



LANDING GEAR

OPERATING, MAINTENANCE, AND REPAIR PROCEDURES



FORMULA 150 – Model LG150-1C9-CS502 Manufactured after 7-1-92

NOTE: This model is similar to other LG150 models, but does contain several unique parts. See Holland Publication LG 217 for other LG150 models.

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.
- Always grip crank handle securely with both hands before shifting.
- Never shift landing gear under load.
- Never leave the crank unsecured.
- Never raise or lower a loaded trailer in high gear.

TO EXTEND:

On outside mounted landing gear, engage the crank with the crankshaft and turn the crank clockwise. Inside mounted landing gear are extended by turning the crank counterclockwise. Using high gear, lower the landing gear until the pads 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. Inside mounted landing gear are retracted by turning the crank clockwise. 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 through the grease fittings and access holes provided in the legs two times a year or as required.
2. Lube 2-speed gears through the grease fitting in the gearbox two times a year or as required.



WARNING

DO NOT use lubricants containing teflon.

TROUBLE SHOOTING — HARD TURNING LANDING GEAR — CHECK THE FOLLOWING:

1. Binding cross shaft. Bolts in the cross shaft must not be overtightened 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 crankshaft holder or extension are used, check for alignment with crankshaft.
7. If a through-axle is used, check for binding where the axle goes through the legs.
8. Binding shaft bushings – bushings must have adequate clearance for operation. Check mounting for proper clearance.
9. 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 & 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.

SINGLE SPEED LEG DISMANTLING PROCEDURE:

1. Remove landing gear from trailer.
2. Remove rust from projecting end(s) of shaft (11), and lubricate for easy removal.
3. Remove screws (5), cover (6), and gasket (7).
4. Remove plug (8). Using plug hole, tap out pin (9) from gear (10).
5. Remove shaft (11), gear (10), and shims (12). Note the quantity and location of shims removed.
6. Remove bevel gear (13) from elevating screw.
7. Slip pin (14) out of elevating screw and remove. Remove washer (15).
8. Upper leg (2) and lower leg (1) can now be separated.
9. Remove bushing (16).
10. Remove bearing (17) and collar (18) from the screw in the lower leg.

2-SPEED GEARBOX LEG DISMANTLING PROCEDURE:

1. Remove landing gear from trailer.
2. Remove nut (19), bolt (20), washers (21), and crank handle (22).
3. Remove rust from shafts (27) and (32), and lubricate to ease removal.
4. Remove nuts (23) and bolts (24) from gearbox.
5. Remove gearbox cover (25) and gasket (26).
6. Remove shaft (27) with gear (28) assembled. To remove gear from shaft, remove roll pin (30), and slide gear from shaft (27). Remove pin (31) from shaft (27).
7. Remove screw (5) and shifter spring (29).
8. Remove screws (5), cover (6), and gasket (7).
9. Remove plug (8). Using plug hole, tap out pin (9) from gear (10). Remove shaft (32) with gear (33) assembled.
10. Remove gear (10) and shims (12). Note quantity and location of shims removed. To remove gear (33) from shaft, remove drive pin (9) and slide gear off shaft.
11. Follow procedures outlined in steps 6 through 10 in "Single Speed Leg Dismantling Procedure," to finish leg dismantling.
12. Remove bushings (34) or (35) if required.

SINGLE SPEED LEG ASSEMBLY PROCEDURE:

1. Replace all worn or broken parts.
2. Place collar (18) on elevating screw, followed by thrust bearing (17). **Note:** Contoured side of collar must face down.
3. Install bushing (16) into place in upper leg (2). Bushing must be flush with the top of the bearing block in the leg.
4. Place upper leg (2) over lower leg (1). Press down until hole in the elevating screw is clearly visible through the hole in the bearing block in the upper leg (2). Check position of bushing (16).
5. Install washer (15) and slip pin (14) in hole in the elevating screw. Install bevel gear (13) and position it so that the slot on the bottom of the gear captures pin (14).

