shaft
11	LG0946-02	1	Single speed drive shaft	33	LG2131-02	1	Driven cluster gear (1" bore)
12	XB-PW-016-19	2	Washer, 1/16" thick	34	XB-0307-PM	2	Bearing (1" diameter)
13	XA-LG0570-01	2	Bevel gear	35	XB-0308-PM	2	Bearing (.88" diameter)
14	XB-GP-052-21	2	Groove pin, 3/8" x 2"	36	LG0094-4575	1	Cross shaft
15	XB-PW-016-62	2	Washer, 1/8" thick	37	LG2125	1	Tube spacer
16	LG2126	1	Spacer	38	XB-GRF-022-16	5	Lube fitting
17	XB-BRG-013-77	2	Thrust bearing	39	LG0056	2	Skid foot (2.00" high)
18	XB-LG0544	2	Collar	40	LG0070-02	2	Axle
19	XB-SLN-012-04	5	Locknut, 3/8-16	41	XB-HHC-050-69	2	Hex bolt, 3/8-16 x 3/4"
20	XB-HHC-050-42	3	Hex bolt, 3/8-16 x 2 1/4"	42	XA-V-1914	1	Crank holder
21	XB-PW-016-03	2	Washer, 3/8" std. Type A	43	XB-PW-016-14	1	Washer, 3/16" thick
22	LG2130-05	1	Crank handle assy.				

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