6. Place the shims (12) and pinion gear (10) on top of the bevel gear with the roll pin hole in the pinion gear facing up.
7. Install shaft (11) in outer leg (2) through shims (12) and gear (10), making certain gear is oriented as shown in the exploded view. Initially start with two shims.
8. Align hole in shaft (11) with gear (10). Install drive pin (9). Check for free movement by rotating shaft (11) (minimum end play 1/32"). It may be necessary to add or remove shims.
9. Install plug (8) in top of leg (2) and fill with permanent type grease (1 pound capacity).
10. Install gasket (7), cover (6) and screws (5). Check to see that the gears turn freely.
11. Install landing gear on trailer. Adjust both legs to the same extended length and install cross shaft (36), bolts (37) and nuts (19). Cross shaft must have enough end play and must rotate freely—adjust bolts accordingly. Mounting bolts should be torqued to 100 ft-lbs minimum.

GEARBOX LEG ASSEMBLY PROCEDURE:

1. Replace all worn and broken parts.
2. Install bushings (34) or (35) if removed.
3. Follow steps 3 through 5 in "Single Speed Assembly Procedure," above.
4. Install gear (33) on shaft (32). Align hole in gear and shaft and secure with pin (9).
5. Insert shaft (32) through top hole in gearbox. Slide two shims (12) on shaft inside upper leg (3). Position gear (10) on top of gear (13), making certain gear is oriented as shown in the exploded view, with hole facing up. Push shaft through until alignment can be made with hole in gear (10) and shaft (32). Install drive pin (9). Check for free movement (minimum 1/32" end play).
6. Install plug (8) and fill with 1 pound of permanent type grease. Install gasket (7), cover (6), and screws (5).
7. Insert pin (31) in shaft (27). Slide gear (28) on shaft (27) until pin engages in slot on gear (28). Then insert pin (30) in front of gear (28).

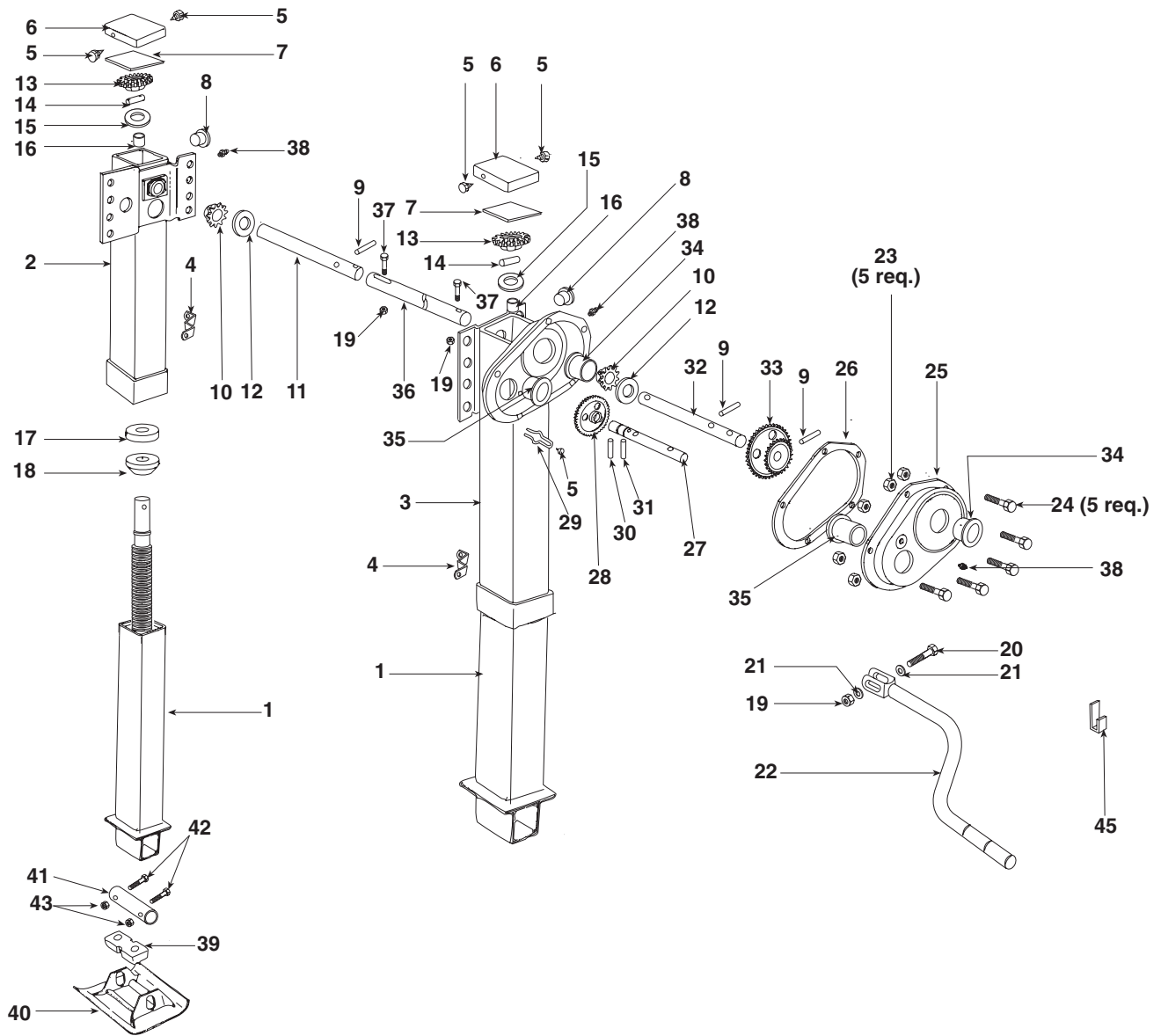


CAUTION

Pin (30) must not extend more than 1/8" above the shaft surface.

8. Install shifter spring (29) and locate with screw (5) installed loosely into gearbox.
9. Insert shaft (27) through shifter spring (29) and lower hole of gearbox. Tighten screw (5). Slide shaft (27) in until spring seats in either groove in shaft (27) and has full tooth engagement with gear (33).
10. Lubricate gears with 1 pound of permanent type grease. Install gasket (26), cover (25), bolts (24) and nuts (23). Tighten to 10 ft-lbs torque.
11. For installation, refer to step 11 in "Single Speed Leg Assembly Procedure."

F150 EXPLODED VIEW



| ITEM | PART NUMBER | NO. REQ'D | PART NAME | ITEM | PART NUMBER | NO. REQ'D | PART NAME |
|------|------------------|-----------|----------------------------|------|------------------|-----------|-------------------------------|
| 1 | XA-06220-1-9-502 | 2 | Inner leg & screw assembly | 23 | XB-3103 | 5 | .25"-28 locknut |
| 2 | XA-06215-1L-502 | 1 | Single speed outer leg | 24 | XB-CX-14-28-F-58 | 5 | .25"-28 x .62" hex bolts |
| 3 | XA-06215-1R-502 | 1 | 2-speed outer leg | 25 | XA-06224-A-502 | 1 | Gearbox cover |
| 4 | XA-S03117 | 2 | Brace ear | 26 | XB-S02838 | 1 | Gearbox cover gasket |
| 5 | XB-04112 | 5 | Self-tapping screws | 27 | XA-06226-C-402 | 1 | Crank shaft |
| 6 | XA-06218 | 2 | Upper leg cover | 28 | XA-0306-1 | 1 | Drive cluster gear .88" bore |
| 7 | XB-06219 | 2 | Leg cover gasket | 29 | XB-03370-1 | 1 | Shifter spring |
| 8 | XB-01789 | 2 | Access plug | 30 | XB-21-S-187-1000 | 1 | Roll pin .19" x 1" |
| 9 | XB-02065 | 3 | .38" x 1.5" groove pin | 31 | XA-01792 | 1 | Pin |
| 10 | XA-06217 | 2 | Bevel pinion gear | 32 | XA-06216-C-R-402 | 1 | 2-speed drive shaft |
| 11 | XA-06216-C-L-402 | 1 | Single speed drive shaft | 33 | XA-02043-1 | 1 | Driven cluster gear (1" bore) |
| 12 | XB-01977 | 2 | Shims | 34 | XB-0307-PM | 2 | Bearing (1" diameter) |
| 13 | XA-LG0570 | 2 | Bevel gear | 35 | XB-0308-PM | 2 | Bearing (.88" diameter) |
| 14 | XB-GP-38-2-E | 2 | .38" x 2" groove pin | 36 | XA-V-1910-45.94 | 1 | Cross shaft |
| 15 | XB-PW-1916-2-18 | 2 | Washer | 37 | XB-V-444-1 | 2 | .38"-16 x 1.75" hex bolts |
| 16 | XB-01744-1 | 2 | Bushing | 38 | XB-04113 | 3 | Lube fitting |
| 17 | XB-V-647-2 | 2 | Thrust bearing | 39 | XB-04676 | 2 | Cushion pad |
| 18 | XB-LG0544 | 2 | Collar | 40 | XA-05168 | 2 | 2.38" cushion foot |
| 19 | XB-338 | 3 | .38"-16 locknut | 41 | XA-V-1901-1 | 2 | Axle |
| 20 | XB-02157 | 1 | .38"-16 x 2.5" hex bolt | 42 | XB-06263 | 4 | .38"-16 x 2.5" hex bolt |
| 21 | XB-1108 | 2 | .38" flat washer | 43 | XB-06188 | 4 | .38"-16 thick hex nut |
| 22 | XA-S03656 | 1 | Crank handle assy. | 44 | XA-V-1914 | 1 | Crank holder |



LANDING GEAR

OPERATING, MAINTENANCE, AND REPAIR PROCEDURES



OLYMPIX 135 – Model LG150-1C9-CS502 Manufactured prior to 7-1-92

NOTE: Holland Olympix 2-speed gearbox has high and low range gears. High range gear is to be used only for rapid traverse up and down from the ground and is not intended to lift any load. For complete tractor-trailer coupling and uncoupling procedures, refer to Holland publication FW-TE-14-B, entitled “Fifth Wheel Operating Instructions”.

To Extend:



CAUTION

1. Always grip crank handle securely.
2. Always grip crank handle securely with both hands before shifting.
3. Never shift landing gear under load.
4. Never leave the crank unsecured.

On outside mounted landing gears, engage the crank with the crankshaft and turn the crank clockwise. Inside mounted landing gears are extended by turning the crank counterclockwise. Using high gear, lower the landing gear until the pads make contact with the ground. To reduce the load on the fifth wheel, shift to low gear and crank an additional 4 to 8 turns. Leave the landing gear in low gear and store the crank handle in the holder provided.

To Retract:

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

MAINTENANCE:

Lubrication:

Although Olympix landing gears 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.



WARNING

DO NOT USE LUBRICANTS CONTAINING TEFLON

1. Lube both legs through the grease fittings and access holes provided in the legs two times a year or as required.
2. Lube 2-speed gears through the grease fitting in the gearbox two times a year or as required.

Trouble Shooting — Hard Turning Landing Gears — Check the Following:

1. **Binding the cross shaft** — Bolts in the cross shaft must not be overtightened 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 crankshaft holder or extension are used, check for alignment with crankshaft.
7. If a through-axle is used, check for binding where the axle goes through the legs.
8. **Binding shaft bushings** — Bushings must have adequate clearance for operation. Check mounting for proper clearance.
9. 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 the crankshaft jams or skips while turning — Examine parts (23 and 26) and all gearbox gears for worn, broken, or missing teeth.

If the crankshaft will not stay in gear while cranking — Check the condition of the shifter spring (36), the shifter grooves in crankshaft (39), and the cluster gear (35). Replace as required.

Single Speed Leg Dismantling Procedure:

1. Remove landing gear from trailer.
2. Remove rust from the projecting end(s) of shaft (31) and lubricate for easy removal.
3. Remove screws (20) and cover (21).
4. Remove plug (18). Using plug hole, tap out pin (27) from gear (26) and remove.
5. Remove shaft (31), gear (26), and shims (25). Note the quantity and location of shims removed.
6. Remove rollpin (37).
7. Remove nut (22) and bevel gear (23) from the top of the elevating screw.
8. Tap the end of the screw with a brass punch until the screw and lower leg assembly (1) separate.
CAUTION: DO NOT DAMAGE THE SCREW THREADS.
9. Remove bushing (24).
10. Remove bearing (5) and thrust washer (6) from the screw in leg (1).
11. Remove bushings (19), if required.

Gearbox Leg Dismantling Procedure:

1. Remove landing gear from trailer.
2. Remove nut (29), bolt (48), washers (46), and handle (47).
3. Remove rust from shafts (32) and (39) and lubricate.
4. Remove nuts (43) and bolts (44) from gearbox.
5. Remove gearbox cover (42) and gasket (41).
6. Remove shaft (39) with gear (35) assembled. Remove screw (58) and shifter spring (36). To remove gear from shaft, remove rollpin (37) and slide gear (35) from shaft (39). Remove pin (38) from shaft (39).
7. Remove screws (20) and cover (21).
8. Remove plug (18). Using plug hole, tap out pin (27) from gear (26). Remove shaft (32) with gear (33) assembled. Remove gear (26) and shims (25). Note the quantity and location of shims removed.
9. To remove gear (33) from shaft, remove drive pin (40) and slide gear off shaft.
10. Follow the procedures outlined in steps 6 through 11 in "Single Speed Leg Dismantling Procedure," above, to finish leg dismantling.
11. Remove bushings (19) and (34) if required.

Single Speed Leg Assembly Procedure:

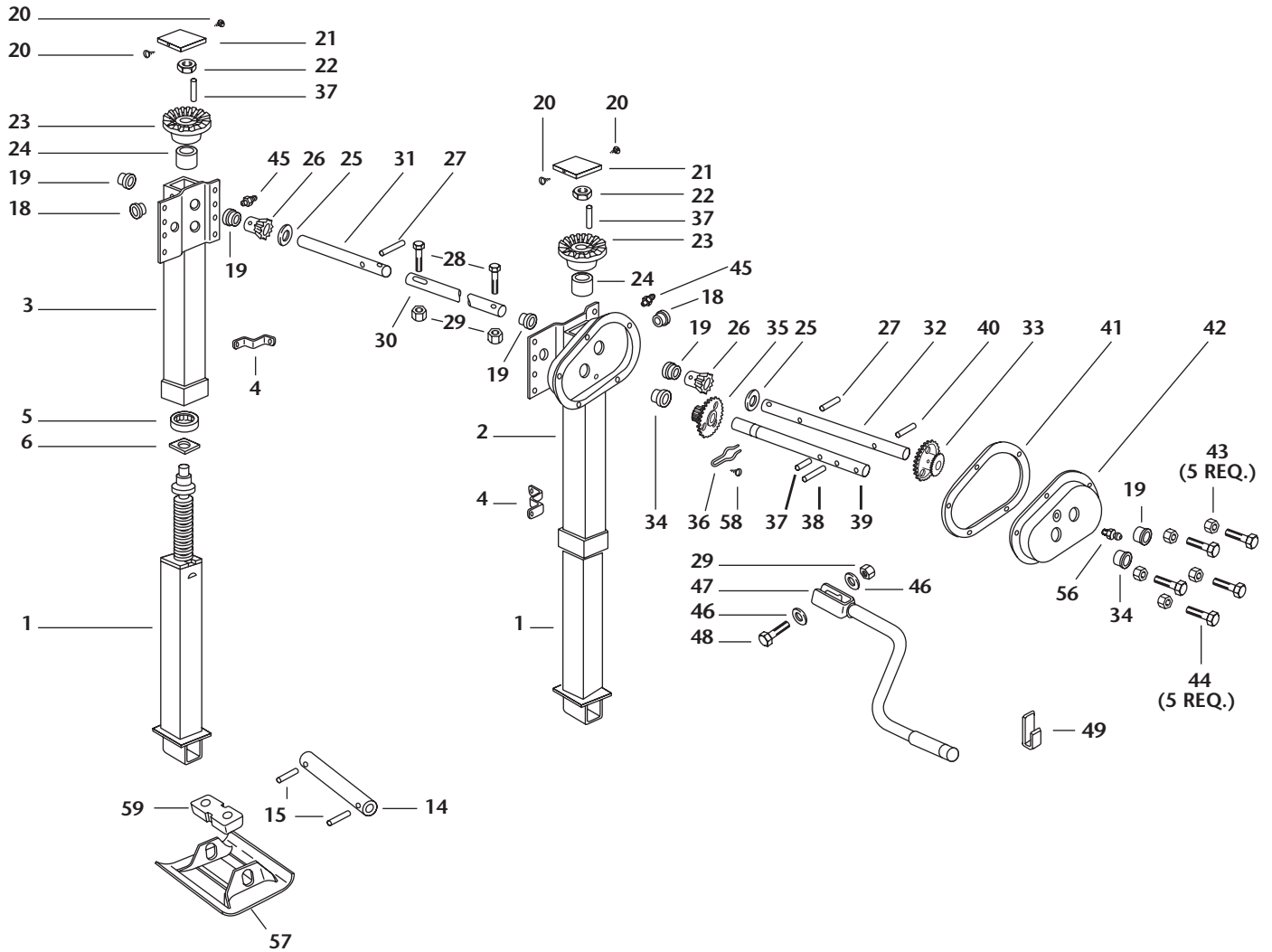
1. Replace all worn or broken parts.
2. Install bushings (19) if removed.
3. Place thrust washer (6) on elevating screw, followed by thrust bearing (5). **NOTE:** Smooth side of washer must face screw shoulder.
4. Install bushing (24) into place in leg (3). Bushing must be flush with the top of bearing block.
5. Place outer leg (3) over lower leg (1). Press down until threaded parts of the elevating screw are clearly visible through the hole in the bearing block in outer leg (3). Check position of bushing (24).

6. Install bevel gear (23) in place and secure with nut (22). Torque nut to 80 ft-lbs, then back off nut $\frac{1}{4}$ turn for operating clearance.
7. Install rollpin (37) in bevel gear (23) to secure nut(22).
8. Place the shims (25) and pinion gear (26) on top of the bevel gear with the rollpin hole in the pinion gear facing up.
9. Install shaft (31) in outer leg (3) through shims (25) and gear (26), making certain gear is oriented as shown in the exploded view on the next page. Initially start with two shims.
10. Align hole in shaft (31) with gear (26). Install drive pin (27). Check for free movement by rotating shaft (31) (minimum end play $\frac{1}{32}$ "). It may be necessary to add or remove shims.
11. Install plug (18) in top of leg (3) and fill with permanent type grease (1 pound capacity).
12. Install cover (21) and screws (20). Check to insure that the gears turn freely.
13. Install landing gear on trailer. Adjust both legs to the same extended length and install cross shaft (30), bolts (28), and nuts (29). Cross shaft must have enough end play and must rotate freely — adjust bolts accordingly. Mounting bolts should be torqued to 100 ft-lbs minimum.

Gearbox Leg Assembly Procedure:

1. Replace all worn and broken parts.
2. Install bushings (19) and (34) if removed.
3. Follow steps 3 through 7 in "Single Speed Leg Assembly Procedure," above.
4. Install gear (33) on shaft (32). Align hole in gear end shaft and secure with pin (40).
5. Insert shaft (32) through top hole in gearbox. Slide two shims (25) on shaft. Position gear (26) on top of gear (23), making certain gear is oriented as shown in the exploded view — on the next page — with hole facing up. Push the shaft through until alignment can be made with hole in gear (26) and shaft (32). Install drive pin (27). Check for free movement and minimum $\frac{1}{32}$ " end play.
6. Install plug (18) and fill with 1 pound permanent type grease. install cover (21) and screws (20).
7. Insert pin (38) in shaft (39). Slide gear (35) on shaft (39) until pin engages in slot on gear (35). Then insert pin (37) in front of gear (35).
CAUTION: Pin (37) must not extend more than $\frac{1}{8}$ " above the shaft surface.
8. Install shifter spring (36) and locate with screw (58) installed loosely in to gearbox.
9. Insert shaft (39) through shifter spring (36) and lower hole of gearbox. Tighten screw (58). Slide shaft (39) in until spring (36) seats in either groove in shaft (39) and has full tooth engagement with gear (33).
10. Lubricate gears with 1 pound of permanent type grease. Install gasket (41), cover (42), bolts (44), and nuts (43). Tighten to 10 ft-lbs. torque.
11. For installation, refer to step 13 in "Single Speed Leg Assembly Procedure," above.

OLYMPIX 135 EXPLODED VIEW



| ITEM | PART NO. | NO. | PART NAME | ITEM | PART NO. | NO. | PART NAME |
|------|------------------|-----|------------------------------|------|------------------|-----|--------------------------------|
| 1 | XA-S04987 | 2 | Inner leg and screw assembly | 32 | XA-01764 | 1 | 2-speed drive shaft |
| 2 | XA-S04989 | 1 | 2-speed outer leg | 33 | XA-02043-1 | 1 | Driven cluster gear (1" bore) |
| 3 | XA-S04988 | 1 | Single speed outer leg | 34 | XB-0308-PM | 2 | Bearing (7/8" diameter) |
| 4 | XA-S03117 | 2 | Brace ear | 35 | XA-0306-1 | 1 | Drive cluster gear (7/8" bore) |
| 5 | XB-V-647 | 2 | Thrust bearing | 36 | XB-03370-1 | 1 | Shifter spring |
| 6 | XA-V-1913 | 2 | Thrust washer | 37 | XB-21-S-187-1000 | 1 | Rollpin 3/16" x 1" |
| 14 | XA-V-1901-1 | * | Axle (skid foot models) | 38 | XA-01792 | 1 | Pin |
| 15 | XB-21-S-375-3000 | * | Rollpin 5/8" x 3" | 39 | XA-S04263 | 1 | Crank shaft |
| 18 | XB-01789 | 2 | Access plug | 40 | XB02065 | 1 | Groove pin |
| 19 | XB-0307 | 5 | Bearing (1" diameter) | 41 | XB-S02837 | 1 | Gearbox cover gasket |
| 20 | XB-03372 | 4 | Self-tapping screw | 42 | XA-S04752 | 1 | Gearbox cover |
| 21 | XB-01762 | 2 | Upper leg cover | 43 | XB-3103 | 5 | 1/4"-28 lock nut |
| 22 | XB-FW-25 | 2 | Jam lock nut 1"-14 | 44 | XB-CX-14-18-F-58 | 5 | 1/4"-28 x 3/8" HHCS |
| 23 | XA-02059 | 2 | Bevel gear | 45 | XA-H-38 | 2 | Grease fitting |
| 24 | XB-01744 | 2 | Bushing | 46 | XB-1108 | 2 | 3/8" flat washer |
| 25 | XB-01977 | | Shims | 47 | XA-S03656 | 1 | Tubular crank handle assembly |
| 26 | XA-0298 | 2 | Bevel pinion | 48 | XB-02157 | 1 | 3/8"-16 x 2 1/2" HHCS |
| 27 | XB-GP-38-1-14-A | 2 | Groove pin | 49 | XA-V-1914 | 1 | Crank Holder |
| 28 | XB-V-444-1 | 2 | 3/8"-16 x 1 3/4" HHCS | 56 | XB-04113 | 1 | Lube fitting |
| 29 | XB-338 | 3 | 3/8"-16 lock nut | 57 | XA-05168 | * | 2 3/8" cushion foot |
| 30 | XA-V-1910-45-94 | 1 | Cross shaft | 58 | XB-04112 | 1 | Self-tapping screw |
| 31 | XA-01765 | 1 | Single speed drive shaft | 59 | XB-04676 | 2 | Cushion pad |



GO THE DISTANCE.

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